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THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME XI

NEW YORK
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1926

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ā as in ale, fate.
ȧ " " senate, chaotic.
â " " glare, care, and as *e* in there.
ă " " am, at.
ä " " arm, father.
à " " ant, and final *a* in America, armada, etc.
a " " final, regal, pleasant.
ą " " all, fall.
ē " " eve.
ė " " elate, evade.
ĕ " " end, pet.
ę " " fern, her, and as *i* in sir, etc.
e " " agency, judgment.
ī " " ice, quiet.
i̇ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
ȯ " " obey, sobriety.
ô " " orb, nor.
ŏ " " odd, forest, not.
o " " atom, carol.
oi " " oil, boil.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse.
ū " " use, mule.
u̇ " " unite.
ŭ " " cut, but.
u̯ " " full, put, or as *oo* in foot, book.
û " " urn, burn.
y " " yet, yield.
B " " Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese.
D " " Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g " " go, get.
G " " German Landtag = *ch* in Ger. ach, etc.
H " *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw " *wh* in which.
K " *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̲ " in sinker, longer.
ng " " sing, long.
N " " French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz''m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

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HAWAIIAN ISLANDS.
Mr. William Churchill; Professor Alvin Saunders Johnson; Mr. Allen Leon Churchill.
HAWTHORNE.
Professor William Peterfield Trent.
Professor John Erskine.
HAY.
Dr. Alfred Charles True.
Dr. Edwin West Allen.
HAYES.
Dr. Newton D. Mereness.
HEALTH, BOARDS OF.
Dr. David Gilbert Yates.
HEART.
Dr. Albert Warren Ferris.
Dr. David Gilbert Yates.
HEART, DISEASES OF.
Dr. David Gilbert Yates.
HEAT.
Professor Joseph Sweetman Ames.
HEATING AND VENTILATION.
Mr. Moses Nelson Baker.
Professor Rolla C. Carpenter.
HEAT STROKE.
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HEAVEN.
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Professor Irving F. Wood.
HEBBEL, FRIEDRICH.
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HEBREW MUSIC.
Professor Nathaniel Schmidt.
HEBREWS, EPISTLE TO THE.
Professor Melanchthon W. Jacobus.
Professor Nathaniel Schmidt.
HEGEL.
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HENRY IV, HOLY ROMAN EMPEROR.
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HENRY II OF ENGLAND.
Professor Dana C. Munro.
HENRY VIII OF ENGLAND.
Dr. Newton D. Mereness.
HENRY IV OF FRANCE.
Miss Grace Owen.
Professor J. Salwyn Schapiro.
HENRY, PATRICK.
Professor James Edward Winston.
HEPATICÆ.
Professor John Merle Coulter.
HERALDRY.
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HERCULES.
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HEREDITY.
Professor Frank R. Lillie.
Mr. C. William Beebe.
HERESY.
Professor Irving F. Wood.
HEROD.
Professor Melanchthon W. Jacobus.
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HERODOTUS.
Professor Paul Shorey.
Professor Charles Knapp.
HESIOD.
Professor Charles Knapp.
HESPERORNIS.
Mr. C. William Beebe.
HESSE.
Professor Robert M. Brown; Mr. Joseph J. Král; Mr. Irwin Scofield Guernsey.
HETEROSPORY.
Professor John Merle Coulter.
HIBERNATION.
Mr. C. William Beebe.
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Professor Christopher Johnston; Professor W. Max Müller; Dr. Oliver Samuel Tonks.
HIGHWAY.
Professor George W. Kirchwey.
HIMALAYA.
Professor Robert M. Brown.
HINDUISM.
Mr. Frank Vexler.
Professor A. V. W. Jackson.
HIPPOPOTAMUS.
Mr. C. William Beebe.
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Dr. Albert Warren Ferris; Professor John Merle Coulter; Dr. David Gilbert Yates.
HISTORY.
Dr. Newton D. Mereness.
HITTITES.
Professor Nathaniel Schmidt.
HOCKEY.
Mr. George Gladden.
HOG.
Dr. Edwin West Allen.
HOHENLOHE.
Professor J. Salwyn Schapiro.
Mr. Irwin Scofield Guernsey.
HOLBEIN, HANS, THE ELDER.
Dr. George Kriehn.
HOLBEIN, HANS, THE YOUNGER.
Dr. George Kriehn.
HOLIDAYS.
Dr. Marcus Benjamin.
HOLOTHURIAN.
Mr. C. William Beebe.
HOLY ROMAN EMPIRE.
Professor Dana C. Munro.
HOLY SEPULCHRE.
Professor Edward E. Nourse.
HOME ECONOMICS.
Dr. Charles Ford Langworthy.
HOMER.
Professor Paul Shorey.
Professor Charles Knapp.
HOME RULE.
Dr. George Elliot Howard.
Professor J. Salwyn Schapiro.
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HONDURAS.
Professor Roscoe R. Hill.
HONGKONG.
Mr. Edward Lathrop Engle.
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Professor Charles Knapp.

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Mr. C. William Beebe.

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Dr. George Kriehn.

ILLUMINATION.
Mr. Reginald Gordon.

ILLUSION.
Professor Edward Bradford Titchener.

ILLUSTRATION.
Mr. William W. Bishop.
Mr. Russell Sturgis.*

* Deceased.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

HAWAII, Blue Laws of. See Blue Laws.

HAWAIIAN (hä-wī′an) **ISLANDS, or HAWAII,** hä-wī′ē (formerly Sandwich Islands; politically, the Territory of Hawaii). A chain of islands in the Pacific Ocean, belonging to the United States, forming geographically and ethnologically the extreme northeastern group of Polynesia. They are situated between latitudes 18° 54′ and 22° 15′ N., and between longitudes 154° 50′ and 160° 30′ W., about 2200 miles southwest of San Francisco, and 4893 miles from Hongkong. The chain consists of eight inhabited and several small uninhabited islands, arranged nearly all in single file extending for about 400 miles from southeast to northwest. The inhabited islands with their areas are, beginning at the southeast: Hawaii, 4015 square miles; Maui, 728; Kahulaui, 69; Molokai, 261; Lanai, 135; Oahu, 600; Kauai, 544; and Niihau, 97. Total area, 6449 square miles.

Topography and Geology. The islands are of purely volcanic origin, being really the summits of enormous volcanic cones raised from the bottom of the ocean, which falls rapidly to a depth of 18,000 feet not far from the shores. The islands are all mountainous, but only one, Hawaii, is actively volcanic, having two of the largest craters in the world, Mauna Loa and Kilauea (qq.v.). Hawaii is the most recent in order of formation; it is much less eroded than the others, and though it contains the highest peak of the group—Mauna Kea (q.v.), 13,805 feet—its elevations are all rounded and easily ascended. The other islands, especially Kauai, which is considered the oldest, are deeply eroded into picturesque crags and deep ravines and gorges. The coasts are to a large extent steep and rocky, consisting in some places of precipices 100 to 500 feet high and extending for several miles. There are some sandy beaches, however, and in many places the coasts are lined with coral reefs; between the mountains and the coasts extend fertile plains and valleys, which are the scene of agricultural activity.

Climate and Hydrography. The climate is in general characterized by a remarkable equability of temperature; it is never too warm and never cold, except on the mountain summits, and even within the narrow limits there are no sudden changes. This is due to the fact that there are neither large ice fields nor hot continental deserts within thousands of miles, and the winds which reach the islands have to pass over a broad expanse of water of a uniform and moderately warm temperature. The average temperatures of the lowlands of Hawaii are 70° F. for January and 78° F. for July, and the extreme maximum and minimum temperatures recorded are, respectively, 89° F. and 54° F. On the mountain peaks, of course, frosts occur, and snow sometimes remains throughout the year. The mean temperature is about 10 degrees cooler than in any other land in the same latitude. The winds show the same equability; the prevailing winds for 10 months in the year are the northeast trades. Alternate diurnal land and sea breezes occur, especially on the southwest coasts and around Hilo Bay on the northeast coast of Hawaii; warm southwest gales are also common in winter. Storms are rare, and hurricanes unknown. With respect to humidity and rainfall, however, the climate is extremely varied, each narrow locality having its own peculiar climate, depending on its position with regard to the winds and mountains. Most of the rain is brought by the northeast trade winds and, owing to the great elevation of the islands, it is almost all precipitated on the northeast sides, which have accordingly the most varied vegetation, while the leeward or southwest sides are much drier and, especially in Hawaii Island, almost arid. Just above Hilo Bay, where the cold winds from the mountains meet the warm and moist trade winds, there is an annual rainfall of 100 to 200, and even 250, inches, one of the heaviest in the world; but at Honolulu the rainfall is only about 32 inches a year. Though the sky is as a rule clear and sunny when it is not actually raining, the humidity is considerable, turning to almost oppressive sultriness during the period of winter southwest winds. In general, the climate is very healthful and agreeable to Europeans, but is not ideal for cases of pulmonary tuberculosis.

The rivers of Hawaii are nearly all small mountain torrents, and, as might be foreseen from the foregoing, they are largely confined to the north and east sides of the island.

Flora and Fauna. The indigenous flora and fauna of Hawaii are interesting, as they partake of the characters both of the Asiatic and Australian, as well as of the American, flora. There are about 130 species of ferns and 900 species of flowering plants, of which 600 are peculiar to the

islands. Some of the characteristic plants are a peculiar Pandanus, or screw pine, several tree ferns, and among the forest trees the Koa (*Acacia koa*). Forests still cover large areas of the uplands, but have greatly decreased. Where vegetation is found it generally grows luxuriantly, but large areas, especially in Hawaii, are covered with naked lava fields.

There are very few indigenous mammals in Hawaii, and no reptiles, except a single species of lizard. The birds are interesting, including many peculiar and highly specialized species, notably in the family Drepanididæ, which differ characteristically from those of the rest of Polynesia. The land mollusks have also reached a remarkable development, almost every valley having its own peculiar species, some of which are allied to those of Mexico and California.

Agriculture. Of the twenty islands composing the Hawaiian group, only eight—Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, Niihau, and Kahulaui—are inhabited. The most important islands—Hawaii, Maui, and Oahu—contain large areas of fertile land. The climatic conditions on these three islands are favorable for agricultural activity. Up to the middle of the nineteenth century land was held by feudal tenure. In 1848, however, a division was made by which about one-third of the inhabited area was set apart for the crown, another third for the government, and the remaining third for the powerful chiefs. The common people were given titles for the house lots which they held and for small pieces of land which they cultivated for themselves. The chiefs gradually lost possession of the land awarded to them and it fell to a large extent into the hands of foreigners. When, in 1893, the monarchy ceased to exist, the lands belonging to the crown were declared to be public lands, and, with other government lands, became the property of the United States government when the islands were annexed in 1898. In 1910 Congress passed measures amending the organic act of the Territory and providing for the consolidation of the administration of public lands in one department. It also made provision for the transfer of land for forestry or other public purposes.

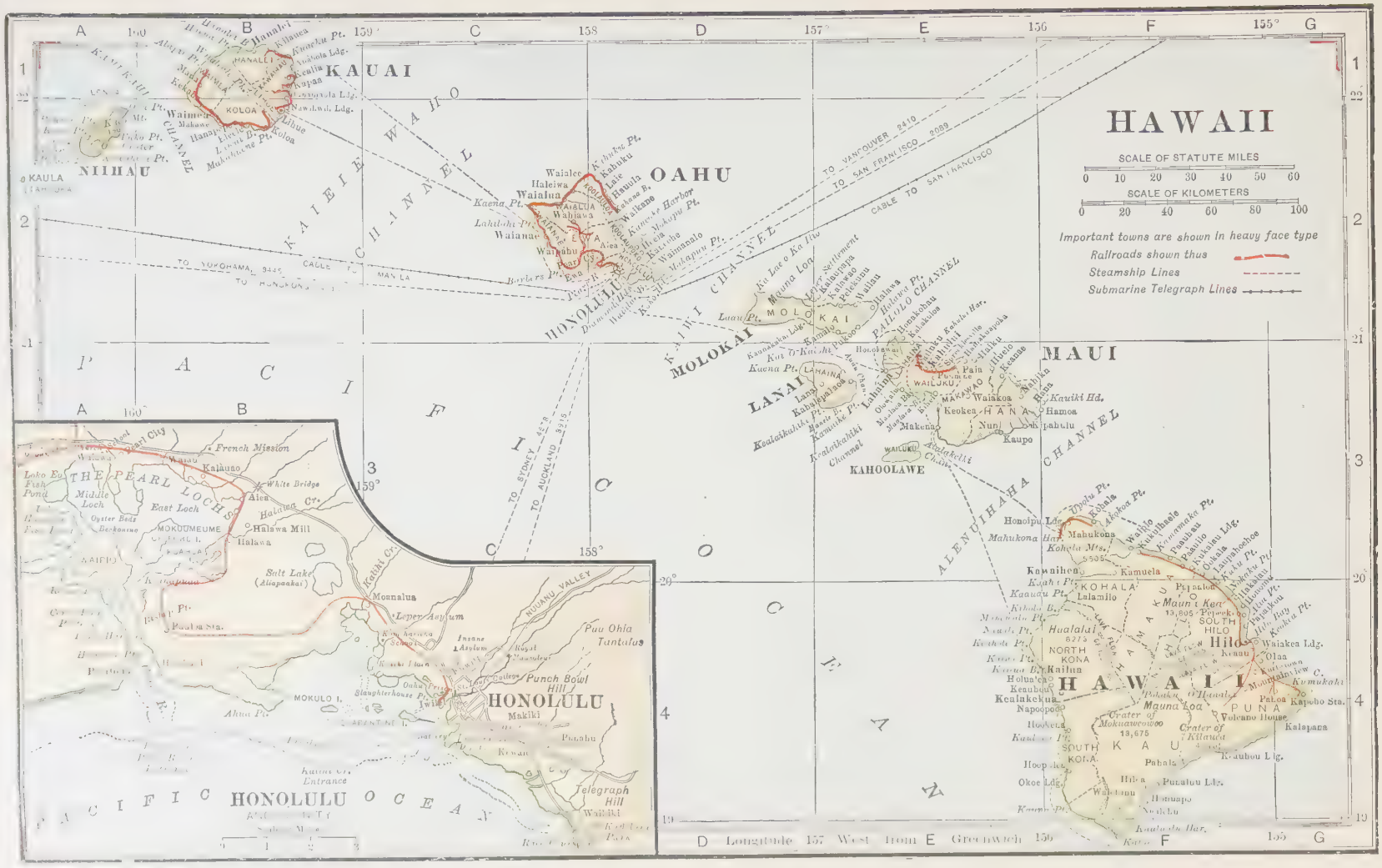
The chief industries of the islands are related to agriculture, but conditions have been such, owing to lack of knowledge of practical agriculture, distance from the world's markets, tariffs, and other causes, that only a few products have been produced on a sufficient scale to export in considerable quantities. In recent years, however, scientific study has been made by the United States Department of Agriculture, and marked progress in the knowledge of possible crops and methods of cultivation has resulted. This is especially true of the sugar industry, in which scientific cultivation has resulted in enormous crops.

Between 1900 and 1910 the population of the islands increased by 37,908, or 24.6 per cent, while the number of farms increased by 2047, or 90.1 per cent. The total number of farms in 1910 was 4320, while in 1900 there were 2273. Out of an approximate area which includes both land and water area of 4,127,360 acres, there were in farms, in 1910, 2,590,600 acres, compared with 2,609,613 acres in 1900—a decrease in acreage in the decade of 19,013. The improved land in farms, however, increased from 294,545 in 1900 to 305,053 acres in 1910. The average acres per farm decreased from 1148.1 in 1900 to 599.7 in 1910, and the average improved acres per farm decreased from 129.6 in 1900 to 70.6 in 1910. The value of farm property, including land, buildings, implements and machinery, domestic animals, poultry and bees, increased from $74,084,988 in 1900 to $96,363,229 in 1910. The average value of land per acre was $30.16 in 1910, compared with $21.64 in 1900. In 1910 87.7 per cent of all the farms were under 50 acres in size.

Of the 4320 farms in 1910, 753 were operated by white farmers, 463 by Hawaiian, 2138 by Japanese, 876 by Chinese, 83 by other Asiatics, and 7 by negroes. The white farmers showed an increase in the decade of 47.9 per cent, while Hawaiian farmers decreased. The number of Japanese farmers increased 302.6 per cent in the decade. In 1910, 834 farmers out of a total of 4320 owned farms; 129 were part owners; 214 were share tenants; 2894 were cash tenants; and 249 were managers. The proportion of owners and part owners showed a great falling off in the decade 1900–10, the former being in 1910 less than two-thirds and the latter less than one-half of the number shown in 1900.

The total value of crops in the islands in 1909 was $28,536,000. Of this total, over nine-tenths was contributed by sugar cane. The only other crop with a value of product of over $1,000,000 was rice; the fruits and nuts, vegetables, and the coffee produced in 1909 were each valued at over $200,000. No other crop had a value amounting to $100,000. The acreage of sugar cane in 1909 was 186,230 and the number of farms growing sugar cane was 1028, compared with 184 in 1899. The production of cane in 1909 was 4,240,000 tons, compared with 2,239,000 in 1899. The value of the sugar crop was $26,306,000, compared with $18,763,000 in 1899. The production and value of sugar since 1909 has been as follows: 1910, 518,127 short tons; 1911, 566,821 short tons; 1912, 595,258 short tons; 1913, 543,220 short tons, and this was valued at about $37,000,000. The yield of cane sugar per acre is the greatest in the world. About half the acreage planted to cane is irrigated. The development of the sugar industry on a large scale dates from 1875, when the Reciprocity Treaty, passed in that year, established practically free trade between the islands and the United States. The greater number of sugar farms are on the islands of Hawaii, Oahu, Maui, and Kauai, at the bases of mountains. Rice is the second crop in value. It is consumed chiefly on the islands and is raised on the lowlands, chiefly by Chinese, in terraces flooded with water. There is little additional land available for this crop, but there is much room for improvement in the method of cultivation. Some improvements have been made chiefly as the result of the work of the Federal experiment station. The acreage planted to rice in 1909 was 9425 and the amount produced was 41,827,900 pounds, valued at $1,068,293. The yield is about 2½ tons per acre per annum (two crops). A small quantity of rice is exported to the United States. This in 1913 amounted to 3,529,667 pounds, valued at $185,938.

The growing of coffee was at one time carried on to a large extent in the islands. Its cultivation began as early as 1817 and was at one time conducted largely by Americans. Owing to competition with other countries and the consequent lowering of prices, coffee growing has now fallen largely into the hands of the Japanese. The out-


HAWAII
SCALE OF STATUTE MILES
0 10 20 30 40 50 60
SCALE OF KILOMETERS
0 20 40 60 80 100
Important towns are shown in heavy face type
Railroads shown thus
Steamship Lines
Submarine Telegraph Lines
KAUAI
NIIHAU
OAHU
MOLOKAI
LANAI
MAUI
KAHOOLAWE
HAWAII
KAIEIE WAHO CHANNEL
KAIWI CHANNEL
PAILOLO CHANNEL
ALENUIHAHA CHANNEL
PACIFIC OCEAN
HONOLULU
THE PEARL LOCHS
Middle Loch
East Loch
MOKUMEUME
Halawa Mill
Salt Lake (Aliapaakai)
Kalihi Cr.
Mounalua
Leper Asylum
Insane Asylum
Royal Mausoleum
Punch Bowl Hill
Makiki
Punahu
Telegraph Hill
Waikiki
Kewalo
Entrance
Paau Ohia Tantalus
NUUANU VALLEY
French Mission
Kaihuno
White Bridge
Aiea
Halawa
MOKULO I.
Ahua Pt.
Pauoa Sta.
Oahu College
Slaughterhouse Pt.
Kaimuki
Kapiolani Park
Diamond Hd.
Waialae
Haleiwa
Waialua
Kaena Pt.
Lahaina Pt.
Waianae
Waianae Mts.
Waimanalo
Makapuu Pt.
Kaena Pt.
Barbers Pt.
Ewa
Waipio
Waiawa
Aiea
Halawa
Waikane Harbor
Kaneohe Bay
Kaneohe
Kahaluu
Kualoa Pt.
Mokapu Pt.
Kaiwi Pt.
Koko Hd.
Koko Crater
Hanauma Bay
Waialae
Kahala
Kaimuki
Kapiolani Park
Diamond Hd.
Honolulu Har.
Kewalo
Punahu
Makiki
Punchbowl Hill
Telegraph Hill
Waikiki

put varies from year to year and is never large. In 1909, 3727 acres were planted to coffee, and the product was 9,834,026 pounds, valued at $213,085. It is almost entirely consumed in the islands.

The growing of pineapples has become of great and increasing importance, and a new product of this industry is the preparation of the juice of pineapples put up in bottles. This product has found a ready sale in the United States. The output of canned pineapples increased from 1200 cases of two dozen cans each in 1900 to 510,000 cases in 1909. In 1910 there were invested in the industry more than $2,000,000, and about 6000 acres were under cultivation. In 1913 the canned pineapple exported to the United States was valued at $4,054,711. The tobacco and cotton industries are being developed and give promise of being important. Some of the tobacco is of a high grade, especially for wrappers. In 1912 there were four plantations under tobacco, and the output in that year was 104,000 pounds, valued at $49,500. During the same year a cigar factory was established and the manufacture of cigars was begun. The principal varieties of cotton grown are the Sea Island, Caravonica, and Egyptian. The production has been small, in 1909 amounting to only 5500 pounds. In addition to pineapples other fruits are grown. The most important of these are bananas, papaya, limes, oranges, and breadfruit. The total value of the fruits exported to the United States in the calendar year 1913 was $4,268,020. Grapes and orchard fruits are produced in small quantities. One of the most promising of the newer industries is the growing of Bermuda onions. A superior quality of sisal hemp is produced, and rubber trees have been planted with some success.

Live Stock and Dairy Products. The live-stock industry is important, but most of the meat is consumed in the Territory. In recent years there has been a reduction in the number of cattle, but a corresponding increase in weight and a reduction in the maturing age from about four years to about three years or less. On account of disease and the overstocking of ranges the number of sheep has also fallen off. The Oriental population consumes large quantities of pork. The quality of the live stock has been greatly improved by the importation of fine breeds. The total value of the milk, cream, and butter sold in 1909 was $215,481. The poultry of all kinds in 1910 numbered 95,667.

Forest Reserves. The United States Government has set aside a considerable area of public land for forest reserves. There were, in 1913, 30 reserves covering 689,261 acres. With the addition of reserves covering a little over 100,000 acres the forest-reserve system of the Territory will be practically completed. Tree planting is conducted on a large scale. In the calendar year 1912, 1,303,698 trees were planted, compared with 1,134,940 for the preceding year.

Irrigation. A large proportion of the sugar farms require irrigation to produce satisfactory results. Water is obtained by pumping from artificial wells and by conducting surface water through tunnels and ditches.

Mineral Resources. There are no large deposits of important minerals. It is not to be anticipated that useful mineral products will ever be of great importance relatively in the Hawaiian Islands, as they are limited both in kind and in quantity. Although the actual number of mineral species is quite large and corresponds to those of similar volcanic areas, the greater number of them are merely mineralogical specimens, rather than available for commercial purposes. It must not be understood, however, that the mineral wealth of Hawaii is wholly insignificant. On the contrary, there is an apparent field for considerable development. Among the minerals noticed are sulphur, pyrite, common salt, sal ammoniac, limonite, quartz, chrysolite, garnet, labradorite, feldspar, soda alum, copperas, Glauber salt, nitre, and calcite. The Hawaiian volcanoes have been natural laboratories, working on an almost unprecedented scale, with a strong decomposing agency of acid steam, high temperature, rainfall, and perhaps sea infiltration, so that secondary decomposition products are numerous and common. Many of the minerals identified have no economic significance, while others occur too sparsely to be properly utilized. As in other volcanic localities and island resorts much frequented by travelers and health seekers, there is a considerable trade in specimens and curiosities of the two extreme types of products, the volcanic and the marine. These consist of minerals and fantastic lava formations from the craters and coral and shells from the shores and sea.

Sulphur is found in large quantities in the craters and upper slopes of the volcanoes. Very large deposits of gypsum, some of it almost pure, exist in the islands. Mineral paints, especially red ochre and yellow ochre, are abundant. There is an abundance of building stone in the islands, but the climatic conditions and mode of life do not call for large stone construction. Large pockets of kaolin have been found, and it is believed that there are workable quantities of this mineral in the islands. An industry of local importance is the gathering of sea salt from accumulations formed by the natural concentration and evaporation of sea water. Pearls have been found, but a productive industry of commercial importance remains to be established.

Manufactures. Manufacturing industries which have not been called into being by the agricultural products of the islands exist for the production or repair of articles of local consumption. In 1909 there were 500 manufacturing establishments, which gave employment to an average of 7572 persons during the year and paid out $2,795,000 in salaries and wages. Of the persons employed, 5904 were wage earners. The products turned out by these establishments were valued at $47,404,000, and materials costing $25,629,000 were consumed. Thus, the value added by manufacture was $21,775,000, which represents the net wealth created by manufacturing operations during the year. The table on page 4 gives the most important data relating to the manufacturing industries of the Territory in 1909 in comparison with 1899. (The industrial census of 1904 did not include the Hawaiian Islands.)

From this table it will be noted that the industries of Hawaii as a whole showed a marked development during the decade. This was due in part to the impetus given to manufacturing industries by annexation to the United States. During this period the number of establishments increased 125.2 per cent and the average number of wage earners increased 61.5 per cent, while the value of products increased 103 per cent and the value added by manufacture 96.1

per cent. It will be noted that the manufacture of sugar is by far the most important industry. Cane sugar alone is produced, although experiments in growing sugar beets indicate that this industry may secure a foothold. Although the sugar industry greatly preponderates, it also exerts a powerful effect on other industries. Exclusive of sugar, the value of the manufactures increased from $4,099,000 in 1899 to $11,454,000 in 1909, or 179.4 per cent. Nearly all the sugar manufactured is exported to the United States. The cleaning and polishing of rice is the industry second in importance. With the exception of some of the larger mills in and near Honolulu, this industry is carried on by

As noted below, the wage earners in all the industries of the Territory numbered 5904. Of these, 5401 were males and 503 females. The wage earners under 16 years of age numbered 62.

Honolulu is the only large city in the island, and, in 1909, 22.6 per cent of the total value of products was made in that city and 41.2 per cent of the average number of wage earners were employed there. From 1899 to 1909 there was a more rapid increase in Honolulu than in the districts outside. The relatively large number of establishments in Honolulu is due, however, to the fact that in this city are found many of the poi shops, bakeries, tin shops, and less important industries.

COMPARATIVE SUMMARY FOR 1909 AND 1899

THE TERRITORY — ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	Wage earners (average number)	Primary horse power	Wages	Value of products	Value added by manufacture
					Expressed in thousands		
All industries	1909	500	5,904	41,930	$2,109	$47,404	$21,775
	1899	222	3,655	19,590	1,473	23,354	11,103
Boot and shoe shops	1909	14	81	4	17	126	48
	1899	14	39	.....	11	47	27
Bread and other bakery products	1909	46	107	38	36	344	124
	1899	8	4	.....	1	10	5
Carriages and wagons and materials	1909	17	68	25	33	116	66
	1899	7	51	37	33	106	56
Coffee and spice, roasting and grinding	1909	4	28	33	4	50	14
	1899	4	17	29	4	38	12
Coffee, cleaning and polishing	1909	5	71	237	12	297	46
	1899	6	47	140	9	95	35
Copper, tin, and sheet-iron products	1909	12	80	18	33	304	133
	1899	12	36	.....	22	91	53
Food preparations	1909	87	172	41	36	341	146
	1899	27	82	28	17	62	37
Ice, manufactured	1909	5	40	271	24	107	86
	1899	4	19	204	12	57	41
Lumber and timber products	1909	8	254	805	110	281	184
	1899	3	35	205	22	91	49
Mineral and soda waters	1909	22	83	114	35	194	120
	1899	7	35	10	11	89	64
Printing and publishing	1909	37	319	117	147	435	337
	1899	10	132	55	22	200	167
Rice, cleaning and polishing	1909	74	138	1,428	36	2,239	638
	1899	41	173	609	49	664	182
Saddlery and harness	1909	6	14	.....	6	49	21
	1899	7	21	.....	16	78	31
Sugar	1909	46	2,517	36,426	781	35,950	17,408
	1899	44	2,369	17,774	748	19,255	9,477
All other industries	1909	117	1,932	2,373	799	6,571	2,404
	1899	28	595	499	496	2,471	867

Chinese and Japanese. Practically all rice milled in the islands is consumed locally, being in great demand among the Chinese and Japanese, who constitute about one-half of the population. As noted in the paragraph on *Agriculture*, the canning and preserving of pineapples has become an industry of great importance in recent years. Since 1895, when this industry was first known, it has shown a steady growth. It was not important enough, however, in 1899 to be shown separately in the census figures.

Transportation. The Territory is peculiarly dependent for its progress upon the development of transportation facilities. It is isolated in the mid-Pacific and is subdivided into a number of islands that are both mountainous and possess comparatively few good natural harbors. Transportation includes interisland traffic, traffic between the Territory and the United States and Mexico, and transpacific traffic, making Hawaii a point of call. Interisland traffic is conducted chiefly by the Interisland Navigation Company,

which has a fleet of about 20 steamers. During 1913 this company carried 84,493 passengers and approximately 429,134 tons of freight. In 1913–14 the company constructed a modern pontoon floating dry dock.

Traffic is carried on extensively between Hawaii and the Atlantic and Pacific coasts of the United States and Mexico. The bulk of the traffic with the Atlantic coast is carried by the American-Hawaiian Steamship Company, which entered the Hawaiian trade in 1901 and has grown rapidly. The bulk of the trade with the Pacific coast is handled by the Matson Navigation Company and has also developed rapidly. The Oceanic Steamship Company in 1913 operated one passenger and one freight steamer between Honolulu and San Francisco on a four-week schedule. The Associated Oil Company operated several steamers and sailing vessels from Hawaii to the Pacific coast. In addition to this service there are several steamship lines whose vessels call regularly at Honolulu on their voyages between San Francisco and the Philippines. These include the Pacific Mail Steamship Company, the Toyo Kisen Kaisha, a Japanese company, and the Canadian-Australian Royal Mail Line.

The most important steam railroad in the islands is a line on the island of Oahu. It had in 1913 about 113 miles of road, extends along the coast from Honolulu to the north end of the island, and has a branch with subbranches between the two ranges of mountains which constitute this island. It connects with more than 100 miles of private railroads on sugar plantations. On the island of Hawaii, the Hilo Railroad Company operates the principal road. This is the only standard-gauge road in the Territory and its line is about 90 miles in length. The only street railway in the Territory is in Honolulu and is an unusually well-equipped and well-conducted line.

For several years the United States government has been making extensive improvements in the harbors, notably at Pearl Harbor, which now constitutes a naval station. Here a dry dock was in process of construction in 1913. When the proposed improvements are completed it will be one of the most important naval stations in possession of the government. The harbor of Honolulu, although the main port of the Territory, is small and requires constant enlargement. The Federal government since the annexation of the islands has carried on improvements here. A breakwater was in process of construction on the island of Hawaii at Hilo in 1912, and other harbor improvements in the Territory were under construction in 1913.

The Territory has been connected by cable with both shores of the Pacific for many years. Hawaii was one of the first countries to install the wireless system, and in 1914 several services of this nature were in extensive use for interisland communication. Wireless communication with California has also been carried on successfully, and on the island of Oahu are two powerful stations used by the Marconi Telegraph Company for its transpacific wireless service. Each of the five largest islands has an extensive telephone system. There were, in 1913, 6488 telephone stations and 5714 miles of wire.

Commerce. Imports and exports for the fiscal year ending June 30, 1913, exclusive of specie, aggregated $80,991,456. This was a decrease of $4,446,120 from the amount in the preceding fiscal year. The decrease was entirely in exports to continental United States, and was due to low prices and a shortage in the sugar crop on account of drought. This more than offset the large increases in imports both from continental United States and from foreign countries and in exports to foreign countries. The imports amounted to $36,002,940, an increase of $7,308,618 over those of the preceding year. Those from continental United States amounted to $29,129,409, an increase of $6,033,531, and those from foreign countries amounted to $6,873,531, an increase of $1,275,087. From 1907 to 1913 the imports from continental United States more than doubled. The exports in the fiscal year 1913 amounted to $43,471,940, a decrease of $11,977,498. Those to continental United States amounted to $42,713,294, a decrease of $12,362,871, while those to foreign countries amounted to $758,646, an increase of $385,373. The imports from the United States for the fiscal year ending June 30, 1914, amounted to $25,571,569. Of these the most important were manufactures ready for consumption, which amounted in value to $15,552,992. The other imports of most importance were chiefly foodstuffs. The exports to the United States for the fiscal year ending June 30, 1914, amounted to $40,628,200. Of this, sugar, raw and refined, was valued at $33,187,920. Fruits and nuts were valued at $4,780,583; canned pineapples, $4,536,919. The exports of Hawaii to foreign countries in the fiscal year 1914 amounted to $902,985, and the imports from foreign countries amounted to $6,282,558. The largest value of imports was from Japan, $2,516,463; from British India, $950,304; from Germany, $696,197; from Chile, $332,310; from Australia and Tasmania, $569,287. The largest value of exports was to the Philippine Islands, $517,978.

Finance. The net receipts for the fiscal year 1913 amounted to $4,247,701, and the net disbursements to $4,208,389. The net receipts exceeded the net disbursements by $39,311. The net cash balance at the close of the year was $660,720, compared with $621,409 at the close of the fiscal year 1912. The principal receipts are from property taxes and land sales and harbor, wharf, and pilot revenues. The most important disbursements are for interest on the bonded debt, general expenses, the support of Territorial institutions, government, and the maintenance of public health. The bonded debt of the Territory at the beginning of the fiscal year was $5,454,000, which was increased during the year by the issue of $1,500,000 of 4 per cent public-improvement bonds, and decreased by a payment of $110,000, leaving the total bonded indebtedness at the end of the year $6,844,000. This was 3.9 per cent of the assessed value of property. The limit of the aggregate indebtedness is fixed by the organic act as 7 per cent of such assessed value, and the limit of the amount that may be incurred in any one year was fixed at 1 per cent. The bonds issued have been for public improvements, public-school buildings, improvements on roads, etc.

Population and Immigration. The population of the islands is extremely heterogeneous and has changed greatly in character as a result of the immigration of different races. There is no definite knowledge as to the population in early times. In 1778 Captain Cook placed the number at 400,000, but this is considered gener-

ally to be about a fourth too large. The native population has decreased rapidly from the time of the first acquaintance of Europeans with the islands. While the cause of this decline has never been fully understood, prominent among the reasons is the introduction of foreign diseases to which natives are peculiarly susceptible. The birth rate of the islands is also small. These conditions indicate that the practical extinction of the race is only a matter of time. While the Hawaiians have been indisposed to intermingle freely with other races, there is a small number of "part Hawaiians." Marriages between the natives and Chinese are quite common, but the Japanese have shown an aversion to mixed marriages. The population of the islands at each census from 1832 to 1910 inclusive has been as follows: 1832, 130,313; 1836, 108,579; 1850, 84,165; 1853, 73,138; 1860, 69,800; 1866, 62,959; 1872, 56,897; 1878, 57,985; 1884, 80,578; 1890, 89,990; 1896, 109,020; 1900, 154,001; 1910, 191,909. The population on June 30, 1913, was estimated at 217,744, an increase of 25,835, or 13.46 per cent, since 1910. The large increase in the population in recent years is the result of the immigration of foreign laborers. In 1910 the pure Caucasian element in the population numbered 44,048, constituting 23 per cent, or a little over one-fifth. In the decade 1900–10 the number of Caucasians increased 15,229, or 52.8 per cent, the percentage of increase for this race being practically the same as in the preceding decade. The increase of the Japanese in the decade 1900–10 was 18,564, or 30.4 per cent. In the same period the Chinese decreased 4093, or 15.9 per cent. The following table shows the distribution of the population in 1900 and 1910.

	1900	1910
Hawaiians	29,787	26,041
Part Hawaiians	7,848	12,506
Caucasians	26,252	44,050 *
Chinese	25,762	21,674
Japanese	61,115	79,674
All others	3,237	7,964
Total	154,001	191,909

* Includes 22,303 Portuguese, 1990 Spanish, and 4890 Porto Ricans.

The only races which showed a decrease in the three years from 1910 to 1913 are the pure Hawaiians through an excess of deaths, and the Chinese through the excess of departures. The largest increase during these three years was in the number of Filipinos, they having been introduced by the Hawaiian Sugar Planters' Association; the Spanish, introduced by the Territorial government; other Caucasians, chiefly Americans, who came in large numbers, many of them in the military forces of the United States; and part Hawaiians, Portuguese, and Japanese, mainly through an excess of births. The Territory in 1913 introduced 2413 Spanish and 228 Portuguese. There were also introduced 65 Russians. From 1907 to 1913 the Territorial authorities introduced 7695 Spanish, 5196 Portuguese, and 2121 Russians, a total of 15,012, of whom 5399 were men, 3644 women, and 5969 children. Early attempts were made in the history of the industrial development of the islands to introduce Polynesians, but these did not result satisfactorily. Since the acquisition of the islands by the United States, the laws for the exclusion of Chinese laborers have been in effect, and this source of labor has been closed. The large influx of Japanese labor was also ended by the agreement between the governments of the United States and Japan, made in 1906, as a result of agitation over Japanese labor in California. The Japanese government agreed to permit the emigration only of laborers having passports. In recent years the sugar planters have to a large extent substituted Filipinos for Japanese and Chinese labor. During 1913 there were introduced 5747 Filipinos, and from 1909 to 1913, 13,715 Filipinos. The percentage of non-Asiatic labor employed on the sugar plantations increased from 12.30 from the organization of the Territorial government to 37.15 in 1913.

Immigration is divided into two classes, unassisted and assisted. The assisted immigration includes that induced to come to the Territory by the Department of Immigration and Labor and by the Hawaiian Sugar Planters' Association. Unassisted immigration includes that of Americans from the mainland of the United States. The problem of securing labor in the islands is a serious one, and efforts have been made as noted above to obtain laborers from European countries, especially from Portugal and Spain, from Russia, Manchuria, and Siberia. During the five years ending 1912, 5306 laborers from these countries were induced to come to Hawaii. During 1912, however, the introduction of Russians from Manchuria was discontinued.

The population of the several islands in 1910 was as follows: Oahu, 81,993; Hawaii, 55,382; 1920, 255,912; Maui, 28,623; Kauai, 23,744; Molokai, 1791; Lanai, 131; Niihau, 208; Kahulaui,2.

Banks. There were, in 1913, 17 banks in operation in the Territory. One of these was a savings bank, two were commercial banks, and the others both commercial and savings. There were four national banks. The aggregate deposits on Dec. 31, 1912, amounted to $17,026,297. The commercial deposits amounted to $11,641,901, and the savings deposits to $5,384,395. The deposits in the savings banks numbered 18,787, which is nearly 10 per cent of the population, the Japanese having the largest percentage of the population depositing in savings banks, 41.52.

Ethnology. The indigenous inhabitants of the Hawaiian Islands are, in physique, good representatives of the Polynesian race, rather tall, and often quite good-looking. In head form they have a tendency towards brachycephaly. In language the Hawaiians are most nearly related to the Marquesans and Tahitians. The narratives of settlement of Polynesian folk upon these northern islands are ample proof of three migration streams. The earliest was that of a fleet of proto-Samoans direct from Samoa. This was succeeded by a Tongafiti migration by way of the Marquesas. The last migration, that which established the social system of the Hawaiians as existing when they were discovered, was from Tahiti; this was not merely a wandering, but intercourse between Tahiti and Hawaii was maintained for several generations. In mental ability and artistic genius the Hawaiians rank high among their kindred, as their advanced governmental institutions, their assimilation of foreign culture, their industrial and artistic manufactures (kapa printing, straw plaiting, feather

weaving, etc.), and their development of a literature amply demonstrate. It was upon one of the peculiarities of the Hawaiian family system, the *punulua*, best comprehended as a survival of polyandry, that Morgan (1871–77) based his second stage in his scale of evolution of the family, the "*punuluan* family." From the older culture the *Kahuna* beliefs, the *hulahula* dances, etc., have survived.

Religion. With a population representing so many races, there is naturally a variety of religions. The great activity of the early missionaries succeeded in bringing the native population within the fold of the Christian Church. However, the Christian faith is ofttimes lightly held, and their old-time pagan practices are sometimes secretly indulged in. The native Protestant following is nearly twice that of the Roman Catholic, the Mormons among them numbering about 4000. The Portuguese are mainly Roman Catholic, but most of the other European and American elements represented are Protestant. The Chinese and Japanese hold generally to their Oriental faith.

Education. Schools were established in Hawaii as one of the earliest results of missionary effort. The first constitution, adopted in 1840, provided for schools in districts wherever 15 or more children suitable to attend school lived close together. Enactments have been made in recent years which have greatly increased the efficiency of the administration of schools, particularly by the Legislature of 1911. Universal education is free and compulsory. Every child between the ages of 6 and 17 is obliged to attend either a public or a private school. The general character of the educational system has continued to be American as a result of foundations laid by American missionaries. As a result of legislation passed in 1911, the public schools were placed largely on an automatic adequate financial basis. During 1913 there was expended for the maintenance of public schools $677,799, compared with $630,334 during 1912 and $479,351 in 1911. Of the expenditure in 1913, $634,434 was contributed by the Territory out of current revenues. Of this $569,334 was for teachers' salaries and $46,319 for other expenses, including school supplies, furniture, books for school libraries, etc. The cost and maintenance of the public schools was $26.44 per pupil in 1913, as compared with $26.53 in 1912. The Legislature of 1911 provided for new buildings, chiefly out of loan funds, while that of 1913 provided for other buildings, chiefly out of current revenues.

The number of all schools in the islands in 1913 was 212. Of these 161 were public schools and 51 were private schools. The teachers in all schools numbered 986, and public schools 674. Of the teachers, 238 were males and 748 females. There is a normal school at Honolulu, and in 1907 the Legislature established a College of Agriculture and Mechanic Arts at Honolulu. In 1913 permanent quarters for this college were completed. There is a high school in Honolulu and a seminary on the island of Maui. There is also an industrial school at Waialee on the island of Oahu, which was founded in 1902. Oahu College, founded in 1852, offers advanced courses of study. It is well equipped with buildings and apparatus and has a considerable endowment

Charities and Corrections. The correctional institutions of the Territory include the prison at Honolulu, two reform schools, to which boys and girls respectively are committed by the juvenile courts, and the local jails. In 1913 plans were completed for new buildings for the prison. For a discussion of the care and aid given to lepers, see the section *Public Health and Sanitation.*

Public Health and Sanitation. The matter of public health in the Territory is of peculiar importance and has called for more attention than almost any other on the part of the government in recent years. The powers of the Board of Health have been greatly extended by the Legislature. Most of the work is done through the Territorial Department of Public Health, but more or less is done also by the local governments. There is close coöperation between the Territorial health officers and those of the United States Public Health Service. The most important institutions are those having to do with leprosy. New methods have been adopted in dealing with this disease in recent years. There were in 1913 four institutions—the leper settlement on the island of Molokai and the leper hospital and the homes for nonleprous boys and girls respectively of leprous parents at Honolulu. At the close of 1913 there were 726 lepers in the islands. Of these 444 were males and 282 females; 606 were Hawaiians and part Hawaiians, 47 Portuguese, 38 Chinese, 13 Japanese, 5 Germans, 3 Americans, and 14 scattered among other races. For a further discussion of this disease in its connection with Hawaii, see LEPROSY. The natives of the islands are peculiarly susceptible to tuberculosis, and the campaign against this disease has been carried on with success, particularly on the islands of Oahu and Hawaii.

War has been waged against rats as a result of bubonic plague. From 1910 to 1913 no case of this plague occurred in Honolulu, but, owing to the prevalence of this disease in the Orient, it is necessary to take preventive measures. During 1913 there were seven cases of bubonic plague in Hamakua and one in south Hilo. In these districts in the year mentioned 137,581 rats and mongooses were killed, of which 20 were found to be infected with plague.

Government. The form of government is territorial and is carried on by the provisions of an Act of Congress passed in 1900. This Act organized the islands into a Territory of the United States. There is a Territorial Representative in Congress.

Executive.—The executive power of the Territory is lodged in a governor, holding office for four years, who is appointed by the President. He must be at least 35 years of age and be a citizen of the Territory. The other executive officer is the Secretary, who is also appointed by the President for the same term as the Governor. With the consent of the Senate the Governor appoints an attorney-general, treasurer, commissioner of public lands, commissioner of agriculture and forestry, superintendent of public instruction, superintendent of public works, auditor, a high sheriff, and members of the various boards and commissions which carry on the routine of the government.

Legislative.—The Legislature consists of the Senate and House of Representatives. The Senate is composed of 15 members and the House of 30. There are four senatorial districts, in which two, three, four, and six Senators respectively are elected, viz., seven at one biennial election and eight at the next; and six repre-

sentative districts, in each three of which four Representatives are elected, and in each of the other three of which six Representatives are elected. The Senators hold office for four years and the Representatives for two.

Judiciary.—The Territorial courts comprise a supreme court of 3 members, 5 circuit courts, of which one has 3 members, who sit separately, and the others 1 member each, and 29 district courts. The supreme and circuit court judges are appointed by the President, and the district judges by the Chief Justice of the Territorial Supreme Court. The circuit courts are the courts of general, original jurisdiction. They try law, equity, probate, and divorce cases. The first circuit court acts also as a court of land registration. The circuit and district courts act also as juvenile courts, the principal juvenile court being presided over by one of the judges of the first circuit court. Entirely distinct from these Territorial courts there is a United States district court, with the jurisdiction also of a United States circuit court. This court has two district judges.

Suffrage and Elections.—An Australian ballot act and a corrupt-practices act were passed early in the history of the Territory. The Legislature of 1911 substituted permanent registration for a special registration of voters. In 1913 the Legislature passed measures prohibiting corporations from contributing funds directly or indirectly for political purposes, and in the same year a direct-primary law was enacted. This is somewhat similar to the Berkeley system of double elections. Any candidate who receives the votes of a majority of the registered voters at the first election is declared elected, and no second election is held during office. If no candidate receives such majority, the party candidates who receive the largest votes of their respective parties and the nonpartisan candidates who receive the votes of at least 20 per cent of the registered voters are the candidates for the second election.

City and County Government.—Local governments in Hawaii were established on July 1, 1905, when the Territory was divided into four counties, one of which, that comprising the island of Oahu, was converted, on Jan. 21, 1909, into a city and county, to be known as the city and county of Honolulu. There is nominally a fifth county, the small one comprising the leper settlement. This, however, is governed by a board of health. Local government has steadily developed since its beginning.

History. Peopled probably from the Polynesian Islands, the Hawaiian Islands when first known to white men had passed through the first stages of savagery and were progressing towards civilization. The particular stage which it had reached was that of feudalism. Instead of a heterogeneous collection of tribes there were in the eighteenth century as many kings as there were inhabited islands in the group, and in the island of Hawaii there were at least two kings. The people held the land which they tilled in tenancy to a class of middlemen, or gentry, who served subordinate chiefs, who were themselves under the control of the dukes or high lords, who owed allegiance to the king. The land was held in military tenure. Society was highly organized into orders, religious and social, with a system of checks, by means of laws and ceremonies. The whole tendency of political movement was towards centralization.

The first white men in Hawaii were the survivors of the crews of two Spanish vessels which were wrecked on the islands as early, possibly, as 1527. They intermarried with the natives, and their descendants, recognized by their Caucasian characteristics in complexion and features, are known to this day at Kekea. Gaetano in 1555 made a landfall here, but it was reserved for Capt. James Cook (q.v.), while on his third voyage in the Pacific, to find this group in 1778. After returning from Bering Strait, to pass the winter in Hawaii, he came into conflict with the natives and in a quarrel lost his life. His estimate of the population at 400,000, though an undoubted exaggeration, shows that the group was densely inhabited. Cook named the group Sandwich Islands, after John Montagu, the fourth Earl of Sandwich (1718–92). In 1790 Kamehameha, one of the kings of the main island, started to bring the whole group of islands under his sway; but with ordinary weapons it is uncertain whether he could have succeeded. Aided by firearms derived from the American whalers and by the construction of a navy (the natives having learned shipbuilding from Vancouver), Kamehameha succeeded in consolidating the group of islands under his rule. He confiscated all the land and declared it to be his estate and let it out again on terms of direct personal fealty to him. At the beginning of the nineteenth century the fur trade on the Pacific coast received a tremendous impulse as a result of the epoch-making expedition of Lewis and Clark. Spending the winter in the Sandwich Islands, the American shipmen dressed their furs and bought the sandalwood then so abundant in the islands.

This trade in sandalwood enriched the chiefs and kings, but especially Kamehameha, who thus secured the sinews of war by sending his people all over the island to cut and transport the fragrant wood, which he traded for vessels, arms, ammunition, and military stores. He died May 8, 1819, and his oldest son, Liholiho, succeeded him, under the title of Kamehameha II, though the real power behind the throne was an "empress dowager," the widow of Kamehameha I. Under the old religious system of taboo (q.v.), which represented conservatism, a class of men corresponding to the "literati" of other lands existed who were more or less hostile to change and especially to centralization. The new King, advised by his Premier, the widow of Kamehameha I, abolished by decree the hoary system of taboo. This bold reform met with organized resistance, and in the appeal to arms a bloody battle was fought. The conservatives were overthrown, and the iconoclasts went through the islands smashing and burning the idols, or tossing them into the sea. Thus the Hawaiians were a people without a religion. At this juncture of affairs Christian missionaries from the United States arrived. More than 10 years before, native Hawaiians, serving as sailors on American ships, had stirred the generous impulses of New England, and one of the first missionary companies sent out by the American Board of Commissioners for Foreign Missions, seven married men with their wives, reached Honolulu April 4, 1820. The King and his Queen made a voyage to England in 1823 and died there in 1824. This event put fresh power into the hands of the widow of Kamehameha I, who governed the kingdom for nine years, until the younger brother of the deceased King reached his majority and reigned as

Kamehameha III. The Ten Commandments were adopted as a basis of laws in 1825, and other criminal laws were enacted in 1827 and 1829. In 1840 the King and his nobles promulgated a constitution granting civil rights to the people. In 1848 he abolished the last relics of feudalism by approving the Land Act, which yielded up the crownlands and provided for the people becoming owners of the soil. Captain Paulet, a British naval officer, in 1843 demanded that Hawaii declare her allegiance to Great Britain, which was done. But in a few months the independence of Hawaii was recognized by England as well as by all other nations. In 1848 an epidemic of measles broke out and in the next few years carried off approximately a tenth of the people. Throughout the first half of the century a force for evil was the group of dissolute ship deserters who encouraged debauchery and licentiousness, and who opposed the efforts of the missionaries and the better class of whites to improve conditions. In 1852 the constitution was revised by the King, and the Legislature and universal suffrage were established. Dying on Dec. 15, 1854, Kamehameha III was succeeded by Alexander Liholiho, son of Kinau, the daughter of the founder of the dynasty. This prince assumed the title of Kamehameha IV. After reigning nine years, honored because of his perseverance in the principles of civilization, he died Nov. 30, 1863, and was succeeded by his brother Lot, as Kamehameha V. During his reign Honolulu became a beautiful modern city, and business and commerce prospered greatly. Nevertheless the new ruler was a reactionary. He forcibly abrogated the national constitution and issued another, in which the right of suffrage was limited by a property qualification. When he died, Dec. 11, 1872, without issue, the direct line of Kamehameha became extinct. After four weeks' government by the cabinet, the Legislature elected the nominee of the people, Lunalilo, as king. He attempted in vain to restore the old constitution. His short and troubled reign of one year ended Feb. 3, 1874.

Lunalilo died childless, and the Legislature again proceeded to elect a king, and on Feb. 12, 1874, chose David Kalakaua, though their action was violently opposed by Emma, the Queen Dowager. In the riot which broke out between her partisans and the legislators several persons were injured. The warships in the harbor under the British and American flags landed marines and sailors, order was restored, and the King began his reign. Kalakaua visited the United States in 1874, and in 1875 a reciprocity treaty was arranged between that country and Hawaii. This was renewed in 1887. The King made a tour of the world in 1881. Kalakaua sought to govern personally and was wasteful in his expenditures, was personally corrupt, and stirred up religious bitterness. The patience of the better elements of society being exhausted, the party of progress at a mass meeting held June 30, 1887, demanded from the King a new constitution and better government, with a cabinet under the control of the Legislature. Although Kalakaua agreed to the demand and signed a new constitution, which was ratified by the vote of the people, he lost no opportunity to regain his power. In this course he was encouraged by his sister, the Princess Liliuokalani. On the King's attempting in 1889 to overthrow the new government, the progressive party reorganized, and a skirmish occurred in which the royal partisans were defeated. On Jan. 20, 1891, Kalakaua died in San Francisco. His sister, Liliuokalani, became Queen. Her reign was marked by continual evasions and nullification of the constitution and attempts to secure absolute power. The Queen granted opium and lottery monopolies. The men of the progressive party, consisting chiefly of Americans and the better elements among the foreigners and natives, were fully acquainted with her determination to promulgate a new political instrument which would enhance the royal power; but just when she was about to bring her plans to consummation they dethroned the Queen and organized a provisional government. The Committee of Thirteen, Jan. 15, 1893, passed a resolution "that it is the sense of this committee that, in view of the present unsatisfactory state of affairs, the proper course to pursue is to abolish the monarchy and apply for annexation to the United States." The Queen's ministers appealed for help to the foreign legations, while the leading citizens of the town were openly and publicly preparing to abolish the Queen's government by force of arms. The United States Legation was in close touch with the best element both of the Americans and of the native Hawaiians. Realizing the great significance of the revolution and the importance of the interests of his country, that were involved, the United States Minister, John L. Stevens (q.v.), had a force of 140 sailors and marines landed from the U.S.S. *Boston*, for the protection of American interests, and at once recognized the provisional government on behalf of his own. Commissioners were sent to the United States to negotiate a treaty of annexation, while Minister Stevens, believing that this small state was not safe from aggression, on his own responsibility declared Hawaii under the protection of the United States, Feb. 16, 1893. President Harrison submitted to Congress a treaty of annexation, but upon the accession of President Cleveland the treaty was withdrawn, the Minister's action disavowed, and a special commissioner, Mr. Blount, was sent to the islands to report upon the situation. The commissioner's report represented that the action of Mr. Stevens had been unwarranted, and that it was the landing of the United States seamen that made the success of the revolution possible. The disposition of the United States government appearing to be favorable to the deposed Queen, negotiations were entered upon for her restoration; but her refusal to grant a general amnesty made it impossible to support her pretensions. Thrown upon its own resources, Hawaii was proclaimed a republic July 4, 1894, and duly organized, with Sanford B. Dole as President, and a Legislature of two chambers. In 1895 a monarchist revolt broke out, which was easily suppressed, and Queen Liliuokalani formally abdicated. The political excitement that had made the annexation question a disturbing one in the United States having subsided, and the Republican party being again in power, the government of Hawaii, then firmly established, renewed negotiations for annexation in 1898.

In accordance with a resolution of Congress, passed July 7, 1898, the Hawaiian Islands were formally annexed Aug. 12, 1898. By the Act of Congress of April 30, 1900, all persons who, on Aug. 12, 1898, were citizens of the Republic of Hawaii were declared to be citizens of the United States and of the Territory of Hawaii. On June 14, 1900, Hawaii was organized as a

Territory, with ex-President Dole as the Territorial Governor.

The political history of the Hawaiian Islands from their creation into a Territory of the United States has been singularly uneventful, in decided contrast with the troubled conditions which prevailed previous to that time. The chief problem has been in connection with immigration and labor. This is discussed fully in the paragraph *Immigration and Labor* above. Mr. Dole continued to serve as Governor until 1904, when he was succeeded by George R. Carter, who served until 1907. In February, 1909, the United States government decided to establish a large military station at Hawaii and make it second only to the Department of the Philippines in importance. On May 27, 1910, President Taft approved an Act passed by Congress which in many important essentials amended the organic act of the Territory. It provided for increases in the salaries of a number of the executive and judicial officers and of members of the Legislature; it settled doubts as to the applicability of various Federal laws to Hawaii by providing that such laws, which purport to relate to all Territories, shall not apply to Hawaii, the provisions of its organic act being deemed sufficient; it settled doubts also as to the powers of the Legislature with reference to appropriations and also to the validity of numerous naturalization laws made by the circuit courts; it improved in several respects the law relating to the disqualification of judges; it authorized the restoration to the Territory of land set aside but no longer needed for Federal purposes. The principal features of the act, however, were the provisions making changes in the land laws. (See *Agriculture*, above.) In 1912 the contract for the dredging of the Pearl Harbor Channel was completed, and the harbor was entered for the first time by a large war vessel, the *California*, the flagship of the Pacific fleet. The Legislature of 1913 enacted measures providing for direct primaries and elections, the merit system in certain services, the prohibition of political contributions by corporations, separate county and Territorial elections, county elections at large instead of by districts, shortening the ballot, and further adjustment of the relations between the Territorial and local governments and the development of the latter. The same Legislature provided for a public-utilities commission with extensive power over public utilities of all kinds. In July, 1913, L. E. Pinkham was appointed Governor of the Territory to succeed W. F. Frear, who had served from 1907. The rulers of the monarchy and the chief officials of the republic of the Territory have been as follows:

SOVEREIGNS

Kamehameha I	1795–1819
Kamehameha II	1819–1824
Kaahumanu (Regent)	1824–1832
Kamehameha III	1832–1854
Kamehameha IV	1855–1863
Kamehameha V	1863–1872
Lunalilo	1873–1874
Kalakaua	1874–1891
Liliuokalani	1891–1893

PRESIDENT

Sanford B. Dole	1893–1898

TERRITORIAL GOVERNORS

Sanford B. Dole	1898–1904
George R. Carter	1904–1907
W. F. Frear	1907–1913
L. E. Pinkham	1913–

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HAWARDEN, här'den. A market town in Flintshire, Wales, 8 miles southeast of Chester. Population of parish, 1901, 15,817; 1911, 20,571. Near by stands Hawarden Castle, long the residence of William Ewart Gladstone. The castle, built in 1752, stands near the ruins of an older one granted by William the Conqueror to his nephew, Hugh of Avranches, called by the Welsh "The Wolf." After many vicissitudes it became the property of Cromwell's Lord Chief Justice, Sergeant Glynne, from whom it descended to Mrs. Gladstone. St. Deniol's Library and Hostel, established by Gladstone in 1896, is housed in magnificent Gothic buildings, erected in 1902 as part of the national memorial to that statesman. Consult Morley and Friederichs, "In William Gladstone's Village," in *Strand Magazine*, vol. xvi (London, 1898).

HAWEIS, hā'is, HUGH REGINALD (1838–1901). An English clergyman and author. He was born at Egham, Surrey; graduated at Trinity College, Cambridge, in 1859; served under Garibaldi at the siege of Capua in 1860; and, after several other curacies, in 1866 became curate of St. James's Church, Marylebone, London. Indefatigable in his efforts to educate the masses, he strongly advocated the opening of libraries, galleries, and museums on Sundays. He often lectured at the Royal Institution and was a Lowell Institute lecturer in Boston in 1885. He was the Anglican delegate to the Chicago Parliament of Religions in 1893 and for the next two years continued a successful lecture and preaching tour around the world. He was

for some time editor of *Cassell's Magazine*. His numerous published works include: *Music and Morals* (1871); *American Humorists* (1883); *Christ and Christianity* (5 vols., 1886–87); *The Broad Church* (1891); *Travel and Talk* (2 vols., 1897); *Old Violins* (1898).

HAWEIS, Mary Eliza (Joy) (?–1898). An English author, artist, and philanthropist, daughter of the genre painter T. M. Joy, born in London. She married the Rev. H. R. Haweis, was a member of the Society of Authors and of the Society of Woman Journalists, vice president of the Maternity Society and of the Central National Society for Women's Suffrage, and superintendent of the Mercy Branch of the British Woman's Christian Temperance Union. She exhibited at the Royal Academy, the Dudley Gallery, and the British Institution, and was a successful illustrator. Among her publications are *Chaucer for Schools* (1900) and a novel, *A Flame of Fire* (1897).

HAWES, hąz, Stephen (?–1523). An English poet. He was born probably in Suffolk and was educated at Oxford. He traveled on the Continent and became a groom in the household of Henry VII. His rare minor poems are of interest chiefly to bibliophiles. But his *Passetyme of Pleasure, or the Historie of Graunde Amoure and la Bel Pucel* (printed by Wynkyn de Worde in 1509) occupies an important place in the history of English poetry. It is a long allegorical poem, written in seven-line stanzas, divided into 46 chapters. It describes the education and career of a perfect knight specifically, but in its secondary sense is an allegory of the life of man. Hawes is a Chaucerian, and Spenser possibly drew some slight aid from this dry allegorist in framing his *Faerie Queene*. Reprints of sixteenth-century editions of the *Passetyme of Pleasure* have been made by Southey in *English Poets* (London, 1831) and by Wright (Percy Society, ib., 1845).

HAWESVILLE, hąz'vil. A city and the county seat of Hancock Co., Ky., 84 miles west by south of Louisville, on the Ohio River, and on the Louisville, Henderson, and St. Louis Railroad (Map: Kentucky, D 4). It is in a coal-mining and lumbering district and manufactures tobacco, hubs, etc. Pop., 1900, 1041; 1910, 1002.

HAW'FINCH (from *haw*, hedge + *finch*). A large European finch, or grosbeak (*Coccothraustes coccothraustes*), considerably larger than the chaffinch. The adult male has the crown and back chestnut brown, the neck and rump gray, the wings partly black, the larger wing coverts white. The hawfinch exists numerously over the whole Palearctic Province and is only partly migratory, but is a very shy bird, avoiding man, and not much is known of its habits. It frequents orchards and hedgerows, seeking for berries and fruit, and gets its name from its supposed partiality for hawthorn berries. It nests in hedgerows and in forest trees.

HAWICK, hą'ik. A manufacturing town and ancient burgh or barony in Roxburghshire, Scotland, at the junction of the Teviot and Slitrig, 50 miles southeast of Edinburgh (Map: Scotland, F 4). It has important hosiery and tweed mills, dye works, and tanneries. Its grain and stock market is one of the most important in the south of Scotland. Its antiquities have almost disappeared; the most important is the Moathill, an earthen work 30 feet high and 312 in circumference. Its oldest church, dating from 1214, was rebuilt in 1763. It has fine modern residences, a handsome town hall, a splendid water supply, and a complete system of drainage. Its municipal charter was granted in 1537. Pop., 1901, 17,303; 1911, 16,877.

HAWK (AS. *heafoc, hafuc*, Icel. *haukr*, OHG. *habuh, habih*, Ger. *Habicht*, hawk, from AS. *hebban*, Goth. *hafjan*, OHG. *heffan*, Ger. *heben*, Eng. *heave;* connected with Lat. *capere*, to seize, Alb. *kap*, I seize). A term popularly meaning any bird of prey not an owl nor vulture. In a more restricted sense the word designates a section of the family, the Accipitrinæ, reckoned by falconers among the ignoble birds of prey. They have wings so short as not to extend to the extremity of the tail, and the bill short and curving from the base. In many of their characters and habits, however, they make a very near approach to the true falcons. In this sense the term would exclude eagles, buzzards, harriers, kites, and the like. In fact, however, the scientific use is hardly more exact than the popular, and descriptions of the various birds so called will be found under Falcon, and under the names of groups or species, as Buzzard; Hen Hawk; Marsh Hawk; Pigeon Hawk; and so on. (See also Plate of Eagles and Hawks.) It should also be noted, however, that in some instances the name is entirely misapplied, ornithologically speaking, to birds whose shape or actions suggest those of a falcon. Examples of this are "man-of-war hawk" (the frigate bird) and "nighthawk" (q.v.), or "mosquito hawk" (a nightjar).

HAWK-BILLED PARROT. A large and remarkable parrot (*Deroptypus accipitrinus*) of the Amazon and Orinoco valleys, related to the Amazon group (*Chrysotis*), and especially characterized by an erectile collar or ruff around the back of the neck. This ruff, the breast, and abdomen are dark red, each feather with a blue edge; the head is brown; the shoulder and inside of both wings and tail are black, while the plumage of the back wings and tail above are green. It frequents palm trees, utters a cry of piercing shrillness, and erects its ruff when angry or excited with a most threatening effect. It is said to become an admirable pet, as it is easily tamed, is very hardy, agile, and graceful in its movements, and is nearly as good a talker as the gray parrot. Consult Greene, *Parrots in Captivity* (London, 1884).

HAWKE, Edward, Baron (1705–81). An English admiral. He was born in London. He entered the navy in 1720 and served on the North American and West Indian stations until 1725, when he returned to England and passed his examinations. After serving several years on various foreign stations, he came into prominence in the naval engagement at Toulon in 1744, when he broke from the line of battle in order to engage the Spanish ship *Poder* and succeeded in compelling her to strike her colors. In 1747 he was promoted rear admiral of the white. In October of the same year he captured six out of a squadron of nine French men-of-war convoying a fleet of merchant vessels bound for the West Indies, and was created Knight Commander of the Bath. In December of the same year he was chosen member of Parliament for Bristol. In May, 1748, he became vice admiral of the blue. In 1756 he succeeded Admiral Byng as commander of the fleet in the Mediterranean. In 1759 he took charge of a squadron sent to cruise off Brest and to intercept a French fleet preparing for an invasion of England. On

the morning of November 20 he sighted the French fleet under Admiral Conflans, off Belle-Isle, and notwithstanding that the French, trusting to their knowledge of the rocks and shallows, retired towards the shore, he engaged them with such impetuosity that more than half of their vessels were either disabled, captured, or driven on shore. For this victory, gained with the loss of only two vessels, Hawke received the thanks of the House of Commons and a pension of £2000 per annum. In 1765 he was appointed vice admiral of Great Britain, and from 1766 to 1771 he was First Lord of the Admiralty. In 1776 he was raised to the peerage, with the title of Baron Hawke of Towton. He died at Sunbury, Oct. 16, 1781. Consult: Burrows, *Life of Edward Lord Hawke* (London, 1883); Fremantle's "Hawke," in *From Howard to Nelson*, edited by Laughton (London, 1899); Mahan, *Types of Naval Officers* (Boston, 1901).

HAWK EAGLE. A convenient term for a group of large birds of prey of the Old World which combine characteristics of both eagles and hawks and in most cases are crested. The best known of these is Bonelli's hawk eagle (*Nisaëtus fasciatus*), which ranges from Spain (where it is a common resident on the rock of Gibraltar) to the Far East, where it is one of the largest and most prominent birds of prey. In India it is numerous and conspicuous, both in the high mountains and in the lowland jungles, and is one of the large hawks called peacock killers. The booted eagle (*Nisaëtus pennatus*) of the Mediterranean region, noted for its shrill scream, and the beautiful great crested eagle of Africa (*Spizaëtus bellicosus*) are other representatives of the group, in which some authors include the crested eagle hawks of tropical America.

HAWKE BAY. An inlet on the east coast of North Island, New Zealand, which gives its name to a provincial district, and a county between Auckland and Wellington, surrounded by one of the two valuable tracts of the island (Map: New Zealand, North I., C 6). The bay was named after Sir Edward Hawke, First Lord of the British Admiralty, when Captain Cook on Oct. 8, 1769, entered it for the first time. Napier, the chief city and port of the district, is on the bay. European settlement dates from 1848.

HAW'KER. See PEDDLER.

HAWKER, ROBERT STEPHEN (1803–75). A Cornish poet and antiquary, born at Stoke Damerel, Devonshire. He was educated at Pembroke College, Oxford (where he won the Newdigate prize in 1827 by a poem on Pompeii), was ordained in 1831, and went as vicar to Morwenstow, Cornwall, in 1834. Afterward the neighboring parish of Wellcombe was added to the living. Hawker did much for the people in his poor parish during his 40 years as priest among them, especially for the seafaring men. Towards the end of his life he became a Roman Catholic and in his last hours was received into that church. Mortimer Collins pictures Hawker as Canon Tremaine in his novel *Sweet and Twenty*. His works include: *Records of the Western Shore* (1832; 2d series, 1836); *Ecclesia* (1840–41); *Reeds Shaken by the Wind* (1843); *Second Cluster* (1844); *Echoes from Old Cornwall* (1846–47); *The Quest of the Sangraal* (1864); *Cornish Ballads and Other Poems* (1869 and 1884). His collected poetical works appeared in 1879, with a notice by J. C. Godwin. He also wrote *Footprints of Former Men in Far Cornwall* (1870). His most celebrated poem, *And Shall Trelawny Die*, first published anonymously, was believed, even by such men as Scott and Dickens, to be an old ballad. Consult: Lee, *Memorials of the Late Rev. R. S. Hawker* (London, 1876); Gould, *The Vicar of Morwenstow* (ib., 1876); C. E. Byles, *Life and Letters of R. S. Hawker* (New York, 1905). There is an excellent critical study of Hawker in P. E. More's *Shelburne Essays* (4th series, New York, 1906).

HAWKES'BURY. A river of New South Wales, Australia. It rises in the Blue Mountains and flows northeast parallel with the coast until it passes Windsor, where it turns to the southeast and enters the Pacific at Broken Bay, 20 miles north of Sydney (Map: New South Wales, F 3). Its length is about 330 miles, and it is navigable for ships of 100 tons to Windsor, about 50 miles from its mouth. It is crossed by a steel railway bridge, 2900 feet long. The Hawkesbury is remarkable for its inundations; in 1844 the waters rose 20 feet in a few hours, while earlier in its history the inundations disheartened the pioneers, who several times lost their homesteads and produce.

HAWKESBURY. A town in Prescott Co., Ontario, Canada, on the Grand Trunk and the Canadian Northern railroads, and on the Ottawa River, 55 miles west by north of Montreal (Map: Ontario, K 2). It has large lumber, pulp, and paper mills, and excellent communication by both rail and water. The town owns its water and sewerage systems. Pop., 1901, 4150; 1911, 4400.

HAWKES'WORTH, JOHN (c.1715–73). An English writer. Apprenticed to an attorney, his first steps in literature were in the footprints of Samuel Johnson, compiling parliamentary debates for the *Gentleman's Magazine* (1744), in which some of his poems were afterward published. Most of his essays appeared in the *Adventurer*, successor of the *Rambler*, which was very popular during the two years of its existence (1752–54), and of which Hawkesworth was editor and joint founder. Besides adapting old and writing such new plays as *Edgar and Emmeline* (1761), he wrote the words for an oratorio, *Zimri* (1760); an Oriental tale, *Almoran and Hamet* (2 vols., 1762); translated Fénelon's *Télémaque* (1768); prepared an edition of the *Works of Jonathan Swift* (6 vols., 1755), and, for the government, an unsatisfactory account (1733) of the voyages of Captain Cook and others in the southern seas. He was for some time intimate with Dr. Johnson, whose style he could imitate to perfection; and his portrait was painted four times by Sir Joshua Reynolds.

HAWK'EYE. One of the names by which Natty Bumppo is called in Cooper's Leatherstocking novels.

HAWKEYE STATE. Iowa. See STATES, POPULAR NAMES OF.

HAWK'ING. See under FALCONRY.

HAW'KINS, ANTHONY HOPE (1863–). An English novelist, known widely as "Anthony Hope." He was born in London and was educated at Marlborough and at Oxford, where he took honors in classics. He studied law, and was admitted to the bar in 1887, but gave up practice in 1894. In 1897 he visited the United States. His first book was *A Man of Mark* (1890), followed in quick succession by *Father Stafford* (1891); *Mr. Witt's Widow* (1892); *Sport Royal*, a collection of short stories (1893);

and *The Prisoner of Zenda* (1894; 60th ed., 1914). This last book, the scene of which is laid in an imaginary principality of South Germany, is a happy combination of romanticism and modernity. Its immense success induced other authors to write uncounted numbers of novels of the same type, but not of the same quality. To the same year belong the delightful and brilliant *Dolly Dialogues*, which have been many times reprinted. Other of his novels are: *The Chronicles of Count Antonio* (1895); *Comedies of Courtship* and *The Heart of Princess Osra* (both 1896); *Phroso* (1897); *Simon Dale* and *Rupert of Hentzau* (both 1898); *The King's Mirror* (1899); *Quisante* (1900); *The Intrusions of Peggy* (1902); *The Indiscretion of the Duchess* (1904); *Double Harness* (1904); *Sophy of Kravonia* (1906); *The Great Miss Dower* (1908); *Mrs. Maxon Protests* (1911).

HAWKINS, Benjamin Waterhouse (1807–89). An English animal sculptor and author, born in London. He lived at Knowsley, the seat of the Earl of Derby, for five years, where he studied animal sculpture. He was assistant superintendent of the International Exhibition of 1851, and in 1852 the Crystal Palace Company employed him to make restorations of extinct animals, in which he was an expert. In 1868 he lectured in New York City and other cities of the United States, where he afterward resided. He was employed by the Central Park commissioners of New York City in restoring the forms of extinct creatures, but later administrations rejected his work, much of which was destroyed. He wrote: *Elements of Form* (1842); *Comparative View of the Human and Animal Frame* (1860); *Atlas of Comparative Osteology* (1865), with Huxley; *Artistic Anatomy of Cattle and Sheep* (1867); *Artistic Anatomy of the Dog and Deer* (1876).

HAWKINS, Dexter Arnold (1825–86). An American lawyer, born in Camden, Me. He graduated at Bowdoin College in 1848, after which he divided his time between teaching, traveling, and studying law until 1854, when he began to practice in New York City. He lectured and wrote on various subjects, but especially on education, which engaged his chief interest. He was largely instrumental in securing the establishment of the National Bureau of Education, and his pamphlets did much to open the eyes of the people to abuses practiced under the educational laws of New York. His publications include: *Sectarian Appropriations of Public Money and Property* (1869); *Report on Compulsory Education* (1874); *The Duty of the State to Protect the Free Common Schools by Organic Law* (1871); *The Roman Catholic Church in New York City, and the Public Land and Public Money* (1880); *The Redemption of the Trade Dollar* (1886).

HAWKINS, Hamilton Smith (1834–1910). An American soldier, born in South Carolina. He graduated at the United States Military Academy in 1855 and in 1861 entered the army. In 1883 he attained the rank of major and in 1889 was promoted to be lieutenant colonel. In 1888 he became commandant at the United States Military Academy, in 1894 colonel, and in the same year commandant of the Fort Leavenworth school. During the Spanish-American War he commanded the division which took San Juan Hill in the second day's battle at Santiago. In 1898 he was promoted to be brigadier general and retired.

HAWKINS, or **HAWKYNS,** Sir John (1532–95). An English naval commander, the son of William Hawkins, a merchant and sea captain of Plymouth, who had made several voyages to America. He was born at Plymouth. He followed the sea from an early age, and by 1561 had made several voyages as far as the Canaries. In 1562, with influential backing, he sailed from England with three ships, secured a cargo of 300 negroes on the coast of Sierra Leone, and then crossed the Atlantic to the West Indies, where he forced the Spaniards to take slaves in exchange for hides, spices, sugar, and ginger. He himself returned to England, but sent two shiploads of merchandise to Spain, where they were seized and the cargoes confiscated. This loss did not deter him from fitting out another expedition on a larger scale in 1564, in which the Earl of Pembroke and Robert Dudley, later Earl of Leicester, were among his partners, and in which Queen Elizabeth herself was interested to the extent of lending him her ship *Jesus*. With four vessels he sailed to the African coast, where his cargoes of negroes were obtained only after hard fighting. After a show of arms at Burburata, Venezuela, and at Río de la Hacha, a "satisfactory trade was opened" and his negroes at length disposed of. Sailing northward, Hawkins relieved the French colony of Laudonnière, on St. John's River, Fla., leaving them provisions and a small ship, and thence sailed homeward. The voyage was exceedingly profitable for all the partners, and Hawkins was granted a coat of arms for his skill. The protests of the Spanish were so great at this threat to their trade monopoly that it was not until 1567 that the Queen would consent to let Hawkins undertake another voyage. Then, indeed, she showed her favor so far as again to lend him the *Jesus*, quite likely becoming thereby a partner in the enterprise. On October 2 the little fleet of six ships, one of which, the *Judith*, was commanded by Francis Drake (q.v.), a kinsman of Hawkins, set sail from Plymouth. Following the course of his previous voyages, Hawkins sailed first to Sierra Leone, where about 500 negroes were obtained, and where some Portuguese merchantmen were plundered and more than 70,000 pieces of gold secured from them. Again force had to be used before the Spanish in the West Indies would trade with them. A large part of his cargo was disposed of at Río de la Hacha, Cartagena, and other ports, and they had turned their prows towards home, when, according to Hawkins's account, a storm drove them into the harbor of San Juan de Lua (Vera Cruz) on the coast of Mexico. There, on September 17, a day after they had entered the port, they were beset by a Spanish fleet of 13 ships. After three days' negotiation a peaceful agreement was arrived at, and the Spanish fleet entered the harbor. The truce was short-lived, however, and on the 24th a conflict was precipitated. Hawkins defended his ships stubbornly, but the odds against him were overwhelming. The *Jesus* was disabled, and Hawkins transferred himself to the *Mission*, one of his smaller ships, in which he finally escaped to sea. The *Judith*, with Drake in command, was the only other English ship that got away from the harbor. After this disastrous voyage Hawkins remained in England for some years, was elected to Parliament in 1572, and in 1573 was made Treasurer and Comptroller of the Royal Navy. His practical

experience as a navigator enabled him to bring about a number of important improvements in the rigging and construction of the ships of the navy; and in spite of charges of dishonesty in contract work the navy was made more efficient than it had ever been before. In 1588 he took part as a rear admiral in the defeat of the Spanish Armada, personally commanding the *Victory*, and winning knighthood for his bravery in action. In 1595 he accompanied Sir Francis Drake in an unsuccessful expedition to the West Indies in search of Spanish treasure and died at sea off Porto Rico the 12th of November. He was one of the founders, with Drake, of the fund for disabled seamen known as "the chest at Chatham," and in 1592 built the Sir John Hawkyns Hospital at Chatham. Consult: Campbell, *Lives of the Admirals* (London, 1812–17); Southey, *Lives of the British Admirals* (ib., 1833–40); *The Hawkins's Voyages*, Hakluyt Society Publications (ib., 1877); Winsor, *Narrative and Critical History of America*, vol. iii (Boston, 1884); Adams, *English Heroes in the Reign of Elizabeth* (Edinburgh, 1902); G. A. R. Callender, *Sea Kings of Britain* (3 vols., New York, 1907); Walling, *A Sea-Dog of Devon* (ib., 1907).

HAWKINS, Sir John (1719–89). An English writer on music. He was born in London, became a lawyer, and devoted his leisure to his favorite study of music. His marriage to a wealthy woman in 1753 enabled him to indulge his passion for acquiring rare works of music, and he bought the collection formed by Dr. Pepusch, which he subsequently presented (1779) to the British Museum. On such materials he founded his celebrated work on the *General History of the Science and Practice of Music* (1776; republished 1853 and 1875), which, although badly written, contains much of historical value. In fact, Burney (q.v.), whose history is equally famous, did not scruple to avail himself of the material first collected by Hawkins.

HAWKINS, or **HAWKYNS,** Sir Richard (c.1562–1622). An English naval hero, only son of the more famous Sir John Hawkins (q.v.). He went to the West Indies for the first time in 1582 with an expedition commanded by his uncle, William Hawkins. In the fight against the Invincible Armada (1588) he commanded the Queen's ship *Swallow;* and in 1593 he set out with three vessels on a voyage around the world, for purposes of preying on the Spaniards and for exploration and discovery. An account of the early part of this voyage was written by himself many years afterward and is therefore not to be too greatly relied upon. He touched at various places on the east coast of South America, passed through the Straits of Magellan, and then sailed northward to Valparaiso, which he captured and plundered; but on June 18, 1594, almost exactly a year after he had left England, he was attacked in the Bay of San Mateo by two Spanish ships under the command of Don Beltran de Castro, a brother-in-law of the Viceroy. The English numbered only about 75 men at this time, while the Spaniards are said to have been at least 10 times as numerous. After three days of fighting Hawkins surrendered on condition that the prisoners' lives should be spared and that they should be sent back to England as soon as possible. In spite of this he was kept in Lima until 1597 and then sent to Spain, where he was imprisoned until 1602. When released, he returned to England, where he was knighted, elected a member of Parliament, and made vice admiral of Devon. In 1620–21 he was vice admiral under Sir Robert Mansell of the unsuccessful expedition against the pirates of Algiers. Consult Markham, *The Hawkins's Voyages* (London, 1878).

HAWKINSVILLE, hą'kĭnz-vĭl. A city and the county seat of Pulaski Co., Ga., 49 miles by rail south of Macon, on the Ocmulgee River, at the head of navigation, and on the Southern, the Hawkinsville and Florida Southern, the Hawkinsville and Western, and the Wrightsville and Tennille railroads (Map: Georgia, C 3). It is the centre of a region which ships agricultural produce, lumber, naval stores, and cotton, and has a cotton mill, cotton gins and compresses, cottonseed-oil mills, carriage and wagon shops, a hardwood mill, fertilizer factories, a brickyard, etc. The city owns its water works and electric-light plant. Pop., 1900, 1013; 1910, 3420.

HAWK MOTH. A moth of the family Sphingidæ. These moths have very stout bodies and long, narrow wings. The sucking tube is usually very long and when not in use is coiled spirally under the head. Most of the hawk moths are large, strong on the wing, and fly at dusk. The larger species are not infrequently called humming-bird moths, because while sipping nectar they have the same poised attitude of the body as the humming birds, maintained by a rapid wing movement. They are all beautiful moths, but in quiet hues—olive, gray, or brown being the prevailing colors, with a bit of yellow or pink in some species. The larvæ have given the name "sphinx" to the type genus of the family, because of the stiff, erect poise assumed by them when disturbed. Near the posterior end of the body a dorsal horn, tubercle, or knob is usually present. About 100 North American species have been described. The most common species are the tomato worm and the tobacco or "horn" worm (qq.v.). Consult Beutenmüller, "Descriptive Catalogue of the Sphingidæ Found within Fifty Miles of New York City," in *Bulletin of the American Museum of Natural History*, vol. vii (New York, 1898), and Rothschild and Jordan, *A Revision of the Sphingidæ* (Tring, Eng., 1903).

HAWK OWL. 1. A large and remarkable owl (*Surnia ulula*) of the subarctic region of both continents, occasionally seen in central Europe and the northern United States in mid-winter. It is about 16 inches long and mottled brown in color, the American specimens being darker, as a rule, than those of the Old World. There are no ear tufts, the top of the head seems flat, and the face very hawklike; it is also hawklike in its manner of flight and is often seen abroad in full daylight. It feeds upon birds and small mammals and always appears in large numbers when the lemmings become plentiful and take to migrating. It usually nests in the hollow of a broken tree top, and defends its five to eight white eggs or young with great courage. In Alaska it is not uncommon and destroys many ptarmigan. See Plate of Owls.

2. Any of the owls of the genus *Ninox*, or *Hieracoglaux*, inhabiting southeastern Asia and Australia and also Madagascar, often distinguished as "Oriental hawk owls." Their small heads, long tails, and hard plumage give them a very falconine appearance, and the Australian species (*Ninox*, or *Hieracoglaux*, *strenua*) reaches a length of 24 inches.

HAWKS, Francis Lister (1789–1866). An

American clergyman, born at Newbern, N. C. He graduated at the University of North Carolina (Chapel Hill) in 1815, studied law under Judge William Gaston, of Newbern, was admitted to the bar, and was elected from Newbern to the State Legislature. He studied theology under the direction of the Rev. W. M. Green (later Bishop of Mississippi); was ordained to the diaconate in 1827; in 1830 was elected professor of divinity in Washington College (now Trinity, Hartford, Conn.); and in 1831 was instituted rector of St. Stephen's Church, New York City; later in 1831 he was elected to the rectorship of St. Thomas's parish, New York, in which office he continued until 1843. He was appointed professor of ecclesiastical history in the General Theological Seminary in 1833 and in 1835 and in 1836 visited England for the purpose of making copies of documents pertaining to the early history of the Protestant Episcopal church in America. From the 18 large folio volumes of manuscripts he prepared two works—on Virginia (1836) and Maryland (1839) respectively. Because of criticism of these, he then withdrew from the undertaking. A school, St. Thomas Hall, established by him at Flushing, L. I., in 1839, became involved in financial embarrassments and failed in 1843. Upon the establishment of the University of Louisiana he was elected its first president. In 1849 he returned to New York as rector of the church of the Mediator, later merged with Calvary parish, the rectorship of which he assumed. In 1862, owing to difference of opinion between his parishioners and himself regarding the Civil War, he resigned, and until 1865 he was rector of Christ Church, Baltimore, Md. He became rector of the newly organized parish of the Holy Saviour in New York in 1865. He was a scholar of high attainment, particularly in ecclesiastical history, and an eloquent preacher. From 1855 to 1861 he served as president of the American Geographical Society. The long list of works written or edited by him further includes: *Commentary on the Constitutions and Canons of the Protestant Episcopal Church in the United States* (1841); *Egypt and its Monuments* (1849); *A History of North Carolina* (1857); *Narrative of Commodore Perry's Expedition, Compiled from Perry's Original Notes and Journal* (1856); and (with W. S. Perry) *Documentary History of the Protestant Episcopal Church in the United States of America* (vols. i and ii, 1863–64). Consult the sketch by Richardson (reprinted from the *American Quarterly Church Review* for April, 1867) in a memorial volume (New York, 1868); also the commemorative discourse by Morgan (ib., 1867).

HAWKS'BEE, Francis. The name of two English physicists. See Hauksbee.

HAWKSBILL TURTLE, or Caret. A large carnivorous sea turtle (*Chelonia,* or *Eretmochelys, imbricata*), so named on account of the shape of its bill, which is a formidable weapon. Its flesh is not good food, but its eggs are sweet. The species is valuable for the plates of its shell, which overlap each other, and furnish the tortoise shell of commerce. This turtle is common in tropical seas, especially the West Indies, the South Sea Islands, and in the Indian Ocean.

HAWKSHAW, hąk'shą, Sir John (1811–91). An English civil engineer, born in Yorkshire, England. After a common-school education in Leeds, he turned to the practical study of engineering, went to Ireland in 1831 to serve under Alexander Nimmo, and in 1832 engaged in mining engineering in Venezuela. He returned in 1834, was connected with various English and German railroads, canals, and docks, settling in London in 1850 as a consulting engineer. His subsequent professional work was concerned with many branches of engineering, in all of which he displayed intimate knowledge and sound judgment; and he was consulted regarding almost all the great engineering projects of his time in Europe. He constructed the Charing Cross, East London, and Cannon Street railroads; a tunnel under the Severn River; the Clifton Suspension Bridge, the Londonderry Bridge in Ireland, and the Nerbudda Bridge in India; and the Amsterdam Ship Canal. He was often the government commissioner in investigating sanitary and military matters and in 1863 was the engineer summoned to report finally upon the plans and site for the Suez Canal, then in course of construction and subject to much hostile criticism. He was at one time engineer of the original Channel Tunnel Company and believed in its feasibility as an engineering project. In 1873 he was knighted. He became a member of the Royal Society in 1855, was president of the Institute of Civil Engineers from 1862 to 1864, was made president of the British Association in 1875, and was an honorary member of the American Society of Civil Engineers. His published works include *Reminiscences of South America* (1838) and a large number of reports dealing with his varied professional labors.

HAWKS'LEY, Thomas (1807–93). An English civil engineer, born at Arnold, near Nottingham. He was educated at the Nottingham grammar school and in 1822 began an apprenticeship to an architect and surveyor named Stavely, who later took him into partnership. His first important engineering work was the development of an increased water supply for Nottingham in 1830. In 1852 he removed to London, where his fame and reputation grew rapidly, until he was recognized as the greatest authority on water-works engineering in England and one of the foremost engineers in that branch in the nineteenth century. At one time or another he was engaged in some capacity, either as a consulting or constructing engineer, by almost every large city in the United Kingdom. His greatest achievements were in connection with the Sheffield and Leicester water works and the planning and construction of the Vyrnwy Dam of the Liverpool water works. On the latter work he was for some time joint engineer with George F. Deacon. He resigned before the dam was completed, alleging that its stability was in question. The allegation was not supported by a subsequent investigation, and the dam has stood safely for several decades. He was president of the Institute of Civil Engineers for two years (1871–73), president of the Institution of Mechanical Engineers in 1876–77, and was elected a fellow of the Royal Society in 1878.

HAWKS'MOOR, Nicholas (1661–1736). An English architect, born in Nottinghamshire. At 18 years of age he entered the service of Sir Christopher Wren, under whose supervision he built several important structures. He became deputy surveyor at Chelsea Hospital (1682–90), clerk of the works of Greenwich Hospital in

1698, and deputy surveyor in 1705. He afterward was associated on more equal terms with his former master and with Sir John Vanbrugh. He assisted Wren in building St. Paul's Cathedral from 1675 to 1710, was associated with Sir John Vanbrugh at Castle Howard, Yorkshire, and also at Blenheim Palace, Oxfordshire. At Oxford he designed the library and the south quadrangle of Queen's College and also the north quadrangle (with the exception of the library) of All Souls' College. At the close of Queen Anne's reign Hawksmoor was appointed one of the surveyors for the building of 50 new churches and designed six of these, the best being that of St. Mary Woolnoth, with a very fine interior, and St. George's, Bloomsbury, noted for its portico. After the death of Wren, in 1723, Hawksmoor was appointed surveyor-general of Westminster Abbey and completed the two western towers after his former master's designs. He also drew designs for monuments and bridges. He was not remarkable for creative genius, his chief excellence being a mastery of details and construction; but, on the other hand, some of the buildings attributed to his more eminent associates are believed to have been designed by him.

HAWK'WEED' (*Hieracium*). A genus of plants of the family Compositæ. The species are annual or perennial, with leafless scapes or leafy stems, one-flowered, or many-flowered; the leaves, stems, and involucres in many species are hairy. The hawkweeds are very numerous, natives of the temperate and colder regions of the Northern Hemisphere, particularly abundant

ORANGE HAWKWEED.

in Europe. The flowers are generally yellow. The orange hawkweed (*Hieracium aurantiacum*), a perennial, 1 to 2 feet high, is a native of the south of Europe, often cultivated in gardens for its rich orange flowers. It has been introduced into Canada and the New England States, where it has become one of the most troublesome weeds in grasslands. Experiments conducted at the Vermont Experiment Station showed that it could be eradicated by salt sown at the rate of 300 pounds per acre. Every plant was killed, and the grass, a species of *Festuca*, was improved by the treatment. Plowing under and devoting the land to hoed crops will destroy it. There are a dozen or more species, native or introduced, in the eastern United States. *Hieracium venosum*, rattlesnake weed, or Robin's plantain, is a common species from Maine to Georgia and westward, occurring in dry woods and sandy places.

HAWK'WOOD, Sir John de (?–1394). An English soldier of fortune. He is reported to have fought with the Black Prince at Crécy and Poitiers and to have been knighted by Edward III; but by 1360 he was at the head of a body of freebooters, plundering Gascony and the northern parts of Italy. His thousand lancers, each with knight and page, came to be known as the White Company, and, joined to double their number of foot soldiers, armed with stout bows of yew, they spread terror throughout southern Europe, devastating villages, holding great noblemen for ransom, and exacting heavy toll from the clergy. After serving under the Marquis of Montferrat, the White Company went into the pay of the Pisan Republic, which was then engaged in a Florentine war. From that time onward Hawkwood took a prominent part in the strife between the different Italian republics, fighting generally upon the side of Florence, by whom he was paid a pension. He fought both for and against Pope Gregory XI. He was endowed with an equal talent for strategy and for organization. He spent the last years of his life among the Florentines, who buried him with great pomp. Consult *Sir John Hawkwood*, translated from the Italian of Temple-Leader and Marcotti by Leader Scott (Florence, 1889).

HAWKYNS. See Hawkins.

HAW'LEY, Charles B. (1858–1916). An American musician, born in Brookfield, Mass. He studied composition under Dudley Buck, Joseph Mosenthal, and C. B. Rutenber, and voice culture with G. J. Webb, P. A. Rivarde, and Gustav Federlein. He became bass soloist in the Calvary Episcopal Church, New York, assistant organist of St. Thomas's, and in 1883 director of the choir at the Broadway Tabernacle. His compositions include many excellent and popular songs and considerable Church music.

HAWLEY, Edwin (1850–1912). An American railroad official, born at Chatham, N. Y. Early in life he sold produce, was a newsboy in New York City, and was successful as an owner of tugboats. Employed by Collis P. Huntington on the Southern Pacific, he quickly rose to a position of importance in the railroad world. As a buyer and seller of railroads and railroad stocks, he in a measure occupied the place left vacant by the death of E. H. Harriman. He purchased the Minneapolis and St. Louis, the Iowa Central, the Colorado and Southern (which he sold to James J. Hill), the Chesapeake and Ohio, the Chicago, Cincinnati, and Louisville, and the Hocking Valley railroads; and he gained a controlling interest in the Chicago and Alton and in the Missouri, Kansas, and Texas. He left a fortune of more than $25,000,000.

HAWLEY, Gideon (1727–1807). An American missionary among the Indians. He was born in a part of Stratford that is now Bridgeport, Conn., graduated at Yale in 1749, and under

the supervision of Jonathan Edwards began work among the Indians at Stockbridge in 1752. Two years later he undertook a mission to the Iroquois on the Susquehanna River, but he was driven out in 1756 by the French and Indian War. After the war he attempted to return, but was deterred by the danger. The latter part of his life was passed in missionary service among the Indian tribes at Mashpee, Mass.

HAWLEY, Joseph (1723–88). An American statesman of the Revolutionary era. He was born in Northampton, Mass., graduated at Yale in 1742, and studied for the ministry, but finally became a lawyer. He was a delegate to the Massachusetts Congress (1774–75) and a special pleader for popular rights.

HAWLEY, Joseph Roswell (1826–1905). An American politician and legislator, born in Stewartsville, N. C., Oct. 31, 1826. His father, a Connecticut Baptist clergyman, returned to his native State in 1837, and there the son was brought up and imbued with antislavery ideas. He was educated at Hamilton College (New York), where he graduated in 1847, afterward studying law, and beginning practice at Hartford, Conn., in 1849. He immediately entered politics as a Free Soil Democrat, became chairman of the party's State Committee, and in 1852 editor of its principal State organ, the *Charter Oak*. The movement which resulted in the founding of the Republican party received his support, and the first meeting for its organization in Connecticut was held in his office. In the next year he abandoned the law and became editor of the Hartford *Evening Press*, the newly established Republican paper. Twenty-four hours after President Lincoln's first call for troops, Hawley recruited the first company of volunteers raised in the State, which became Company A of the First Connecticut Regiment, with Hawley as captain. He participated in the first battle of Bull Run, after which he became lieutenant colonel of the Seventh Connecticut Volunteers, with it took part in the Port Royal expedition, and was present at the siege and capture of Fort Pulaski. In January, 1863, as colonel, he took his regiment to Florida and was present at the siege of Charleston and capture of Fort Wagner. In February, 1864, he commanded a brigade in the battle of Olustee, Fla., and later in the same year saw active campaigning in Virginia, being present at the siege of Petersburg. In September, 1864, he was promoted brigadier general of volunteers. In 1865 he served as General Terry's chief of staff, was with Sherman in the Carolina campaign, and on September 25 was brevetted major general. In April, 1866, he was elected Governor of Connecticut. In 1867 he was defeated for reëlection and turned his attention to journalism, purchasing the Hartford *Courant*, with which he united the *Press*, and, for the the rest of his life produced one of the most influential Republican newspapers in the country. He became prominent as a Republican campaign speaker, was chairman of the Republican National Convention in 1868, and chairman of the Committee on Resolutions at the Convention of 1876. In November, 1872, he was elected to fill a vacancy in Congress and was reëlected for a full term to the Forty-third Congress, serving from 1873 to 1875, and taking part in the fight for sound money and the resumption of specie payments. He was defeated in 1874 and 1876, but was again elected in 1878, serving from 1879 to 1881, and at the end of the term was elected to the United States Senate. He was president of the United States Centennial Committee from March, 1873, to the completion of the work of the Centennial Exposition. In 1884 he was a candidate for the presidential nomination before the Republican National Convention. He was reëlected to the Senate in 1887, 1893, and 1899, served as chairman of the Senate committees on the Civil Service and on Military Affairs, was a persistent advocate of strong coast defenses, vigorously opposed the Chinese Exclusion Bill, and favored an international copyright. On March 3, 1905, at the close of his fourth term as Senator and 14 days before his death, he was placed on the retired list of the army with rank of brigadier general.

HAWORTH, hą′wērth, Adrian Hardy (1767–1833). An English entomologist and botanist, born at Hull. He studied law, but never practiced it. His place of abode was alternately Cottingham and Little Chelsea, and he was founder in chief of the Entomological Society of London, afterward a section of the Linnæan Society, of which he was also a member. The Botanical Garden at Hull was begun under his direction, and he made collections of specimens, and wrote works upon botany and entomology, including: *Observations on the Genus Mesembryanthemum* (1794); *Prodromus Lepidopterorum Britannicorum* (1802), enumerating 793 species; the sixth volume of the *Botanist's Repository* (1803); and *Synopsis Plantarum Succulentarum* (1812), which is planned on the Linnæan system, and gives in Latin the description, habitat, date of introduction, and month of flowering of each species. A supplement to this work was issued in 1819.

HAWORTH, Erasmus (1855–). An American geologist, born near Indianola, Warren Co., Iowa. He graduated from the University of Kansas in 1881 and from Johns Hopkins University (Ph.D.) in 1888 and taught in various colleges, becoming professor of geology and mineralogy at the University of Kansas in 1892. He organized the Kansas Geological Survey in 1894 and became State geologist, joined the United States Geological Survey, and did much work for railroads and private corporations. His publications comprise vols. i–iii and viii and Bulletin I on the well waters of Kansas (1895–1904) and parts of vols. v and ix in the *Reports of the Kansas State Geological Survey;* the annual reports on the mineral statistics of Kansas (1897–1904); and bulletins of the Missouri and the United States geological surveys.

HAWORTH, Joseph (1855–1903). An American actor, born at Providence, R. I. At the age of 18 he became a member of a stock company in Cleveland, Ohio, where he was brought up, having already once appeared upon the stage there a year or two before with Charlotte Crampton in *Richard III*. During the season of 1882–83 he toured with John McCullough. Afterward, for several years, he himself traveled as a star in *The Bells*, *The Leavenworth Case*, *Hamlet*, and other Shakespearean plays. In 1896–98 he supported Madame Modjeska, playing an exceedingly effective Macbeth to her Lady Macbeth. His subsequent rôles included those of John Storm in *The Christian*, Rafael in *The Ghetto*, Vinicius in Stanislaus Stange's version of *Quo Vadis*, and Cassius in Mr. Richard Mansfield's production of *Julius Cæsar*. Consult

Strang, *Famous Actors of the Day in America* (Boston, 1900), and Clapp and Edgett, *Players of the Present* (New York, 1899).

HAW RIVER. A name sometimes applied to the upper course of Cape Fear River (q.v.) in North Carolina, above its confluence with Deep River, the two being regarded as the head streams of the Cape Fear (Map: North Carolina, C 1).

HAWSE, hąz *or* hąs (older form *halse,* from Icel. *hāls,* neck, fore part of a ship, AS. *heals,* Goth., OHG. *hals,* Ger. *Hals,* neck; ultimately connected with Lat. *collum,* neck). 1. The part of a ship in which the *hawse pipes,* or heavy castings forming the lining for the *hawse hole* through which the anchor cable passes, are placed. 2. The direction of the cable by which the ship is riding. 3. The cables of a ship when moored. A vessel is *athwart the hawse* of another when she or her chain is ahead of the latter and across her stem or chain, or nearly so. When a ship is moored, she is said to have a clear hawse when the chains lead from the hawse pipes to the anchors without touching each other. The hawse is *open* when the chains lead away from the bows to their respective anchors and the ship rides to both of them. If a ship lying in this position swings through 180°, she will have a *cross* in her hawse, the chain leading from its pipe across the stem to the anchor which is on the other side; another swing of 180° in the same direction gives an *elbow* in the hawse; the next, a *round turn;* the next, a *round turn and an elbow;* the next, *two round turns,* etc. A ship is said to have a *foul hawse* if her hawse is neither *open* nor *clear.* When the chains are in this condition, the *hawse* must be cleared by unwinding one of them from the other. To effect this a chain pendant, called the *clear hawse pendant,* is led out of one of the hawse pipes and by means of a large hook on the end firmly secured to one of the chains, usually the lee one (i.e., the one which is hanging slack, not the one by which the ship rides). The clear hawse pendant being made fast inside the ship, the lee chain is unshackled, and by means of a *dip rope* the end is *dipped* underneath the other and unwound from it. It is then brought into the ship and shackled to its other part again. This seems a very simple operation, but, owing to the great weight of the chain cables of large ships and to the fact that much of the work must be done in a boat, perhaps in quite rough water, it is a very laborious and troublesome one. To avoid the necessity of it, heavy swivels, called *mooring swivels,* are frequently used. This device has two shackles attached to the lower part and two to the upper. The chains are unshackled and the inner ends attached to the upper shackles of the swivel and the other ends to its lower shackles. The ship thus moored is free to swing without fouling her chains so long as the swivel is kept in order so that it will revolve with the ship. See MOOR; MOORING SWIVEL.

The Hawse Buckler is an iron plate, hinged to the upper edge of the hawse pipe on the outside of the ship and designed to close the hawse pipe against the admission of water when at sea. In recent ships the anchor is pulled up into the hawse pipe until the flukes take against the side of the ship, so no hawse bucklers are fitted. The **Hawse Hole** is the hole in sides of the ship through which the cable passes.

The Hawse Pipe. A heavy casting which forms a lining for the hawse hole and prevents the cable from tearing the plating of the bow. In ships carrying their anchors stowed in the hawse pipes the latter are large enough to take three parts of the chain easily. This greatly facilitates putting on and taking off the mooring swivel.

HAWSER, hąz′ẽr *or* hąs′ẽr (older forms *halser, haulser, halsier,* OF. *haulseree,* from *haulser, hausser,* Fr. *hausser,* It. *alzare,* to raise, from Lat. *altus,* high). A rope of manila fibre 4 inches or more in circumference, or a wire rope exceeding 3 inches in circumference. It was formerly the custom to call heavy ropes hawsers only when they were *hawser-laid;* i.e., when they consisted of three *plain-laid,* three-stranded ropes laid up left-handed. Large plain-laid ropes were called tow lines. Present practice is, however, less precise, all large ropes being commonly referred to as hawsers; and rope which was formerly called hawser-laid is now called *cable-laid.*

HAW′THORN (from AS. *hægþorn,* Ger. *Hagedorn,* from AS. *haga,* Eng. *haw,* hedge + *þorn,* Eng. *thorn*), *Cratægus oxyacantha.* A shrub or small tree, native of Europe, Siberia, and northern Africa and sparingly introduced into the United States, which reaches a height of 25 feet. It has roundish obovate three to five lobed deciduous leaves, and corymbs generally of white, rose-colored, or sometimes deep-crimson flowers, succeeded by a small red fruit (*haw*) with yellow pulp, which, since they remain on the tree after the leaves have fallen, afford winter food to birds. Of the many varieties of hawthorn, the Glastonbury thorn—so named because supposed to have originated at Glastonbury Abbey—is remarkable for its early flowering, which in England often takes place in the middle of the winter. The common kind blossoms in May or June. The winter flowers are, however, not generally followed by fruit, and a second flowering often takes place in the same year. The common hawthorn is often popularly called "may," from the season of its flowering in England. It is also called "whitethorn," to distinguish it from the sloe or blackthorn. It is also sometimes employed as a stock

HAWTHORN.

on which to graft apples and other pome fruit. The wood is very hard, close-grained, and takes a fine polish, but is apt to warp. A fermented liquor, which is very intoxicating, is made from the fruit in many parts of France. The hawthorn is particularly valuable as a hedge plant, for which purpose it is widely used in Great Britain, in consequence of its strong and plentiful spines, quick growth while young, its long life, and its ready adaptation to a variety of soils and especially to trimming. For this purpose it is propagated by seed. In the United States the name "hawthorn" is applied to nearly all the numerous species of *Cratægus*. See CRATÆGUS; HEDGE.

HAWTHORNE. A borough in Passaic Co., N. J., 2 miles north of Paterson, on the Erie and the New York, Susquehanna, and Western railroads (Map: New Jersey, D 2). There are railroad shops, glue and candy factories, dye mills, glassworks, etc. Hawthorne has adopted the commission form of government. Pop., 1900, 2096; 1910, 3400.

HAWTHORNE, CHARLES WEBSTER (1872–). An American genre and portrait painter, born in Maine. He started as office boy in a New York stained-glass factory, studied at night school and with Mowbray and Chase, and abroad in both Holland and Italy. He became a member of the National Academy in 1911 and in the same year was awarded the Thomas B. Clarke prize (of the academy). His winters were spent in Paris and New York, his summers at Provincetown, Mass., where he owned the Cape Cod School of Art. Among his works are: "The Trousseau," Metropolitan Museum, New York; "Mother and Child," Syracuse (N. Y.) Museum; "Net Mender," Rhode Island School of Design, Providence; "Venetian Girl," Worcester Museum; "The Family," Buffalo Fine Arts Academy. His technical facility is remarkable, and his interpretations of sitters and types show unusual ability to analyze character.

HAWTHORNE, JULIAN (1846–). An American novelist, born in Boston, son of Nathaniel Hawthorne. He entered Harvard in 1863, but did not graduate. He studied civil engineering in America and Germany, was engineer in the New York City Dock Department under General McClellan (1870–72), spent 10 years abroad, and on his return edited his father's unfinished *Dr. Grimshawe's Secret* (1883). While in Europe, he wrote the novels: *Bressant* (1873); *Idolatry* (1874); *Garth* (1877); *Archibald Malmaison* (1879); *Sebastian Strome* (1880). Of many novels written after his return to America, perhaps the most noteworthy are: *Noble Blood* (1884); *John Parmlee's Curse* (1886); *The Professor's Sister* (1888); *A Fool of Nature* (1899); *One of Those Coincidences and Other Stories* (1899). He wrote also: *Saxon Studies* (1876); *Nathaniel Hawthorne and his Wife* (1885); *Confessions and Criticisms* (1886); *American Literature* (1891); a *History of the United States* (1899, 1912); and *Hawthorne and his Circle* (1903). His experiences in the Federal prison at Atlanta were related in *The Subterranean Brotherhood* (1914). See MORTON, W. J.

HAWTHORNE, NATHANIEL (1804–64). An American romancer. He was born at Salem, Mass., July 4, 1804. He was of English descent, and his family had spelled their name "Hathorne," to which Nathaniel added the "w." His ancestor, William Hathorne, had accompanied Winthrop in the *Arbella* in 1630. He settled first in Dorchester, and moved thence to Salem (1637), where he received a large grant of land. He seems to have been a man of strong and energetic will, and a Puritan of the grimmest type. John, his son, was like him in abilities and disposition, took an active part in the persecution of witches at Salem, and was a magistrate as well as a soldier. Two of the Hathornes were privateersmen during the Revolution. The novelist's father, Nathaniel Hathorne (1776–1808), was also a sailor and sea captain, and married Elizabeth Clark Manning, of Salem, whose ancestors had emigrated to America in 1679. They had three children, of whom Nathaniel was the second. Upon her husband's death, the mother took her children to her father's house, but of Nathaniel's boyhood we only know that he was fond of long solitary walks, and showed an hereditary longing for the sea. When he was 14 his mother went to live with his uncle, Richard Manning, at Raymond, Cumberland Co., Me. Nathaniel still cared more for nature than for study, hunted and roamed the woods, and jotted in his notebook impressions that show how close was his sympathy with nature, and how minute his observation. After a year here, he returned to Salem to prepare for college. He entered Bowdoin College in 1821, where he found three fellow students who were destined to exercise much influence on his future—Horatio Bridge, the poet Longfellow, and the future President, Franklin Pierce. His scholarship was good, especially in the classics. Upon his graduation (1825), he returned to Salem. Here he led a somewhat secluded life, and still indulged in long walks and in literary studies, in which he is said, at times, to have become so absorbed that food would be left for him before his locked door. He wrote much, but destroyed almost as much, for he could not satisfy his taste. *Fanshawe*, the first work of fiction that he committed to the press, was issued anonymously in 1828. About this time he began to write short stories and essays for the *Token*, a holiday annual under the direction of S. G. Goodrich. They were favorably received, but hardly justly appreciated. Goodrich persuaded Hawthorne to do some hack work for an *American Magazine of Useful and Entertaining Knowledge*, on which he worked for a time as editor (1836), at a salary of $500, but the magazine was in difficulties before the year was out. For the same publisher he compiled, with the collaboration of his sister Elizabeth, a *Universal History*, the pay for which, $100, he gave to his sister. Meantime his genius had been discovered by the London *Athenæum*, which quoted extracts from several of his most characteristic pieces, and with this encouragement and with the financial guaranty of Horatio Bridge, Goodrich brought out in 1837 the first collection of *Twice-Told Tales*. These were generously reviewed by Longfellow, who praised the author's genius and the beauty of his style; but they were received by the public with languid appreciation.

The slight returns from literature prompted Hawthorne to accept from the Collector of the Port of Boston, George Bancroft the historian, a post as weigher in the customhouse there, and in this office he measured coal, salt, and the like, at a salary of $1200. Salem was strongly Federalist in politics, and Hawthorne, an hereditary Democrat, owed this position less to his own

abilities than to partisan policy. He performed his irksome work for two years (1839–41), but was dismissed on the advent of the Whigs to power. With a mind somewhat widened by this experience, he returned to Salem and to literature, and wrote a series of sketches of New England history for children, which he published as *Grandfather's Chair* (1841). In April of that year he was drawn to Brook Farm (q.v.). He invested $1000 in the enterprise, his savings from the customhouse, and charmed his associates by his modest manliness; but, like the Miles Coverdale of his *Blithedale Romance*, a hardly disguised picture of this experiment, he was rather a looker-on than a participant. The genius of Brook Farm was discipline through society. Hawthorne's taste was for solitude, and after a year's patient experiment he left it, married Miss Sophia Peabody, of Salem, and made a home for himself at Concord, in the house that he has made memorable by his *Mosses from an Old Manse*. Here he wrote a second part of *Grandfather's Chair* (1842), and in 1842 published an enlarged collection of *Twice-Told Tales*. In 1845 he edited the *African Journal* of his old classmate at Bowdoin, Horatio Bridge, and in the next year published two volumes of *Mosses from an Old Manse*, the fruit of his scholarly leisure. Many of these sketches, however, had first appeared in the *Democratic Review*, from whose irregular payments he derived most of his income, till it failed, much in his debt (1845). These stories include such masterpieces in miniature as: *The Celestial Railroad; The Procession of Life; Roger Malvin's Burial; Rappaccini's Daughter; The Birthmark; Young Goodman Brown; The Artist of the Beautiful*, which, with some of the *Twice-Told Tales*, notably the four *Legends of the Province House*, first represent his mature genius. But they did not afford him a living, and after four years at Concord he returned in 1846 to the civil service, and accepted from the new Democratic administration the post of surveyor of the customhouse at Salem. There his powers ripened for three years, and reached their fullest expression in *The Scarlet Letter* (1850), the first draft of which he wrote before leaving his post. He has told the story of this period in the introduction to the novel with an irony not a little resented by his fellow citizens, to whom, indeed, he felt he owed no debt, having been, he said, "deliberately lied down" by them till he was at last removed from office.

The Scarlet Letter, as written at Salem, seemed to him so sombre that he submitted to his friend and publisher, James T. Fields, in Boston, a proposal to print with it some sketches in lighter vein, that may now be read in *The Snow Image* (1852), but Fields was so deeply impressed by the work that he persuaded Hawthorne to revise and extend it, though he was skeptical enough to have the type distributed without stereotyping. The first edition of 5000 copies was sold in two weeks. The book was immediately reset, at once reprinted in England, and on both sides of the Atlantic was received with the greatest enthusiasm. It was Hawthorne's first sustained effort and his greatest. From this time till his death he devoted himself to writing, and found a ready market for his work. He moved in the summer of 1850 to Lenox, Mass., still eagerly seeking seclusion, save for the genial companionship of Herman Melville, who lived at Pittsfield. Here he wrote *The House of the Seven Gables* (1851), a story of subtle power. The same year he wrote the juvenile *Wonder Book* published in 1852. In 1851 he left Lenox for West Newton, where he wrote *The Blithedale Romance* (1852), *The Snow Image, and other Twice-Told Tales* (1852); and in the spring of the next year went back to his old favorite Concord, where, with Alcott for his next-door neighbor, he wrote, by one of literature's ironies, a campaign *Life of Franklin Pierce* (1852), and also *Tanglewood Tales* (1853). He had declared that he would take no office in case of Pierce's election, but his friends made him think better of it, and he accepted from his old college mate the consulate at Liverpool.

The next seven years Hawthorne spent in Europe—five at the consulate, with little journeys to the English lakes and Scotland, two in France and Italy. A record of the English years remains in *English Note-Books* and *Our Old Home*. That of the Continent may be found in *French and Italian Note-Books*. The monumental work of this period is *The Marble Faun* (1860), published also in England under the title *Transformation*, a romance long popular, which, however, scarcely holds its own with the critics. When he returned to America on the eve of the Civil War, he found himself somewhat remote, both by nature and by political sympathy, from the intense passions of the period. He was, as he had ever been in public affairs, rather a looker-on than an actor. Very characteristic of his attitude is a little paper, "Chiefly About War Matters," printed in the *Atlantic Monthly* (1862), with some editorial excision and footnotes, which, though ascribed to the editor, are Hawthorne's own. Characteristic, too, of his aloofness from the passion of the time was his dedication to the then unpopular ex-President Pierce of *Our Old Home* (1863). This book indeed well expressed the feeling of New England for the Old. That the English did not like the book rather enhanced the interest in it in America. This was Hawthorne's last book. *The Dolliver Romance*, begun in the *Atlantic Monthly*, was incomplete at his death, as was *Dr. Grimshawe's Secret*, first printed in 1882. *Septimius Felton* also was rescued from loose sheets and printed, not as he would have had it, in 1871. These, and even more inchoate fragments, add nothing to his fame or achievements. He did little after the spring of 1864. His health failed rapidly, and he received a shock, from which he never recovered, by the sudden death of his friend and publisher, Ticknor, during a visit that they made together to Philadelphia. He had a premonition that his own death would be on a like journey, and so it befell. He went in May, with his friend Pierce, to the White Mountains; on the 18th they came to Plymouth, and there in his sleep Hawthorne died. He was buried in Sleepy Hollow Cemetery, Concord, on the 24th, where his body now lies, close to those of his friends Emerson and Thoreau.

Hawthorne's bearing and features were as noteworthy as his personality. His face had a romantic beauty, symmetrical, full and strong in feature, with a massive brow, and an expression that veiled power behind a poetic refinement. In manner he was shy but always self-possessed, quiet in conversation, and often silent in company. To the end, as in boyhood, he did not shun solitude, living much within himself and seeming to find no better company. The style was like the man, exquisite in its purity of dic-

tion, finely poetic, delicate, gentle; yet it had a manly gravity that bore witness to the inherited Puritan conscience. These qualities, subtly and strangely blended, give to his style a unique literary quality, and make him one of the greatest masters of English prose, in spite of the fact that when read continuously his elaborateness is sometimes found to cloy. Turning from the man to his work, one finds the dominant note, alike of the short tales and of the novels, well described by Henry James as a "feeling for the latent romance of New England." He found the shadow and the mystery in the Puritan conscience with its oppressive sense of responsibility and ingrained sin. It is the hidden passion, the secret impulse, the double life, the weird and supernatural imaginations, religion grown fierce in the struggle and isolation of early New England, out of which his poet's fancy loved to create symbolic impersonations. In the early tales, and to the last, he preferred to explore the dark corners of the human heart rather than to describe the expression which they found in social relations. Something of this tendency could be detected in *Fanshawe*, but its quintessence is in the tales of old Massachusetts, *Goodman Brown*, the *Legends of the Province House*, or in the more whimsically humorous *Village Uncle*, and *A Rill from the Town Pump*. When he went abroad for his scenes, he carried New England with him. *Rappaccini's Daughter* has in it as little of the atmosphere of Italy during the Renaissance as *Roger Malvin's Burial;* and when we turn to the novels it is still the romance of the Puritan conscience in its self-tormenting of which we read first and supremely in *The Scarlet Letter*, with its climax of penance and demoniac triumph at Dimmesdale's shame. And that study of sin festering in darkness, shunning the antidote, and seeking vainly the anodyne, has its counterpart there in Hester Prynne, who finds in sin itself the power of a higher spiritual life; while her child is a joyous and perennially fascinating mystery. *The House of the Seven Gables* is no less characteristic, though the noonday light is here softened to a mystic glow, and we breathe a ghostly atmosphere of vicarious sorrow and atonement. *The Blithedale Romance*, too, could have been dreamed only in New England, and of *The Marble Faun* one must say with Henry James, that Hawthorne "took with him to Italy more of the old Puritan conscience than he left behind." One feels it in Donatello, and it is in every fibre of Hilda's being. Here, as always, moral guilt, and its effect upon the individual alone with himself, is the theme on which the reader's thought is concentrated with vague yet persistent shadowings of the supernatural and weirdly fascinating revelations of the depths of human souls, around which the Italian scene throws the glamour of antiquity. And as we find New England in this story of Italy, so we find it in the point of view of the *Note-Books*. While he was at home he sought relief from the present in the past; when he was abroad, he viewed the new scene from the standpoint of the old, and looked at English, French, and Italian society with the same aloofness that marked his attitude towards American politics and the socialistic aspirations of the Transcendentalists. He was less a moralist than a dilettante in morals, without dogmatism, without insistence, "outside of everything, an alien everywhere, an æsthetic solitary" (Henry James).

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HAW'TREY, Charles Henry (1858–). An English actor-manager and playwright, born at Eton, and educated there and at Oxford. At the age of 23 he made his theatrical début. His plays include *The Private Secretary*, *Jane*, and *Mr. Martin*, the first of which was originally produced in Cambridge in 1883 and was an adaptation from Von Moser's *Der Bibliothekar*. It proved a tremendous success and was performed 844 consecutive times. In 1884 a compromise was arranged by which William Gillette's adaptation of the same play could be produced in America. Some years later Hawtrey got control of the Comedy and Avenue theatres in London. During the season of 1901–02 he brought his company to New York with *A Message from Mars*, which had already run for 500 performances in London, and in 1913 he played in *Gen. John Regan* and *Never Say Die*.

HAXO, åk'sô', François Nicolas Benoît, Baron (1774–1838). A French general of engineers, born in Lorraine. He fought in the armies of the Republic, first in Germany and afterward under the First Consul in Italy. His ability was recognized by Napoleon, who sent him to Turkey in 1807 to fortify Constantinople for the Sultan. At the end of the year he returned to Italy, and in 1808 was sent to Spain, where he took an active part in the capture of Saragossa, and was promoted colonel. In 1811 he was made Baron, and in the same year, as commander of engineers in the army of Germany, he inspected the fortresses held by the French in Prussia and Poland. Many of them he strengthened, particularly those at Modlin and Danzig; and in the latter he introduced casemate batteries of his invention which were later adopted for the fortresses of France. During the retreat from Moscow he received from Napoleon the brevet rank of general of division, and in June, 1813, he was made commander in chief of the engineers of the Imperial Guard. After the Peace of 1814 the Bourbons gave him employment, but on Napoleon's return from Elba he joined the Emperor and fought under him during the Hundred Days. Nevertheless, upon Napoleon's final overthrow, the Bourbons

again received him into their service and made him inspector general of fortifications. In the discharge of this office he worked so strenuously to modernize the fortresses of France that General Rogniat said of him: "Peace was for him more laborious than war." He proposed the method of fortifying Paris which, with some modifications, was finally adopted, and in 1832 he conducted the celebrated siege of Antwerp. He left a number of writings on military engineering and analogous subjects.

HAXTHAUSEN, häkst'hou'zen, AUGUST (FRANZ LUDWIG MARIA), BARON VON (1792–1866). A German economist, born near Paderborn. He studied mining at Klausthal and went to the University of Göttingen. His first book, *Die Agrarverfassung in den Fürstentümern Paderborn und Corvey* (1829), procured him commissions for similar studies in Prussia and Russia, summed up in *Die ländliche Verfassung in der Provinz Preussen* (1839) and *Studien über die innern Zustände des Volkslebens und insbesondere die ländliche Einrichtungen Russlands* (1847–52; in English version, *The Russian Empire*, 1856). He also wrote on the Caucasus two volumes translated into English under the titles *Transcaucasia* (1854) and *The Tribes of the Caucasus* (1855). He edited a series of essays called *Das konstitutionelle Prinzip* (1864).

HAY (AS. *hīg*, Goth. *hawi*, OHG. *hewi, houwi*, Ger. *Heu;* probably connected with AS. *hēawan*, OHG. *houwan*, Ger. *hauen*, Eng. *hew*). A term applied to a considerable number of cured crops used for feeding farm animals. The most important hays are made from the various grasses (timothy, meadow fescue, meadow foxtail, brome grasses, etc.), legumes (clover, alfalfa, etc.), and cereal grains (rye, oats, and barley). The different crops should be cut for hay before they have fully ripened seed, as, generally speaking, the nutritive value increases up to this time and decreases afterward. (See GRASSES.) While most crops will not cure unless they are cut and treated in the usual way, some grasses, e.g., Buffalo grass, dry in their natural habitat without appreciable loss of nutritive material, and constitute fairly good natural hay. If the cereal grains are allowed thoroughly to ripen before cutting, and the grain separated, the material is called straw, and is not as valuable for feeding as hay. Hay is cured by exposing the cut crop to the sun and air. The processes of haymaking vary with the crop and climatic conditions. The varying nature of the crops converted into hay, the dampness or dryness of the soil, the amount of moisture in the atmosphere, and the duration and intensity of the sunlight are all factors which influence the problem. At the present time haymaking is quite generally carried on by the aid of machinery. (See REAPERS, REAPING; IMPLEMENTS, AGRICULTURAL.) Generally speaking, hay is cured in the United States by spreading on the ground. In some parts of northern Europe, in the Mackenzie River region of Canada, and elsewhere, where the rainfall is very abundant, hay is cured on racks. During the curing process the green crops lose water, which is, perhaps, the most marked change. However, there are other changes, which are due to the action of ferments. These modify more or less the composition of the hay and aid in developing the peculiar aroma. It has been found that grass which is merely dried does not have exactly the same composition as a similar sample which has been cured as hay. Fermentation, which begins in the field, often continues after the hay is stored. As in many other chemical changes, fermentation is accompanied by the liberation of heat, and in the case of hay the temperature may rise sufficiently to cause ignition. Many fires have been caused by the spontaneous combustion of hay owing to this cause. Though frequently a single grass or other crop is planted for hay, meadows often have a number of crops growing together as grasses and clovers, and these yield what is termed mixed hay. The hay from salt marshes consists of such plants as black grass (*Juncus gerardi*), fox grass (*Spartina patera*), branch grass (*Distichlis spicata*), flat sage (*Spartina stricta maritima*), etc. The average composition of a number of sorts of hay follows:

AVERAGE PERCENTAGE COMPOSITION OF A NUMBER OF SORTS OF HAY FROM GRASSES, LEGUMES, AND CEREAL GRAINS

KIND OF HAY	Water	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
GRASSES						
Hay from mixed grasses	15.3	7.4	2.5	42.1	27.2	5.5
Timothy	13.2	5.9	2.5	45.0	29.0	4.4
Orchard grass	9.9	8.1	2.6	41.0	32.4	6.0
Kentucky blue grass	21.2	7.8	3.9	37.8	23.0	6.3
Meadow fescue	20.0	7.0	2.7	38.6	25.9	6.8
Salt-marsh hay	10.4	5.5	2.4	44.0	30.0	7.7
Rowen	16.6	11.6	3.1	39.4	22.5	6.8
CEREAL GRAINS						
Barley hay, cut in milk	15.0	8.8	2.4	44.9	24.7	4.2
Oat hay, cut in milk	15.0	9.3	2.3	39.0	29.2	5.2
Rye hay	10.6	9.3	2.5	8.7	23.6	5.3
LEGUMES						
Red clover	15.3	12.3	3.3	38.1	24.8	6.2
White clover	9.7	15.7	2.9	39.3	24.1	8.3
Crimson clover	9.6	15.2	2.8	36.6	27.2	8.6
Alfalfa	8.4	14.3	2.2	42.7	25.0	7.4
Cowpea	10.7	16.6	2.9	42.2	20.1	7.5
Soy bean	11.3	15.4	5.2	38.6	22.3	7.2
Pea vine	15.0	13.7	2.3	37.6	24.7	6.7
Vetch	11.3	17.0	2.3	36.1	25.4	7.9
Serradella	9.2	15.2	2.6	44.2	21.6	7.2
Peanut vines (without nuts)	7.6	10.7	4.6	42.7	23.6	10.8
Sanfoin	15.0	14.8	3.0	39.5	20.4	7.3
Alsike clover	9.7	12.8	2.9	40.7	25.6	8.3

Hay contains more nutritive material in proportion to its bulk than the green crops from which it is made. In other words, it has been concentrated by the evaporation of a large amount of the water originally present. It contains fairly large amounts of carbohydrates, both nitrogen-free extract and crude fibre, and a considerable amount of protein. The latter constituent is especially abundant in hay from leguminous crops. The different sorts of hay are very important feeding stuffs for all classes of farm animals. They are valuable not only for the nutrients they contain, but because, like all coarse fodders, they furnish the needed bulk in the ration. In early times animals were wintered on hay alone, but experience has shown that although farm animals may be maintained without other feeding stuffs, if it is desired to produce gains in weight or an abundance of milk, hay must be supplemented by grain or other concentrated feed.

Rowen, i.e., hay made from second-growth grasses or aftermath, is especially rich in nutrients; but it is made at a time of the year when the ground is often damp, the days shorter, and the sun's heat less strong than earlier in the season. This renders the curing of rowen somewhat difficult, and the product is usually of less value for some purposes than first-crop hay. When cured under favorable conditions, rowen hay is an excellent article for winter feeding. In Switzerland and other parts of Europe it is customary to cut the soft grasses commonly grown a number of times during the season. The resulting hay is fine, relatively rich in protein, and is said to be especially relished by stock. New-made hay is laxative, and should be fed cautiously to work horses or to driving horses. The average coefficients of digestibility of a number of sorts of hay follow:

AVERAGE DIGESTIBILITY OF A NUMBER OF KINDS OF HAY, SHOWN BY THE PERCENTAGES OF DIGESTED CONSTITUENTS

KIND OF HAY	Dry matter	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
GRASSES						
Timothy	56.6	46.9	52.2	62.3	52.5	32.8
Timothy rowen	62.2	68.0	49.5	63.4	66.5	56.4
Orchard grass	56.6	59.5	53.8	55.4	60.4	....
Pasture grass	72.6	73.4	67.3	74.2	76.1	51.8
Mixed grasses	57.1	58.5	48.5	58.7	59.7	....
Salt-marsh hay	56.4	42.6	29.7	54.7	60.7	69.8
Rowen	64.4	69.1	47.4	66.2	66.6	46.6
CEREAL GRAINS						
Barley	61.2	65.2	40.5	63.3	61.7	44.8
Oat	49.3	54.2	61.9	52.0	43.5	34.6
LEGUMES						
Red clover	57.4	58.0	55.2	64.4	54.2	29.1
Red clover rowen	58.0	64.8	59.8	62.8	47.4	45.8
Alsike clover	62.2	66.1	50.2	70.7	53.5	52.2
Alfalfa	58.9	72.0	51.0	69.2	46.0	39.5
Cowpea vine	59.2	64.8	51.8	70.6	42.0	49.5

Hay is fed "long," i.e., whole, or "chopped," i.e., more or less finely cut. Where a large number of animals are fed, chopping has some advantages. If a little water is added to the chopped hay it lays the dust. Meal may be added to the moistened chopped hay. Such a ration is especially recommended for hard-worked horses which are in the stable only at night. If animals have abundant time for chewing and digesting, chopping is not very desirable. Growing pigs and breeding swine are often benefited by a reasonable allowance of steamed or boiled and chopped alfalfa or clover hay. The boiling or steaming increases the palatability of the feed, though it probably does not increase its digestibility. Cooked clover hay is often given to poultry with advantage. In general it does not pay to steam or cook hay for stock. Alfalfa hay is sometimes ground to meal with or without the addition of molasses.

"Hay tea," properly made, has been successfully used for rearing calves in place of milk. The tea should be supplemented by ground flaxseed and middlings cooked in it.

Hay is commonly stored under cover or in stacks in the open field. It is now generally baled for shipping, in which form it is conveniently handled and stored.

HAY, FRANCIS (?–1631). A Scottish nobleman, ninth Earl of Errol, identified with attempts to reëstablish the Roman Catholic religion in his native country. He became a convert to that religion, and after succeeding to the earldom in 1585 he joined Huntly in the attempt to induce Philip II of Spain, after the defeat of the Armada, in 1588, to fit out another expedition for the conquest of England. On discovery of his treachery, he was summoned before the Council to answer the charge of attempting to subvert the Protestant religion, and upon refusing to appear he was denounced as a rebel. The Earl's career from 1589 to 1617 was little more than a series of attempts to carry out his main design, during which he engaged in conspiracies, fomented rebellions, was tried, imprisoned, and afterward released. The Scottish King, James (afterward James I of England), was unwilling to exercise extreme severity upon Errol, though he knew of his guilt, and warned him of the futility of his attempts. After an abortive rebellion, in which the Earl and Huntly were the leaders, the former was sent to prison in Edinburgh Castle for an alleged share in Bothwell's attempt to capture Falkland Palace while the King was occupying it. In 1592 he was again denounced as a rebel for alleged complicity in Spanish intrigues, but was finally ordered to choose between exile and accepting the Protestant religion. Having failed to make a choice, he was declared a traitor. The Earl and Huntly rebelled in 1594, and defeated a force sent against them by the King. Soon afterward

they fled the country, but returned in 1596, and the following year Errol, having complied with the King's conditions by abjuring his religion and subscribing to the Confession of Faith, was restored to his rights and possessions. The genuineness of his profession was, however, doubted by the Scottish Kirk, and after various unsuccessful attempts to satisfy themselves on that point, Errol was in 1608 excommunicated and imprisoned in Dumbarton Castle, but was finally released in 1611 and in 1617 he was absolved from excommunication. He died July 16, 1631.

HAY, GEORGE (1729–1811). A Scottish Catholic bishop and polemical writer, born of Protestant parentage in Edinburgh, where he was educated and apprenticed to a surgeon. He became a Catholic, studied in Rome, and, in 1778, after the death of Bishop Grant, became Vicar Apostolic of the Lowlands. A year later his chapel houses were mobbed and burned and his library ruined by fanatics, who were aroused by the fear that government purposed more lenient treatment of the Catholics. Hay was influential in the reëstablishment of the Scots College at Rome, and in building a Catholic seminary at Aquhorties (1799). He wrote *The Scripture Doctrine of Miracles* (1775) and *The Sincere, Devout, and Pious Christian* (1781–86), a work still esteemed in the Catholic church. A complete edition of his works with a memoir was published in five volumes at Edinburgh (1871–73).

HAY, JAMES, EARL OF CARLISLE (c.1575–1636). An English diplomat and favorite of James I. He was born at Pitscorthy, Fifeshire, and educated in France. James knighted him, took him to England, gave him a rich wife, Honora, heiress of Sir Edward Denny, and repeatedly paid off the debts which Hay, who was an easy-going spendthrift, was always making. In 1619, soon after his creation as Viscount Doncaster, he was sent on a mission to Bohemia, where James's son-in-law, Frederick of the Palatinate, was for a short time King. A little later we find him in France (1621–22), exerting himself unsuccessfully in an effort to make peace between Louis XIII and the Huguenots. He was made Earl of Carlisle in 1622 and was sent back to Paris two years later to arrange a marriage between Charles and Henrietta Maria, and advised the King against promising Richelieu that there should, in event of the marriage, be any abatement of laws against Catholics. Carlisle seems to have distrusted the French alliance now as strongly as he had before desired it; and he retired from politics when it became apparent that the court policy was for peace with France. The title of Carlisle became extinct on the death of his son James (1660). See HAY, LUCY.

HAY, JOHN (1838–1905). An American statesman, author, and journalist. Born in Salem, Ind., of Scottish ancestry, Oct. 8, 1838, he graduated from Brown University in 1858 and studied law at Springfield, Ill., where he became acquainted with Abraham Lincoln, then the leader of his profession and of the Republican party in Illinois. In 1861 he was admitted to practice in the Supreme Court of Illinois. He accompanied President-elect Lincoln to Washington and was his assistant private secretary until his (Lincoln's) death, with the exception of a brief interval during which he served as adjutant and aid-de-camp to the President and of a few months when he served in the army under Generals Hunter and Gillmore. He rose to the rank of major and was later brevetted lieutenant colonel and colonel. After Mr. Lincoln's death he went to Paris as Secretary of Legation (1864–67). He then served (1867–68) as Secretary of Legation and chargé d'affaires at Vienna, and after a short interval went in the same capacity to Madrid, where he remained until 1869. From 1870 to 1875 he was an editorial writer on the New York *Tribune* and for a short time acted as editor in chief of that journal as substitute for Horace Greeley. In 1874 he married the daughter of Amasa Stone, of Cleveland, Ohio. From 1879 to 1881 he served under President Hayes as First Assistant Secretary of State; then until 1883 he acted in Whitelaw Reid's place as editor of the *Tribune;* and afterward for 16 years he was engaged in literary work, chiefly in preparing a biography of Lincoln. On March 19, 1897, he was appointed by President McKinley Ambassador to Great Britain, to succeed Thomas F. Bayard. His 18 months' service in this capacity was marked by thoroughness, skill, and tact, and did much to cement relations with Great Britain and to increase the diplomatic prestige of the United States. On Sept. 20, 1898, he was appointed Secretary of State, to succeed William R. Day, who had just resigned. His conduct of the foreign affairs of the nation was characterized by unusual vigor and foresight. He at once made a *modus vivendi* concerning the Canadian-Alaskan boundary. Perhaps his greatest diplomatic achievement was when in September, 1899, he secured the "open-door" policy in China by the written guarantees of the European nations, and prevented the Empire from being dismembered. In this the United States for the first time acted in concert as a world power. During the British war in South Africa he used his good offices to secure the neutrality of the continental European powers. When the United States began negotiations to build the Panama Canal, he negotiated a treaty with England (see HAY-PAUNCEFOTE TREATY) that made this possible. Again, when Colombia refused to ratify the canal concessions to the United States in 1900, he was influential in having the new Republic of Panama recognized and in completing negotiations for the canal. In 1902 he called on the European Powers to prevent atrocities on the Jews in Rumania; in the same year he settled a dispute between Europe and Venezuela by upholding and extending the scope of the Monroe Doctrine; he was instrumental in establishing a Philippine policy; and largely through his efforts an arbitration court was reestablished at The Hague. In all, he brought about more than 50 treaties, including the settlement of the Samoan dispute, as a result of which the United States secured Tutuila, with an excellent harbor in the Pacific; a definitive Alaskan boundary treaty in 1903; the negotiation of reciprocity treaties with Argentina, France, Germany, Cuba, and the British West Indies; the negotiation of new treaties with Spain; and the negotiation of a treaty with Denmark for the cession of the Danish West India Islands. Mr. Hay died July 1, 1905.

Mr. Hay was the author of *Pike County Ballads* (1871); *Castilian Days* (1875); a translation of Emilio Castelar's treatise on the Republican Movement in Europe (1875); and (with John G. Nicolay) he wrote an authoritative life of Lincoln, entitled *Abraham Lincoln: A History* (9 vols., 1890). He was one of the seven orig-

inal members of the American Academy of Arts and Letters. Consult Lorenzo Sears, *John Hay, Author and Statesman* (New York, 1914).

HAY, John. See Tweeddale, Marquis of.

HAY, Lucy, Countess of Carlisle (1599–1660). An English political intriguer, daughter of Henry Percy, Earl of Northumberland. At the age of 18, much against the will of her imprisoned father, she married James Hay (q.v.). Cartwright, Herrick, Carew, and Suckling sang of her beauty and wit. She soon gained a high place in the favor of the Queen and did much for Strafford with her influence. When Strafford was dead, she became the spy and servant of the Parliamentary party, which she warned of the plan to arrest the five members. In both civil wars she was intimate with the aristocratic Presbyterian party and intrigued in behalf of Holland. In 1649 she was arrested, imprisoned, and threatened with the rack, and was held in confinement until 1652.

HAY, Oliver Perry (1846–). An American paleontologist, born at Saluda, Jefferson Co., Ind. He studied at Eureka (Ill.) College, Yale, and Indiana University (Ph.D., 1884); taught in several institutions, being professor of biology and geology at Butler College, Indianapolis (1879–92); was at the Field Museum, Chicago (1895–97), and assistant and associate curator of vertebrate paleontology at the American Museum of Natural History, New York (1901–07); for four years was engaged in private investigations; and in 1912 became research associate at the Carnegie Institution, Washington. He assisted in geological surveys of Arkansas, Indiana, and Iowa, was associate editor of the *American Geologist* in 1902–05, and published *Bibliography and Catalogue of the Fossil Vertebrata of North America* (1902) and *The Fossil Turtles of North America* (1908).

HAYASHI, hä'yä-shē, Count Tadasu (1850–1913). A Japanese diplomat, born at Sakura and educated in England. After holding minor offices he was Assistant Minister for Foreign Affairs in 1891–95, Minister to China in 1895–96 and to Russia in 1897–99. In the latter year he represented Japan at The Hague Peace Conference and from 1900 to 1905 was Ambassador to England. He helped to bring about, and signed, the treaties of alliance of Jan. 20, 1902, and Aug. 12, 1905, between Great Britain and Japan (q.v.). He was Minister of Foreign Affairs in the Saronji cabinet in 1906–08 and Minister of Commerce in 1911–13. In 1896 he was made Baron, in 1902 Viscount, and in 1907 Count.

HAY ASTHMA. See Hay Fever.

HAY BOTE, or **HEDGE BOTE** (from hay, AS. *hege*, OHG. *hag*, Ger. *Hag*, Eng. *haw*, hedge + ME. *bote*, Eng. *boot*, advantage, recompense). A common-law right of a tenant for life or years to cut timber for the repair of hedges and fences. Such a tenant is restrained by the law of waste from cutting timber, or woods suitable for building, excepting for certain specified purposes included in the ordinary use and upkeep of the premises, as for firewood, necessary repairs, and the like. The excepted cases were known as botes, or estovers. See Estover.

HAY'DEN, Ferdinand Vandeveer (1829–87). An American geologist, born in Westfield, Mass. Graduating from Oberlin College in 1850, he studied medicine at Albany, N. Y., and in 1853 commenced a series of scientific explorations by an examination of the remains of extinct animals found in the Bad Lands of Dakota. The next three years were passed in a similar exploration of the upper Missouri, resulting in the discovery of an important collection of fossils, which was afterward divided between the academies of science of St. Louis and Philadelphia. Being appointed geologist of a government expedition to the Northwest, he acted in this capacity until the outbreak of the Civil War, when he entered the Union army as a surgeon. He rose to be chief medical officer of the Army of the Shenandoah. In 1865, and until 1872, he was professor of geology and mineralogy in the University of Pennsylvania, vacating this post on account of his duties in connection with exploratory work in the West. In 1867 he had been placed in charge of a geological survey of Nebraska which was the beginning of a much broader survey, known as the Geological Survey of the Territories, and for which from 1869 to 1872 he conducted explorations in Dakota, Wyoming, Colorado, and Utah. One of the results of this work was the establishment of the Yellowstone National Park as a government reservation. From 1873 to 1879 he served as director of the Territorial survey, and in the latter year, when the present United States Geological Survey was organized, he became geologist in charge of the Montana division. He resigned from public office in 1886. His papers and reports on the geology and other natural features of the West are numerous, the more important being incorporated in 10 volumes of *Reports of the United States Geological Survey of the Territories.*

HAYDN, hī'd'n, Johann Michael (1737–1806). An Austrian musician, brother of Josef Haydn, born at Rohrau. From 1745 to 1755 he was a chorister at St. Stephen's, Vienna, and, after studying the violin and organ, assistant organist there. In 1757 he was kapellmeister at Grosswardein, in 1762 concertmeister to Archbishop Sigismund at Salzburg, and in 1777 organist of the cathedral and of St. Peter's Church in that city. In 1800 his property was destroyed by the French occupation of Salzburg, but his brother and friends and the Empress Maria Theresa came to his assistance, and he was enabled to open a school of composition. This enterprise was very successful, among its pupils being Weber and Reicha. His best works were his oratorios, masses, cantatas, and anthems, which his brother held in the highest estimation. He published little, but his compositions embrace almost every department of music. Consult O. Schmid, *Joh. Michael Haydn: Sein Leben und Wirken* (Langensalza, 1906).

HAYDN, Josef (1732–1809). A famous Austrian composer. He was born at Rohrau, Lower Austria, March 31, 1732. His father was a traveling wheelwright, with a natural love of music. The sweetness of the boy's voice and his correct ear for pitch were noted early. His cousin, Matthias Frankh, a schoolmaster and choirmaster in Hainburg, took the lad, whom the father had destined for the Church, to his home for musical instruction. Though treated at times with much harshness, he undoubtedly was started on his career by Frankh.

From his eighth to his eighteenth year Haydn was a pupil in the choir school of St. Stephen's, Vienna, Kapellmeister Reutter having heard him sing in Hainburg. Though wretchedly poor and often without sufficient food, he studied diligently and at 13 composed a mass. When his voice broke, Reutter made his boyish prank in cutting off a fellow pupil's queue the occasion

for his dismissal. A former chorister whom he chanced to meet took him in, and a kind-hearted tradesman, named Buchholz, loaned him 150 florins. Haydn not only repaid the loan, but years afterward remembered Buchholz's granddaughter in his will. Gratitude, tolerance, and the never-failing good humor which is reflected in his music, and which even a wretched marriage could not mar, mingled in his nature.

Through Metastasio, the Italian poet and librettist, Haydn secured pupils, himself taking lessons in composition from Porpora, for which he paid by menial duties. In 1758 his circumstances changed for the better. Through Baron Fürnberg, for whom he had composed his first quartet, and Countess Thun, he was appointed musical director to Count Franz Morzin, for whose orchestra he wrote his first symphony. It was during this incumbency that he married the eldest daughter of a Viennese wigmaker, named Keller. He had loved the younger daughter, but she entered a convent, and urged by her father he married her sister instead. His wife was utterly unsympathetic and unworthy of him. She tore up his manuscripts for curl papers and pie forms, squandered his earnings for finery, and even selected a house to live in in anticipation of her widowhood. By an irony of fate Haydn survived her and went to live in this very house.

In 1760 he became kapellmeister to Prince Paul Anton Esterházy and retained this position under his original patron's successors till near the time of his death. Prince Nikolaus played upon the barytone (a stringed instrument superseded by the cello), and for this instrument alone Haydn wrote 175 pieces. For operatic performances in the princely household he composed more than a dozen operas, and for concerts numerous symphonies, quartets, and sonatas.

Haydn and Mozart became acquainted in 1781, and from then until Mozart's death a close and generous friendship existed between them. Beethoven (q.v.) was a pupil of Haydn's for about a year, but, despite the fact that the latter praised some of his compositions, he soon grew dissatisfied with his teacher. Haydn's fame, however, steadily increased, and when, in December, 1791, he arrived in London under engagement to Salomon the violinist, he was the musical lion of the season, as he was also on his second visit, in 1794. His *Salomon* symphonies were composed for his London concerts. The famous Austrian national anthem he composed in 1797, and in 1798 he produced his greatest work, the oratorio *The Creation*, following it with *The Seasons* in 1801. His last years were ailing, and his undermined constitution could not stand the shock of the bombardment of his beloved Vienna by the French in May, 1809. After the third shot he fell into convulsions, and on May 31 he died. For almost a century after his death Haydn was regarded as the "Father of the Symphony" and the "Father of the Modern Orchestra." The recent rediscovery of the works of Stamitz (q.v.), who was born 15 years before Haydn, establishes beyond a doubt the claims of the latter to both these honors. As a matter of fact, the earlier works of Haydn are much inferior to those of Stamitz. Only gradually did Haydn's genius unfold itself, more especially after his acquaintance with Mozart, whom he venerated beyond everything and whom he regarded as the greatest musical genius the world had ever seen. Haydn adopted Stamitz's style and form (the "sonata form") and his individual treatment of the orchestral instruments without adding anything of his own on the mere technical side. His inborn genius, however, filled these forms with such content that before long Stamitz fell into undeserved oblivion. Haydn, though not the creator of the new instrumental style, still maintains his lofty position in the history of music as the earliest of the really great masters of the new style. The prevailing note of his music is joyousness, frequently mingled with droll and even boisterous humor; he never compasses the sublime and occasionally merely hints at the tragic.

Haydn was honored even during his lifetime by a monument erected near his birthplace by Count Harrach, in whose service his mother had been. He attended the unveiling on his return from his first London season. His musical output was enormous. It included 104 symphonies, 77 string quartets, 66 divertissements, 16 concert overtures, 51 concertos for various instruments with orchestra, 68 trios for various combinations of instruments, 12 sonatas for violin and piano, 33 sonatas for piano, and an endless number of smaller pieces. Besides the oratorios already mentioned, he wrote *Il ritorno di Tobia*, 26 masses, 2 requiems, and a great number of motets and sacred arias. His 24 operas and his songs are forgotten to-day. *Die sieben Worte am Kreuze*, originally written as a symphony, was later changed to an oratorio by his brother Johann (q.v.). In 1908 Breitkoff and Härtel, of Leipzig, began the publication of the first complete edition of Haydn's works (estimated to comprise more than 80 volumes). The editor is E. von Mandyczewski. Many works have never been published, and as recently as 1913 an unknown symphony was discovered.

Bibliography. C. F. Pohl, *Mozart and Haydn in London* (Vienna, 1867); id., *Josef Haydn* (2 vols., Leipzig, 1875–82); Nohl, *Life of Haydn* (trans. by Upton, Chicago, 1889); L. Schmidt, *J. Haydn* (Berlin, 1907); M. Brenet, *Haydn* (Paris, 1909); F. H. Cowan, *Haydn* (New York, 1912).

HAY'DON, Benjamin Robert (1786–1846). An English historical painter. He was born at Plymouth, Jan. 26, 1786, the son of a printer and publisher. He was educated at Plymouth and at Plympton. While an apprentice to his father, he was attacked by a malady that caused a dimness of vision which in after life prevented his executing small pictures. In 1804 he went to London and spent two years studying, drawing from the cast by himself, attending the Academy schools and the lectures on anatomy by Charles Ball. He was one of the first of the English artists to appreciate the Elgin Marbles, and it was largely through his efforts that they were acquired by the nation. From his studies of them he received inspiration for the painting "Dentatus" (1809), which brought him a premium of 100 guineas at the Academy Exhibition. But he was never elected a member of the Academy, owing to his constant quarrels with the members. His quarrel with the Academy was further aggravated by various slights, and by letters written by himself for publication, which alienated many of his powerful friends. In 1821 he married Mary Hymans, a beautiful widow, who did much to lighten his disappointments in life.

His life was an heroic struggle against adverse circumstances, partially the fault of others, but also as a result of his unscrupulousness in money matters, vanity, and egotism. His *Journal*, consisting of 26 manuscript volumes, contains a vivid record of this struggle. He painted only very large historical canvases, which involved him in debt, and he was several times an inmate of the debtors' prison. During his second confinement he painted the "Mock Election," which George IV purchased for 500 guineas.

Although his ability was not recognized by the Academy, he numbered among his admirers such men as Keats and Wordsworth, both of whom wrote sonnets to him, Sir Walter Scott, Charles Lamb, Southey, Hazlitt, and Mrs. Siddons. They especially appreciated his ambitious plans for the promotion of British art, which he inculcated in his letters, pamphlets, books, and lectures. Among his published works the best known is his *Lectures on Design* (London, 1844–46), delivered at the Mechanics' Institute at London, and often repeated, not only in the principal cities of England, but at the University of Oxford. As a teacher, he was equally successful, numbering among his pupils Sir Charles Eastlake, Charles and Thomas Landseer, William Harvey, George Lance, and William Berwick. But although his ideas on schools of design and the decoration of the Houses of Parliament were adopted, he was neglected when it came to carrying them out. His cartoons for the latter were rejected. He struggled through life, mostly in great poverty, and finally, overcome by the mental strain consequent on the failure of the exhibition of his last two pictures, he committed suicide in the Thames, June 22, 1846.

Haydon was the greatest British historical painter of his day. His aims and ideals were lofty, and with the advantage of good technical training (such as certain continental schools afforded) he might have achieved wonders. As it was, his art was deficient in pictorial qualities. Haydon's drawing shows knowledge of anatomy, although it is often defective in proportions; his color, at times rich, is not always harmonious; his conceptions are always vigorous, but the execution is very unequal. The works which attracted most attention during his lifetime were: "Joseph and Mary Resting on the Road to Egypt" (1806); "Dentatus" (1809); "Romeo and Juliet" (1809); "Judgment of Solomon" (1814); "Christ's Entry into Jerusalem" (1820), now in Philadelphia; "Lazarus" (1882), now in the National Gallery; "Christ Blessing Little Children"; the "Anti-slavery Society at Freemasons' Hall" (1840), now in the National Portrait Gallery. Among his other works are "Venus and Anchises"; "Alexander and Bucephalus"; "Napoleon at St. Helena," Metropolitan Museum, New York; "Cassandra"; "Xenophon"; "Eucles," National Gallery; "The Mock Election"; "Maid of Saragossa"; "Banishment of Aristides"; "Nero Playing the Lyre during the Burning of Rome." Consult: Haydon's *Correspondence and Table Talk*, edited by his son, F. W. Haydon (London, 1876); Tom Taylor, *Life of Haydon* (ib., 1883); Redgrave, *A Century of Painters of the English School* (ib., 1866); Symonds, *B. R. Haydon and his Friends* (New York, 1905).

HAYDUCKS, hī'dụks. See HAIDUKS.

HAYE, L. M. DE LA. See CORMENIN.

HAYEL, hä'yĕl, or **HAIL,** hä'el. Capital of the Sultanate of Shomer, situated in the northern part of Arabia, about 250 miles northeast of Medina, 3550 feet above sea level (Map: Turkey in Asia, E 5). It is a walled town, a place of considerable trade, and summer residence of the emir. Pop., 25,000.

HAYEM, à'yăN', GEORGES (1841–). A French physician, born in Paris. He was educated at the University of Paris, where in 1879 he became a professor in the faculty of medicine. He was made a physician of the Saint-Antoine Hospital and in 1886 was elected a member of the Academy of Medicine. From 1873 to 1898 he edited the *Revue des sciences médicales en France et à l'étranger*. He also became an Officer in the Legion of Honor. His works include: *Des hémorragies intra-rachidiennes* (1872); *Du sang et de ses altérations anatomiques* (1889); *Leçons de thérapeutique* (1887–93); *Leçons sur les maladies du sang* (1900); *Les évolutions pathologiques de la digestion stomacale* (1907); *Maladies de l'estomac* (1913).

HAYES, hāz, AUGUSTUS ALLEN (1806–82). An American chemist, born at Windsor, Vt. He graduated at the Norwich Military Academy in 1823 and began the study of chemistry under Professor Dana at Dartmouth. Here he distinguished himself by his researches on the proximate constituents of American medicinal plants and by his discovery of the organic alkaloid sanguinaria, a compound remarkable for the brilliant colors of its salts. He was for a time assistant professor of chemistry in the New Hampshire Medical College and while there in 1827 investigated the compounds of chromium, and his paper on this subject was highly praised by Berzelius. His contributions were published in the *Proceedings* of the American Academy and of the Boston Society of Natural History, the *American Journal of Science*, and the *Annual of Scientific Discovery*. In 1837 his investigations into the generation of steam and the economy of fuel led to the construction of improved furnaces and boilers.

HAYES, C(HARLES) WILLARD (1859–1916). An American geologist, born at Granville, Ohio. He graduated from Oberlin College in 1883, and, after a year as a high-school principal and further study, gained his Ph.D. at Johns Hopkins in 1887. He was connected with the United States Geological Survey from 1887 to 1911 (chief geologist, 1902–11), serving in 1898–99 also as geologist of the Nicaraguan Canal Commission. In 1911 he became first vice president and general manager of the Mexican petroleum company, El Aguila. He is known for his articles on theoretic and economic geology and on the geology of the southern Appalachians, and for his *Handbook for Field Geologists* (1912).

HAYES, DOREMUS ALMY (1863–). An American Methodist Episcopal theologian. Born at Russelville, Ohio, he graduated from Ohio Wesleyan University in 1884 and from Boston University School of Theology in 1887, in the latter also receiving the degree of Ph.D. from Boston University. He was professor of the Greek language and literature at the University of the Pacific from 1888 to 1891; was then for a year in Berlin and Leipzig as Jacob Sleeper fellow of Boston University School of Theology; in 1895–96 was professor of biblical theology in the Iliff School of Theology; and thereafter was professor in Garrett Biblical Institute—of the

English Bible (1896–1901) and then of New Testament exegesis. He contributed to various Bible encyclopædias and to religious periodicals and is author of *The Synoptic Problem* (1912); *The Most Beautiful Book Ever Written* (1913); *The Gift of Tongues* (1913).

HAYES, Isaac Israel (1832–81). An American Arctic explorer, born in Chester Co., Pa. He went with Captain Kane as surgeon on the second Grinnell expedition in search of Sir John Franklin (1853–55). Distinguishing himself by tracing by sledge journey the coast of Grinnell Land to Cape Frazer, 79° 43′ N., Hayes differed with Kane as to the advisability of abandoning the *Advance* and attempted unsuccessfully to reach Upernivik by a boat journey, returning to Kane in the winter of 1853. Upon his return to the United States Hayes was fired with a desire to verify his conviction of the existence of an open polar sea. Through the influence of several scientific societies he succeeded in obtaining financial support and set out from Boston in 1860, with two astronomers and but 12 other persons, on board the *United States*. Wintering in Foulke Fiord, near Littleton Island, on the west coast of Greenland, he made an heroic attempt to reach the polar ocean in the spring of 1861. His astronomical observations were incorrect, either as to latitude or as to longitude, and it is uncertain at what point he thought himself to be on the shores of an open polar sea. Greely has given cogent reasons for fixing on Cape Goode, 80° 11′ N., as Hayes's farthest. From Cape Goode he would naturally look down on the large area of open water (from heavy tides) that occurs at the southern end of Kennedy Channel. The result of his explorations was to confirm him in the opinion, soon proved to be entirely erroneous, that an open route to the pole was practicable for steamships in summer from Cape Frazer. After his return Hayes was appointed from Pennsylvania as surgeon of volunteers, in which capacity he served until the end of the Civil War, being brevetted lieutenant colonel. Removing later to New York, he entered political life and served for five years as a member of the New York Assembly. He made a voyage to Greenland in 1869; published *An Arctic Boat Journey* (1860), *The Open Polar Sea* (1867), *Cast Away in the Cold* (1868), *The Land of Desolation* (1871); and was honored by medals from the Royal Geographical Society of London and the Société de Géographie of Paris.

HAYES, Rutherford Birchard (1822–93). The nineteenth President of the United States. He was born in Delaware, Ohio, Oct. 4, 1822. He was a descendant in the sixth generation of George Hayes, who left Scotland in 1680 and settled at Windsor, Conn. His grandfather, Rutherford Hayes, born in New Haven, Conn., in 1756, settled in Brattleboro, Vt. Here the father of the President, also named Rutherford, was born. Rutherford senior and his wife emigrated to Ohio in 1817, but the father died shortly before his son's birth. When the boy was 16 years old, he was sent to Kenyon College, where he graduated at the head of his class in 1842. He studied law for two years in the office of Thomas Sparrow, of Columbus, and subsequently spent two years (1843–45) in the Harvard Law School. In 1845 he was admitted to the bar at Marietta, Ohio, and soon afterward entered into practice at Fremont, the residence of his uncle Sardis Birchard, then a wealthy banker. In 1849 he removed to Cincinnati, where he soon gained a remunerative practice and became prominent in his profession. In 1852 he married Miss Lucy W. Webb, daughter of Dr. James Webb, of Chillicothe, Ohio. He took an active part in the first Republican presidential campaign and from 1858 to 1861 served as city solicitor. In 1861, when the Civil War broke out, he enlisted for the whole war, and on June 7 was commissioned as major of the Twenty-third Ohio, of which W. S. Rosecrans was colonel. To the regiment was assigned the duty, at Clarksburg, W. Va., of protecting the Baltimore and Ohio Railroad and of defending the border from raids; and Major Hayes took a prominent part in various expeditions necessary for the defense of the position. He served for a time as judge advocate of the Department of Ohio, and in August, 1862, he was promoted to the colonelcy of the Seventy-ninth Ohio, but he preferred to remain, with the rank of lieutenant colonel, with the Twenty-third, which had been incorporated with Burnside's command in the Army of the Potomac. At South Mountain (q.v.) the Twenty-third, led by Hayes, was hotly engaged, more than 100 of Hayes's men falling dead or wounded, and he himself being wounded in the arm. There was a pause for reënforcements, when a dangerous flank movement of the enemy was discovered, and Hayes was again seen at the head of the regiment. He was finally carried, fainting with loss of blood, from the field. Upon his recovery he was promoted to the rank of colonel and rejoined his regiment near the falls of the Great Kanawha. There he remained until March 15, 1863, when his regiment was ordered to Charleston, W. Va. After this he led in several important expeditions, notably in that which he himself organized to dispute the retreat of Morgan (q.v.) and his band after their raid through Ohio. By a quick movement he cut off Morgan's retreat and forced him to surrender. In the famous raid upon the Virginia and Tennessee Railroad, in May, 1864, he led the principal assault upon the enemy's fortifications with admirable boldness and success. He took an honorable part in the attack on Lynchburg, June 18, covering the retreat of the Union forces under dangerous conditions with perfect success. In the campaign of the Shenandoah, under Sheridan (q.v.), his services were conspicuous and valiant. In the battle of Winchester especially he displayed great coolness and courage in the most trying circumstances. "For gallant and meritorious services in the battles of Winchester, Fisher's Hill, and Cedar Creek," he was after the last-named battle speedily promoted to the rank of brigadier general; and "for gallant and distinguished services during the campaign in West Virginia, and particularly at the battles of Fisher's Hill and Cedar Creek," he was, on March 13, 1865, brevetted major general.

His achievements in the war made his name popular in Ohio, and when the Republicans of the Second District felt the need of a strong candidate for Congress, he consented to accept the nomination, with the understanding that he would not take the seat unless the war should meantime be ended. When, after the close of the war, he entered Congress, he at once attracted attention by his ability. He was reelected in 1866, but had served only his first term when the Republicans of Ohio, in 1867, nominated him as their candidate for Governor,

under the conviction that he was the one man whom they could hope to elect. He was chosen by a majority of 3000 and reëlected in 1869 by a majority of 7518. He was elected for the third time in 1875, and while occupying the place was nominated by the Republican party as its candidate for President of the United States, William A. Wheeler being nominated for Vice President. The nominees of the Democratic party were Samuel J. Tilden and Thomas A. Hendricks. The contest was severe and close, and disputes arose as to the electoral votes of several States. After a period of great tension all the contested cases were decided in favor of Hayes by the Electoral Commission (q.v.), and, having a majority of one electoral vote (185 to 184), he was duly inaugurated on March 4, 1877. Aside from violent partisan disputes upon the questions adjudicated by the Electoral Commission, his administration was admitted by men of all parties to have been pure and honorable. An effort was made to reduce the evil of using appointments to office as rewards for partisan services, but this policy did not meet with hearty support among politicians. The President also failed to maintain close harmony with the party leaders in his attitude towards the "reconstructed" States, from which he aimed to withdraw the Federal troops, even against the vigorous demands of the radicals for a continuation of the military supervision. He was generally recognized as a pacificator at a time when conciliation was essential to peace. Upon all political questions save those above referred to he was in full harmony with the Republican party, and by his courageous and unflinching exercise of the veto power prevented the adoption of measures calculated to injure the credit of the country and hinder a return to specie payments. He also, by the interposition of the same power, prevented the repeal of the laws enacted by Congress, under the express authority of the Constitution, to guard the purity of national elections. After his retirement from public office President Hayes devoted himself as a private citizen to the support of philanthropy and education. He died at Fremont, Jan. 17, 1893. Consult Stoddard, . . . *Hayes, . . . Garfield, and . . . Arthur* (New York, 1889), and Gladden, *The Great Commoner of Ohio* (Columbus, 1893). For the circumstances of his election, see Haworth, *The Disputed Election of 1876* (Cleveland, 1906), which is somewhat biased, and Bigelow (ed.), *Letters and Literary Memorials of Samuel J. Tilden*, vol. ii (New York, 1908). There are also three campaign biographies: Howard, *Life, Public Services, and Select Speeches of Rutherford B. Hayes* (Cincinnati, 1876); Howells, *Life of R. B. Hayes* (New York, 1876); and Conwell, *Life and Public Services of Gov. . . . Hayes* (Philadelphia, 1876). For an account of the administration of Hayes, see UNITED STATES.

HAYEZ, ï'âts, FRANCESCO (1791–1882). An Italian genre and historical painter, born in Venice. He studied under Maggiotto at the Venice Academy and afterward at the Academy of Milan and under Palagi in Rome. In 1820 he was appointed professor at the Milan Academy and became head of the Romantic movement in Italian art. He is chiefly noted as a vigorous colorist. Among his best-known works are frescoes in the Vatican and the Venice Academy and the following pictures: "The Two Foscari," Vienna Museum; "Peter the Hermit"; "The Farewells of Pietro Rossi and his Family" (1820); "The Flight of Bianca Capello" (1854), National Gallery, Berlin; "The Battle of Magenta," and a portrait of Cavour.

HAY FEVER, HAY ASTHMA, HAY COLD, ROSE COLD, or AUTUMNAL CATARRH. A nervous affection which recurs annually at about the same time of the year and lasts several weeks, characterized by a profuse flow of secretion fron the nose, as well as of tears from the eyes, with frequent sneezing, general malaise, irritability, insomnia, depression, and in many cases asthma. The eyes flinch in bright light, headache occurs daily, appetite is lessened, and rarely there is fever. In some patients the attack appears in June and lasts about a fortnight. This is termed rose cold. Many suffer first in July, during haying; but probably the greater number begin to suffer early in August and are relieved only on the approach of frost in October. The cause appears to be threefold: 1. A central nervous disease, with the lesion probably in the floor of the fourth ventricle in the brain, as in spasmodic asthma. 2. Intranasal deformity, as a deviating septum, or distorted and chafing turbinates. 3. A special pollen of some plants, affecting some and failing to excite others; while during the whole year fine dust causes in these patients sneezing, coryza, and slight rhinitis, lasting an hour or so. Removal to the seashore or a sea voyage benefits many patients; while a sojourn in the mountains at an altitude of 1000 feet or more benefits a large number. Of the mountains in the eastern part of the United States the White Mountains have the greatest reputation with regard to the effect of their atmosphere upon hay-fever patients. On returning home before frost, however, the affection recurs. It is said that most hay-fever patients are people of considerable intellectual development; certainly many are neurotics. Arsenic, iodides, and bromides benefit some. Nasal sprays and internal administration of extract of suprarenal gland (adrenalin, q.v.) are serviceable in many cases, relieving the nasal stenosis. In England and on the Continent the disease appears to be of milder type and to run a course of only a month. Dunbar's pollantin, an antitoxin obtained from animals into which pollen of rye and other grasses had been injected, was used in 1894 by Berlin experimenters who reported 57 per cent of cures, 32 per cent of improvement in the early variety of the disease, 70 per cent of cures, and 19 per cent of improvement in the fall variety. Pollantin is applied in the form of serum, powder, or ointment—generally to the eyes, sometimes to the nose. American clinicians do not obtain such a high percentage of cures as those reported by the Berlin investigators. Many sufferers are cured or greatly relieved by surgical correction of diseased conditions in the nose.

HAY'FORD, JOHN FILLMORE (1868–). An American civil engineer. He was born at Rouse's Point, N. Y., and graduated as a civil engineer from Cornell University in 1889. Until 1909 he served (periodically) with the United States Coast and Geodetic Survey in various capacities, becoming expert computer and geodesist in 1898, and in 1900 inspector of the geodetic work and chief of the computing division. He was assistant astronomer of the International Boundary Commission of the United States and Mexico in 1892–93, taught civil engineering at Cornell in 1895–98, and in 1909 became director of the College of Engineering of Northwestern

University. Besides monographs, he is author of *A Text Book of Geodetic Astronomy* (1898).

HAY'GOOD, ATTICUS GREEN (1839–96). An American clergyman of the Methodist Episcopal Church South, born in Watkinsville, Ga. He graduated at Emory College, Georgia, in 1859, and soon afterward entered the ministry. Between 1870 and 1875 he edited the Sunday-school publications of the Southern branch of the church. He was president of Emory College from 1876 to 1884 and from 1878 to 1882 was editor of the *Wesleyan Christian Advocate.* Large sums of money were placed in his hands to promote various institutions, and in 1883 he was elected general agent of the Slater fund of $1,000,000 for the education of Southern negroes. He declined an election as Bishop of the Methodist Episcopal Church South in 1882, but accepted another election in 1890. His works include: *Our Children* (1876); *Our Brother in Black* (1881); *Speeches and Sermons* (1884); *Pleas for Progress* (1889); *Jackknife and Brambles* (1893); *The Monk and the Prince* (1895).

HAY'LEY, WILLIAM (1745–1820). An English poet, born at Chichester. He was educated at Eton and at Trinity College, Cambridge. After some ill success as a playwright, he began the production of poetical epistles to his friends—one on *Painting* to Romney (c.1777), e.g., and one on *History* (1780) to Gibbon. In *English Bards and Scotch Reviewers* Byron impales Hayley as the author of the eminently successful poems, *The Triumphs of Temper* (1781) and *The Triumphs of Music* (1804). His prose *Life of Milton* (1794) was a more creditable performance, and through the writing of it he became an intimate friend of Cowper, for whom he was influential in obtaining a pension. Blake's illustrations enhance the value of his *Ballads Founded on Anecdotes of Animals* (1805), and on the whole Hayley is more interesting as the friend of great men than on his own account. His volume of *Memoirs,* published in 1823, is his most important contribution to literature.

HAYM, hīm, RUDOLF (1821–1901). A German writer on philosophy and literary history, born at Grünberg in Silesia. He studied at the universities of Halle and Berlin and was a delegate to the National Assembly at Frankfort (1848–49). From 1858 to 1864 he edited the *Preussischen Jahrbücher.* In 1851 he became instructor in philosophy and modern literature at the University of Halle, in 1860 he was made assistant professor and in 1868 professor. He wrote a number of excellent biographies, among them: *W. von Humboldt* (1856); *Hegel und seine Zeit* (1857); *Arthur Schopenhauer* (1864); *Herder, nach seinem Leben und seinen Werken dargestellt* (1877–85); *Das Leben Max Dunkers* (1890). He also published *Die romantische Schule* (1870), *Erinnerungen aus meinem Leben* (1901); and edited *Briefe von W. von Humboldt an G. H. L. Nicolovius* (1894). Consult *Philosophische Abhandlungen dem Andenken Rudolf Hayms gewidmet von Freunden und Schülern* (1902).

HAY'MAR'KET, THE. A former market for hay and straw in London, founded in the first half of the seventeenth century and discontinued in 1830. On the square of the same name, occupying the site of the market, stand the Haymarket and His Majesty's theatres. Addison wrote *The Campaign* while living there.

HAYMARKET SQUARE RIOT, THE. An occurrence at Chicago, May 4, 1886, in a square in Randolph Street, where an anarchist meeting was in progress. The attempt to disperse the gathering resulted in the killing of seven policemen and the wounding of 27 others, by a bomb, thrown by an unidentified member of the mob, supposed to have been one Schnaubelt. The actual bomb thrower was never caught, but August Spies, Adolph Fischer, George Engel, and Albert Parsons were hanged as accomplices on Nov. 11, 1887; Samuel Fielden and Michael Schwab were sentenced to imprisonment for life, and Oscar Neebe for 15 years (all three pardoned by Gov. John P. Altgeld, q.v.); and Louis Ling escaped the gallows only by committing suicide in prison.

HAYMARKET THEATRE. One of the most famous playhouses in London. It was originally built in 1720 by John Potter, on the site of the King's Head Tavern, in the Haymarket, and leased to a French company, whence the appellation, the New French Theatre, by which it was for some time known. Fielding produced his burlesque *Tom Thumb the Great* there in 1730 and in 1734 became manager. Ten years later Charles Machlin assumed its management and was followed in 1747 by Samuel Foote. In 1776, however, Colman the Elder purchased it, and it was managed by him until 1794. In 1820, under Harris's management, the theatre was abandoned, and a new one was built near by, which was opened on July 4, 1821, with *The Rivals.* In 1880 it was again removed, its present site being the south end of the Haymarket, opposite Charles Street. Consult Cyril Maude, *The Haymarket Theatre: Some Records and Reminiscences* (London, 1903), and H. B. Baker, *History of the London Stage* (New York, 1904).

HAYMERLE, hī'mĕr-le, HEINRICH KARL, BARON (1828–81). An Austrian statesman, born and educated at Vienna. He took part in the students' rising in the revolution of 1848 and narrowly escaped execution. He served in the diplomatic corps at Athens, Dresden, and Frankfort as Secretary of Legation; became Ambassador to Copenhagen in 1864, took part in negotiating the Treaty of Prague (1866), and from Berlin went to Constantinople (1868) and to Athens (1869), thence to The Hague (1872), and in 1877 to the Italian court. In the following year he took part in the Berlin Congress and in 1879 succeeded Andrássy as Minister of Foreign Affairs. In this post, which he held till his death, he was especially active in effecting friendly relations with Italy and cementing the alliance with Germany. Consult Arneth, *Heinrich Freiherr von Haymerle* (2d ed., Berlin, 1882).

HAYMO. See HAIMO.

HAYNAU, hī'nou, JULIUS JAKOB, BARON (1786–1853). An Austrian general. He was the natural son of the Elector William I of Hesse and was born at Cassel, Oct. 14, 1786. He entered the Austrian service in 1801 and served throughout the Napoleonic wars, being wounded at Wagram. He was gradually advanced in rank, becoming colonel in 1830, major general in 1835, and field marshal lieutenant in 1844. During the Italian campaigns of 1848–49 he evinced great military talents, but acquired also an unenviable reputation for cruelty, especially in the repression of the insurrection at Brescia, March 31 and April 1, 1849. Haynau was engaged in the siege of Venice, when he was summoned to Hungary to command the Imperial

forces in that country. On August 9 he gained a decisive victory over the Hungarians near Temesvár. After the surrender of the Hungarian main army at Világos he executed a number of the leading Hungarian generals. In 1850, however, after being loaded with honors, he was dismissed from public service for the intractability of his disposition. In the same year he made a tour of Europe, but so general was the hatred his acts had inspired that he was several times in great danger from mobs, and while in London was assaulted and beaten by the infuriated draymen of Barclay's brewery. For this insult the British government declined giving any satisfaction. In Belgium and France he was also received by the populace with strong dislike, but the vigilance of the authorities preserved him from actual harm. He died at Vienna, March 14, 1853. Consult Schönhals, *Biographie des Feldzeugmeisters Julius Freiherrn von Haynau* (3d ed., Vienna, 1875), which seeks to vindicate him from charges of cruelty.

HAYNE, hān, Paul Hamilton (1831–86). An American poet, born in Charleston, S. C. After the death of his parents he was reared by his uncle, Robert Y. Hayne (q.v.). He studied law after having been educated at South Carolina College, but did little practicing because he was under no financial necessities and because his bent was literary. When in his early twenties he edited *Russell's Magazine* and was connected, as editor or contributor, with other Charleston and Southern publications, notably as contributor to the *Southern Literary Messenger*. He was a prominent member of the small literary coterie of which William Gilmore Simms and Henry Timrod (q.v.) were conspicuous ornaments. In 1855 a volume of his poems appeared; another followed in 1857, and a third in 1859. During the Civil War he saw active service and suffered great financial losses—among others that of his library, which was burned. From 1865 to his death he resided at a small cottage home near Augusta, Ga., which he called Copse Hill. His health was not good, but he maintained his spirits under his various misfortunes and won a genuine though limited reputation as a poet in both the North and his native section. His memory is still cherished warmly in Augusta and the surrounding region. His later publications include: *Legends and Lyrics* (1872); *The Mountain of the Lovers* (1873); and his *complete Poetical Works* (1882). He also edited, with a memoir (1873), the poems of his friend, Henry Timrod, and of Dr. F. O. Ticknor (1879), and wrote memoirs of R. Y. Hayne and H. S. Legaré (1878). Hayne's poetry is the work of a genuine artist, whose qualities, however, are not salient enough to attract greatly the general reader. Although he produced many good poems, in which much of the languorous sweetness of the South may be discovered, it was not his fortune to compose, like his friend Henry Timrod, lyrics of great power and popular appeal. Nevertheless he is one of the most important of Southern writers and deserves more attention at the hands of historians of American literature than he has hitherto received.—His son, William H. Hayne (1856–), born in Charleston, inherited some of his father's poetical ability. His publications include *Sylvan Lyrics* (1893) and many occasional verses in the magazines.

HAYNE, Robert Young (1791–1839). An American political leader, prominent as an exponent of the States' Rights view of the Federal Constitution. He was born in St. Paul's Parish, Colleton District, S. C., on Nov. 10, 1791, was educated in a private school at Charleston, studied law in the offices of Langdon Cheves (q.v.), was admitted to the bar at Charleston in November, 1812, and attained immediate prominence in his profession. During part of the War of 1812 he acted as a captain in the Third South Carolina Regiment. From 1814 to 1818 he was a Democratic-Republican member of the State Legislature, serving as Speaker of the House in the latter year, and from 1818 to 1822 was Attorney-General of the State. In 1823 he was elected as a States' Rights Democrat to the United States Senate, in which body he quickly became conspicuous as a pronounced strict-constructionist and an advocate of free trade and of States' Rights. He vigorously opposed the tariffs of 1824 and 1828, denounced the antislavery programme of the Panama Congress, and in various debates upheld the view that slavery was purely a domestic institution, and as such should be wholly exempt from Federal legislation or interference. He is best known, however, for his great debate with Daniel Webster in January, 1830, arising out of the so-called Foote's Resolution, but covering the important question of the relation of the States to the Federal government. Hayne began the debate on January 19, and Webster answered on the following day, while Hayne again spoke on the 21st, 25th, and 27th, and Webster on the 26th and 27th. In these speeches, besides attacking New England, and especially Massachusetts, for the part taken by that section in the War of 1812, he brilliantly upheld the theory that the Federal government was in reality a compact between the various States, as such; that the Federal government itself was a party with each of the individual States to the compact thus formed, and that any State, when convinced that that compact had been broken, could for its own protection nullify or arrest the enforcement within her borders of any law deemed to be in violation of the Constitution. He naturally supported South Carolina in her controversy with the Federal government over the tariff measures of May, 1828, and July, 1832; was a member of the Nullification Convention which assembled at Charleston on Nov. 19, 1832; and as chairman of the Committee of Twenty-one, reported the famous Ordinance of Nullification, which was passed by the convention on November 24. Soon afterward he resigned from the Senate, partly, no doubt, in order that Calhoun might take his seat in that body; and in December he was elected Governor of the State and commander in chief of the State forces. On the 13th he delivered his inaugural address, pledging himself to maintain at all hazards the principle of nullification, and on the 20th issued a ringing counterproclamation to the famous proclamation issued by President Jackson on the 10th. During the whole crisis he administered the executive office with marked ability, and though firmly convinced of the correctness of the position taken by his State, he used his influence on several occasions to restrain the nullificationists from acts of violence. His term as Governor ended in December, 1834. He was mayor (intendant) of Charleston in 1835–37, and president of the Louisville, Cincinnati, and Charleston Railroad from 1836 until his death. He died at Asheville, N. C., Sept. 24, 1839. Consult: Paul H. Hayne, *Lives of Robert Y. Hayne and Hugh Swinton Legaré* (Charleston,

1878); McDuffie, *Eulogy upon the Life and Character of the Late Robert Y. Hayne* (ib., 1840); Lindsay Swift (ed.), *The Great Debate Between Robert Y. Hayne, of South Carolina, and Daniel Webster, of Massachusetts* (Boston, 1898), in the "Riverside Literature Series"; Jervey, *Robert Y. Hayne and his Times* (New York, 1909).

HAYNES, hānz, ELWOOD (1857–). An American inventor. Born at Portland, Ind., he graduated from Worcester Polytechnic Institute in 1881, and after study at Johns Hopkins University (1884–85), taught sciences for a year. He was manager of the Portland Natural Gas and Oil Company until 1890 and then field superintendent of the Indiana Natural Gas and Oil Company until 1901. In 1898 he became president of the Haynes Automobile Company. In 1893–94 he constructed a horseless carriage, now exhibited at the Smithsonian Institution. He found several metallic alloys useful in connection with the manufacture of automobiles.

HAYNES, HENRY WILLIAMSON (1831–1912). An American archæologist, born in Bangor, Me., son of Nathaniel Haynes, editor of the *Eastern Republican.* He graduated at Harvard in 1851, studied law, and practiced for a few years. Then he was appointed professor of Latin and later of Greek in the University of Vermont, a chair from which he resigned in 1873 to make archæological researches in Europe and in Egypt. His memoirs on the Paleolithic Age in Egypt (1878) won him a medal and a diploma from the Anthropological Congress of that year in Paris and afterward were published in the papers of the American Academy of Arts and Sciences. Haynes was long a fellow of the American Association for the Advancement of Science, and recording secretary of the Massachusetts Historical Society.

HAYNES, JOHN (?–1654). An English Colonial Governor in New England. He was born in Essex, but emigrated to Newe Towne (now Cambridge), Mass., with other Puritans in 1633. He was Governor of Massachusetts in 1635–36 and then became one of the settlers of Hartford, Conn. In 1639 he was chosen Governor of Connecticut (of whose constitution he was one of the five framers), and to this office he was reelected as often as the law permitted—i.e., each alternate year until his death—serving in five of the alternate years as Deputy Governor. In Bancroft's *History of the United States,* vol. i, he is described as being "of a very large estate and large affections; of a heavenly mind and a spotless life; of rare sagacity and accurate but unassuming judgment; by nature tolerant, ever a friend of freedom."

HAYNES, JOHN HENRY (?–1910). An American archæologist, born at Rowe, Mass. He graduated from Williams College in 1876 and taught school for several years in Massachusetts. An expedition to Crete made with W. J. Stillman, aroused his interest in archæology. He went with the American expedition to Assos, tutored at Robert College, Constantinople, for three years, was manager of the Wolfe expedition to Babylonia in 1884, and then was teacher and treasurer at the Central Turkey College at Amtal until 1888. He accompanied two expeditions to Babylonia and had charge of two more in 1892 and 1898, under the auspices of the University of Pennsylvania, and in the intervals served as United States Consul at Bagdad. His discoveries were of importance.

HAYNES, JOSEPH. See HAINES.

HAY-PAUNCEFOTE (hā'-pans'fut) **TREATY.** The convention negotiated in 1901 by John Hay, Secretary of State, on the part of the United States, and Lord Pauncefote, the British Ambassador at Washington, on the part of Great Britain, which abrogated the Clayton-Bulwer Treaty (q.v.) and defined the policy which should govern the United States in the construction and maintenance of an Isthmian canal between the Atlantic and Pacific oceans. The Clayton-Bulwer Treaty was extremely unpopular in the United States, owing to its provision that any canal which should be constructed to connect the Atlantic and Pacific oceans should be the work of both nations and should be under their joint control. The statement in President McKinley's annual message to Congress in 1898, that the construction of the canal had become a national necessity, led to diplomatic correspondence that resulted finally in the opening of negotiations, with the end in view of so modifying the Clayton-Bulwer Treaty that, without affecting the general policy of neutrality enunciated therein, the United States would be enabled to proceed alone with the construction of the canal and have the sole right of control over it. The treaty then negotiated, and transmitted to the United States Senate by President McKinley on Feb. 5, 1900, provided: (1) for the construction of the canal by or under the auspices of the United States government; (2) for its neutralization on the same basis as the Suez Canal; and (3) for an invitation to other powers to join in guaranteeing such neutrality. The convention was finally ratified by the Senate on Dec. 20, 1900; but with three amendments—the first of which provided that the restrictions contained in the second article, based on the Suez convention, should not apply to such measures as the United States might find it necessary to take for their own defense and the maintenance of public order; the second explicitly stated that the Clayton-Bulwer Treaty was thereby abrogated; and the third struck out the provision in regard to the guarantee to be asked of other nonconstructing powers. In its amended shape Great Britain refused to ratify the convention, and it expired by limitation on March 5, 1901. Negotiations for a new treaty were immediately started, however, by Secretary of State Hay and Lord Pauncefote; the new convention was signed by them on Nov. 18, 1901, transmitted to the Senate by President Roosevelt on December 5 following, and ratified by that body, with but slight opposition, 11 days later. The principal differences between the first and final treaties were three in number: (1) no guarantees of the canal's neutrality were to be asked either of Great Britain or any other power; (2) the Clayton-Bulwer Treaty was specifically abrogated, although the general principle of neutrality contained therein was retained; (3) certain undefined rights of control were to be allowed to the United States in time of war, the exact nature and extent of which were not specified, but there was no requirement that the canal should be kept open and free in time of war as in time of peace, nor was there a prohibition of the erection of fortifications commanding the canal or its adjacent waters. It was further provided that the canal to be constructed should be open to the ships of all nations on equal terms, and that no change in the sovereignty of the territory traversed by the

canal should alter the principle of neutrality and of equal rights of all nations to enjoy the benefits of the canal. The completion of the canal over the Isthmus of Panama and the enactment by Congress of the Panama Canal Act in 1911, providing for the exemption of American vessels engaged in domestic commerce from the tolls imposed on other vessels, raised the last-mentioned provision into prominence and excited great controversy. The government of Great Britain formally protested against the exemption of domestic American shipping on the ground that it constitutes a clear violation of the provision of the treaty which guarantees equal treatment of the shipping of all nations using the canal, and suggested the reference of the controversy to arbitration. On the other side it was contended (1) that the clause forbidding discrimination among the users of the canal had no reference to domestic but only to foreign commerce; (2) that the provision was intended to confer equal privileges only on foreign nations as between themselves and not to limit the power of the United States to regulate its commerce, foreign and domestic, in its own interest; and (3) that the acquisition of the Canal Zone by the United States was such a change of conditions existing at the time the treaty was made or contemplated by those who framed it as to render the restrictive provisions null and void. It was also urged by the large and aggressive party opposing the claims of Great Britain that the treaty is so clearly at variance with the fundamental interests of the United States as to demand its immediate abrogation. No action was taken on the request of Great Britain that the question at issue be submitted to arbitration, but, President Wilson having taken the view that the national honor and the best interests of the country call for the strict observance of the treaty in its spirit as well as its letter, Congress, on his recommendation, but in the face of strong opposition, passed a bill repealing the obnoxious provisions of the Panama Canal Act (1914). Notwithstanding this victory for the treaty, it cannot be said that it is popular in the United States. Much of the irritation with the Clayton-Bulwer Treaty, which resulted in its abrogation, has been transferred to its successor. It is widely regarded as an undue interference with the freedom of action of a sovereign nation—the Panama Canal strip having come to be popularly regarded as a part of the territory of the United States. Consult L. Nixon, *Canal Tolls and American Shipping* (New York, 1914).

HAY RIVER. A river at Alberta, Canada, which rises in the Rocky Mountains in British Columbia, and flows northeast, emptying into the Great Slave Lake (Map: Canada, G 5). Its length is 350 miles, of which 140 are navigable. The two Alexandra Falls, averaging 900 feet wide and about 250 feet high, occur in its course.

HAYS. A city and the county seat of Ellis Co., Kans., 222 miles by rail west of Topeka, on Big Creek, and on the Union Pacific Railroad (Map: Kansas, C 5). It has grain elevators, flour mills, machine shops, etc., and a trade in flour, grain, and live stock. Hays is the seat of the western branch of the State normal school and of an agricultural experiment station, comprising some 2000 acres, of the State Agricultural College. The water works are owned by the city. Pop., 1900, 1136; 1910, 1961.

HAYS, Charles Melville (1856–1912). An American railroad official, born at Rock Island, Ill. He was connected with the Atlantic and Pacific Railroad until 1877, then with the Missouri Pacific until 1884, and with the Wabash, St. Louis, and Pacific, of which he became assistant general manager in 1886. Later he served as general manager of the Consolidated Wabash System, and as general manager of the Grand Trunk Railway (1895–1901). For part of a year he was president of the Southern Pacific, returning to the Grand Trunk to be second vice president and general manager. In 1910 he was elected president of the Grand Trunk Railway and all its subsidiary lines. He was one of the victims of the *Titanic* disaster.

HAYS, Francis (1865–). An English temperance advocate, born in Liverpool. He gave up the study of law on Cardinal Manning's suggestion to enter the Catholic priesthood, to which he was ordained in 1894. In 1896 he founded the World's Catholic Temperance Crusade and preached this crusade in nearly every part of the English-speaking world with much success. Leo XIII gave him the title "The Apostle of Temperance."

HAYS, Isaac (1796–1879). An American physician, born in Philadelphia. He graduated at the University of Pennsylvania in 1816, studied medicine there for four years, and subsequently devoted himself largely to editorial work on medical journals. He was sole editor from 1827 to 1869 of the *American Journal of the Medical Sciences*, was the founder of the *Medical News* in 1843 and of the *Monthly Abstract of Medical Science* in 1879, was president of the Academy of Natural Sciences in Philadelphia from 1865 to 1869, and was an active member of the Philosophical Society. He was also one of the founders of the Franklin Institute, was its secretary for several years, and at the time of his death was its oldest member. He was one of the oldest members, and for a time an officer, of the College of Physicians of Philadelphia; also one of the founders of the American Medical Association, and author of its code of ethics, which has been adopted by all the medical societies in the country. He edited several important works on medicine.

HAYS, William Jacob (1830–75). An American animal painter, born in New York. In order to paint animals he visited Nova Scotia and the upper waters of the Missouri. Some of his pictures are of historic interest—such as "The Herd in the Moor" (a herd of buffaloes); "The Prairie-Dog Village"; "A Bison Bull at Bay"; "Prairie on Fire"; "Herd of Caribou in Nova Scotia." His work is fresh and spirited, but deficient in color.

HAYS, William Shakespeare (1837–1907). An American journalist, ballad writer, and composer. He was born at Louisville, Ky., became a reporter for the Louisville *Democrat* in 1857, and as "river editor" for the Louisville *Courier-Journal* was active in the movement for the betterment of the Ohio and Mississippi waterways. He served also as clerk and captain on river steamboats for four years. Under the name "Will S. Hays" he gained a national reputation as the author of popular ballads—his "Mollie Darling" had an estimated sale of 2,000,000 copies. Hays always insisted that he wrote the original words and composed the air of "Dixie." Among his better-known songs are: "Keep in de Middle ob de Road," "The Little Old Log

Cabin in the Lane," "Write me a Letter from Home," "Nora O'Neil," and "Shamus O'Brien."

HAY'TER, Sir George (1792–1871). An English historical and portrait painter. He was born in London and was the pupil of his father, Charles Hayter, a popular drawing master and teacher of perspective, and of the Royal Academy. After some years spent at sea, he took up miniature painting and was named miniature painter to the Princess Charlotte. He then studied at Rome, where he was honored by membership in the Academy of St. Luke, and, returning to London, became a successful portrait painter. On Victoria's accession he was appointed painter to the Queen, and was knighted in 1842. Among his best-known works are: "Trial of Queen Caroline," with 189 likenesses; "First Reformed Parliament," National Portrait Gallery; "Coronation of Queen Victoria"; "Marriage of Queen Victoria," Windsor Castle—all official pictures. He is best represented in the National Portrait Gallery, London. Modern critics find it difficult to share the former appreciation of his work, which is detailed and spiritless in execution and poor in color.

HAYTI, hā'tĭ. See Haiti.

HAY'WARD. A town in Alameda Co., Cal., 22 miles southeast of San Francisco, on the southern Pacific and the Western Pacific railroads (Map: California, C 5). It contains a public library, high school, and two fine boulevards. Situated in an agricultural and fruit-growing country, Hayward has canning factories, pickle works, etc. Pop., 1900, 1965; 1910, 2746.

HAYWARD. A town and the county seat of Sawyer Co., Wis., 58 miles by rail south-southwest of Ashland, on the Namakagon River, and on the Chicago, St. Paul, Minneapolis, and Omaha Railroad (Map: Wisconsin, B 2). It has a Carnegie library, a $20,000 county jail, and a United States government Indian school. Agriculture is the most important industry, and there are a creamery, a pickle factory, and a flour and feed mill. The water works are owned by the town. Pop., 1900, 2720; 1910, 2869.

HAYWARD (AS. *hæigweard,* from *haga,* OHG. *hag,* Ger. *Hag,* Eng. *haw,* hedge + *weard,* OHG. *wart,* Ger. *Wart,* guard). The name originally given in England to one who kept the common herd of cattle of a town, or of a manor, when the copyhold or other tenants had the right of sending cattle to graze. In the New England villages, particularly of Massachusetts, the name "hayward" was given to the keeper of the pound for strayed horses and cattle. The word is not now in general use in the United States.

HAYWARD, Abraham (1801–84). An English essayist, born at Wilton, near Salisbury. He received his education at home with a tutor and afterward in the fine library of the solicitor to whom he was articled. While a student at the Inner Temple, London, he attracted attention as the joint editor of a law magazine and also as a debater in the same club with J. S. Mill, whom he wrote against in later years. As a result of two German sojourns, Hayward made an acceptable translation of Goethe's *Faust* (1833), of which a second and enlarged edition was published the following year, and he was thus introduced into the society of such men of letters as Lockhart, Macaulay, and Sydney Smith. He wrote, notably, a book upon *The Art of Dining* (1852); *Sketches of Eminent Statesmen and Writers* (1880); numerous essays and papers, topical and other; and he did considerable editorial work, Mrs. Piozzi's *Autobiography* (1861) and *Diaries of A Lady of Quality from 1797 to 1844* (1864) being conspicuous in this field. He left the Tory party for the Whigs in 1846, but, not receiving from them the preferment he considered his due, he took revenge upon his enemies with tongue and pen. However, he had many warm friends and was a noted club man, whist player, and contributor of biographical and political essays to the leading reviews.

HAYWARD, Sir John (c.1564–1627). An English historian. He was born and educated at or near Felixstowe, Suffolk, and graduated at Cambridge. His earliest production, *The First Part of the Life and Raigne of Henrie the III, Extending to the End of the First Yeare of his Raigne* (1599), placed him in the bad graces of Queen Elizabeth, who was easily persuaded that he was pointing a moral for herself in his account of Richard II's downfall and therefore had the historian imprisoned. Having learned policy, Hayward kept the favor of James I, dedicated books to him and his son, defended the divine right of kings, and advocated the union of England and Scotland. Among his works are: *An Answer to the First Part of a Certaine Conference Concerning Succession* (1603); *The Lives of III Normans, Kings of England* (1613); *The Sanctuarie of a Troubled Soule* (1616); *David's Teares* (1622–23); *Christ's Prayer Upon the Crosse for His Enemies* (1623); *Of Supremacie in Affaires of Religion* (1624–25); and *The Life and Raigne of King Edward the Sixth* (1630), published after the author's death.

HAY'WOOD, Eliza (c.1693–1756). An English novelist and dramatist, born probably in London. Her maiden name was Fowler. She married when she was young, was deserted by her husband, and about 1715 appeared in Dublin and London as an actress. Steele's *Sappho,* in the *Tatler* of April 23, 1709, is usually identified with her, but wrongly it would seem from the dates. She rewrote *The Fair Captive* (1721); composed a comedy, *A Wife to be Lett* (1723), in which she acted, and a tragedy, *Frederick, Duke of Brunswick Lunenburgh* (1729); and collaborated with Hatchett in *Opera of Operas* (1733). But she is best known for her novels which brought upon her an attack by Pope in the *Dunciad* (book ii, 157 et seq.). Mrs. Haywood and Curll replied with a *Female Dunciad* (1729). A collected edition of her novels, not including the famous *Memoirs of a Certain Island* (1725) and *The Secret History of the Present Intrigues of the Court of Caramania* (1727), appeared in 1724.

HAYWOOD, William D. (?–). An American labor agitator. He first attracted notice by his leadership of the Western Federation of Miners, of which he was secretary, during the Cripple Creek strikes of 1904. When ex-Governor Frank Steunenberg was murdered in 1905, Haywood, with others, was implicated by the confession of the assassin, Harry Orchard; but he was acquitted two years later. He became a member of the executive committee of the Industrial Workers of the World, and as a leader of that organization conducted the Lawrence (Mass.) textile strike in 1912 and the strike in the Paterson (N. J.) silk mills in 1913. In the latter year his advocacy of sabotage and contempt for political action by the Socialist party cost him his membership in the National Executive Committee of that organization. He

is coauthor with Frank Bohn of *Industrial Socialism* (1911).

HAY WORM. A lepidopterous larva (*Asopia costalis*), peculiar to North America, which has the strange habit of feeding normally upon dried hay, especially clover hay, but also upon timothy and alfalfa. In large numbers it attacks the hay, both in the mow and in the stack, cutting the leaves up into chaffy pieces and webbing them together with silken threads. The hay looks moldy, is infested with excremental pellets, and is distasteful to cattle. The larva is dirty white in color and grows to a length of about three-fourths of an inch. The adult moth is lilac brown or purple, with two bands of a lighter shade on each fore wing. Old mows should be thoroughly cleaned out before putting new hay in a barn, and infested stacks should be burned.

HAY'YUJ, JUDAH BEN DAVID (c.950–c.1000). A Jewish grammarian. He was born at Fez, near the middle of the tenth century, went to Cordova, and became a pupil of the grammarian Menahem ben Saruk. His theory that all Hebrew roots contain three letters was an important contribution at the time to Hebrew philology and lexicography. He died in the beginning of the eleventh century. His two important grammatical works are *The Book of Verbs with Weak Letters* and *The Book of Verbs Containing Doubled Letters,* which are intended to illustrate his theory. In addition, he prepared a monograph on *Punctuation,* setting forth the features of the Hebrew vowel system. Of a fourth grammatical work only fragments have been found. Consult Jastrow's edition of Hayyuj's treatises on *Weak and Geminative Verbs in Hebrew* (Leyden, 1897).

HAZARAS, hä-zä'räz. A semi-independent and partially nomadic people, of Mongolian ancestry, in the region between Herat and Kabul, Afghanistan, into which country they are said to have come, in the fourteenth century, in the wake of the great Mongolian movement of Genghis Khan. They profess Islam, the Hazaras proper to the east being Shiites, the western Hazaras, or Aimak (i.e., horde), as they are sometimes called, Sunnites. Their language has been not a little influenced by Persian.

HAZ'ARD (OF. *hazard, hasard,* Fr. *hasard,* from Sp. *azar,* unlucky throw of dice, misfortune, ace of dice, from Ar. *al,* the + *zār,* from Pers. *zār,* die). A game of dice, formerly very popular in England, where it is played both for amusement and for purposes of gambling. In the latter respect, however, a frequent player, by his knowledge of the peculiarities of the game, has the beginner at a considerable disadvantage. The game is played with two dice. The "main," which is called by the "caster," may be either 5, 6, 7, 8, or 9. Should he (the caster) throw the number called, he is said to "nick," and thus defeats his opponent, who is styled the "setter."

HAZARD, CAROLINE (1856–). An American educator, born at Peacedale, R. I. She was educated privately in the United States and abroad, contributed reviews, essays, and verse to magazines, published several volumes, and from 1899 to 1911 was president of Wellesley College (Massachusetts). Her works include: *Narragansett Ballads* (1894); *The Narragansett Friends' Meeting* (1899); *Some Ideals in the Education of Women* (1900); *A Scallop Shell of Quiet* (1908); *A Brief Pilgrimage in the Holy Land* (1909); *The College Year* (1910).

HAZARD, à'zär', DÉSIRÉ. A nom de plume of Octave Feuillet (q.v.).

HAZ'ARD, EBENEZER (1744–1817). An American author, born in Philadelphia and educated at Princeton. He went into the publishing business in New York in 1770, but left it five years later for a government position and from 1782 to 1789 was Postmaster-General. In 1791 he was once more in business—this time in Philadelphia, where he helped to establish the North American Insurance Company. Besides giving literary assistance in the compilation of two histories and a biblical translation, he published *Historical Collections* (2 vols., 1792–94), and a few years later *Remarks on a Report Concerning Western Indians,* evincing, among other things, his solicitude for the spiritual welfare of the red man. But his most valuable literary remains are the letters in the possession of the Massachusetts Historical Society.

HAZARD, ROWLAND GIBSON (1801–88). An American manufacturer and author. He accumulated a fortune in the woolen business at Peacedale, R. I., and was for three terms a member of the State Legislature. Among his writings are essays on *Language: Its Connection with the Constitution and Prospects of Man* (1836), on *The Resources of the United States* (1864); and two letters addressed to John Stuart Mill, on *Causation and Freedom in Willing* (1869).

HAZE. Any comparatively slight obscuration of distinct vision due to the opacity of any medium, such as the atmosphere, through which the object is seen. The thickest haze in the atmosphere obscures the light of the sun to such an extent that his disk is but just distinguishable from the surrounding background; any greater obscuration than this is usually spoken of as cloud. This hazy effect may be produced in several ways: 1. When the air is filled with small masses of very different densities, such as rising currents of hot air and descending currents of cold air over a heated soil. In this case the beam of light is by refraction broken up and diffused so that a hazy effect, or even complete opacity, may be produced, as in a mixture of air bubbles and water. Such a mixture is also partly opaque to sound. The haze thus produced is ordinarily spoken of as *heat haze.* 2. The ordinary hazy effect in the atmosphere produced by the presence of foreign particles, either solid or liquid. Minute particles of ice or water form an *aqueous haze;* all other material is included under the term *dust haze.* The dust is raised from the ground by strong wind, by currents of hot air, and especially by volcanic eruptions; particles of salt left by the evaporation of salty water also produce dust haze. The most delicate dust haze is produced by myriads of shells and fragments of shells of diatoms and other microscopic forms of life living in fresh-water ponds and in marshes that are dried up at certain seasons of the year. The principal source of this dust is the interior of north Africa, whence it is carried outward in all directions, but especially westward and southward by dry Harmattan winds. A red dust haze of a much coarser grade is carried by southerly winds from northern Africa over into Europe, and in rare cases, as in March, 1901, this is carried to northern Germany and England. Over India a cloud of yellowish dust haze rises day by day higher and higher during the dry season, attaining a general level of from 2000 to 4000 feet, above which

the air is comparatively clear. Dust clouds of less extent are formed over the loess formations of China and North America. The great clouds of smoke from prairie and forest fires, as they subside, leave a hazy atmosphere due to the presence of fine particles of carbon, and it appears likely that each of these gathers to itself a special atmosphere of aqueous vapor, just as spongy platinum absorbs hydrogen. This haze occurs during Indian summer in America and is known as Moor-Rauch in Europe.

The finest dust haze ordinarily produces a whitish or grayish tint in the sky; coarser particles produce buff and reddish tints. When the dust particles are exceedingly small and of regular size, as when they are composed of a few molecules of water, so that their diameters are comparable with some wave length of light, they produce the phenomena of selective reflection and refraction, giving to the sky its ordinary blue tint and forming glories of colored rings around the sun and moon. When they are a little larger, they show the colors of thin plates, and when larger still, they may by diffraction give rise to small glories and larger halos. The vapor dust from the eruption of Krakatoa in 1883 spread over the north temperate zone, producing for a year or two magnificent sunset and sunrise tints and Bishop's Ring, so called after its first observer, Sereno Bishop, of Honolulu. The eruption of Skaptar Jökul in 1783 furnished a similar cloud of aqueous haze and red sunsets to the greater part of Europe and North America; and the same phenomenon, although on a somewhat more restricted scale, followed the eruptions of Pelée on Martinique, the Soufrière on St. Vincent, in 1902, and Katmai, Alaska, in 1912. The colors due to aqueous haze have been most thoroughly investigated by Prof. Carl Barus (see his "Colors of Cloudy Condensation," *United States Weather Bulletin, No. 12*). The haze produced by volcanic eruption is described most fully in the *Report of the Krakatoa Commission* (London, 1887). Consult also an abstract of the report on the haze of 1912–13, in the *Monthly Weather Review* (Washington, April, 1914). See Fog.

HAZEBROUCK, äz'brōōk'. The capital of an arrondissement in the Department of Nord, France, on the Bourre, 37 miles southeast of Calais by rail (Map: France, N., H 2). It has canal communication with the Lys. It is a well-built town, with the sixteenth-century church of Saint-Eloi (spire 260 feet high), an Augustinian convent, part of which is used for a hospital, a linen market, college lecture rooms, and a tobacco warehouse. There are also several educational institutions and a public library. Linen, cloth, starch, dyes, leather, beer, salt, soap, oil, and lime are manufactured, and an active trade is carried on in hops, grain, and cattle. In this most typical of Franco-Flemish towns the Flemish language still lingers. Its name, signifying "the marsh of the hares," is derived from the marshland on which the town is built. Pop., 1901, 13,261; 1911, 12,566.

HA'ZELNUT', Filbert, or Cobnut (AS. *hæsel*, Icel. *hasl*, OHG. *hasala*, Ger. *Hasel*, hazel; connected with Lat. *corulus*, OIr., Welsh *coll*, hazel), *Corylus*. A genus of trees and shrubs of the family Betulaceæ, of which the fruit is a nut in a leafy and laciniated cup, the enlarged involucre of the female flower. The male flowers are in cylindrical catkins; the female flowers mere clusters of colored styles at the extremities of buds. The common hazel (*Corylus avellana*), Lambert's filbert (*Corylus maxima*), and the Constantinople hazel (*Corylus colurna*) are natives of all the temperate parts of Europe. Two species are native to the United States, the American hazel (*Corylus americana*) and the beaked or California hazel (*Corylus rostrata*), neither of which is cultivated. Both species are of wide distribution in America. Most of the cultivated varieties of the hazelnut are known by the names of cobnuts and filberts; the former generally of a roundish form, the latter characterized by the greater elongation and laciniation of the fruit cup. The finer kinds of hazel are propagated by grafting and by layers. Hazel plants for copses are obtained

HAZELNUT (LEAVES AND FRUIT).

from seed. A Himalayan species of hazel (*Corylus ferox*) has a spiny fruit cup and an excessively hard nut. Barcelona nuts are the nuts of a variety of the common hazel, kiln-dried before their exportation from Spain. This process preserves their agreeable flavor. The larva of a weevil (*Balaninus nucum*) feeds on the kernels of hazelnuts, and great numbers of nuts are thus destroyed.

Hazelnuts of improved varieties are grown to a considerable extent in the south of Europe, but only to a slight extent in America. Hazelnuts yield, on pressure, about half their weight of a bland fixed oil, often called *nut oil*. Hazelnut oil has drying properties and is much used by painters; it is also used by perfumers as a basis with which to mix expensive fragrant oils, and it has been employed medicinally in coughs. The wood of the hazel, although seldom large enough for the purpose of the carpenter, is very tough and flexible, and hazel rods are therefore much used for making crates, hurdles, hoops for small barrels, etc. The thicker stems of hazel are used for making charcoal, which is in demand for forges and is much esteemed for artists' crayons.

HAZELTINE, hā'zel-tīn, Mayo Williamson (1841–1909). An American journalist and reviewer, born in Boston, Mass. A graduate of Harvard and later a student at Oxford, England, he practiced law until 1878, when he became literary editor of the New York *Sun*. His original publications include *Chats about Books, Poets, and Novelists* (1883), but he was best known for his reviews in the New York *Sun*.

HAZELTON, hā′zel-ton, GEORGE COCHRANE, JR. (?–1921). An American lawyer and playwright, born at Boscobel, Wis. He graduated from Columbia Law School in 1895, having previously studied the drama and dramatic writing and played rôles with the Booth-Barrett Company (1890–91) and the Modjeska Company (1891–93). He practiced law in Washington in 1895–97, in Philadelphia from 1898 to 1900, and in New York City after 1901. His writings include: *The National Capitol: Its Architecture, Art, and History* (1897); *Mistress Nell: A Merry Tale of a Merry Time* (1901); *The Raven: The Love Story of Edgar Allan Poe* (1909); and, besides dramatized stories, *Captain Molly* (1902), a play; and *The Yellow Jacket: A Chinese Play,* which, though financially a failure when presented in New York in 1913, was the season's most original and artistically effective production.

HA′ZEN, CHARLES DOWNER (1868–). An American historian, born at Barnet, Vt. He graduated from Dartmouth College in 1889, studied at the universities of Berlin, Göttingen, and Paris in 1890–92, and received the degree of Ph.D. from Johns Hopkins in 1893. In 1894 he became professor of history at Smith College, and he also lectured at Columbia University in 1910–11. He received the degree of LL.D. from Dartmouth in 1914. He is coauthor of *Historical Sources in Schools* (1902); wrote *Contemporary American Opinion of the French Revolution* (1897), *Old Northampton* (1904), *Europe Since 1815* (1910); and translated Charles Borgeaud's *Adoption and Amendment of Constitutions in Europe and America* (1895).

HAZEN, JOHN DOUGLAS (1860–). A Canadian lawyer and statesman. He was born at Oromocto, New Brunswick, was educated at the University of New Brunswick, and after 1883 practiced law successfully, first at Fredericton and after 1890 at St. John. After serving as mayor of Fredericton he sat in the House of Commons (1891–96) as Conservative member for St. John (city and county), at this time voting for the motion made by Nicholas Flood Davin (q.v.), to extend the Dominion franchise to women. Elected to the New Brunswick Legislature in 1899, he was leader of the Conservative Opposition therein until 1908, when he became Premier and Attorney-General. In 1911, after the defeat of the Laurier administration, he resigned, and was appointed Minister of Marine and Fisheries in the federal administration of the Conservative Premier, Robert Laird Borden (q.v.). Hazen was for a time president of the New Brunswick Barristers' Society, and he was a member of the Interprovincial and Maritime Provincial Conferences, held at Ottawa in 1910.

HAZEN, WILLIAM BABCOCK (1830–87). An American soldier. He was born in West Hartford, Vt., graduated at West Point in 1855, and served for a time on the frontier. In the spring of 1861 he was promoted captain in the regular infantry, but he raised the Forty-first Regiment of Ohio Volunteers and went to the front as its colonel. He defended the Ohio border, fought in Kentucky, commanded a brigade in the movement by way of Nashville to Pittsburg Landing, won distinction at Shiloh, Corinth, and the battle of Stone River, and at Missionary Ridge captured 18 pieces of artillery. He served through the Atlanta campaign and commanded the Second Division of the Fifteenth Corps in Sherman's march through Georgia. He was promoted major general of volunteers in 1864, for his services at the capture of Fort McAllister, and in the summer of 1865 he commanded the Fifteenth Army Corps. At the close of the war he was brevetted major general, United States army. He served on the frontier as colonel of infantry from 1865 to 1880, except during his stay in France, in the Franco-German War, and at Vienna, as military attaché to the United States Legation during the Turko-Russian War. In 1880 he became chief signal officer, with the rank of brigadier general. He did much to raise the character of the signal service by employing expert physicists, electricians, and meteorologists, and by coöperating with State weather bureaus and scientific societies. By his efforts the present standard-time meridians were adopted. He also introduced the "cold-wave" signals and the system of hourly weather bulletins. His publications include: *The School and the Army in Germany and France, with a Diary of Siege Life at Versailles* (1872); *Our Barren Lands* (1875); *A Narrative of Military Service* (1885).

HA′ZLETON. A city in Luzerne Co., Pa., 28 miles (direct) south by west of Wilkes Barre, on the Lehigh Valley, the Wilkes Barre and Hazleton, and the Pennsylvania railroads (Map: Pennsylvania, K 5). It has a picturesque site at an elevation of 1700 feet and enjoys some popularity as a summer resort. It is the seat of a State hospital for miners and of the township high school and has Hazle Park, a summer resort, United Charities Home, a public library, and a fine city hall. Hazleton is the centre of the anthracite coal district and is extensively interested in coal mining. Its silk mills have become of considerable importance, and there are also ironworks, knitting mills, cornice works, coffin and casket factories, breweries, and manufactories of shirts, paper boxes, underwear, macaroni, etc. Settled in 1820, Hazleton was incorporated as a borough in 1856 and in 1892 was chartered as a city. The commission form of government was adopted in 1913. Pop., 1900, 14,230; 1910, 25,452; 1914 (U. S. est.), 27,511; 1920, 32,277.

HAZLITT, hăz′lĭt, WILLIAM (1778–1830). A distinguished English critic and essayist. He was born at Maidstone in Kent, April 10, 1778, where his father was then a Presbyterian minister, though afterward a Unitarian. The latter went to America when Hazlitt was five years old, but returned three years later and settled at Wem in Shropshire. The son was at first privately educated and then sent to the Unitarian College at Hackney. He did not take kindly to dissenting theology, and, after leaving college in 1795, spent the next few years at his father's house, dabbling in metaphysics and painting. His intellectual life, on the one hand, was keenly stimulated by his meeting with Coleridge in 1798, and by hearing the last sermon preached by the philosopher, which profoundly impressed him. His artistic tastes, on the other hand, led him to Paris in the winter of 1802. He spent his time there copying pictures in the Louvre, and, returning to London, took up the profession of portrait painting. He attained no great success in this, but it brought him into literary and artistic society, of which on the latter side his *Conversations with Northcote* (1830), though belonging to a later period, is the best memorial, while on the former the association

with Lamb, Hunt, and Godwin brought out the taste for pure literature, in which he was to win the triumphs denied him in the two fields of his earlier predilection. His grave *Essay on the Principles of Human Action* (1805), though his own favorite work, did not please the public. In 1808 he married, and settled at Winterslow, near Salisbury; but neither he nor his wife seems to have been well adapted for domestic life in the country. "Never, I suppose," writes his grandson, "was there a worse-assorted pair." The divorce, however, which finally separated them did not come until 1822. In 1812 Hazlitt came back to London, where at first he was parliamentary reporter and dramatic critic for the *Morning Chronicle*. Presently, however, he found the line that suited him and began to pour forth the remarkable series of literary criticisms on which his highest fame rests. With Leigh Hunt he tried in the *Examiner*, in 1815, to revive the glories of the *Spectator* and the *Tatler;* the best of the essays thus produced were published in 1817 under the title of *The Round Table*. His chief critical works are: *Characters of Shakespeare's Plays* (1817); *A Review of the English Stage* (1818); *Lectures on the English Comic Writers* (1819); *Lectures on the English Poets* (1818), with essay from the "Round Table" on *Love of the Country;* and *Lectures on the Dramatic Literature of the Reign of Queen Elizabeth* (1821). Coming at a time when Coleridge had just begun really to make people see what was in Shakespeare, and aiding Lamb and Hunt to recall to the memories of Englishmen the glories of their half-forgotten golden age, his criticism was of the highest importance; and he joined with the two last named in establishing an easy, flowing, familiar style of prose which was to have great results throughout the remainder of the century. Saintsbury places him in the first rank as a critic, his distinction lying not so much in systematic judgment as in the most valuable particular appreciations; and Stevenson, the most charming practitioner in the same prose style, takes his leave of him with, "though we are mighty fine fellows nowadays, we cannot write like Hazlitt." He and his group show in criticism the effects of the Romantic movement—a widening of the judgment, an importation of human sympathy and the personal equation, and a combination of philosophic discussion of life with bookish details. His temperament was uneven and self-tormenting; it estranged him more or less from all his friends, even for a time from Lamb. One of the most curious episodes in his career is the romantic passion which he conceived for a very ordinary girl, Sarah Walker by name, of a menial station and no attractions that others could see; Hazlitt recorded his emotions during its progress in a little book of extreme interest as a psychological document, called *Liber Amoris, or the New Pygmalion* (1823; new ed., New York, 1902). Soon after his divorce he married a widow, apparently on a sudden impulse, but after a year's travel on the Continent they, too, separated. The most important literary works of his later life are: *Table Talk* (1821–22); *The Spirit of the Age* (1825); *The Plain Speaker* (1826); *Sketches and Essays* (1829). His *Life of Napoleon* (4 vols., 1828–30), of whom he was an ardent admirer, was neither a literary nor a financial success. Disappointed and harassed by anxieties, he died on Sept. 18, 1830, with Charles Lamb at his bedside; his last words, despite all that he had suffered, were, "Well, I've had a happy life." His *Literary Remains* were issued in 1836. Consult: W. C. Hazlitt, *Memoirs* (London, 1867); an excellent volume of selections in the Cavendish Library (ib., 1889), with introduction by A. Ireland, who has also compiled a *List of the Writings of Hazlitt and Hunt* (ib., 1868); his *Life* by A. Birrell, in the "English Men of Letters Series" (ib., 1902); also Saintsbury in *Essays in English Literature 1780–1860* (ib., 1890); id., in *History of Criticism III* (ib., 1900 et seq.); Leslie Stephen in *Hours in a Library* (2d series, ib., 1877); the essay on Hazlitt in C. T. Winchester, *A Group of English Essayists* (New York, 1910); J. Zeitlin, *Hazlitt on English Literature* (Oxford, 1913). A complete edition of his works, in 12 volumes, introduction by W. E. Henley, was published in 1902.

HAZLITT, William (1811–93). An English writer, son of the essayist. He became a lawyer and was appointed registrar of the Court of Bankruptcy in London in 1854, a position he held until 1891. He edited the writings of his father and made numerous translations, notably of works of Guizot and Thierry. He was also the author of books on the law of bankruptcy. Consult W. C. Hazlitt (his son), *Four Generations of a Literary Family* (London, 1897).

HAZLITT, William Carew (1834–1913). An English man of letters, grandson of the essayist. He was born in London, studied law and civil engineering, but became a journalist, and finally devoted himself to literature. His works include: *History of the Venetian Republic* (4 vols., 1860); *Memoirs of William Hazlitt* (2 vols., 1867); *Poems* (1877); *Offspring of Thought and Solitude* (1884), essays; *Coins of Europe* (1893–97); *Coin Collector* (1896); *Four Generations of a Literary Family* (2 vols., 1897); *The Lambs: Their Lives, their Friends, and their Correspondence* (1897); *Lamb and Hazlitt* (1899); *Shakespeare: The Man and his Work* (2d ed., 1903); *Faiths and Folk Lore* (1905); *The Hazlitts* (privately printed, 1911). He also edited *Dodsley's Old Plays* (15 vols., 1874–76); *Shakespeare's Library* (5 vols.); *Lamb's Letters* (1886). As a bibliographer, he did good service in *Bibliographical Collections and Notes on Early English Literature* (1903), and in its predecessor, *Handbook to the Popular, Poetical, and Dramatic Literature of Great Britain* (1867; supplemented in 1876, 1882, 1887, and 1889).

HAZZAKEN. See Hillel.

HEAD. See Skull; Nervous System.

HEAD, Barclay Vincent (1844–1914). An English numismatist, born at Ipswich and educated there at St. Elizabeth's School. He was made assistant in the British Museum in 1864 and in 1893 keeper of the department of coins and medals. He became a member of the Imperial German Archæological Institute, a *lauréat* of the French Institute, and joint editor of the *Numismatic Chronicle*. He wrote a history of Greek coinage (1874–1901); a *Guide to the Coins of the Ancients* (1881); *The Young Collector's Handbook of Greek and Roman Coins* (1883); the very valuable manual, *Historia Numorum* (1887; 2d ed., 1911); and *A Guide to the Principal Gold and Silver Coins of the Ancients in the British Museum* (4th ed., 1895).

HEAD, Sir Edmund Walker, Bart. (1805–68). An English Governor-General of Canada,

He was born near Maidstone, Kent, was educated at Winchester and Oxford, and was a fellow of Merton College (1830–37), a university examiner, and a law student. Succeeding to his father's title in 1838, he was Poor-Law Commissioner in 1841, went to New Brunswick six years later as Lieutenant Governor, and from 1854 to 1861 was Governor-General of Canada. During Sir Edmund's term of office the clergy reserves and seigneurial tenures were abolished, the Victoria Bridge at Montreal was built, and Ottawa was chosen by the Queen as capital of Canada. After his return to England he was made a civil-service commissioner. He published a *Handbook of the Spanish and French Schools of Painting* (1845); *Shall and Will, or Two Chapters on Future Auxiliary Verbs* (1856); *The Temple of Serapis at Pozzuoli* (1858); *Viga Glum* (1866), a translation of an Iceland story. He also edited Kugler's *Handbook of Painting of the German, Flemish, Dutch, Spanish, and French Schools* (1854) and *Lewis's Essays on the Administrations of Great Britain* (1864). His poetical contributions to *Fraser's Magazine* were published posthumously in 1868.

HEAD, Sir Francis Bond (1793–1875). An English colonial Governor and author, of Portuguese-Jewish descent. He was born at the Hermitage, Higham, Kent, Jan. 1, 1793, and was educated at Rochester and in the Woolwich Military Academy, where he was made first lieutenant of engineers in 1811. He saw service on the Continent and was at the battle of Waterloo, but retired on half pay in 1825, when he went to South America to prospect in gold and silver mines. His first work recounted his experiences under the title, *Rough Notes of a Journey in the Pampas and Andes* (1826), and the rapidity of his traveling gained him the nickname "Galloping Head." In 1835–37 he was Lieutenant Governor of Upper Canada. Knowing nothing of the political situation of the country, he opposed the union of the provinces and assumed that a popular desire for responsible government merely indicated a desire for annexation to the United States. He fancied he could govern without the aid of his council and through his bad judgment and want of tact seems to have been largely to blame for the Upper Canadian share in the rebellion of 1837. He was made Baronet in 1837; he died in Croydon, July 20, 1875. Among his published works are: *Life of James Bruce* (1830); *Bubbles from the Brunnen of Nassau* (1833); *A Narrative* (1839)—the author's account of his administration of the government in Upper Canada; *The Emigrant* (1846); *Stokers and Pokers* (1849); *Defenceless State of Great Britain* (1850); *A Fortnight in Ireland* (1852); *Fagot of French Sticks* (1852); *The Horse and his Rider* (1860); *The Royal Engineer* (1869); *Sketch of the Life of Sir J. M. Burgoyne* (1872). Consult Kingsford, *History of Canada*, vol. x (London, 1898).

HEAD, Sir George (1782–1855). An English traveler, elder brother of Sir Francis Bond Head. He was born in Higham Parish, Kent, was educated at the Charterhouse School, and went to the Peninsular War as a commissary clerk, rising gradually to be next to the head of the commissariat in 1814. This experience provided material for his *Memoirs of an Assistant Commissary-General* (1837), while from his five years' service in Halifax he gleaned *Forest Scenery and Incidents in the Wilds of North America* (1829). William IV knighted him (1831), and Queen Victoria made him her deputy knight marshal at her coronation. He was best known as the author of *A Home Tour through the Manufacturing Districts of England* and *A Home Tour through Various Parts of the United Kingdom*, reprinted, in one volume, in 1840. He was also a translator of Apuleius and the translator of Cardinal Pacca's *Memoirs*.

HEAD'ACHE', medically termed Cephalalgia. A pain in any part of the head except the face. It is a symptom of heat stroke, cerebral apoplexy, eyestrain, nasal disease, middle-ear or internal-ear disease, uterine disease, neurasthenia, etc. Treatment of headache as a disease, or by the use of "headache powders" so commonly sold, is therefore ridiculous. The most severe headaches are those accompanying meningitis or brain diseases, tumor of the brain usually causing great suffering. These are generally brow or vertex headaches. Many fevers, such as typhoid, have a severe general headache as a symptom. Sufferers from Bright's disease have daily frontal headache in many instances. Eyestrain is probably the most frequent cause of frontal, temporal, and the so-called recurrent "sick headaches." The pain is sometimes referred to the back of the neck, or occipital region. Diseased conditions of the accessory nasal sinuses (see Nose) and of the nasal chambers themselves are often the causal factors in daily or periodical headaches. Gastric dyspepsia causes headache referred to the brows. The headache of constipation or of caries of front teeth is generally experienced over the brows and temples; that of anæmia, or bladder disease, or endometritis, at the vertex; that of carious back teeth, eyestrain, and middle-ear disease, at the temple as well as at the mastoid cells behind the ear; that of neurasthenia generally at the base of the occiput, though also at the brow; while derangement of the liver causes pain which may be felt over the whole occiput. Syphilis and malaria are also causes of headache of irregular distribution. Migraine (q.v.) is a headache affecting one side of the head and accompanied by nausea and vomiting and other symptoms, and is due to nerve fag, gout, indigestion, or eyestrain, or malaria in people of nervous diathesis. Gout is a frequent cause of headache, as is also alcoholic indulgence. Domestic treatment of headache should begin with copious drafts of water and a cathartic, with rest in the recumbent position in the dark, and abstinence from food for a few hours. Drugs, especially narcotics, should be taken only upon a physician's advice after study of the sufferer's environment, vocation, diet, and physical condition. Frequent use of strong alleviatives is often undermining and damaging. Among the drugs used are aconite, belladonna, antipyrin, acetanilide, codeia, morphia, phenacetin, bromides, chloral, ergot, mineral acids, salol, salicylic acid, iodides, strychnine, nitroglycerin, quinine, alkalies, digestants, and cathartics. Consult Behan, *Pain* (New York, 1914).

HEAD'DRESS'. Among social badges the headdress is of great interest. As distinguished from the clothing of the body, which may arise from the desire for ornament, for comfort, or for protection, the headdress was a distinctive mark, representing the organization of groups of men in primitive times. The sexes also were thus discriminated. This feature has persisted to this day, though it is now giving way before the unifying powers at work on the race.

In the study of headdresses there must be taken into consideration the varieties of natural head covering, which determine the extent of the use of the artificial headdress, the environment regulating the materials, and the need of protecting the head from cold, heat, rain, etc. To these must be added the degree and course of the advancement of the peoples, their religious beliefs and customs, and in greatest measure the æsthetic sense which pervades and modifies all these classes.

As Deniker remarks, the nature of the hair in the different divisions of mankind furnishes the broad groundwork for headdress. People with woolly hair, as the negroes, arrange it in the most complicated fashion. Smooth-haired peoples allow it to flow behind, as the Malays and some Americans, or gather it in plaits, whorls, chignons, rolls, as among the Eskimo, Koreans, Japanese, Chinese. The fuzzy-haired peoples of north Africa and Melanesia reach the acme with their great mops fantastically arranged. Following the almost instinctive desire of the human race to improve on nature, to alter and make distinctive the hair, we have dyeing, plastering with clay or oils, and the wearing of wigs practiced by many tribes. On the other hand, among lower tribes, as the Australians and Veddas, little attention is paid to the hair, which remains in its primitive luxuriance and untidiness. To the hair are also attached feathers, flowers, etc., often as ornaments, but most frequently as a badge or token, familiar in the plumes of the North American Indians.

Perhaps the most primitive headdress, well-nigh universal among smooth-haired peoples, is the fillet, originating in the need of securing the hair, and by its material, color, and other characters serving as a badge. The fillet thus appears to be the ancestor of all hats. The ancient Chinese, as well as the Greeks, were fillet wearers, and the custom survives in the present, while many people have discarded the custom within recent times. The turban is a development of the fillet. From the fillet most headdresses arose by additions horizontally or vertically, the structure remaining crownless for a long period. It is probable that devices for holding the feather or bunch of feathers in the hair may have developed certain types of headdress. The more important of man's activities that have distinctive classes of headdress are the chase, war, rank, social position, and religious ceremony. Protection may also be mentioned as more particularly an outgrowth of environment, the ears rather than the head being covered from both heat and cold. The headdress of hunting tribes embraces features connected with stalking of game and fetishism, as well as the shading of the eyes and of the head.

The headgear of war, originally designed to strike terror into the enemy as well as to show rank, is represented by the helmet. A much wider range of headdress marks rank and social position. This class has its highest development in the Orient, as in eastern Turkestan and Korea, e.g., where the headdress of each individual is an index of his standing. In ceremony the most extensive and interesting phase of this subject is presented. We have here repeated the ranks from priest king, through priest to worshiper, the head covering for different ceremonies, and as belonging to the hosts of spiritual beings. With this also are connected the class of masks, which are largely, if not entirely, to be taken as headdresses. It will be found that each of the divisions presented has its own ceremonial headdresses. Consult G. W. Rhead, *Chats on Costume* (New York, 1906). See HAIRDRESSING.

HEAD FORM, CHANGES IN. See IMMIGRATION; INDEX, CEPHALIC.

HEAD-HUNTING. Head-hunting has in past times been practiced by many peoples, scattered all over the world, but at the present time is confined to a few tribes remote from civilization. An enemy's head served as a war trophy, and the possession of it was supposed to be proof of the prowess and courage of the owner. A warrior's standing in his tribe and the chances of his obtaining a desirable bride would be largely regulated by the number of heads he had taken. These heads were often used in various rites and ceremonies. The following are some of the best-known head-hunters of more recent times: the Was, a hill tribe on the northeastern frontier of India; the Kukis and the Nagas of Assam. The custom was common to all the Malay races and has not been entirely suppressed in some parts of Borneo. The Land Dyaks of Sarawak had a special house for keeping the heads. The Iban (or Sea) Dyaks, essentially an agricultural people, are, according to Professor Haddon, passionately devoted to head-hunting, often joining the Malays in their large war prahus on extended piratical raids; the plunder went to the Malays and the heads of those killed to the Dyaks.

Until very recently the people of the island of Kiwai, British New Guinea, were head-hunters. The head of an enemy was cut off with a bamboo knife and afterward hung over a fire until the hair was singed off. While this was being done, all the young girls danced in a ring near by. The flesh was then removed, the skull washed, and a carved peg stuck into it, by means of which it was hung up on the main post of the house. A young man of Kiwai could not marry unless he had at least one skull as a trophy.

SHRUNKEN HUMAN HEAD.
War Trophy of Jivaros Indians of Ecuador.

In the Philippine Islands the practice, according to Dean C. Worcester, was limited to tribes of the northern part of Luzon—the Negritos, Ifugaos, Tingians, Kalingas, and the Bontoc Igorots. The practice still persists in the remote parts of the subprovinces of Kalinga and Apayao and among the Negritos of the all but unknown coast of northern Luzon.

South America furnishes two well-known head-hunting tribes, the Mundurucu of Brazil and the Jivaros of Ecuador. The Mundurucu

get their heads from their enemies of the Yuruna and Parentintim tribes. The trophies of the Jivaros are the familiar "shrunken human heads" to be seen in most museums. The bones of the skull are removed and hot stones introduced, which are replaced by others as they become cool. The head is kept constantly turning, another person taking it when the operator tires. The process lasts some days, and the head is reduced to the size of an orange. Long cords hang from the closed lips, and feather ornaments, like tassels, from the ears. Consult: Carl Bock, *Head-Hunters of Borneo* (London, 1882); A. C. Haddon, *Head-Hunters Black, White, and Brown* (ib., 1901); Worcester, in *National Geographic Magazine* (Washington, September, 1912); C. D. Willcox, *Head-Hunters of Northern Luzon* (Kansas City, Mo., 1912); A. J. N. Tremearne, *The Tailed Head-Hunters of Nigeria* (London, 1912).

HEADLAM, hĕd'lam, Arthur Cayley (1862–). An English theologian, born in Whorlton, Durham. He was educated at Winchester and at New College, Oxford; was fellow of All Souls', Oxford, in 1885–97, and theological lecturer in Oriel, Queen's, and Trinity; and (after being rector of Welwyn, Herts, for seven years) in 1903 became professor of dogmatic theology in King's College, London, of which he became a fellow in 1905. He published: *Ecclesiastical Sites in Isauria* (1893); a commentary on Romans (1895), with Sanday; *Sources and Authority of Dogmatic Theology* (1903); *History, Authority, and Theology* (1909); *St. Paul and Christianity* (1913).

HEADLAM, Walter George (1866–1908). An English Greek scholar. He graduated in 1887 from King's College, Cambridge, where he became a fellow in 1890. He specialized on the criticism of the newly discovered text of Herondas and also in the study of the Greek tragedies. He translated Æschylus' *Supplices* (1900), *Agamemnon* (1904), *Choëphori* (1905), *Eumenides* (1908), *Prometheus* (1908); edited the *Fragments of Sophocles* (1908) to complete Jebb's edition of that poet; and published *A Book of Greek Verse* (1907). Consult *Walter Headlam: His Letters and Poems,* with a memoir by Cecil Headlam and a bibliography by L. Howard (London, 1910).

HEADLEY, hĕd'lĭ, Joel Tyler (1813–97). An American historical writer. He was born in Walton, N. Y., graduated at Union College in 1839, studied at Auburn Theological Seminary, and was for a time pastor of a church in Stockbridge, Mass. His health soon failing, he traveled in Europe and then joined the editorial staff of the New York *Tribune.* Soon, however, he was compelled to spend a considerable portion of every year in the Adirondacks for his health. His newspaper letters on the region, afterward published as *The Adirondack, or Life in the Woods* (1849), are said to have been the first to attract attention to that region as a health resort. Among his works are: *Napoleon and his Marshals* (2 vols., 1846); *Washington and his Generals* (1847); *Life of Cromwell* (1848); *Life of Washington* (1857), which was at one time exceedingly popular; *The Chaplains and Clergy of the Revolution* (1864); *The Great Rebellion* (2 vols., 1863–66); *Grant and Sherman: Their Campaigns and Generals* (1866); *Farragut and our Naval Commanders* (1867); *Stanley's Adventures in the Wilds of Africa* (1890); *Our Army in the Great Rebellion* (1891); *Our Navy in the Great Rebellion* (1891).

HEADLEY, Phineas Camp (1819–1903). An American clergyman and biographer, born in Walton, N. Y. He was admitted to the bar before studying for the ministry at Auburn Seminary. His publications include: *Empress Josephine* (1850); *Lafayette* (1851); *Kossuth* (1852); *General Sheridan* and *Admiral Farragut* (1864); *General Sherman* (1865); *General Grant* (1866); *Public Men of To-day* (1882).

HEAD'LONG HALL. A satirical novel, interspersed with lyrics, by Thomas Love Peacock, published in 1816.

HEAD-MONEY TAX. The term applied to a tax levied by an Act of Congress, passed in August, 1882, which provided that there should be collected "a duty of fifty cents for each and every passenger, not a citizen of the United States, who shall come by steam or sail vessel from a foreign port to any port within the United States. . . . The money thus collected shall be paid in to the United States Treasury, and shall constitute a fund to be called the Immigrant Fund, and shall be used, under the direction of the Secretary of the Treasury, to defray the expense of regulating immigration under this act, and for the care of immigrants arriving in the United States," etc. This act of Congress is similar in its essential features to statutes enacted by many States of the Union for the protection of their own citizens, and for the good of the immigrants who land at seaports within their borders. A statute of New York covering this ground was, however, held void as infringing upon the ground of national legislation (92 U. S. Rep., p. 259, and 107 U. S. Rep., p. 59). The questions arising under the act of Congress were considered by the Supreme Court of the United States in what were called the Head-Money cases (112 U. S. Rep., p. 580), and the act was held valid. In 1903 the tax was increased to $2 per head. By Act of Feb. 20, 1907, as amended by Act of March 26, 1910, the tax was again increased to $4 per head. See Immigration.

HEADS'MAN, The. A novel by J. Fenimore Cooper (1833), the story of the hereditary executioner of Bern.

HEALD. See Heddle.

HEALD, hēld, Frederick de Forest (1872–). An American botanist, born at Midland City, Mich. He graduated from the University of Wisconsin in 1894 and from the University of Leipzig (Ph.D.) in 1897. He taught botany in several institutions, in 1906 being appointed professor of agricultural botany and botanist at the Nebraska Experiment Station (in 1907 also State botanist); had charge of the School of Botany at the University of Texas in 1908–12; and after 1912 was agent in forest pathology of the United States Department of Agriculture. In 1911 he became associate editor of *Phyto-Pathology* and in 1912 was elected president of the American Microscopical Society. He published: *Laboratory Manual in Elementary Botany* (1902), *Symptoms of Disease in Plants* (1909), *Experiments in Plant Physiology* (1910), with I. M. Lewis, and revised C. R. Barnes's *Analytic Keys to Genera and Species of North American Mosses* (1897).

HEA'LEY, George Peter Alexander (1808–94). An American portrait painter. He was born at Boston, studied in Paris under Gros, and was much influenced later by Couture. At the

Paris Exposition of 1855 he received a second-class medal. He returned to the United States in 1858, going to Chicago, where he resided until 1867. After this he went to Rome, and in 1885 he opened a studio in Paris, where he remained until 1892. Returning to Chicago, he died June 24, 1894. Healey is one of the best American portrait painters of the middle period. His drawing is sound, his color pleasing. His portraits vary in quality from strong and characteristic likenesses to insipid productions. His historical works are little more than collections of portraits. The principal are: "Franklin Urging the Claims of the American Colonies before Louis XVI" (1855) and "Webster's Reply to Hayne," Faneuil Hall, Boston, containing 130 portraits. Some of the best-known portraits are: M. Guyot (1841), Smithsonian Institution; Pius IX (1871), Convent of the Sacred Heart, Albany; Louis Philippe, General Grant (1878); Webster, Clay, Calhoun; Presidents Quincy Adams, Jackson, Van Buren, Tyler, Taylor, Fillmore, Pierce, Polk, Buchanan, and Lincoln—all in Corcoran Gallery, Washington; Generals Grant and Sherman, Newberry Library, Chicago; William H. Seward, State Library, Albany; James Lenox (1851), in the Public Library, New York; and a portrait of the artist in the Metropolitan Museum, New York. Consult his autobiography, *Reminiscences of a Portrait Painter* (Chicago, 1894).

HEALTH (AS. *hælþ*, from *hāl*, Goth. *hails*, OHG., Ger. *heil*, Eng. *whole;* connected with OChurch Slav. *cělŭ*, whole, OPruss. *kailūstikan*, health, OIr. *cēl*, augury, and probably with Skt. *śiva*, healthful, kind). The condition of a living body in which all the tissues are in a state of soundness or integrity and the organs perform their functions normally, in which waste and repair go on progressively, and in which proper growth or retrograde metabolism occurs, according to the age of the individual, disease being absent. Disease is present when the integrity of the blood or of other tissues is impaired, where function is disordered, or where excessive growth or abnormal retrogression and decay occur. Perfect health is rarely seen, and never continues for any considerable portion of life in the artificial conditions of modern existence among civilized people. Health is therefore a comparative term.

Health officers are elected or appointed in all towns of any size in the United States, whose duty it is to limit the spread and prevent the invasion of disease, to enforce sanitary laws, and take all precautions to safeguard the health of citizens. See HEALTH, BOARDS OF.

The reports of occurrence of disease and death are recorded by county, State, and national health officials. (See DISTRIBUTION OF DISEASE; VITAL STATISTICS.) For the consideration of measures to safeguard the public health, see SANITARY SCIENCE; and for a consideration of the laws of health, see HYGIENE.

HEALTH, BILL OF. In shipping, a certificate of a consul, or health officer, as to the health of the crew, when the ship has come from a suspected port. A clean bill, a suspected bill, and a foul bill are the three short names given to the several degrees of health.

HEALTH, BOARDS OF. Institutions organized under government and deriving powers from the laws for the purpose of protecting the health of the citizens.

Municipal Boards of Health. These are created for the purpose of controlling and repressing agencies which undermine the health of the residents of a city or a municipality. The function of such a board is to adopt ordinances which compose a sanitary code, under which certain measures may be enforced and the authority of the officers of the board may be maintained. Such a code includes provisions for the prevention of fraud and pretense in the preparation and sale of medicines, or of the sale of poisons except for lawful uses and purposes; of adulteration of coffees, teas, and other preparations from which beverages are made; for the control of the construction of buildings, ventilation, drainage, and plumbing; for the control of the sale of food and drink, to prevent stale, unwholesome, or unhealthy food, as well as adulterated or watered milk, from being offered in the market; to control the passage of cattle, horses, or any dangerous or offensive animals through the public streets; to regulate slaughtering and slaughterhouses; to exercise care over sidewalks in streets; to regulate the sanitary condition of pounds; to kill animals afflicted with hydrophobia; to prevent or limit offensive odors and liquids from any source; to provide for proper accumulation and removal of filth and dirt; to prevent diseased animals from being brought into the city, or dead, sick, or injured animals being left in the streets; to provide for the notification of contagious and infectious diseases; to control the unloading of vessels, the removal of sick persons, vaccination, exposure to disease, handling and interment of dead bodies; to outline the duties of coroners; to secure the reporting of vital statistics; to regulate matters relating to vehicles used for passenger transportation; and to control noise, expectoration in public conveyances, life lines at bathing places, etc.

As an example of a municipal board of health, the organization of the health department in New York City may be described, as it has existed since the adoption of the charter creating the Greater New York. In chap. xix of this charter the several powers and duties of the health officers are set forth in detail. The head of the department is called the president of the board of health. The board consists of a single commissioner of health, commissioner of police, and the health officer of the port. The commissioner of health is appointed by the mayor (as is also the commissioner of police), and is the president of the board and the executive officer. He may or may not be a physician. He has absolute power to control any condition he deems deleterious to health.

Two bureaus have been established under the act of Legislature. The chief executive officer of one is called the sanitary superintendent, who at the time of his appointment must have been for at least 10 years a practicing physician and for three years a resident of the city. The chief officer of the second bureau is the registrar of records. An office of the board of health is established in each of the different boroughs of the city, wherein the business of the department is transacted. An assistant sanitary superintendent and an assistant registrar of records are appointed for each borough. In addition to these officials there are a chief and a borough chief of each of the following divisions: general sanitary inspection, contagious diseases, communicable diseases, child hygiene; a supervising food inspector, a director of the vaccine labora-

tory, a director of the research laboratory, a superintendent of hospitals, and a chemist. Similar municipal boards of health exist in other cities.

State Boards of Health. These are institutions established by State legislative enactments, having many specific relations to the public health, and intended to have a central advisory relation to the local sanitary organizations, and also to supervise a State system of vital statistics. In 1913 there were 54 State boards in existence in the States and Territories of this country. The first organization under this name in the United States was established in Louisiana in 1855, but under the present acceptation of the term it is not to be classed with the average State board of health, as it was created for the sole purpose of maintaining a quarantine for the protection of New Orleans. Following are the dates in which boards of health were established in the different States and Territories: Massachusetts, 1869, under a law for which successive legislatures had been asked since 1856; California, 1870; Virginia and Minnesota, 1872; Michigan, 1873; Maryland, 1874; Alabama and Georgia, 1875; Colorado and Wisconsin, 1876; Mississippi, New Jersey, Tennessee, and Illinois, 1877; Connecticut, Kentucky, Rhode Island, and South Carolina, 1878; Delaware and North Carolina, 1879; Iowa and New York, 1880; Arkansas, Indiana, West Virginia, and New Hampshire, 1881; Missouri, 1883; Maine, Kansas, and Pennsylvania, 1885; Ohio and Vermont, 1886; Florida and North Dakota, 1889; Nebraska, Washington, Oklahoma, and South Dakota, 1891; Nevada, 1893; New Mexico, 1895; Utah, 1898. Since 1898 the following State boards have been established: Arizona, District of Columbia, Idaho, Montana, Oregon, Texas, Wyoming; and Territorial boards have been organized in Hawaii, Philippine Islands, Porto Rico, and in the Canal Zone.

As an example of the organization of a State board of health, that of New York may be mentioned, which is composed of a single commissioner, assisted by a deputy commissioner and a secretary. These constitute the board of administration. There are, in addition, a division of sanitary engineering, with a chief engineer and assistants; a division of laboratory work, consisting of a director of State laboratories, a chief sanitary chemist, water analyst, and bacteriologist. The divisions of vital statistics, communicable diseases, publicity, and education are each headed by a director. There are also a consulting staff of specialists, viz., dermatologist, ophthalmologist, orthopædist, laryngologist, and statistician, and a tuberculosis advisory board consisting of nine physicians; scattered through the State are 45 medical officers of the department.

National Board of Health. A national board of health was organized in 1879. At the end of four years this board went out of existence, having investigated diseases of food-producing animals, adulteration of food and drugs, disposal of sewage; having established quarantine, and secured consular reports regarding disease and sanitation. At present these labors are performed by the Bureau of Animal Industry, various food commissioners, and the United States Marine Hospital Service (now called the United States Public Health Service), which is connected with the Department of the Interior. Some Congressmen favor a proposition to create a national board of health, at whose head shall be a secretary of health, who shall be a member of the cabinet.

HEALTH, Public. See Health, Boards of; Sanitary Science.

HEALTH ASSOCIATION, American Public. On April 18, 1872, an informal conference was held in the city of New York of representatives of five States and five cities, at which a committee was appointed to draw up a constitution for the organization of a national institution for the promotion of sanitary science. The committee made its report at a subsequent meeting, held September 12 and 13, at which a constitution was adopted and officers elected. The objects of the association are to a great extent served by annual meetings, the thirty-ninth of which was held at Havana, Cuba, in 1912, when matters of importance relating in various ways to sanitary science are discussed, the essays and addresses being published in the *American Journal of Public Health*, the official organ of the association. The association has exerted considerable influence in the improvement of the sanitary condition of the country.

HEALTHS, Drinking. See Drinking Usages: Toast.

HEALY, Timothy Michael (1855–). An Irish Nationalist leader, born at Bantry, County Cork. During the decade preceding his birth the potato famine had wrought frightful havoc in southern Ireland, and young Healy, whose nature was vehement and excitable, grew up with a burning hatred for English rule in Ireland. Until his thirteenth year he attended St. Colman's College at Fermoy. Further opportunities of education were denied him, but it is characteristic of his energy and industry that he became one of the best-informed men in the House of Commons, intimately acquainted not only with English but also with French and German literature. Associating himself with the "active" section of the old Home Rule party, he gained the attention of Parnell, who was greatly attracted by the bright, industrious, sleeplessly active young Irishman. In 1880 Healy was nominated and returned without opposition as member for Wexford. A quarter of an hour after he had taken his seat he horrified the House of Commons by his maiden speech, which gave evidence of fierce conviction rather than promise of the oratorical power he later gained. Healy made a thorough study of the Irish land question—it was said that there were but three men who knew the Land Bill, Mr. Gladstone, Mr. Law, and Mr. Healy. Working night and day, he obtained many concessions and finally secured the adoption of the Healy Clause, which forbids increases in rent because of tenants' improvements. He then went on a lecture tour in the United States, which netted $250,000 for the Land League. On his return to England he was cited to appear before the Queen's Bench, and, upon refusing to give bail, was sentenced to a half-year's imprisonment, but he was released at the expiration of four months. In 1882 he married Erina, daughter of T. D. Sullivan, the Irish ballad writer. Reëntering Parliament in 1880, as member for Wexford, he continued his parliamentary career; sitting for Monaghan (1883–85), South Londonderry (1885–86), North Longford (1887–92), North Louth (1892–1910), and Northeast Cork after 1911. In 1891 he opposed Parnell and nominated Justin McCarthy as chairman of the anti-

Parnellite party. Nine years later Healy was instrumental in reconciling both factions by the nomination of John Redmond as chairman of the Irish Nationalist party. He was called to the Irish bar in 1885 and received the compliment of a "special call" to the English bar in 1903. He was elected bencher of King's Inn, Dublin, in 1905 and bencher of Gray's Inn in 1910 and was made K.C. in 1910. In the opinion of many his pen is even more effective than his tongue; his writing is characterized by mordant wit, happy illustration, trenchant argument, liveliness—the prime requisites of effective journalism. He is author of *Why there Is an Irish Land Question and an Irish Land League* (1881); *A Word for Ireland* (1886); *Loyalty Plus Murder; Why Ireland Is not Free; Stolen Waters: A Page in the Conquest of Ulster* (1913).

HE AND SHE BIBLE. See BIBLE, CURIOUS EDITIONS OF.

HEANOR, hē'nēr. A town in Derbyshire, England, 8 miles northeast of Derby. It has large hosiery works and important coal-mining and iron-manufacturing industries. Pop., 1901, 16,250; 1911, 19,851.

HEAP, DAVID PORTER (1843–1910). An American engineer, born in San Stefano, Turkey, and educated at Georgetown College, District of Columbia, and at West Point, where he graduated in 1864. During the remainder of the Civil War he served with the engineer corps of the Army of the Potomac and was brevetted captain on April 2, 1865. Two years afterward he received his commission as captain in the corps of engineers, in 1883 he was promoted major, in 1895 lieutenant colonel, and in 1903 colonel. After the Civil War he was chiefly employed in building fortifications and improving harbors. He explored the Yellowstone National Park in 1871, 10 years afterward was the military representative of the United States at the Paris Congress of Electricians, and was retired in 1905 with the rank of brigadier general. His publications include: *History of the Application of the Electric Light to Lighting the Coasts of France* (1883); *Electrical Appliances of the Present Day* (1884); *Ancient and Modern Lighthouses* (1887).

HEAR'ING (from *hear*, AS. *hyren, heran*, Goth. *hausjan*, OHG. *horren*, Ger. *horen*, to hear, connected with Gk. *ἀκούειν, akouein*, to hear, and possibly ultimately with Eng. *ear*). In its broadest sense, any judicial examination of the issues in a legal proceeding, whether those issues are presented in a formal action at law, in a suit in equity, upon a motion addressed to a court or judge, or upon the appearance of one party only. Specifically, however, the term "hearing" signifies the proceeding in an equity suit, corresponding to a "trial" in an action of law, or to the preliminary examination as to the commission of a crime conducted by a coroner or a committing magistrate. The term is also commonly applied to the sitting of a legislative committee, an official board or commission or other public officer or body, held for the purpose of giving interested parties an opportunity to express their views on any measure or policy then under consideration. The proceedings at hearings, even when of a judicial character, are usually less formal than those of a trial. See TRIAL; PROCEDURE.

HEARING. See AUDITION; EAR.

HEARING IN ANIMALS. Hearing has been defined as that sense whose adequate stimulus consists of vibrations of a surrounding medium, usually air, but sometimes water or some other substance. This definition is, however, not entirely satisfactory, since man, and presumably lower animals, may respond to a vibratory stimulus when the sense of hearing is absent. (See MECHANICAL SENSE; TOUCH.) We are led, therefore, to posit the sense of hearing in animals only when we find both a specific organ and a specific mode of behavior conditioned upon vibratory stimulation.

In the lowest vertebrates there is no adequate basis for supposing the existence of a sense of hearing. In cœlenterates, and in crustacea we find organs, called otocysts, which from their structure might be thought to be primitive auditory organs. We do not find, however, any specific form of behavior correlated with the stimulation of these organs; and it has therefore been suggested that they are not auditory in function, but that they have to do with the maintenance of the animal's position in space. Both the annelids (earthworms) and the crustacea sometimes respond to vibratory stimuli, but their reactions in such cases do not differ from their response to other mechanical stimuli. Darwin, e.g., found that earthworms, which did not ordinarily respond to tones, retreated into their burrows when the pots containing them were placed on a piano and a note was struck. Spiders, although no specific organ of hearing has definitely been made out, have been found to react readily to tuning forks; but it seems as if the response takes place only when the web is set into vibration. This limitation alone would not disprove the existence of hearing in spiders, for it might be the case that the more positive transmission of the impulse by a solid body was necessary for its effectiveness. Since, however, the behavior of the animal does not differ from its response to other forms of mechanical stimulation, the assumption of an auditory sense is not justifiable.

Despite popular belief, there is no conclusive evidence of hearing in the insects. Grasshoppers are provided with chordotonal organs, which may function for hearing or, as has been suggested, for a sense intermediate between hearing and general body sensibility. Ants are not dependent upon sound in their complex social activities; and bees, although they produce a number of different noises under varying conditions, have not as yet been shown to respond to noises as such.

Fishes possess structures analogous to the human ear, and many species respond to the vibrations of a tuning fork or of a string apposed to the aquarium. When the auditory nerves are cut, these responses become much less frequent. Fishes also possess lateral line organs, for which "the stimulus (a water vibration of low frequency) is a physical stimulus intermediate in character between that effective for the skin (deforming pressure of solids, currents, etc.) and that for the ear (vibrations of high frequency), and indicates that these organs hold an intermediate place between the two sets of sense organs named."

Among the amphibia frogs have been shown to respond to certain sounds and to inhibit or modify movements as the result of acoustical stimulation. They may be affected by sounds ranging between 50 and 10,000 single vibrations in one second.

There is no doubt that the higher vertebrates, in general, are endowed with the sense of hearing, but the degree and the range of their auditory sensibility have still to be determined. Experimenters have attempted to show that raccoons and cats can discriminate similar articulate sounds; that raccoons discriminate noises better than human beings and have a lower limen for noise; that dogs can not only discriminate an interval of a semitone, but can even distinguish a difference of a half tone in one of the notes of a chord. The experiments upon which these conclusions are based have, however, not been made under strictly controlled conditions, and there is good evidence that many of the apparently finer discriminations made by the animals were based upon such secondary criteria as the various unconscious movements of the experimenter.

For a description of the organs which may mediate hearing in the different animal forms, see EAR, COMPARATIVE ANATOMY OF. Consult, in general, Washburn, *Animal Mind* (New York, 1908); and for the experimental work on mammals, Johnson, *Audition and Habit Formation in the Dog* (ib., 1913).

HEARN, hērn, GEORGE ARNOLD (1835–1913). An American merchant and art collector, born in New York City. In 1860 he entered the dry-goods business which his father had established in 1826, and of which he became head on his father's death, in 1886. An enthusiastic art collector, especially of the work of American painters, he presented to the Metropolitan Museum of Art 22 pictures in 1903, 28 pictures and $100,000 in 1905, 15 pictures in 1909, and still another bequest of pictures and another $100,000, in memory of his son Arthur Hoppoch Hearn, in 1911. He was a patron also of the Brooklyn Institute of Arts and Sciences. He acquired a private collection of more than 300 paintings, possessed very fine collections of miniatures and ivories, and owned several fine pieces of sculpture. These he bequeathed to his widow.

HEARN, LAFCADIO (1850–1904). A writer on Japan, born in the Ionian Islands, the son of a Greek woman and of an Irish officer, Surgeon Major Charles Hearn. He was educated in England and France, went to the United States at the age of 19, and engaged in journalism, first in Cincinnati, then in New Orleans and New York. After winning a reputation for his powers of picturesque description, he went to Japan in 1891 as a correspondent, but soon gave up his connection with the newspapers, secured an engagement to teach English in the University of Tokyo, and became a citizen of Japan. He married a Japanese wife and devoted his extraordinary gifts of appreciation and criticism to interpreting between the civilizations of the East and the West. The social importance of his work is not yet fully realized; the exquisiteness of his literary art is beyond dispute. He died Sept. 26, 1904. Among his writings are: *Chita: A Memory of Last Island* (1889); *Two Years in French West Indies* (1890); *Youma, the Story of a West Indian Slave* (1890); and, after his going to Japan, *Out of the East* (1894); *Glimpses of Unfamiliar Japan* (1894); *Reveries and Studies in New Japan, Kokoro,* and *Hints and Echoes of Japanese Inner Life* (1896); *Gleanings in Buddha Fields* (1897); *Exotics and Retrospectives* (1898); *Shadowings* (1900); *Kotto* (1902); *In Ghostly Japan* (1904); *Japan: An Attempt at Interpretation* (1904); *Kwaidan* (1904). Consult: Bisland, *The Life and Letters of Lafcadio Hearn* (Boston, 1906); id., *Japanese Letters of Lafcadio Hearn* (London, 1911); Gould, *Concerning Lafcadio Hearn* (Philadelphia, 1908), with a bibliography by Laura Stedman; Kennard, *Lafcadio Hearn* (London, 1912); P. E. More, *Shelburne Essays* (2d series, New York, 1907); Noguchi, "A Japanese Appreciation of Lafcadio Hearn," in the *Atlantic Monthly* (Boston, 1910); id., *Lafcadio Hearn in Japan* (ib., 1911).

HEARNE, THOMAS (1678–1735). An English antiquary, born at White Waltham, Berkshire, and educated at Oxford, where he passed his life at St. Edmund Hall. He was appointed second keeper of the Bodleian Library in 1712, but lost his post and all hope of university preferment owing to his refusal to swear allegiance to the house of Hanover. He edited Leland's *Itinerary* (1710–12); *Aluredi Annales* (1716); Camden's *Annales* (1717); Robert of Gloucester's Chronicle (1724). From 1705 to within a few days of his death he kept an extensive diary. Consult *Reliquiæ Hernianæ: The Remains of Thomas Hearne* (2d ed., 3 vols., London, 1869).

HEARSAY EVIDENCE. Testimony as to a fact which is given in evidence by one who had no immediate, first-hand knowledge of the fact, but who derived his knowledge from written or oral statements made to him by others or from common report. In the law of evidence as administered in the courts of England and the United States, such evidence is received only under exceptional circumstances, the general rule being that a witness may testify only to occurrences and other facts which have come under his own observation, i.e., have become known to him directly through his own senses. To permit him to repeat in court statements made to him by others would be to receive in evidence reported statements of fact, not themselves given under the solemn sanction of judicial proceedings, under oath, and not subjected to the test of cross-examination.

Other legal systems, like those of the continent of Europe, realizing that much of the knowledge by which men guide their lives, and that many, if not most, of the facts which they unhesitatingly accept as true, are known to them only by hearsay, admit such evidence in their judicial proceedings, leaving it to the tribunal trying the fact, whether judge or jury, to estimate it at its true value. But the distrust of the jury which the common-law courts have always entertained has, in the legal systems of England and the United States, led to the rejection of such evidence, on the assumption that the jury was not competent to weigh its trustworthiness as compared with the direct, first-hand evidence in the case. It may well be doubted whether this judicial distrust of the jury's competence is wholly justified; certainly the rule excluding hearsay shuts out much information that would be helpful to the jury in reaching a verdict on the facts, and there is little reason to believe that the verdicts reached by French or German juries on evidence made up in part of hearsay are less sound and just than those rendered by English and American juries under the more restricted rules by which they are governed. But the hearsay rule is too firmly established in English and American procedure to be shaken by such considera-

tions. The most that is hoped for by the critics of the rule is that the scope of the few excepted classes of cases in which hearsay, or reported, testimony is received, may in the course of time be somewhat enlarged.

It will be noted that the hearsay rule, as it is called, does not bar out all testimony as to words spoken to or in the hearing of the testifying witness. When the words spoken are themselves material facts, as a threat uttered in his hearing, a conversation alleged to embody a contract, or an incendiary speech made in his presence, he may, of course, testify to those facts. In other words, where the question is whether a statement was or was not made by a given person, any competent person who heard it may give it in evidence. It is only where such extrajudicial statement is offered to prove the fact asserted in it that it becomes hearsay. For a statement of the hearsay rule and its exceptions, see EVIDENCE.

HEARSAY RULE. See HEARSAY EVIDENCE; EVIDENCE.

HEARSE, or **HERSE** (OF. *herce*, Fr. *herse*, from Lat. *hirpex*, harrow). A name now used to designate the conveyance in which a coffin is borne to the grave. The term was formerly applied to a metal grating or spike fence with upright spikes for the reception of candles for illumination and the hanging of decorative draperies around a tomb or at a gateway. Afterward it was used at the ceremonies of the Church and at funeral services. It was very simple in form, but in the fifteenth and sixteenth centuries hearses of great splendor came into use and were erected in the churches over the bodies of distinguished personages. They were often of metal, and the permanent adjunct to tombs. At other tombs they were around the altar. The framework was of wood, iron, or brass, sometimes of beautiful workmanship, square, octagonal, etc., in plan, with pillars at the angles and arched framework above forming a canopy. The whole was hung over with rich cloths and embroidery, banners, and coats of arms, and lighted up with hundreds of wax candles and decorated with wax images. Such hearses were used at public funerals and set up in the streets. They were temporary. From this the transition to the modern funeral hearse can be easily traced. In Roman Catholic churches of the present day the hearse still exists as a triangle with spikes, on which candles are placed.

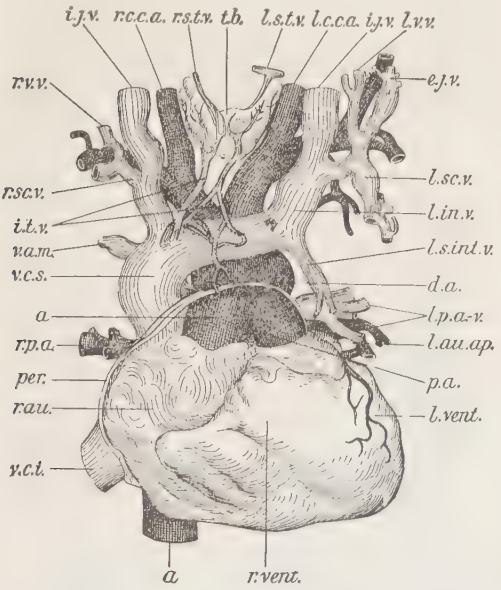
HEARST, hērst, PHEBE APPERSON (1842–1919). An American philanthropist, mother of William Randolph Hearst. Her husband was Senator George Hearst, to whom she was married in 1862. She established and for several years supported kindergarten classes in San Francisco, Cal.; for 10 years she maintained a training class for kindergarten teachers in Washington; and later she established kindergarten classes at Lead, S. Dak., where her principal mining interests were located. At Lead and at Anaconda, Mont., she built and at first maintained public libraries; in Washington, D. C., she built the National Cathedral (Episcopal) School for Girls at a cost of $250,000; and looking towards a comprehensive expansion of the University of California, at Berkeley, she paid the cost of a notable architects' competition. As a memorial to her husband, she erected and equipped the mining building at Berkeley.

HEARST, WILLIAM HOWARD (1863–). A Canadian statesman. He was born in Arran Township, Bruce Co., Ontario, and was educated at the Collingwood Collegiate Institute and Toronto University. He was called to the bar in 1888, practiced his profession at Sault Ste. Marie, and was appointed government agent and counsel in connection with the guarantee loan to the Lake Superior Corporation. He resigned in 1908 and was made king's counsel the same year. Though unsuccessful as a Conservative candidate for the Ontario Legislature in 1894, he was elected in 1908. In 1911 he was made Minister of Lands, Forests, and Mines in the administration of Sir J. P. Whitney (q.v.) and after the latter's death in 1914 became Premier of Ontario. He was prominently identified with the development of the resources of northern Ontario.

HEARST, WILLIAM RANDOLPH (1863–). An American journalist and politician, born in San Francisco, a son of Senator George Hearst and Mrs. Phebe Apperson Hearst (q.v.). He was educated at Harvard University and in 1886 was placed in charge of the San Francisco *Examiner* by his father. In 1895 he purchased the New York *Journal*, and later the New York *Advertiser*, and newspapers in Chicago, Los Angeles, and Atlanta, and established the Boston *American*. Under him so-called "yellow journalism" throve, and the typography of all American newspapers materially changed. He is credited with the invention of the "spread news head." Mr. Hearst advocated the tenets of the most radical wing of the Democratic party. In 1904 he was strongly supported for the presidential nomination in the St. Louis Convention. In 1905 he was the candidate of the Municipal Ownership party for the mayoralty of New York, against George B. McClellan, and failed of election by less than 6000 votes out of half a million. He represented a New York district in Congress from 1903 to 1907. He formed (in 1906) a party of his own, known as the "Independence League," and ran as its candidate for Governor of New York. In 1909, as the nominee of the Independence League for mayor of New York, he failed to secure election; again in 1913 he was prominent during the mayoralty campaign, though not a candidate. He acquired large magazine interests and came into control of a syndicate known as the International News Service.

HEART (AS. *heorte*, Goth. *hairtō*, OHG. *herza*, Ger. *Herz;* connected with Lat. *cor*, Gk. *καρδία, kardia*, Lith. *szirdìs*, OChurch Slav. *srĭdĭce*, Arm. *sirt*, heart; probably connected with Skt. *hṛdaya*, Ar. *zərədaya*, heart, or with Skt. *śraddhā*, Lat. *credere*, to trust). A muscular organ situated in the thorax, occupying part of the space between the lungs, and acting as a pump for propelling the blood to all parts of the body. It is a four-chambered organ, consisting of two upper parts, the right and left auricles, and two lower parts, the right and left ventricles. This article will be confined to a description of the human heart. It is cone-shaped and flattened and in the adult lies obliquely behind the lower two-thirds of the sternum, projecting considerably to the left. Its base is upward and directed somewhat backward and is situated practically at the level of the third intercostal space. Its apex is directed to the left, downward and forward, and reaches the space between the fifth and sixth costal cartilages. The heart is so tilted that the margin of its right ventricle lies upon the central tendon of the

diaphragm. The adult heart is about 5 inches from base to apex, by 3½ inches across the base, by 2½ inches thick. Its weight is, in the male 11 ounces, and in the female about 9 ounces; its weight gradually increasing up to



ANTERIOR VIEW OF THE HEART WITH THE LARGER BLOOD VESSELS.

i.j.v., internal jugular veins; *r.c.c.a.*, right common carotid artery; *r.s.t.v.*, right superior thyroid veins; *r.v.v.*, right vertebral vein; *r.sc.v.*, right subclavian vein; *i.t.v.*, inferior thyroid vein; *v.a.m.*, vena azygos major; *v.c.s.*, vena cava superior; *a.*, aorta; *r.p.a.*, right pulmonary artery; *per.*, cut edge of pericardium; *r.au.*, right auricle; *v.c.i.*, vena cava inferior; *r. vent.*, right ventricle; *t.b.*, thyroid body; *l.s.t.v.*, left superior thyroid vein; *l.c.c.a.*, left common carotid artery; *l.v.v.*, left vertebral vein; *e.j.v.*, external jugular vein; *l.sc.v.*, left subclavian vein; *l.in.v.*, left innominate vein; *l.s.int.v.*, left superior intercostal vein; *d.a.*, ductus arteriosus; *l.p.a.-v.*, left pulmonary artery and vein; *l.au.ap.*, left auricular appendix; *p.a.*, left pulmonary artery; *l.vent.*, left ventricle.

middle life, and then growing less as age advances.

The right auricle receives the venous blood from the venæ cavæ and empties it into the right ventricle. The auricle presents a central cavity or sinus of nearly quadrangular shape and a small appendix somewhat resembling a dog's ear and called the auricular appendix. The walls of the auricle are composed of two layers of muscular fibre and are very thin. The left auricle resembles its fellow of the right side. It receives the blood from the lungs through the four pulmonary veins, which empty, without valves, by four distinct openings. It opens into the corresponding ventricle by means of the left auriculo-ventricular orifice. Each auricle holds within its cavity, moderately distended, about two ounces of fluid. The ventricles, which constitute the bulk of the heart, are characterized by the great thickness of their walls and their large capacity relatively to the auricles. The cavity of each ventricle is conoidal, that of the right being broader and shorter and a trifle more capacious than that of the left. Prominent muscular ridges and papillæ, the *columnæ carneæ*, arise from the inner surface of each ventricle, and from them the *chordæ tendineæ*, fibrous cords, pass to the free border of the valves which close the openings between auricles and ventricles. There are four valves in the heart. The mitral valve closes the left auriculo-ventricular opening and consists of two segments. When these are closed together, the blood is prevented from regurgitating from the left ventricle into the left auricle. The tricuspid valve, situated in the right ventricle, closes the right auriculo-ventricular opening. It consists of three segments, each triangular in shape and adherent to each other at the portion of their free margins which is nearest the fibrous ring from which they arise. The largest of the segments is nearest the pulmonary artery. The semilunar valves are found at the aortic and pulmonary orifices of the heart. The aorta (q.v.) springs from the left ventricle, and through it passes the blood to the arterial system. The pulmonary artery springs from the right ventricle, and through it blood passes to the lungs. The closure of the flaps of the semilunar valves prevents regurgitation of the blood into the aorta and pulmonary artery when the heart expands during the diastole. These valves are well supplied with fibrous material and possess great rigidity, so that they retain their shape. They open out of the ventricles and not in their cavities.

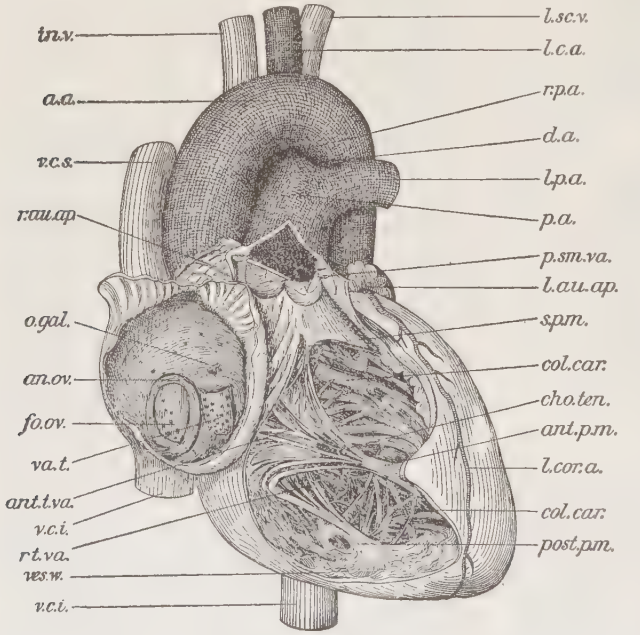
The heart receives its nourishment from blood conveyed to it by the coronary arteries during the diastole of the heart. The veins of the heart accompany the arteries and return their blood into the cavity of the right auricle. The nerves of the heart run into the *deep* and *superficial cardiac plexuses* and also the *posterior* and *anterior coronary plexuses*. These plexuses are formed by sympathetic nerve fibres and by filaments from certain cranial nerves. The heart and the roots of the great vessels are enveloped in the pericardium (q.v.), a sac of conical shape with base below lined with serous membrane (which is reflected over the heart) and containing a very small amount of fluid.

The contraction of the heart, which occurs in the adult from 70 to 80 times a minute, begins in the auricles, which empty their blood into the ventricles. The ventricles then contract—the left to empty itself through the aorta, the right to empty itself through the pulmonary artery. The mitral valve in the left heart prevents regurgitation of blood into the right auricle, and the tricuspid valve in the right heart prevents a like accident in the case of the left auricle. The semilunar valves, as stated, prevent regurgitation at the end of the contraction, or systole. The diastole, or expansion, of the heart begins at once, and the auricles dilate—the right one receiving blood from the two venæ cavæ, which carry venous blood from the upper and lower parts of the body; the left one receiving arterial blood from the lungs through the four pulmonary veins. The ventricles then expand, and the blood passes through the auriculo-ventricular orifices from the auricles until they are full, and the diastole is then complete. (See CIRCULATION.) Previous to birth the circulation in the infant differs, because of structural differences. See FŒTUS; EMBRYO.

Sounds of the Heart. On applying the ear to the cardiac region of a living man or mammal, in a state of health, two successive sounds are heard, each pair of which corresponds with one pulsation. These are known as the *first* and the *second* sound. The *first* sound is dull and prolonged, while the *second* is short and sharp,

and the difference between them is well expressed by articulating syllables, lubb, dŭp. The first sound continues during three-tenths of the pulsation, then follows the "short pause" lasting one-tenth, next the second sound lasting two-tenths, lastly the "long pause" lasting four-tenths.

The cause of the first of these sounds has been a subject of much discussion. During the first sound several distinct actions are taking place to which it is ascribed by physiologists.



ANTERIOR VIEW OF THE RIGHT CHAMBERS OF THE HEART, WITH THE GREAT VESSELS.

in.v., innominate vein; *a.a.*, arch of aorta; *v.c.s.*, vena cava superior; *r.au.ap.*, right auricular appendix; *o.gal.*, orifice of vein of Galen; *an.ov.*, annulus ovalis; *fo.ov.*, fossa ovalis; *va.t.*, valve of Thebesius; *ant.t.va.*, anterior segment of tricuspid valve; *v.c.i.*, vena cava inferior; *rt.va.*, right segment of tricuspid valve; *ven.w.*, section of ventricular wall; *l.sc.v.*, left subclavian vein; *l.c.a.*, left carotid artery; *r.p.a.*, right pulmonary artery; *d.a.*, ductus arteriosus; *l.p.a.*, left pulmonary artery; *p.a.*, pulmonary artery; *p.sm.va.*, pulmonary semilunar valves; *l.au.ap.*, left auricular appendix; *s.p.m.*, small papillary muscle connected with septum; *col.car.*, columnæ carneæ; *cho.ten.*, chordæ tendineæ; *ant.p.m.*, anterior papillary muscle; *l.cor.a.*, left coronary artery; *post.p.m.*, posterior papillary muscle.

Thus, we have (1) the impulse of the apex of the heart against the side of the chest, producing the "apex beat"; (2) the contraction of the muscular walls of the ventricles; (3) the tension of the auriculo-ventricular (tricuspid and mitral) valves and of the chordæ tendineæ. (See CIRCULATION.) The second sound is caused by the sudden closure of the valves of the aorta and of the pulmonary artery as the currents of blood reverse at the instant the heart relaxes and begins to dilate.

When the valves are changed by disease, the sounds undergo special alterations, which are of the highest importance in diagnosis. The normal sounds may be intensified or weakened, or they may disappear entirely and be replaced by murmurs; or abnormal sounds may be heard simultaneously with, or in the intervals between, the normal ones. Thus, we find murmurs of regurgitation in valvular insufficiency, murmurs of obstructed flow of blood in valvular stenosis, aneurismal murmurs, friction sounds in pericarditis, etc. Consult Kirkes, *Physiology* (New York, 1907), and Cunningham, *Textbook of Anatomy* (ib., 1913).

HEART, DISEASES OF THE. Heart disease is a term including many affections of the organ as well as disturbances in its action due to disease elsewhere. Galen was the first to write of disease of the heart, which Hippocrates had denied, though to Vesalius is due the credit of accurate and intelligent grasp of the subject. The discovery of the circulation of the blood by Harvey in 1628 led the way for the investigations which, nearly a century later, gave clinicians absolute knowledge of certain affections of the heart. Vieussens, Lancisi, Morgagni, Sénac, and Auenbrugger deserve mention in the history of this subject. Laënnec, who in 1819 added the method of auscultation to that of percussion, advanced by his teacher Corvisart, and who invented the stethoscope, opened the field to all explorers. Richard Bright detected the enlargement of the organ which accompanies Bright's disease of the kidneys. Kreysig and Bouilland recognized endocarditis. Virchow in 1856 elucidated thrombosis and embolism.

Diseases of the heart are either (1) functional or (2) organic. In *functional* diseases there is no discoverable alteration in structure, and the disorder of function is due to nervous influences. In *organic* diseases structural alteration is present.

FUNCTIONAL HEART DISEASES

These include disorders in the beating of the heart and in the nature of its contractions as well as neuralgic pains in the heart. Palpitation is the term given to a rapid and more or less distressing beating of the heart, in which the pulse may be accelerated from the normal 70 to 80 beats a minute to 150 or more a minute. This condition may be due to organic disease, or it may be due to emotional disturbance (as fright or embarrassment), or to excessive physical strain, or to indigestion, with a production of gas and toxins, or to nervous disorder such as neurasthenia, or to tobacco, tea, coffee, alcohol, or certain drugs, or to hemorrhage, or to certain diseases, such as Basedow's disease (q.v.). Generally nervous excitability, apprehension, shortness of breath, increased perspiration, and flushing of the face accompany palpitation. Acute pain in the heart is experienced by some patients during attacks of hysteria, e.g.; neuralgia of that organ also occurs. Cardiac pain also accompanies fermentative dyspepsia. Disease of the coronary arteries causes, it is believed, the exquisitely painful angina pectoris (q.v.).

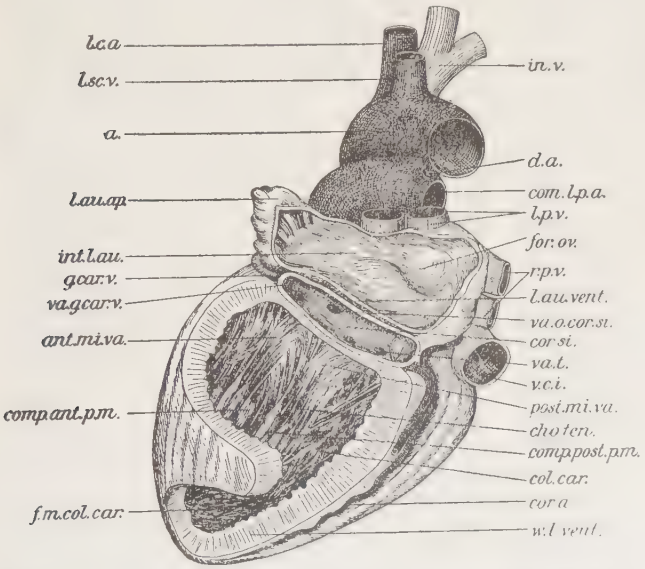
ORGANIC DISEASES

Besides angina pectoris, these include pericarditis, endocarditis, myocarditis, hypertrophy, dilatation, embolism, aneurism, and degenera-

tive changes without inflammation. More than one disease may be found coexisting, and both functional and organic diseases may be present together.

Pericarditis is an inflammatory disease in which the pericardium is thickened and roughened. See PERICARDITIS.

Degenerative Changes in the Heart Muscle. Parenchymatous degeneration, or cloudy swelling, as it is often called, is the form of degeneration which usually accompanies the infectious diseases such as diphtheria or typhoid fever. The heart walls are somewhat softer than normal and rather paler in color. The changes in the heart muscle cells are quite similar to the changes of parenchymatous degeneration in the cells of other organs. (See DEGENERATION.) The heart cells become gradually more granular, and in proportion to the extent of the granulation lose part or all of their normal striated appearance. "Hyaline," "amyloid," and "calcareous" degeneration may occur in heart muscle. *Fatty degeneration* of the heart muscle is a quite common lesion. Its causes are anæmia, old age, wasting diseases, prolonged infectious fevers, certain poisons, such as phosphorus, etc. It consists in the replacement of the heart muscle cell protoplasm by, or its transformation into, fat to a greater or less extent. The degeneration is often not distributed uniformly throughout the heart muscle, but occurs in patches. The degenerated muscle looks pale in color and is softer than normal. The fat drop lets within the cells may be large or small, may be few in number or in such numbers as entirely to destroy the normal appearance of the tissue. What is known as "fatty infiltration of the heart" is not a lesion of the heart muscle itself, but consists in an accumulation of fat beneath the pericardium and in the connective tissue between the muscle fibres. The amount of fat may be very large, causing atrophy of the muscle tissue and interfering with the functions of the organ.



POSTERIOR VIEW OF THE LEFT CHAMBER OF THE HEART, WITH THE GREAT BLOOD VESSELS AND CORONARY SINUS LAID BARE.

l.c.a., left carotid artery; *l.sc.v.*, left subclavian vein; *a.*, aorta; *l.au.ap.*, left auricular appendix; *int.l.au.*, interior of left auricle; *g.car.v.*, great cardiac vein; *va.g.car.v.*, valve of great cardiac vein; *ant.mi.va.*, anterior segment of mitral valve; *comp.ant.p.m.*, compound anterior papillary muscle; *f.m.col.car.*, fine meshwork of columnæ carneæ at the apex of ventricle; *i.n.v.*, innominate vein; *d.a.*, ductus arteriosus; *com.l.p.a.*, commencement of left pulmonary artery; *l.p.v.*, left pulmonary veins; *for.ov.*, concave edge of the foramen ovale; *r.p.v.*, right pulmonary veins; *l.au.vent.*, left auriculo-ventricular opening; *va.o.cor.si.*, valve orifice of vein in coronary sinus; *cor.si.*, coronary sinus; *va.t.*, valve of Thebesius; *v.c.i.*, vena cava inferior; *post.mi.va.*, posterior segment of mitral valve; *cho.ten.*, chordæ tendineæ; *comp.post.p.m.*, compound posterior papillary muscle; *col.car.*, columnæ carneæ; *cor.a.*, coronary artery; *w.l.vent.*, section through wall of left ventricle.

Myocarditis. This is an inflammation occurring in the middle or muscular layer of the heart walls and involving also the blood vessels and interstitial connective tissue. The acute form is frequently suppurative in character and occurs as an extension from an ulcerative endocarditis or pericarditis, or as a complication of one of the infectious diseases. It may be diffuse or, as is more commonly the case, circumscribed with the formation of abscesses. In the chronic form of myocarditis the lesion consists in an increase in the connective tissue elements of the heart, with more or less atrophy of the muscular elements. The condition is usually associated with lesions of the coronary arteries. Opinions differ as to the primary lesion, some holding that the atrophy of the heart muscle is dependent upon the increase in connective tissue, a true productive inflammation; others, that the degeneration of the heart muscle occurs first, the connective tissue proliferation being of the nature of a replacement hyperplàsia. Syphilitic myocarditis and tubercular myocarditis sometimes occur. Myocarditis may give rise to few or no symptoms.

Endocarditis. The lesion in endocarditis is an inflammation of the endocardium, or lining membrane of the heart. While any portion of this membrane may be involved, it is common for the inflammation to be confined to that part of it which covers the valves of the heart and to result in an impairment of their efficiency. For this reason it is often referred to as "valvular heart disease," or "valvular endocarditis." *Simple acute endocarditis* is a frequent complication of rheumatism. It may also be caused by some of the acute infectious diseases, especially scarlet fever and pneumonia. There may be simply thickening of the valves of the heart, their surfaces remaining smooth; or the valves may be rough and either eroded or studded with new growths, called vegetations, which give them a warty appearance. Microscopically the vegetations are seen to be made up of granulation tissue, covered on the surface with a layer of fibrin. There is usually more or less proliferation of the cells in the subendothelial connective tissue. *Malignant* or *ulcerative endocarditis* is due to the action of bacteria. The streptococcus and staphylococcus pyogenes are the most common incitants. More rarely the pneumococcus, the gonococcus, or the bacilli of anthrax, tuberculosis, or typhoid fever are present. The con-

dition may be either primary or, more frequently, it may exist as a complication of one of the infectious diseases. The valves of the heart may be covered with vegetations, or there may be suppuration or necrosis with destruction of tissue. The vegetations consist of granulation tissue covered with fibrin and containing many microörganisms. It is most common on the mitral and aortic valves. More rarely, instead of occurring on the valves, it involves the walls of the heart, when it may lead to perforation either of a septum or of the external wall itself. Detachment of bits of the vegetations or necrotic tissue is not uncommon. Entering the circulation, they form infectious emboli, setting up foci of infection in distant parts of the body. *Chronic endocarditis*, the usual forerunner of valvular diseases of the heart, consists in sclerosis of one or more of the valves of the heart. The sclerosis may be primary, but is usually secondary, to the acute form of the disease. In this, again, the cause is primarily in most cases rheumatism; gout, syphilis, alcoholism, and Bright's disease are also important etiological factors. A common cause, especially in the case of the aortic valve, is constant and excessive muscular exertion. There may be small vegetations on the valves representing remains of acute inflammation. The valves are thickened, opaque, and shrunken. This shrinkage produces deformity; the edges become curled so that the valve is incapable of perfect closure. In this way the valve may become insufficient without any degree of stenosis (narrowing of the opening), or, as the process goes on and the thickening becomes greater, the stenosis may be marked. In the later stages of the disease lime salts are frequently deposited in the new connective tissue of the valves, forming a dense mass of calcareous tissue. Chronic endocarditis may affect the walls of the heart, forming patches of fibrous tissue. Tuberculous endocarditis sometimes occurs.

Endocarditis, whether due to rheumatic inflammation (and the heart complication is said to occur in over 40 per cent of the cases of rheumatism) or whether due to other causes, produces difficulty with the action of the valves of the heart. The thickening of the cusps or flaps of the valves, due to deposits between the layers of endocardium which cover them, makes them stiff and unyielding. They may obstruct the flow of blood through them, causing *stenosis*. The valve flaps may become shortened from contraction of the fibrous structure newly developed and allow the blood to flow back through the valves when they are tightly shut, causing *regurgitation*. Alteration of the normal heart sounds reveals to the trained ear information which will determine the condition. (See *Sounds of the Heart*, in the article HEART.) A rough surface on the valve flaps may lead to a deposit of fibrin from the blood and the formation of a thrombus (q.v.). A thrombus, or a vegetation (a fringe or small lump of granulation tissue), may become broken off and be carried up into an artery of the brain, plugging it, with dire results. Such a plug is called an *embolus*, and the occurrence is termed *embolism* (q.v.). The result of embolism of a cerebral artery may be immediate death, paralysis, convulsions, or secondary softening, with consequent mental deterioration in course of time. Chronic endocarditis may exist for a considerable length of time without causing any symptoms; the heart becoming hypertrophied in one or another of its parts, and being thus enabled to meet the extra amount of work that is thrown upon it by the valvular stenosis or insufficiency. Sooner or later, however, the disease causes the appearance of symptoms, of which the most characteristic are shortness of breath, hemorrhage from the lungs, blueness of the lips and finger nails, dropsy of the hands and feet, dyspepsia, headaches, vertigo, and fainting spells. The prognosis depends upon the particular valve affected, the existence or nonexistence of compensatory hypertrophy, the age of the patient, etc.

Hypertrophy of the Heart. This consists in thickening of the heart walls, the cavity of the heart remaining of normal size (*simple hypertrophy*), contracting (*concentric hypertrophy*), or dilating (*eccentric hypertrophy*). The muscle tissue in hypertrophy of the heart is enlarged, probably both by increase in the number of fibres and by increase in size of the individual fibres. The hypertrophied muscle is dense, firm, and dark in color. If the hypertrophy affects both ventricles, there is an increase in both length and breadth of the heart. If the left ventricle alone is affected, there is an increase in the length of the heart, while hypertrophy of the right ventricle broadens the heart on the right side. Hypertrophied hearts may weigh from two to three pounds or more. Dilatation of the heart may, as already mentioned, be associated with hypertrophy. This is known as active dilatation. Or dilatation may occur with thinning of the heart walls, which is known as passive dilatation. The dilatation may affect any one or all of the cavities. The right side of the heart is more frequently affected than the left side.

Dilatation with compensating hypertrophy, if the valves of the heart are competent, is of little moment. The heart is the stronger for the hypertrophy. Mountain climbing may cause it, as well as mental emotion with oft-repeated increase of the heart's action, or obstacle to the circulation. When the heart has become enlarged as a sequel of kidney disease, it is the latter that causes death when it comes. The ventricles are far more often dilated than the auricles, though all four cavities may be dilated. Should the hypertrophied heart become fatty, a grave danger arises; progressive cardiac failure may occur, with weakening of the circulation and dropsy of the lower extremities.

Heart Block, also known as the Stokes-Adams syndrome, is a disease characterized by partial or complete dissociation of the contractions of the auricles and the ventricles of the heart. It manifests itself in slowness of the pulse (40 to 30 beats per minute) and periodic fainting attacks. Secondary symptoms may be digestive disturbances, nausea or vomiting, and respiratory difficulties, dyspnœa, and sometimes Cheyne-Stokes respiration (q.v.). There are two theories as to the origin of heart contractions. According to the myogenic theory they are originated in and maintained by the muscle fibres themselves. According to the neurogenic theory the heart contracts only in response to stimulation by the cardiac ganglia and the central nervous system. The cause of heart block is believed, by followers of the myogenic theory, to be a destructive lesion of the bundle of His, or Gaskell's bridge, a bundle of muscle fibres about 18 millimeters long, 2.5 millimeters broad, and

1.5 millimeters thick, situated in the intraventricular septum, by which the impulse initiating the contraction of the heart is conveyed from the auricle to the ventricle. Those who favor the second theory seek the cause of heart block in lesions of the pons or medulla, affecting the respiratory and cardio-inhibitory centres. Among the pathologic findings in cases of heart block may be mentioned gumma, syphilitic ulcer or scar, arteriosclerosis with a calcareous nodule compressing the bundle of His, anæmic degeneration, abscess and ulcer of pyogenic origin, tumors and infarcts.

In the main heart diseases are rare, and they are an infrequent cause of death. One with valvular trouble of a mild degree may fulfill the ordinary expectation of life, if he is content to live on a level, avoiding violent exercise, running or lifting, and avoiding anger, grief, and general emotional conditions. Cases of sudden death, called death from heart disease, are often due to cerebral embolism.

Aneurism of the Heart is very rare. It is always fatal. Consult: Strümpell, *Text-Book of Medicine* (New York, 1905); Osler, *Practice of Medicine* (ib., 1912); Satterthwaite, *Cardiovascular Diseases* (ib., 1913); Cowan, *Diseases of the Heart* (London, 1914).

HEART BURIAL. See BURIAL.

HEART LYMPH. See CIRCULATORY SYSTEM, EVOLUTION OF.

HEART OF ENGLAND. A name applied to Warwickshire, as the middle county of England.

HEART OF MIDLOTHIAN, mĭd-lō'thĭ-an. One of Scott's *Tales of my Landlord* (1818).

HEARTS. A game of cards, most frequently played by four persons. The whole pack is ordinarily dealt, in succession, one to each of the four, until each player has 13 cards. The first player to the left of the dealer plays any card he likes, the rest following suit, if possible. The highest card of the suit played wins the trick. If the player cannot follow suit, he may play any card he pleases, and, when hearts are not led, he has the opportunity of getting rid of them. The winner of the first trick leads for the second; and so on until all the 13 tricks have been taken. Then the players in turn expose their hands, count the number of the hearts, and pay into the pool one chip or unit for each one they have, and the pool is divided as provided for under the rules, or it remains, under some circumstances, as an added stake for the next hand. But if the settling is according to Hoyle's rule, each player also pays in addition as many other chips as there are other players (in every four-handed game there are, of course, three other players, and a player who has two hearts has to pay six chips, and so on all round). There will always, therefore, be 39 chips in the pool. Then each player draws out of the pool one chip for every heart *not* taken by him in the play. Thus, if one player has not taken any hearts, he draws 13 chips. The man who has taken 3 hearts takes 10 chips, he who has taken 4 hearts takes 9 chips, and he who has taken 6 hearts takes 7 chips. This exhausts the pool. It is impossible to discuss in detail the reasons which will operate in a player's mind in the various heart games. "Progressive hearts" is played after the manner of progressive euchre, so far as the arrangement of players, tables, and scoring is concerned. In the double, or *eagle*, game each player gives for an ace, 14; a king, 13; a queen, 12; a knave, 11; and for each of the other cards the equivalent of the spots they stand for. This is instead of paying the pool one chip for each heart taken. It may also be played so that the ace counts 5; queen, 3; knave, 2; and all other cards 1. In a variation of the regular game common in the United States, one of the black queens, usually the queen of spades, and called the "Lizzie," or "black lady," is given the value of 13, and must be played in suit. The effort, therefore, is to get rid of this card. Other variations of the game include "six-handed hearts," "three-handed," "sweepstake," "auction," "spot," "drive," "joker," and "jack pot." Consult *Foster's Complete Hoyle* (New York, 1909).

HEART'S CONTENT. A port of Newfoundland on the east side of Trinity Bay (Map: Newfoundland, G 5). It is an excellent harbor and noted as the landing place of three Atlantic telegraph cables from Valentia, Ireland. Pop., 1901, 1079; 1911, 1017.

HEARTSEASE. See VIOLET.

HEART URCHIN. See ECHINOIDEA.

HEAT (AS. *hæu*, OHG. *heizi*, heat; connected with AS. *hit*, Icel. *hiti*, Goth. *heito*, OHG. *hizza*, Ger. *Hitze*, heat, and AS. *hāt*, Icel. *heitr*, OHG. *heiz*, Ger. *heiss*, Eng. *hot*). A definite sensation, known as "warmth," is felt when one places his hand near a flame, exposes it to the sun, rubs it with the other hand, etc. A different sensation is experienced when the hand is placed on a block of ice or is when wet exposed to a draft of air, etc. These sensations are due to two sets of nerves which correspond to the "temperature" sensations. If natural objects are exposed to conditions similar to those just described, it is observed that they undergo certain changes; in fact, as a rule, all of their physical properties excepting inertia and weight are affected—their size, shape, state, electrical and magnetic properties, elasticity, etc. These changes, when produced in this manner, are called "heat effects."

From the time of the Greek philosophers Epicurus and Democritus until about 1800, heat effects were believed to be due to the addition of a substance to the body experiencing the effects; or, in other words, heat was considered a form of matter. Such an idea was furthered when Professor Stahl (1660–1734), of the University of Halle, announced the theory of "phlogiston," which was represented as a material substance emitted from a burning body. That the theory of the material nature of heat, which in this form was called caloric, was generally accepted in the eighteenth century, is shown by the fact that prizes of the French Academy of Science, offered in 1738 for essays on the nature of heat, were granted to scientists who took this view of the question. Although the material idea of heat prevailed during the seventeenth and eighteenth centuries, it must be mentioned that, by some physicists of those and earlier times, it was considered as a mode of motion in some form or other, just as a few philosophers at different times believed in the undulatory theory of light and in a crude way formulated their ideas. Such men as Descartes, Amontons, Boyle, Francis Bacon, Hooke, and Newton believed that heat must be due to motion of the substance, but could not substantiate their theories by experimental proof or urge them with such force as to secure their

adoption. At a time when experimental knowledge was exceedingly limited, that these men should have arrived at such results by pure reasoning is a matter of great wonder, and if they had continued and verified their theories by actual experiments it is safe to assume that the dynamical theory would have been established on a definite basis far earlier.

Caloric, according to the eighteenth-century physicists, was a fluid of an elastic and self-repellent nature, which permeated all matter. The various heat effects were very plausibly explained on this basis, and it was a long time before the theory was overthrown. The first serious opposition came from Count Rumford (1753–1814), whose experiments on the production of heat by friction were published in 1798. These led him to believe that heat, instead of being a material substance, was merely motion. In fact, in 1804 he wrote to Pictet: "I am satisfied that I shall live a sufficiently long time to have the satisfaction of seeing caloric interred with phlogiston in the same tomb." Experiments by Humphry Davy (1778–1829), in which two pieces of ice were melted by friction, caused him also to think that heat was merely the vibration of the corpuscles of the body. In 1812 he asserted that the immediate cause of the phenomenon of heat is motion, and "the laws of its communication are precisely the same as the laws of the communication of motion." Rumford and Davy were also assisted by Thomas Young (1773–1829) in their attempts to displace the theory of caloric; but, in spite of their efforts, the old theory continued to be accepted for many years, and, in fact, Sadi Carnot (1796–1832) in his famous treatise, *Réflexions sur la puissance motrice de feu*, reasoned on this basis, although later he became finally convinced of the truth of the dynamical theory. It is to the experiments of Joule, however, that we owe the most complete evidence in favor of the idea that heat effects are due to energy. (It should be borne in mind that no experiments can *prove* this relation between cause and effect; they can simply be shown to be in accord with theory.) The modern theory that heat effects are due to energy alone is founded largely on the work of Carnot and Mayer. See THERMODYNAMICS.

The researches on heat are more or less closely connected with the development of the thermometer first made and used by Galileo (1564–1642), as described under THERMOMETER. There was also the stimulus of the invention of the steam engine, and from the time of the construction of the first practical steam engine (1711) many of the inventors who improved that machine carried on investigations in heat. Joseph Black (1728–99), who was among the foremost of these, was an assistant of James Watt, the great Scottish inventor, and later a professor of chemistry at Edinburgh. He derived the idea of latent and specific heats and was the first to use proper methods for calorimetry (q.v.); Lavoisier (1743–94) and Laplace (1749–1827), working along lines somewhat similar, determined specific heats of a number of substances and devised calorimeters.

Nature of Heat Effects. One of the simplest modes of producing heat effects is by means of friction. If two pieces of ice are rubbed together, they will melt; if two pieces of metal are rubbed violently, their temperature rises—as detected by the "temperature sense"—they also increase in volume; if a paddle is turned rapidly enough in a vessel of water, the water will boil. It requires work to produce friction; and the energy thus lost by the agency doing the work is gained by the bodies on which the work is done and which manifest the heat effects. Similarly, in every known case, if such heat effects as rise in temperature, expansion, boiling, melting, etc., are produced by any external agency, the latter can be proved to have lost energy; and the "amount of the heat effect" is proportional to the energy received. If, on the other hand, a body experiences the reverse changes, such as fall in temperature, contraction, condensation, freezing, etc., it may be proved that it loses energy. This energy which the body gains or loses is not kinetic energy of the whole body or of its visible parts, nor potential energy of strains of the entire body; it is energy associated with the minute portions of the body—its molecules and atoms. The energy of the body considered by itself—omitting any kinetic and potential energy of the whole body that it may have—is called its "intrinsic" energy. This energy of the molecules and atoms is partly the kinetic energy of their irregular motions and vibrations, and partly potential energy in case it requires work to change their relative positions. In ordinary language a flame is called a "source of heat"; when a body is brought near, it is said to receive "heat," and the effects produced are said to be due to heat. These expressions are most unscientific and misleading. A flame is a source of energy; when a body is brought near, energy passes from the flame to it; part of this energy is spent in increasing the intrinsic energy of the body, and part in enabling the body to do external work; e.g., if it expands it pushes back the atmosphere or whatever rests against it, thus doing work. It is proper to speak of the energy which the body receives as "heat energy"; and in accordance with the conservation of energy one may say that "heat energy received" = "increase in intrinsic energy" + "external work done." One can speak of the intrinsic energy in a body (although no idea can be formed of its amount or even nature); but it is as improper to speak of the amount of "heat" in a body as it is to refer to the amount of sound in a horn or the amount of light in a candle.

Energy of a Gas. One of the most important facts in regard to a gas is that, if it is allowed to expand under such conditions that it does no external work, there is no sensible change of temperature, showing that it has required no work to separate the molecules, and that the molecules themselves have not lost energy. In other words, there are no sensible forces either of attraction or of repulsion between the molecules of a gas, and so the energy of the molecules is entirely kinetic. This fact was first shown by Gay-Lussac and later by Joule; and, although the more elaborate experiments of Thomson and Joule showed that there were minute changes in temperature when a gas expanded freely, they indicate that the molecular forces are extremely small. If a gas is allowed to expand in such a manner as to do external work, the energy required for the work is taken from the kinetic energy of the molecules; a fall in temperature is always observed under these conditions when external work is done; and therefore the temperature of a gas depends upon the kinetic energy of its molecules.

Temperature. The units to be used in the measurement of the quantities involved in heat effects are in most cases self-evident: the "heat energy" itself should be expressed in ergs or joules (q.v.); changes in volume, in cubic centimeters; melting or boiling, in number of grams experiencing the change, etc. The difficulty comes in giving a numerical value to "temperature." Primarily this is a question of sensation; and although our senses give us a rough idea as to hot and cold bodies, they do not enable us to give numbers to the property of these bodies which corresponds to these sensations. Recourse must be had to the changes which some natural object undergoes under the conditions when the senses recognize differences in temperature, changes which may be measured. One of the simplest of these changes is alteration in volume. Two standard thermal states must be chosen arbitrarily, e.g., the thermal state of a mixture of pure water and ice at normal barometric pressure, and that of the vapor rising from pure water boiling under normal barometric pressure, because experiments have shown that these conditions are perfectly definite and unvarying. Let v_1 and v_2 be the volumes of any definite body, e.g., a piece of iron of nitrogen gas initially at a certain density, under two thermal conditions, assuming no other changes in external conditions and particularly no change in the pressure on the body. Let v be the volume of the selected body under the thermal condition for which a numerical value is desired, e.g., a vessel of water, the air of a room. Let it be agreed to take n "degrees," or steps, between the two standard thermal states; then $\frac{v_2 - v_1}{n}$ is the change in volume corresponding to one degree; and the number of degrees corresponding to the change in volume $v - v_1$ is

$$\frac{v - v_1}{\frac{v_2 - v_1}{n}}, \quad \text{or} \quad n\frac{v - v_1}{v_2 - v_1}.$$

Therefore, if it is agreed to give the number t_1 to the first thermal state, the proper number for the temperature of the state to which the volume v corresponds is

$$t = t_1 + n\frac{v - v_1}{v_2 - v_1}.$$

In this method for giving a numerical value to the temperature the following steps are arbitrary: (1) choice of property of body, which varies with the temperature; (2) choice of body to serve as "thermometric substance"; (3) choice of two standard thermal states; (4) choice of number of degrees between the temperatures of these states; (5) choice of number for first state. There are, consequently, an indefinite number of methods for giving numerical values to temperature. (See THERMOMETRY.) The scientific world has agreed to use numbers depending upon the change in volume or pressure of hydrogen gas initially at a pressure of 100 centimeters of mercury, the standard thermal states being those of melting ice and vapor rising from boiling water under normal atmospheric pressure, the number of degrees between the temperatures of these states being taken as 100 and the temperature of melting ice being taken as 0. (Therefore the temperature of the other standard state is 100.) Then, in the above formula, the numerical value of t becomes

$$t = 100\frac{v - v_0}{v_{100} - v_0}.$$

This is, then, the temperature on a constant-pressure hydrogen thermometer, Centigrade scale.

[If change in pressure of a gas kept at constant volume is the property measured, the temperature is

$$t = 100\frac{p - p_0}{p_{100} - p_0},$$

where p_0, p_{100}, p are the pressures of the gas at 0°, 100°, t°. Experiments show that using hydrogen the temperature defined this way has the same numerical value as that defined by the change at constant pressure.]

It is seen, then, that in order to give a numerical value to a thermal state, e.g., to that of water in a vessel, three measurements are necessary—those of the volume of the hydrogen when the bulb containing it is immersed in melting ice (v_0), in vapor rising from the boiling water (v_{100}), and in the water (v). The fact should be emphasized that temperature is not "measured" in the proper sense—the volume is measured; we have simply defined a method for giving a number to temperature. In ordinary laboratory practice mercury-in-glass thermometers are used; and divisions with numbers are marked on them, which are designed to correspond to proportionate increases in volume. These numbers have no meaning until the instrument is compared with a hydrogen thermometer; and a table of values connecting the numbers and the true temperatures—as defined above—is prepared. See THERMOMETER.

Mechanical Equivalent of Heat. Since in practice heat effects are rarely produced by mechanical work, the erg is not a convenient unit in terms of which to measure heat energy. Almost invariably the energy required to produce a given heat effect or the energy given out when the opposite effect occurs, is measured in terms of the change in temperature of water: thus, to find how much energy is required to make ice melt, a quantity of ice of known mass is put into a known mass of water at a known temperature, and the fall in temperature is observed. Therefore a practical unit for the measurement of heat energy is the "energy required to raise the temperature of one gram of pure water from 15° to 16° Centigrade"; this is called the "calorie." The limiting temperatures must be defined, because it is not necessarily true that the same amount of energy would raise the temperature of one gram of water from 10° to 11°, or from 60° to 61°, as from 15° to 16°—in fact, it does not. This definition of a practical unit for measuring heat energy is not an ideal one, because it makes the unit of energy depend upon so many extraneous conditions, viz., all those involved in the definition of temperature. It would be much better theoretically to choose some heat effect which is independent of temperature, e.g., the energy required to make one gram of water boil away at normal atmospheric pressure; but such a unit could not be used practically. Experiments show that the amount of energy required to raise the temperature of one gram of water one degree at any temperature is nearly one calorie; and so for all practical purposes this is assumed. The

number of ergs equivalent to one calorie has been called the "mechanical equivalent of heat." Its value is 4.187×10^7, according to the best determinations. There are in general two experimental methods for measuring this most important quantity—a mechanical one, depending upon the production of the rise of temperature of the water by a paddle revolving in it; an electrical one, in which the rise in temperature is produced by the heating effect of an electric current. In the first method the amount of work done is measured directly in ergs by a suitable dynamometer; in the second, the electrical quantities, current resistance, and electromotive force are measured and the number of ergs calculated (energy $= E\,i\,t$). (See ELECTRICITY.) The mechanical method was first used accurately by Joule (1843–45) and more recently by Rowland (1878) and by Reynolds and Moorby (1897). (The last two investigators did not measure the calorie directly, however.) The electrical method was also first used by Joule; and within recent years it has been perfected by Griffiths (1893), Schuster and Gannon (1894), and Callendar and Barnes (1899). (For a full discussion of these experiments reference should be made to an article by Ames in *Reports of the International Congress of Physics*, vol. i, Paris, 1900.) It should be noted that previous to the experiments of Joule both Carnot and Mayer had made calculations of the mechanical equivalent of heat, using the numerical values found for certain properties of gases.

Specific Heat. It is found by experiment that the heat energy required to raise the temperature of bodies varies greatly with the material of the body, with the external conditions, and slightly with the initial temperature. The number of calories required to raise the temperature of one gram of a substance from $t°$ to $(t + 1)°$ under given conditions is called the "specific heat" of that substance at $t°$ and under the specified conditions. Ordinarily these conditions are those of constant atmospheric pressure, but it is possible to make the condition one of constant volume in the case of gases. (Methods for the measurement of specific heats are described under CALORIMETRY.) The specific heat of a gas at constant pressure is greater than that at constant volume by an amount equivalent to the energy required to expand the gas against the constant pressure, because, as has been stated, no appreciable work is necessary to produce the expansion of the gas itself. The ratio of these two specific heats of a gas is a most important constant for that gas and may be determined directly by several methods. Its value for hydrogen, oxygen, and nitrogen is almost exactly 1.4. (See ELASTICITY.) The specific heat of a substance varies with its temperature. Its value for water at different temperatures is now known quite exactly, owing to the recent experiments of Callendar and Barnes. Its value for solids at different temperatures is hard to obtain, and under ordinary conditions the variations are not important. Boron, carbon, silicon, and iron, however, have specific heats, which increase markedly with increase of temperature. The specific heat of a substance which can exist in several allotropic forms varies with the modification; thus, at ordinary temperatures the specific heat of graphite is 0.202, of charcoal is 0.241, of diamond is 0.147. When a substance changes its state from solid to liquid and then to vapor, its specific heat changes too; thus, the specific heat of ice is about 0.50, of water it is 1.00, of steam it is 0.48. Owing to this change in the specific heat of a substance when its molecular arrangement is altered, there is a curious property observed in the case of iron. If an iron wire is raised to a "red heat" in a flame, then removed and allowed to cool, its color disappears, then reappears, and soon disappears again for good. This is called *recalescence*. It is due to the fact that as the iron first cools from its red heat it comes to a state when the molecules rearrange themselves owing to some internal condition of instability, and in so doing liberate energy, which is at once manifest by the iron becoming red-hot again, but at a lower temperature than before.

It was observed by Dulong and Petit that, if the specific heats of different solids are compared, there is an approximate connection between them and the atomic weights of the solids. In fact, the product of the specific heat of a substance in the solid condition and its atomic weight is approximately the same for all substances, viz., 6.4. This product for any substance is called its "atomic heat," because by the definition of "atomic weight" it is proportional to the heat energy required to raise the temperature of one atom one degree. The agreement between the values of the atomic heat for different substances is not very exact, partly no doubt due to the fact that the conditions of temperature under which the specific heats were measured were not such as to make the other conditions of the solids comparable; e.g., one solid is nearer its melting point than is another at the same temperature. This law of Dulong and Petit has been extended by Woestyn to the idea of "molecular heats"; he thinks it probable that the heat energy required to raise the temperature of a molecule one degree equals the sum of the amounts of energy required to raise the temperature of the individual atoms. This extension of the law is not verified in the case of most compounds.

TABLE OF SPECIFIC HEATS

SUBSTANCE	Specific heat	Temperature
Water	1.000	15°C.
Mercury	.033	20
Copper	.092	50
Iron	.110	50
Zinc	.093	50
Platinum	.032	50

SPECIFIC HEATS OF GASES

	Constant pressure	Constant volume
Air	.2374	.1721
Carbon dioxide	.2169	.1730
Hydrogen	3.4090	2.402
Nitrogen	.2438	
Oxygen	.2175	

Expansion. In general when heat energy is added to a body, its volume is changed; and experiments prove that an approximate relation connects the change in volume of any substance and its change in temperature. If v_0 is the volume at 0°, and v is the volume at $t°$, the external pressure remaining constant, $v - v_0 = v_0\beta t$ or $v = v_0(1 + \beta t)$, where β is approximately a

constant for any one substance (with certain marked exceptions). It is called the *coefficient of cubical expansion at constant pressure*, referred to 0°. [A more exact relation would be $v = v_0 (1 + a_1 t + a_2 t^2 + a_3 t^3 + \text{etc.})$.] If the change in length of a linear dimension of the body—e.g., an edge of a cube, if it is in that form—is considered, it will satisfy a similar formula. Let l and l_0 be the final and initial lengths; then $l = l_0 (1 + \alpha t)$, where α is called the *coefficient of linear expansion*. If the body is in the form of a cube, whose edges have the length l_0 at 0° and l_1, l_2, l_3, respectively, at $t°$, $v_0 = l_0^3$, $v = l_1 l_2 l_3$. Hence, if

$$l_1 = l_0 (1 + a_1 t), \quad l_2 = l_0 (1 + a_2 t), \quad l_3 = l_0 (1 + a_3 t);$$
$$v = v_0 [1 + (a_1 + a_2 + a_3) t + (a_1 a_2 + a_2 a_3 + a_3 a_1) t^2 + a_1 a_2 a_3 t^3].$$

But since a_1, a_2, a_3, are all extremely small in general this may be written $v = v_0 [1 + (a_1 + a_2 + a_3) t]$; and it follows that $a_1 + a_2 + a_3 = \beta$. If the body is isotropic, $a_1 = a_2 = a_3 = \frac{1}{3} \beta$; but if the body is crystalline, the coefficients of linear expansion in different directions may be different and may even be of opposite sign. In this last case it might happen that the contraction in one direction would be so great as to make β negative, i.e., produce a diminution of volume with rise in temperature. The change in volume of water as the temperature changes is peculiar, inasmuch as it decreases while the temperature increases from 0° to about 4° C., and then it increases as the temperature continues to increase. This fact plays a most important part in the economy of nature, as, owing to it, when the temperature at the surface of a pond or lake falls below 4°, the cold water, being lighter, stays on the surface, and ice is formed. Ordinarily, of course, the colder a liquid is, the denser it is; and so, if the surface of a liquid standing in a tall vessel is cooled, the top layers will sink and the lower ones will rise. There will thus be *convection currents* until the whole liquid is at the same temperature. Similarly, if the bottom of a vessel of an ordinary liquid is warmed, there will also be convection currents. The motion of these liquid masses is evidently due to the force of gravity, making the denser liquid come below the lighter. The coefficients of cubical expansion at constant pressure are different for different liquids and solids; but for all gases they are practically the same, viz., 0.003662. This most important property of gases is called the "law of Gay-Lussac," although its accurate verification is due to Regnault. If Boyle's law is true for a gas, viz., at constant temperature the product of the pressure and volume of a given mass of gas remains constant, it follows at once that the change in pressure of a constant volume of a gas as the temperature is raised from 0° to $t°$ obeys the law $p = p_0 (1 + \beta t)$, where p_0 is the pressure at 0°; p that at $t°$; and β is the same coefficient as that for changes in volume, viz., 0.003662. The law that the coefficient of change in pressure at constant volume for all gases is practically the same is sometimes called the "law of Charles." If both the pressure and temperature of a gas are changed—assuming Boyle's and Gay-Lussac's laws—it may be shown that under all conditions $\frac{p}{\rho (t + 273)}$ is a constant for the gas, where ρ is the density at $t°$ and pressure p. This may be written

$$\frac{pv}{m (t + 273)} = R,$$

where R is a constant for any one gas, and evidently equals $\frac{1}{273} \frac{\rho}{\rho_0}$, where ρ_0 is the density of the gas at 0° C. and at pressure p. It is evident, further, from the formula that, *if it could be supposed to apply to gases at very low temperatures*, at $t = -273°$, $pv = 0$, an equation which in itself is meaningless. A lower value of t would lead to a negative value for pv, which is absurd. Therefore the temperature —273 C. is sometimes called "absolute zero on the gas scale of temperature"; and $t + 273$, or T as it is written, is called the "temperature on the absolute gas scale." (A more accurate determination of the coefficient of expansion makes the absolute zero —273.1° C.)

Methods for the measurement of coefficients of expansion are described in all treatises on heat. See Preston, *Theory of Heat*.

COEFFICIENTS OF CUBICAL EXPANSION

SOLIDS

Platinum	0.000027
Copper	0.000051
Steel	0.000033
Brass	0.000056
Glass	0.000027
Zinc	0.000087

LIQUIDS

Mercury	0.000182

GASES

For all gases	0.003662 approximately

Changes in State. Fusion and Vaporization. If a flame is applied to a vessel, such as a glass beaker, in which there is a block of ice at a low temperature, at first the temperature will rise, but finally a temperature is reached when there is no longer any change, and the ice begins to melt. If during the process the mixture of ice and water is stirred, the temperature will remain unaltered until all the ice is melted; then the temperature will again rise until the water begins to boil, when the temperature is again constant until all the water is boiled away; and then the temperature of the steam will rise. Conversely, if the steam is cooled, it will begin to condense into water at the same temperature as that at which it boiled, *provided its pressure is the same;* but so long as it is condensing there is no change in temperature; then, when all is condensed, the temperature of the water will fall until it begins to freeze, as it will at the same temperature as that at which the ice melted, *provided the pressure on it is the same;* and during the process of freezing there is no change of temperature, but when it is completed there is again a fall. This course of events is common to all crystalline solids; but many solids, such as waxes, have no definite temperature at which they melt, but pass through a pasty condition from solid to liquid, the temperature continually rising; and the converse happens when they become solids. There is, then, in the case of ice and similar bodies, a temperature at which the solid and liquid states are in equilibrium together, unless there is addition or withdrawal of heat energy. This is called the "fusion point." There is also a temperature at which the liquid and the vapor are in equilibrium unless there is addition or withdrawal of heat energy. This is called the "boiling point." Both these equilibrium temperatures

vary with the pressure on the bodies. As the pressure is increased on a liquid, its boiling point is raised, and conversely; e.g., in the case of water, a change of pressure from 76 to 77 centimeters of mercury changes the boiling point from 100° to 100.37°.

FUSION AND BOILING POINTS

Fusion point		Boiling points at normal pressure	
Platinum	about 1800° C.	Sulphur	444.5° C.
Copper	" 1096	Mercury	357
Gold	" 1092	Water	100
Silver	" 985	Ethyl alcohol	78
Zinc	415	Ethyl ether	34.6
Bismuth	268	Carbon dioxide	−79
Sulphur	115	Oxygen	−183
Mercury	−39	Nitrogen	−194
		Hydrogen	−238

As the pressure on most solids is increased, their melting point is increased also; but there are certain exceptions, viz., those substances which on melting occupy smaller volumes in the liquid than in the solid state. Such solids are ice, cast iron, bismuth. This change in the freezing point is, however, most minute. In the case of ice the melting point is changed from 0° to — 0.0075° C. if the pressure on the ice is increased from one to two atmospheres. The phenomenon of "regelation" is due to this last fact. When the pressure on a piece of ice is increased, its melting point is lowered. Therefore, if two blocks of ice at 0° are pressed together, the ice under pressure at the point of contact has a melting point less than 0°, but being at 0° is at a temperature which is higher than its melting point, and so melts. The water which results from this is at a temperature lower than 0°; and so as it flows out from under the pressure it freezes again, because now its freezing point is 0°. The motion of glaciers depends on this phenomenon.

The presence of nuclei greatly facilitates the processes of solidification, boiling, and condensation. A drop or a bubble cannot be formed without some nucleus (see CAPILLARITY); and a liquid can be cooled far below its freezing point if there is no nucleus and if the liquid is not disturbed or jarred. A liquid exposed in an open vessel will evaporate, i.e., will pass slowly into the form of vapor, at all temperatures below its boiling point. If, however, a large closed vessel is placed over the one containing the liquid, the evaporation will soon cease apparently—there is equilibrium between the liquid and the vapor. The process does not in reality stop; but the evaporation of the liquid is exactly balanced by the condensation of the vapor. Experiments show that this state of equilibrium is reached at a certain temperature when the pressure of the vapor is a definite quantity, viz., at the "boiling point" for that pressure; if the temperature is changed, so is the pressure which corresponds to equilibrium. If the temperature in the above experiment is lowered, some vapor will condense; illustrations of this are the formation of dew, formation of drops of water on ice pitchers, etc. Again, if in the above experiment the volume of the space over the liquid is made smaller, some of the vapor will be condensed. Thus, there are two methods for the liquefaction of a gas or vapor—to lower the temperature and to decrease the volume. It was established by Andrews in 1869 that a vapor cannot be liquefied by any decrease in volume, however great, unless the temperature is below a certain limit, which is different for different substances, and which is called its "critical temperature." But by lowering the temperature sufficiently and by making the volume small enough, all known gases have been liquefied. (See LIQUEFACTION OF GASES.) The critical temperatures of a few gases are given below:

CRITICAL TEMPERATURES

Carbon dioxide	30.92°	Hydrogen	−234°
Sulphur dioxide	156	Oxygen	−118
Sulphuric ether	194.4	Nitrogen	−146
Water	365		
Ammonia	130		

If substances are dissolved in a pure liquid, both its freezing and its boiling points are altered; the former is lowered and the latter is raised, the amount of the change varying directly with the quantity of substance dissolved. In most cases, however, both the solid and the vapor formed are those of the pure liquid. If the dissolved substance is volatile, then it will evaporate also. Common salt and water serve as an illustration. If salt is added in small amounts to a vessel of water, a time will come when the water will no longer hold the salt in solution, but will deposit it; the solution is said to be "saturated." The amount of salt required to produce saturation varies directly with the temperature. If an unsaturated solution has its temperature lowered below 0°, the freezing point of the solution will finally be reached, pure ice will separate out, leaving the solution more concentrated; the freezing point of this solution is lower than that of the first; and so, as the temperature gets lower and lower, the solution becomes more and more concentrated until finally it is saturated. If now heat energy is removed, ice will form, but salt will be deposited also in equivalent amounts; this mixture of ice and salt is called the "cryohydrate," and the temperature of its formation is — 22° C. (Other salts and liquids have different cryohydrates and different temperatures of formation.) In this cryohydrate of common salt there are 23.8 parts by weight of the salt and 76.2 parts of ice. Therefore, if a mixture is made of salt and ice in this proportion, it will form a solid whose melting point is — 22° C.; and if it actually is at the temperature — 5° or — 10°, it will of course melt, and in so doing heat energy will be abstracted from surrounding bodies, because energy is required for two reasons—to melt the ice and to make the salt dissolve in the water. For this reason such a mixture is called a "freezing mixture."

The fact that heat energy is required to make a solid melt or a liquid evaporate is familiar from many experiments. Similarly heat energy is liberated when a liquid freezes or vapor condenses. The number of calories corresponding to the change in state of one gram of a substance under a definite pressure is called the *latent heat* for that change at the given pressure. Similarly, when one substance dissolves in another, there are, as a rule, changes in temperature, showing that heat energy is liberated or absorbed. The heat of solution is defined to be the number of calories produced when one gram of a substance dissolves in a great mass of a given solvent, a quantity so great that any further increase in it would not affect the heat energy liberated or absorbed. Values for latent heats and heats of solution are given in the following tables:

LATENT HEATS

SUBSTANCE	Fusion	SUBSTANCE	Vaporization
Water	80.02	Water	536.6
Sulphur	9.37	Ammonia	297
Benzene	30.85	Benzene	92.9
Mercury	2.82	Ether	90
Silver	21.07	Chloroform	58.5

HEATS OF SOLUTION IN WATER

Ammonia gas	+495.6
Ethyl alcohol	+ 55.3
Sulphuric acid	+182.5
Caustic potash	+223.3
Sodium chloride	− 18.22
Potassium chloride	− 59.7
Silver chloride	−110

\+ Means rise in temperature.
− Means fall in temperature.

There are, of course, other changes of state than those mentioned; among these are sublimation, when a solid passes directly into the state of vapor; dissociation of a gas, when the molecules of a gas break up into other parts; etc. It is found, however, in all these cases that there will be equilibrium at a definite temperature only when a certain pressure is reached, and conversely.

Transfer of Heat. There are three processes by which the energy used in producing heat effects is conveyed from one point to another—convection, conduction, radiation. It should be particularly noted that in all cases a difference of temperature is essential for a transfer of energy, and that it is the body at the lower temperature which gains heat energy, while the body at the higher temperature loses it. *Convection* has already been described. It consists in applying a flame or "source of heat" to the lower portion of a column of some fluid; this portion expands, becoming less dense; then under the influence of gravity it rises to give place to some heavier portion of the fluid above it. The motion of the wind, of drafts of smoke in chimneys, of water in hot-water systems of heating, etc., are illustrations of this process. *Conduction* is illustrated when one end of a long metal rod is raised to a high temperature, while the other is maintained at a lower one. There may be observed a steady increase of temperature from the latter end up to the former; the heat energy required to produce this temperature coming from the "source of heat," which keeps the hot end at its high temperature by a process of "conduction" from particle to particle down the rod. Some bodies conduct better than others, meaning that the effect of the source of heat at the hot end is felt farther down the rod. Metals are all good conductors; but silver, copper, and aluminium are the best. Woods and cloths are poor conductors; so are all liquids, with the exception of molten metals, and gases also, relatively to their volumes. The principle of the miner's safety lamp depends upon conduction. The temperature of the hot gases rising from the flame through the gauze envelope of the lamp is made so low by the conducting away of heat energy by the gauze and the metal base that the exterior gas is not ignited. *Radiation* is the process by which heat energy is conveyed from one body to another by a wave process in the luminiferous ether. (See RADIATION; ABSORPTION; ETHER.) Illustrations are afforded when the hand is held beside a stove or exposed to the sun. All bodies in the universe, so far as is known, are emitting these ether waves, owing to vibrations inside the molecules. These waves have lengths varying from less than 0.00002 of a centimeter to a few hundredths of a millimeter. They carry energy; and if they are absorbed by any body upon which they fall, this energy is, as a rule, distributed throughout the minute portions of the body, and it manifests heat effects. The total amount of energy radiated by a body increases as the temperature is raised; and, further, as the temperature rises, the body emits shorter and shorter waves—finally the body may become visible. If two bodies are allowed to radiate to each other, each loses energy by radiation and gains it by absorption, until finally there is equilibrium of temperature. It may be shown (see RADIATION) that the radiating and absorptive powers of any body are the same at any one temperature; and in general a body which is a good absorber is a good radiator, e.g., a body painted black; while, if a body is a poor absorber and therefore a good reflector, it is a poor radiator, e.g., a piece of polished metal. Some bodies are transparent to ether radiations of certain wave lengths and opaque to others; they are called diathermanous if the waves which are transmitted by them carry a large amount of energy which may be transformed into heat energy if absorbed. See DIATHERMANCY.

Consult: Preston, *Theory of Heat* (2d ed., New York, 1904); Tyndall, *Heat as a Mode of Motion* (new ed., ib., 1905); Maxwell, *Theory of Heat* (new ed., ib., 1902); F. M. Hartmann, *Heat and Thermodynamics* (ib., 1911); C. H. Draper, *Heat and the Principles of Thermodynamics* (ib., 1914); M. Planck, *Theory of Heat Radiation* (Philadelphia, 1914). For heat considered as a factor of organic evolution, see EVOLUTION.

HEAT, ANIMAL. See ANIMAL HEAT.

HEATH, hēth (AS. *hæþ*, Icel. *heiþr*, Goth. *haiþi*, OHG. *heida*, Ger. *Heide*, heath, OWelsh, Bret. *coit*, Corn. *cuit*, forest, Gall. *cēto-* in *Cētobriga*, *eto-cētum*, Lat. *cetum* in *bu-cetum*, cow pasture, *quer-cetum*, oak forest). A term of varied significance, applied originally to various members of the Ericaceæ (see below) and long used to designate areas covered by such plants. It has been still further extended to include most sterile, uncultivated tracts covered with low shrubs. In its more proper ecological sense, however, a heath may be defined as a plant community on sterile and commonly dry soil in which the dominant plant types are evergreen shrubs, chiefly ericads or ericad-like plants. The heath, defined in this way, is much less common in America than in Europe, although in the northern United States and Canada small areas of low evergreen shrubs are often found in which the bearberry (*Arctostaphylos*) and junipers dominate. Small heath areas are also found in mountain (even Alpine) districts. In the far northern regions and sometimes locally in the Northern States, habitats like the above are often covered with coarse mosses like *Polytrichum* or lichens of the genus *Cladonia* (including the reindeer lichen); these areas may be called moss or lichen heaths, since the soil conditions are those of the true heath, though the exposure is perhaps too great for the shrubs.

Heaths are conspicuous in the vegetation of

many Arctic and Antarctic areas, such as the Faroe and Falkland Islands. In the latter region the heather is replaced by *Empetrum*, a low evergreen shrub of the same family. Grasses and large mosses are abundant, the whole giving rise to thick layers of peat. These peat beds afford the only fuel supply of the Falkland Islands, since the climate does not permit trees to grow.

The origin of the heath is twofold: it may arise from a moor or undrained swamp (q.v.), or from a dry sandy area, as a beach or dune. This fact is of great ecological interest, since, so far as water content is concerned, a dune is xerophytic, while a swamp is hydrophytic. That dune, heath, and moor are closely related as to their ecological conditions, however, is shown not only by the twofold origin of the heath, but also by the fact that all typical dune, heath, and moor plants have identical and xerophytic structures (see XEROPHYTES); not only this, but the dominant plant families, conifers and ericads, are the same throughout. On the dune transpiration is great, perhaps because of the excessive exposure; on the heath and in the swamp transpiration is great in relation to absorption, probably because of the soil acids and the relative absence of bacteria. Hence in all three cases only those plants can thrive which are able to reduce transpiration by protective structures, and those structures are peculiarly prominent in conifers and ericads.

The heaths are small shrubs, distinguished by a calyx of four leaves and a bell-shaped or ovate corolla. The leaves are small, linear, and evergreen. The genus has been separated by some botanists into a number of genera, but the old name, *Erica*, is still commonly retained. The name "heath," however, is in popular language extended to many plants of genera nearly allied to *Erica*. The little shrub which chiefly covers the large tracts named moors or heaths (Ger. *Heide*) in Great Britain and on the continent of Europe, is the common ling, or heather (*Calluna vulgaris*), the only known species of the genus *Calluna*. It is also found in a few places in the eastern United States, where it was probably introduced. It is found on arid places and also in bogs. The flowers, which have much the appearance of being in spikes, are of a lilac-rose color, rarely white. They afford abundance of honey, and the beehives are therefore transported to the moors when the heather is in bloom. In bogs it contributes much to the formation of peat. In some of the Hebrides a decoction of heath is used for tanning leather. The plant is applied to various other uses in the Highlands of Scotland. About 400 species of *Erica* are known, and these, with few exceptions, are natives of the south of Africa. None are found in America. The British Isles produce seven species, of which some have been found only in Ireland and some in the southwest of England; cross-leaved heath (*Erica tetralix*) and fine-leaved heath (*Erica cinerea*) are common plants in most parts of Great Britain, and, like most of the genus, are very beautiful when in flower. The heather bells of Scottish song are the flowers of one or both of these species. *Erica mediterranea* and *Erica carnea*, common in the southern parts of Europe, are very frequent ornaments of British flower borders, hardy plants, producing their flowers in great profusion in April. Many of the African species, remarkable for the size and beauty of their flowers, are much cultivated in greenhouses. Some of the South African or Cape heaths attain in their native region a much greater size than any European heath. The roots of *Erica scoparia* are known as bruyere and furnish the true brier pipes of France. See Plate of DICOTYLEDONS.

HEATHER.

HEATH, HAROLD (1868–). An American zoölogist. He was born at Vevay, Ind., and graduated from Ohio Wesleyan University in 1893 and from the University of Pennsylvania (Ph.D.) in 1898. He was professor of biology at the University of the Pacific in 1893–94 and then taught zoölogy at Leland Stanford, where he became professor in 1909. He served as naturalist for the United States Fish Commission on the *Albatross* in 1904 and was a member of expeditions to Florida in 1890, to the California coast in 1905, to Japan in 1906, to the Pribilof Islands in 1910, and to Brazil in 1911. His papers deal chiefly with the anatomy of invertebrates and mollusks, and he is author, besides, of *Animal Forms* (1900) and *Animals* (1902).

HEATH, JAMES (1629–64). An English historian, born in London and educated at Westminster School and for two years at Christ Church, Oxford, from which he was expelled by the visitors from Parliament in 1648. He was an ardent Royalist and lived in exile with Charles II. He wrote: *A Brief Chronicle on the Late Intestine War* (1661); *The Glories and Magnificent Triumphs of the Blessed Restitution of King Charles II* (1662); *Flagellum: or, the Life and Death, Birth and Burial of Oliver Cromwell* (4th ed., 1669); and a number of poems, which posterity has permitted to remain undisturbed.

HEATH, NICHOLAS (c.1501–78). An English prelate and jurist, born in London, and educated at St. Anthony's in London, at Corpus Christi, Oxford, and at Christ's College, Cambridge. In 1539 he was made Bishop of Rochester. He "oversaw and perused" the Great Bible of 1541 and was made Bishop of Worcester after Hugh Latimer's resignation. In 1550 he refused to accept Cranmer's form for the Prayer Book and was imprisoned and deprived of his see, but was restored at the accession of Mary and in 1555 became Archbishop of York. When Mary died, Heath did all in his power to bring about the immediate and peaceful accession of Elizabeth; but when the question of Elizabeth's supremacy came before Parliament, Heath opposed her claim to the headship of the English church and later refused to take the oath required by the Act of Supremacy. For this contumacy he was again deprived of his see (1659), imprisoned in the Tower, and then permitted to retire, on the understanding that he was not to meddle with politics, profane or ecclesiastical. How much liberty he was allowed in his later years is disputed, it being sometimes claimed that much of the time he was in strict confinement. Consult Strype's *Works* and, for the Catholic

view, Phillips, *The Extinction of the Ancient Hierarchy* (London, 1905).

HEATH, Perry Sanford (1857–). An American newspaper publisher and editor, born at Muncie, Ind. He was editor and publisher of Western papers until 1881, and then until 1893 was a correspondent at Washington, D. C. He had charge of the literary departments of the Harrison nominating campaigns (1888, 1892) and of the McKinley nominating campaign (1896), helped frame the North and South Dakota constitutions, and in 1894–96 was president and editor of the Cincinnati *Commercial-Gazette.* While First Assistant Postmaster-General (1897–1900), he developed the present system of free rural mail delivery. From 1900 to 1904 he served as secretary of the Republican National Committee. He published the Salt Lake *Tribune* in 1901–05 and founded the Salt Lake *Telegram* in 1902, also becoming interested in various business enterprises. He is author of *A Hoosier in Russia* (1887).

HEATH, Sir Robert (1575–1649). An English jurist, born at Brasted in Kent and educated at Tonbridge and at St. John's, Cambridge. He studied law, rose rapidly, became Solicitor-General in 1621, was knighted and entered Parliament in the same year. He showed himself a thorough Royalist in Parliament in 1623–25, and was appointed Attorney-General as a reward for his services. In this office he was active and severe; he arrested in 1629 Holles, Eliot, Selden, and other members of the Commons, arguing that privilege did not protect after the close of a session, and carried their prosecution through successfully and was equally strenuous and successful in his prosecutions before the Star Chamber. But there was a rumor that he was Puritan in secret, and he was removed without cause. But his loyalty did not waver; he accompanied the King to York in 1642 and later to France, where he died at Calais. Consult the autobiography in vol. i of the *Philobiblon Society Miscellany* (New York, 1861).

HEATH, William (1737–1814). An American soldier. He was born at Roxbury, Mass., and was brought up on a farm, upon which he lived up to the outbreak of the Revolutionary War. He was a member of the General Court of Massachusetts in 1761, entered enthusiastically into the political movement that culminated in the Revolution, and from 1771 to 1774 was a member of the committees of Safety and Correspondence. In the latter year he was elected to the Provincial Congress. His interest in the organization of the militia, of which he had made a special study, obtained for him in December, 1774, an appointment as a brigadier general of militia, and as such he was present at the British retreat from Concord after the battle of April 19, 1775. Thereafter he was made major general of militia, and on June 22, 1775, was commissioned by Congress a brigadier general of the continental troops. In March, 1776, he was ordered to New York, on August 9 was promoted major general, and after the battle of White Plains, in the following October, was placed by Washington in command of the troops in the Highlands. In 1777 he became commander of the Eastern Department, with headquarters at Boston, and in June, 1779, was transferred to the command of Hudson River posts, where, with the exception of his coöperation with the French in Rhode Island in 1780, he remained until the close of the war. After the war he was a member of the Massachusetts Convention that ratified the Federal Constitution, was a State Senator in 1791–92, and was probate judge of Norfolk County in 1793. In 1806 he was elected Lieutenant Governor of Massachusetts, but declined to serve. His *Memoirs,* which contain much valuable material on the Revolutionary period, were published in 1798 by authority of Congress and were last republished under the editorship of William Abbatt in New York in 1901. His correspondence is published in the "Heath Papers," vols. iv–v, *Massachusetts Historical Society Collections* (7th series, Boston, 1904–05).

HEATHCOAT, hĕth′kōt, John (1783–1861). An English inventor, born at Duffield, near Derby. He worked with a hosier, and later with a stocking maker and frame smith at Nottingham. In 1808 and 1809 he patented his complicated machinery for the manufacture of lace. His factory at Loughborough was attacked by the Luddites, and most of his machinery and lace destroyed. Rather than continue at Loughborough, Heathcoat refused an award of £10,000 for damages. He built a new plant at Tiverton and for 26 years (1832–59) represented that constituency in Parliament. He built schools at Tiverton and planned many charities, which were carried out by his daughters.

HEATH COCK, HEATH HEN. See Black Cock; Grouse.

HEATHCOTE, hĕth′kōt, Caleb (1665–1721). An American merchant, born in England, where his father was mayor of Chester. He established himself with his uncle, Capt. George Heathcote, a large shipowner, in New York, and upon Heathcote's death inherited his fortune. He was a zealous churchman and was one of the petitioners for a license to build the first Trinity Church. He held many offices, among them those of mayor of New York (1711–14); judge of admiralty for New York, New Jersey, and Connecticut (1715–21); commander in chief of the forces of the Colony; surveyor-general of the eastern district of North America in 1715–21; and receiver-general of the customs for the province from 1697 to 1721. His large estates descended to his two daughters.

HEATHEN CHINEE, The. A celebrated satiric poem by Bret Harte (1869), in the metre of the threnody in Swinburne's *Atalanta in Calydon,* selected, as Harte says, because "it was just the kind of thing which Truthful James would be the last man in the world to adopt in expressing his views." It is probably the best known and most quoted of the author's writings.

HEATHER, hĕth′ẽr. See Heath.

HEATH′ER BLEAT′ER. A provincial name in England for the common snipe (q.v.), in allusion to the love cry of the cock bird in the breeding season.

HEATH′FIELD, George Augustus Eliott, first Baron (1717–90). A British soldier, born at Stobs, Roxburghshire, Scotland, Dec. 25, 1717. He was educated in Edinburgh, at the University of Leyden, and at the French military college of La Fère. He served in the War of the Austrian Succession, being present at the battles of Dettingen and Fontenoy. As colonel of a regiment of light horse, he took part in the Seven Years' War in the years 1759–61. In 1762 he was second in command in the English expedition to Cuba and for his services there was raised to the rank of lieutenant general. In

1775, when, because of the *pacte de famille* between France and Spain, it was thought very probable that one or both of these countries, taking advantage of the rebellion in America, would attack England, an experienced soldier was deemed necessary for the command of Gibraltar, and Eliott received the appointment. Ample time was given to him to repair the defenses, as it was not until 1779 that the Spanish undertook a regular siege. In the attacking force of French and Spaniards were the greatest engineers of the age; but their efforts to reduce the stronghold, including the terrific cannonade with the floating batteries of the Chevalier d'Arcon in 1782, were futile. Eliott and his little garrison, though at the verge of starvation because of the blockade, held out until relief came from a force in command of Lord Howe, who succeeded in breaking through the Spanish lines with supplies. At the conclusion of peace, in 1783, Eliott returned to England, where he was richly rewarded for his bravery. He was made Knight of the Bath and in 1787 advanced to the peerage as Baron Heathfield of Gibraltar. He died at Aix-la-Chapelle July 6, 1790. His portrait by Reynolds is in the National Gallery. Consult Drinkwater, *History of the Siege of Gibraltar* (new ed., London, 1844), and Adye's "Heathfield," in Wilkinson, *From Cromwell to Wellington* (ib., 1899).

HEATING AND VENTILATION. These topics are so closely related in sanitary and engineering discussions, as well as in the actual planning and erection of buildings, that they are generally considered together. Where artificial heat is seldom if ever required, little attention need be given to ventilation, since the people spend most of their time either out of doors or in loosely constructed buildings, with plenty of exposure to the outer air. In cold climates ventilation becomes as essential for complete healthfulness as heating is for comfort. Where much artificial heat is required, the fresh air provided as a part of ventilation must also be heated, which may add greatly to the expense of fuel. In general it may be said that the object of heating is to provide a uniform moderate temperature, and the aim of ventilation is to displace foul air with pure. The moisture in the air plays an important part from a sanitary standpoint; for best results it should approximate about 60 per cent of saturation but is generally much less; hot-air furnaces are especially noted as giving very dry air. It should be noted that the atmosphere of a poorly ventilated, overcrowded room gradually becomes saturated with watery vapor.

What constitutes a comfortable temperature is largely a matter of habit; it is generally less in temperate than in cold climates. Heating has for its standard in the colder parts of the United States and in Canada a temperature of about 70° F., against some 62° in England. Heat for warming is produced by the combustion of fuel (q.v.), except in those few rare cases where electricity generated by water power (as at Boise, Idaho) or the stored heat from underground waters is utilized. Coal and wood are most commonly employed as fuel, but coke, oil, and gas are also used. Open fireplaces, stoves, or furnaces may be employed for burning any of the fuels named, except that oil is rarely if ever burned in open fireplaces.

The methods of heating are classified as direct and indirect radiation. Direct radiation takes place when the heat is generated either in the room, as with open fireplaces, stoves, and furnaces, or when hot water or steam is produced by means of central furnaces and then conveyed through pipes to radiators located in the various compartments to be heated. Indirect radiation involves the bringing in of air warmed by passing it over some central heated surface, generally a furnace, but sometimes a coil of steam or hot-water pipes. It will be noted that direct radiation heats the objects already in the room, while indirect radiation brings in heated air. Thus, indirect radiation may be a means of ventilation. The same end may be effected by locating the heating surface in the room and passing the fresh air over it, which is known as direct-indirect radiation. It should be noted that air is heated only by convection or rubbing contact produced by air currents, while solid objects are heated by the direct rays of radiant heat; thus, e.g., fireplaces heat by direct radiation, i.e., by sending the heat out in straight lines until it is deflected or absorbed by something other than air. With stoves and radiators the heat is largely made available by convection, i.e., by heating the air that impinges upon or passes over the heated surface.

History. The first application of artificial heat consisted, most likely, in lighting a fire of dried sticks and leaves in a grove, a cave, or other natural shelter. Where tents or wigwams came to be erected, the fire would be lighted on the middle of the floor, with perhaps a hole in the roof for smoke to escape. The Romans warmed their apartments chiefly by portable stoves, without any regular exit for the smoke and fumes. A brazier of charcoal is still the chief means of heating sitting rooms in houses in Spain and Italy, which are in general without chimneys, and is comparatively a modern invention. The early fireplaces were without chimneys, and the flues extended only a few feet up in the thickness of the wall. They were then turned out through the wall, to the back of the fireplace, the openings into the outer air being small oblong holes. There is no evidence of chimneys earlier than the twelfth century, and brick was not used for their construction till late in the fifteenth century. Of the modern methods of heating dwellings by fireplaces, stoves, furnaces, steam and hot-air apparatus, the fireplace is the oldest, having been employed during the Middle Ages, and becoming in northern Europe an important feature of the architectural development. The fireplace, at first wholly of masonry, was afterward framed in elaborately carved oak, and the settle, which soon became an essential part of mediæval furniture, was built into the angle of the chimney. Stoves are said to have been used for the first time in Alsace in 1490, but they did not come into general use as a means of heating until three centuries later. In 1744 Benjamin Franklin invented a cast-iron open heater, which projected out from the chimney and so radiated heat into the room from the back and sides as well as from the front. The cast-iron box stove was invented in 1752. Early in the nineteenth century cylindrical sheet-iron stoves were made. About 1830 the first baseburner was put upon the market in America, and since that time the different types of stoves have been developed, by successive patents, to their present state of perfection.

The first attempt to construct a hot-air furnace for supplying pure heated air to rooms was

probably made by Franklin. Early in the nineteenth century the method of warming by hot air was developed. The first hot-air furnace in New England is said to have been built in Worcester, Mass., in 1835. Heating by hot water was an invention of great antiquity. According to Seneca, the baths of Rome were warmed by water running through brass pipes, which at one point were heated in a fire. With the fall of Rome this method of warming seems to have been forgotten, for we next hear of it as a fresh discovery made in 1777 by M. Bounemain for warming the hothouses of the Jardin des Plants in Paris. Heating by hot water was introduced into England in 1816 by the Marquis de Chabonne. It was used in Canada for many years before it became popular in the United States, where it was not generally adopted till the last quarter of the nineteenth century. Heating by steam was proposed, in the middle of the eighteenth century, by William Cook, of Manchester, England. In the United States it was not introduced till nearly a century later. The first building in America warmed in this way was the Eastern Hotel of Boston, and the first factory the Burlington Woolen Mill, Vermont.

Fireplaces. Fireplaces are used in modern heating systems principally for ventilation purposes and for imparting an air of comfort and cheerfulness in a room. Fireplaces are inefficient, since they utilize only 10 to 15 per cent of the heating value of the fuel, and as they warm only by radiation the heat they give off is diffused irregularly; as an adjunct to a heating system they are, however, of great sanitary utility. The fireplace, besides its cheerfulness and sentimental features, may be ornamental, while as an efficient aid to ventilation it is most useful. The substitution of brick-lined for nonlined fireplaces conserves some of the heat. Much also depends upon the shape of the fire box, or grate itself, where coal, rather than wood, is burned. The chief object is to present as large a surface as possible of glowing fire to the front in order to secure as much radiant heat as possible. With this view the grate is made long and deep, in proportion to its width from front to back.

Placing grates almost on a level with the floor is a mistake. The floor and the lower part of the person receive no share of the radiant heat. The chimney throat, instead of a gulf drawing in a constant wide current of the warm air of the room, and causing drafts from windows and doors towards the fireplaces, should just be sufficient to admit the burned gases and smoke. Fireplaces are sometimes so arranged in connection with an air inlet as to introduce a current of warmed air into the room. In cold climates fireplaces must be supplemented by more effective means of heating.

A stove is simply an inclosure of metal, brick, or earthenware, heated by burning a fire within it, and then giving out its heat to the air by contact and to surrounding objects by radiation. The simplest arrangement is a hollow cylinder or other form of iron standing on the floor, closed at top, and having bars near the bottom on which the fire rests. The door by which the coals are put in being kept shut, the air for combustion enters below the grate, and a pipe issuing from near the top carries the smoke into a flue in a wall. If this pipe is made long enough by giving it, if necessary, one or more bends, the heated gases from the fire may be made to give out a large proportion of their heat before they enter the wall. A stove made of cast iron is extensively used for heating the cheaper form of buildings in the United States and is the principal means employed in heating farm buildings. The low first cost of the stove has had much to do with its extensive use. The great objection to this form of stove is that the metal is apt to become overheated, which not only gives rise to accidents, but lessens the percentage of humidity in the air. It adds greatly to the dust contents of the air and is decidedly objectionable from a sanitary standpoint. It has an efficiency for warming purposes of from 40 to 60 per cent of the heating value of the fuel, which makes it a decided improvement over the fireplace. It introduces no additional air for ventilation purposes and is objectional for that reason.

Furnaces. In ordinary hot-air furnaces the fire is burned in a small compartment within the inner case, and the air is warmed by circulating between the inner and outer cases. When placed in the apartment or hall to be warmed, the outer casing has perforations about

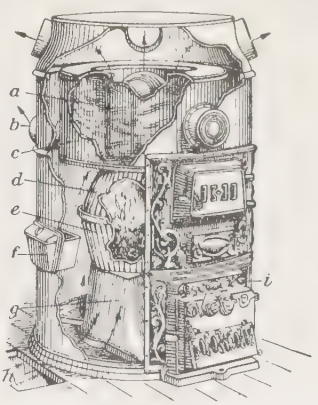


FIG. 1. FURNACE.

a, division plate; *b*, smoke pipe; *c*, steel-plate radiator; *d*, body; *e*, fire pot; *f*, water pan; *g*, ash pit; *h*, cold-air duct; *i*, dust flue.

the top for the issue of the warm air. Usually the furnace is placed in a separate room or cellar, and the warm air is conveyed to the different parts of the building in pipes or flues, while fresh air is drawn to the furnace through a fresh-air inlet and duct from outside the building to the openings in the outer casing of the furnace. The warm-air pipes are generally of tin plate, suspended from the ceiling of the cellar, in their horizontal course, or from the beams supporting the floor above, and carried upward in the partitions to the higher floors to be heated.

The heated air is admitted to the several rooms through registers. Each room heated should have a separate pipe line, provided with a damper at the furnace. Each register should be supplied with valves, so the heat may be regulated in the room. The several small openings in the registers should have an aggregate clear area at least twenty-five per cent greater than the cross sectional area of the heat pipe. The supply of fresh outdoor air to be heated and distributed should be ample, for otherwise the air circulation will be irregular and the rooms will

not heat uniformly. The fresh-air box should be as nearly air-tight as possible, and both it and the inlet should be kept well away from any source of contamination. Economy and health

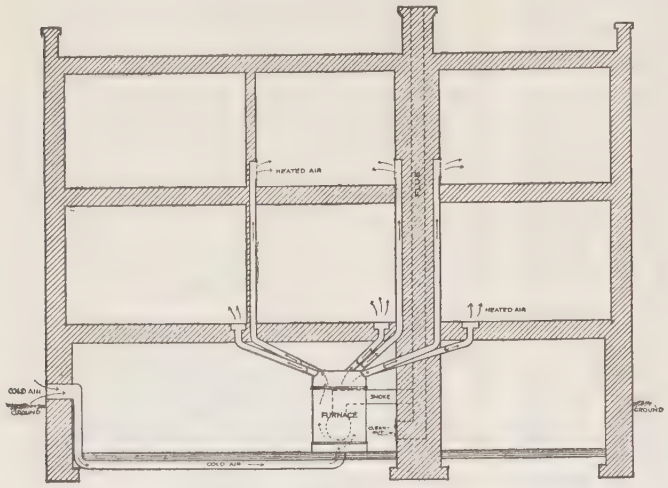


FIG. 2. HOT-AIR SYSTEM.

alike demand that furnaces be large enough to serve their purpose without being forced, since forcing is wasteful of fuel and overheats the room air supply. The latter is not only bad in itself, but increases the danger of contamination by the gases of combustion. Some means of mixing cold air with hot is desirable, in order to avoid the necessity of shutting off of the fresh-air supply when the room becomes too warm.

It is very difficult to warm uniformly all parts of a building with a hot-air furnace. The rooms on the windward side are quite likely to be cold. This is due to the fact that the force for circulating the heated air is very feeble and is produced only by the difference in temperature of the cold air entering the heater and the hot air leaving the same. It is desirable to have a vent pipe for the discharge of air in each room in the interest of more uniform distribution of heat. Generally it is not desirable to attempt to move the warm air a greater distance than 15 feet horizontally, and this limits the application of the hot-air furnace to small buildings. The system is commendable in view of the ventilation it produces, although objectional because of the dryness of the heated air and because of the dust it contains.

Steam and Hot-Water Heating. Either steam or hot water is the most common medium for heating the better class of residences and large buildings and groups of buildings. Either may be conveyed long distances with ease, and both are practically unaffected by the direction or the strength of the wind—freedom from a limitation which is one of the greatest drawbacks to the use of hot-air furnaces. Steam and hot water may be produced in connection with a steam plant for power purposes, which has proved of great importance in connection with district heating systems erected as adjuncts of electric-power plants for utilizing the exhaust steam and other wastes of heat.

Steam and hot water heating is practiced with direct radiation, in which case the radiators are placed directly in the rooms to be heated, or by indirect, in which case the radiators are located in the air passages leading to the room. The great disadvantage of direct radiation of either steam or hot water is that it merely warms the air already in the room, instead of bringing in a constant supply of fresh warm air. This matters little where an independent system of ventilation has been provided and is intelligently used; but in small buildings, particularly houses, there rarely is a system of ventilation. To meet this objection the indirect system or the direct-indirect is often employed in place of direct radiation. Mechanical draft, when the air is circulated by a fan driven by power, is employed in one type of indirect heating system used frequently for large buildings.

Both steam and hot-water systems require a boiler or heater, a pipe system, and radiators. As the hot water is circulated at 140° F., against 212° F. for low-pressure steam, the radiating surface for hot water must be larger by about 166 per cent than for steam. Hot-water fitting requires greater care in design and construction than steam, due to the fact that the circulating force in hot-water heating is due to the difference of temperature in the ascending and descending column and is feeble; it is overcome by obstructions in pipes, bad alignment, etc.

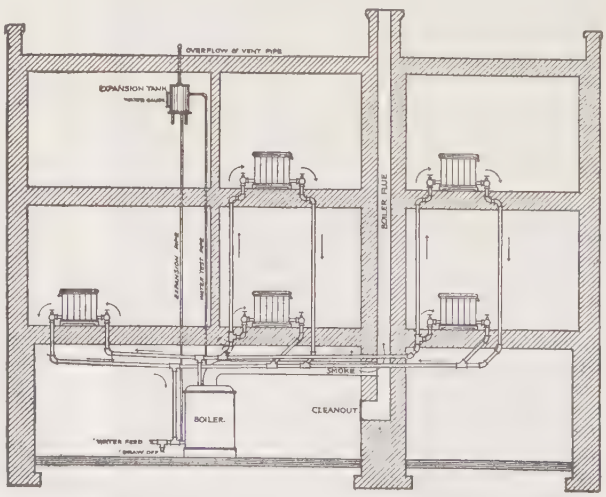


FIG. 3. HOT-WATER HEATING — USUAL METHOD OF PIPING.

The circulation is also inversely as the resistance in a pipe, and hence the distribution of heat is greatly affected by the pipe construction. Aside from greater care, there is no distinction in the process of pipe fitting for hot water or steam;

both are old arts, and both are practiced by the same workmen.

Hot water has this advantage over steam, viz., that it begins to yield heat very soon after the fire is started and continues to do so until the water cools, while there can be no heat from steam plants until a water temperature of 212° F. has been attained, and none after it falls below that point. On the other hand, steam heat may be shut off more quickly than water, since the latter continues to give off its heat for a much longer period, but this is modified somewhat by the fact that the hot-water system contains a large mass or weight as compared with the steam system, which makes it relatively slow in warming. The temperature in the hot-water system is controlled by partly closing a valve, which is not the case with the steam-heating system. The hot-water system works without noise, while the steam system is likely to be affected by water hammer and to be very noisy when steam is first turned on.

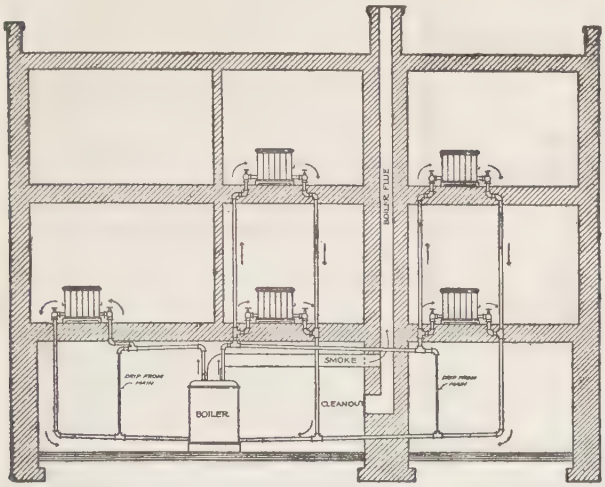


FIG. 4. STEAM HEATING — TWO-PIPE SYSTEM.

Steam boilers and hot-water heaters alike require a furnace, with a grate surface for burning the fuel and a heating surface for imparting the heat thus derived to the water in the boiler or heater. Where steam for both power and heat is to be generated, the boiler will be chosen principally for its suitability for power, or wholly so if the exhaust steam from the engine is to be used for heating. For this condition some suitable type of power boiler built for high-pressure steam should be adopted. Such boilers are fully described in special works on boiler construction and are frequently subject to inspection by legal authorities. Where the boiler is employed for heating only, low-pressure steam of 1 to 10 pounds' pressure is likely to be used, and the boiler need not differ very much from a water heater, except that the former has a reservoir for steam mounted above the heating surface, while the latter has not. Boilers for low-pressure steam for modern heating systems, or for hot-water heating, are usually built of cast-iron sections connected together by nipples with push or threaded joints. These boilers are extremely durable, are low in first cost, and perfectly safe for the low pressures employed. They are usually as economical as any type of boilers. The heating boiler is usually designed for burning from four to six pounds of coal per square foot per hour and so as to require attention only once in 8 to 12 hours, thus making it nearly automatic in operation.

The choice of a boiler, from the many types and styles available, will depend upon a variety of local and even individual conditions. Thus, a vertical boiler may be chosen where horizontal space is scarce and vertical space is ample; or a water-tube boiler may be selected where a high pressure is to be carried for power purposes. Where fuel is cheap or the service is likely to be temporary, a boiler of low efficiency may be permissible, to save a relatively large capital outlay. The character of labor readily available as boiler attendants may have a very important bearing upon the choice of a boiler. Thus, for heating most residences and many school buildings simplicity, coupled with a maximum of safety, even under neglect, may be of more importance than economy of fuel. Sectional boilers are advantageous here, since a small portion, instead of the whole boiler, may give way in case of accident. Under other conditions fuel economy may be put first, with the understanding that the continuous service of a skilled fireman will be insisted on. In large heating plants, particularly central heating stations (see below), automatic stokers may be used to feed coal to the furnaces and also mechanical means for removing the ashes. See BOILER.

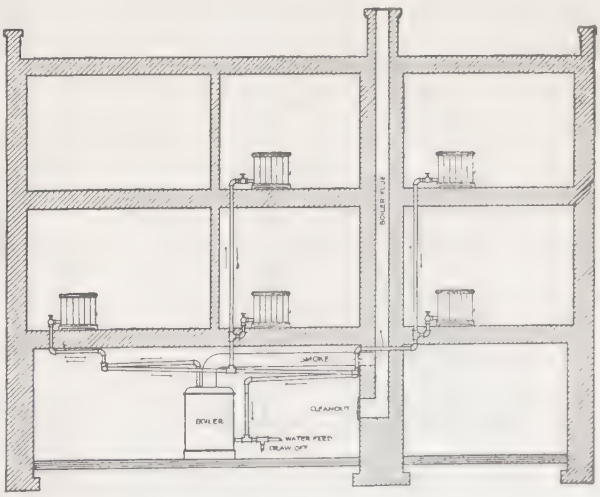


FIG. 5. STEAM HEATING — PARTIAL-CIRCUIT SYSTEM.

Piping and Radiators. Pipes for distributing both steam and hot water and for returning the condensed steam and the partially cooled

water to the boiler and heater, respectively, are generally of wrought iron or steel connected with screw joints formed by means of couplings. The

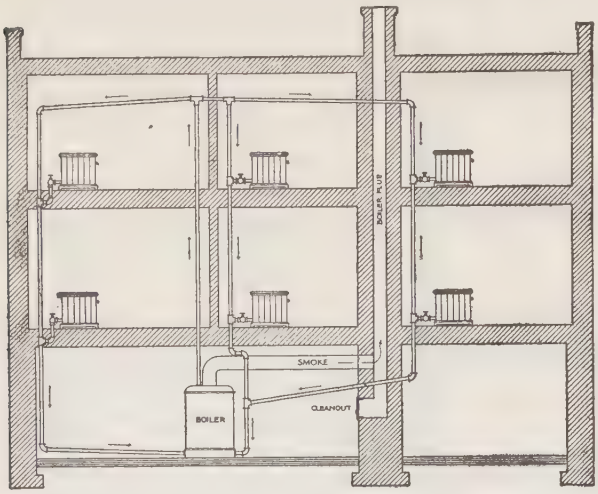


FIG. 6. STEAM HEATING — DIRECT-CIRCUIT SYSTEM.

pipe lines and radiators are controlled by various steam, water, and air valves, some of which are automatic. In most isolated plants the circulation is maintained wholly by gravity. Originally the radiating surfaces were mostly of cast-iron pipe, in horizontal lines; but this was superseded by coils of wrought-iron pipe with standard fittings, and these, in turn, have been largely replaced by vertical radiators, of either cast or wrought iron. For direct heating cast-iron sectional radiators are most commonly used.

For heating purposes steam is employed principally at low pressures; the pressure seldom exceeds 10 pounds per square inch; it is usually less than 2 pounds above the atmosphere in radiators, and in many recent installations it is maintained at less than atmospheric pressure. The latter condition is made possible by maintaining a vacuum on the system. This latter system is now frequently called the vapor or vacuum system and possesses most of the advantages of the hot-water systems as to ease of control, noiseless operation, etc.

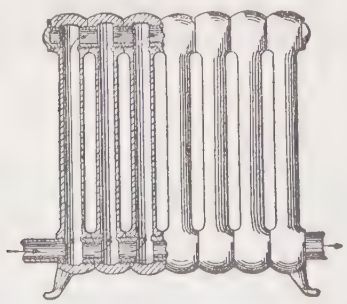


FIG. 7. SECTIONAL RADIATOR FOR HOT-WATER HEATING.

For steam the connections enter and leave the vertical radiators at the base, but hot-water radiators have connections at the top as well as at the bottom. This allows the air, which collects at the highest point in all water pipes and between the steam and water in steam pipes, to be drawn off. The indirect radiators are of either cast or wrought iron, placed in a chamber, so that the fresh-air supply to be warmed may be passed over or through them. Some of the essentials of radiator designs are ample radiating surface, free passages to minimize friction, and good drainage in the case of steam radiators. To prevent the escape of heat where not needed for warming, steam and hot-water pipes are covered with asbestos, felt, or other insulating materials. Where high-pressure steam is used for heating, it is generally reduced before entering the distributing system, since steam at low pressure is nearly as valuable for heating and is less likely to cause water hammer or leaks or other difficulties. Over 212° F. would be unpleasant if not dangerous to those coming near or in contact with the radiators. Recent improvements in heating include the securing of a partial vacuum in the pipes and radiators after admitting the steam, thus lessening the trouble with air. It may also be mentioned that fans are employed to aid the circulation of air in the indirect systems of steam and hot-water heating.

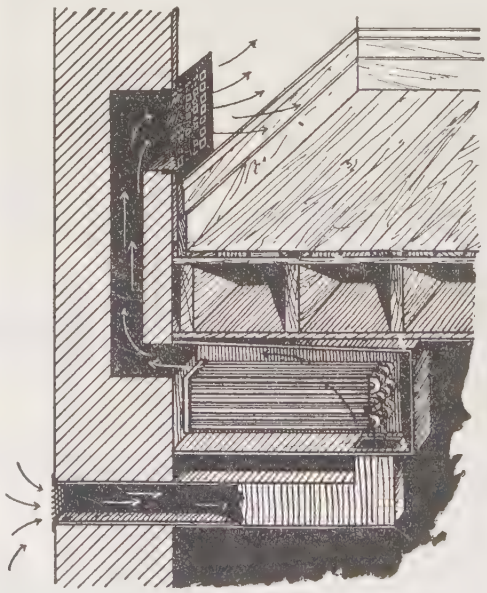


FIG. 8. RADIATOR FOR INDIRECT SYSTEM.

Electric Heating. Heat is developed by the passage of an electric current through any conductor; the greater the resistance of the conductor, the higher will be the temperature to which it is raised by the passage of the current. This is the principle upon which all electric heaters are constructed. These heaters have come into considerable use since 1895 for heating street cars. Their general construction is as follows: wire of high resistance is embedded in asbestos, fire clay, or other refractory material, and built up into plates of large radiating surface, these being generally inclosed between iron

plates. The current is passed through the resistance wire, which at once becomes very hot and in turn heats up the refractory material and the inclosing iron. When the heater has been brought up to the required temperature, the current may be turned all or partly off, and, owing to the nature of materials used, the heater will retain its heat for a long time. To heat water or other liquids the resistance coils or the cases which contain them may be placed in the liquid to be heated. Electric heating is used but slightly, except in electric street-railway cars, where current is more readily available than any other means of heating. The heaters are placed beneath the seats, running throughout the length of the car; thus, a good distribution of the heat is possible, making a pleasant contrast with the heat derived from the small red-hot coal stove formerly used. In special cases, where economy is of relatively small importance in comparison with, say, advertising effects or convenience, electric heating is used for apartments in buildings. Its cost is so much greater than the more direct utilization of fuel that the general use of electric heating is a luxury in which even the very rich do not indulge. This may be the better appreciated when it is remembered that there is a loss at every step in the process of developing heat by electricity, and that the steps are many. Thus, there is a loss in the combustion of fuel, in the transformation of the heat so obtained into steam, in the utilization of steam in the engine, in the conversion of the power thus obtained to electric energy, in the transmission of that energy through wires to the electric heater, and finally in the reconversion of the electric energy to heat.

Electricity is used extensively for cooking despite its fundamental cost, which, however, is largely offset by saving in labor. One of the great advantages of the electric current for cooking is that though there is great loss of power in the course of transmission, there is little loss of heat at the point where it is applied, while only a small proportion of the fuel burned in ordinary cookstoves is utilized for cooking. See Electric Heater.

Heating with Artificial Gas is far less expensive than electric heating, but with illuminating gas at $1 per 1000 feet it costs some four to ten times as much as heating with coal. Where cheap fuel gas is available the case for artificial gas heating is not so bad. Gas may be used in fireplaces, stoves, hot-air furnaces, and steam and hot-water systems. For occasional use in fireplaces or other heating apparatus placed in living-rooms gas is often advantageous. It makes no dust, and thus possesses a great advantage over coal or wood. But without good ventilation it vitiates the atmosphere; or at least it consumes much of the available oxygen and may give off objectionable gases. Gas for cooking is rapidly growing in favor, particularly for summer use and for small dwellings and apartments.

The Choice and Design of Heating Plants. The factors entering into both the choice and design of heating plants are many and various, including range of temperature through which the air is to be raised, the size and character of the building to be heated, the sort of fuel to be used, the heating system to be employed, and the amount of ventilation, if any, to be provided.

The amount of heat needed to warm any building depends upon the loss of heat by conduction through walls and windows and by infiltration and leakage of air; it has no scientific relation to the cubic contents. While the heat losses vary with different character of material, yet in practical building construction the heat losses from buildings for the same purpose are fairly uniform. Coefficients for heat losses were determined by E. Peclét, of Paris, as early as 1860, and have been substantiated by extensive application. Tables of coefficients are published in works by Peclét, Box, and Carpenter. The heat loss will approximate the following in ordinary structures, the amount being expressed in B. T. U. per square foot per hour per degree difference of temperature: ordinary window, 1 B. T. U.; ordinary exposed wall, ¼ B. T. U. The air leakage is often expressed as a function of the cubic contents, but more scientifically it is a function of the exposed wall and glass surface.

The amount of heat, coal, and radiation needed depend directly on the difference of temperature to be maintained in the building and outside. The usual basis for all American calculations is the attainment of 70° F., the original temperature varying with the locality and season, sometimes falling to — 20° F., or even lower. In the matter of the individual buildings there must be considered the area of the ground plan, the number of stories, the number and cubical contents of the several rooms, the areas of exposed or outer wall and window surfaces, and the material of which the outer walls are built, whether of wood, brick, or stone. A large ground plan, e.g., precludes heating with hot air, unless a fan or blower is used, or many furnaces are employed. The character and area of the outer walls of the buildings have an important bearing upon the amount of heat lost by passage through them, although usually constructed to a certain standard. The choice of fuel depends largely upon local prices, but there are other important considerations, such as the smoke nuisance from soft coal, which may be (but often is not) avoided with large plants, but cannot be avoided in most plants for heating private residences. In the design of a specific heating plant the relation of grate to exposed wall and window surface of the hot air furnace, steam boiler, or hot-water heater must first be considered, having in mind the fuel and the type of furnace or boiler to be employed. Next comes the relation of the heating surface to the radiating surface, when steam or hot water is used, and finally the proportion of the radiating surface to the heat losses of the building. Any skimping on the various proportions named means either insufficient warmth in very cold weather, or overworking the heating apparatus—a practice which is wasteful of fuel, may injure the heating plant, and, worst of all, be a menace to health. The foregoing factors in the choice or design of heating apparatus are by no means the only ones, but are sufficient to show the technical nature of many of the problems involved, and the desirability of intrusting the solution of the latter to persons of skill and experience. In fact, the possible savings in fuel and doctor's bills are so great, to say nothing of matters of comfort and convenience, that a thoroughly competent engineer or architect may well be consulted in the selection, or design, and installation of heating plants for all buildings, from moderate-sized residences up. For all but very small heating plants, and for all systems of ventilation, this will be essential to the securing of the best possible result.

Central Heating Plants are employed to heat a number of buildings from a common source. Steam or hot water is conveyed from the central station to the several buildings through underground pipes. Within the buildings the heat is distributed in the same manner as when generated on the premises. Hot water must be returned to the central station, but the condensed steam is drawn out of the system in each building and discharged into the sewer or returned in a separate pipe to the boiler plant when possible. By first passing the exhaust through an economizer indirect heating and ventilation may be afforded. The central station equipment consists of boilers for steam and heaters for hot water, or else utilizes the exhaust steam from electric light and power stations, as explained below. The large size and greater efficiency of the central station, as compared with isolated plants for private heating, results in economy in construction and operation, in addition to which there are the savings due to the use of cheaper fuel and automatic devices for feeding the coal to and removing the ashes from the furnaces. The consumer reduces his fire risk, avoids the dirt and dust incident to isolated heating, the bother of getting coal into and ashes out of his cellar, and all possible vitiation of the air of his house by furnace gases. The community at large may be benefited by a marked reduction in both the ashes and the smoke nuisance, the latter being of great possible importance where soft coal is used for domestic fuel. Finally, the consumer may be assured of an equable temperature, night and day. As an offset to the economy of central heating, there is the cost of installing and maintaining the distribution system and of making good the losses of heat in transmission. Then it must be remembered that the care of isolated heating plants involves, oftentimes, no extra expense for labor, since they are tended by some member of the family, or some employee whose time is not fully occupied.

Central heating plants, for colleges and other institutions having groups of buildings, were constructed previous to 1880. A few plants were also installed at an early date in cities, notably New York and Detroit. Such plants received a great impetus when there came into vogue the utilization, for this purpose, of the exhaust steam from electric lighting and power plants. The occasional early installations were most frequent where a number of large customers could be secured near the station, particularly if steam could also be sold for power purposes. The latter was quite possible, since live steam was supplied to the mains, and reduced in pressure at the premises to be heated. Since 1895 many heating installations have been added to central electric-lighting and power plants. Although originally started as an experiment in many details, this departure has extended considerably. The combination adds stability to both the electric and the heating industry: (1) by enabling the former to utilize a large percentage of the heat value of the fuel, which would otherwise go to waste; (2) by saving the entire fuel bill of the latter, so long as the exhaust steam is sufficient for the heating demand; (3) by making it easier to secure customers for both current (light and power) and heat, since many possible consumers either went without electric light and power or maintained isolated plants because they required a steam plant for heating purposes. On the other hand, where the exhaust steam is used for heating, noncondensing engines, with lower efficiency than condensing, are generally employed. At present the majority of electric stations use condensing engines, so they are at liberty to operate the more efficient condensing engine as a means of utilizing a portion of their exhaust steam and a central heating installation to utilize the whole of it.

Station Equipment for central plants is much the same as for isolated ones, only on a larger scale. When combined with electric plants, live steam must be made available when the demand for heat is greater than can be supplied by the exhaust steam. In such cases the pressure of the live steam is reduced before admitting it to the mains. Back pressure on the engine must be eliminated as far as possible. This may be effected, at times of low demand for exhaust steam, by wasting a part of the exhaust. If hot water is the heating medium, the exhaust steam is passed through a heater, then condensed, and the warmed water distributed by pumping.

Distribution Systems consist of supply pipes for the steam or hot water and return pipes for the latter, and corresponding branches, or services, for the several consumers, all of which must be carefully installed to prevent loss of heat in transmission. The pipe is generally of wrought iron. Special provision must be made for expansion and contraction. Expansion joints of the Holly type are known as *variators*. They are made without packing, both to save the trouble and expense of renewal and to diminish the number of manholes. Insulation is secured in a variety of ways. One of the means of insulation first employed was bored pine logs. The large pipe is often inclosed in regular compartments, formed of brick side walls and plank tops. The space between the walls and the pipe is packed with some nonconductor of heat, in addition to which the pipes may be wrapped with asbestos felt. More expansion joints, better insulation, and more thorough protection against ground water are required for steam than for hot-water pipes, on account of the higher temperature and consequent greater heat losses of steam and also to prevent condensation. Inside the building line there is a shut-off valve, and beyond that there may be a reducing or a regulating valve, to maintain the pressure at the desired point, regardless of its amount or variation in the street pipes. Where the steam is sold by direct measurement, a steam meter is applied to the entering steam. A hot-water meter on the main waste pipe leading to the sewer is often employed.

In the case of heating by hot-water circulation the temperature, rather than the volume, of the water is increased when more heat is required. The temperature in hot-water systems is sometimes regulated at the central station and sometimes it is left to the customer. In either case the regulation may be effected by a thermostat. In fact, thermostats may be employed to a greater or less extent on nearly all systems of heating, isolated as well as central. The charges for central heating are most frequently based on the service for a whole season, modified by either the radiating surface supplied or the cubical space which that surface is designed to heat.

VENTILATION

History of Ventilation. Although special openings were left in the roofs of Roman build-

ings for the escape of air, their object was to regulate the temperature rather than the air supply of the building. Later the necessity of securing a supply of fresh air in mines served to call attention to the necessity of ventilation independent of heating. In the sixteenth century Georg Agricola (q.v.) wrote a treatise, *De Re Metallica*, in which he describes the methods employed to ventilate the mines of Saxony and Bohemia.

In France ventilation was formerly studied chiefly from the standpoint of securing a fresh-air supply for hospitals. In 1843, according to Pecht, there was but one hospital in France having a regular ventilating apparatus. In 1853 two systems were tried in the construction of the Hospital Lariboisière—one of aspiration, the other of inflation. Both were unsatisfactory because neither of them supplied a sufficient quantity of fresh air. In Germany, as in France, the early history of ventilation is connected with hospital construction. In England attempts at securing a fresh-air supply began much earlier and consisted in repeated attempts to secure ventilation for the English Houses of Parliament. In 1660 Sir Christopher Wren made the first attempt, and the history of the subsequent efforts made would be an epitome of the advance of the science of ventilation. In 1856 the General Board of Health of England appointed a commission to inquire into the best methods of warming and ventilating dwellings. About the same time, owing to the heavy losses by sickness in the Crimean War, the question of barracks-room ventilation was under discussion.

In the United States, as in England, the early attempts at ventilation were directed towards securing fresh air for the meeting places of legislative assemblies, the first report on the subject having been made on April 2, 1849.

Ventilation has for its object the maintenance of a pure-air supply indoors. This can be effected only by the introduction of the proper amount of pure air, which involves the removal of the foul air, since these two processes go together. One of the objects of ventilation is to "condition the air" and render it of best quality for respiration. Considered from the standpoint of the air in the room, ventilation removes or dilutes such impurities as have been introduced by man, regulates the moisture, cools the air, and may be instrumental in warming it, although the latter, properly speaking, pertains to heating. It alone can give no better air than that surrounding the building to be ventilated.

Dust removal is an important feature in ventilation. In the latest plants dust is removed by a system of washing with sprays, followed by means for removing the excess water. In some plants the humidity is maintained at any desired point by an automatic regulator. Filter plants for removing dust are still used to some extent, but are open to many objections and are only partly successful. Bacteria are nearly all removed by the processes of air washing. The moisture of the air supply may be lessened by drying, and air which is too dry may be moistened by spraying with water.

The chief impurities in the air of houses and public-assembly rooms are those thrown off by the lungs and skin. Next in importance are the gaseous products of the combustion of oil and gas for lighting, and of these two substances and coal when used for heating. Dust, also, is found everywhere—some being due to the processes already mentioned, some being brought in on the feet and clothes, or blown in through doors and windows, while large quantities of it are due to the wear and tear of clothing, carpets, and the like. In shops and factories the air is contaminated in most of the ways already mentioned, some of which, like dust, may be intensified many fold. In addition, the air of manufactories is liable to be made impure by the gases given off by the chemicals employed or produced or by the decomposition of organic matter.

The number of hours in a day during which a room is occupied, as well as the number of occupants in proportion to the cubical contents of the room, has a most direct bearing upon the vitiation of the air and the means to be employed to rectify it. Thus, dwellings of the better class have some rooms continuously occupied for one-half the day, and other rooms for the remaining half, the air space to each person being large. Churches may be crowded, but generally only for one to two hours during the week. School buildings, legislative assemblies, and factories may be crowded for hours together, then as completely emptied as churches. Hospital wards are liable to be fully and continuously occupied, in addition to which there are various well-known special ways of contaminating the air of hospitals. Wherever rooms are used intermittently, it is generally possible to give them a thorough airing by throwing the windows wide open; but, beneficial as this may be, its effect is not permanent, and it is often neglected, particularly in cold weather. Ventilation through open windows is not effective so far as introducing air is concerned, but it serves a useful purpose in reducing temperature and exerting a controlling effect on humidity. In the modern ventilating systems air is usually introduced positively by a fan or blower. Such systems are now usually so designed as to be efficient with the windows open. Even in the summer time the ventilation of crowded assembly halls and hospitals cannot be left with safety to open windows, since the air may be stagnant outdoors as well as in. In capacious dwelling houses, with walls, doors, and windows not too tight, the natural interchange between the inner and outer air may suffice during a large part of cold weather, while open doors and windows will give as much fresh air in summer as it is practicable to provide; but there will be times in cool weather when even these favorable conditions will be lacking.

It is pretty clearly shown by the foregoing that ventilation should be made an essential feature in the design and use of practically all classes of buildings in which people live, work, are instructed, or amused. The quantity of air to be supplied and removed, and the proper means of doing both, can be best understood after considering in more detail the nature and amount of the chief impurities which it is desired to avoid. The vital principle of air is oxygen. Normal air contains about 20.9 per cent, in volume, of oxygen, 79 per cent of nitrogen and argon, and 0.1 per cent of other substances, including some 0.03 or 0.04 per cent of carbonic acid (carbon dioxide). After having been passed through the lungs the oxygen has been diminished to 16 per cent, and carbonic acid has been increased to 4.4 per cent of the total volume, the nitrogen rising slightly to some 79.5 per cent. This exhaled air is rapidly diffused throughout the room, so, unless the room is crowded, the percentage of total oxygen is not greatly diminished

for some time. Associated with the diminished oxygen there is also an increase in watery vapor, in the effete and putrescible organic contents of the air, and possibly in the number of harmful bacteria which it contains. Another cause of diminished oxygen is the burning of oil and gas for illumination. As an index of the impurities present, and of the diminution of oxygen, carbonic acid has been chosen. For convenience it is generally expressed in parts per 10,000, thus giving 4 parts per 10,000, instead of 0.04 per cent, as the normal average amount in the air. In the purest air the carbon dioxide may fall to 3.2 parts; in cities it may be normal at 4.5 parts; in occupied rooms it may go to 33 parts per 10,000, or even higher.

Recent investigations tend to prove that an increase in carbon dioxide contents to 4 or 5 per cent, accompanied with a corresponding decrease in free oxygen, is not detrimental for purposes of respiration. The most harmful effects due to bad ventilation are high temperature and lack of circulation. High temperature with excessive humidity exerts a depressing action on the heart and often causes faintness. The tendency of modern ventilation is to reduce the supply of air per person over the previous requirement, to condition such air as to dust, humidity, and temperature, and circulate such air to every portion of the room. It has been found desirable to supply each person in a room with 30 cubic feet of fresh air per minute, or 1800 cubic feet per hour.

After a careful consideration of the subject, including a weighing of authorities, Dr. John S. Billings, in his work on ventilation, gave the following table:

	Cubic feet of air per hour
Hospitals	3,600 per bed
Legislative assembly halls	3,600 per seat
Barracks, bedrooms, and workshops	3,000 per person
Schools and churches	2,400 per person
Theatres and ordinary halls of audience	2,000 per seat
Office rooms	1,800 per person
Water-closets and bathrooms	2,400 each
Dining rooms	1,800 per person

No allowance should be placed "on leakage through crevices or on bad construction of the building as a source of air supply," and where it is "assumed that the walls will be rendered more or less impermeable by paper and paint." Dr. Billings also emphasized the fact that the whole ventilating and heating system must be proportioned in accordance with the figures given, or any modification of them which may be adopted, including all air ducts, inlets and outlets, blowers, and heat-generating apparatus.

Ventilation may be divided into two classes, gravity and mechanical. *Gravity ventilation* is based on the fact that warm air is lighter than cold, and hence is overbalanced and replaced by the latter. In cold weather the inner is warmer than the outer air, so, if sufficiently capacious inlets and outlets are provided, the warm, foul air will be displaced by cool, fresh air. But in warmer weather the differences in temperature, and consequently in pressure, are less, and the interchange lags. The currents in the ventilating ducts may then be aided by a slight heating, which may be effected in a variety of ways, such as a light fire, or even a gas jet or jets in the base of the ventilating shaft; or a coil of steam or hot-water pipes, where feasible. Even if there be no ventilating flues, there will be a more or less constant interchange of air through the walls and the cracks around chimneys and doors; but in well-constructed houses this may be very small in fairly cold weather, and practically nothing in mild weather, while for schools, churches, and the like it is of little consequence except on very cold or windy days. Natural ventilation, for the reason stated, is frequently unreliable and is serviceable only for small buildings.

Mechanical ventilation, as the name implies, depends upon machinery for the movement of the air. It may be used to introduce fresh air, to remove foul air, or both. Air introduced for ventilating purposes must be warmed when necessary to provide a uniform temperature in the rooms to be heated; this is accomplished by placing radiating surfaces in the passage of the entering air. The heating surface for warming the rooms can be of the direct or indirect character. The air introduced must in all cases be at the same constant volume, which requirement is met by passing a variable portion of the air over an indirect heater and permitting the other part to pass into the room unheated. With either indirect or direct heating an air blast has the great advantage of perfect control of the fresh-air supply. If a hot-air blast is employed, both heating and ventilation are under equally good control.

The most common mechanical aids employed are blowers or fans, placed in the air ducts, and either forcing the air ahead of them or creating a vacuum into which it rushes. The terms *plenum*, or inflating, and *vacuum*, or aspirating, are applied, respectively, to blowing in and to sucking out air. The fans and the pipes leading from the same must be perfectly proportioned for the work to be done. Engineering information respecting the designs of fans or blowers and also pipes for conveying the air is now well disseminated among fan engineers, and there is no uncertainty as to power needed, resistance in pipe line, or capacity in cubic feet per minute in a well-engineered plant. The first cost of a mechanical ventilating system is not expensive, and where the law requires a specified air delivery it is usually installed.

The proper elevations for introducing fresh and removing foul air are still mooted questions. It is certain, however, that the relation of the inlets and outlets should be such as to give the most perfect diffusion of the fresh air and to leave no stagnant foul air in the rooms, which will also tend to avoid heavy drafts. Many authorities favor the location of the inlets and outlets on the same side of a room, the inlets to be above the heads of the occupants. The theory is that the fresh air will ascend to and pass along the ceiling, and that the foul air will pass along the lower part of the room and then out. One of the chief objections to locating inlets, for either heating or ventilation, in the floor is that the ascending air carries up floor dust with it; and another is that unless the inlets are very numerous the inrush of air will be unpleasant to those near by.

Bibliography. Billings, *Ventilation and Heating* (New York, 1893), which is particularly full in its discussion of ventilation; Carpenter, *Heating and Ventilating Buildings* (ib., 1895; 7th ed., 1914), which goes more fully into heating and develops the mechanical phases of both subjects; Richards and Woodman, *Air, Water, and Food* (ib., 1900), which sets forth the physiological side of ventilation and has a valuable chap-

ter on methods of air analysis; Putnam, *The Open Fireplace in All Ages* (Boston, 1881); Dwyer, on "Stoves and Heating Apparatus," in *One Hundred Years of American Commerce* (New York, 1895); *Proceedings American Society of Heating and Ventilating Engineers* (ib., 1894, 1913); Allen, *Notes on Heating and Ventilation* (ib., 1905); Jones, *Heating by Hot Water: Ventilation and Hot Water Supply* (ib., 1905); Thomas, *Ventilation, Heating, and Lighting of Dwellings* (London, 1906); C. H. Innes, *The Fan* (ib., 1905); id., *Air Compressors and Blowing Engines* (ib., 1906); Hoffman and Raber, *Handbook for Heating and Ventilating Engineers* (Lafayette, Ind., 1910).

HEATON, Augustus George (1844–). An American historical and portrait painter. He was born in Philadelphia, Pa., and was the first student from the United States admitted to the ateliers of painting of the Ecole des Beaux-Arts, Paris (1863). He studied under Cabanel there and afterward became a pupil of Bonnat. Among his works are: "Washington at Fort Duquesne," Union League Club, Philadelphia; "The Recall of Columbus," bought by the United States government for the Capitol, and engraved on the 50-cent stamp of 1893; "Hardships of Emigration," engraved on the 10-cent stamp celebrating the Trans-Mississippi and International Fair, Omaha; "The Promoters of the New Congressional Library" (1888); "Baron Steuben at Valley Forge" (1907). His best-known portraits include those of Bishop Bowman (Cornell College) and Paul Tulane (Tulane University).

HEATON, Sir John Henniker (1848–1914). An English public official, known as the "father of universal penny postage." He was born at Rochester, Kent, and was educated at the Kent House Grammar School, and at King's College, London. He became a landowner and part proprietor in newspapers in Australia, represented New South Wales at the Amsterdam Exhibition in 1883 and at the Indian Colonial Exhibition in 1886, and was delegate of the Tasmanian government to the Berlin Telegraph Conference in 1885. With his entrance into the British Parliament, where he served as Conservative member for Canterbury from 1885 to 1910, Heaton became widely known as a persistent advocate of penny postage, and the final success of the Imperial penny postage scheme in 1898 was largely due to his efforts. Moreover, he introduced telegraph money orders into England and a parcel post between France and England; and in 1907 he secured the Anglo-American penny postage rate, which went into operation in the following year. He was created Baronet in 1912. He published: *A Short Account of a Canonization at Rome; The Manners and Customs of the Aborigines of Australia; Australian Dictionary of Dates and Men of the Time.*

HEATON, John Langdon (1860–). An American editorial writer. Born at Canton, N. Y., he graduated from St. Lawrence University in 1880. He joined the staff of the Brooklyn *Times* in 1881 and became known after 1899 as an editorial writer for the New York *World.* He is author of *The Story of Vermont* (1889); *Stories of Napoleon* (1895); *The Quilting Bee* (1896); *The Story of a Page: Thirty Years of Public Service and Public Discussion in the Editorial Columns of the New York World* (1913).

HEAT STROKE, Sunstroke, or Thermic Fever, also called Insolation, Heat Apoplexy, Sun Fever, and Siriasis. The effect produced upon the body by exposure to intense heat, whether from the sun, from furnaces, or from the atmosphere. Another form of affection resulting from exposure to heat is Heat Exhaustion, or Heat Prostration, in which there is a very different set of symptoms. In the commoner, mild form of heat prostration, the patient exhibits exhaustion, weakness, faintness, and occasionally nausea; in the severe form, pallor, great depression, collapse, and loss of consciousness, with a subnormal temperature dropping sometimes as low as 95° F. All cases recover in a few hours. Heat stroke, on the contrary, usually comes on abruptly or is preceded by some weakness and anxiety. Unconsciousness supervenes early, with flushing of the whole body and profuse sweating, delirium or even mania, vomiting and diarrhœa, and a temperature of 108° to 115° F. Death may ensue speedily, from cessation of respiration or from cerebral anæmia; the sweating ceasing, the full rapid pulse becoming imperceptible, and asphyxia, coma, or convulsions following. Laborers in the open, laundresses in an overheated kitchen, bakers, and firemen in engine rooms, present most of the cases. Many cases occur at night among those exposed to indoor heat who have not been in the sun at all; others who have been in the sun during the day are stricken at night in the vitiated atmosphere of crowded tenement-house rooms, after drinking alcoholic beverages and eating hearty meals.

Two and six-tenths per cent of the heat produced by the chemical metabolism within the body is lost from the body in warming substances taken in as food and drink, 2.6 per cent in warming the inspired air, 14.7 by evaporation, and 80.1 per cent by radiation and conduction from the skin. With the inspired air hotter than the body, radiation and conduction abolished, and evaporation rendered impossible in an atmosphere nearly saturated with vapor, the constant production of heat by muscular action must result in a great strain upon the inhibitory cerebral centres that preside over heat regulation. Any previous ill health, alcoholic indulgences, or other excess is followed by a failure of these centres under such strain, and heat stroke is the result. The combined influence of heat and auto-intoxication constitutes the cause of heat stroke, with the possibility of a germ poison. Sambon, of Rome, in a paper on heat stroke published in 1898, asserted the infectious character of the disease as produced by a specific germ. He classes it with yellow fever, dengué, and other tropical affections—all germ diseases requiring high atmospheric temperature for their development. This view has yet to be substantiated. Van Gieson, of New York, however, during an extensive examination of brains of victims of heat stroke, found changes in the chromophilic plaques of the ganglion cells. These plaques were changed in shape, fewer in number, replaced by fine dust, or entirely absent. Van Gieson believed the condition to be due to a toxic degeneration, and the changes in the ganglion cells similar to those produced by alcohol, lead, and the microbe poisons; and that heat stroke is "a species of auto-intoxication, the neural symptoms finding a clear and definite explanation in the acute parenchymatous degeneration induced by an autogenous poison."

Siriasis is a specific form of heat stroke, not depending alone upon an elevated temperature, but probably of microbic origin and developing

only in the presence of high atmospheric temperature and certain local conditions. It is known in Africa, Asia, and Australia, and occurs to some extent on the Atlantic coast of the United States. According to Manson, the mortality among English troops is about 25 per cent of those who develop the disease. Post-mortem examination shows that the heart is remarkably rigid, the blood unusually fluid and acid in reaction; the viscera are engorged with venous blood. Rigor mortis occurs very soon after death.

The treatment of heat prostration, the mild form of thermic exhaustion, consists in securing elevation of the temperature of the body by the use of external heat and in supporting the heart by the use of alcoholic stimulants, strychnine, and similar drugs. In heat stroke, on the other hand, rapid reduction of temperature must be secured at the earliest possible moment. Sprinkling ice water over chest and body or rubbing with ice is imperative. It has been urged that ambulances carry ice and a sprinkler, that treatment may begin as soon as the patient is reached and continued during his trip to the hospital. Here the patient is placed on a Kibbé cot or a Walton bed, and the cold affusion is continued till the temperature falls to 102.5° F. He is then rubbed dry, removed to a bed and wrapped in warm blankets, with as little disturbance as possible during the operation. If the temperature rises, the ice-water treatment is to be repeated. Acetanilid and antipyrine have been employed as antipyretics, adjuvant to the ice water, but their use is not without danger. Venesection has been practiced with great relief in some cases. Ether or chloroform has been used to control convulsions, anæsthesia being continued for several hours. Morphine is very valuable in many cases. Flagellation of the extremities, sinapisms to the legs, stimulating rectal injections, atropine, digitalis, and nitroglycerin all have been used, according to special indications, in addition to the drugs mentioned.

The sequelæ of heat stroke possible are headache, tinnitis, deafness, insomnia, impaired memory, insanity, epilepsy, paralysis, meningitis, and many functional irregularities, especially of the heart. Heat stroke is often preventable. Laborers should dress in thin, loose clothing in place of woolen; sleeping rooms should be ventilated, stimulants should be avoided, shelter from the sun should be provided when possible, and plenty of water should be drunk by those exposed to the heat. Troops, as well as gangs of laborers, should be inspected, and when sweating ceases and the skin becomes hot and dry, relief from duty, rest, and a cold bath should be ordered.

Consult: Wood, *Thermic Fever or Sun-Stroke* (Philadelphia, 1872); Horton, *Diseases of Tropical Climates: Sun-Stroke* (London, 1879); Borely, *Le coup de chaleur* (Paris, 1884); Manson, *Tropical Diseases* (4th ed., New York, 1907); Lyth, *Studies on the Influence of Thermal Environment on the Circulation and the Body Heat* (London, 1913).

HEAT TREATMENT. See HOT-AIR TREATMENT.

HEAU'TON TIM'ORU'MENOS (Lat., from Gk. *ἑαυτὸν τιμορούμενος, heauton timoroumenos*, the self-tormentor). A comedy by Terence, based on a play with the same title by Menander and first performed in 163 B.C. In it Terence developed the intrigue of the original into an extravagant plot. The play contains the famous line, "Homo sum; humani nihil a me alienum puto."

HEAVEN (AS. *heofon*, OS. *heban*, Icel. *hifinn;* connected with Goth. *himins*, Icel. *himenn*, OS. *himil*, OHG. *himel*, Ger. *Himmel*, heaven, ceiling). In theology, that portion of infinite space in which the Lord of all things, although present throughout all, is supposed to give more immediate manifestations of His glory. Of the belief in the existence of some such special scene of the presence of the Deity, most of the known religions of the world, ancient and modern, present abundant evidence. Chthonic gods reside in the earth; sun gods were often thought of as residing in the west, or in an underworld through which the sun passes at night (Egyptian religion); the "lofty" gods were sometimes conceived to dwell on some high mountain, like Olympus or the Himalayas; but more often the home of the gods was placed in the sky. In addition, however, to the idea of its being the special scene of God's glory, the word "heaven" also designates the place, or the state or condition, of the blessed spirits, and of the souls of just men who are admitted into the participation or the contemplation of the divine beatitude. In the religious system of the Greeks and Romans none were supposed to be admitted to the heaven of the gods except the deified heroes or demigods; but with them the elysian fields (q.v.) of the lower world held, morally speaking, the same place in relation to the great doctrine of the divine retribution for the good and evil actions of human life. The elysium of the classic mythology is in all essential respects the natural equivalent of the heaven of the just. The Pythagorean doctrine of metempsychosis approached nearer to it in form; for it supposed that the soul, after the purification of successive transmigrations, was elevated to a higher and incorporeal condition in the cosmos. The doctrine of Plato was still more explicit. It may be said in general that all the philosophical systems which included the belief of the immortality of the soul also involved, at least in substance, the idea of a state of happiness as the reward of a virtuous life. The ideal of happiness of the heaven of these various creeds differed widely. The delights of the classical elysium were, at all events in part, delights of sense. The German warrior had his war horse and his armor laid in his grave, that he might be able to pursue, after death, the fierce enjoyments in which he had delighted while in the world of the living. The paradise of the Indian hunter is but a richer and more extensive hunting ground. *The Testament of the Twelve Patriarchs* (see APOCRYPHA) contains a very curious exposition of the same notion.

The Hebrews conceived of the sky as a solid firmament, upholding the celestial reservoirs of water. (See FIRMAMENT.) They invariably used a plural noun for heaven, indicating a belief in a plurality of heavens (Gen. i. 1; Deut. x. 14; 1 Kings viii. 27; Ps. cxlviii. 4). The conception of seven heavens, based on a division of the celestial spaces among the seven planets, appeared before the Christian era, perhaps borrowed from the Babylonians. In the beginning of the Christian era this idea finds expression in the Slavonic Enoch (q.v.) and some parts of the Testaments of the Twelve Patriarchs, where the character of each of the seven heavens is described in detail. Substantially the same

conception is found in the Ascension of Isaiah, the Apocalypses of Moses, Ezra, John, Isaac, Jacob, and the Acts of Callistratus. In view of these facts it becomes probable that in the Pauline Epistles the heavens are also assumed to be seven in number. Thus, paradise is in the third heaven in 2 Cor. xii. 2, 3, as in Slavonic Enoch viii; in Eph. vi. 12 there are spiritual hosts of wickedness in the heavens; in Col. i. 20 the kings in heaven as well as on earth have to be reconciled to God; in Heb. iv. 14 the great high priest passes through the heavens. The Jewish apocalyptic sketch in Rev. xii describes a war in heaven, between Michael and his angels and Satan and his angels. While ultimately the old Semitic doctrine of seven heavens and of battles and places of punishment in one of these heavens was suppressed in Christian thought, it continued in the religious systems of the Mandæans (q.v.) and in the Koran. As the storm cloud was the celestial abode of Yahwe, Israel's god, so the translation of such heroes as Enoch and Elijah originally implied only that they were carried alive from earth to be with Him among the clouds. But as the conception of the Deity expanded, His heavenly dwelling place began to occupy more fully the imagination. In the Ethiopic Enoch (see ENOCH, BOOK OF) and the Slavonic Enoch this antediluvian patriarch describes minutely the heavens through which he is permitted to pass. The hope awakened through the Persian doctrine of resurrection, of a release from Sheol, in the case of all Israelites or of the pious in the nation, offered the possibility either of a new life on earth or of a translation to heaven. In the recorded sayings of Jesus there is no description of heaven. His answer to the question of the Sadducees touching the resurrection seems, however, to imply that He considered those who had been accounted worthy of being raised from the dead as living in heaven, being like angels, neither marrying nor being given in marriage (Luke xx. 33 et seq.). The idea of heaven in the early Church was simply the current Jewish idea, and the relation of the dead to it was, as in Judaism, not wholly consistent. The dominant view seems to have been that, until the return of the Lord upon the clouds of heaven to raise the dead, those who had died were asleep, and that they would be suddenly awakened to be given their new bodies, after which they would reign with Him in the Messianic Kingdom. But, largely under the influence of Greek thought, other conceptions prevailed. The fate of the patriarchs, prophets, and pious men of the old dispensation naturally occupied much attention and led to the idea that they were detained in a preparatory abode which the fathers called *limbus patrum*, awaiting the advent of the Redeemer. The general belief of Christians has been that since the resurrection of Christ the just who are free from sin are admitted immediately after death into heaven, where their chief joy consists in the unclouded vision of God. But especially since the sixteenth century some have returned to the millennial views of a part of the early Church. (See MILLENNIUM.) Traditional theology maintained that since the coming of Christ no human being can be admitted into heaven without some identification with Him or His Church, through personal faith, or the sacraments, but there has been a growing belief that Heaven would not be denied to unbaptized infants, pagans, or others having had insufficient opportunities of embracing the gospel, and even that all souls would ultimately reach heaven. Consult: Smend, *Alttestamentliche Religionsgeschichte* (Freiburg, 1899); Beyschlag, *New Testament Theology* (Edinburgh, 1899); Morfill and Charles, *Book of the Secrets of Enoch* (Oxford, 1896); Atzberger, *Christliche Eschatologie* (Freiburg, 1890); Charles, *Eschatology* (London, 1899); Kennedy, *St. Paul's Conception of the Last Things* (New York, 1905). See ESCHATOLOGY; IMMORTALITY.

HEAVES (from AS. *hebban*, Goth. *hafjan*, OHG. *heffan*, Ger. *heben*, to lift), BROKEN WIND, or ASTHMA. A chronic disease or unsoundness of equines, characterized by a hurried, wheezy breathing (which is increased by close weather, a full stomach, or exercise), by a double lifting of the flank with each expiration, by a weak dry cough (which is easily excited by a drink of cold water), and by a marked disorder of the digestive organs. The disease, which results from faulty feeding and working, is most commonly due directly to a chronic alveolar bloating of the lungs. It develops, as a rule, after the animal has been used a long time for heavy work, either pulling or running, and is more rarely due to continued inspiratory or expiratory dyspnœa in chronic diseases of the air passages. Feeding on clover hay or straw, too bulky and nonnutritious food, and keeping the horses in a dusty atmosphere or badly ventilated stable predispose to heaves. Horses brought from a high to a lower level are also predisposed.

After death, if the organs are examined, very few changes are found in recent cases, but if the animal has been broken-winded for a long time the changes are well marked. The lungs are paler than natural and of much less weight in proportion to their volume. The walls of the small bronchial tubes and the membrane of the larger tubes are thickened. The right side of the heart is enlarged and its cavities dilated. The stomach is enlarged and its walls stretched. The important change found in the lungs is a condition known as pulmonary emphysema.

The treatment of heaves is very unsatisfactory, and a palliation of the symptoms by keeping the alimentary canal in proper order, administering occasional purgatives, and feeding on a proper quantity of the best oats, which should always be bruised, are all that can be recommended as remedies; turning out to pasture, or feeding on cornstalks or other laxative food, gives relief. Only the best quality of hay should be fed, and that in small quantities. Some veterinarians have vaunted their power to cure this disease and recommend large doses of camphor, digitalis, and opium; but these potent narcotics only operate for a very short time, and as their effects pass off the symptoms return, often with increased severity. It is generally conceded that when established the disease is incurable. Horses very frequently drop down exhausted when at hard work and die either from congestion of the lungs, hemorrhage, or simple suffocation.

Consult F. Hutyra and J. Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol. ii (Chicago, 1913), and J. Law, *Text-Book of Veterinary Medicine*, vol. i (Ithaca, N. Y., 1905).

HEAVY FIELD ARTILLERY. The artillery intermediate in mobility and power between *light field artillery* and *siege artillery*. It is

only within recent years that the distinction and difference between the functions of the three types has been clearly recognized and defined. The development of a mobile weapon more powerful than the 3-inch fieldpiece, the adopted type for the divisional artillery of all armies, was brought about by the necessity for reaching troops under cover of modern hasty intrenchments and fieldworks. Improvement in the rapidity of construction and in the strength of such works, which can now be thrown up almost overnight, was met by the production of more powerful guns, mortars, and howitzers designed to breach them. In order to be available whenever needed such artillery had to have the mobility of the army to which it was attached, i.e., the rate of march of infantry. As a rule, heavy field artillery includes such guns, mortars, and howitzers as may be moved at a walk by a team of eight heavy horses over ordinary roads. The weight behind the team varies considerably in different armies, but is always greater than the 4000-pound load, the average behind the six-horse team of light artillery. Calibres vary from 4.7 inches to about 6 inches, both inclusive. Weights of projectiles vary from 60 pounds to about 120 pounds, the latter being the weight for the United States 6-inch howitzer. The loads behind the team vary from 4800 to 10,000 pounds. The lighter load (4800 pounds) is obtained for the French *Rimailho* 6.1-inch field howitzer by carrying the howitzer itself as a separate load. This piece therefore has great mobility and can move at a trot, but has the disadvantage of delay in getting into action, as it has to be assembled on its carriage after reaching the firing position. The tactics of heavy field artillery, being a comparatively recent development, have not as yet been so clearly defined as those of the 3-inch fieldpiece. To Germany, primarily, belongs the introduction of these powerful weapons, which played a distinguished part in the European War of 1914. In both the Balkan War of 1912 and the European War of 1914 these guns and howitzers were used not only to breach fieldworks and to attack overhead cover, but to assist the safe deployment of the lighter field guns. On account of their great range it was also possible, without change of position, to reach any point of a very wide sector of fire, and often, by moving the guns close in, to secure an enfilading fire on the trenches and gun positions on the hostile flanks. For cannon above 6-inch calibre, see SIEGE ARTILLERY. See ARTILLERY; FIELD ARTILLERY; HOWITZER; MORTAR; ORDNANCE.

HEAV'YSEGE, CHARLES (1816–76). A Canadian poet, born in Liverpool, England. For some time after his arrival in Canada (1853) he followed his trade, that of a cabinetmaker, but later branched off into wood carving, and then went into journalistic work for the Montreal *Witness*. After publishing anonymously *The Revolt of Tartarus* (1853) and a volume of sonnets, he produced (1857) *Saul*, a dramatic work of remarkable originality and power, a tragedy, in three parts of five acts each. This was followed by *Count Filippo, or the Unequal Marriage: A Drama in Five Acts* (1860); *The Dark Huntsman* and *The Owl* (1864); *Jephthah's Daughter* and a novel called *The Advocate* (1865). For a critical estimate of *Saul*, see "English-Canadian Literature," by Thomas Guthrie Marquis, in *Canada and its Provinces*, vol. vi (Toronto, 1913–14).

HEBBEL, hĕb'ĕl, FRIEDRICH (1813–63). A German, one of the greatest of modern dramatists. He was born in Wesselburen (at that time Danish) in Schleswig-Holstein, of poverty-stricken parents. His childhood was hard and cheerless. His father, embittered by failure and want and almost hating his children, died when Friedrich, still with little schooling, was about 14 years old. His mother, a servant, had a good heart, but a bad temper. After his father's death the poet became office boy to a sort of town clerk and petty magistrate, who gave him at least bread to eat and books to read. The literary efforts of this period—tales, poems, and dramatic fragments—show the influence of Hoffman, Schiller, the Schlegels, and Tieck. His youthful publications in the *Neue Pariser Modeblätter* of Hamburg attracted the attention of the editor, Amalia Schoppe, who found means to bring the young poet to Hamburg in February, 1835. Here he worked hard on stories and essays, began his famous diary, and became enamoured of the poor but faithful seamstress Elise Lensing. In order to study law he set out on foot for Heidelberg in March, 1836; but, having no formal preparation, he could not matriculate, but was, however, permitted to attend lectures, first on law, and then on literature and philosophy. Poverty and lack of preparation hampered him. In September he walked to Munich. Schwab and Uhland, whom he saw on the way, helped him but little. At Munich, where he heard Görres and Schelling, only the scant savings of Elise Lensing kept him from actual starvation. But he read widely and well during those dreadful months and learned from bitter experience what turned out to be the keynote of most of his tragedies—that the tragic in life is very often due rather to a conflict between the idiosyncrasies of an individual and the world than to any moral transgression. His Munich writings were mostly sombre lyrics. Another long, hard walk from Munich to Hamburg in the early spring of 1839 nearly killed him, but Elise nursed him back to life. At a suggestion got from reading Gutzkow's (q.v.) drama *Saul*, he completed, in January, 1840, his first important drama, *Judith*, a realistic dramatization in prose of the apochryphal story of Judith and Holofernes. Through Amalia Schoppe and the Berlin actress Crelinger it was successfully given in Berlin and Hamburg. This made Hebbel a name. His next drama, *Genoveva* (1841), five acts in verse, is a subjective study of Hebbel's own personality in the character of Golo. Raupach's drama of the same name prevented its presentation in Berlin. His next effort, *Der Diamant* (1841), a comedy, was unsuccessful. Meantime Elise Lensing had borne him a son, and the young father was penniless. He went to Copenhagen, hoping that King Christian VIII would make him professor of æsthetics in the University of Kiel; but, disappointed in this, he finally secured from the King a pension of 600 thalers yearly for two years of travel. In September, 1843, he went to Paris; but his poverty and ignorance of the language prevented him from getting as much as he had hoped. The death of his son Max was a hard blow to him. But he completed his drama, *Maria Magdalena*, a three-act prose tragedy of Christianity holding fast to the letter of the moral law, begun in Copenhagen in 1844. This was the first of the modern naturalistic dramas, thus a forerunner of Ibsen's social-

problem drama. Shortly before its publication in October of that year he left for Rome. On account of worrying about Elise and his newborn son and with his habitual gloominess he got comparatively little out of his stay in Italy. In Naples he worked on his terrible dramatic fragment *Moloch*, ranking with Schiller's *Demetrius* and Kleist's *Robert Guiscard*. Late in 1845 Hebbel arrived in Vienna, too poor to appear in good society. If two noble young Poles had not given him means, he would have left Vienna in despair. But he remained, and met Christine Enghaus, a famous actress of the Burgtheater, who had already conceived a great admiration for his dramas and a strong affection for himself. Hebbel now had the difficult choice either of the faithful but poverty-stricken and ignorant Elise, mother of his children, and, as he himself expressed it, "the pistol," or of the brilliant, rich, appreciative actress, with whom a successful career was practically certain. He made the selfish choice, but the only one that could save his life as a man and as an artist. Elise was furious, but later became reconciled and lived for a time in his house. Hebbel and Miss Enghaus (died 1910) were married in the spring of 1849. He now turned to his literary work with zeal, finishing first his masterpiece, *Herodes und Mariamne* (1848), a poetic-realistic dramatization in five acts of blank verse of the struggle of two exceptional individuals, resulting in the man's becoming a mere beast and the woman's becoming a dagger of ice—a splendid exemplification of Hebbel's theory of the tragedy. This was performed with no great success in Vienna in 1849. He lived a retired life, having little to do with Grillparzer (q.v.) and Halm, and least of all with Laube, director of the Burgtheater. His journalistic efforts made him extremely unpopular in Viennese literary circles. *Agnes Bernauer* (1851) is a five-act prose dramatization of the story of the Augsburg barber's beautiful daughter, beloved of Duke Albrecht but cruelly murdered by the command of his father, the reigning Duke Ernst. Its première in Munich in 1852 was a success. His next tragedy, *Gyges und sein Ring* (1854), is a five-act verse dramatization of the familiar story found in Herodotus and Plato, of Kandaules and his wife Rhodope, by many considered a better interpretation of the problem of Ibsen's (q.v.) *A Doll's House*. This was not produced until 1889. Then came his most ambitious work, his *Nibelungen* trilogy (*Der gehörnte Siegfried*, the one-act prologue, and the two five-act dramas, *Siegfrieds Tod* and *Kriemhilds Rache*), which was not completed until 1860, and put on the stage successfully the following year, with Frau Hebbel as Brunhilde in *Siegfrieds Tod* and as Kriemhild in *Kriemhilds Rache*. The trilogy won the Schiller prize. Hebbel follows not the Norse but the mediæval version of the story, and was not altogether successful in transforming the epic into the dramatic. With his wife and daughter the poet lived winters in Vienna and summers in his country home at Orth, near Gmund, enjoying the reputation which he so richly deserved. On account of the hardships and worry of his earlier days his health broke in 1859, and he died, while at work on his drama, *Demetrius*, in December, 1863.

Among his other works may be mentioned: lyrics and ballads; the prose narratives *Anna* (1836) and *Die Kuh* (1849); the æsthetic essays *Mein Wort über das Drama* (1843) and *Vorwort zur Maria Magdalena* (1844); his famous diaries (from 1835); the dramas *Michelangelo* (1850) and *Julia* (1851); and his correspondence. His complete works were issued in an historical-critical edition of 22 volumes, including his diaries and his letters (1901–08). Consult: Emil Kuh, *Biographie Friedrich Hebbels* (2 vols., Vienna, 1877); Bamberg, "Hebbel," in the *Allgemeine Deutsche Biographie*, vol. xi (Leipzig, 1875–1912); Kulke, *Erinnerungen an Fr. Hebbel* (Vienna, 1878); A. Neumann, *Aus Friedrich Hebbels Werdezeit* (Leipzig, 1899); Bulthaupt, *Dramaturgie des Schauspiels*, vol. iii (Oldenburg, 1902); Georgy, *Die Tragödie Friedrich Hebbels nach ihrem Ideengehalt* (ib., 1904); R. M. Werner, *Hebbel, ein Lebensbild* (Berlin, 1905).

HEB'BURN. A town in Durham County, England, on the south shore of the Tyne estuary, 4 miles east of Newcastle. It is an important industrial centre, with shipbuilding and supplementary establishments, engineering and chemical works. The public buildings include a mechanics' institute, an armory, and isolation hospital; among modern municipal improvements are a new drainage system, a public park, and electric lighting. Pop., 1901, 20,901; 1911, 21,766.

HEBE, hē'bê (Lat., from Gk. Ἥβη). The goddess of youth, the daughter of Zeus and Hera, or, according to others, of Hera alone, the wife of Heracles after he had been deified. She was the cupbearer of Olympus before Zeus conferred that office upon Ganymede (q.v.), and she always retained the power of restoring the aged to the bloom of youth and beauty. In the cult she usually appears joined with Hera or with Heracles; but in Phlius she was worshiped as Ganymede, and at Sicyon as Dia, as one who frees from all bonds, apparently through the joys of life. Statues of Hebe are rare, but on vases and reliefs she often appears with Heracles or as cupbearer of Zeus. The representations of Hebe and the eagle are all late. Consult: Kekulé, *Hebe* (Leipzig, 1867); Preller-Robert, *Griechische Mythologie* (Berlin, 1894); and the article "Hebe," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912). See JUVENTAS.

HEBEL, hā'bel, JOHANN PETER (1760–1826). A German dialect poet. He was born of poor parents at Basel, studied at Erlangen, and in 1808 became director of the Gymnasium at Karlsruhe. In 1805 he was appointed Church councilor and in 1819 prelate. He is chiefly known for his *Allemannische Gedichte* (poems in the Alemannic dialect of Lörrach, 1803 et seq.; with introduction by Albrecht and illustrations by Kögler, 1900), which, very favorably reviewed by Goethe in the *Jenaische Allgemeine Litteraturzeitung*, made him famous. His best-known poem is *Die Wiese* (an affluent of the Rhine near Basel). He also wrote for his periodical, *Der Rheinländische Hausfreund*, a number of short stories afterward published as *Schatzkästlein des rheinländischen Hausfreundes* (1811). Hebel's complete works were published in eight volumes (1832–34). Consult: Schultheiss, *Hebels Leben* (Heidelberg, 1831); Längin, *Johann Peter Hebel, ein Lebensbild* (Karlsruhe, 1874); Giehne, *Studien über Hebel* (Würzburg, 1894).

HE'BER, REGINALD (1783–1826). An English poet, second Bishop of Calcutta, born at

Malpas, Cheshire. In 1800 he entered Brasenose College, Oxford, and three years afterward produced his prize poem, "Palestine." In 1805 he became a fellow of All Souls. In 1807 he was inducted into the family living at Hodnet. In 1812 he was made prebendary of St. Asaph and published a volume of poems, *Poetical Works;* in 1815 he was appointed Bampton lecturer at Oxford and in 1822 preacher at Lincoln's Inn. The same year he was consecrated Bishop of Calcutta. During his three years in India he labored with great zeal, traveling through his vast diocese, healing dissensions, and encouraging his fellow missionaries. His prose writings include the Bampton lectures on *The Personality and Office of the Christian Comforter* (1816); *A Life of Jeremy Taylor* (written in 1822); *Sermons* (1829, 1830); *Journey through India* (1828). His fame, however, rests chiefly on his hymns, as "From Greenland's Icy Mountains" and "Holy, Holy, Holy! Lord God Almighty!" Consult the lives by his widow (London, 1830) and by G. Smith (ib., 1895), and A. Montefiore, *Reginald Heber* (New York, 1904).

HEBER, Richard (1773–1833). An English bibliophile, son of Reginald Heber and half brother of Bishop Reginald Heber, born at Westminster. He was educated by George Henry Glass and at Brasenose College, Oxford. Closely following his early devotion to Latin poetry, especially to Persius, Claudian, and Silius Italicus, whom he edited (respectively in 1790, 1793–96, 1792), came an interest in early English drama and poetry; and he became the intimate friend of Walter Scott, who frequently alludes to him in his notes, and dedicated to him the sixth canto of *Marmion.* He was chosen member for the University of Oxford in 1821 and resigned from Parliament five years afterward. He was (1824) one of the founders of the Athenæum Club. His wonderful collections of books—said to have cost him £100,000—were not mentioned in his will and were sold at auctions in London, Ghent, and Paris; they included more than 145,000 volumes and formed a matchless library of early English literature.

HEB'ERDEN, William (1710–1801). An English physician, born in London. He graduated at St. John's College, Cambridge, in 1728, studied medicine in London, and practiced for 10 years in Cambridge and for more than 30 years in London, where he was prominent in the College of Physicians. A remarkably original thinker, Heberden took minute notes on his more important cases and published them under the title *Commentarii de Morborum Historia et Curatione* (1802), of which an English translation, possibly by his son William, appeared in 1803. His contributions to the *Medical Transactions* of the College of Physicians include a description of the first recorded case of angina pectoris and other original matter. Heberden's nodes, knobby enlargements of the terminal phalanges of the fingers in arthritis deformans, are called after him.

HÉBERT, ā'bâr', Edmond (1812–90). A French geologist, born at Villefargeau, Yonne, and educated at the Collège de Meaux, Auxerre, where he became professor in 1836, and at the Ecole Normale, Paris, where he was appointed instructor in 1833, returning as demonstrator in chemistry and physics in 1838, and becoming director of the department of science in 1852. In 1857 he accepted the professorship of geology at the Sorbonne. He did important work on Tertiary, Cretaceous, and Jurassic formations and came to be known as the leading French geologist of his day. His publications include: *Les mers anciennes et leurs rivages dans le bassin de Paris* (1857); *Mémoire sur les fossils de Montreuil-Bellay* (1861); *Matériaux pour servir à la description du terrain crétacé supérieur en France* (1875); *Notions générales de géologie* (1883).

HÉBERT, Ernest (1817–1908). A French painter, born at Grenoble. He was a pupil of David d'Angers and Paul Delaroche and won the Prix de Rome in 1839. He was director of the French Art School in Rome from 1866 to 1873 and from 1885 to 1890. Although classic and elegant in style, and a good colorist, Hébert has often a cloying sentimentality. The picture which made him famous, "Malaria"—a scene of the Pontine marshes—is typical of his art, which prefers morbid subjects. Besides this picture the Luxembourg (Paris) possesses "The Kiss of Judas" and two others; the museum of his native city nine examples, including "A Slave Breaking his Chains." He also painted portraits, of which we cite those of himself (Grenoble) and Madame d'Attainville (Luxembourg). He received all honors possible to a painter. He won first medals at the Paris Exposition of 1855, the Grand Prix at the Paris expositions of 1889 and 1900; he was chosen member of the Institute and Commander of the Legion of Honor in 1874 and received the Grand Cross in 1903.

HÉBERT, Jacques René (1755–94). A journalist and politician of the French Revolution. He was born at Alençon, Nov. 15, 1755, of respectable parents, and was educated at the local college; but disgracing his family by his wild conduct, he quitted Alençon, went to Rouen, and subsequently arrived at Paris. There he dragged out a miserable existence from 1780 to 1790. He finally emerged from obscurity in the latter year as a pamphleteer and editor of a rabid Republican paper, *Le Journal du Soir.* He first became famous, however, as the editor of the journal *Le Père Duchesne,* started in opposition to a publication of the same name edited by Lemaire. He displayed such an exaggeration of principles and cynicism of language that he not only ruined the enterprise of his honest rival, but made himself a popular idol and earned the name of "Père Duchesne." After the events of Aug. 10, 1792, he became a member of the Revolutionary Commune, and as such approved of the September massacres. In December, 1792, he became a substitute procureur for the Commune and in 1793 actively advocated the overthrow of the Girondist party. The Convention, alarmed at the violence of the Hébertists, ordered Hébert and three others to be arrested. His popularity was so great, however, that he had to be set at liberty a few days later, and he was presented with a civic crown by the Commune. With Chaumette he inaugurated the worship of Reason, and as a member of the commission appointed to examine Marie Antoinette, he added to her sufferings by accusing her falsely of scandalous offenses. His party were called *les enragés* and advocated the most extreme measures; but the Committee of Public Safety, under the control of Robespierre and Saint-Just, caused the Hébertists to be arrested, March, 1794, and after a summary trial Hébert, together with many of his adherents, was guillotined, March 24, 1794. His wife perished on

the scaffold a month later with Gabel and Chaumette. Consult: Duval, "Hébert chez lui, dans la révolution française," *Revue Historique*, vols. xii and xiii (Paris, 1880–81); Brunet, *Le Père Duchesne d'Hébert* (ib., 1859); Tridan, *Les Hébertistes* (ib., 1864); Mater, *J. R. Hébert avant la journée du 10 Avril, 1792* (Bourges, 1888); Aulard, *Le culte de la raison et le culte de l'être suprême* (Paris, 1892).

HÉBERT, Louis Philippe (1850–1917). A Canadian sculptor. He was born at Sainte-Sophie d'Halifax, Quebec, and studied at Montreal in the studio of N. Bourassa, and at Paris, where he afterward settled. In 1882 he won the prize offered by the Dominion government for the statue of Sir Georges Cartier (Ottawa); he was elected to the Royal Canadian Academy in 1883 and won the Confederation medal presented by the government in 1894. He became Knight of the Legion of Honor (1901). His principal works are the bronze statues of Maisonneuve and five others in Montreal; the Cartier, Mackenzie, Macdonald, and Queen Victoria monuments in Parliament Square, Ottawa; the Laval Monument, Quebec; and the Home Monument, Halifax.

HÉBERT CASE, The. A case which involved a legal contest as to the federal and provincial legislative powers respectively in Canada in regard to the marriage contract. On July 14, 1908, Eugene Hébert and Marie Emma Clouatre were married at Montreal by a Protestant minister. The marriage was annulled on Nov. 12, 1909, because it contravened the *Ne Temere* decree. The case was afterward heard in the civil courts and finally became a political issue. In 1912 an attempt was made in the Dominion Parliament to legislate on the subject; but the Supreme Court of Canada decided that the proposed law was *ultra vires;* and on appeal this was finally ratified by the Judicial Committee of the Privy Council. Consult *Canadian Annual Review* (1911 and 1912). See also Marriage.

HEBRA, hā'brä, Ferdinand, Ritter von (1816–80). An Austrian dermatologist, born at Brünn. He was educated at the University of Vienna, in 1842 became instructor in dermatology in the medical faculty, was appointed consulting physician of the general hospital of the city in 1848, and professor of dermatology in 1849. He was the first great German dermatologist and entirely reformed the therapeutics of the science. He strongly indorsed local treatment. He wrote: *Atlas der Hautkrankheiten,* with Elsinger and Heitzmann (1856); *Lehrbuch der Hautkrankheiten,* with Kaposi (1872–76); and a third and smaller work under the former title, with Bärensprung (1867–68).—His son, Hans von Hebra (1847–1902), was a specialist in the same branch and wrote: *Kurzgefasstes Lehrbuch der Hautkrankheiten* (1884); *Die krankhaften Veränderungen der Haut mit Beziehung auf die Krankheiten des Gesamtorganismus* (1884); *Die moderne Behandlung der Hautkrankheiten* (1890–91).

HEBREW LANGUAGE AND LITERATURE. See Jews; Semitic Languages.

HEBREW MELODIES. A collection of poems by Lord Byron which, with music by Braham and Nathan, was published in 1815 by Murray, who gave £500 for them. Among them are "The Destruction of Sennacherib," "Jephtha's Daughter," and "She Walks in Beauty."

HEBREW MUSIC. Our knowledge of ancient Hebrew music is very scanty. With the exception of a few reliefs on coins, practically our sole source is the Bible, which must be supplemented by constant reference to the musical instruments of the Assyrians and Egyptians.

There is no reason to doubt that the Hebrew tribes, even during the nomadic period, had some music and, like the ancient Arabs, had their battle songs, their songs of triumph, their songs celebrating the exploits of their favorite heroes, which they chanted or sang to the accompaniment of primitive forms of drums and of simple stringed instruments, while for the purpose of calling the people together for battle or assembly some form of wind instrument perhaps existed in very early days. While the statement in Gen. iv. 21, that the antediluvian patriarch Jubal became "the father of all who handle the harp and the flute," manifestly has no historical value, and the description of Miriam dancing and singing to the accompaniment of the timbrel (Ex. xv. 20, 21) is probably a later embellishment of the tradition of the Exodus (q.v.), an incidental reference to "songs, drum, and lyre" in connection with friendly leave-taking, such as is found in Gen. xxxi. 27, seems to point to a popular custom associated with a comparatively primitive form of life. Through foreign influence—notably from Egypt and Babylonia—more elaborate musical instruments are likely to have been introduced into Palestine long before the Hebrew invasion, and a large variety of percussion, wind, and string instruments may have been adopted by the invading tribes from the Amorites and the Canaanites. That the earliest use of music among the Hebrews was largely if not exclusively secular seems reasonably certain; but the religious bearings of events of a secular character, such as battles and victories, rejoicings at harvest time and wedding festivities, lend to music even when thus employed also a certain religious significance. On all the occasions named, with the exception perhaps of wedding festivities, the tribal or national deity would come in for a share at least of recognition. His help was sought before proceeding to battle; to him thanks were offered for the victory, and it was his favor that had blessed the fields with plenty. From such considerations it did not require many steps for the introduction of music as part of the organized worship. To what extent, however, music was introduced in the preëxilic temple at Jerusalem it is difficult to say. Amos vi. 5 (they collect [*hasharu,* not *hashabu*] for themselves musical instruments) shows that David had in the eighth century the reputation of being interested in musical instruments. The connection rather suggests that it was for secular purposes; but it is intrinsically probable that music formed a part of the cult in Jerusalem as well as in other sanctuaries from the earliest times, though the elaborate description furnished in 1 Chron. xv. 11–24; 2 Chron. v. 12, etc., of the temple service and organization in the days of David and Solomon applies to the second temple (and even here only in a measure), and not to the first. Similarly the melodies and musical directions connected with the Psalms belong to the later phases of postexilic worship among the Jews, though all this does not preclude the possibility that in preëxilic days music on occasions formed part of the temple service in Jerusalem and perhaps also in

connection with some of the sanctuaries outside Jerusalem.

Only a few of the musical instruments mentioned in the Old Testament are genuinely Hebraic in character. 1. Of stringed instruments the most common and probably the oldest was the lyre (Hebrew *kinnor*), the form of whose sounding board, as also the number of its strings, varied considerably. Three to six strings appear to have been the ordinary number, but there are lyres depicted on Jewish coins with as many as 12 strings. Next to the lyre, the harp (Hebrew *nebel*) is most frequently referred to; but we must not suppose that the ordinary harp was a large affair, such as the Egyptians used. It was probably a small triangular instrument, consisting ordinarily of not more than 10 strings. 2. The most common wind instrument among the Hebrews was the flute (Hebrew *khalil* and *'ugab*), which, like the lyre, dates from very early times. It was the ordinary instrument at weddings and funerals and in the second temple was played before the altar on festival occasions. It is probable that the Hebrews, like the Egyptians and the Assyrians, had both the long flute, held straight before the player, and the oblique flute, which was played by blowing into a hole at the side. The horn (Hebrew *shophar*) was a ram's horn, whose limited compass (never over an octave) made it unsuitable for other purposes than signals to assemble the people, to give the order to disperse, etc. In the Jewish ritual it was retained as a solemn rite, and to this day in orthodox synagogues the ram's horn is blown during the services on New Year's Day, at the close of the Day of Atonement, on the day of the Feast of Tabernacles, and during the entire month of Elul, after the recital of the supplications. The Hebrew trumpet (*khasoserah*), of which there is a representation on the Arch of Titus, was a very long instrument and was used by the priests in the later temple service. 3. The chief percussion instruments were (*a*) the drum (*toph*), of which there were numerous forms, though ordinarily the hand drum is intended; (*b*) the cymbals (*mesiltayim*), which were made of metal; and (*c*) the sistrum (*mena'ane'im*), which appears to have been introduced from Egypt. Besides the above list, there are quite a number of instruments mentioned in the Old Testament (cf. especially Dan. iii. 5–10), which have not yet been identified with certainty. For example, the *symphony* (Dan. iii. 5, margin) seems to be the Gk. *συμφωνία, symphonia,* a species of bagpipe, the *sebbekha,* Gk. *σαμβύκη, sambykē,* a sackbut, the psaltery, *pesantherin,* Gk. *ψαλτήριον, psaltērion,* a kind of harp, while the *shalishim* (1 Sam. xviii. 6) appears to have been a sort of triangle.

Bibliography. Breslaur, *Sind originale Synagogen- und Volks-Melodien bei den Juden geschichtlich nachweisbar?* (Leipzig, 1898); Saalschütz, *Geschichte und Würdigung der Musik bei den Hebräern* (Berlin, 1829), which gives a comparison of the Hebrew instruments with the Greek and the modern Arabian; Stainer, *The Music of the Bible* (London, 1879); Wellhausen's edition of the Psalms in the *Polychrome Bible* (New York, 1898), with appendix on the "Music of the Hebrews"; J. Weiss, *Die musikalischen Instrumente in den heiligen Schriften des Alten Testaments* (Vienna, 1895); Büchler, "Zur Geschichte der Tempelmusik und der Tempelpsalmen," *Zeitschrift für alttestamentliche Wissenschaft* (1899–1900); Gressmann, *Musik und Musikinstrumente im Alten Testament* (Berlin, 1903); Prince, art. "Music," in *Encyclopædia Biblica* (New York, 1903); Cohen, "Music," in *The Jewish Encyclopædia* (ib., 1905); Benzinger, *Hebräische Archäologie* (2d ed., Tübingen, 1907); Cornill, *Music in the Old Testament* (Chicago, 1909); Gunkel, "Poesie und Musik Israels," in *Die Religion in Geschichte und Gegenwart* (Tübingen, 1913). See PSALMS; DAVID.

HEBREWS. The name given to a group of tribes of Semitic stock. It is first applied in the Bible to Abraham (Gen. xiv. 13); but there is an earlier eponymous ancestor, Eber (Gen. x. 21), to whom it properly belongs. When Abraham is designated as "the Hebrew," it would therefore seem to be implied that he belonged to a people existing long before his time, including various South Arabian as well as Mesopotamian clans. It is now generally assumed by scholars that the Hebrews are referred to as Habiri in the Tell el-Amarna letters (c.1400 B.C.). This is in harmony with biblical tradition. There is no intimation in the Amarna correspondence as to their origin or ethnic character. In Gen. xl. 15 Joseph explains to the Egyptians that he had been robbed from the land of the Hebrews; in Ex. ii. 6 the Egyptian princess recognizes in Moses one of the Hebrews' children; and in 1 Sam. iv. 6 the Philistines speak of the great shout in the camp of the Hebrews. The implication is that the Israelites were known to foreigners as Hebrews. From the genealogies it may be inferred that they regarded themselves as a part of the Hebrews, who included not only the supposed descendants of Abraham, such as Israel, Judah, Ishmael, Edom, Sheba, Dedan, Midian, etc., but also Moab, Ammon, and many tribes in Mesopotamia and Yemen. How far this may be correct still escapes historic verification; but there is no reason to doubt that the Habiri-Hebrews, when they appeared in Palestine in the fifteenth century B.C., may have contained elements coming on the one hand from south Arabia, on the other from Mesopotamia. Etymologically Hebrews may mean 'those who pass from place to place,' 'nomads,' and may have been a designation given them by the Amorites. Neither Israel nor Judah seems to have called itself by this name in the days of their independence. In later times the name has been applied to the Jews, not only by foreigners, but also by themselves. See JEWS; PALESTINE; SEMITES; SEMITIC LANGUAGES.

HEBREWS, EPISTLE TO THE (Gk. *ἡ πρὸς Ἑβραίους ἐπιστολή*). One of the books of the New Testament canon, usually classed as an epistle. The work, as a whole, may be viewed as a hortatory argument intended to show that in Christ, His Son, God has given His final and perfect revelation, and thus the new Christian faith completely fulfills and supersedes the purely typical and incomplete and temporary provisions and ceremonies of the old (Mosaic) covenant. In particular the argument seeks to show that Jesus is the one only true and perfect High Priest, whose priesthood is eternal and continuously efficacious. Such being the case, the readers are urged to abide steadfast in the faith, to endure all trials with patience, knowing that soon their reward will be complete. The critical questions concern the author, the readers

to whom the work was addressed, and the place where, as well as the time when, it was written, and it cannot be said that any one of them is yet positively settled.

The time of composition could not have been later than 95 A.D., since the book was used freely by Clement of Rome in his letter to the Corinthians, which is assigned to about this date. How much earlier than this it was written depends largely upon what is to be understood by the persecutions referred to in x. 32–34. If they are to be identified with the Claudian edict (see PERSECUTIONS OF THE CHRISTIANS), it cannot be dated earlier than 48; if they are to be identified with the Jewish War (see JEWS), it cannot be dated before 65. In fact, whichever event is intended, it is likely that the writing was long subsequent to it, since the persecutions are referred to as belonging to the "former days" (x. 32). As between these two events, however, the statement in xii. 4 that the readers had "not yet resisted unto blood" would seem to make it unlikely that they had passed through the horrors of the Jewish War. But the force of this argument is dependent largely on the assumption that the readers were resident in Jerusalem or some part of Palestine. If resident elsewhere, then a new viewpoint of the persecutions is possible, and the above limits may not be necessary. It would seem to be certain that the author belonged to a generation later than the Gospel times (ii. 3; cf. Luke i. 1–4), and that the readers were under rulers different from those who had founded and had originally been in charge of the Church (xiii. 7). It would further seem to be clear that the persecutions mentioned in x. 32–34 as belonging to the "former days" are to be separated from those in the midst of which the readers were at the time of writing, and in which they had not yet come to the shedding of blood (xii. 4), though the crisis of their troubles was not far beyond them (x. 25; cf. xii. 25–29). Anything more definite than this, however, must depend upon the consideration of the remaining points.

The place of the Epistle's composition would seem largely to depend on the interpretation of xiii. 24 b. If "they of Italy" is to be understood as referring to those who had come from Italy, then the Epistle was written somewhere outside of that country; if it is to be understood as referring to those who belonged to Italy, then the place of writing was most naturally somewhere within that land. As to which of these two usages the author had in mind, it may, perhaps, be impossible definitely to say; although, from the grouped character of the salutations in the verse, it would seem that he was sending a greeting to all those who were associated with the readers—both officers and fellow Christians—from all those who were associated with himself. But this would seem to imply that these latter were the Christians generally of the land from which he was writing, since otherwise they must be merely Christian sojourners who were accidentally in the place where he was. In this case we should have a general greeting on the one side and a strangely partial greeting on the other—a greeting from a group of Christian travelers in a city, but none from the Christians of the city itself. There would, consequently, seem to be something in favor of the Epistle's having been written within the land of Italy. If so, it was probably at some other place than Rome, since Timothy's release from prison and his expected arrival at the place where the author was (xiii. 23) would indicate a coming from Rome, as the most probable place of imprisonment, to some other place where the author was awaiting him.

The readers of the Epistle have generally been considered Jewish Christians—a conclusion which would appear to be clearly evidenced by the distinctively Hebrew character of the argument employed in the Epistle. Recently, however, critics have claimed a Gentile Christian readership, saying that a Hebrew argument might have been formulated for Christians who were not Jews. Theoretically this is true; but were it so in this particular case, the Epistle would become a purely academic essay, lacking all the significance which would otherwise come from its appeal to the Jewish race from the point of view of its peculiar institutions and its distinctive Scriptures. It amounts to nothing in support of such Gentile readership to contend that the Epistle contains no direct statement of the fact that the readers were in danger of an apostasy to Judaism, for the readers might not have come to the point of apostatizing and yet have been Jews. Jewish Christians as well as Gentile might have been simply weak in the faith and in need of exhortation to hold fast to their profession. In fact, if this weakness of faith and insecurity of profession were the condition of the readers, it is difficult to understand why such a Jewish background to the strengthening exhortation given them was selected, unless they were Jewish themselves. In view of this background, such passages as vi. 1, 2, and xiii. 4 are of no significance, since they are both specifically applicable to Jewish Christians, the latter especially, in view of Paul's arraignment of the race in Rom. ii. 17–29.

Admitting the probability, therefore, that the readers were Jewish, their habitation would seem to be most naturally in a place of Jewish surroundings such as Palestine and Jerusalem. Against this, however, is the strong Alexandrian mode of thought which quite plainly underlies the Epistle's argument. This would not be natural in the places mentioned above. On the contrary, it would suggest Alexandria itself and Egypt. Against this latter location the only argument would be our general ignorance of the condition of early Christianity in this region. Rome is urged by modern critics, and, as far as the Alexandrian mode of thought is concerned, there might not be much against the place. As a matter of fact, however, the critics base their contention largely on the specifically Jewish character of the Roman church—an argument which is so clearly against the facts of the Roman Epistle as to be impossible of acceptance. There would, consequently, seem to remain only some such locality as the Phrygian region of western Asia—a region largely inhabited by Jews and largely under the influence of Alexandrian thought. With such a locality Timothy's relationship (xiii. 23, "our brother Timothy"), and the evident tendencies of the readers to angel worship (chaps. i and ii), an eclectic spirit, and a false asceticism (chap. xiii), would be significant.

In view, therefore, of the probable Jewish character of the readers and their most natural location in western Asia Minor, the strong probability of an Italian place of composition is greatly strengthened; since to Jewish readers

resident in Phrygia a salutation from mere Italian sojourners would have no meaning. And in view of all three points, a date some time after the Jewish War would seem most reasonable; for then the Jewish colonies in the Diaspora would be largely increased and such independent Hebrew congregations more possible. We could also thus understand by the persecutions of the "former days" the Jewish War, whose horrors were not likely to have faded from the exiles' minds; while the newer persecutions, in the beginnings of which the readers were (xii. 4), could quite easily be the rise of the Domitian anti-Christian aggressiveness. This supposition is favored by two considerations—the distinctive Jewish rivalry to Christianity after the destruction of Jerusalem, and the general Christian disappointment at the nonreturn of Christ, which had been widely expected in connection with this catastrophe, in view of the common understanding of the words of Christ as promising it. These two facts would almost seem to account for the troublous situation of the readers, at least from its Jewish side; for it is clear they were suffering from oppression by their unbelieving countrymen—an oppression which gathered an irritating strength largely from the failure of the expected return of their Christ. This oppression might be more or less connected with the government's hostility and shows the situation to have been one of peculiar danger because of the combination of evil which threatened them. We might place the writing of the Epistle, therefore, somewhere about 90 A.D.

The question of author has been generally held to be the most important point connected with the criticism of the Epistle. It is, in fact, the least important, since the even approximate settling of the above questions gives us practically all the critical knowledge of the Epistle which we need for working purposes. The fact, therefore, that there is no certain answer to this question is of no significance. At the same time it can be safely said that, whoever the author may have been, he was not Paul. This is universally accepted by critics to-day. Outside of Paul, evidence would seem in some respects to point to Barnabas, whose name was apparently attached to the manuscripts of the Epistle with which Tertullian was acquainted, and whose authorship was considered by him in his day as an accepted tradition. Any definite conclusion, however, is impossible. The attempt of Harnack to credit it to Prisca and Aquila, chiefly Prisca, is not supported by the facts.

Doctrinally Hebrews holds in one respect a unique position, for its conception of the Messiah as a *priest* is not found in any other part of the New Testament, and there is no evidence that such a doctrine was definitely taught by Jesus. The writer was profoundly convinced of the typological significance of the sacrificial ritual of the Old Testament, viewing it as having as it were a prophetic aspect and destined to be at some time ideally fulfilled. Making use of the common view of Jesus' death as having an atoning significance, and of the common faith in Him as the glorified Son of God. he formulated his theory of the eternal high-priesthood of Jesus and thus in his way proved what Paul proved in another way (e.g., in Galatians, q.v.), viz., the all-sufficiency of God's work in Christ and the fact of direct and immediate access to God through faith in Christ.

Bibliography. An exhaustive and practically complete bibliography will be found in James Moffat's *Introduction to the Literature of the New Testament* (New York, 1911). Special attention may be called to the following: the commentaries by B. F. Westcott (2d ed., London, 1892); A. B. Davidson (Edinburgh, 1882); E. Riggenbach, in Zahn's *Kommentar* (Leipzig, 1913); A. S. Peake, in *The Century Bible* (London, 1902); also the introductions of Zahn (Eng. trans., vol. ii, Edinburgh, 1909) and Jülicher (6th ed., Tübingen, 1906).

HEBREWS, GOSPEL OF. See APOCRYPHA, *New Testament*.

HEBRIDES, hĕb'rĭ-dēz. The name applied to all the islands of the west coast of Scotland, popularly known as the WESTERN ISLES (Map: Scotland, A 2). They are classified as the Outer and Inner Hebrides. To the Outer belong Lewis-with-Harris, North Uist, Benbecula, South Uist, Barra, and the remote Isle of St. Kilda. The principal of the Inner islands are Skye, Coll, Tiree, Eigg, Mull, Iona, Staffa, Ulva, Lismore, Kerrera, Easdale, Colonsay, Jura, and Islay. Bute, Arran, and the Cumbraes, though lying in the Firth of Clyde, are usually classed with the Hebrides.

The total number of the Hebrides is about 521; of these not more than 120 are inhabited, and one-third of this number have a population of not more than 10 persons each. The entire area is 2812 square miles, and the population in 1901 was 78,947, of which 41,031 were females, who outnumbered the males by 10 per cent. Only about 200,000 acres are arable; the rest is in pasture land, and in morasses, peat mosses, lakes, and barren sands and rock. Geologically the Hebrides are divided into groups, of which the more important are the gneiss, trap, and slate. The scenery is grand and picturesque; Mull is noted for its lofty mountains, Jura for its peaks, and Arran for its high, rugged hills. Islay and Bute are comparatively level and arable. Staffa is remarkable for its basaltic columns and great cavern. Iona derives interest from its ruins and historical associations. Politically all the Hebridean isles are attached to Scotland. The counties among which they are distributed are those of Ross, Inverness, Argyll, and Bute. The principal Hebridean towns are Stornoway in Lewis, Portree in Skye, Tobermory in Mull, and Rothesay in Bute. Though situated on the mainland of Argyll, Oban (q.v.) is usually considered a town of the Hebrides and, along with Rothesay, is best known to tourists. Sheep, cattle, and pony rearing, herring fisheries, distilling, slate quarrying, and the manufacture of kelp are the chief industries. Live stock, fish, kelp, wool, and stone are the principal exports; iron and groceries the imports.

Enjoying the benefit of the moist southwest winds, the climate, although humid, is mild, pleasant, and healthful, and is recommended for certain classes of invalids. The poorer class of natives for the most part speak Gaelic. The establishment of several distinct lines of steamer communication with Glasgow and the opening up of remote tracts formerly reached with difficulty have developed the resources of the islands and brought them, with the neighboring coast, within the sphere of trade and the reach of tourists, who come in large numbers and add materially to the prosperity of the inhabitants of the islands. Under modern proprietorship

real estate has improved, and large tracts of moorland are annually rented to sportsmen as shooting grounds.

The Hebrides are the *Ebudæ* of Ptolemy, the *Hebudes* of Pliny, and the *Sudreyjar* of the Norwegians. In the latter part of the ninth century emigrants from Norway subdued the Celtic inhabitants. These settlers very soon became sufficiently powerful to annoy the mother country, whereupon Harald Haarfagr (q.v.) fitted out a large expedition and subdued not only the Hebrides, but also the Orkneys, the Shetlands, and Man. These became a Norwegian kingdom, with its chief seat at Colonsay. They remained subject to Norway till 1266, three years after the battle of Largs, and were then transferred to Scotland. In 1346 one of the chiefs, named Macdonald, reduced the whole under his authority and took the title of "Lord of the Isles" (q.v.). The Hebrides were ecclesiastically dependent on Norway as late as 1374. The islands remained turbulent and backward in civilization until after 1748, when the heritable jurisdiction of the chiefs was abolished and the authority of the central government established. The abolition of feudal conditions, however, did not bring prosperity. The tenant farmers were driven out by high rents, and sheep farming was introduced on a large scale. The rapidly increasing population was forced to depend almost entirely on herring and potatoes for subsistence. In 1846 a potato blight left the greater part of the population destitute. In 1884 a royal commission was appointed, whose recommendations led to the passage, in 1886, of the Crofters' Holdings Act, which has done much to improve the economic condition of the islands. Scott's *Lord of the Isles* contributed materially to create popular interest in these islands, which has been added to by William Black's novels. Consult: Buchanan, *Hebrid Isles* (London, 1883); Gordon-Cumming, *In the Hebrides* (ib., 1883); Mackenzie, *History of the Outer Hebrides* (Paisley, 1903); J. Boswell, *Journal of a Tour to the Hebrides* (new ed., London, 1906); L. C. Hartley, *Wind-Seekers in the Hebridean Seas* (Manchester, 1906).

HE'BRON (Heb. *Khebrōn*). A very ancient sacred city of southern Palestine, the modern El-Khalil, about 21 miles south-southwest of Jerusalem (Map: Palestine, C 4). It figures in tradition as one of the oldest cities of Palestine (cf. Num. xiii. 22) and was originally called Kirjath Arba, 'four-city' (Gen. xxiii. 2; Josh. xiv. 15; cf. Josephus, *Bel. Jud.*, iv, 9, 7). As one of the famous sanctuaries of the south, it became associated in the traditions and legends of the Hebrews with the beginnings of their history. All three patriarchs—Abraham, Isaac, and Jacob—are represented as sojourning in Hebron (Gen. xiii. 18; xxxv. 27; xxxvii. 14), and tradition locates here the cave of Machpelah, where all three, as well as Sarah and Rebecca, were buried (Gen. xxiii; xxv. 9; xxxv. 27–29; xlix. 29–32; l. 13). The spies sent out by Moses before entering the promised land came hither (Num. xiii. 21, 22). Joshua is said to have destroyed the city, given it to Caleb for an inheritance, and made it a city of refuge (Josh. x. 36–37; xiv. 13; xx. 7). Hebron figures prominently in the history of David (q.v.); it was here that he was anointed King, first over Judah, later over all Israel (2 Sam. ii. 1–4; v. 1–3). The popularity of the Davidic dynasty probably had much to do with the production of legends regarding Hebron and the reshaping of old traditions of the place to make them conform to the later scheme of Hebrew historiography. It was from Hebron that Absalom made his attempt to secure the throne (2 Sam. xv. 7 et seq.). After this time it is seldom mentioned in biblical history. Judas Maccabæus captured it from the Edomites, and the Romans stormed it. It was held for a time by the Crusaders and became the seat of a Latin bishop in 1167, but fell into the hands of Saladin (1187), and since then has belonged to the Mohammedans, who have always respected its sanctity and regard it as one of the four sacred cities of the world, Mecca, Medina, and Jerusalem being the other three. Its association with Abraham, who is called by the Mohammedans *Khalil Allah* (friend of God), has given it its modern name. The city has at present a population of about 22,000, including 2000 Jews. The chief object of interest in the city is the Haram, or sacred area inclosing the traditional site of the cave of Machpelah, a mosque, and dwellings of dervishes, saints, and guardians. The mosque is a building erected by the Crusaders between 1167 and 1187, probably on the site of a church built by Justinian. Only a few Europeans of high rank have been admitted to the Haram. We possess no account of the cave of Machpelah; above this cave there are said to be six shrines, or cenotaphs, of the patriarchs. Jews and Christians are not allowed to ascend beyond the seventh step of the flight on the southern side. The Jews lament here, as they do at the Place of Wailing in Jerusalem. An ancient oak in the garden of the Russian hospice is pointed out as the oak of Abraham. In the neighborhood are the so-called tombs of Ruth, Jesse, and Abner. North of the city are the ruins of Haram Ramet el-Khalil, an ancient structure, of which the south and west walls have in part been preserved; the blocks are of great length (10 to 16 feet) and are jointed without mortar. Consult: Robinson, *Biblical Researches* (2d ed., London, 1856); Guérin, *Judée*, vol. iii (Paris, 1869); Benzinger, in Baedeker, *Palestine and Syria* (5th ed., Leipzig, 1912).

HEBRON. A city and the county seat of Thayer Co., Neb., 81 miles southwest of Lincoln, on the Little Blue River, and on the Chicago, Burlington, and Quincy and the Chicago, Rock Island, and Pacific railroads (Map: Nebraska, G 4). It is the commercial centre for a farming and stock-raising district, has flour mills and a cement-block factory, and contains the Blue Valley Hospital, Lutheran Academy, Sacred Heart parish, and Sisters' Home (Catholic). The water works, electric-light plant, and sewage system are owned by the city. Pop., 1900, 1511; 1910, 1778.

HEBRUS, hē'brŭs. The ancient name of the river Maritza (q.v.).

HEC'ATÆ'US OF ABDERA (or, according to some, of Teos). A Greek historian and philosopher, of the fourth century B.C. He went with Ptolemy I Soter on an expedition to Syria, and also up the Nile as far as Thebes. Out of his travels sprang two works, Αἰγυπτιακά, *Aigyptiaca*, dealing with Egypt, and Περὶ Ὑπερβορέων, *Peri Hyperboreōn*, on the far north. Suidas declares that he wrote also on the poetry of Hesiod and Homer. The work on Egypt was used by Diodorus Siculus. For the fragments of Hecatæus' writings, consult Müller, *Frag-*

menta Historicorum Græcorum, vol. ii (Paris, 1841), and Reinhardt, "Hecatæus von Abdera und Demokritus," in *Hermes*, xlvi (Berlin, 1912).

HECATÆUS OF MILETUS (Lat., from Gk. Ἑκαταῖος, *Hekataios*). The most important of the Greek logographers (q.v.), son of Hegesander of Miletus. He flourished about 500 B.C. At the time of the Ionian revolt (c.501–493 B.C.) he strove in vain to keep his countrymen from entering upon the war with Persia, and after their defeat he went as an ambassador to Artaphernes, the Persian satrap, and induced him to treat the Ionians kindly. Like most of the logographers, he was an extensive traveler; to judge from the fragments of his work, he must have visited Greece, Thrace, the countries bordering on the Euxine, a great part of Persia, Africa, and possibly Italy and Spain. He wrote a work called *Genealogies* (Γενεαλογίαι), which was little more than a prose version of the poetical legends of the Greeks. A work called *Tour of the World* (Περίοδος Γῆς), in two books, commonly ascribed to him, is interesting from the fact that it was accompanied by a map of the earth, probably based upon that of Anaximander (q.v.); the authenticity of this work, however, is questioned by Wells, *Journal of Hellenic Studies*, vol. xxix (London, 1909). To this *Tour* Herodotus was much indebted. The fragments of these two works are published by Müller, *Fragmenta Historicorum Græcorum*, i and iv (Paris, 1841–70). Consult also: Atenstädt, "De Hecatæi Milesii Fragmentis quæ ad Hispaniam et Galliam Pertinent," *Leipziger Studien zur classischen Philologie*, vol. xiv (Leipzig, 1891); Tropea, *Ecateo da Mileto ed i frammenti della periegesis (estratto degli Atti dell' Acad. Pelormitana*, 1896–97); Berger, *Geschichte der wissenschaftlichen Erdkunde der Griechen* (2d ed., Leipzig, 1903); Prašek, "Hekataios als Herodots Quelle zur Geschichte Vorderasiens," in Klio, vol. iv (ib., 1904); Bury, *The Ancient Greek Historians* (New York, 1909).

HECATE, hĕk'ȧ-tē (Lat., from Gk. Ἑκάτη, *Hekatē;* the name perhaps means 'the far-working goddess,' from ἑκάς, *hekas*, afar). An ancient Greek deity, generally regarded, not only from her functions, but from the direct statements of the ancients, as a moon goddess. She is first mentioned by Hesiod, in *Theogony*, 409 ff., as the only daughter of the Titan Perses and of Asteria, or night; some, however, consider this passage a later interpolation. Hesiod praises her as a mighty goddess ruling earth, heaven, and sea, the helper of hunters and fishermen, giver of victory in battle and council. Like other moon goddesses, she appears as helper of women in their confinement, guardian of children, and goddess of marriage; she also possesses the power of purifying from sin, as did Apollo. Mysteries were celebrated in her honor at Ægina and in conjunction with the Corybantes in the Zerynthian cave of Samothrace. The special seats of her worship are found in Asia Minor and on the east coast of Greece, though in later times she was widely honored. Hecate in the general belief of antiquity was associated with the guardianship of doors and roads, and her sanctuaries seem in general to have been little more than wayside shrines. A statue of the triple Hecate by Alcamenes stood near the entrance to the Acropolis of Athens, and she was worshiped in private houses. The crossroads were under her special protection, and at them sacrifices, especially of dogs, were offered. At each new moon, also, the rich set out in her honor food, which was eaten by the poor. As a goddess of the night, Hecate is also associated with the lower world, a companion of Persephone, and guardian of her door. She had control of the spirits of the dead, goblins, and spectres; her coming was greeted by the howling of dogs, and she was invoked by magicians and witches. From these varied functions it is not strange that she became closely connected with Persephone and especially with Artemis. In art she was at first represented as a maiden carrying torches; this type persisted through the classical period. The common type, however, derived probably from her epithet Τριοδῖτις (Lat. *Trivia*, 'where three roads meet'), was that of three bodies, joined so as to face in three directions. In this three-bodied guise she represents, it has been held, the new, the full, and the waning moon. In the frieze of the great altar at Pergamon (q.v.), Hecate is shown as having three heads and six arms, but a single body, and this type appears occasionally in later works. Consult: Preller-Robert, *Griechische Mythologie* (Berlin, 1894); Gruppe, *Griechische Mythologie*, vol. ii (Munich, 1906); and especially the article "Hekate" in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886–90), and in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912). For a different view, which makes Hecate originally an earth goddess, see Farnell, *Cults of the Greek States*, vol. ii (Oxford, 1896).

HEC'ATOMB (Lat. *hecatombe*, from Gk. ἑκατόμβη, *hekatombē*, from ἑκατόν, *hekaton*, hundred + βοῦς, *bous*, ox). Strictly, a sacrifice of 100 oxen, but even in the Homeric poems a term for any sacrifice of a large number of animals; thus, we hear of a hecatomb of 12 oxen or of 50 rams. The belief that the favor of the gods was dependent upon the size of the offering probably was one factor in inducing such large numbers of victims; but a powerful influence was also exerted by the desire to feed the populace, since only a small part of each victim was actually consumed upon the altar. See also SACRIFICE.

HECK, BARBARA (1734–1804). One of the founders of the Methodist church in America. She was born, of German parentage, in Ballygarry, County Limerick, Ireland, a district which early felt the influence of Wesley's preaching. She and her husband, Paul, came to America in 1760 and in 1766, with Philip Embury, organized a Methodist society in New York City. The building of the famous old John Street Methodist Church was due, in great part, to her tireless energy. During the Revolution the Hecks retired to northern New York and finally to Canada, to be among Loyalists. They founded the earliest Methodist society in Canada. Consult W. H. Withrow, *Barbara Heck: A Tale of Early Methodism* (Cincinnati, 1895).

HECK'ELPHONE. A member of the family of oboes (q.v.), named after its inventor, W. Heckel. Its range is from A to f^2, and the sound has a rich, mellow barytone quality. It was introduced into the orchestra by R. Strauss in his *Salome* (1905).

HECK'ER, FRIEDRICH KARL FRANZ (1811–

81). A German revolutionist and American soldier. He was born at Eichtersheim in Baden, Sept. 28, 1811, and after studying law in Heidelberg became, in 1838, advocate of the Supreme Court in Mannheim. Elected in 1842 a member of the Second Chamber in Baden, he abandoned his profession for political life and soon grew popular among the more advanced elements of the opposition. He sat and voted with the Extreme Left, and his influence helped to oust the Blittersdorf ministry from office. In 1845, in conjunction with Itzstein, he conducted a democratic campaign in Germany, during which he was arrested at Berlin and expelled from Prussia. In 1848 he employed his eloquence in revolutionary agitation, and he and Struve became leaders of the advanced Revolutionary party. When the preliminary convention of the German nation (*Das Vorparlament*) met at Frankfort, Hecker endeavored, with the influence of his whole party, to constitute it into a permanent republican assembly. The frustration of this effort led him to attempt to surprise the smaller governments of southern Germany with the bands of artisans which had come from France. Defeated at Kandern, in Baden, April 20, 1848, he fled into the Canton of Basel, where he conducted a radical newspaper and wrote his work, *Die Volkserhebung in Baden*. On being refused admission to the National Assembly at Frankfort, though twice elected to represent Thiengen, he emigrated to America, where he bought a farm at Bellville, Ill. The Baden revolution (1849) brought him back to Europe; but finding the revolution over on his arrival, he returned to America. He was a colonel and brigadier general in the Union Army during the Civil War, raising a regiment and acquitting himself with distinction. During his later years Hecker watched with interest the founding of the new German Empire and was a stanch supporter of German interests in America. He died at St. Louis, March 24, 1881. His *Reden und Vorlesungen* were published in Germany in 1872 and were followed two years later by *Betrachtungen über den Kirchenstreit in Deutschland und die Infallibilität*.

HECKER, Isaac Thomas (1819–88). An American priest of the Roman Catholic church, founder of the Paulist Fathers. He was born in New York City and early in life engaged in business. In 1843 he was a member of the socialistic community at Brook Farm and later of that at Fruitlands, Mass. He also lived for some time with Henry D. Thoreau at the latter's "Hermitage." In 1844 he was converted to the Roman Catholic faith and five years later was ordained to the priesthood by Cardinal Wiseman. He joined the Redemptorists, but with others was released from his vows to found in 1858 the Congregation of St. Paul the Apostle, or Paulists (q.v.), in New York. Father Hecker was the founder and director of the Catholic Publication Society and also founded and edited from 1865 until his death the *Catholic World*, a popular Roman Catholic magazine in America. His writings also included: *Questions of the Soul* (1855); *Aspirations of Nature* (1857); *Catholicity in the United States* (1879). Consult Elliott, *Life of Father Hecker* (New York, 1891). The appearance of an abridged and incorrect anonymous French version (1897; 6th ed., 1898) of Father Elliott's volume evoked an attack by Abbé Maignan, of the Congregation of St. Vincent de Paul, in *Le Père Hecker, est-il un saint?* (1898). This was succeeded by the so-called "Americanism" controversy, for the settlement of which Pope Leo XIII in 1899 addressed an apostolical letter, the *Testem Benevolentiæ*, to Cardinal Gibbons. The charge had been made that the American Paulists had allowed too great departures from Catholic doctrine and discipline, but the charge was not sustained. For an account of the matter, consult Sedgwick, *Father Hecker* (Boston, 1900).

HECKER, Johann Julius (1707–68). A German educator, born at Werden, Prussia. He studied at Halle, where he specialized in pedagogy. He had charge of the school systems in Potsdam and Berlin for a number of years. Hecker was the founder of a new type of school when in 1747 he opened the Oekonomisch-mathematische Realschule, probably the earliest of the Realschule of Germany to provide a non-classical curriculum. He also interested himself in the training of teachers. At the command of Frederick II of Prussia he drew up a system of regulations for the government of common schools, parts of which are still in force. Consult Fr. Ranke, *Johann Julius Hecker* (Berlin, 1861).

HECKER, Justus Friedrich Karl (1795–1850). A German physician and writer of medical history, born in Erfurt, Prussian Saxony. He was professor of medicine in the University of Berlin and wrote: *Geschichte der Heilkunde* (2 vols., 1822–29); *Der schwarze Tod im 14. Jahrhundert* (1832); *Die Tanzwut, eine Volkskrankheit im Mittelalter* (1832), translated into English by B. G. Babington, under the title "The Dancing Mania of the Middle Ages" (1875); *Der englische Schweiss: Ein ärztlicher Beitrag zur Geschichte des 15. und 16. Jahrhunderts* (1834); *De Peste Antoniniana Commentatio* (1835); *Geschichte der neuern Heilkunde* (1839); *Kinderfahrten, eine historisch-pathologische Skizze* (1845).

HECK'EWEL'DER, John Gottlieb Ernestus (1743–1823). An American pioneer missionary and orator, born in Bedford, England. He came to Pennsylvania with his parents in 1754, studied theology, and entered the Moravian ministry. In 1771 he became assistant to David Zeisberger (q.v.), who had charge of the missionary work of that church among the Indians in the Ohio country, whither Heckewelder proceeded in that same year. In this service he remained for 15 years. In 1792 and 1793 he assisted in drawing up treaties between the United States and the Indians, by whom he was greatly loved and trusted. He remained in Ohio until 1810, when he settled at Bethlehem, Pa., and engaged in writing the history of his labors and observations. He published: *An Account of the History, Manners, and Customs of the Indian Nations who Once Inhabited Pennsylvania and the Neighboring States* (1818), which was translated into both German and French; *Narrative of the Mission of the United Brethren among the Delaware and Mohegan Indians* (1820); *Names which the Lenni Lenape or Delaware Indians Give to Rivers, Streams, and Localities* (1822; new ed., 1907). Many of his manuscripts are preserved in the Pennsylvania Historical Society. His narratives are valuable, though uncritical. Consult Rondthaler, *Life of Heckewelder* (Philadelphia, 1847).

HECKLE. See Hackle.

HECKMONDWIKE, hĕk'mond-wīk. A manufacturing town in the West Riding of York-

shire, England, 10 miles southwest of Leeds. It has coal mines, ironworks, machine shops, dye works, and is an important centre of carpet, blanket, and heavy woolen manufactures. The town has good drainage, an ample water supply, and electric lighting. Pop., 1901, 9460; 1911, 9016.

HECKSCHER, hĕk'shĕr, JOHANN GUSTAV WILHELM MORITZ (1797–1865). A German politician, born in Hamburg. He served during the War of 1815 as a volunteer in the Hanseatic Corps and then studied at the universities of Göttingen and Heidelberg. Upon completing his studies, he first traveled all over the Continent and then settled in Hamburg, where he practiced law, and after 1840 directed the politics of the *Hamburger Nachrichten.* In 1848 he was elected to the Vorparlament, in which he opposed the propositions of the Democratic party. In the National Assembly at Frankfort (1848–49) he was at first a member of the Left Centre, but inclined more and more to identify himself with the Right. He advocated the election of Archduke John of Austria as vicar of the provisional government, in which he himself was appointed Minister of Justice, and opposed the proposition to exclude Austria, and erect a German empire with a Prussian king as hereditary emperor. When a permanent government was established, he was sent as Minister to Turin and Naples and in 1853 to Vienna. Later he helped to organize the Pan-German party.

HEC'LA, or **HEK'LA.** A volcano in Iceland, situated in the southwestern part of the island, about 20 miles from the coast. It has an irregular cone, built of lava, scoriæ, and ashes, and bare of vegetation, which rises to a height of 5100 feet above the sea. There are several subsidiary craters, besides the principal crater on the summit, and the cone is dissected by deep ravines, through which torrents rush down from the snow fields above. The volcano has an extremely wild and desolate appearance. Eruptions take place at irregular intervals, the total number on record since the discovery of Iceland being 28. The most violent outbursts occurred in 1157, 1300, 1597, 1636, and 1766. In the last-named year a large area was buried beneath the ejected lava and ashes. The volcano was again active from September, 1845, to April, 1846, and in March, 1878. See ICELAND.

HECTARE, or **HEKTARE, HECTOGRAM, HECTOLITER, HECTOMETER.** See METRIC SYSTEM.

HEC'TIC FEVER (from Gk. ἑκτικός, *hektikos,* consumptive, from ἕξις, *hexis,* condition, from ἔχειν, *echein,* to have). A type of fever, usually associated with tubercular disease, abscess, or septicæmia, distinguished by an afternoon or evening rise of temperature, during which the patient has bright eyes, flushed cheeks, and some nervous excitement, while afterward the temperature falls and profuse perspiration occurs. It is a common symptom of chronic suppuration from whatever cause, when the wound cannot be kept aseptic and well drained. The periodic rise in temperature is attributable to chronic blood poisoning, depending on the absorption of small quantities of the products of putrefaction or fermentation. The treatment must be directed towards the existing disease, of which it is generally a grave symptom.

HEC'TOR (Lat., from Gk. Ἕκτωρ). The leader and mightiest warrior in the Trojan army, son of Priam and Hecuba, husband of Andromache, and father of Astyanax or Scamandrius. In the *Iliad* he appears as brave in battle, but hasty and often imprudent; he is also full of reverence for the gods, tender love for his family, and devoted patriotism. During the absence of Achilles from the fight he storms the Greek camp and penetrates even to the ships. He is driven back by Patroclus, the friend of Achilles, but at length, by the help of Apollo, slays Patroclus. Roused by a thirst for vengeance, Achilles is reconciled with Agamemnon and in divine armor routs the Trojans with fearful slaughter, and finally, after chasing Hector three times round the walls of Troy, slays him by the help of Athena and drags the body at his chariot wheels to the Greek ships. Here the corpse is miraculously preserved from corruption by the gods and finally ransomed by Priam. With the burial of Hector the *Iliad* closes. In the post-Homeric literature little is added to the picture of Hector. At Ilium he was worshiped as a hero, and similar offerings were made at Thebes, whither it was said an oracle had commanded the removal of his bones. In art the combats of Hector with various Greek heroes, his death, the maltreatment of his body, and his ransom are favorite subjects.

The name "Hector" has been given to one of the minor planets in the plane of Jupiter's orbit.

HECTOR, ANNIE (FRENCH) (1825–1902). A British novelist, best known by her pseudonym "Mrs. Alexander," born in Dublin, Ireland. She began writing at an early age, but with so little success that on her marriage she laid aside her pen and resumed it only when the death of her husband obliged her to seek some means of maintenance. Among her novels, some of which met eventually with considerable success, are: *The Wooing O't* (1873); *Her Dearest Foe* (1876); *By Woman's Wit* (2 vols., 1886); *Mona's Choice* (1887); *A Life Interest* (3 vols., 1888); *A Winning Hazard* (1896); *Barbara: Lady's Maid and Peeress* (1897).

HECTOR, or **ECTOR,** SIR. The name of two knights in Arthurian legend. See ECTOR.

HEC'UBA (Lat., from Gk. Ἑκάβη, *Hekabē*). The second wife of Priam, King of Troy, to whom she was said to have borne 19 children, including Hector, Paris, Helenus, Cassandra, Deiphobus, Polydorus, and Troilus. In the *Iliad* Hecuba appears as bringing offerings to Athena, trying to restrain Hector from battle, and lamenting his death. The tragedians, and especially Euripides (q.v.), basing their work on the later epics, developed her story, and it served as a source for still later poets. Before the birth of Paris she dreamed, it was said, that she bore a blazing torch which fired the whole city. From dread of the meaning of this omen, Paris was exposed. Another episode was her vengeance on Polymestor, King of Thrace, to whom Priam had sent his son Polydorus and much treasure for safe-keeping. Polymestor murdered his ward and threw the body into the sea, which bore it to the shore of the Troad, where it was discovered by a servant of the now captive Hecuba. She then enticed Polymestor to her tent and with her attendants slew his sons before his eyes and blinded him. The loss of Polydorus was only one of her sufferings after the capture of Troy, for she saw her husband and her sons slain, her grandson Astyanax, son of Hector, thrown from the walls of Troy, and her daughter Polyxena sacrificed at the

tomb of Achilles, while the lot assigned her as slave to her most hated enemy, Odysseus. The legends of her end varied, as in one version she was transformed into a dog, which sprang into the sea and was drowned (consult Ovid, *Metamorphoses*, iii, 399–575), while in another her lamentations and curses so angered the Greeks that they stoned her. Her name became proverbial for a sorrowful fate. Some have regarded her as a goddess to whom dogs were sacred.

HECUBA, or **HEC'ABE.** A tragedy by Euripides, produced about 424 B.C. It deals with the revenge of Hecuba on Polymestor, King of Thrace, who had murdered her youngest son, Polydorus, previously consigned by Priam to his guardianship. The tragic pathos of the play is also heightened by the introduction in the first part of the story of Polyxena, the daughter of Hecuba, who was sacrificed by the Greeks to the shade of Achilles. The play is somewhat lacking in unity.

HECYRA, hĕs'ĭ-rà (Lat., from Gk. Ἑκυρά, mother-in-law). A comedy by Terence, produced in 165 B.C.

HEDA, hā'dà, Willem Claesz (c.1594–c.1678). A Dutch still-life painter. He was born probably at Haarlem. It is unknown under whom he studied, but he was prominent among artists, having been dean of the Haarlem Guild in 1631 and in 1651. Aside from this nothing is known of the events of his life. He is one of the most attractive of the Dutch still-life painters. Although minute in execution, his paintings are good in color and admirably composed. His subjects are usually "breakfast pieces," sometimes elaborate in character—food upon rich plate, oysters with the peeled lemon, bread, wine in stately beakers, and pastry; at others a more humble repast—ham, bread, walnuts, and beer. He is well represented in almost all important German and Dutch galleries; also at Vienna, in the Louvre, and in the National Gallery, London.

HEDBERG, hĕd'bĕr-y', Frans Teodor (1828–1908). A Swedish dramatist, born at Stockholm. He was appointed reader, and then teacher, at the Royal Theatre in Stockholm (1861), and later director of the New Theatre, Gothenburg (1881). In 1883 he gave up this position to devote himself entirely to writing. His works include comedies, tragedies, poems, etc. The best known of his plays is *Bröllloppet på Ulfåsa* (1865). He also wrote *Karakteristiker och Porträtter af Svenska Skådespelare* (1884) and *Karakteristiker och Porträtter af Svenska Operasångare* (1885), besides other works dealing with theatrical subjects.—His son Tor (1862–) wrote novels of abnormal psychology, including *Judas* and *Ouf Torpa* and dramas of like character, among them *Gerhard Grim* (1897), *Amor och Hymen* (1905), the drama *Johan Ulfstierna* (1907), and the recluse tragedy *Mikael* (1908).

HEDDA GABLER, hĕd'dà gä'blĕr. A play by Henrik Ibsen (1890), and the name of its heroine, an eccentric woman who, disappointed in her marriage with a young savant, attempts to regain her influence over a former lover, Eilert, now under the good influence of a former school friend of Hedda. He loses the manuscript of a new work which is to make him famous, and Hedda's husband finds it, but she destroys the work. When Eilert, in despair, thinks of suicide, she gives him a pistol with which he ends his life in a low resort, and Hedda kills herself.

HED'DING, Elijah (1780–1852). An American Methodist Episcopal bishop. He was born in Pine Plains, Dutchess Co., N. Y., and began to preach in Vermont when 19 years old. During most of the time between 1807 and 1824 he was presiding elder in New Hampshire, in Portland, Me., and in Boston. In 1824 he was elected Bishop, and during the formative period of the church's growth he exercised a powerful influence. He was one of the founders of *Zion's Herald*, the first Methodist paper in the country, and author of a *Discourse on the Administration of Discipline* (1842). Hedding College, Abingdon, Ill., was named for him. Consult D. W. Clark, *Life and Times of Rev. Elijah Hedding, D.D.* (New York, 1855).

HED'DLE, or **HEALD** (of Scandinavian origin; cf. Icel. *hafald*, thrum for holding the weft). In weaving, the threads of the warp are so arranged that at each passage of the shuttle backward and forward a certain number of the warp threads are raised and the remainder lowered; this is done with vertical threads, cords, or wires, with a small loop in the middle through which the warp thread is passed, there being one of the vertical threads for each horizontal or warp thread. These threads or wires are known as heddles, or healds. See Loom.

HEDENSTIERNA, hā'den-styĕr-nà, Karl Joseph Alfred (1852–1906). A Swedish author, born at Vedåsa (Småland province). In 1879 he became connected with the staff of the *Smålandsposten* at Vexiö and in 1890 was made editor in chief of that journal. In addition to several volumes descriptive of Swedish peasant life, he wrote a series of popular humorous articles, published weekly in the *Posten* over the name "Sigurd" and in part collected in a translation into German by Krusenstierna and Langfeldt, entitled *Allerlei Leute* (Leipzig, 1892–97). His best works are: *Stuta-Perssons Josua* (1899), *Svenssons* (1903), *Petterssons Lina* (1906).

HEDEWARY. See Khuen-Belasi-Hedewary.

HEDGE (AS. *hecg*, *hege*, OHG. *hecga*, *hegga*, Ger. *Hecke*, hedge; connected with AS. *hege*, Eng. *hay*, and AS. *hēawan*, Eng. *hew*). A fence formed generally of growing shrubs or trees and cultivated either for defense or ornament. Hedges are much used in England, Italy, and in other countries where wood for fences is scarce. For many situations they are particularly adapted, owing to the protection which they afford from high winds. The height to which they are permitted to grow should be accommodated to the requirements of the locality. Hedges in Great Britain are generally formed of hawthorn (q.v.). Beech hedges are very common around gardens and pleasure grounds, and a hedge of beech and hawthorn mixed is common in many places. Holly makes an excellent ornamental hedge, much in use for gardens and pleasure grounds. Ornamental hedges are sometimes formed of yew, hornbeam, lime, and other trees. In the United States osage orange (*Maclura aurantiaca*) and honey locust (*Gleditschia triacanthos*) are considered the best hedges for fence purposes. For ornamental hedges California privet (*Ligustrum ovalifolium*), Norway spruce (*Picea excelsa*), American arbor vitæ (*Thuja occidentalis*), common hemlock (*Tsuga canaden-*

sis), Japan quince (*Cydonia japonica*), *Deutzia scabra*, and some spireas and viburnums are used.

HEDGE, Frederic Henry (1805–90). An American clergyman, critic, and philosopher, born at Cambridge, Mass. He was a son of Levi Hedge, professor of logic and metaphysics in Harvard College. He studied in Germany under the care of George Bancroft from 1818 to 1823 and graduated at Harvard (1825) and from the Divinity School at Cambridge in 1828, becoming a Unitarian minister. In 1857 he was made professor of ecclesiastical history in the Harvard Divinity School and editor of the *Christian Examiner* (1857–60). From 1872 to 1881 he was professor of German at Harvard. To literary criticism he contributed *Prose Writers of Germany* (1848) and *Hours with German Classics* (1886); to religious and philosophical criticism: *Reason in Religion* (1865); *The Primeval World of Hebrew Tradition* (1870); *Martin Luther and Other Essays* (1888). He wrote also several hymns and translations from the German poets and prepared a liturgy for the Unitarian church (1856). His chief significance to American thought was the attention his work called to German scholarship and literature.

HEDGE'BOTE'. See Haybote.

HEDGE'HOG'. One of a genus (*Erinaceus*) of insectivorous quadrupeds, the type of the family Erinaceidæ. The muzzle is rather elongated, the neck short, the limbs short, the feet five-toed, the claws strong, the tail short, the body covered with short spines on the upper part and with hair below and capable of being rolled up into a ball. The teeth are 36 in number, 20 in the upper jaw and 16 in the lower; the middle incisors are very long and stand forward. Like many other insectivora, hedgehogs are by no means limited to insect food, but prey on larger animals, as reptiles, small quadrupeds, and birds; they are fond of eggs and of milk and in confinement will readily eat soaked bread, cooked vegetables, or porridge. Their power of rolling themselves into a ball, from which the spines project on every side, is their means of protection from enemies. The spines are curiously bent near the root and so set that on the contraction of the muscles by which the animal rolls itself up they are held firmly in their position, their points towards the adversary. They are very strong and sharp, and their elasticity is so great that the animal can sustain falls from considerable heights without apparent injury.

The common hedgehog (*Erinaceus europæus*) is a native of all Europe and of western Asia. Its short ears are one of its distinctive specific characters. It is seldom more than 9½ inches in length. Its spines are about an inch long. It readily kills snakes, and even vipers, which it eats, beginning always at the tail. It brings forth from two to four young at a birth and provides for the occasion a curiously constructed nest, mostly of dry leaves, of which the roof is capable of throwing off the rain. The young are blind at first, their ears are closed, and their bodies are covered with soft, incipient spines. In winter the hedgehog becomes torpid, retiring to a hole at the base of a tree, beneath roots, or in some such situation. It provides no winter store, and few animals hibernate so completely. The hedgehog is easily tamed, becomes very familiar, and is very useful in houses where cockroaches are troublesome. Night is its period of activity. Its flesh is eaten in some parts of Europe, but in Great Britain only by gypsies, who roll the animal up in a ball of clay and so roast it. Spain, Italy, and Sicily have each their subspecies of the common hedgehog. About 18 other species of hedgehogs are found in different parts of Asia and Africa, but no closely related animal is included in the American fauna. See Plate of Porcupines and Hedgehogs.

HEDGEHOG PLANT (so called from the shape). A name given to those species of medic (*Medicago*) in which the pods are spirally twisted and rolled up into a ball, beset with spines. The peculiar appearance of the pods makes them objects of interest, on which account they sometimes find a place on flower borders. Like other medics, they are useful as sheep and cattle food in countries where they abound. They are particularly plentiful on sandy grounds near the sea in some parts of South America, and their burlike pods are often abundant in South American wool. *Medicago hispida*, the bur clover, is frequently sown in the Southern States for winter pasture.

HEDGE HYSSOP. See Gratiola.

HEDGE MUSTARD, *Sisymbrium*. A genus of plants of the family Cruciferæ, mostly annual or perennial herbs, with various foliage, yellow or white flowers, and long, roundish, or six-angled pods. Several species are natives of Europe, of which one, the common hedge mustard (*Sisymbrium officinale*), was once employed in medicine for catarrh and other ailments, and still is sometimes cultivated as a potherb on account of its mild pungency. It is abundantly introduced into the United States, where it is considered a troublesome weed. Broad-leaved hedge mustard, or London rocket (*Sisymbrium irio*), is said to have sprung up in great abundance on the ground desolated by the fire of London in 1666. There are a number of other weedy species. *Sisymbrium sophia* is sometimes known as flixweed. *Sisymbrium alliaria*, or *Alliaria officinalis*, has a garlic-like odor. *Sisymbrium altissimum*, a recent introduction into America, where it is known as tumbling mustard, has become a troublesome weed in many localities.

HEDGE NETTLE. See Stachys.

HEDGES, hĕj'ĕz, Job Elmer (1862–). An American Republican politician and lawyer. He was born at Elizabeth, N. J., and graduated from Princeton University in 1884 and from Columbia Law School in 1886. He was secretary to Mayor Strong of New York City in 1895–97, city magistrate in 1897–98, and for a time Deputy Attorney-General of New York; was appointed to represent the United States on the International Fisheries Commission; in 1912 was the candidate of the Republican party for Governor of New York; and in 1914 was defeated (at the first direct primaries) for the governorship nomination by Charles S. Whitman. As a lawyer, his practice was in connection with the firm of Hedges, Ely, and Frankel of New York City. St. Lawrence University conferred on him the degree of LL.D. in 1914. He became noted as a public speaker and is author of *Common Sense in Politics* (1910).

HEDGES, Killingworth (c.1845–). An English engineer, privately educated. He worked on the North Holland Sea Canal and the Denver and Rio Grande Railway, installed an electric-lighting plant at the Liverpool docks in 1878, was one of the first to install electric

lights on steamships, and about 1899 turned his attention to lightning conductors. He modified the Clerk Maxwell system, substituting rain pipes for ordinary lightning rods, and in 1900 was a leader in forming the Lightning Research Committee, whose report was published in 1905. He wrote: *Continental Electric Light Central Stations* (1892); *American Electric Street Railways* (1894); *Modern Lightning Conductors* (1905).

HEDGE SPARROW, HEDGE WARBLER, or DUNNOCK. A familiar European warbler (*Prunella modularis*). It is not quite as large as the house sparrow, which it somewhat resembles in dull-brownish plumage, but in little else. It feeds principally on insects. It is one of the earliest spring songsters, having a sweet plaintive song. The nest, of green moss, roots, and wool, lined with hair, is usually placed rather low in a bush or hedge. The eggs are four or five in number, of a delicate and spotless bluish green.

HEDIN, hĕ-dēn′, SVEN ANDERS (1865–). A Swedish explorer, born at Stockholm and educated there and at Upsala (1885), at Berlin and at Halle, where in 1892 he received the doctorate. He traveled in southwestern Asia in 1885–86 and gave an account of his journey in *Genom Persien, Mesopotamien och Kaukasien* (1887); was a member of the Swedish commission to Teheran, which he described in *Konung Oscar's beskickning till Schahen af Persien* (1892). In the years 1894 to 1897 he traveled through East Turkestan, the Pamir, the Takla-Makan Desert, northern Tibet, and the Desert of Ordos, reaching Peking and returning west through Mongolia and Siberia, and in the latter year won the Karl Ritter medal from the Berlin Geographical Society. These journeys, performed at times amid extraordinary hardships, were described in *Through Asia* (1899), which made the author's reputation in England and America; and, less popularly, in *Petermanns Mitteilungen* (1900): "Die geographisch-wissenschaftlichen Ergebnisse meiner Reisen in Central Asien, 1894–97." Hedin's expedition of 1899–1902 explored the lower course of the Tarim, the country between it and the Tchertchen-Darya, the region of Lom-Nor, the Desert of Gobi, and the greater part of Tibet. He made two unsuccessful attempts to enter the sacred city of Lhasa. In 1906–08 he made another expedition to Tibet, the geographical results of which were noteworthy. On this occasion he took a number of meteorological observations which constitute the first record of the kind for this region. His memoir on the physical geography of Tibet studied on this trip was equally important. The data accumulated on this trip enabled him to compile the first detail map, on a scale of 1 to 1,000,000, of that section of Asia. In 1911 he was elected a member of the Paris Academy of Sciences; in 1912 he was raised to the nobility by the King of Sweden in recognition of his work, and in 1914, at the request of the German Emperor, he visited Belgium to investigate destruction caused there by the war in Europe. His best-known work is *Scientific Results of a Journey in Central Asia* (6 vols. and 2 vols. maps, Stockholm, 1904–08).

HEDJAZ. See HEJAZ.

HEDJAZ (hĕj-ăz′) **RAILWAY,** THE. See TURKEY.

HEDLEY, hĕd′lĭ, JOHN CUTHBERT (1837–1915). An English Benedictine and Roman Catholic bishop. He was born at Morpeth, was educated at Ampleforth College, Yorkshire, and in 1854 entered the English Congregation of the Benedictine Order. He was ordained priest in 1862, was consecrated auxiliary Bishop in 1873, and in 1881 became Bishop of Newport. He wrote several volumes of sermons: *Christian Inheritance* (1894); *A Retreat* (1895); *Lex Levitarum* (1905); *The Holy Eucharist* (1907).

HE′DONISM (from Gk. *ἡδονή, hēdonē,* pleasure; connected with *ἡδύς, hēdys,* Lat. *suavis,* Goth. *suts,* OHG. *suozi,* Ger. *süss,* Eng. *sweet,* Skt. *svādu,* sweet, from *svad,* to make pleasant, to taste). The theory that pleasure is the highest human good (ethical hedonism), or that pleasure is the only end that can be pursued (psychological hedonism). The distinction between these two types of hedonism has not always been kept clear, and the result is that the history of hedonism often presents very confusing because confused systems. In the very brief outline we shall give of this history we shall not distinguish between these two types of hedonism, although a critical estimate of hedonism would require this distinction. Such an estimate we shall give briefly in the last two paragraphs. In Occidental speculation hedonism appeared very early and was vigorously asserted by many sophists (q.v.). Aristippus (q.v.) and his school (see CYRENAIC SCHOOL) made hedonism their central doctrine. Aristippus seems at times to have insisted upon the supreme value of the pleasure of the moment and to have lost sight of the necessity, even for securing pleasure, of considering the future. But while many of the sayings attributed to him have this irrational character, the value he set upon insight would seem to indicate that it was not his intention to hold up as ideal the man who completely ignored all the hedonic consequences of his action. Epicurus (q.v.) laid more emphasis on the desirability of choosing "productive" pleasures, to use Bentham's phraseology, i.e., pleasures whose consequences are not painful. But however they differed in other points, all the ancient hedonists were agreed that the pleasure of the agent was, for the agent himself, the supreme end. A disinterested desire for some one else's good was not recognized as possible; or, if possible, it was regarded as perverse. Early modern hedonists (see HOBBES; LOCKE) were almost or quite as individualistic as the ancients. But with Cumberland, Hutcheson, and Hume, a new phase of hedonism was introduced, viz., the theory that not the agent's greatest pleasure, but "joy in widest commonalty spread," is the supreme end of moral action (universalistic hedonism, or utilitarianism, q.v.).

Psychological hedonism is controverted by well-known facts. So far is man from always seeking pleasure that in most of his actions he has no thought of pleasure. He acts from automatic impulse, from instinct, from habit, from desire for certain objective ends, as well as occasionally from desire for pleasure. It has even been denied that there can be any desire for pleasure, although this is, without doubt, an extreme position. The tendency among many writers at the present day is to maintain that the affections, i.e., pleasantness and unpleasantness, are the motives or mainsprings of *voluntary* action, and not that pleasure and the avoidance of pain is the *end* of action. The difference between a motive and an end is that between an efficient and a final cause (see CAUSALITY), although it

should be remarked that motive is often used as synonymous with end. This view that the affections are the motives of actions, so far as these actions are voluntary, is not to be confused with hedonism as above defined, which is a theory of ends, not of cause. However, the term "hedonism" has sometimes been used to designate this view.

Ethical hedonism is beset at the outset with one great difficulty. It is often argued that hedonism is not practicable unless all pleasures can be compared in some way with each other. Who shall say whether the pleasures of the table are greater or less than those of the opera? The question can be only approximately answered by each individual according to his own tastes. And even such an answer can claim no uniform applicability. At one time, e.g., when extremely hungry, even the most enthusiastic lover of music might prefer beefsteak to Wagner, while just after an epicurean banquet the gourmand might temporarily prefer music. The greatest sum of pleasures either for the agent or for the race would be a very difficult ideal to set before one, except in the abstract—too difficult, perhaps, to make it the criterion of morality for the ordinary man. But the difficulty of it must not be a bar if on sufficient ground it can be proved that man *ought* to seek the greatest pleasure either of himself or of others. But how are we to prove that such an obligation obtains? The final appeal of hedonists is generally to reason, it being maintained that the reasonable man invariably prefers the greatest pleasure to anything else. Consult: Watson, *Hedonistic Theories from Aristippus to Spencer* (Glasgow, 1895); Sidgwick, *The Methods of Ethics* (6th ed., London, 1901); J. C. Palmer, *A Plea for Hedonism* (Wooster, Ohio, 1903); Max Zerbst, *Die Philosophie der Freude* (Leipzig, 1904). Consult the authorities referred to under UTILITARIANISM; ETHICS.

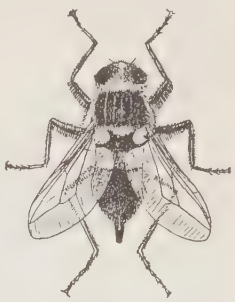
HÉDOUIN, ā'dwăN', EDMOND (1820–89). A French painter, etcher, and lithographer. He was born at Boulogne-sur-Mer and studied painting under Delaroche and etching under Nanteuil. He began as a painter of genre and landscape scenes of peasant life, especially in Spain and the Orient; and he painted decorative pieces in the Théâtre Français and the Palais Royal. One of his landscapes, "Gleaners Overtaken by Storm" (1857), is in the Luxembourg. But it is chiefly as an etcher that he established a deserved reputation. In this medium he copied the works of Teniers, Boucher, Millet, Bida, and others, and illustrated the entire works of Molière (1881–91), Rousseau's *Confessions*, and Sterne's *Sentimental Journey*.

HÉDOUVILLE, ā'dōō'vêl', GABRIEL MARIE JOSEPH THÉODORE, COUNT D' (1755–1825). A French general and diplomat, born at Laon and educated at La Flèche and at the Military School. In 1797 he was made Governor of Santo Domingo, but was unable to cope with Toussaint L'Ouverture, and returned to France two years afterward. In 1801 he was made Minister to Russia, in 1805 went on diplomatic missions in Italy, and, with Josephine, to Strassburg and Munich. After the peace with Austria he was Plenipotentiary at Frankfort, but in 1814 voted for the overthrow of the Empire. He was made Count in 1818 and was appointed to the commission on the disputes between France and the Grand Duchy of Warsaw.

HEDWIG, hāt'vĭK (1174–1243). The patron saint of Silesia, a daughter of Berthold IV of Meran. In her twelfth year she was married to Duke Henry I of Silesia, who died in 1238. She entered a Cistercian cloister which she had founded near Breslau, and died there. Consult *Sainte Hedwige* (Bar-le-Duc, 1895).

HEDWIG, or **JADWIGA,** yâd-vē'gȧ (1371–99). Queen of Poland, daughter of Louis the Great of Poland and Hungary. After his death (1382) the Poles put her on the throne. In 1386 she married Jagellon of Lithuania, who embraced Roman Christianity and became known as Wladislaw (Ladislas).

HEEL FLY. A local name in the Southern and Western States for the ox botfly (*Hypoderma lineata*), derived from the fact that the adults hover around the heels of cattle for the purpose of laying their eggs on the hairs, whence they will be licked off. See BOT.



HEEL FLY.

HEEM, hām, JAN DAVIDSZ DE (1606–84). The most celebrated still-life and flower painter of the Dutch school. He was born at Utrecht and studied under his father, David de Heem, a painter of still life. We know but little of his life. In 1620, and during the years following, he was active at Leyden, and in 1635 he became a member of the Painters' Guild, and in 1637 a burgher, of Antwerp. In 1667 he returned to Utrecht, but during the French invasion of 1672 he fled to Antwerp, remaining there until his death in 1684. Heem's pictures represent for the most part vases or garlands of flowers, dishes of fruits, musical instruments, and ornaments of various kinds. They are often of moral intent and point a lesson, as in the subjects called "Vanitas." They were at first small in size, in the brown tones, and with the detailed execution of the earlier Utrecht painters. Then his treatment became more pictorial, the arrangement more skillful, the tone and chiaroscuro more delicate—apparently under the influence of the youthful Rembrandt, who was then at Leyden. At Antwerp he was influenced by Seghers, and his work became more grandiose in form; but it remained essentially Dutch in its minute and loving fidelity to nature and pronounced chiaroscuro. Even in his own day his work was popular and commanded high prices. It is now found in nearly all the principal galleries of Europe, especially in those of Holland, Belgium, and Germany.—The DE HEEM family embraced a number of painters devoted to still life. Jan's brother, David Davidsz, and his cousin, Jan, his three sons, David, Cornelis, and Jan, and even his grandson, David Cornelis, practiced the art. By far the most important was his son and pupil, CORNELIS (1631–95), who is recorded as member of the guild at Antwerp and as practicing at The Hague in 1678. Although his style resembles his father's sufficiently to be often confounded with it, his work is not of equal excellence. He is represented in the principal European museums. Consult Bode, *Great Masters of Dutch and Flemish Painting* (London, 1909).

HEEMSKERK, hāms'kĕrk, MARTIN VAN,

properly MARTIN VAN VEEN (1498–1574). A Dutch historical and portrait painter. He was born at Heemskerk, near Haarlem, where his father was a field laborer. He first studied at Haarlem under Jacob Willemsz, later with Jan Laicasz at Delft, and again at Haarlem under Jan Scorel, from whom he derived his predilection for Italian art. In 1532–37 he journeyed to Italy, stopping at Rome, where he was greatly influenced by Michelangelo. After his return to Haarlem he quickly acquired a great reputation and painted many altarpieces for Haarlem, Amsterdam, Alkmar, Delft, and other Dutch cities, destroyed in the religious wars which followed. He was dean of the Painters' Guild in 1540. Although a man of considerable talent, his painting, except portraits, is little more than a mannered imitation of the Italian. He seems also to have made architectural designs, e.g., the Houtpoort (a gate of Haarlem, now destroyed), designed glass paintings and tapestries, and also etched a few plates. A large part of his artistic activity consisted in designing line engravings executed by others, which he was the earliest artist in Holland to do. Over 600 of such engravings survive. His surviving paintings are best represented in the gallery of Haarlem, which possesses "St. Luke Painting the Virgin" (1532); "Ecce Homo" (a triptych, now transferred to canvas); "The Brazen Serpent"; and three others. In the cathedral of Linköping, Sweden, is a colossal altar with the "Scenes from the Passion" and the "Life of St. Lawrence." Heemskerk is also represented at Delft, The Hague, Berlin, Vienna, and by a portrait of his father, Jacob van Veen (1532), in the Metropolitan Museum, New York. Two sketchbooks by him are in the Berlin Museum, besides which 189 drawings, mostly in the Cabinet of Engravings, Copenhagen, survive. Consult his biography by Preibisz (Leipzig, 1911).

HEEP, URIAH. A very "'umble" person and a most egregious hypocrite in Dickens's *David Copperfield.*

HEER, hār, OSWALD (1809–83). A Swiss naturalist, born at Nieder-Utzwyl. He was director of the botanical gardens at Zurich (1835–83), and after 1851 professor of botany at the University of Zurich and at the Polytechnicum. His earliest publications were on entomology, but his most important contributions to science were his works on the fossil plants and insects of the Tertiary period, notably *Flora Tertiaria Helvetiæ* (3 vols., 1854–58); *Die Urwelt der Schweiz* (1865; 2d ed., 1879); *Die fossile Flora der Polarländer* (7 vols., 1868–83); *Beiträge zur Kreideflora* (1869–72); *Flora Fossilis Helvetica* (1877). Consult J. J. Heer and Schröter, *Oswald Heer, Lebensbild eines schweizerischen Naturforschers* (Zurich, 1885–87), and Malloizel, *Oswald Heer: Bibliographie et table iconographique* (Berlin, 1888).

HEEREN, hā'ren, ARNOLD HERMANN LUDWIG (1760–1842). An eminent German scholar, born at Arbergen, near Bremen, where his father was at that time pastor. He was educated at the cathedral school of Bremen and at the University of Göttingen. His first published work was an edition of Menander's *De Encomiis* (1785); somewhat later appeared the *Eclogæ Physicæ et Ethicæ* of Stobæus (1792–1801). In collecting materials for the latter he visited Italy, the Netherlands, and France. In 1794 he was appointed professor of philosophy, and in 1801 professor of history, at Göttingen. In 1793–96 appeared at Göttingen his *Ideen über Politik, den Verkehr und den Handel der vornehmsten Völker der alten Welt* (4th ed., 6 vols., 1824–26; Eng. trans., Oxford, 1833). This work has secured him a place among the most eminent modern historians and is still of much value because in it for the first time proper heed was given to such matters as the constitutions, the economic relations, and the financial systems of the ancient peoples. If his *Geschichte des Studiums der klassischen Litteratur seit dem Wiederaufleben der Wissenschaften* (2 vols., 1797–1802; 2d ed., 1822) proved less satisfactory to scholars, his *Geschichte der Staaten des Altertums* (5th ed., 1826; Eng. trans., Oxford, 1840) and his *Geschichte des europäischen Staatensystems und seiner Colonien* (5th ed., 1830) abounded in new views and acute expositions. For his *Versuch einer Entwickelung der Folgen der Kreuzzüge* (1808), he received the prize from the Institute of France. His *Vermischte historische Schriften* (1803–08) contain some very interesting treatises. In 1821–30 he published an edition of all his historical works (*Historische Werke*), in 15 volumes, at Göttingen.

HEERINGEN, hā'rĭng-en, JOSIAS O. O. VON (1850–). A German soldier, born at Kassel. He was educated in the Gymnasium of his native city, later was member of a cadet corps, and in 1867 entered military service in the Eightieth Regiment of Foot Guards. He was a sublieutenant in the Franco-Prussian War, after which he was promoted through the various grades to that of captain (1880), major (1887), and colonel (1895), during this time seeing varied service. His ability as an organizer and administrator resulted in his appointment to major general in 1898 with directorship of the army administration department in the War Ministry. There followed his promotion to lieutenant general (1901), after 1903 with command of the Twenty-second Division, and to general of infantry with command of the Second Army Corps (1906). In 1909 Heeringen entered the ministries of State and War and became inspector general. For his part as a leader of the German army in 1914, see WAR IN EUROPE.

HEERMANN, hār'mān, HUGO (1844–). A distinguished German violinist, born at Heilbronn. He studied at the Brussels Conservatory under Meerts, Fétis, and De Bériot. In 1865 he became concert master of the Museum Konzerte at Frankfort. When in 1878 the Hoch Conservatory was established, he was appointed principal violin professor. In 1904 he resigned and established a private violin school. He came to America in 1907 as concert master of the Chicago Symphony Orchestra. As a soloist, he plays rather in scholarly than temperamental fashion. He was one of the very first violinists to play the Brahms concerto, at a time when that noble work was regarded as a monstrosity. His greatest fame is as a quartet player. In 1914 he accepted the headship of the violin department at the Geneva Conservatory.

HEERMANS, A. See HERRMANN, A.

HEFELE, hā'fe-le, KARL JOSEPH VON (1809–93). A Roman Catholic bishop and scholar. He was born at Unterkochen, not far from Stuttgart, Württemberg, March 15, 1809, graduated at Tübingen, and in 1840 received a professorship in the Catholic theological faculty, where he lectured on Church history, Christian

archæology, and patrology. From 1842 to 1845 he was a member of the Württemberg Chamber of Deputies. He was consecrated Bishop of Rottenburg in 1869 and took a prominent part in the Vatican Council, where he was foremost among those who spoke and voted against the dogma of papal infallibility. In 1870 he published *Causa Honorii Papæ* against it. At first he refused to proclaim it in his diocese, but on April 21, 1871, did so, and in 1872 gave his public assent to it on the ground that to refuse assent to what the church had proclaimed would be to "set his own infallibility in the place of the infallibility of the church." In 1874 he declined the archbishopric of Freiburg offered to him by the Baden government, on the ground that he could not take the oath which was demanded from the bishops in Prussia and Baden. His most important work, based on the study of original materials, is the *Konziliengeschichte*, a history of the councils of all grades, in nine volumes. Hefele's part of the work extends to the Council of Florence, but, with Hergenröther's appendix, the work goes to Trent. The English translation (5 vols., Edinburgh, 1871–96) goes as far as 738. Hefele's *Life of Ximenes* (1844) has been translated (London, 1860). He died in Rottenburg, June 5, 1893.

HEF'FERNAN, Mr. Michael. The nom de plume which Samuel Ferguson signed to *Father Tom and the Pope, or a Night at the Vatican.*

HEFFTER, hĕf'tĕr, August Wilhelm (1796–1880). A German jurist, educated at Berlin and Leipzig. In 1820 he was a judicial assessor in Cologne and from 1821 to 1823 practiced law in Düsseldorf. He was made professor at Bonn (1823), at Halle (1830), and at Berlin (1832). From 1849 he was a member of the First Chamber of the Prussian Diet, in 1861 was appointed Crown Syndic and became as such life member of the Prussian Upper House. He wrote: *Institutionen des römischen und deutschen Civilprozesses* (1825); *Das europäische Völkerrecht der Gegenwart* (8th ed. by Geffken, 1888); *Lehrbuch des gemeinen deutschen Strafrechts* (6th ed., 1857); *Die Sonderrechte der souveränen und mediatisierten Häuser Deutschlands* (1871); and, on current history, *Der gegenwärtige Grenzstreit zwischen Staats- und Kirchengewalt* (1839).

HEFNER UNIT. A primary standard of illumination equal to 0.90 international candle. It is the official German standard of light, and is a wick lamp of fixed design and dimensions, which under standard atmospheric conditions burns amyl acetate, whose chemical and physical properties are specified. See Photometry.

HEGAN, Alice Caldwell. See Rice, Alice Hegan.

HEGAR, hā'gär, Friedrich (1841–). A Swiss composer, born at Basel. He studied at the Leipzig Conservatory under several famous teachers and in 1860 became leader of the Bilse Orchestra at Warsaw. In 1863 he settled in Zurich, where he became a well-known conductor and in 1876 founded a school of music. He composed some piano and violin music, but became best known for his male choruses and songs. His oratorio, "Manasse," was highly successful and is a striking work.

HEGEL, hā'gel, Georg Wilhelm Friedrich (1770–1831). One of the greatest German philosophers. He was born Aug. 27, 1770, at Stuttgart and became in 1788 a student in the University of Tübingen, where his speculative abilities, however, were outshone by his younger companion, Schelling, who, together with Hölderlin, exercised a great intellectual influence on him. In the university he studied theology, philosophy, and natural science, and was interested in political events and theories. His diploma described him as having good parts, but did not mention him as distinguished for his knowledge, philosophical or otherwise. After leaving the university in 1793, he was a private tutor at Bern and Frankfort-on-the-Main for seven years, during which period he continued his studies in philosophy and theology and wrote a *Life of Jesus*, which, however, was never published. In the beginning of 1801 he left Frankfort for Jena, where he published his first work, *Ueber die Differenz des Fichteschen und Schellingschen Systems der Philosophie* (1801), and entered the university as privatdocent. Next year he joined Schelling, to whose philosophy he seems at this time to have adhered, in the editorship of the *Kritisches Journal der Philosophie*. This alliance did not last long and soon turned into philosophical antagonism. His lectures in Jena did not attract much notice, but it was at this place, while the din of the battle of 1806 was sounding through the town, that he completed his first important work, *Phänomenologie des Geistes* (1807), which he used afterward to call his voyage of discovery. Shortly before the battle he had been made professor extraordinarius of philosophy; but the disaster which the war brought upon Jena compelled him to seek means of subsistence elsewhere, and he went accordingly, at Niethammer's request, to Bamberg, where he edited a political paper for a year or two. In 1808 he was appointed rector of the Gymnasium at Nuremberg, and there he had just completed the first edition of his *Wissenschaft der Logik* (1812–16), when he was called in 1816 to a professorship of philosophy in Heidelberg. There he published his *Encyklopädie der philosophischen Wissenschaften* (1817), in which he first developed his complete system. In 1818, however, he was called to Fichte's place in Berlin, and it was here that he first began to gather around him a new philosophical school. His lectures, which were delivered without rhetorical ornament, yet with an impressiveness due to the expression of laborious thought, attracted hearers from all ranks and professions. He rose to great political influence by reason of his defense of existing political institutions. This defense subsequently led his critics to charge him with time service; the charge, however, does him a great injustice. In 1821 he published his *Grundlinien der Philosophie des Rechts*, in which he gave expression to his ethical and political views. He demands in that work, among other things, representation of the people, freedom of the press, publicity of judicial proceedings, trial by jury, the administrative independence of corporations, and, above all, a monarch who shall "put the dot over the *i*," i.e., complete the constitution of the state. In the midst of an active life he was suddenly cut off by cholera, Nov. 14, 1831. He was buried beside Fichte. A complete collection of his works was published in 18 volumes (Berlin, 1832–41), some of them compiled from notes taken by his students. Of his works translated into English may be mentioned: *Philosophy of Mind* (Oxford, 1894) and *Logic* (2d ed., ib., 1892), translated by Wallace, both of which are portions of the

Encyklopädie; Philosophy of Right, translated by Dyde (London, 1896); *Philosophy of Religion*, translated by Spiers and Sanderson (ib., 1895); *Philosophy of History*, translated by Sibree (ib., 1857); *History of Philosophy*, translated by Haldane and Simpson (ib., 1892); *Hegel's Doctrine of Reflection*, translated by W. T. Harris, book ii of *Greater Logic* (New York, 1881); portions of book i of the *Greater Logic* by J. H. Stirling in his *Secret of Hegel* (2d ed., Edinburgh, 1897); *The Phenomenology of Mind*, by Baillie (London, 1910); *The Philosophy of Art* (New York, 1879).

It is impossible in this article to give any detailed account of Hegel's system of philosophy. He called it the system of the Absolute Idea. The idea is, for him, the indissoluble unity of the universe, existing in the two polar distinctions of subject and object. This idea is absolute because all-inclusive. The method by which Hegel arrived at this result he called dialectic (*Dialektik*), and by this he meant the process of exhibiting the incomplete character of any conception except the all-inclusive conception of the Absolute Idea. Thus, in his *Logik*, which expounds the method, Hegel begins with the conception of Being (*Sein*) and shows that it is not a complete conception, i.e., that it cannot be thought by itself. It is always only a partial conception and has no independence. The other part of the conception is Naught (*Nichts*). These two parts are not put together in any external way, but each is originally connected with the other. The organic unity of the two conceptions he calls Becoming (*Werden*). In the same way Becoming is not a complete thought; it is only part of a larger thought, which in its turn is part of a still larger, till at last we reach the thought of the Absolute Idea. But the *thought* of the Absolute Idea is itself only a partial fact if it is conceived as a mere conception, i.e., as something that has existed only "in the abstract medium of pure thought." Thought must have its objects. These objects we may try to conceive as existing apart from thought, but this conception is in its turn shown to be as incomplete as that of thought without object. The Absolute Idea, then, is not a conception in the ordinary sense of the word, but it is a fact, the fact of the inevitable union of thought and object of thought. Again, the inseparability is not spatial; it is doubtful whether it should be interpreted as even temporal. That is to say, Hegel does not mean that the act of thinking and the object thought must be in the same place or at the same time. All that he means is that whatever may be the temporal or spatial relation between the act of thinking and the object thought, the latter cannot be conceived as existing except either as an actual object of thought or as standing in necessary intelligible relation to some actual thought, just as the act of thinking cannot exist except in thinking some object. Though an interval of time may separate subject and object, an object which stands out of all relation to a subject or a subject which stands out of all relation to an object is inconceivable. In other words, all reality is one, in the sense that all real things, physical or psychical, are interconnected in such ways that their several reality is not something they have in isolation from the system of real things of which each is an integral part. Hegel's theology and the other parts of his system, such as the philosophy of law, of nature, of art, and of mind, are too subtle to admit of treatment here. Indeed, even the short sketch of the dialectic, given above, would be rejected by many students of Hegel as inaccurate, so difficult is the task of interpreting Hegel.

Four years after Hegel's death a controversy was raised among his followers by Strauss's *Leben Jesu* (see STRAUSS) and was further embittered by Strauss's *Christliche Glaubenslehre*. The Hegelians then split into three sections, called severally, the right, the left, and the centre, accordingly as they represented supernaturalism, naturalism, or a mediating tendency. The first section was represented, among others, by G. A. Gabler, H. T. W. Hinrichs, and K. T. Göschel; the leftists, by Bruno Bauer, Feuerbach, Strauss, and K. L. Michelet; the centrists, represented by J. K. Rosenkranz, J. E. Erdmann; while W. Vatke, Weisse, I. H. von Fichte, the younger Ulrici, Fischer, and Carrière, were named pseudo-Hegelians, because, though retaining a large element of Hegel's doctrine, they did not follow closely the Hegelian tradition as represented by the three schools.

Hegel's philosophy has had great influence in other countries than Germany, notably on British and American thought. T. H. Green (q.v.), J. Caird, E. Caird, W. Wallace, J. H. Stirling, B. Bosanquet, F. H. Bradley, H. Jones, J. Watson, D. G. Ritchie, A. S. Pringle-Pattison, McTaggart, and Baillie in Great Britain, and G. S. Morris, W. T. Harris, J. Dewey, and J. Royce in the United States, have been more or less influenced by Hegel, although many of these thinkers have attacked Hegelianism. In Italy at the present time a modernized form of Hegelianism is advocated by B. Croce. In Germany the encouraging patronage extended by the Prussian government created in the later years of Hegel's life a great professorial constituency of Hegelians. But the metaphysical excesses of these Hegelians led to a violent reaction, the effects of which have lasted to the present day. For various views of his system, consult: Trendelenburg, *Logische Untersuchungen* (Berlin, 1840; 3d ed., 1870); Ulrici, *Ueber Princip und Methode der hegelschen Philosophie* (Halle, 1841); Janet, *Etudes sur la dialectique dans Platon et dans Hegel* (Paris, 1865); Harris, *Hegel's Logic* (Chicago, 1890); Caird, *Hegel* (London, 1883); Bosanquet, *Introduction to Hegel's Philosophy of Fine Art* (ib., 1886), containing also translations of selected portions of Hegel's writings on æsthetics; Morris, *Hegel's Philosophy of the State and of History* (Chicago, 1888); Seth (Pringle-Pattison), *Hegelianism and Personality* (2d ed., Edinburgh, 1893); McTaggart, *Studies in the Hegelian Dialectic* (Cambridge, 1896), *A Commentary on Hegel's Logic* (ib., 1910), and *Studies in Hegelian Cosmology* (ib., 1901); Noel, *La logique de Hegel* (Paris, 1895); Schmitt, *Das Geheimniss der hegelschen Dialektik* (Halle, 1888); Baillie, *Origin and Significance of Hegel's Logic* (London, 1901); Hibben, *Hegel's Logic* (New York, 1902); Mackintosh, *Hegel and Hegelianism* (ib., 1904); *Hegel's Religion-Philosophie, in gekürzter Form, hrsg. von A. Drews* (Jena, 1905); Cunningham, *Thought and Reality in Hegel's System* (New York, 1910); J. O. Knott, *Seekers after Soul* (Boston, 1911); the philosophical works of Rosenkranz and of K. L. Michelet; and the histories of modern philosophy by Ueberweg and Heinze, Fischer, Windelband,

Höffding, Erdmann, Weber, and Thilly. For his life, consult Rosenkranz, *Hegels Leben* (Berlin, 1844), and Haym, *Hegel und seine Zeit* (ib., 1857).

HEGEL, Karl von (1813–1901). A German historian, elder son of the philosopher. He was born at Nuremberg, studied philosophy, theology, philology, and history at Berlin and Heidelberg, was assistant at the Kölnische Gymnasium in Berlin, became professor of history at Rostock (1841) and at Erlangen (1856). He was chief editor of *Chroniken der deutschen Städte vom 14. bis ins 16. Jahrhundert* (1862–99) and a member of the commission for the publication of the *Monumenta Germaniæ historica.* His principal work is *Geschichte der Städteverfassung von Italien* (1847); and among his other works the more important are: *Die Chronik des Dino Compagni* (1875); *Ueber den historischen Wert der ältern Dante-Kommentare* (1878); *Briefe von und an G. W. F. Hegel* (1887); *Städte und Gilden der germanischen Völker im Mittelalter* (1891); *Die Entstehung des deutschen Städtewesens* (1898); *Leben und Erinnerungen* (1900), an autobiography.

HEGELUND, hā′ge-lund, Peder Jensön (1542–1614). A Danish dramatist, born at Ribe. He studied at Copenhagen, Leipzig, and Wittenberg, was made rector of the school at Ribe (1568), dean of the cathedral, and Bishop of Ribe (1595). A number of his plays and an historical work are lost, but several of his poems, and a play, *Susanna og Calumnia,* adapted from Sixtus Bitulejus, which he arranged for pupils, and which was acted at Ribe (1576), have been edited by S. Birkit Smith (1888–90).

HEGE′SIAS (Lat., from Gk. Ἡγησίας, *Hēgēsias*). A Cyrenaic philosopher, who flourished about 300 B.C. He was a hedonist (see Hedonism) and a follower of Aristippus (q.v.), but taught that a life of pure pleasure was unattainable and therefore not to be sought. The chief aim of life was freedom from pain. Therefore it was the part of true wisdom to cultivate a state of absolute indifference to all pleasure. In his doctrine he set forth the desirability of suicide as a means of escaping the sorrows of this life so eloquently that Cicero tells us Ptolemy forbade his teaching as pernicious. From this advocacy of suicide he was given the nickname πεισιθάνατος (Death's advocate).

HEGESIAS OF MAGNESIA, in Lydia. A Greek rhetorician and historian, who flourished about 300 B.C., called by Strabo founder of the so-called Asiatic or florid style of Greek oratory. He wrote on the life of Alexander the Great, perhaps in an historical work, perhaps, rather, in an epideictic oration. Consult: Cicero, *Orator,* 67, 69, with Sandys's notes; Bury, *Ancient Greek Historians* (New York, 1909); Norden, *Die Antika Kunstprosa,* vol. i (2d ed., Leipzig, 1909).

HEG′ESIP′PUS (Lat., from Gk. Ἡγήσιππος). A Christian writer of the second century. He was probably of Jewish descent and born in the East, whence he went to Rome, stopping at Corinth on the way. He is supposed to have died about 189. While at Rome he composed a work, *Hypomnemata,* in five books, which was probably directed against the Gnostics and may have been in some sense a history of the early Church. It is known only from fragments, mainly in Eusebius. Another work on the wars of the Jews (also in five books), ascribed to Hegesippus, is confessedly spurious. The most complete collection of the fragments of his writings is that of Galland, *Bibliotheca,* vol. ii (Venice, 1765–81); they are also in Migne, *Patrol. Græca,* vol. v (Paris, 1854–66), and are translated in the *Ante-Nicene Fathers,* vol. viii (New York, 1890–97). Consult Zahn, *Forschungen zur Geschichte der Neue Testament Kanons* (Leipzig, 1900), and Harnack, *Chronologie der altchristliche Literatur* (ib., 1893).

HEGESIPPUS. An Athenian orator of the fourth century B.C., an ally of Demosthenes against Philip of Macedon. In 343 B.C. he was sent, with others, to negotiate with Philip for the return of the island Halonnesus, situate in the Ægean Sea, off the coast of Thessaly, which Philip had seized. The oration *De Halonneso,* ascribed to Demosthenes, probably is the work of Hegesippus. Consult Christ-Schmid, *Geschichte der griechischen Litteratur* (5th ed., vol. i, p. 556, Munich, 1908).

HEGESO, hē-jē′sō, Monument of. One of the most beautiful of the monuments in the Street of Tombs at Athens. It belongs to the fourth century B.C. and is decorated with a relief representing a lady at her toilet with a female slave in attendance. Consult Weller, *Athens and its Monuments* (New York, 1913), and the Plate accompanying the article Greek Art.

HEGIRA, hĕj′ī-rā. See Hejira.

HEGIUS, hā′gī-ụs, Alexander (c.1433–98). A German humanist, teacher of Erasmus. He was born at Heek (whence his name) in Westphalia and was taught by Thomas à Kempis at Zwolle. In 1469 he taught at Wesel; in 1474 at Emmerich and at Deventer, where Erasmus, the future Pope Adrian VI, Conrad Goclenius, afterward professor at Louvain, and Hermann von dem Busche were among his pupils. His methods were novel; he did not use the mediæval textbooks, but made classic Latin his standard and tried to introduce Greek. His works, comprising treatises on pedagogy, morals, and psychology, together with hymns, elegies, and letters, and an essay, *De Utilitate Græcæ Linguæ,* now very rare, were originally published by his pupil, Jakob Fabri, in 1503.

HEGNENBERG-DUX, hĕg′nen-bĕrk-dụx′, Friedrich Adam Justus, Count (1810–72). A Bavarian statesman, descended from Georg Dux, a natural son of William IV of Bavaria. He was educated at Würzburg in law and medicine and in 1845 was elected to the Bavarian Lower House. He was a member of the National Assembly at Frankfort and from 1848 to 1865 was President of the Bavarian House of Deputies. Always independent in politics, he was a leader of the opposition up to 1848, then for a short time was allied with the government, only to oppose it again because of its extreme conservatism. In 1871 he was made Prime Minister, but he died less than a year after.

HEGNER, hĕng′nâr′, Anton (1861–1915). A Danish violoncellist, born at Copenhagen. Immediately after graduation from the Copenhagen Conservatory he became solo cellist of the Copenhagen Philharmonic Orchestra. A concert tour of Germany in 1892 gained him international reputation. The success of his American tour of 1894 was such as to induce him to settle in New York for several years. He wrote two concertos and many solo pieces for his instrument, four string quartets, and a piano trio.

HEGNER, hāg′nēr, Ulrich (1759–1840). A Swiss author, born at Winterthur. He wrote:

Auch ich war in Paris (1803–04); *Berg-, Land- und Seereisen* (1818); *Die Molkenkur* (3d ed., 1827), a descriptive novel; its sequel, *Suschens Hochzeit* (1819); and *Salys Revolutionstage* (1814), an historical novel; also the biographical and critical works: *Hans Holbein, der jüngere* (1827) and *Beiträge zur nähern Kenntnis und wahren Darstellung J. K. Lavaters* (1836). The collected edition of his works in five volumes was published at Berlin (1828–30). Consult Schellenberg-Biedermann, *Erinnerungen an Ulrich Hegner* (Zurich, 1843), and Waser, *Ulrich Hegner* (Halle, 1901).

HEGO'LEH, or MADOQUA. See DUIKER; BENI ISRAEL.

HEHN, hān, VIKTOR (1813–90). A German-Russian writer and teacher, born at Dorpat. He studied there (1830–33) and at Berlin (1838–40). After extended travels, especially in Italy, he became teacher of German at Pernau (1841) and afterward at the University at Dorpat. Here he fell under suspicion politically and, after a long consideration of his case, was by Czar Nicholas ordered to serve in an inferior position in the Province of Tula in the interior of Russia. But Alexander II summoned him to St. Petersburg and made him chief librarian of the Imperial library (1855). In 1860 and 1863 he traveled again in Italy and from 1874 on lived at Berlin as Russian Imperial Councilor. His works are: *Zur Charakteristik der Römer* (1843); *Zur Physiognomie der italienischen Landschaft* (1844); *Italien: Ansichten und Streiflichter* (6th ed., 1900); *Kulturpflanzen und Haustiere in ihrem Uebergang von Asien nach Griechenland und Italien sowie in das übrige Europa* (7th ed., by O. Schrader, 1902), the most important of his works and the most important work, especially in its method, on the subject; *Gedanken über Goethe* (4th ed., 1900); and, posthumously, *Hehns Briefe an seinen Freund Wichmann* (1890); *De Moribus Ruthenorum: Zur Charakteristik der russischen Volksseele: Tagebuchblätter, 1857–73* (1892, ed. by Schiemann); *Ueber Goethes Hermann und Dorothea* (2d ed., 1898, ed. by Leitzmann and Schiemann); *Reisebilder aus Italien und Frankreich* (1894, ed. by Schiemann). For his *Life*, consult Schrader (Berlin, 1891) and Schiemann (Stuttgart, 1894).

HEIBA, hā'bȧ, EL. A Moroccan pretender in 1912–13. He gained some temporary successes after the abdication of the Sultan, Mulai Hafid. See MOROCCO, *History*.

HEIBERG, hī'bĕrg, AXEL (1848–). A Norwegian publicist, born and educated at Christiania. In 1871–73 he was Vice Consul at Shanghai, and later he entered into extensive industrial enterprises at home. He first became prominent through the financial help he gave to the development of sport in Norway. Later he became known as a patron of Norwegian science, art, and culture. With Th. Fearnley and Ellef Ringnes he contributed large sums to Nansen's Polar expedition in the *Fram* and to the Otto Sverdrup Polar expedition. In 1896 he led in the establishment of Nansen's Fund for the Advancement of Science by giving 60,000 kroner to it. To the National Theatre at Christiania he gave statues of Ibsen and Björnson. But probably his greatest importance is due to his energetic work for the reforestation of Norway. He formed (1898) *Det norske Skogselskab*, to which he gave much in money and time. His extensive estate at Strand, Numedal, he developed as a model farm. Heiberg came to be known as one of Norway's most prominent publicists in the early twentieth century.

HEIBERG, GUNNAR EDVARD RODE (1857–). A Norwegian dramatist, born at Christiania and educated there and outside of Norway. His first two poems, *Menneskets Genesis* and *En soirée dansante* (1878), did not attract notice; but his first drama, *Tante Ulrikke* (1884), showed that a new power had entered literature. From 1884 to 1888 he was successful as director of Bergen's Theatre. His drama *Kong Midas* (1890) caused a sensation throughout Scandinavia because of its attack on Björnson. Refused at the Christiania Theatre, it was acted throughout the North, with Heiberg's wife in a leading part. Psychologically more important were the comedies *Kunstnere* (1893) and *Balkonen* (1894), the latter of which, as a piece of dramatic art, is one of the most remarkable in Norwegian literature, but its lack of respect for morals aroused great indignation. There followed the social drama *Det store Lod* (1895), and the comedies *Folkeraadet* (1897), chastising the politicians, *Harald Svans Mor* (1899), and *Kjærlighed til Næsten* (1902). Measuring fully up to his best works is *Kjærlighedens Tragedie* (1904), a melancholy consideration of the lot of man as ruled by the unconquerable powers of Nature. His later dramas include *Jeg vill værge mit Land* (1912) and *Parade-Sengen* (1913). Consult C. Collin, *Kunsten og Moralen* (1894), and C. Nærup, *Litteraturhistorie* (1890–1904).

HEIBERG, hī'bĕrg, HERMANN (1840–1910). A German novelist, born in Schleswig and educated there. He succeeded his father in his publishing house, sold it in 1870, and went to Berlin, where he was business manager of the *Norddeutsche Allgemeine Zeitung* and of the *Spenersche Zeitung*, and, after a few years as a banker, devoted himself to literature. His novels are modern and realistic, successful in painting German provincial but not cosmopolitan life; among the nearly threescore titles the following may be mentioned: *Plaudereien mit der Herzogin von Seeland* (1881); *Acht Novellen* (2d ed., 1895); *Apotheker Heinrich* (2d ed., 1890)—these three said to be his best; *Eine vornehme Frau* (2d ed., 1889); *Esthers Ehe* (2d ed., 1890); *Menschen untereinander* (2d ed., 1896); *Höchste Liebe schweigt!* (2d ed., 1894); *Zwischen drei Feuern* (1895); *Merkur und Amor* (1898); *Vieles um Eine* (1900); *Dreissig Geschichten* (1901); *Zwei Frauen* (1901); *Heimat* (1902); *Die schwarze Marit* (1903). His collected works appeared in 18 volumes (1894–96).

HEIBERG, JOHANN LUDVIG (1791–1860). A Danish poet and critic, born in Copenhagen. He was the son of Peter Andreas Heiberg and of a famous novelist who later became Baroness Gyllembourg-Ehrensvärd (q.v.). The father was exiled for political reasons in 1800, and the mother cared for the son till he entered the University of Copenhagen in 1809. He spent four years in study and travel and in 1813 wrote at Stockholm "Hjemkomsten" (The Return Home), a poem of much strength. This was followed by a drama, *The Theatre for Marionettes* (1813), and other works that brought Heiberg (1817) a grant from the government for travel. He passed 1819–22 at Paris with his exiled father. For three years he was pro-

fessor of Danish at Kiel and lectured on the comparative merits of the Eddas and Oehlenschläger (Ger. trans., 1827). In 1825 he returned to Copenhagen and devoted himself to the task, in which he was only partially successful, of gaining a footing for the Hegelian philosophy. During this period he produced in rapid succession national dramas, comedies, vaudevilles, and farces, while editing the Copenhagen *Flying Post*, and writing also poems collected in 1841, two of which, "A Soul after Death" and "The Newly Wedded," have taken a high place in Danish literature. Much of all this work was satirical, and Heiberg grew increasingly unpopular, especially for a malicious dramatic skit, *The Nut-Cracker* (1845). Yet in spite of this he was made director of the National Theatre in 1849, a post from which he was forced by intrigue in 1856, after which he was made theatrical censor. He died in Paris. Heiberg's *Works* are in 22 volumes (Copenhagen, 1861–62).

HEIBERG, Peter Andreas (1758–1841). A Danish dramatist and satirist, born at Vordingborg on the island of Zealand. From 1788 he was active at Copenhagen as an official translator, and, with Malte-Brun (q.v.), as an exponent of liberal ideas and a scathing critic of the Danish government. In 1799 he was accused of a series of offenses against a newly enacted press law and was banished. He went to France, was there appointed by Napoleon to a post in the Ministry of Foreign Affairs, and obtained a pension from Louis XVIII. In his *Rigsdalersedlens Hændelser* (Adventures of a Bank-Note, 2 vols., 1787), and more particularly in his operettas and comedies, he unsparingly satirized the existing régime for its obscurantist tendencies and its unfairness. As a dramatist, he was perhaps second to Holberg (q.v.) in influence, but was greatly inferior to him in merit. One of his comedies appeared in an English rendering, by C. H. Wilson, as *Poverty and Wealth* (London, 1799). He further wrote political treatises in Danish and French. Consult the study, by Schwanenflügel (Copenhagen, 1891); also Heiberg's own *Erindringer af min politiske og literaire Vandel i Frankrige* (Christiania, 1830), and Longfellow, *The Poets and Poetry of Europe* (New York, 1855). His complete works appeared in four volumes (1806–19).

HEIBERG (hī'bĕrk) **LAND.** An Arctic island to the west of Grinnell Land, being the largest of the four islands forming the archipelago discovered in 1900 by the Norwegian explorer Sverdrup (Map: Arctic Regions, E 6). The other islands are called Amand Ringnes, Ellef Ringnes, and King Christian. They are all ice-clad and uninhabited. Their discovery filled in the extended gap between Grinnell Land and the Parry Islands. Heiberg Land is separated from Grinnell Land by Greely Fiord, Nansen and Eureka sounds. Its southern limit is in 78° N., and its northern is in about 81° 31′ N. The peninsula Svartenhuk was renamed by Peary in 1906 Cape Thomas Hubbard, by which designation it is usually known. Consult Sverdrup, *New Land: Four Years in the Arctic Regions* (2 vols., New York, 1904).

HEIDEGGER, hī'dĕg-ĕr, Johann Heinrich (1633–98). A Swiss theologian, born at Bärentschweil in the Canton of Zürich. He was a student at Marburg and Heidelberg and afterward returned to the latter town as professor of Hebrew and then of philosophy. In 1665 he was made professor of moral philosophy at Zürich. An ardent reformer and expert controvertist, he was the author, with Turretin, of the *Formula Consensus Helvetica* (1675), the object of which was to effect a league of the Reformed churches. This plan, however, failed. He was the author of a number of other works of little interest now, mostly directed against the Catholic church, and including *Anatome Concilii Tridentini* (2 vols., 1672) and a *Historia Papatus* (1684), published under the pseudonym "Nicander von Hohenegg."

HEIDELBERG, hī'dĕl-bĕrk. A city of Germany, formerly capital of the Palatinate, situated in the northern part of Baden, on the left bank of the Neckar, 12 miles southeast of Mannheim and 55 miles south of Frankfort (Map: Germany, C 4). It is renowned for its romantic picturesqueness and historic environs. The old town lies on a beautiful slope between the castle hill and the river. It consists mainly of one street (Hauptstrasse), about 1½ miles long, and is architecturally very interesting. The newer portion of Heidelberg extends westward. The interesting Rathaus was built in 1704. Among the ecclesiastical edifices the most prominent are the late Gothic Heilige Geist Kirche, of the fifteenth century, erected under the Emperor Rupert, whose tomb it holds, and the Protestant church of St. Peter, restored in the ornate Gothic style in 1867.

Besides the famous university (see Heidelberg, University of), the city is celebrated for its castle, one of the most interesting in Europe, known as the "German Alhambra," now largely a ruin. It overlooks the town on the east and is surrounded by a splendid park. It was probably founded by Conrad of Hohenstaufen in the twelfth century and was enlarged at various times by the rulers of the Palatinate, the palatial portions dating from the sixteenth century and the earlier part of the seventeenth. The castle was well-nigh destroyed in the desolating wars waged by Louis XIV towards the close of the seventeenth century. It was largely rebuilt, then ruined by lightning in 1764 and left in its present condition. This ivy-clad, moated castle, reached by a bridge, and rising with careless grandeur in the midst of beautiful trees and foliage, consists of a number of buildings constructed at different periods. The yard is faced by the highly decorated façades of the castle's two finest buildings—the Friedrichs-Bau and the Otto-Heinrichs-Bau. The former is a grandiose, late Renaissance building, dating from 1601 and renovated in 1897–1903. The latter, dating from 1556, with a striking portal, is a rare example of German Renaissance, its front being lavishly covered with medallions and with symbolical statues, both biblical and pagan. There are vast princely halls, the great watch tower, a beautiful balcony, dungeons, cellars, one containing the well-known Heidelberg tun (q.v.), the museum with pictures and historic relics, and a magnificent terrace which commands a splendid view. On the terrace is a statue of Victor von Scheffel, unveiled in 1891.

The environs of Heidelberg abound in ancient, often prehistoric, ruins, foundations, ring walls, and cisterns, and are rich in legendary and literary associations. Among the conspicuous objects of interest are the Molkenkur, a lovely hill whose top commands a view of the castle from above; the Heiligenberg, the Mons Piri of the Romans; the old and new bridges over the

Neckar; the Philosophenweg, a long, charming walk through vine-clad slopes, with views reaching to the distant Speyer Cathedral and the Hardt Mountains; and the famous students' inn and dueling grounds in the vale of the Hirschgasse. The University Library, erected in modern Renaissance style in 1905, contains 500,000 bound volumes and over 4000 papyri.

The educational institutions of Heidelberg comprise, besides the university, one Gymnasium, an Oberreal, a high school for girls, continuation schools (trade, commercial, and general), and seven private schools. The public grammar schools had 5979 pupils in 1910–11. The trade schools had 1412 pupils in 1912–13. There are also a museum and a number of scientific and art societies. The manufactured products include cement, artificial wood, scientific instruments, fire-department apparatus, etc. There is considerable trade in the hops, tobacco, fruits, and nuts grown in the vicinity. The town is equipped with electric railways both for local and interurban traffic, and a mountain railway connects the city with the Molkenkur. These lines, owned in part by the city, carried 7,817,000 passengers in 1912. The city owns property valued at 25,700,000 marks and has a municipal debt of 22,900,000 marks. The population was 40,121 in 1900 and 56,016 in 1910, including 34,212 Protestants. Of the total population, 26,528 were male and 29,488 female. The number of foreign residents, many of whom were English and American students in the university, was 1779 in 1910.

Heidelberg stands on the site of a Roman colony, but the town dates only from the latter part of the Middle Ages. From the thirteenth century, when it was an insignificant place, down to 1720 it was the capital of the Palatinate. After the Reformation Heidelberg was long the headquarters of German Calvinism and gave its name to a famous Calvinistic catechism. The town suffered much during the Thirty Years' War. Tilly captured and plundered it in 1622. It was severely treated by the French in 1688 and was in 1693 almost totally destroyed by them. It passed to Baden in 1803. Consult Oncken, *Stadt, Schloss und Hochschule Heidelberg* (Heidelberg, 1885), and E. Godfrey, *Heidelberg: Its Princes and its Palaces* (New York, 1906).

HEIDELBERG, University of. The oldest of the German universities within the present German Empire, founded in 1386 by Rupert I, Elector Palatine. The first rector and the real organizer was Marsilius von Inghen, who modeled the university after that in Paris, where he had been a lecturer. The organization was ecclesiastical, the mode of teaching scholastic. From the beginning the university was well attended and successful. In the middle of the sixteenth century Melanchthon gave his aid to a complete reorganization; scholasticism gave way to humanism, and from being Catholic the university became Protestant and a stronghold of Calvinism. At this time the staff included Ursinus and Olevianus, the authors of the Heidelberg Catechism, published in 1563. A period of great prosperity followed, lasting till 1622, when Tilly captured the town and sent to Rome the famous collection of manuscripts known as the Bibliotheca Palatina. The university was much crippled and in 1626 suspended altogether. In 1652 it was restored, and religious tests for teachers were removed. In the French wars at the end of the century, however, the town again suffered, and the university was again broken up. Some of the professors, it is true, set up instruction at Frankfort-on-the-Main in 1694, removed to Weinheim in 1698, and two years later returned to Heidelberg once more; yet for a century the university led a dead-and-alive existence under the influence of Catholic reactionaries, and after the Peace of Lunéville (1801) nearly all its possessions and endowments were lost. When Heidelberg became a part of Baden in 1803, its new sovereign restored the foundation, and it has since in a measure recovered its former fame. In 1886 the five-hundredth anniversary was celebrated. There were 2264 students in the winter half year 1912–13, the largest number in any one faculty being in medicine. The number of teachers and professors was 163. The library has about 500,000 volumes, including incunabula, and 4000 manuscripts. Consult: Hautz, *Geschichte der Universität Heidelberg* (Mannheim, 1862–64); Georg Weber, *Heidelberger Erinnerungen* (Stuttgart, 1886); H. Buhl, *Zur Geschichte der Universität Heidelberg* (Heidelberg, 1902).

HEIDELBERG CATECHISM. See Catechism.

HEIDELBERG JAW. See Man, Science of, *Ancient Types.*

HEIDELBERG TUN. An enormous wooden cask in the cellar beneath Heidelberg Castle, set up in 1751 by the Elector Charles Philip. It has a capacity of 49,000 gallons and measures 36×24 feet. Until 1769 it was constantly kept full of Rhine wine, but the custom was abandoned in that year.

HEIDELBERG UNIVERSITY. A coeducational institution, situated at Tiffin, Ohio. It was incorporated as a college in 1851 and reorganized as Heidelberg University in 1890. Its endowment in 1914 was $360,000, its income $40,000, and the approximate value of its buildings and grounds $400,000. In the same year its faculty numbered 36, and its student body 484, of whom 192 were enrolled in the collegiate department. Its departments include summer and preparatory schools, and schools of music, art, oratory, commerce, and liberal arts. The first building on the campus was completed in the spring of 1853. Other buildings include University Hall, Sarah Keller Cottage, the Library, Science Hall, and Rickly Chapel. The degrees of A.B., B.S., P.B., and B.L. are given. The library contains about 20,000 volumes. The president in 1914 was Rev. Charles Ervine Miller, D.D., LL.D.

HEIDELOFF, hī'dĕ-lôf, Karl Alexander von (1788–1865). A German architect and painter, born at Stuttgart. He studied in Stuttgart and in 1818 was appointed city architect at Nuremberg. His knowledge of the early Gothic made him particularly successful in restorations; examples of this type of work are the churches of St. Sebald and St. Lawrence, and Albert Dürer's fountain—all in Nuremberg. From 1822 to 1854 he was a professor in the polytechnic school and conservator of the monuments of art in the same city. He was an historical painter of some note, and the author of several important works on architecture, among which are: *Die Lehre von den Säulenordnungen* (1827); *Der Kleine Vignola* (1832); *Nürnbergs Baudenkmale der Vorzeit* (1838–43; complete ed., 1854); *Die Ornamentik des Mittelalters* (1838–42); *Die Kunst des Mittelalters in*

Schwaben; Baudenkmale aus Schwaben (1854–61).

HEIDEN, hī'den, EDUARD (1835–88). A German agricultural chemist, born and educated at Greifswald. He went to Eldena in 1855 and became assistant in the chemical laboratory of the academy there in 1857. He was professor of agricultural chemistry at Waldau (1862–67) and at Berlin (1867), in 1868 was appointed to the superintendency of the experimental station at Pommritz, and in 1871 became a professor at the latter station. He wrote: *Die Phosphorsäure* (1864); *Lehrbuch der Düngerlehre* (1867–68; 2d ed., 1879–87; a third volume, *Statik des Landbaues*, 1871); *Die landwirtschaftlichen Versuchsstationen* (2d ed., 1874); *Leitfaden der gesamten Düngerlehre und Statik des Landbaues* (3d ed., 1892); *Ueber die zweckmässigste Ernährung des Schweins* (1879); and, with Müller and Langsdorff, *Die Verwertung der städtischen Fäkalien* (1885).

HEIDENHAIN, hīd'en-hīn, RUDOLF PETER HEINRICH (1834–97). A German physiologist, born at Marienwerder and educated at Königsberg, Halle, and Berlin. He spent several years in experimental research with Du Bois-Reymond and became docent at Halle (1857) and professor at Breslau (1859). Besides many contributions to the foremost German technical journals of histology, anatomy, and physiology, he published: *Physiologische Studien* (1856); *Mechanische Leistung, Wärmeentwicklung und Stoffumsatz bei der Muskelthätigkeit* (1864); *Der sogenannte tierische Magnetismus* (1880); *Die Vivisektion im Dienste der Heilkunde* (1879; 2d ed., 1884); *Die Vivisektion* (1884); *Beiträge zur Histologie und Physiologie der Dünndarmschleimhaut* (1888). Consult Grützner, *Zum Andenken an Rudolf Heidenhain* (Bonn, 1899).

HEIDENHEIM, hī'den-hīm. A town of Württemberg, Germany, situated on the Brenz, a short distance from the Bavarian frontier (Map: Germany, D 4). It has a Latin school, a college for textile workers, and a number of large manufactories of textiles, machinery, cigars, dyestuffs, binding materials, and beer. Pop., 1900, 10,510; 1910, 17,780.

HEIDENMAUER, hī'den-mou'ĕr (Ger., heathen wall). 1. A name given in Germany to the remains of various prehistoric fortifications of German and Roman origin. Such ramparts are found on the Ottilienberg, a hill of the Vosges in Lower Alsace, and on the Kastanienberg near Dürkheim in the Palatinate. 2. A novel by James Fenimore Cooper (1832). The scene is laid in the Vosges during the Middle Ages.

HEIDENSTAM, hī'den-stâm, (KARL GUSTAF) WERNER VON (1859–). A Swedish littérateur, born at Olshammar (Nerike Province). He studied painting at the Stockholm Academy and traveled extensively, but later turned to literature; took prominent rank among contemporary Swedish lyrists by his collections, *Vallfart och Vandringsår* (1888) and *Dikter* (1895); and wrote further, among various works, the volumes of prose sketches, *Från Col di Tenda till Blocksberg* (1888) and *Saint Göran och draken* (1900; in a German rendering, 1902); the fantastic romance *Hans Alienus* (1892); the viking novel *Folkungaträdet* (1905); *Dagar och händelser* (1909); *Svenskarna och deras hövdingar* (1909); *Proletärfilosofiens upplösning och fall* (1911); *Stridsskrifter* (1912).

HEIGEL, hī'gel, KARL AUGUST VON (1835–1905). A German poet belonging to the Munich school, born in Munich and educated at the university there. After traveling somewhat, he settled in Berlin, where he was literary editor of the *Bazar* from 1865 to 1875. From 1875 on he lived a wandering life in Munich, the Tirol, and Italy, occupying himself with literary work under the patronage of Louis II of Bavaria. His principal works are: the epic *Bar Cochba, der letzte Judenkönig* (1857); the dramas *Marfa* (1876), *Freunde* (1880), *Die Zarin* (1898), *Josephine Bonaparte* (1882); the stories *Novellen* (1866), *Neue Novellen* (1872), and *Neueste Novellen* (1878)—all three collections—*Es regnet: Eine Münchner Geschichte* (1878), *Am blauen Gardasee* (1899); the novels *Ohne Gewissen* (1871), *Die Dame ohne Herz* (1873), *Der Theaterteufel* (1878), *Das Geheimnis des Königs* (1891), *Der Volksfreund* (1896), *Die neuen Heiligen* (1901), *Brömmels Glück und Ende* (1902); and the biographies *Karl Stieler* (1890) and *König Ludwig II. von Bayern* (1892).

HEIGEL, KARL THEODOR VON (1842–1915). A German historian, brother of Karl August von Heigel. He was educated at Munich, his native city; became instructor in history (1873), member of the Academy (1876), assistant professor in the university (1879), in 1885 professor, and in 1904 president of the Academy. His works include: *Das Herzogtum Bayern zur Zeit Heinrichs des Löwen und Ottos von Wittelsbach* (1867), with Riezler; *Ludwig I, König von Bayern* (1872); *Der österreichische Erbfolgestreit* (1877); *Quellen und Abhandlungen zur neuern Geschichte Bayerns* (1890); *Nymphenburg* (1891); *Deutsche Geschichte vom Tode Friedrichs des Grossen bis zur Auflösung des alten Reichs* (1899–1911); *Biographische und kulturgeschichtliche Essays* (1906); *Politische Hauptströmungen in Europa im 19. Jahrhundert* (1906); *Die Münchner Akademie 1759–1909* (1909); *Zwölf Charakterbilder aus der neuen Geschichte* (1913).

HEIGHTS, MEASUREMENT OF. See LEVELING; HYPSOMETRY.

HEIHACHIRO, TOGO. See TOGO HEIHACHIRO.

HEIJERMANS, hī'yĕr-måns, HERMAN (1864–). A Dutch playwright, born at Rotterdam, Holland. He attracted attention by his sketches of Jewish family life, published in the Amsterdam *Handelsblad* under the pen name "Samuel Falkland." His works of fiction include: *Trinette* (1892); *Fles* (1893); *Kamertjeszonde* (2 vols., 1896); *Intérieurs* (1897); *Diamantstadt* (2 vols., 1903); *Die Augen, oder Jobs wundersame Erlebnisse* (1910). His plays include: *Dora Kremer* (1893); *Ghetto* (1898, 1905); *Het zevende Gebot* (1899, 1906); *Op Hoop van Zegen* (1900), which was played in Paris and was translated into English under the title *The Good Hope; Het Pantser* (1901, 1904); *Ora et Labora* (1901, 1904); *Wonnemond* (1904); *Ahasver* (1906); *Allerseelen* (1906); *Seltsame Jagd* (1909); *Dornröschens Erwachen* (1909).

HEIJN, PRIT. See HEYN, PRIT.

HEI-KU-TAI, BATTLE OF. See RUSSO-JAPANESE WAR.

HEILBRONN, hīl-brŏn'. A manufacturing town of Württemberg, Germany, situated on the Neckar (here navigable), 33 miles by rail northeast of Stuttgart (Map: Germany, C 4). The old section of Heilbronn is surrounded by a fine

avenue laid out on the site of the ancient fortifications. In keeping with the mediæval character of the town are the interesting Gothic church of St. Kilian, of the fifteenth century (restored), with a finely carved altar and beautiful windows; the late Gothic Rathaus of the sixteenth century, with a remarkable clock, and associated intimately with the history of Götz von Berlichingen, as is also the Götzenturm, where he was imprisoned; the administration building, originally an Imperial palace and afterward occupied by the Teutonic Order; and the Schönthaler Hof, where Charles V once sojourned for the sake of the Heilbronn waters. Memorials and statues to famous Germans are numerous. Schiller lived in Heilbronn for a time, and his house is shown. There are an historical museum, a theatre, interesting archives (among which are letters from Gustavus Adolphus, Charles XII, Schiller, and others), a Gymnasium founded at the beginning of the seventeenth century, a splendid post office, schools of music, of trade, and of agriculture, and a meteorological observatory. The town is lighted by municipal gas and electricity.

Heilbronn produces chemicals, silverware, machinery, sugar, cigars, iron and metal ware, glue, fertilizer, paper, conserves, envelopes, cutlery, cologne, pianos, soap, cement, white lead, vinegar, leather, soda, chicory, coffee, and beer. In the vicinity are situated extensive salt works and numerous vineyards. The town has four harbors and a large trade in groceries, agricultural products, wood, and coal. The magnificent views in the vicinity embrace the mountains of middle Germany, the Black Forest, and the Vosges. Heilbronn is first mentioned in 741 under the Carolingians. It became a town in 1225 and a free city in 1360 and suffered greatly from war through the Middle Ages. Here, in 1633, in the course of the Thirty Years' War, a treaty of alliance was concluded between the German Protestant states and Sweden. Heilbronn came into the possession of Württemberg in 1802. Pop., 1900, 37,891; 1910, 42,709, mostly Protestants.

HEILBUTH, hīl′bo͝ot, Ferdinand (1826–89). A French genre painter, born at Hamburg. He studied at the Düsseldorf Academy, at Rome, and, under Gleyre, at Paris, where he became identified with the French school. His pictures are charming in color and full of humor and grace. The best include: "Excavations at Rome" and "The Cardinal," Wallace collection, London; "Palestrina's Rehearsal" (1857); "Luca Signorelli by the Body of his Slain Son" (1859), Hamburg Gallery; "Mont de Piété" (1861), Luxembourg; "On Monte Pincio," Corcoran Gallery, Washington; besides examples in several French provincial museums. He also painted portraits. In 1881 he received the cross of the Legion of Honor.

HEIL DIR IM SIEGERKRANZ, hīl dēr ĭm zē′gĕr-krănts (Ger., Hail to Thee with Victor's Crown). The Prussian national hymn, the original words for which were written by Heinrich Harries. They were published in the *Flensburger Wochenblatt* of Jan. 27, 1790, as "A Song for the Danish Subject to Sing on his King's Birthday," to the melody of the English national hymn, "God Save Great George, the King." In 1793 B. G. Schumacher published a revised version in five stanzas which soon became the national hymn.

HEILPRIN, hīl′prĭn, Angelo (1853–1907). An American naturalist and traveler, son of Michael Heilprin. He was born at Satoralja-Ujhely, Hungary, and came to the United States in 1856. In 1876–78 he studied at the Royal School of Mines, London, at Geneva, and at the Imperial Geological Institution of Vienna. He was professor of invertebrate paleontology and geology at the Academy of Natural Sciences, Philadelphia (1884–1900), executive curator of that institution from 1883 to 1892, and the first president of the Geographical Society of Philadelphia. In 1886 he went to Florida and determined the geological structure of the peninsula. In 1888 he investigated the structure of the Bermuda Islands, and in 1890 made a journey to Mexico, in the course of which he ascended Orizaba, Popocatepetl, and Iztaccihuatl, making new barometric measurements of their altitude. In 1892 Heilprin led the Peary relief expedition to Greenland. After the destruction of Saint-Pierre, Martinique, by the eruption of Mont Pelée, in 1902, he made two journeys to the island and climbed to the crater while the volcano was in eruption. Recording this remarkable performance, he wrote *Mount Pelée and the Tragedy of Martinique* (1903) and *The Tower of Pelée* (1905). His other publications include: *Contributions to the Tertiary Geology and Palæontology of the United States* (1884); *The Geographical and Geological Distribution of Animals* (1887); *The Geological Evidences of Evolution* (1888); *The Bermuda Islands* (1889); *Principles of Geology* (1890); *The Arctic Problem* (1893); *The Earth and its Story* (1896); *Alaska and the Klondike* (1899). He edited, with his brother, Louis Heilprin, *Lippincott's New Gazetteer* (1905) and contributed to the New International Encyclopædia.

HEILPRIN, Louis (1851–1912). An American scholar and encyclopædist, brother of Angelo Heilprin. He was born in Hungary. He was connected with the New International Encyclopædia, and was the author of the *Historical Reference Book* (1884; 6th ed., 1899). He was joint editor with his brother of *Lippincott's New Gazetteer* (1905).

HEILPRIN, Michael (1823–88). A biblical scholar, critic, and writer. He was born at Piotrkow, Russian Poland, of Jewish parents. He belonged to a family whose members were distinguished in the field of Hebrew lore as far back as the sixteenth century. His father, Phineas Mendel Heilprin, a Hebrew scholar of note, left Poland with his family in 1842, in consequence of the oppressive measures of the Russian government, and settled in Hungary. On the outbreak of the Hungarian revolution of 1848, Michael Heilprin threw himself ardently into the movement for national independence headed by Kossuth, whose friend he became. He published stirring war songs in the Magyar language, of which he had made himself master, and was appointed secretary of the literary bureau attached to the Ministry of the Interior under Szemere. After the collapse of the revolution Heilprin lived for less than a year in France, returned in 1850 to Hungary, and in 1856 went to England and shortly after to America. He was connected with the *New American Cyclopædia* from 1858 and was one of the associate editors of the new edition of that publication (1873–76). On the establishment of the New York *Nation*, in 1865, he became one of the regular contributors, his articles embracing a wide range in current European

history and literary criticism. In 1879–80 he published two volumes of *The Historical Poetry of the Ancient Hebrews, Translated and Critically Examined*, a work of profound original research, which at once took a position both in America and Europe as a most valuable contribution to advanced biblical criticism. The work was left incomplete at the author's death. Heilprin devoted the last years of his life, from 1881, in great measure to furthering Russian-Jewish agricultural colonization in the United States. He was a scholar of encyclopædic knowledge and was familiar with more than a dozen languages.

HEILSBRONN, hīls-brŏn′. A small town in Middle Franconia, Bavaria, 20 miles from Nuremberg. Its chief industry is the handling of forest products and grain. The Cistercian abbey of Heilsbronn, the burial place of the Hohenzollern burgraves of Nuremberg, of the first Hohenzollern electors of Brandenburg, and of a number of Franconian princes of the house, owed its origin, in 1132, to Bishop Otto of Bamberg. The church contains monuments commemorative of ancient German history, a carved wood altar, and paintings by Dürer and other mediæval artists. Pop., 1900, 1208; 1910, 1366.

HEIM, hĕym, or **HEIMR,** hĕymr (Icel., home). In Norse mythology nine worlds are named: Muspelheim, Asaheim, Ljosalfaheim, Vanaheim, Mannaheim, Jötunheim, Svartalfaheim, Helheim, and Niflheim. The highest is Muspelheim (world of fire), the home of Surt, in the highest region of which was Gimli (heaven). The lowest is Niflheim (mist world), the home of cold and darkness, having in its midst the fountain Hvergelmer, where the dragon Nidhogg dwells. Midway between Muspelheim and Niflheim is Mannaheim (man's world), the round plane of the earth surrounded by the ocean. Above Mannaheim is Asaheim (world of the gods), forming an immense vault above the earth. In the midst of this is Idavold, the place where the gods assemble. Beyond the ocean is Jötunheim (home of giants), separated from Asaheim by the river Ifing, which never freezes over. Next above the earth is Ljosalfaheim (home of the elves of light), and between it and Asaheim is Vanaheim (home of the vans). Farther down is Svartalfaheim (world of dark elves); farther still Mannaheim and lastly Helheim (world of the dead, or *hel*).

HEIM, hīm, Albert (1849–). A Swiss geologist, born at Zurich, where he was educated and, after further study at Berlin, was made docent, and in 1873 professor, in the Polytechnic Institute. In 1875 he became also professor in the university. In 1881 he was appointed director of the department of natural sciences in the Polytechnic and head of the geological museum. He traveled to New Zealand in 1901, and in 1911 he retired. In 1904 the Wollaston medal of the London Geological Society was awarded him. His contributions to the study of mountain folding and glaciers, although largely based on observations in the Swiss Alps, have had a very broad influence upon research in these fields, both in Europe and in America. Heim wrote: *Untersuchungen über den Mechanismus der Gebirgsbildung* (1878); *Handbuch der Gletscherkunde* (1885); *Beiträge zur geologischen Karte der Schweiz* (1890); *Geologische Excursion quer durch die östlichen Schweizer Alpen* (1894); *Das Säntisgebirge untersucht und dargestellt* (1905); *Luft-Farben* (1912). He also published a *Geologische Karte der Schweiz* (1894), with Schmidt, as well as several panoramic views and reliefs of Switzerland.

HEIMBURG, hīm′bŭrk, Gregor von (c.1400–72). A German jurist and diplomat, born at Würzburg. He is ranked as one of the most brilliant men of his time. About 1430 he became secretary to Æneas Silvius, afterward Pope Pius II, and accompanied him to the Council of Basel; but they soon quarreled because of Heimburg's opposition to the papal policy of interference in German affairs, and the young man became syndic of Nuremberg and took a great part in the declaration of the neutrality of the German church in the quarrel between the Council and Pope Eugene IV (1438). He was a member of the commission demanding from the Pope the reinstatement of the electors of Cologne, Mainz, and Treves (1446), and as Minister of Duke Sigismund of Austria opposed the Pope and was put under the ban. Eventually Sigismund made his peace with the Pope, and Heimburg left his service for that of the Hussite King, George Podiebrad, of Bohemia. The latter died in 1471, and his Minister went to the court of the Duke of Saxony, where he died in the following year, only a few months after Pope Sixtus IV had removed the excommunication against him. His collected works, showing well the polemic character of the man, were published at Frankfort in 1608. Consult: Pfizer's poem, *Der Welsche und der Deutsche* (Stuttgart, 1844); Brockhaus, *Gregor von Heimburg* (Leipzig, 1861); Joachimson, *Gregor von Heimburg* (Munich, 1891).

HEIMBURG, Wilhelminie. See Behrens, Berta.

HEIMCHEN AM HERD, DAS. See Cricket on the Hearth.

HEIMDAL, hām′dâl, or **HEIMDALR,** hām′-dâl-ēr (Icel.). In Norse mythology, Odin, whose mother was of the Jötun race, often said to be the son of nine virgin sisters. He is the guardian of Asgard, for which position he is peculiarly fitted; for he can see as well by night as by day, requires as little sleep as the birds, and can hear the grass grow. Before the last conflict he will rouse the gods by blowing on his horn Gjallarhorn. He and Loki, who are natural enemies, will then kill each other.

HEIMSKRINGLA, hīms′krĭng′lâ (Icel., world circle). One of the most important works in early Norse literature, being a history of the Norse kings from the earliest times down to his own day, by Snorri Sturluson (q.v.). There is an English translation by Laing, in three volumes, published first in 1844 and by the Norroena Society in 1906.

HEINE, hī′ne, Heinrich (1797–1856). The greatest lyric poet, next to Goethe, of modern Germany, born in Düsseldorf, Dec. 13, 1797. He was called by himself the last of the Romanticists, and by Matthew Arnold the continuator of Goethe, and was one of the few writers of primary importance in German literature after Goethe's death. "Your grandfather," he says he was told, "was a little Jew and had a big beard." This grandfather had shrewd sons, for all of them won a competence, and Heine's uncle Salomon became one of the wealthiest bankers of Hamburg. His father had but small part in his life. His mother (named Von Geldern), to whom he showed a constant devotion till his death, gave to his fantastic and romantic na-

ture a joy of life and a spirit of naturalism that make him akin to Goethe. He was a precocious boy, educated in a desultory way by Roman Catholic monks and French "philosophes," with the result that he became a skeptic before he had any faith to lose. He seems to have suffered little from race prejudice in youth, and for that he was grateful to France and to Napoleon, for whom he retained a kind of hero worship, and so had little sympathy with the War of Liberation (1813–14), that "contracted the heart so that men learned to hate what was foreign and in ceasing to be citizens of the world became only narrowly German."

While preparing himself to become a merchant and learning English, French, and Italian, he began to write poetry under the inspiration of a child love for "Veronica," probably also the "Reseda" of early poems. He conceived a passing affection, too, for an executioner's daughter, Josepha, the subject of several poems, of his "Dream Pictures," and of the most exquisite passage in his memoirs. She was, he says, his "love's purgatory" before he fell into love's hell in his unrequited affection for his cousin Amalie at Hamburg, whither he went in 1816. He tried to set up a business there in 1818, but he liked neither the business nor the city. For Amalie, under the names Ottilie, Maria, Clara, Evelina, Agnes, Juliana, he voiced his passion in many beautiful songs, and it has since been made the subject of two novels, Zianirtza's *Heinrich Heine der Liederdichter* (1864) and Dietz's *Heinrich Heines erste Liebe* (1870). He failed in business, and at the expense of his uncle, Amalie's father, who aided him generously through life, he went in 1819 to study law at Bonn, where he came under the influence of A. W. Schlegel and the Romantic school in so far as it stood for the reawakening of the poetic spirit of the Middle Ages. He shared with them also a gift of irony, though in him this sprang from the incompatibility of two elements in his nature, a Greek joy of life inherited from his mother and fostered by the influence of Goethe, and a congenital Hebrew earnestness. There was never harmony between these antinomies of his character, and from their jarring came a mocking spirit that he possessed in higher degree than any other writer of the century. At Bonn under this new influence Heine wrote more lyrics and had begun a tragedy, *Almansor*, when he left Bonn for Göttingen; and, being soon suspended from the university there for participation in a frustrated duel, he went to Berlin, where he came under the influence of the philosopher Hegel and associated with Grabbe, Immermann, Willibald Alexis, Gans, Moser, Chamisso, Fouqué, and particularly with Varnhagen and his wife Rahel, who led him to a juster appreciation of Goethe, though he never became one of his unqualified admirers.

In Berlin Heine's genius found warm appreciation. He essayed journalism and in 1822 published a volume of poems (*Gedichte*), which for delicacy, fancy, conciseness, originality, and depth of lyric expression had no equal in Germany. A second volume (1823) contained the *Lyrisches Intermezzo*, which served to carry off two tragedies, *Almansor* and *Ratcliff*, his sole dramatic efforts. The *Intermezzo* is more bitter, reckless, sensual, than the *Poems*, but contains some of his most perfect lyrics. At home, Heine tells us, his mother read it and did not like it; his sister tolerated it; his brothers did not understand it, and his father did not read it at all. In 1823 a visit to the North Sea inspired *Heimkehr*, which with the later North Sea cycle (*Nordsee Cyclus*) are among the world's best poems of the sea, worthy to rank with the best of Byron or Shelley. The year 1824 brought him to Göttingen again, and in June, 1825, he submitted to baptism that he might obtain an advocate's license. "I assure you," he writes to a friend, "if the law had allowed stealing silver spoons instead, I should not have been baptized." During the second stay at Göttingen Heine made the tour of the Harz Mountains and wrote the *Harzreise* (1826), sparkling with inimitable humor, the best known of his prose works. After taking his degree he revisited the North Sea and wrote *Norderney*, incorporated with the *Harzreise* in the *Reisebilder* (Pictures of Travel), which later embraced also *Das Buch Le Grand* and *Die Bäder von Lucca*. Such light, easy, sparkling prose, such graceful, daring, bubbling wit, had never yet been known in Germany, and the *Reisebilder* remain an unapproached model. Heine in this field has never been equaled save by himself, and he has not always maintained the level of the *Harzreise*. The *Buch Le Grand*, written in 1826, was revolutionary in tendency and in its admiration for Napoleon. Heine thought it safer to abide its publication in England (1827). It was enthusiastically received and generally prohibited by the police. It was graceful, grotesque, cynical, naïve; it had a brilliancy, a vigor, a keenness of scorn, a fire of enthusiasm, that have seldom been surpassed. Heine made but a short stay in England, which was not congenial to him. He said, "The Ocean would have swallowed it long ago if he had not been afraid it would make him seasick." He admired, however, the liberty of England. In September, 1827, he was again in Hamburg, seeing through the press his collected lyrics, the now famous *Buch der Lieder*. Thence he went to Munich, tried journalism, hoped in vain for a professorship of German literature, and then attacked Massmann, the successful candidate, as well as King Ludwig. In July, 1828, he went disappointed to Italy, a journey that he describes after his manner in *Die Bäder von Lucca*—brilliant, witty, entertaining, immoral, coarse, revolutionary, and atheistic. After this Prussia was closed to him; influential men had been made his mortal enemies wantonly, and in the case of the poet Platen (q.v.) Heine's enmity assumed an utterly indefensible shape. Having been recalled to Hamburg by his father's death, Heine went in 1829 to Helgoland, where he gave himself up for two months to the fascination of the sea. He returned to his family in Hamburg famous throughout Germany as the author of the *Reisebilder*, the third volume of which appeared early in 1830, but as much feared as admired, and fiercely attacked on the part of those whom his reckless satire had wounded. Prussia, whose government had prohibited the circulation of the third volume of the *Reisebilder*, was now closed to him, and the thought of a professorship, which he had long cherished, had to be abandoned. He turned his thoughts to Paris. The news of the French revolution of 1830 reached him in Helgoland, where he spent the summer of that year, and filled him with enthusiasm. May, 1831, saw Heine in Paris, which remained his home till death.

Heine's first years in Paris were busied with

journalism and dreary feuds with German Liberals. He soon found himself at home in the French capital and enjoyed the society of Madame Récamier, Balzac, Dumas, George Sand, Béranger, Thiers, Chopin, Liszt, Berlioz, and many lesser celebrities. He pretended to consider it his mission to draw Germany and France closer together and wrote a series of papers on French conditions for the Augsburg *Allgemeine Zeitung*, which he republished in French. But not a few of his letters to the German press, even his art critiques, fell under the censor's pencil. In 1833, however, his acute critical study, *Die romantische Schule*, established his fame in France and opened to him the great *Revue des Deux Mondes*, in which he printed his *History of Religion and Philosophy in Germany since Luther*, a work of brilliant suggestiveness, which afterward appeared in Heine's own German version as *Zur Geschichte der Religion und Philosophie in Deutschland*. The satiric *Memoiren des Herrn von Schnabelewopski*, half autobiographic, belong to this time. The scandal caused by his irregular life was checked by his "conscience marriage" with Mathilde Mirat (1834). They were legally married in 1841 and remained closely attached till the poet's death. He had provided for her, and she lived till 1883. Financial embarrassments now led Heine to seek a pension from the French government. Though he had always criticized his patrons freely, the fact was bitterly remembered against him when it became known in 1848. From 1834 to 1842 his literary work is comparatively unimportant. A fragment of a novel, *Florentinische Nächte*, an essay on German mythology, and a slanderous attack on his fellow exile and journalistic critic Börne, may be merely mentioned. But in 1842 he wrote *Atta Troll* (Hamburg, 1843), a brilliant poetic satire on German politicians and on the Romantic school, and in 1843 a brief visit to Germany evoked *Neue Gedichte* and *Deutschland, ein Wintermärchen* (1844), keenly satiric, which became immensely popular. Disease now laid an unrelaxing hand on him. His eyes were affected, then his vocal cords, then his spine. The death of his generous uncle, Salomon Heine, from whom he had received a yearly stipend of 4800 francs, and the disgraceful meanness of his cousin, added to his sufferings. But he forced the continued payment of the annuity. These years of sufferings show Heine in a nobler light than any in which he had yet appeared. In sleepless nights he composed wonderful songs on his "mattress grave." His legs were paralyzed; to see he was obliged to hold up an eyelid with an emaciated finger; his hearing was weak. It was, he said, "a grave without rest, death without the privileges of the departed." But it brought a deeper, almost a spiritual, earnestness into his life. He "returned to God like a Prodigal Son, after tending swine with the Hegelians." In this mood he wrote the poems of *Romanzero* (1851), so tender, so melodious, so exquisite in fancy, that it seems almost past belief that they should have been the product of the sleepless nights of a bedridden sufferer; humorous pieces, like "The White Elephant," fierce political songs, like "The Weaver's Marseillaise," and the weird "Lazarus Cycle," written under the very shadow of death. Never had Heine been so many-sided as now. He continued to work as long as he could hear and speak. Many friends cheered him, among them, as poems testify, the talented Camille Selden, "*la mouche*," and his "little fairy," the motherly Caroline Jaubert. Two miscellaneous volumes, headed by *Geständnisse*, appeared in 1854. His *Memoirs*, of which some parts have been published, occupied him to the eve of his death. His last words were "Paper and pencil." He died Feb. 17, 1856, and was buried in Montmartre Cemetery without religious service.

Heine was essentially a realist, a revolutionary reformer, but never a blinded partisan. He speaks for a restless, questioning, dissatisfied age that has lost for the moment its ethical moorings. He is the most delicate and graceful song writer and incomparably the wittiest, clearest, keenest, and most unprincipled satirist of Germany, and so he is read with delight by an introspective and critical generation.

Heine's *Works* appeared in 21 volumes (1861–63) and in 20 volumes (1865). They have been ofter reëdited. The best critical edition is that in seven volumes by E. Elster (1887–90). Translations of the *Poems* by E. A. Bowring are in "Bohn's Library." There is an American translation of the *Pictures of Travel*, and a version of the *Works* by Leland and others was published in New York in 1906; *Wit, Wisdom, and Pathos of Heinrich Heine*, by Snodgrass, appeared in London (1888). The best English critique of Heine is in Matthew Arnold's *Essays*. Consult also essay by George Eliot. There is an English *Life, Work, and Opinions of Heinrich Heine*, by Stigand (London, 1876). The most complete German biography is by Strodtmann (3d ed., Berlin, 1884). Consult also those by Prölss (Stuttgart, 1886); Karpeles (Berlin, 1888); also his *Heine: Aus seinem Leben und aus seiner Zeit* (Leipzig, 1899); Keiter (Cologne, 1891), besides Brandes, *Das junge Deutschland* (Leipzig, 1890); id., *Die Litteratur des 19. Jahrhunderts*, vol. vi (ib., 1891); Betz, *Heine in Frankreich* (Zurich, 1895); Mietzki, *Heinrich Heine als Dichter und Mensch* (Berlin, 1895); Nassen, *Heinrich Heines Familienleben* (Fulda, 1895); Kaufmann, *Heines Liebesleben* (Zurich, 1898); id., *Heines Charakter* (ib., 1901); Steinmann, *Heinrich Heine: Denkwürdigkeiten und Erlebnisse aus meinem Zusammenleben mit ihm* (Prague, 1757); Hüffer, *Aus dem Leben Heinrich Heines* (Berlin, 1878); Franzos, *Heines Geburtstag* (ib., 1900); W. Bölsche, *Heinrich Heine, Versuch einer aesthetisch-kritischen Analyse seiner Werke* (Leipzig, 1888); A. Bartels, *H. Heine, auch ein Denkmal* (Dresden, 1906); E. Moos, *Heine und Düsseldorf* (Düsseldorf, 1908); E. Eckertz, *Heine und sein Witz* (Berlin, 1908); H. Reu, *Heine und die Bibel* (Munich, 1908); H. J. Forman, *In the Footprints of Heine* (Boston, 1910); Edward Thorn, *Heinrich Heines Beziehungen zu Clemens Brentano* (Berlin, 1913).

HEINECCIUS, hī-nĕk'tsī-ŭs, JOHANN GOTTLIEB (1681–1741). A learned jurist of Germany, born at Eisenberg. He studied theology at Leipzig and law at Halle, where in 1713 he was made professor of philosophy and in 1720 professor of law. In the latter capacity he went in 1723 to Franeker and in 1727 to Frankfort-on-the-Oder, but in 1733 returned, as professor of law and philosophy, to Halle, where he died Aug. 31, 1741. His works display a thorough acquaintance with all departments of jurisprudence, but especially with Roman and German law; and their varied learning, logical arrange-

ment, and elegant Latin long maintained for them a classical character. His *Antiquitatum Jus Romanum Illustrantium Syntagma* was re-edited as recently as 1841 by Mühlenbruch; and his *Elementa Juris Civilis Secundum Ordinem Institutionum* (ed. by Biener, 1815), his *Elementa Juris Secundum Ordinem Pandectarum*, etc., are still studied by jurists.—Heineccius' son, JOHANN CHRISTIAN GOTTLIEB HEINECCIUS (born 1718 at Halle; died 1791 at Sagan), was for a long time professor in the academy for young noblemen at Liegnitz and edited, besides several of his father's works separately, a complete collection of them (*H. Opera Omnia*, 9 vols., Geneva, 1771), and wrote an account of his father's life and work, *Commentarius de Vita et Scriptis J. G. Heineccii.*—Heineccius' brother, JOHANN MICHAEL HEINECCIUS (born at Eisenberg, 1674; died Sept. 11, 1722), was a celebrated pulpit orator in Halle and also the first who studied seals scientifically. His theological writings are forgotten, but he is remembered by his *De Veteribus Germanorum Aliarumque Nationum Sigillis* (Leipzig, 1710; 2d ed., 1719), and by the work edited in conjunction with Leuckfeld, *Scriptores Rerum Germanicarum* (Frankfort, 1707).

HEINITZ, hī'nĭts, FRIEDRICH ANTON, BARON (1725–1802). A Prussian statesman, born at Dröschkau, near Torgau. He studied mining and smelting at Kösen, Dresden, and Freiberg, filled several government positions, and planned the Freiberg Academy of Mines. He also took great interest in forestry and in road building, traveling all over the Continent to study the prevailing conditions. In 1777 he left the Saxon for the Prussian service on his appointment as head of the departments of Mining and Smelting and in this capacity did much to develop the iron and coal industries. He published: *Mémoire sur ma gestion des 4e et 5e départements* (1788), a defense of his administration of the Bureau of Commerce and Manufacture; and anonymously, *Essai d'économie politique* (1785) and *Mémoire sur les produits du règne minéral de la monarchie prussienne* (1786). Consult Reimann, *Abhandlungen zur Geschichte Friedrichs des Grossen* (Gotha, 1892).

HEINRICH, hīn'rĭk, GUSTAV (1845–). A Hungarian literary critic, born at Budapest and educated at Leipzig and Vienna. He was appointed professor of German philology in the university at Budapest in 1875 and became a prominent educator and a special student of the interrelation of German and Hungarian literature. He edited many German classics for Hungarian readers and wrote: *Bankban in der deutschen Dichtung* (1879); *Boccaccios Leben und Werke* (1882); *Etzelburg und die ungarische Hunnensage* (1882); *Deutsche Verslehre* (2d ed., 1878); *Faust-Studien* (1888); *Kudrun* (1885), and a valuable history of German literature in Hungarian. After 1877 he edited the *Allgemeine philologische Zeitschrift*, from 1881 to 1889 the *Ungarische Revue*, and after 1897 the *Altungarische Bibliothek*.

HEINRICH DER GLÎCHEZARE, dĕr glēK'-*e*-tsä'*re* (the Hypocrite). An Alsatian gleeman of the twelfth century. He wrote (c.1170) the earliest German poem on Reynard the Fox, copied freely after French models. Of this poem, *Isengrîmes Nôt*, in its original form, nothing is left save a few fragments, edited by Grimm, *Sendschreiben an K. Lachmann über Reinhart Fuchs* (1840); a revision, only a little later in date, was published by Reissenberger (1886). Consult Büttner, *Studien zu dem Roman de Renart und dem Reinhart Fuchs* (Strassburg, 1891).

HEINRICH DER TEICHNER, dĕr tīK'nĕr. An Austrian didactic poet of the latter half of the fourteenth century. His poetry consists largely of proverbs and fables in rhymed couplets, valuable for their record of the reconstruction of Austrian life of the period. Selections from his works are to be found in Grimm's *Altdeutsche Wälder* (3 vols., Cassel, 1813–16). Consult Karajan, *Ueber Heinrich den Teichner* (Vienna, 1855).

HEINRICH VON DEM TÜRLIN, fŏn dĕm tŭr'lēn. A German (Carinthian) poet of the earlier half of the thirteenth century. His poems deal with the legends of the Round Table and are modeled after Chrétien de Troyes. His *Der Aventiure Krone* (c.1215), a long, dreary, and rather coarse epic recounting the adventures of Sir Gawain, was edited by Scholl in the publications of the *Stuttgarter literarischer Verein* (1852); and *Der Mantel*, which relates the story of the marvelous cloak that will fit none but a pure woman, has been published by Karnatsch (1883). Consult Martin, *Zur Gralsage* (Strassburg, 1880).

HEINRICH VON DIESSENHOVEN, fŏn dē'sen-hō'fen (c.1300–76). A mediæval German historian, born in Thurgau, canon of the cathedral at Constanz and chaplain of Pope John XXII at Avignon. His history completes the ecclesiastical chronicle of Ptolemy of Lucca and deals with the pontificate of John. It is edited by Böhmer in *Fontes Rerum Germanicarum*, vol. iv (Stuttgart, 1868).

HEINRICH VON FREIBERG, fŏn frī'bĕrK (or **VRIBERG**). A German poet of the early part of the fourteenth century. He wrote a spiritual poem, *Vom heiligen Kreuze*, probably from a Latin source, edited by Fietz (1881); *Ritterfahrt Johanns von Michelsberg*, written about 1305, edited by Kraus (1888); and a continuation of Gottfried's epic *Tristan*, composed about 1300, in style similar but unequal to Gottfried's, and following other originals for material. The farce entitled *Vom Schrätel und vom Wasserbär*, edited in Von der Hagen, *Gesamtabenteuer*, No. 65 (1850), is attributed to Heinrich von Freiberg. Consult Wiggers, *Heinrich von Freiberg als Verfasser des Schwankes vom Schrätel und vom Wasserbären* (Rostock, 1877).

HEINRICH VON HERFORD, fŏn hĕr'fôrt (?–1370). A German Dominican monk, author of many theological and important historical works and of a valuable chronicle, *Liber de Rebus Memorabilibus*. Its latter part is one of the most important sources for the history of the thirteenth and fourteenth centuries and was edited by Potthast (1859).

HEINRICH VON LAUFENBERG, fŏn lou'fen-bĕrK (c.1390–1460). A German poet and monk of the order of St. John, born in Switzerland. He lived at Freiburg and Strassburg and wrote numerous hymns in honor of the Virgin, of which 100 are to be found in Wackernagel, *Das deutsche Kirchenlied* (1864–77); a collection of *Carmina Figurata* (1441), also praising Mary; and a German translation of the *Regimen Sanitatis*, under the title *Spiegel menschlichen Heils* (1437).

HEINRICH VON MELK, fŏn mĕlk. A German satirist of the twelfth century, a monk in the Austrian cloister of Melk. He wrote a vivid, bitter satire on the morals of the time and espe-

cially on the condition of the clergy, *Von des Todes Erinnerung* (c.1160), sometimes called, from its opening line, *Von dem gemeinen Leben.* The *Pfaffenleben*, an incomplete poem of like character, but probably not by Heinrich, was published with it (by Heinzel, Berlin, 1867). Consult: Lorenz, *Heinrich von Melk* (Halle, 1886); Kochendörffer, in the *Zeitschrift für deutsches Altertum*, vol. xxxv (Berlin, 1890); Wilmanns, *Beiträge zur Geschichte der älteren deutschen Literatur*, part i (Bonn, 1885).

HEINRICH VON MORUNGEN, fŏn mō′rụng-en. A German (Thuringian) minnesinger, of the end of the twelfth and the first quarter of the thirteenth century, ranking in beauty and originality next to Walther von der Vogelweide. His poems, showing strongly the influence of classic mythology and of the troubadours of Provence, are edited by Von der Hagen in his *Minnesinger* (1838) and in Lachmann and Haupt's *Des Minnesangs Frühling* (5th ed., 1910). Consult: Paul, *Beiträge zur Geschichte der deutschen Sprache und Literatur*, vol. ii (Halle, 1875); Michel, "Heinrich von Morungen und die Troubadours," *Quellen und Forschungen*, vol. xxxviii (Strassburg, 1880); Rössner, *Untersuchungen zu Heinrich von Morungen* (Berlin, 1898).

HEINRICH VON MÜGELN, fŏn mụ′gĕln (c.1310–c.1375). A German author and scholar, a counselor of Charles IV at Prague and later of Rudolph IV of Austria. His works include translations of Valerius Maximus (first printed, 1489), and of the commentary on the Psalms written by Nikolaus of Lyra; an Hungarian chronicle in Latin (ed. by Engel, in *Monumenta Ungarica*, 1809); an allegory, *Der meide cranz;* and fables and *minne* poetry (ed. by Müller, 1848), which won him a place among the 12 founders of the art of the minnesingers. Consult Helm, "Zu H. von Mügeln," in the *Beiträge zur Geschichte der deutschen Sprache und Literatur*, vols. xxi, xxii (Halle, 1896–97).

HEINRICH VON NEUSTADT, fŏn noi′shtât. A German poet, born at Wiener-Neustadt, who appears as a physician, in a document of 1312, in Vienna. His works, imitative of Wolfram von Eschenbach, include a long epic (c.21,000 verses), patterned after the Latin story of Apollonius of Tyre, but with a curious coloring from Arthurian story; and *Von Gottes Zukunft*, reminiscent of Alanus ab Insulis' *Anticlaudianus.* Excerpts from the two poems are published in Strohl, *Heinrich von Neustadt* (Vienna, 1875).

HEINRICI, hīn-rē′tsē, Karl Friedrich Georg (1844–). A German Protestant theologian, born at Karkeln in East Prussia and educated at Halle and at Berlin, where in 1871 he became docent. In 1873 he became professor at Marburg and went to Leipzig in 1892. In 1909 he became a fellow of the Royal Saxon Society of Learning and in 1911–12 was rector magnificus at Leipzig. He wrote: *Die valentinianische Gnosis und die heilige Schrift* (1781); *Erklärung der Korintherbriefe* (1880–87); the commentary, in Meyer's *Kritischexegetischer Kommentar über das Neue Testament*, on First Corinthians (9th ed., 1910) and Second Corinthians (8th ed., 1900); *Schriftforschung und Schriftautorität* (1890); *Theologische Encyklopädie* (1893); *Beiträge zur Geschichte und Erklärung des Neuen Testaments* (5 parts, 1894–1908); *Das Urchristentum* (1902); *Hellenismus und Christentum* (1909); *Die Eigenart des Christentums* (1911); *Die Bodenständigkeit der synoptischen Ueberliefrung vom Werke Jesu* (1913).

HEINS, hīnz, George Lewis (1860–1907). An American architect. He was born in Philadelphia, studied at the University of Pennsylvania, and graduated from Massachusetts Institute of Technology in 1882. He then worked in architects' offices at Minneapolis and St. Paul, Minn. In 1884 he became associated with John La Farge (q.v.) in New York City, and later, in collaboration with C. G. La Farge (q.v.), he designed the Protestant Episcopal Cathedral of St. John the Divine. He was also one of the architects of the New York Rapid Transit Commission, of the buildings of the New York Zoölogical Park, of the church of the Divine Paternity, and of other structures in New York City. From 1898 until his death he was State architect of New York—the first to receive this appointment.

HEINSE, hīn′ze, Johann Jakob Wilhelm (1749–1803). A German novelist, translator, and critic of art, born at Langewiesen in Thuringia. He studied law and ancient and modern literature at Jena and at Erfurt, where he met Wieland, who greatly influenced his poetry, and Gleim, who procured for him a place as private tutor at Halberstadt (where he lived under the name of Rost). In 1774 he went to Düsseldorf as editor of *Iris.* Here he became so interested in art that he spent three years in Italy, giving most of the time to Rome. He made the acquaintance of the painter Müller, learned much of Italian art and literature, and widened his knowledge of the art and literature of antiquity. While he was in Italy he translated Tasso's *Gerusalemme Liberata* and the *Orlando* into German prose. On his return to Düsseldorf (1784) he wrote *Ardinghello*, his masterpiece, in which he gives his ideas on painting. The Elector of Mainz, Friedrich Karl Joseph, now (1786) made him his lektor and (1787), at Aschaffenburg, his private secretary. On Friedrich's death his library became the property of the state, and Heinse was made librarian. His earliest work was *Sinngedichte* (1771). This was followed by translations and works in classic vein: *Begebenheiten des Enkolp, aus dem Satyrikon des Petron übersetzt* (1773); *Die Kirschen* (1773), a work of equal obscenity; and *Laidon, oder die eleusinischen Geheimnisse* (1774), with the form of a romance, describing the apotheosis of Lais. Like the last-mentioned work, *Ardinghello, oder die glückseligen Inseln* (last ed., 1838) is little more than a series of dazzling pictures, like Pompeian wall paintings. In *Hildegard von Hohenthal* (last ed., 1838), his second masterpiece, Heinse gives his ideas on music, and in *Anastasia und das Schachspiel* (last ed., 1831) on chess. *Fiormona, oder Briefe aus Italien* (1803), though usually ascribed to Heinse, is not his work. H. Laube issued his works in 10 volumes (1838); new critical edition by Schüddekopf (1907). Consult: *Briefe zwischen Gleim, Heinse und Johannes von Müller*, edited by Körte (Zurich, 1806–08), which gives a good picture of the man and contains his criticism of the paintings in the Düsseldorf Gallery; Schober, *Heinse, sein Leben und seine Werke* (Leipzig, 1882); H. Pröhle, *Lessing, Wieland, Heinse* (Berlin, 1877–79); K. D. Jessen, *Heinses Stellung zur bildenden Kunst* (ib., 1901).

HEINSIUS, hīn′sī-ụs, Antonius (1641–1720). A Dutch statesman, celebrated as a formidable opponent of Louis XIV of France. He was born at Delft, Nov. 22, 1641, and after pur-

suing the study of law at the University of Leyden entered the service of the state and became in 1679 Pensionary of Delft. He was the confidential friend of William of Orange, upon whose accession to the throne of England, in 1689, Heinsius, as Pensionary of Holland (see GRAND PENSIONARY), succeeded to the virtual control of the foreign policy of the Dutch Republic. The friendship between William and Heinsius continued till the former's death, and their correspondence is of capital importance for the light it throws on the intricate political problems of the period from 1688 to the outbreak of the War of the Spanish Succession. Heinsius was instrumental in bringing about the partition treaties of 1698 and 1700, which had in view the dismemberment of Spain, and contributed to the formation of the Grand Alliance in 1701. Into that struggle against France he entered heart and soul, and after William III's death, in 1702, became the virtual leader of the European combination against Louis XIV. The victories of Marlborough and Prince Eugene were due in no little measure to Heinsius' restless activity in the prosecution of the war. Determined upon the total humiliation of France, he spurned the French King's overtures of peace, made as early as 1706; and only the defection of England and the recrudescence of French resistance that followed induced him to agree to the terms of peace at Utrecht. He died Aug. 3, 1720.

HEINSIUS, DANIEL (1580–1655). A Dutch scholar of distinction and a pupil of Scaliger, born in Ghent. He was a leading figure of the Dutch Renaissance, professor of Greek at Leyden, and a facile Latin poet. He wrote: *Iambi* (1602); *Elegiæ* (1603); *Emblemata Amatoria*, with Dutch verses (1604); *Poemata* (1605). He edited Theocritus, Bion, Moschus, Horace, Aristotle, Seneca, Terence, and Livy, and published Latin *Orationes* (1609 and 1621) and other learned works as well as a Dutch tragedy, *The Massacre of the Innocents* (1613), and Dutch *Poems* (1616).—NICOLAAS HEINSIUS (1620–81), a son of Daniel, was born in Leyden and educated in the university of his native town. For more than 25 years he led the busy life of traveler, scholar, diplomat, and poet. He ransacked the libraries of France and Italy for classical manuscripts. In 1650 he entered the service of Christina of Sweden and in 1654 became Dutch Minister at Stockholm. In 1669 he visited Russia and two years later retired to private life. He published editions of Vergil, Ovid, Prudentius, Vellius Paterculus, and Valerius Flaccus, based on manuscripts in his possession, as well as commentaries on many other poets of antiquity. He is said to have supplied Milton with facts for use against Salmasius (q.v.). His Latin poems were published at Amsterdam in 1666. He died at The Hague, Oct. 7, 1681.—His illegitimate son NICOLAAS (1655–?) was a scapegrace of remarkable talent, who wrote the only original Dutch romance of the seventeenth century, *The Delightful Adventures and Wonderful Life of Mirander* (1675), a curious anticipation of *Gil Blas*. He fled from Holland, a disowned criminal, in 1677 and died in obscurity.

HEINTZELMAN, hīn'tsel-măn, SAMUEL PETER (1805–80). An American soldier, born at Manheim, Lancaster Co., Pa. He graduated at West Point in 1826 and was assigned to the Second Infantry, with which he served on the frontier. He took part in the wars with the Florida Indians from 1835 to 1841, becoming a captain in 1838; served with his regiment in the Mexican War, and received the brevet of major for gallantry at the battle of Huamantla, Oct. 7, 1847. Later he served in California, accompanying the expedition against the Yuma Indians in 1852, and in Texas. He attained the rank of major in 1855 and at the outbreak of the Civil War became colonel, and inspector general of the Department of Washington. On May 17, 1861, he was commissioned brigadier general of volunteers and was in command of the forces which occupied Alexandria, Va. In McClellan's Peninsular campaign of 1862 he commanded the Third, and later also the Fourth, Army Corps and participated in all of the important battles. He received his commission of major general of volunteers on the day of the battle of Williamsburg (May 5, 1862), and for gallantry at the battle of Fair Oaks received the brevet rank of brigadier general in the regular army. He fought also at Savage's Station, Glendale, and Malvern Hill, and later in the year at the second battle of Bull Run and at Chantilly. In the winter of 1862–63 he was in command of the defenses of Washington, and from February to October, 1863, of the Department of Washington. During the remainder of the war he was not in the field, serving as commander of the Department of the West in 1864 and on court-martial duty in 1865. In March, 1865, he was brevetted major general in the United States army for his conduct at Williamsburg and in 1869 was retired, on account of age, with the full rank of major general.

HEINZ, hīnts, HENRY JOHN (1844–1919). An American packer of food products, born in Pittsburgh, Pa. After receiving his education in the public schools and at Duff's Business College, in 1869 he entered, at Sharpsburg, Pa., the business in which eventually he made a fortune. In 1872 he moved to Pittsburgh and formed the partnership of Heinz, Noble & Company, which became F. & J. Heinz, and finally in 1888 the H. J. Heinz Company. The partnership, which had remained under this last name, was replaced by a corporation in 1905 with Heinz as president. The firm grew until it had 14 branch factories, 42 branch houses, and agencies in all parts of the world. It early became famous through its advertising. H. J. Heinz became a director in various industrial, civic, and philanthropic organizations, and was chosen chairman of the executive committee of the World's Sunday School Association.

HEINZE, hīn'tse, F. AUGUSTUS (1869–1914). An American mining engineer and capitalist, born in Brooklyn, N. Y. He attended the Polytechnic Institute, Brooklyn, graduated from the Columbia School of Mines in 1889, and studied also in Germany. His remarkable early success in smelting and mining operations in Montana made him a millionaire and "copper king" before he was 30—he became president of the United Copper Company and director of the Montana Ore Purchasing Company. With the help of his brother Arthur, a lawyer, Heinze carried on for nine years a mine claims' fight with Marcus Daly and Daly's successors, the Amalgamated Copper Company (i.e., the Standard Oil interests). War was waged in the mines as well as in the courts. In 1906 Amalgamated admitted defeat. In 1907 Heinze's attempt to effect a corner in copper failed; there was a run on the Mercantile National Bank, of which

Heinze was then president; and a country-wide financial panic was precipitated. Heinze resigned his bank presidency; was obliged to sacrifice huge blocks of stock to meet his obligations (though he saved a comfortable fortune), and the United Copper and Montana Ore Purchasing companies went into the hands of receivers.

HEINZE, hīn'tse, Karl Friedrich Rudolf (1825–96). A German criminologist, born at Saalfeld and educated at Leipzig. He served successively in the judiciary of Meiningen and of Saxony; in 1865 was appointed professor of jurisprudence at Leipzig, and eight years afterward at Heidelberg. He was three times representative of the University of Leipzig in the Saxon Diet and was a prominent member of the party of the opposition. His works, which treat especially the reform of German criminal law and criminal procedure, include: *Parallelen zwischen der englischen Jury und dem französisch-deutschen Geschworenengericht* (1864); *Ein deutsches Geschworenengericht* (1865); *Das Recht der Untersuchunschaft* (1865); *Verhältnis des Reichsstrafrechts zu dem Landesstrafrecht* (1871); and a report for the International Congress for Prison Reform at St. Petersburg, *De quelle façon l'ivresse peut-être envisagée dans la législation pénale* (1890).

HEINZEL, hīn'tsel, Richard (1838–1905). An Austrian philologist, born in Capodistria and educated at Vienna. After teaching in Gymnasia at Triest, Vienna, and Linz, he was appointed professor of German at Graz (1868) and then at Vienna (1873). His work comprises discussions of Germanic phonetics, Teutonic myths, and the relation of German poetry to French. Among his writings are: *Heinrich von Melk* (1867); *Geschichte der niederfränkischen Geschäftssprache* (1874); *Ueber den Stil der altgermanischen Poesie* (1875); *Beschreibung der isländischen Saga* (1880); *Ueber die Nibelungensage* (1885); *Ueber die Hervararsaga* (1887); *Ueber die Walthersage* (1888); *Ueber die ostgotische Heldensage* (1889); *Abhandlungen zum altdeutschen Drama* (1895); *Beschreibung des geistlichen Schauspiels im deutschen Mittelalter* (1898); *Ueber die französischen Gralromane* (1892); *Ueber das Gedicht von König Orendel* (1891); *Ueber Wolframs von Eschenbach Parzival* (1893); *Saemundar Edda* (2 vols., 1903), with F. Detter. A *Festgabe,* entitled *Forschungen zur neueren Litteraturgeschichte,* was presented to him in 1898. An edition of his *Kleine Schriften* was published by Jellinek and Von Kraus in 1907.

HEINZEN, hīn'tsen, Peter (better known as Karl) (1809–80). A German-American author, born at Grevenbroich and educated at Bonn, whence he was expelled because of his radicalism. After two years in the Dutch army he returned to Germany and entered the service of the Aix-la-Chapelle Fire Insurance Company. But his contributions to the *Leipziger Allgemeine Zeitung* and to the *Rheinische Zeitung* excited the displeasure of the government; both journals were suppressed; his book, *Die preussische Büreaukratie* (1845), was confiscated, and he escaped trial by flight to Belgium, Switzerland, and finally to America. He returned to take part in the revolution of 1848; then came once more to the United States; lived in New York, Louisville, Cincinnati, and, after 1860, in Boston, and published the very radical organ, the *Pionier.* His collected works were published at Boston (3 vols., 1868–72), and include: *Gedichte; Sechs Briefe an einen frommen Mann; Die Teutschen und die Amerikaner; The True Character of Humboldt.* Many of his writings were published by the Society for the Propagation of Radicalism in the United States—e.g., *Rights of Women* (1891) and *Teutscher Radikalismus in Amerika* (1898).

HEIR (Lat. *heres*). In the most general sense, the person entitled by law to succeed to an inheritance. At **Roman law,** the estate of a deceased person always passed as an entirety (by "universal succession") to one or more persons described as heirs. The heir or heirs, if not appointed by testament, were designated by the law; and in the later development of the Roman law certain near relatives of a testator were entitled to a share of his estate even against his will, unless they had so acted as to give him legal ground for disinheriting them. (See Succession.) If the heir, whether appointed by testament or designated by law, was under the decedent's household authority, the inheritance vested in him immediately. If, on the other hand, the inheritance was given by testament or assigned by law to a person out of the household, the latter became heir only by an act of entry. The chief practical importance of the distinction lay in the fact that inheritance established a merger, or "confusion," of the inherited estate with the personal estate of the heir, and that the heir was accordingly personally liable for the debts of the estate. If these exceeded the assets, the forced succession of the household heir was an injury to him. The prætors accordingly, towards the close of the Republican period, gave such heirs protection against the creditors of the estate, if they abstained from interfering with the assets—a change which practically abolished the forced or "necessary" succession. Justinian introduced a further reform, permitting an heir who promptly made an inventory of the assets to take the inheritance without incurring any personal liability for its debts (*beneficium inventarii*). See Inventory.

The position of a testamentary heir at Roman law was substantially identical with that of an English executor who is also a residuary legatee. The testamentary heir paid the debts and all special bequests (*legata*) and kept the remainder of the estate. The position of the intestate heir was substantially identical with that of an English administrator.

Mediæval Law. To the Germanic peoples, including the English, testaments were originally unknown. They received them through the Church. Even then they were reluctant to admit that a person could dispose by testament of the real estate, which in the Germanic view belonged to the family rather than to its head. The direct heirs, the "born" heirs, had rights in the land of which they could not be deprived. The development of the feudal system emphasized in the law of succession, as in other fields of the law, the distinction between realty and personalty. To the Church authorities, accordingly, mediæval custom assigned not only the execution of testaments disposing of the personalty, but also, in many countries, the administration and distribution of the personal estate in cases of intestacy. On the Continent and in Scotland, at the close of the Middle Ages, the reception of the Roman law (see Civil Law) effaced these distinctions; but in England they

still underlie the whole law of inheritance and distribution (q.v.).

Modern Civil Codes. The modern codes of Europe have reëstablished the principle of the universal succession; the estate of a decedent passes as an entirety to the testamentary or legal heir or heirs. The Roman distinction between household heirs and outside heirs has disappeared; in both cases the inheritance vests at the moment of death; in both cases there is a right of renunciation, and usually a right of entry, with the "benefit of inventory." In cases of intestacy the legal heirs administer the estate; the courts appoint administrators only when the intestate heirs cannot be found, or when they all renounce the inheritance. Unless a testator has appointed special executors, the testamentary heirs liquidate the estate and pay the legacies and statutory shares. In this matter, however, the French law is different. In France, if there be near relatives who are entitled to statutory shares, these, and not the testamentary heirs, administer the estate. The latter are termed "universal legatees," and they have the rights of heirs only in the absence of the "legitimate heirs."

English and American Law. The feudal separation of real and personal property has maintained itself in the common-law system even to the present time. It appears in its extremest form in the law of inheritance. The personal property of one who dies intestate passes to a person who may or may not be of the blood of the decedent, and only for purposes of administration, the distribution of the surplus after the payment of debts, etc., being determined by statutes of distribution. Only the real property "descends," according to fixed canons of inheritance, to the next of blood of the decedent, under the description of the heir. In English and American law, then, the term "heir" has reference always to the person or persons to whom the real (not the personal) property passes, and that not by will, but only on intestacy. In the main the English canons of descent laid down by Blackstone still govern the determination of the heirship or inheritance of estates, though these have been considerably modified by statute in England and still more in the United States. The principal difference is that in England the rule of primogeniture still obtains as well as the preference of the male to the exclusion of the female of equal degree of consanguinity, whereas in the United States the descent is to all who stand in the same degree of consanguinity to the ancestor, without distinction of sex. See DESCENT.

In **Scottish law**, the term "heir" is often used in a loose sense to denote the person entitled to succeed to the heritable as well as to the movable estate. In Scotland the same rule exists as in England, that if a person do not by deed *mortis causa* (which operates like an English will) dispose or convey his estate to some other person, the law points out who is to take such estate, and that person is the heir at law. The rules by which the heir to heritable estate in Scotland is pointed out differ considerably from the English rules. These rules are the same as to the descendants of the deceased person. But after his descendants are exhausted, differences begin; for then it is not the father, nor yet the eldest brother of the intestate, but the next younger brother, who succeeds; then the next younger again, until the youngest brother—after whom and his descendants comes the next elder brother of the deceased, and so on upward to the eldest brother. In Scotland, when females succeed equally, they are called heirs portioners. The mother never succeeds in any event, nor any of her relatives, except brothers and sisters german who trace their descent through her.

Heir Apparent. In the common-law system, the person who is contingently entitled to succeed to the inheritance of real property if he outlive his ancestor. The term "heir" alone is not properly applicable to any one so long as the ancestor from whom he expects to inherit is still alive, in accordance with the maxim that no one can be the heir of a living person (*nemo est hæres viventis*). The expectant heir may be either the person who is first entitled under the canons of descent, as the eldest son, and who cannot be displaced by the subsequent birth of a nearer relative of the ancestor, or he may be a person in the second or any later degree of consanguinity—in which case he is liable to be displaced by the birth of a son or other person having a prior claim to the inheritance. The expectant heir in the former case is known as the heir apparent, in the latter case as the *heir presumptive*. Under the rule of primogeniture, which still obtains in England, a daughter would be only an heir presumptive, as the subsequent birth of a son to the father would displace her; whereas the eldest living son is, while the father lives, the heir apparent. A younger son, however, is not entitled to the designation of heir presumptive so long as his elder brother lives, although by the death of the latter he would at once become heir apparent.

In Scotland the phrase is also sometimes used popularly in this sense; but the words "apparent heir," when used technically there, mean quite a different thing, viz., the person who after his ancestor's death is entitled to succeed, provided he make up his titles, but who has not yet actually done so. The apparent heir has a year to deliberate, called the *annus deliberandi*, whether he will enter upon the property, because the responsibility is so much greater in Scotland than in England.

Consult the authorities referred to under CIVIL LAW; DESCENT; LAW; REAL PROPERTY; ETC.

HEIR-AT-LAW, THE. A comedy by George Colman the Younger, in five acts, produced in 1797 and still occasionally brought out.

HEIRESS, âr'ĕs. In heraldry, a lady having no brothers who leave issue; known as an "heir." The husband of an heiress is entitled to bear her arms in an escutcheon of pretense—i.e., a small escutcheon in the centre of his paternal shield—and the children of an heiress may quarter her arms with their paternal coat. Neither practice is of very early date in heraldry.

HEIRLOOM, âr'lōōm'. In English law, chattels which in some localities go to the heir at law by special custom instead of passing, as chattels commonly do, to the executor or administrator of the decedent. The chattels usually comprehended within this description are such homely but necessary articles as the best bed, table, pot, pan, cart, and the like. But articles of honor and ornament may fall within the category of heirlooms, such as family portraits, ducal coronets, the crown jewels, etc. The origin of the right is obscure, and it is of rare occurrence. In America it is wholly unknown. In Scotland a somewhat similar usage prevails, but of wider extent, whereby the best articles of furniture in

the house of a person who dies leaving heritable property pass under the description of *heirship movables* to the inheritor of the lands. The extent of this right is also not clearly settled. Consult the *Commentaries* of Blackstone and Erskine.

HEIR OF LINNE, lĭn. A ballad of unknown date and authorship, preserved in Percy's *Reliques.*

HEIS, hīs, EDUARD (1806–77). A German astronomer, born at Cologne and educated at Bonn. He became an instructor at Cologne in 1827, at Aix-la-Chapelle in 1837, and in 1852 was appointed professor of mathematics and astronomy at Münster. Heis edited *Wöchentliche Unterhaltungen aus dem Gebiete der Astronomie und Meteorologie,* and was author of *Neuen Himmelsatlas* (1872), marking all stars visible to the naked eye; *Zodiakallicht-Beobachtungen in den letzten 29 Jahren, 1847–75* (1875); *Sammlung von Beispielen und Aufgaben aus der allgemeinen Arithmetik und Algebra* (95th ed., 1896); and, with Schweiler, a *Lehrbuch der Geometrie,* in three volumes.

HEISS, hīs, MICHAEL (1818–90). An American Roman Catholic prelate. He was born at Pfahldorf, Bavaria, studied at Munich and at a Catholic seminary at Eichstädt, and was ordained in 1840. Two years later he came to the United States, engaged in missionary work in Kentucky and Ohio, and afterward at Milwaukee, where he founded the Seminary of St. Francis de Sales, of which he was first rector. He was consecrated first Bishop of La Crosse, Wis., in 1868, and established St. John's College and other schools in his diocese. In 1880 he was appointed coadjutor to the Archbishop of Milwaukee, and two years later became second Archbishop. He was a member of the Vatican Council of 1869–70.

HEJAZ, hĕ-jäz′, or **HEDJAZ** (Turk., land of pilgrimage). A Turkish vilayet of Arabia (q.v.), extending along the northeast shore of the Red Sea from the Gulf of Akabah to about the parallel of 20° N. and to the Nafud Desert on the east (Map: Turkey in Asia, D 6). Its area is about 96,500 square miles. The district is hot, barren, and covered with sand and eruptive material. In the central part are the Tehema Mountains, reaching a height of 6000 feet in Jebel Shar (*biblical* Mount Seir). Vegetation is found only in a few oases. The estimated population is 300,000 Bedouins, an average of three per square mile. Within the confines of Hejaz are the sacred cities of Mecca and Medina. The chief port is Jeddah. A line of railroad, to be known as the Medina-Mecca-Jeddah line, is in course of construction by the Hejaz Railway Company. See end of article Arabia.

HĔJĪRA, hĕj′ī-rȧ (Ar. *hijra,* departure, flight, from *hajara,* to abandon). The departure of Mohammed from Mecca to Medina to escape the persecution of his kinsmen, the Koreish (see MOHAMMED), and the starting point of the Mohammedan era. The exact day of the departure is uncertain. The custom of dating events with reference to it originated with Mohammed himself, but the calendar was first instituted by Omar, 17 years after the event, and was made to begin, not with the day of the flight, but with the first day of the year (i.e., the first of the month Muharram) in which it took place, which corresponds with July 15, 622, of the Christian era. The Mohammedan year is a lunar year, of 354 days, 9 hours, hence about 11 days shorter than the Christian year, and this fact must be borne in mind in computing the date of the Christian calendar corresponding to any given Mohammedan date. An easy rule, which will give the year approximately, is to deduct 3 per cent from the Mohammedan year and add the result to 622. Thus, the year of the Hejira 1332 will be found to correspond roughly to the year 1914 of the Christian era (1332 − 40 + 622 = 1914). For more accurate results, consult Wüstenfeld, *Vergleichungstabellen der mohammedanischen und christlichen Zeitrechnung,* continued by Mahler (Leipzig, 1854–87), and Hanauer, *A Table of the Christian and the Mohammedan Eras from July 15, A.D. 622, the Date of the Hejira, to A.D. 1900* (London, 1904).

HEKKING, hĕk′ĭng, ANTON (1856–). A noted Dutch violoncellist, born at The Hague. Having received his first musical instruction in his native city, he entered the Paris Conservatory for further study under Chevillard and Jacquard. In 1882, together with Ysaye, he made an extensive and very successful tour of the principal cities of Europe. In 1888 he visited the United States, at the conclusion of which tour he lived for some years in Boston and New York. Together with Schnabel (piano) and Wittenberg (violin), he established in 1902 a trio in Berlin, which soon was recognized as one of the foremost chamber-music organizations of Germany.

HEKLA. See HECLA.

HEKTARE, hĕk′târ. See METRIC SYSTEM.

HEKTOEN, hĕk-tōōn′, LUDVIG (1863–). A distinguished American pathologist, born at Westby, Wis., of Norwegian parents. He graduated from Luther College (1883) and (1887) from the Chicago College of Physicians and Surgeons (where he was professor of pathology in 1892–94), and he studied also at Upsala, Prague, Berlin, and Vienna. From 1889 to 1903 he was pathologist to the Cook County Hospital; he held professorships in Rush Medical College; and in 1901 he became head of the department of pathology and bacteriology at the University of Chicago. He served as a member of the Occupational Disease Commission of Illinois (1899–1911); was president of the Association of American Pathologists and Bacteriologists (1903); and, besides editing the *Journal of Infectious Diseases,* he wrote *The Technique of Post-Mortem Examination* (1894) and was editor of Durek's *Pathologic Histology* and co-editor of and contributor to the *American Text-Book of Pathology* (1901).

HEKTOGRAPH, hĕk′tō-grȧf (Gk. *ἑκατόν, ekaton,* hundred, and *γράφω, graphō,* write). A copying device, consisting of a pad of specially prepared gelatin, in a shallow tin tray, upon which an impression is made from writing or drawing with so-called hektograph ink on a sheet of paper from which other impressions or duplicates can be made. The pad is prepared from glue or gelatin and glycerin according to various formulas, some of which involve also the addition of kaolin, barium sulphate, dextrin, oil of cloves, to prevent decomposition, and like substances. The gelatin is first swelled in cold water, and then it is added to hot glycerin and thoroughly stirred, after which it is poured into the pan and allowed to stand for five or more hours. Previous to using, the gelatin must first be moistened with a wet sponge and left till nearly dry, after which the writing is placed on its surface face down and rubbed on the back. The writing should be allowed to remain for

about a minute, and then copies may be taken by laying clean sheets of paper on the gelatin, pressing down, and removing carefully by a corner. The pad, after the desired number of impressions has been made, may be cleaned with a wet sponge, or the ink will be absorbed if left for a few days. In using the hektograph special inks are employed, which contain glycerin, gum, and alcohol, with such coloring materials as are desired.

HEL, hāl (Icel., probably meaning hidden, *sc.* goddess). The Northern goddess of the dead, who dwelt beneath one of the three roots of the sacred ash Yggdrasil and was the daughter of Loki (q.v.) by the giantess Angurboda. Hel, together with her brothers, the wolf Fenrir and the serpent Jormundgand, was bred up in the giants' home of Jötunheim, where she remained till, at the request of the Æsir, or gods, the All-father sent for her and her brothers. Knowing that by their origin these children must prove a source of calamity, he resolved upon their destruction, and after casting the serpent into the deep ocean which surrounds all lands, where it has grown so large that it encircles the whole world and bites its own tail, he hurled Hel into Niflheim (q.v.), over which he gave her authority, and in which she was to assign places to all who die of sickness and age. Her abode is surrounded by a high inclosure with massive gates. Her dwelling is *eljudnir* (preparer of pain): her dish, *hungr* (hunger); her knife, *sullt* (starvation); her servants, *ganglâti* (slow moving); her bed, *kör* (sickness); and her curtains, *blikiandaböl* (gleaming misery); and she is easily recognized by her fierce aspect and her half-black, half-flesh-colored skin; and she rides a horse with only three feet. Faith in this goddess is not yet extinct. Hel-shoes (hell-shoon) are still put on the feet of the dead, and her dog is heard barking to give warning that death is at hand. In Norway, when any one recovers from dangerous illness he is said to have given Hel a bushel of oats, in allusion to the belief that she wanders around in the form of a horse.

After the introduction and diffusion of Christianity the ideas personified in Hel gradually merged, among all the races of northern and German descent, in the local conception of a hell, or dark abode of the dead. Consult: Guerber, *Myths of Northern Lands* (New York, 1895); Mogk, *Germanische Mythologie* (Leipzig, 1906); Mortensen, *A Handbook of Norse Mythology*, translated by Crowell (New York, 1913).

HELBIG, hĕl'bĭg, Wolfgang (1839–). A German archæologist. He was born at Dresden and was educated at Göttingen and Bonn. After he had taught one year in the Joachimsthaler Gymnasium of Berlin, he went to Rome as scholar in the German Archæological Institute, of which he was made second secretary in 1865. This office he resigned in 1885, but he did not leave Rome, save for occasional trips through Italy, Greece, northern Africa, France, and Russia. His more important works are: *Wandgemälde der vom Vesuv verschütteten Städte Campaniens* (1868); *Untersuchungen über die campanische Wandmalerei* (1873); *Beiträge zur altitalienischen Kultur- und Kunstgeschichte* (1879); *Das homerische Epos aus den Denkmälern erläutert* (1887); *Führer durch die öffentlichen Sammlungen klassischer Altertümer in Rom* (last ed., 1913–14); *La collection Barracco d'après la classification et avec le texte de G. Barracco et W. Helbig* (1893).

HELD, hĕlt, Adolf (1844–80). A German economist, born at Würzburg and educated there, at Munich, and at Berlin. He became an instructor in the university at Bonn in 1867, associate professor in 1868, and full professor in 1872. In 1880 he was called to a professorship at Berlin; but he died by drowning shortly afterward. Held's work is characterized by his insistence upon historical method, and by the prominence assigned by him to state influence in the economic order. He was one of the chief leaders of the tendency in German economics known as "Socialism of the Chair." His chief writings are *Careys Sozialwissenschaft und das Merkantilsystem* (1866); *Die Einkommensteuer* (1872); *Die deutsche Arbeiterpresse der Gegenwart* (1873); *Grundriss für Vorlesungen über Nationalökonomie* (1872; 2d ed., 1878); *Sozialismus, Sozialdemokratie und Sozialpolitik* (1877); and, edited by Knapp, *Zwei Bücher zur sozialen Geschichte Englands* (1881).

HELD, Hans Heinrich Ludwig von (1764–1842). A Prussian patriot, born at Auras and educated at Frankfort-on-the-Oder, Halle, and Helmstedt, where he studied law. For his open attack on the integrity of the Minister, Count Hoym, he was removed from his post in the customs service at Posen (1797); but four years afterward he published the famous "Black Book"—so called from its binding—a second attack on the ministers Hoym and Goldbeck, under the title *Die wahren Jakobiner im preussischen Staat, oder aktenmässige Darstellung der bösen Ränke und betrügerischen Dienstführung zweier preussischen Staatsminister.* For this publication, after a long trial, he was sentenced to 18 months in prison. His later writings were two pamphlets attacking Napoleon, and in 1805 a eulogy of his patron, Struensee. In 1812 he received a minor appointment from the Minister, Hardenberg; but the ill fortune of the preceding years had broken his spirit, and when the state money in his possession was stolen from him he despaired of life and committed suicide. He wrote a *Geschichte der drei Belagerungen Kolbergs im Siebenjährigen Kriege* (1848). Consult Grünhagen, *Zerboni und Held in ihren Konflikten mit der Staatsgewalt* (Berlin, 1897).

HELDENBUCH, hĕl'dĕn-bo͝ok (Ger., book of heroes). A collection of old epic poems, connected with the heroic legends of Germany. No manuscript exists, and the oldest printed edition is without date. The second copy was printed in 1491 and was afterward reprinted in 1509, 1545, 1560, and 1590, and edited by A. von Keller at Stuttgart in 1867. It is an adaptation preserving the general characteristics of the older poetic form and contains the poems "Ornit," "Hugdietrich," "Wolfdietrich," the "Great Rosegarden," and the "Little Rosegarden, or King Laurin." A similar but inferior adaptation of the same material, with additions from the tales of Attila and Dietrich, appeared about 1472. Of the latter work one manuscript exists, now in Dresden. The collection is known by the name of one of its two writers, Kaspar von der Rhön (Gaspard de la Roen).

HELDER, hĕl'dēr. A strongly fortified seaport town of the Netherlands, situated on the narrow passage of Marsdiep which separates the mainland of the Province of North Holland from the island of Texel, 58½ miles from Amsterdam (Map: Netherlands, C 2). The city and surrounding country are protected from the inroads of the sea by an enormous dike, nearly 5 miles long and 30 feet wide at the top, built of Nor-

wegian granite; it descends 200 feet into the sea at an angle of 40°. A road on the top of the dike connects Helder with the harbor of Nieuwediep, the sea entrance to the North Holland Canal, which connects Helder with Amsterdam. Nieuwediep is one of the chief naval stations of the Netherlands, where are large docks, shipyards, barracks and magazines, a naval hospital, and the royal cadet school known as Willensoord. Owing to its position at the north end of the North Holland Canal, Helder has rapidly developed from a small fishing village into a city. Pop., 1910, 27,458. Helder is noted for the famous naval battle which took place there in 1673 between the united fleets of England and France, on one side, and the Dutch, on the other. The latter, led by Tromp and De Ruyter, were victorious. The fortifications of the town were begun in 1811 by Napoleon and completed afterward by the Dutch.

HELDERBERG, Lower. See Lower Helderberg.

HELE, hā'le, or Henlein, Peter (1480–1542). A German clock maker of Nuremberg, who is credited with having made the first pocket timepiece, about 1511. In 1903 a statue was erected to his memory at Glashütte. His name is also spelled "Hell."

HEL'EN (Lat., from Gk. Ἑλένη). The daughter of Zeus and Leda (q.v.), wife of Tyndareus (q.v.), King of Sparta, or, according to the epic poem *Cypria,* of Zeus and Nemesis, whom the god pursued in the form of a swan. Nemesis brought forth an egg, which was found by Leda, who on the birth of Helen reared her as her foster child. According to the ancient legend she was so exceedingly beautiful that at the age of 10 she was carried off by Theseus and Pirithous, but was recovered subsequently by her brothers, Castor and Pollux. Tyndareus afterward engaged her suitors, who numbered about 30, in a solemn oath to unite together to aid the husband whom Helen should choose, should any attempts be again made to carry her off. In accordance with this oath, her husband, Menelaus, when she was afterward carried off by Paris (q.v.), son of Priam, King of Troy, summoned all the princes of Greece to avenge the injury he had sustained and thus gave rise to the Trojan War. The ordinary legend states that after the death of Paris she voluntarily married his brother, Deiphobus, and that on the taking of Troy, in order to recover the favor of Menelaus, she betrayed Deiphobus into his hands. (See *Æneid,* vi, 517 ff.) Another version told how she fled to the temple of Aphrodite and was pursued with drawn sword by Menelaus; but such was the power of her beauty that he laid aside his thought of vengeance and took her once more as his wife. Their voyage home was long, as they were driven to Egypt, but at last reached Sparta in safety, where the *Odyssey* shows them living in happiness. By her husband Menelaus she had one daughter, Hermione, but some writers said that by Theseus she was the mother of Iphigenia. Of her death also there were many versions. Her grave was shown at Therapne, near Sparta, where she and Menelaus were worshiped. On the other hand, the Rhodians told how she was driven out of Sparta after the death of Menelaus and came to her friend, Polyxo, in Rhodes. Polyxo, however, had lost her husband in the Trojan War and consequently forced Helen to hang herself to a tree. Hence Helen was worshiped at Rhodes in connection with the tree, as Helena δενδρῖτος. Another story told how she was translated by the gods to the Islands of the Blest, where she was wedded to Achilles. She received divine honors at many places and was believed by the sailors to appear in the single flame of St. Elmo's fire, which was regarded as a sign of disaster, while the double flame, or Castor and Pollux, was believed to insure safety (see Elmo's Fire, St.). In art scenes from the story of Helen are frequent and represent almost all the episodes in her eventful life. Stesichorus made Helen remain in Egypt, whither she had come with Paris on her way to Troy, detained by the Egyptian King, Proteus, who later restored her to her husband. Paris, he said, took to Troy only a phantom, for whom Greeks and Trojans fought. Much in the nature of the legends of Helen and in the characteristics of her worship seems to indicate that she was originally a moon goddess, who has been superseded by Selene and Artemis and thus transferred to the heroic legends. For a full collection of the ancient material relating to Helen, consult: Engelmann's article in Roscher, *Lexikon der griechischen und römischen Mythologie,* vol. i (Leipzig, 1886–90); the article "Helene, 3," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft,* vol. vii (Stuttgart, 1912); Oswald, *The Legend of Fair Helen* (New York, 1905); Gruppe, *Griechische Mythologie,* vol. i (Munich, 1906).

HELEN: A Tale. A novel by Maria Edgeworth, published in 1834.

HELENA, hĕl'ĕ-nâ. A city and the county seat of Phillips Co., Ark., 70 miles by rail south-southwest of Memphis, Tenn., on the Mississippi River, and on the St. Louis, Iron Mountain, and Southern, the Missouri and North Arkansas, and the Yazoo and Mississippi Valley railroads (Map: Arkansas, E 3). It has steamboat connection with St. Louis, New Orleans, and other river ports, and is an important shipping point for lumber, cotton, and cottonseed oil, and has lumber mills, cotton compresses, cottonseed-oil mills, box factories, stave mills, railroad shops, manufactories of chairs, brooms, spokes and handles, and ice, foundries, etc. The city contains United States District, State, county, and municipal courts, fine Federal and high-school buildings, and several monuments to Civil War heroes. Here on July 4, 1863, General Holmes, commanding a Confederate force of 9000, attacked General Prentiss with a Union army of about 4500, but was repulsed with a loss in killed, wounded, and prisoners of one-fifth his number. Pop., 1900, 5550; 1910, 8772; 1914 (U. S. est.), 10,144.

HELENA, hĕl'ĕ-nâ. A city, the capital of Montana, and the county seat of Lewis and Clark County, 72 miles by rail north by east of Butte, on the Great Northern and the Northern Pacific railroads (Map: Montana, D 3). It lies at an elevation of 4200 feet, overlooking Prickly Pear valley, a fertile agricultural district, and is surrounded by a highly productive mineral region. It is one of the commercial centres of the State, is extensively engaged in gold, silver, and copper mining, and in sheep and cattle raising, and has foundries and machine shops, quartz and planing mills, mining-machinery works, manufactories of soap, candles, candy, and crackers, and smelters. From the famous Last Chance Gulch, which traverses the city, it is estimated that more than $30,000,000 worth of gold has been mined. Helena was settled as a mining camp in 1864 and laid out as a town in the same year

and was incorporated in 1881. The city is the seat of the Montana Wesleyan University, opened in 1890, of Mount St. Charles College, and St. Vincent's Academy, and has public, State, and other libraries, and a United States Assay Office. Other features are the State Capitol, the High School, Y. M. C. A., and Federal buildings, Broadwater Hot Springs, and Fort William Henry Harrison. Places of scenic interest in the vicinity are Mounts Helena and Ascension, Last Chance Gulch, Ten Mile Cañon, Lakes Sewall and Hauser, and Prickly Pear Cañon. Under the general code provision passed in 1895, the city government is vested in a mayor, elected biennially, and a unicameral council, which confirms the executive's nominations to all subordinate offices except those of police magistrate and city treasurer, which are filled by popular election. The water works are owned by the city. Pop., 1900, 10,770; 1910, 12,515; 1914 (U. S. est.), 13,258; 1920, 12,037.

HELENA (Lat., from Gk. Ἑλένη, *Helenē*). The name of several saints of the Catholic church, the most celebrated of whom is the Empress Helena, wife of Constantius Chlorus, and mother of Constantine the Great. She was born probably in Dardania, about 248, became concubine to Constantius and bore him Constantine about 274, when she became his wife; but in 292, when he became Cæsar, Constantius divorced her so that he might marry another. In 306 Constantine succeeded his father, and it is likely recalled his mother to the court. It is also probable that late in life Helena became a Christian through Constantine's influence and won the gratitude of the Christian community by her zeal for the advancement of religion and her acts of piety and munificence. Among the public events of her Christian life the most remarkable is the discovery (according to the belief of the church) of the cross of the Lord during the memorable visit she made to the Holy Land, after 326. (See CROSS, INVENTION OF; HOLY SEPULCHRE.) The church said to have been built by her at Bethlehem still stands. She died in the year 328, or later. Her day is celebrated by the Latin church on August 18, by the Greeks on May 21. Other saints of the same name are Olga, wife of the Grand Prince Igor of Kiev (died 969), who is honored in the Russian church; and Helena of Sköfde, Sweden, who suffered martyrdom in the twelfth century.

HELENA. A fantastic tragedy by Euripides (412 B.C.), founded on the story that the real Helen never was at Troy, but was represented there by a phantom, while she was carried to Egypt by the gods. There she was found by Menelaus after the Trojan War and rescued from the Egyptian King, and the phantom Helen vanished.

HELENA. 1. The leading character in Shakespeare's *All's Well that Ends Well*, in love with Bertram, who leaves her on their wedding day. 2. An Athenian lady, enamored of Demetrius, in Shakespeare's *Midsummer Night's Dream.*

HELENA, THE. A name given in Germany to Act iii, part ii of Goethe's *Faust*, which was begun in 1800 and published separately in 1827, under the title *Helena: A Classic-Romantic Phantasmagoria.* It is a complete allegorical poem in itself and only slightly connected with the action of the drama.

HÉLÈNE, ā'lān', LOUISE ELISABETH. See ORLÉANS, HÉLÈNE LOUISE ELISABETH.

HELE'NIUS A'CRO. A Roman grammarian and commentator of the second century A.D. He wrote commentaries on some of the plays of Terence (q.v.), and on Horace; the latter were used by Porphyrion (q.v.). Certain scholia or comments on Horace, still extant, whose author is in reality unknown, were wrongly ascribed in fifteenth-century manuscripts to Acro. These scholia have been most recently collected in O. Keller, *Pseudoacronis Scholia in Horatium Vetustiora* (2 vols., Leipzig, 1902–04). Consult Teuffel, *Geschichte der Römischen*, § 365a (6th ed., Leipzig, 1913).

HELENSBURGH, hĕl'enz-bŭr'ŭ. A favorite watering place in Dumbarton, Scotland, on the right bank of the Firth of Clyde, opposite Greenock, from which it is 4 miles distant (Map: Scotland, D 3). The town is entirely modern, dating from 1802, and is laid out with all the regularity of an American city. Pop., 1911, 8529.

HEL'ENUS (Lat., from Gk. Ἕλενος, *Helenos*). The one son of Priam to survive the siege of Troy. After the death of Paris, he vainly wooed Helen and either withdrew to Mount Ida, where at the instance of Calchas he was captured by Odysseus, or deserted to the Greeks outright. He was the twin brother of Cassandra and, like her, gifted with prophecy. He declared that Troy could not be subdued without Neoptolemus and Philoctetes, and his was the suggestion that the Greeks steal the Palladium and build the wooden horse. Having been assigned, along with Andromache, to the share of Neoptolemus, he won this Prince's good will by foretelling the tempest which the embarking Greeks should encounter and by dissuading him from starting. He was taken to Phthia, but advised his master to settle in Epirus. Grateful for his fidelity, Neoptolemus bestowed upon him Andromache, by whom he had a son, Cestrinus. After the death of Neoptolemus, Helenus ruled over a part of Epirus, which he called Chaonia. There he welcomed Æneas (Vergil, *Æneid*, iii, 294–490).

HELFERT, hĕl'fĕrt, ALEXANDER JOSEF, BARON (1820–1910). An Austrian author and politician, born at Prague, where his father, an ecclesiastical historian, was professor. After serving as assistant to his father and as instructor at the University of Cracow, he was elected to the Austrian Parliament of 1848. He soon became connected with the Ministry of Education, of which (1860–61) he was provisional head, and then was made head of the educational bureau in the Ministry of State, and president of the Imperial Commission on Art and Archæology. He became prominent as leader of the Clerical Federalist party in the Austrian House of Peers, which he entered in 1881. He was editor of the *Oesterreichisches Jahrbuch* (1885 et seq.) and author of many historical works, of which the following may be mentioned: *Huss und Hieronymus* (1853); *Die Schlacht bei Kulm, 1813* (1863); *Geschichte Oesterreichs vom Ausgange des Wiener Oktoberaufstandes 1848* (1869–86); *Maria Luise* (1873); *Die Wiener Journalistik im Jahre 1848* (1877); *Joachim Murat* (1878); *Fabrizio Ruffo* (1882); *1814: Ausgang der französischen Herrschaft in Oberitalien* (1890); *Gregor XVI und Pius IX* (1896); *Kaiser Franz I und die Stiftung des lombardo-venetianischen Königreichs* (1901); *Aufzeichnungen und Erinnerungen aus jungen Jahren* (1904); *Die Tyroler Landesvertheidigung im Jahr 1848* (1904).

HELGESEN, hĕl′gĕ-sĕn, Povl (c.1480–?). A Danish humanist, born at Varberg in Halland. He studied in the monasteries at Varberg and Elsinore and became a Carmelite monk. As lector at the University of Copenhagen, he taught the future leaders of the Danish Reformation, and though forced to flee to Jutland because of his opposition to Christian II, in 1523 he returned under Frederick I. He denounced the sins of the clergy, but, when Luther appeared, he opposed him as a revolutionist. Becoming provincial of the Carmelite Order for Scandinavia, in 1530–33 he engaged in a series of polemics with Hans Tausen, the Protestant leader; in 1534 his attempt to reconcile the two different confessions succeeded only in offending both Catholics and Protestants. His ideal was to bring about reformation within the Church. Of considerable repute as a historian, he published *Danmark's Kongers Historie* and *Skibby Kröniken.* Consult Ludwig Schmitt, *Der Karmeliter Paulus Heliä* (Freiburg, 1893).

HELGOLAND, hĕl′gō-länt, or **HELIGOLAND.** A small German island in the North Sea, situated about 35 miles off the western coast of Schleswig-Holstein, in lat. 54° 10′ N. and long. 7° 53′ E. (Map: Germany, B 1). It covers only a little over one-fifth of a square mile. A few centuries ago the island had five times its present area, but the sea was fast consuming it, when a sea wall, 25 feet high, of steel, granite, and concrete, costing $30,000,000, was built for its protection, being completed in 1910. Other work for protection and harbor purposes cost about $8,000,000, and it now affords accommodation for the German high-sea fleet. It holds a commanding position over the entrance to the Kiel Canal and has been heavily fortified, being known as the "Gibraltar of the North Sea." The island played an important part in the naval operations during the War of 1914. (See under War in Europe.) Helgoland has two good ports, one on its northern and another on its southern side. The inhabitants are supported chiefly by fishing and commerce, by serving as pilots, and by catering to the needs of the strangers who come for sea bathing. A lighthouse stands on the cliff near the village. Pop., 3000. The natives are of Frisian origin and speak a Frisian dialect, although German is the official language. Helgoland was anciently sacred to the goddess Hertha, and was known as Fosetisland, from the Frisian goddess Foseta, who had a temple on the island. From the middle of the tenth century it was an independent republic, but came into the possession of the dukes of Schleswig in the fourteenth century and was captured in the beginning of the eighteenth century by Denmark. In 1807 it was occupied by Great Britain, to whom it was officially ceded by Denmark in 1814. By treaty between England and Germany the island became a German possession in 1890.

HELI'ACAL RISING (from Lat. *heliacus,* Gk. *ἡλιακός, hēliakos,* pertaining to the sun, from *ἥλιος, hēlios,* sun; connected with Lat. *sol,* Goth. *sawil,* AS., Icel. *sōl,* Ir. *sul,* Lith., Lett., OPruss. *sauls,* Skt. *sūra, svar,* sun). A star is said to rise heliacally when it rises just before the sun. When the sun approaches a star which is near the ecliptic, the star becomes for a season invisible—the heavens being too bright in the quarters of sunrise and sunset, at the time of its rising and setting, to allow it to be seen. But when the sun, progressing in its apparent orbit, separates from the star, and the latter begins to rise first, it in time rises so much earlier than the sun as just to be visible before daylight. The heliacal risings of various bright stars, such as Sirius, were used by the ancients to mark definite dates in the year. See Canicula.

HELIADE-RADULESCU, ĕl′ī-ăd-rä′dụ-lĕ′-skōō, Joan (1802–72). A Rumanian author, called the "father of modern Rumanian literature." He was born at Targovistea, and was educated under Lazar at St. Sava until this school was closed by the government in 1821. Then he went to Bucharest, as professor and publisher; founded the *Curierul Românesc* (1829–48) and the *Curierul de Ambe Sexe* (1836–44), the earliest Wallachian literary periodicals, and busied himself with almost endless translations —of the Bible, Dante, Tasso, Molière, Ossian, Byron, and Lamartine. In 1828 he published a *Grammar* in which he simplified the Cyrillic orthography. He took so active a part in the revolution of 1848 that he became a member of the provisional government and in consequence was banished when the Russians and Turks overthrew the government. He returned to Bucharest with Omer Pasha in 1854. In his later years he lost much of his national influence and became insane shortly before his death. He wrote: *Paralelismul intre dialectele român si italian* (1841); *Souvenirs et impressions d'un proscrit* (1850); *Le protectorat du Czar* (1850); and a *Mémoire sur l'histoire de la régénération roumaine* (1851); an heroic drama, *Mircea* (1844), and many other plays; a national epic, *Mihaida* (1846); and *Cursŭ de poesie generală* (1868 et seq.). He was very fond of coining words from the Latin and Italian.

HELI'ADES, or **HELI'ADÆ** (Lat., from Gk. Ἡλιάδες). The daughters of Helios and the Oceanid Clymene. They made ready the sun chariot for their brother Phaëthon without the command of Helios and at his death were changed into poplars, while their tears became amber. Some accounts name three Heliades—Ægle, Phaëthusa, and Lampetië; others mention seven. Consult Ovid, *Metamorphoses,* ii, 1–366.

HE'LIÆ'A (Lat., from Gk. *ἡλιαία, hēliaia*). A higher court at Athens, composed of 6000 citizens over 30 years of age chosen by lot annually, and including a panel of 1000 jurors held in reserve. It was usually divided into 10 sections, each of which constituted a court by itself. See Dicast.

HELIAND, hā′lē-ănd (OS. *Hēliand,* Saviour). A Saxon poem of the ninth century. The portion still preserved relates the life of Christ as told by the four Evangelists, whose various narratives the author seeks to harmonize. It is thought to have been composed by a Saxon writer of unknown name at the request of the Emperor Louis the Pious and to have contained when complete about 6000 lines. Fragments of the poem have been found in four different manuscripts. Like all early Germanic poems, the *Heliand* is written in alliterative verse, in the use of which the author shows marked skill. Until the publication by Zangemeister and Braune in 1894 of fragments of a Saxon paraphrase of Genesis, the *Heliand* was the only important monument of Saxon known to the present age. Apart from its great value to the student of language, the *Heliand* is of interest

because of its spirited and sympathetic treatment of the gospel narrative. The author shows himself to be no mere slavish transcriber, but a true poet. In accordance with the taste and knowledge of the age, scenes and incidents are strongly localized, the spirit of the whole work being Germanic rather than Christian. To modern readers the intense reality of the characterization often seems irreverent, suggesting the later treatment of biblical narratives in the religious drama; but the purpose of the poet is evidently earnest and extremely reverent. It is doubtful whether an historically correct treatment of the New Testament would have appealed to the primitive audience for whom the poem was composed. The most recent and the fullest edition of the *Heliand* is that of Piper, the first volume of which, containing the text, appeared in 1897. There are German translations by E. Behringer (1898) and Trautmann, in *Bonner Beiträge zur Anglistik* (1905). Consult: Behagel, *Heliand und Genesis* (2d ed., Halle, 1903); Bruckner, *Der Helianddichter* (Basel, 1904); Löffler, *Das Passiv bei Otfrid und im Heliand* (Tübingen, 1905); Martin, *Der Versbau des Heliand und der altsächsischen Genesis* (Strassburg, 1907); Kunze, *Die Bindung von Haupt- und Nebensatz im Heliand und der altsächsischen Genesis* (Leipzig, 1911).

HELIANTHIN, hē'lĭ-ăn'thĭn. See COAL-TAR COLORS.

HE'LIAN'THUS. See ARTICHOKE, JERUSALEM; SUNFLOWER.

HELIAS, HELIS, or **HELYAS,** hē'lê-ȧs. See SWAN, KNIGHT OF THE.

HELICE, hĕl'ĭ-sē (Lat., from Gk. Ἑλίκη, *Helikē*). 1. In Greek mythology, the daughter of Lycaon, beloved by Zeus and transformed by Hera into a bear. Zeus thereupon placed her in the heavens as the constellation of the Great Bear. 2. The daughter of Selinus and wife of Ion. She gave her name to the town of Helice in Achæa, on the shore of the Corinthian Gulf. This city had a famous temple of Poseidon. It was also a gathering place of the early Ionians. In 373 B.C. it was completely destroyed by an influx of the sea, due to a violent earthquake (Pausanias, vii, 24).

HELICIDÆ, hē-lĭs'ĭ-dē (Neo-Lat. nom. pl., from Lat. *helix*, Gk. ἕλιξ, spiral). A large cosmopolitan family of terrestrial pulmonate gastropod mollusks, the land snails. They have a part of the mantle cavity formed into an air-breathing organ, or lung, and the shell coiled. See SNAIL.

HELICOCERAS, hĕl'ĭ-kŏs'ĕr-ȧs (Neo-Lat., from Gk. ἕλιξ, *helix*, spiral + κέρας, *keras*, horn). A curious fossil ammonoid shell found in Cretaceous rocks of Europe, Asia, and America, characterized by the looseness of the turreted shell, the last coil of which is of irregular curvature. It is one of the peculiar aberrant forms evolved in the last stages of a race that began in Jurassic time with closely wound discoid shells of the normal ammonoid form. See AMMONOIDEA; CEPHALOPODA.

HELICON, hĕl'ĭ-kŏn (Gk. ἑλικών, *helikōn*, musical instrument with nine strings, from ἕλιξ, *helix*, spiral, from ἑλίσσειν, *helissein*, to turn; connected with Lat. *volvere*, to turn, Eng. *wallow*). 1. An ancient stringed instrument for illustrating the theory of musical intervals. 2. The lowest of all brass instruments, a form of the tuba (q.v.). It is constructed in various pitches (F, E♭, C, B♭). The helicon is built in the form of a circle carried around the body, terminating in a wide bell. For this reason it is much used in military bands, because it can be carried with less effort in marching.

HELICON (Lat., from Gk. Ἑλικών, *Helikōn*). A mountain range in the southwest of Bœotia in Greece, forming a continuation of the range of Parnassus. The loftiest summit (now called Palæovouno) is 5738 feet high. At the foot of Helicon stood the village of Ascra, now Pyrgaki, the native place of Hesiod (q.v.) and the seat of an early school of didactic epic. The mountain was the seat of a very ancient worship of the Muses, and with this is probably to be connected the poetic school at Ascra. The grove of the Muses was at the northern foot of Helicon, in a valley near the monastery of St. Nicholas; higher up the mountain (20 stadia according to Pausanias, ix) was the fountain of Hippocrene (q.v.), probably the modern Kryopegadi, or cold spring. Near Ascra was the celebrated fountain of Aganippe. Consult Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909).

HELICON'IDÆ. A family of butterflies noted in the study of mimicry. See MIMICRY.

HELIGOLAND. See HELGOLAND.

HE'LIOCEN'TRIC (from Gk. ἥλιος, *hēlios*, sun + κέντρον, *kentron*, centre). A term in astronomy, signifying that the sun is taken as the centre of reference or view. It is opposed to geocentric (q.v.), which indicates that the earth is taken for centre.

HE'LIODO'RUS (Lat., from Gk. Ἡλιόδωρος). A Greek romance writer, born at Emesa in Syria. He flourished probably at the end of the third century A.D. and is not to be confused with Heliodorus, the Bishop of Trikka in Thessaly, who, according to the Church historian Socrates, wrote a romance in his youth. His work, in 10 books, entitled *Æthiopica* (Αἰθιοπικά), narrates the loves of Theagenes and Chariclea (q.v.). At times the work shows almost epic beauty and simplicity. The descriptions are excellent, and the interest of the reader is in general well maintained; but in the presentation of the emotions the work is far less successful. The language betrays the Semitic origin of the author, and the style shows his rhetorical training and adherence to the Neo-Pythagorean school. Heliodorus was strongly influenced by Homer and Euripides and in his turn has been a favorite model of many French dramatists—e.g., of Racine (q.v.). He influenced also Tasso and Cervantes. The romance was translated into many languages. There are editions by Bekker (Leipzig, 1855) and Hirschig (Paris, 1856); English translations by Rowland Smith (London, 1855) and Underdowne (1857; last printed, London, 1895). Consult: Rohde, *Der griechische Roman* (Leipzig, 1900); Oeftering, *Heliodorus und seine Bedeutung für die Literatur* (Berlin, 1901); Wolff, *The Greek Romances in Elizabethan Prose Fiction* (New York, 1912).

HE'LIODO'RUS, treasurer of Seleucus IV of Syria (187–175 B.C.). Seleucus sent him to Jerusalem to rob the temple, but he was refused admittance by Onias, the high priest, on the first day, and on the next was driven away, according to the story (2 Macc. iii), by a terrible angel. He murdered his master and usurped the throne, from which he was driven by Attalus and Eumenes, princes of Pergamus, after a few months.

HE'LIOGAB'ALUS. See ELAGABALUS.

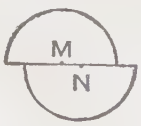
HELIOGRAPH, hē'lĭ-ō-grȧf (from Gk. ἥλιος,

hēlios, sun + *γραφία*, *graphia*, writing, from *γράφειν*, *graphein*, to write). An instrument used for communication between distant stations by reflections of the sun from a mirror or system of mirrors. The great advantage of this method over the ordinary signal system, where flags, semaphores, or other visual signals are employed, is that the apparatus is more portable and can be used over greater distances, but only with success in regions where the atmosphere is clear of clouds for considerable periods of time. There are two methods of using the heliograph, which are based in the main on the dot and dash of the Morse alphabet or code: the reflection may be obscured except when the screen is temporarily removed to produce a flash or letter; or the reflection may be kept exposed except when it is obscured to produce a letter. The first method is said to be the easier for the beginner, but the second less fatiguing to the eye. The distance through which this mode of communication may be carried on varies with the size of the mirrors and the clearness of the atmosphere. In 1890 messages were signaled along the Arizona mountains for 215 miles. When the signaling station forms an angle greater than a right angle between the sun and the receiving station, two mirrors are used to prevent too great a loss of rays by oblique reflection. The mirrors are mounted on tripods and are held by a socket, or a universal joint. The heliograph has served also to define distant points in a geodetic survey and for this purpose has been employed in triangulation. When so used, it is called a heliotrope. Perhaps the chief use of the heliograph is in military operations in the field. It formed the sole means of communication between the besieged British garrisons and the relief columns during the Boer-British War. See SIGNALING, MILITARY.

HELIOG'RAPHY. See PHOTOGRAPHY.

HELIOLITES, hē'lĭ-ō-lī'tēz (Neo-Lat., from Gk. *ἥλιος*, *hēlios*, sun + *λίθος*, *lithos*, stone). A genus of fossil alcyonarian corals found in Ordovician and Silurian rocks and less abundantly in the Devonian formations. Heliolites is the type of an important family, Heliolitidæ, comprising about 10 genera and 45 species. All the members of the family have rounded coral masses that consist of larger tubes surrounded by smaller tubes. The genera and species are based upon modifications of the horizontal and vertical walls that traverse the interior of the mass. They have been found in all countries where Silurian and Lower Devonian formations exist, and they often form fossil coral reefs of considerable extent. *Heliolites interstinctus*, the best-known species, is of world-wide distribution. Consult Lindström, "Remarks on the Heliolitidæ," in *Kongliga Svenska Vetenskaps-Akademiens Handlingar*, vol. xxxii (Stockholm, 1899). See CORAL; OCTOCORALLA.

HE'LIOM'ETER (from Gk. *ἥλιος*, *hēlios*, sun + *μέτρον*, *metron*, measure). An instrument



originally intended for measuring the angular diameter of the sun. It is an equatorially mounted telescope in which the object glass is divided diametrically, the two halves so arranged that they can be made to slide past each other in opposite directions (as shown in the figure) by means of a graduated screw. Each half will form a perfect image in the focus of the eyepiece; and the images may be made to diverge, coincide, or overlap each other by varying the distance between the centres of the half lenses. If the diameter of the sun is to be measured, the two lenses are adjusted so that the images of the sun will touch each other, then the distance between the centres of the two object glasses measured in seconds gives the diameter of the sun. The following diagram will serve to make this clear: *M*, *N*, are the optical centres of the two halves of the object glass; *S*, *T*, the ends of a solar diameter. When the

distance between *M* and *N* is properly adjusted, the image of *S* due to the lens *M* and that of *T* due to the lens *N* will coincide at *J*; *I* is the image of *T* due to the lens *M*, and *K* that of *S* due to the lens *N*. Since *S* and *T* are infinitely distant, the lines *IM*, *JN* and *JM*, *KN* may be regarded as parallel pairs, and consequently *MJN* is the angle subtended at *J* by *ST*, i.e., the sun's angular diameter. It is therefore only necessary to know the angular value of the graduations of the screw in order to be able to obtain the angular diameter of the sun. When it is required to measure the distance between two stars, the line of division of the object glass must first be brought into coincidence with the line joining the stars, and for this purpose the telescope must be mounted so that it can be turned about its own axis.

The original idea of the heliometer was due to Savary (1743) and Bouguer (1748), who made use of two object glasses, one of which could be displaced with reference to the other. Dollond in 1758 showed how a simpler arrangement could be obtained by cutting the object glass into two halves; but the first really available instrument was constructed by Fraunhofer for the observatory at Königsberg, and was mounted there in 1829, three years after his death. The perfected type of instrument as used to-day is the work of A. Repsold and Sons of Hamburg. The original use of the heliometer has been greatly extended, especially in the hands of Gill at the Cape of Good Hope Observatory. As now made, angular distances above two degrees can be measured on the sky with extreme precision. On the whole, the modern heliometer is considered the most precise measuring instrument known to astronomy.

HELIOPHOBES, hē'lĭ-ō-fōbz (from Gk. *ἥλιος*, *hēlios*, sun + *φόβος*, *phobos*, fear). A term applied to plants that are supposed to dislike or avoid the sunlight. It is equivalent in most instances to the more desirable designation "shade plants," that carries with it no implication of purpose on the part of the plant.

HE'LIOPHYL'LUM (Neo-Lat., from Gk. *ἥλιος*, *hēlios*, sun + *φύλλον*, *phyllon*, leaf). A fossil coral very common in the Hamilton shales of central and western New York and other localities in America. This coral is usually simple, of conical form, with a large shallow cup in which a great number of slender septa,

or walls, radiate from the centre towards the elevated edge. Perfect specimens, which are quite common, are really beautiful objects. Sometimes the coral branches, and then two or more cups or calyces are found on the same stem. *Heliophyllum halli* is the common species.

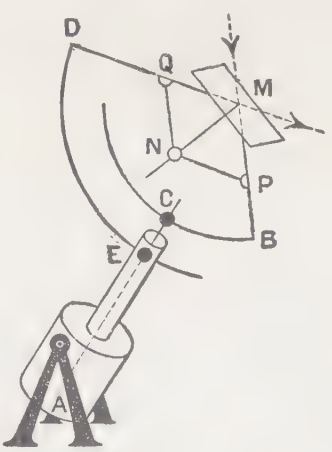
HE'LIOP'OLIS (Lat., from Gk. 'Ηλίου πόλις, *Hēliou polis*, city of the sun). The Greek name of the ancient Egyptian city On, situated on the east side of the Pelusiac branch of the Nile near the apex of the delta. Its site is occupied by the modern village of Matariah. Heliopolis was the seat of worship of the god Tum, or Atum, who later came to be regarded as one of the forms of the sun god Rê. Its sacred name was Per-Rê (house or city of Rê), and of this the Greek name is a translation, as was also the Hebrew name *Bethshemesh*. As On, it is often mentioned in the Bible. Although a very ancient and important city—according to Manetho, it existed in the time of the second dynasty—it is seldom mentioned in Egyptian texts before the twelfth dynasty. Amenemhat I built here a splendid temple, on the site of an older sanctuary, and his son and successor, Usertesen I, erected before it two great obelisks, of which one is still standing. The obelisks known as Cleopatra's Needles, of which one is now in New York and the other in London, were originally erected at Heliopolis by Thothmes III. Under Rameses III (about 1200 B.C.) the temple was at the height of its influence, standing second only to that of Ammon at Thebes; 12,693 persons are said to have been engaged in its service. The theological school of Heliopolis had a strong influence upon Egyptian religious thought, and to it is due a very considerable portion of the religious literature of ancient Egypt. Greek writers mention the great reputation for wisdom enjoyed by the Heliopolitan priests, and Thales, Solon, and Plato are said to have studied under them. Under the later dynasties Heliopolis seems to have declined, since Herodotus speaks only of the wisdom of its priests, not of the splendor of its buildings; and Strabo, at the beginning of the Christian era, states that the place was practically deserted, though the temple and college still existed. The ruins of the city and temple existed in a fair state of preservation far down into Arab times, but now little remains except the obelisk of Usertesen I.

HELIOPOLIS, IN SYRIA. See BAALBEK.

HE'LIOS (Gk. Ἥλιος, or, in the epic, Ἠέλιος, *Eëlios;* connected with Lat. *sol*, Goth. *sauil*, AS., Icel. *sōl*, Ir. *sul*, Lith., Lett., OPruss. *saule*, Skt. *sūra, svar*, sun). The Greek name of the sun god. He was, according to Hesiod's *Theogony*, a son of the Titan Hyperion and of Thea or Euryphaessa, and is described by the same poet as giving light to both gods and men. He rose in the east from the marshy borders of Oceanus, into whose dark abysses he also sank at evening. The later poets, however, gave him a splendid palace in the east, somewhere beyond Colchis, and described him as being conveyed back to Colchis, after the termination of the burning labors of the day, in a winged boat of gold, along the northern coasts of the sea. In the earlier poets Helios is a distinct personality, all-seeing, the possessor of herds on Trinacria, a powerful deity. Later, much of his personality is obscured, and the real sun god becomes Apollo, probably because the word "Helios," denoting also the actual sun, was not felt so fully as a proper name. Euripides contributes much to this fusion. The worship of Helios was widely spread. He had temples in Corinth, Argos, Trœzene, Elis, and many other cities; but his principal seat was Rhodes, where four white horses were annually sacrificed to him. A similar sacrifice was offered in his honor on the summit of Mount Taÿgetus in Laconia. In art he was represented as a young man in the full vigor of his strength and beauty, with flowing hair, and a crown of rays. Often he was represented in his four-horse chariot, as in a celebrated group by Lysippus at Rhodes. Consult Fairbanks, *The Mythology of Greece and Rome* (New York, 1907), and the article "Helios," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HE'LIOSTAT (from Gk. ἥλιος, *hēlios*, sun + στατός, *statos*, fixed; from ἑστάναι, *hestanai*, to stand). An instrument used in astronomy, physics, and engineering to reflect the light from the sun in any desired direction notwithstanding the motion of the sun. It consists essentially of a mirror mounted on an axis, which is parallel to the axis of the earth and is caused to turn by clockwork with the same angular velocity as that of the sun. The first instrument of this kind was described by s'Gravesande (1688–1742) in his *Physices Elementa* (3d ed., 1742).

Various improved forms were invented by Fahrenheit, Biot, Foucault, Silbermann, and others. In Fahrenheit's heliostat a plane mirror is rigidly connected with the revolving axis in such a way that the angle between the normal to the mirror and the axis is equal to half the sun's polar distance. The normal is then adjusted so as to have the same right ascension as the sun, with the result that the mirror will constantly reflect the sun's rays in the direction of the earth's axis; a second fixed mirror is then used to reflect the rays in the desired direction. The use of the second mirror is unnecessary with Silbermann's heliostat, the principle of which may be illustrated by the accompanying diagram: *AM* is the axis of revolution, and *MB* a



rod which can be clamped to the axis in any position by means of an adjustable quadrant *BC*. *MPNQ* is a small rhombus of jointed rods, *M*, *P*, and *Q* being fixed joints, while *N* can slide in a slot on the rod *MN*, which is normal to the mirror and rigidly connected with it. By means of a couple of sights, *MB* is set so as to coincide with the direction of the sun's rays; *MD* is set in the direction in which it is desired to reflect

the rays, and is clamped at *E* to the fixed sleeve in which the axis revolves. The joints, *M*, *P*, and *Q*, must be of such a nature that the rhombus is free to adjust itself as *MB* revolves towards *MD*. Since the angles *NMP* and *NMQ* are always equal, it is easy to see that the incident beam will be reflected constantly in the desired direction. The heliostat is used with the spectroscope (q.v.), where it is desired to keep the sun's rays on the slit or in connection with a permanently mounted horizontal telescope. A telescope of large size and long focal length, especially for spectrographic work (see TELESCOPE), it would be most difficult to mount equatorially, and accordingly it is necessary to reflect the light from the heavenly objects under observation into its object glass. The heliostat has also been used for observing eclipses, especially where it is desired to photograph the eclipse or make extensive spectroscopic observations. The term "heliostat" is also used to name an instrument which is more usually known as the *heliotrope*, used by surveyors and engineers in making long-distance observations for distant stations. This consists of a mirror at the distant station which is so mounted and adjusted that it will reflect a beam of light to the observing station. The heliostat of Thomas Drummond was an instrument of this kind and was employed in geodetic surveying in England with considerable success.

HE'LIOTAX'IS (Neo-Lat., from Gk. ἥλιος, *helios*, sun + τάξις, *taxis*, arrangement). Same as phototaxis (q.v.). See also HELIOTROPISM; TROPISM.

HELIOTHERAPY, hē'lĭ-ō-thĕr'ă-pĭ. A system of treatment consisting in prolonged exposure of the naked body to the solar rays. While the healing virtues of sunlight have probably always been recognized, their systematic employment in the treatment of specific diseases and in graduated doses is a comparatively recent practice. The credit of first using sunlight in this way is generally assigned to Professor Poncet of the Lyonnaise school.

It is interesting to note that as far back as 1857 Madame Duhamel, who cared for tuberculous children at Berck, had them taken twice a day to the beach, and, after bathing them and washing their open sores, exposed them nearly naked to the air, believing that this, with the sunlight, would hasten the cure. Professor Poncet's experiments began about the end of the 19th century; but he, with others of the same school, exposed only the diseased portions of the body which they desired to treat.

Rollier was the first to expose the entire body. At his sanatorium in Leysin, in the Swiss Alps, 4000 feet above sea level, tuberculous patients are treated in the following manner. New patients are put to bed for a few days, to insure acclimatization. After two or three days the bed is wheeled out on a gallery, and the sunlight exposures begin, the diseased focus being exposed for five minutes three times the first day, ten minutes the second, until the patient is getting sunlight exposure for an hour and a half daily. At the same time the body is gradually exposed to the sunlight, at first the feet, then the legs, until the patients are able to remain all day in the open and take sun baths for hours at a time. During the intervals the wounds are covered with an aseptic dressing. Each patient has a gallery to himself, where he can lie exposed to the light during the day and sleep at night also if he wishes. Colds are unknown. Children are allowed to be up and around in winter with snowshoes and bathing trunks for their sole apparel.

The transformation of the subjects under the solar rays is characteristic. Completely exposed to the sun and sheltered from the wind, with head protected by a wide hat and the eyes screened by means of smoked glasses, pigmentation of the skin is very rapid; at the end of a month or two brunettes take the color of rosewood and actually look like negroes, blondes become mahogany-colored, the general aspect is modified and becomes blooming, the muscles are regenerated, the digestive functions are regular. Of the diseases benefited by this form of treatment, all forms of surgical tuberculosis show the greatest improvement. All varieties of external tuberculosis, tubercular peritonitis, tuberculosis of the eyes, muscular rheumatism, infected wounds, and many chronic skin diseases are cured.

Collet treated patients suffering from laryngeal tuberculosis by heliotherapy in a most ingenious manner. The patient, wearing a broad black hat and black spectacles, sits facing the sun, and by means of a laryngoscopic mirror placed in the throat and a hand glass in front of him directs the rays of sunlight into the larynx. This procedure is repeated at intervals during the day until a total exposure of an hour or more is attained.

Kime, of the Boulder Sanatorium, at Fort Dodge, Iowa, investigated the effect upon the skin of the chemical rays obtained by filtering sunlight through various media. Direct sunlight produces erythema solare (sunburn), marked by extreme redness, swelling, and great tenderness, with subsequent peeling of the skin. There is some tendency to the formation of blisters. Sunlight, concentrated by large reflecting mirrors and passed through blue glasses, thus securing the maximum effects of the chemical rays, shows a great tendency to blister, but there is little redness and swelling and practically no pain. Focusing direct sunlight through a convex lens of plain glass produces destruction of the skin, and, if used with great intensity, gases form beneath the outer layers of the skin, and small explosions occur. This method of using sunlight is very efficacious in the removal of warts, superficial moles, and small nonmalignant growths. If the light be reflected by a concave mirror and focused, the formation of gases is not noted. If, after the light is focused in either of the two ways last mentioned, it is passed through blue glass before falling on the skin, blistering is produced without destruction of the deeper layers of the skin. When a wavy, opalescent glass is employed and the sunlight is reflected with a large condensing mirror, 10 feet in diameter, and passed through this opalescent glass, neither blistering nor destruction of the skin takes place, but blanching of the tissues occurs. The light used in this manner is very effective in lupus and in vascular nævi, even of very large extent. Just what the properties of the light may be that effect these various results has not been determined. It would appear, however, that some of the rays are absorbed by the reflecting mirror and others by the variously colored glasses. The wavy glass transmits the light in an irregular manner and produces results widely different and more effective, in the class of cases mentioned, than the glass with an even surface. See PHOTOTHERAPY.

HE'LIOTROPE. See SURVEYING INSTRUMENTS; HELIOGRAPH; HELIOSTAT.

HELIOTROPE (from Lat. *heliotropum*, Gk. *ἡλιοτρόπιον*, *hēliotropion*, heliotrope, sundial, from *ἥλιος*, *hēlios*, sun + *τροπή*, *tropē*, a turning, from *τρέπειν*, *trepein*, to turn), *Heliotropium*. A genus of plants of the family Boraginaceæ (q.v.). Many of the species have fragrant flowers which are used by perfumers. The Peruvian heliotrope (*Heliotropium peruvianum*), a small shrub, seldom more than 2 feet high, with oblong-lanceolate wrinkled leaves and small lilac-blue flowers, is in almost universal cultivation for its fragrance, which resembles that of vanilla. The European or common heliotrope (*Heliotropium europæum*), a native of the south and west of Europe, is an annual with small white, or rarely pale-red, flowers. A white-flowered species (*Heliotropium curassavicum*) grows wild in

HELIOTROPE.

the southern United States. *Heliotropium corymbosum* is a large-trussed, large-flowered, narcissus-scented species. Many hybrid heliotropes are now to be seen in flower gardens and greenhouses, which exhibit great variety in the size and color of their flowers. They delight in a light, rich soil. The shrubby kinds are generally propagated by cuttings.

HELIOTROPE, or BLOODSTONE. A variety of chalcedony of a green color, with small spots of red jasper. It is found in Siberia, in the Hebrides on the west coast of Scotland, and in the United States—in Chatham Co., Ga., Orange Co., N. Y., and in Oregon and Colorado. It was known to the ancients, who valued it for gem purposes. During the early ages of the Christian Church it was used for the engraving of sacred subjects, the figures being so arranged that the red spots were made to represent drops of blood. It is sometimes called St. Stephen's stone. It is still frequently used as a seal.

HE'LIOT'ROPISM, or **PHOTOT'ROPISM** (from Gk. *ἥλιος*, *hēlios*, sun + *τροπή*, *tropē*, a turning). The sensitiveness of plant organs to the direction of light rays incident upon them. The organ responds to lateral illumination by bending in such a way as to bring its axis into a certain fixed position with reference to the direction of the rays of light. The main shoots of most higher plants are positively heliotropic—i.e., they bend so as to direct their axes towards the source of illumination (Fig. 1). Thus, whenever plants are grown in front of a win-

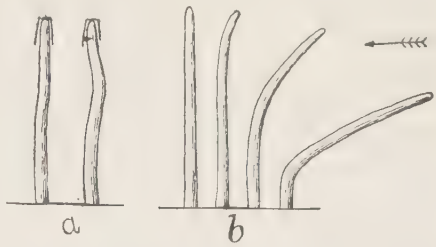


FIG. 1. POSITIVE HELIOTROPISM.

Seedlings of oats grown in darkness: *a*, two exposed to light from direction of arrow, but with sensitive tips capped with tin foil; *b*, four, whose tips were not shaded, sketched at intervals as the bending towards the light increased. Growth is accelerated on the side less illuminated.

dow, the stems bend towards the light. Some organs are negatively heliotropic. This is seen best in the case of certain roots (especially those of plants belonging to the mustard family) when grown in water. If such roots are laterally illuminated after having been grown in the dark, they bend away from the light. This distinction between primary roots and stems is only apparent, for primary roots (so far as they are phototropes at all) respond positively to unilateral light of very low intensity, while stems respond negatively if the light be of very high intensity. The difference, then, is in the intensity required to give one or the other response in the two sorts of organs.

Another mode of response to the stimulus of one-sided illumination is known as "diaheliotropism." Most leaves are diaheliotropic; they bend so as to bring their blades into a plane at right angles to the direction of the incident rays, the normally upper side of the leaf always facing the light (Fig. 2). This reaction is well shown by many house plants, such as the geranium (*Pelargonium*), when subjected to one-sided lighting. The form of heliotropic response may be very different when the intensity

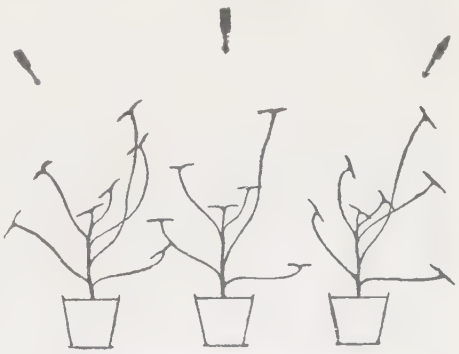


FIG. 2. TRANSVERSE HELIOTROPISM OF LEAVES.

Diagrams showing the plane of the leaves of Tropæolum with light successively from the direction of the arrows.

of the illumination varies. Many leaves, when exposed to a light of medium intensity, are diaheliotropic; but when the intensity of the light increases beyond a certain limit, they bend so as to direct their tips either towards or away

from the source of the stimulating rays. They thus present less surface for the light to fall upon. Oxalis leaves show this response on bright summer days. The leaflets fold along the midrib and drop downward as though wilted. Clover (*Trifolium*), the sensitive plant (*Mimosa*), cassia, the bean (*Phaseolus*), and many others exhibit this phenomenon also. The final position assumed by any plant organ is never due, in nature, to the heliotropic response alone, but results from the combined action of many factors, of which light and gravity are the most important. See PHYSIOLOGY OF PLANTS.

For heliotropism in animals, see TROPISM; PHOTOTAXIS.

HE'LIOZO'A (Neo-Lat. nom. pl., from Gk. *ἥλιος, hēlios,* sun + *ζῷον, zōon,* animal). An order of rhizopods, comprising forms naked, or clothed with a siliceous skeleton, and with fine, more or less stiff pseudopodia radiating from all sides. Contraction vacuoles are generally present. They are fresh-water forms and are frequently called sun animalcules. They are sometimes supplied with a stalk and occasionally form colonies, but many of them are free-swimming. They take their food into the body by means of the currents of protoplasm on the pseudopodia. A widespread and familiar species is *Actinophrys sol.*

HELIUM (Neo-Lat., from Gk. *ἥλιος, hēlios,* sun). A gaseous element detected spectroscopically in the solar chromosphere by Janssen in 1868, Janssen's observation being correctly interpreted in the same year by Lockyer and Frankland as the discovery of a new element, which they named helium, the solar element. Among the elements of the earth helium was discovered in 1895 by Ramsay, who found it as the principal constituent of the gaseous mixture given off by the Norwegian mineral cleveite on heating. Later in the same year Kayser discovered spectroscopically its presence in the air, and in 1908 Ramsay showed that 1,000,000 volumes of air contain about four volumes of helium. The element further occurs in the mineral uraninite, from which Hillebrand expelled it in 1889 (without recognizing the gas as a new element); also in fergusonite, bröggerite, and certain other minerals. According to Cady and McFarland, Kansas natural gas contains in some localities nearly 2 per cent of helium; others have found relatively large amounts of helium in the gases from certain mineral springs. How it originated in all these sources, how it is held so firmly occluded in the minerals mentioned above, is not known, and the keenest investigators have not yet succeeded in throwing light on the subject. But by far the most remarkable fact about helium is its *creation* (discovered by Ramsay and Soddy in 1903) from the element radium, and again its creation (discovered in 1907) from the radioactive elements actinium and thorium. When, e.g., a radium salt is dissolved in water, a slight evolution of gas sets in, the water being decomposed into hydrogen and oxygen, while the radium salt itself gives a radioactive "emanation" (see NITON); but the latter is not a permanent substance, for in the course of about four days it gradually disappears, helium gas appearing in its place.

Helium (symbol He; atomic weight, 3.99) is a colorless gas, not quite twice as heavy as hydrogen. Chemically it is, as far as known, absolutely inert, no substance being known to contain helium in chemical combination. Its molecules consist of single atoms, so that its atomic weight is also its molecular weight. In 1909 Kammerlingh Onnes, after many fruitless efforts, succeeded in liquefying the gas, his product being no less than 60 cubic centimeters of pure liquid helium. He found it to be the lightest liquid known, its specific gravity being only 0.122. The critical temperature of helium is 268° below the freezing point of water (i.e., only 5° above the absolute zero of temperature), which explains the difficulty of liquefying it. (See CRITICAL POINT.) Under normal atmospheric pressure liquefied helium boils at 268.5° below 0° C.; but even the great cold produced by its rapid ebullition is not sufficient to freeze it.

The isolation of helium in the pure state is a matter of some difficulty. To begin with, some mineral containing the gas, like cleveite or uraninite, is finely powdered and heated with dilute sulphuric acid, the air being excluded and the expelled gas being collected over mercury. The gas—mostly helium, but containing also nitrogen and other atmospheric constituents—is next transferred into an evacuated vessel partly filled with a mass of charcoal and cooled from the outside with liquid air; the charcoal gradually absorbs everything except the helium and part of the neon (q.v.), and if the process is repeated several times, nothing but pure helium remains behind unabsorbed.

HE'LIX (Lat., from Gk. *ἕλιξ*, spiral). 1. In geometry, the spiral line described on a regularly revolving cylinder by a point moving parallel to its axis. 2. In architecture, such a line is described when a flight of steps winds round a cylindrical space or centre post. The name is also given to the little volutes under the flowers of the Corinthian capital. The *helical* line is the central line of such a helix or spiral. 3. A genus of land snails. Fossil forms are often found in great abundance in both the fresh-water and marine limestones and marls of Tertiary age in America, Europe, Asia, and Africa. See SNAIL, and Colored Plate of SNAILS.

HELL (Icel. *hel,* AS. *hel, hell,* OHG. *hella,* Ger. *Hölle;* probably connected with AS., OHG. *helan,* Ger. *hehlen,* to cover, and ultimately with Lat. *celare,* Gk. *καλύπτειν, kalyptein,* to hide, OIr. *celim,* I hide; hence, the hidden, unseen place). In common use, the place or state of the wicked after death, or the abode of evil spirits. Among the early Teutons the term signified the place under the earth whither all men, good or bad, went after death, and consequently denoted a conception similar to the Hebrew Sheol (q.v.). There is evidence, however, that already before contact with Christianity this nether world was divided into distinct parts. Thus, in the realm over which the goddess Hel rules there is the blessed place where Balder and Nanna dwell, and also Lif and Lifthraser, who are to become parents of a new and better human race; and there is Nastrand, where the monster Nidhögg feeds upon the bodies of murderers, perjurers, and adulterers. How strongly intrenched the original meaning was is evident from the fact that the early translators of the Bible did not hesitate to use the word as a rendering of Sheol, the pit, or the grave, even in passages where good men are said to descend into these places. Modern translators generally restrict the word to those cases where the original has Gehenna (q.v.) or Tartarus, in harmony with the significance that the term has gradually attained.

The Greek conception of Hades, or the unseen world, as seen in the Homeric poems, is substantially the same as that of the early Teuton. To the animistic origin of the idea the Mycenæan tombs bear testimony. Whatever native tendencies there may have been in the direction of a moral distinction and a differing lot among the shades in Hades, they were greatly strengthened in the seventh and sixth centuries B.C. by the establishment upon Grecian soil of the originally Thracian Orphic cult societies. Those initiated in the Orphic mysteries secured for themselves a blessed immortality, while the uninitiated were liable to severe punishment for their sins in Hades. In a society where the *lex talionis* prevailed, it is natural that the punishment conceived to be inflicted upon men in a future world should be related to the crimes committed, and Greek imagination nicely adjusted the penalty to the sin. Through Pythagoras of Samos in the sixth century B.C., the idea of a transmigration of souls and the necessity of expiating the sins of a past age grafted itself upon the Orphic conceptions. With the expansion of Greek civilization through the conquests of Alexander, Orphic and Pythagorean speculation spread in the East, modifying or transforming many native ideas. As in other Semitic nations, so in ancient Israel, the shadowy existence in Sheol was in marked contrast with existence in the land of the living and could not be called life at all. In Sheol there were no moral distinctions and no rewards for virtue or punishments for crimes. "The wicked ceased from troubling, and the weary were at rest." This attitude towards the future was preserved throughout the Old Testament. There is not a single passage in which Sheol is represented as a place where the wicked are punished. When for the first time the idea of a resurrection is found in the twelfth chapter of the Book of Daniel (written 165 B.C.), the tyrants that are raised to obloquy and shame, as well as the martyrs that rise to life and glory, undoubtedly continue their existence on earth. In an addition to the last chapter of the Book of Isaiah, probably made in the second century B.C. (lxvi. 23, 24), it is predicted that the pious Jews who visit the temple in Jerusalem on Sabbaths and other holidays will go out to look with pleasure upon the carcasses of the enemies that are being consumed by fire and worms. Probably the valley of Hinnom (q.v.) is meant. It is significant that this place of punishment has not yet been transferred to the unseen world. There was no allusion to this passage in the original text of Ecclus. vii. 17, where the Hebrew has only "the hope of man is the worm." But substantially the same conception of the valley of Hinnom is found in Enoch xxvii. 2, 3, and xc. 24–26. While the growth of the doctrine of Gehenna can be explained from national premises (see HINNOM), the transformation of a Sheol without wide distinctions into a hell where the wicked are punished, seen for the first time in Enoch xxii (towards the end of the second century B.C.), can scarcely be accounted for without resorting to the assumption of foreign influence, Persian or Hellenistic. In this place of punishment some sinners remain, according to the author, even after the general judgment, being neither slain nor raised. The Parables of Enoch (see ENOCH, BOOKS OF) refer to "a deep valley with burning fire" into which the kings and the mighty are cast, and where there is an "abyss of complete condemnation" and a burning furnace for the hosts of Azazel liii. 1–5. This is evidently Gehenna. In the Slavonic Enoch the prison of the apostate angels is in the second heaven (vii), and the place of the damned in the northern part of the third heaven (x); and in the Testaments of the Twelve Patriarchs the spirits of the lawless are confined in the second heaven. In the Wisdom of Solomon, iii. 10, 14; iv. 10, 19, Hades is practically identical with Gehenna, since the author does not believe in a resurrection. The influence of Orphic-Pythagorean thought is particularly evident in the fullest description of hell preserved from the early Church, the Apocalypse of Peter, where the different punishments are carefully adjusted to the different kinds of sin. Among early Christian writers the word "hell" is variously employed, sometimes to signify a place of temporary purgation, in which sense it comprehends the Roman Catholic purgatory; sometimes the place (*limbus patrum*) in which the souls of the just of the old law awaited the coming of Christ, who was to complete their felicity; sometimes the place in which unbaptized children are believed to be detained, on account of the stain of unremitted original sin; and lastly, the prison of those who die stained with the personal guilt of grievous sin. As to the nature of the punishment to which they are subjected, whether it is confined to the "pain of loss"—i.e., to the remorseful consciousness of having forfeited the presence of God and the happiness of heaven—or whether and to what degree it further includes the "pain of sense," there is some difference between the Eastern and the Western church, and it is sometimes alleged that the Eastern church altogether rejects the idea of punishment of sense. This, however, is a mistake; both churches agree that the punishment of hell includes the "pain of sense," the controversy between them having regarded not the existence of the pain of sense, but certain questions as to its nature, and especially whether it consists of material fire—a point which, in the decree for the union of the Greek and Latin churches at the Council of Florence, was left undecided. The controversy on the subject of the eternity of the punishment of hell dates from an early period, Origen and his school having taught that the punishment was but purgatorial in its object; that, its purifying effect having once been attained, the punishment would cease for all, even for the devils themselves; and that its duration in each case is proportioned to the guilt of the individual. This doctrine of the final restoration of all to the enjoyment of happiness was the well-known Origenistic theory of the *apocatastasis*, to which so many of the early writers refer. It was condemned by the second Council of Constantinople, and a belief in the eternity of the punishments in hell became characteristic of both the Eastern and the Western churches, and from them passed into the creeds of the churches of the Reformation. The more radical thinkers of the Renaissance period rejected the doctrine of hell, and especially many Baptist and anti-Trinitarian churches. In modern times the belief in physical punishment after death has been abandoned by certain Protestants, and the endless duration of this punishment is rejected by many, either on the ground of a future acceptance of Christ after a punishment commensurate with the offenses committed during a

brief lifetime, or for reasons connected with their general interpretation of life. Consult: Söderblom, *La vie future* (Paris, 1901); Dieterich, *Nekyia* (Leipzig, 1893); Charles, *Eschatology* (London, 1899); Bautz, *Die Hölle* (Mayence, 1882); Passaglia, *De Æternitate Pœnarum deque Igne Inferno* (Regensburg, 1854); Volz, *Jüdische Eschatologie von Dàniel bis Akiba* (Tübingen, 1903); Bousset, *Die Religion des Judentums in neutestamentlichen Zeitalter* (2d ed., Berlin, 1906). See ESCHATOLOGY; HEAVEN; INTERMEDIATE STATE; JUDGMENT, FINAL.

HELL, PETER. See HELE, PETER.

HEL'LA. A town in Asiatic Turkey. See HILLAH.

HEL'LADOTHE'RIUM (Neo-Lat., from Gk. Ἑλλάς, *Hellas*, Greece + θηρίον, *thērion*, dim. of θήρ, *thēr*, wild beast). A fossil giraffe, with hornless skull and legs of nearly equal length, skeletons of which have been found in the Pliocene deposits of Europe, Persia, and India. It is interesting as being allied to the recently discovered okapi. See GIRAFFE.

HEL'LAND, AMUND THEODOR (1846–). A Norwegian geologist, born at Bergen and educated at the University of Christiania, where he became lecturer in 1874 and professor in 1885. For scientific purposes Helland traveled through almost all European countries, from North Cape to Greece, Italy, and Spain, to north Africa, to Greenland (1875), where he showed the quick movements of the glaciers, to the Orkney, Faroe, and Shetland Islands (1879, with James Geikie), Iceland (1881), and every district of Norway. He wrote many books and a large number of articles on fiords, seas, glaciers, ores, volcanoes, and mining. In 1897 he became editor of the great work *Norges Land og Folk* (founded in 1884 by Kjær and others), of which, in 1914, 29 volumes were ready (also Ger. trans.). Besides, he published the important *Haandbog i Grubedrift* (Manual of Mining, 3 vols., 1887) and *Norsk Bergret* (1892), and a work on prehistoric Norway, *Oldfundene og Norges Folkemængde i forhistoriske Tider* (1908), which attracted much attention.

HELLANI'CUS (Lat., from Gk. Ἑλλάνικος, *Hellanikos*) (c.496–c.406 B.C.). One of the Greek logographers (q.v.) of the fifth century B.C., born at Mytilene on the island of Lesbos. Although a contemporary of Herodotus, Hellanicus' attitude was essentially that of the older Ionian logographers rather than that of the historian. He traveled extensively, and the titles of his works show that he had an intimate knowledge of many parts of Greece. He wrote a chronicle based upon the records of the priestesses of Hera at Argos (Ἱέρειαι αἱ ἐν Ἄργει), and another based on the lists of victors at the Carneian games at Sparta (Καρνεονῖκαι). He also composed special histories of a number of districts in Greece, such as the Ἀτθίς (history of Attica), Φορωνίς (history of Argos), Ἀσωπίς (history of Bœotia), *Arcadica*, *Æolica*, *Lesbica*, etc., as well as accounts of special events, such as the Trojan War (Τρωϊκά) and the Persian invasion (Περσικά). He is blamed by Thucydides and subsequent historians for inaccuracy in his chronological statements, but there can be no doubt that his work was employed by Herodotus and later historical writers. He first made progress towards a scientific chronology and, for his sources, went beyond mere tradition to priestly records. All that is preserved of his writings is given in Müller, *Fragmenta Historicorum Græcorum* (Paris, 1841–70), and in Kullmer, "Hellanikos," in *Jahrbücher für klassische Philologie*, Supplementband xviii (Leipzig, 1902). Consult: Koehler, *Leipziger Studien zur klassischen Philologie*, xviii (Leipzig, 1898); Lehmann-Haupt, "Hellanicos, Herodot, Thukydides," in Klio, vol. vi (ib., 1906); J. B. Bury, *Ancient Greek Historians* (New York, 1909); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (5th ed., Munich, 1908).

HEL'LAS (Lat., from Gk. Ἑλλάς). In the Epos, a district of southern Thessaly, near Phthiotis, with which it is sometimes identified; it was under the rule of Peleus, father of Achilles. As the name Hellenes (Ἕλληνες, or, at first, Παναχαιοί) came to be applied to the whole Greek race, so the name "Hellas" was applied to the lands where the Greeks were settled, and, in a more restricted sense, to the mainland of Greece, especially the district north of the Peloponnesus. The Greeks seem to have received the name "Hellenes" as a collective title with the growth of the legend that Hellen (q.v.), son of Deucalion, was the father of the race. Originally it must have meant only the inhabitants of the little district of Hellas.

HELL'BEND'ER. A large, ugly-looking, but harmless salamander (*Cryptobranchus alleghaniensis*), which occurs in Ohio, Pennsylvania, Tennessee, and southward. It is also commonly known as alligator and water dog. It is voracious and feeds on crayfish, fish, and other water animals and readily takes the bait from the fisherman's hook. It exudes much slime and is consequently difficult to handle. It is tenacious of life and can live for hours out of water. The spawn much resembles that of frogs, but is lighter in color. It may reach a length of about 20 inches.

HELLBORN, LOUIS SUSSMAN. See SUSSMAN-HELLBORN.

HELLDEVIL. See CORYDALIS.

HELLE, hĕl'lē (Lat., from Gk. Ἕλλη). In Greek mythology, a daughter of Athamas, King of Orchomenus in Bœotia, and the goddess Nephele (Cloud). When Athamas married Ino (q.v.), daughter of Cadmus, Nephele punished the land by a drought. Ino plotted the sacrifice of Phrixus, brother of Helle; but Nephele rescued her children by giving them the ram with the golden fleece, on which they escaped over the sea to Colchis. While passing through the strait between Asia and Europe, Helle fell from the ram and was drowned. The strait was called Hellespont, or sea of Helle, in her honor. The fleece of the ram the Argonauts (q.v.) later sought. See GOLDEN FLEECE.

HELLEBORE, hĕl'ē-bōr (Lat. *helleborus*, *elleborus*, from Gk. ἑλλέβορος, ἐλλέβορος). A name applied to a number of plants of different genera, but properly to the species of *Helleborus*, a genus which belongs to the family Ranunculaceæ, and which contains about a dozen species, most of which are natives of Europe. The species are perennial herbs, with short rootstocks and few stem leaves; the leaves are deeply divided, and the flowers terminal. One of the best-known species is the black hellebore (*Helleborus niger*), which has evergreen leaves and is so called from its black rootstock. Its flowers, which are white or tinged with red, turning green after fertilization, appear very early in the season; in England, frequently during the winter, on which account it is called

Christmas rose. In former times this plant was reputed as efficacious in the treatment of insanity, but it is little used at present. It has some medicinal properties, but in overdoses is an acrid poison. A second species, common in Europe, is the stinking hellebore (*Helleborus fœtidus*), which grows upon hills in England and elsewhere, has leafy stems, and greenish flowers tinged with purple. It is noted for its disagreeable smell. Green hellebore (*Helleborus viridis*), which has large, greenish-yellow flowers, is another common European species. It has escaped from cultivation in the eastern part of the United States. *Helleborus orientalis*

HELLEBORUS NIGER.

is the species known to the ancients. To it was first attributed the virtue of a specific for insanity. It is particularly abundant in Greece and the Levant and was formerly very plentiful about Anticyra, where the best was obtained. Of these different species there are many horticultural varieties, some of which are beautiful. On account of their early flowering they are planted usually in shrubberies and borders. Closely allied to the above, and often called winter hellebore, is *Eranthis hyemalis*, the winter aconite, a native of central and southern Europe introduced into England and sparingly escaped in the United States. This plant is employed in horticulture in the same way as the species of *Helleborus*. It has a single large yellow flower surrounded by an involucre of a single leaf.

A third plant, to which the name "white hellebore" is given, is *Veratrum album*. This genus belongs to the Liliaceæ. White hellebore has a leafy stem, 3 to 4 feet high, and a long compound panicle of yellowish-white flowers. It is a native of central and southern Europe and abounds in mountainous regions. The root of this plant is an active, acrid poison and is used in medicine. In a powdered state it is an important insecticide and is especially valuable for dusting over currant bushes as a protection against the currant worm. The American hellebore (*Veratrum viride*), also known as swamp hellebore, Indian poke, and itchweed, is a common plant in wet grounds from Canada to Alabama. Its properties are similar to those of white hellebore. A species commonly known as *Veratrum californicum* is found from the Rocky Mountains to the Pacific coast. Its properties are doubtless similar to those of the other species, and it is reputed to be the cause of considerable loss to stockmen through its being eaten by stock. The active principle seems in all of the species to be the alkaloid veratrine, or a substance similar to it. Some pharmacologists restrict the production of veratrine to the related *Asagræa officinalis*, or *Schœnocaulon officinale*, and call the corresponding alkaloid of *Veratrum viride* veratroidine.

HEL'LEN (Lat., from Gk. Ἕλλην). In Greek tradition, the son of Deucalion (q.v.) and Pyrrha, and father of Dorus, Æolus, and Xuthus; from Æolus were descended the Æolians, from Dorus the Dorians, while from the two sons of Xuthus, Ion and Achæus, came the Ionians and the Achæans. From Hellen came the collective name of the Greeks, Hellenes. (See HELLAS.) The whole story is relatively late, being unknown to the Homeric poems, where the Hellenes are a tribe of the Phthiotis, a district in Thessaly, and is probably a creation of the eighth century B.C. or later, when the feeling of national unity developed among the Greeks, and the name "Hellenes" received its later meaning. We are told that Hesiod and Archilochus were the first to call the body of Greeks Hellenes.

HELLENES, hĕl'lēnz. The name applied by ethnologists to the earliest Greek-speaking Aryans, who on their arrival in the peninsula found the land already inhabited by the Pelasgians, the eastern division of Sergi's Mediterranean species. The Pelasgi, excepting a few scattered groups, became Hellenized, the heterogeneous elements being fused with a Hellenic nationality, built upon a Pelasgic substratum and possessed of Hellenic culture. See GREECE.

HELLEN'ICA (Lat., from Gk. Ἑλληνικά, *Hellēnika*, neuter pl. of Ἑλληνικός, *Hellēnikos*, relating to Greece, from Ἑλλάς, *Hellas*, Greece). An historical work in seven books by Xenophon, taking up the history of Greece from the point at which the history by Thucydides ends, and covering the 48 years prior to the battle of Mantinea. The work is on the whole a very important authority for the period covered, but suffers from incompleteness, failure to mention momentous events, and the prejudice of the author. Convenient editions with English notes, etc., are those by Manatt (Boston, 1888), Bennett (ib., 1892), and Brownson (New York, 1908).

HELLEN'IC STUDIES, SOCIETY FOR THE PROMOTION OF. An English society, organized in 1879 for the advancement of the study of the Greek language, literature, and art, and for the perpetuation of the history of the Greek race in the ancient, the Byzantine, and the Neo-Hellenic periods. It has devoted itself to the collection of drawings, facsimiles, transcripts, plans, and photographs of Greek inscriptions, works of art, ancient sites and remains, and to organizing means for the pursuit of archæological researches in countries which at any time have been the sites of Hellenic civilization. The society issues annually the *Journal of Hellenic Studies*, which contains the results of the researches prosecuted under its auspices. It has members in every quarter of the globe. Among those who were active in the work of organization were: J. S. Blackie, Sidney Colvin, J. P. Mahaffy, A. H. Sayce, Sir Richard Jebb, Sir

John Lubbock, and Hon. A. J. Balfour. The society has about 900 members, including foreign members in every quarter of the globe. The annual meeting of the society takes place in June.

HEL'LENIST (Gk. Ἑλληνιστής, *Hellēnistēs*, one who speaks Greek, from Ἑλληνίζειν, *Hellēnizein*, to speak or make Greek, from Ἕλλην, *Hellēn*, Greek, from Ἑλλάς, *Hellas*, Greece). In biblical and Jewish history, a Jew distinguished by the adoption or affectation of Greek thought, manner, or language. The Greek word is found in the Bible only in Acts vi. 1; ix. 29; xi. 20 (cf. the Revised Version, margin), and in the last two of these passages the Codex Alexandrinus reads, not "Hellenist," but "Greek" (Ἕλλην). The latter term, which occurs rather frequently in the Greek Bible, chiefly in the books of the Maccabees, the writings of Paul, and the Acts, is used generally for the heathen, in distinction from the Jewish, world, although at times in a more narrow sense of the cultured, in distinction from the barbarian, part of the non-Jewish world. After the conquest of the civilized world by Alexander the number of Jews outside of Judæa, and especially in Egypt, Cyrene, and Syria, increased very rapidly. In these countries the Jew soon lost the use of his original Palestinian Aramaic and came to speak Greek, finally using it altogether, even in the synagogue services. Many Jews in these circumstances were brought into close contact with Greek thought and literature and in some cases were ardent students of Greek philosophy. To their more rigid brethren in Judæa such Jews were "Hellenists," and all Greek-speaking Jews were liable to be thus designated. Even in Judæa a Hellenizing party grew up, and the conflict of tendencies thus engendered precipitated the Maccabæan War (168–142 B.C.). The war put an end to the Hellenizing propaganda, and the term "Hellenist" came to be used with no special prejudice, simply as a designation for a Jew whose native tongue was Greek and not Palestinian Aramaic. If "Hellenists" is the original reading in Acts xi. 20, which does not seem probable, then Luke must have used the word inadvertently as practically equivalent to "Greeks." See JEWS; and for the Hellenistic Greek dialect, see BIBLE.

HEL'LENIS'TIC ART. See GREEK ART, *History*, III, The Hellenistic Period.

HELLENISTIC GREEK. See GREEK LANGUAGE, *Later History*.

HELLENISTIC PERIOD. See ALEXANDRIAN AGE; GREEK ART, *History*, III, The Hellenistic Period; GREEK LANGUAGE, *Later History;* GREEK LITERATURE, 4, *The Alexandrian Age*.

HELLENISTIC PHILOSOPHY. See GREEK PHILOSOPHY.

HELLER, hĕl'lẽr, KARL BARTHOLOMÄUS (1824–80). An Austrian naturalist, born at Myslibořitz, Moravia, and who was a professor in the Theresianum at Vienna. He traveled in Central America and Mexico in 1845–47 and is best known for his attempt to classify the fauna of that region in his *Reisen in Mexiko in den Jahren 1845–48* (1853).

HELLER, STEPHEN (1814–88). An Hungarian composer and pianist, born in Budapest. When only nine, he performed so successfully in public that he was sent to Vienna to continue his studies. In 1827 he played in Vienna and in 1829 began a concert tour through Europe with his father, which was interrupted in 1830 by a serious illness at Augsburg. Here he remained from 1830 to 1838. He had meanwhile continued his musical studies and upon going to Paris became an intimate friend of Chopin, Liszt, and Berlioz. As a pianist, Heller now became well known, but his compositions gained favor more slowly. They are characterized by a fresh, natural beauty, forceful treatment of themes, and exquisite melody. In the originality of his themes Heller far outranks Mendelssohn, with whom, however, he has much in common. His studies for the pianoforte are among the very best and are in universal use. With the exception of two visits to London, Heller lived in Paris from the time of his first journey there in 1838 to his death. For his life, consult Barbadette (Paris, 1876; Eng. trans., 1877); R. Schütz, *Stephen Heller: Ein Künstlerleben* (Leipzig, 1911).

HEL'LESPONT. See DARDANELLES.

HELLEU, ā'lẽ', PAUL (1859–). A French dry-point etcher and painter. He was born at Vannes and studied painting at the Ecole des Beaux-Arts with Gérôme, although following impressionism. He began as a painter of dim Gothic naves and stained glasses, such as "Glasses of St. Denis," in the Boston Museum; then took up landscape, depicting autumn scenes with falling leaves, like his "Study of Versailles," in the Luxembourg; and he also painted portraits. But his chief reputation is in dry-point (q.v.) etching, of which he became probably the greatest master of his time. He received his first instruction in this medium from James Tissot. His principal theme the portraiture of modern woman tastefully and fashionably attired, he depicts her with unstudied elegance and refinement and in graceful spontaneous poses, which place his work in a class by itself. Using a diamond-pointed needle, he draws directly upon the copper plate with a sureness of line that knows no error and a power of selection that chooses only the essential. The effect is that of a spirited drawing, often heightened by the use of more than one color in printing. He has of course represented Parisian women more than any others, his favorite subject being his wife, whom he has drawn in all manner of poses, especially with his children. He has also portrayed Englishwomen and many Americans, including the Duchess of Marlborough, Mrs. Philip Lydig, Miss Carol Harriman, Mrs. Walter Lewisohn, and Mrs. Leonard Thomas—the last three belonging to a series of about 30 executed by the artist on a visit to the United States in the winter of 1912–13. Consult Clément-Janin, in *Die graphischen Künste*, vol. xxvi (Vienna, 1903), and Wedmore, *Etchings* (London, 1911).

HELLEVOETSLUIS, hĕl'lē-vo͞ot-slois', or **HELVOETSLUIS.** A fortified seaport of the Netherlands, on the southern coast of Voorne in the Province of South Holland (Map: Netherlands, C 3). It has a good harbor, wet and dry docks, an arsenal, shipyards, a naval school, large artillery stores, and is connected by steam tramway with Rotterdam. Pop., 1900, 4299; 1910, 4355. Hellevoetsluis is noted as the place where William of Orange embarked for England in November, 1688.

HELL-FIRE CLUBS. The name given to certain associations in England, Ireland, and Scotland, formed of profligate persons of both sexes, which came into existence in the early

part of the eighteenth century. Several were suppressed by royal proclamation in 1721.

HELL GATE. A passage, called by the Dutch settlers of New York Helle Gat, being that part of the East River between Long Island and Manhattan Island, also between Long Island and Ward's Island, and between Ward's Island and Manhattan Island. The reefs of rock in the main passage, some of which were islands at low tide, caused with the rising and falling of the tide numerous whirlpools and eddies, which rendered navigation at times dangerous, always difficult, and for large ships impossible, although the depth in the tortuous channel might be sufficient. The East River receives the Sound tide from the east and the Sandy Hook tide from the south. The times as well as heights of these tides being different, additional force is imparted to these treacherous currents. It was claimed that one out of every 50 sailing vessels attempting to go through Hell Gate was more or less damaged by the rocks.

A survey was made in 1848 by Lieutenants Charles H. Davis and David Porter, of the United States navy, and in their report they recommended the destruction by blasting of Pot Rock, Frying Pan, and Ways' Reef, which lie between Long Island and Ward's Island.

The first attempts at removing the obstructions in Hell Gate were made by M. Maillefert, with whom a contract was made by citizens of New York. He commenced work in August, 1851, and by surface blasting operated upon the most prominent surface of the smaller rocks obstructing Hell Gate and of a part of Diamond Reef and reduced them to an average depth of about 16 feet, the work costing $13,861.59. Congress, in 1852, appropriated for the work $20,000 and placed it under the direction of Major Fraser. Pot Rock was reduced to 20.5 feet below mean low water. The method was by surface blasting, as had been practiced by M. Maillefert. The reefs in this channel are largely composed of a stratified gneiss, and the layers, being tipped up nearly perpendicular, were unevenly affected by the action of the water, the softer parts being worn away and the harder parts left in vertical sheets or points. In 1866 Gen. John Newton, of the United States Engineer Corps, was ordered to make a survey, and proposed the construction of a drilling scow which should be securely moored at the site of operations. The machine was constructed, and put into operation on Diamond Reef, near the mouth of the East River, in May, 1871. Coenties Reef was also operated on with this scow in alternation with the work on Diamond Reef. These operations proving satisfactory, the machine was taken to Hell Gate, where it was in operation nearly three years and effected a great improvement in the channel.

The first really important engineering accomplishment was the removal by tunneling and blasting of Hallet's Point Reef, which extended from the Astoria shore into the East River. By means of diverging tunnels and transverse galleries the reef was thoroughly undermined, and nitroglycerin in cans was introduced into a large number of holes drilled in the pillars supporting the roof and in the roof itself. After water was let into the mine, the charge was exploded and the reef was destroyed, the débris being removed by grappling and dredging, so that there was a depth of 26 feet at low water over the site of the reef. The explosion at Hallet's Point took place Sept. 24, 1876, and was followed by energetic prosecution of work on Flood Rock, or Middle Reef, where similar tunnels were constructed. After over 21,000 feet of tunneling had been constructed and holes aggregating 113,102 feet had been drilled, 300,000 pounds of explosives were put into the holes, and water was let into the tunnel. The result of the explosion that took place Oct. 10, 1885, and subsequent dredging which has since been in progress, provided a channel of at least 200 feet in width and a depth of at least 26 feet through Hell Gate, the width of channel varying from the minimum width mentioned off Hallet's Point for a short distance. In 1914 a steel arch bridge, supported on concrete bents, with a span of 977.5 feet across the East River at Hell Gate, was under construction.

HELL'GRAMMITE FLY, or HELLDEVIL. See CORYDALIS.

HELLHOFFITE. See EXPLOSIVES.

HELLIN, â-lyēn'. A district town of the Province of Albacete, Spain, situated near the river Mundo, 69 miles north-northwest of Murcia (Map: Spain, E 3). In its vicinity are sulphur springs and mines. The sulphur mines have been worked since Roman times, and their exploitation is still the principal industry of the town. It is a market for agricultural products, wine, and oil, and produces woolen textiles, leather, and pottery. Pop., 1900, 12,787; 1910, 17,781.

HELL'MANN, GUSTAV JOHANN GEORG (1854–). A German meteorologist and geographer, born at Löwen and educated at Göttingen. In 1879 he was made assistant, in 1882 temporary head, of the Meteorological Institute of Berlin, and in 1907 director. He also became professor at the University of Berlin in 1905. He was vice president of the Berlin Geographical Society and after 1892 a director of the *Meteorologische Zeitschrift.* Besides his contributions to the latter, Hellmann's more important works are: *Repertorium der deutschen Meteorologie* (1883); *Meteorologische Volksbücher* (1891); *Das Klima von Berlin* (1891); *Schneekrystalle* (1893); *Regenkarte der Provinz Schlesien* (1899); *Regenkarte der Provinzen Ostpreussen, Westpreussen und Posen* (1900); *Regenkarte der Provinz Brandenburg und Pommern* (1901); *Denkmäler mittelalterlichen Meteorologie* (1904); *Die Niederschläge in den norddeutschen Stromgebieten* (3 vols., 1906); *Internationaler Kodex* (1907; 2d ed., 1911); and the series *Meteorologische Neudrucke* (1893–1900).

HELLMESBERGER, hĕl'mĕs-bĕrk'ĕr. A family of Austrian musicians whose founder, GEORG (1800–73), was a celebrated violin teacher in Vienna. In 1829 he became conductor of the Imperial Opera and in 1833 a professor at the Vienna Conservatory. He made several successful tours and composed considerable music for the violin.—His two sons, GEORG, JR. (1830–52), and JOSEPH (1829–93), were talented violinists. The former produced two operas, *Die Bürgschaft* and *Die beiden Königinnen,* and made a tour through Germany and England. Joseph was first violin of the Hellmesberger Quartet (1849–87), violin professor at the Conservatory (1851–77) and director (1851–93); concertmeister at the Imperial Opera (1860); soloist in the Court Orchestra (1863) and court conductor (1877).—His son JOSEPH (1855–)

is the most important member of the family. He was second violin in his father's quartet and in 1887 succeeded him as leader. In 1878 he became a professor at the Vienna Conservatory and after having been a violinist in both the Imperial and Opera orchestras was made leader in 1884, and kapellmeister in 1887, of the Court Opera. His compositions are wholly dramatic and include six operettas, produced at Munich, Vienna, and Hamburg, numerous ballets, and some incidental music.

HELLMUTH, hĕl'mo͝ot, ISAAC (1817–1901). An English clergyman, born at Warsaw, Poland, of Jewish parentage. He was educated at Breslau, became converted to Christianity, emigrated to Canada in 1844, and was ordained a priest in the Protestant Episcopal church in 1846. He founded Huron College and other schools and was Bishop of Huron from 1871 to 1883. He was also a professor at Bishop's College, Lennoxville, Canada, and in 1881 established Western University, in connection with Huron College. He then went to England to become Assistant Bishop of Ripon. In 1885 he was made rector of Bridlington; in 1891 chaplain at Holy Trinity, Pau; and in 1897–99 was rector of Compton Pauncefoot, Somerset. Among his published works are *The Genuineness and Authenticity of the Pentateuch* (1867) and a *Biblical Thesaurus* (1884).

HELLQVIST, hĕl'kvĭst, KARL GUSTAF (1851–90). A Swedish historical painter. Born in Kungsör, he was a pupil of the Stockholm Academy and continued his studies at Munich (1878–82) and at Paris (1882–86), at the same time producing important works. He became professor at the Berlin Academy in 1886, but afterward lived in Munich. His early death cut short a promising career. Besides other honors, he was awarded the great gold medal at Vienna (1882) and a gold medal at Munich (1883). Hellqvist belongs to the best historical painters of the later nineteenth century. His principal works include: "Entry of Sonnanväder and Knut into Stockholm, 1526" (1879), Metropolitan Museum, New York; "The Death of Sten Sture" (1880) and "Sack of Visby by Valdemar IV, 1361" (1882), both in the National Museum, Stockholm; "The Embarkment of the Body of Gustavus Adolphus" (1885); "Huss Going to the Stake" (1887).

HELLRIEGEL, hĕl'rē-gel, HERMANN (1831–95). A noted German agricultural chemist, born at Mausitz in Saxony. In 1857 he became director of the agricultural experiment station of Brandenburg and Niederlausitz at Dahme, from which he resigned in 1873, and in 1882 accepted a similar post at Bernberg, where he died. From 1873 to 1882 he was wanderlehrer at Bernberg. Among his many agricultural investigations with plants none rank in importance with his demonstration of the ability of leguminous plants to assimilate the free nitrogen of the air, and his discovery of the tubercles on the roots as the agency through which this takes place. The question of the ability of leguminous plants to use the nitrogen of the air had long been one of inquiry, and its settlement by him marked an epoch in the agricultural world. The important parts of these experiments he published in *Untersuchungen über die Stickstoffnahrung der Gramineen und Leguminosen* (Berlin, 1888) and *Ueber Stickstoffnahrung landwirtschaftlicher Kulturgewächse* (Vienna, 1890). Consult Römer, *Hermann Hellriegel, Nachruf* (Leipzig, 1896). See LEGUMINOSÆ.

HELLWALD, hĕl'vält, FERDINAND VON (1843–84). An Austrian historian of literature, born in Vienna. From 1862 to 1874 he was employed in the Imperial Library there, studied the North Germanic dialects and literatures, and was sent to the Netherlands by the library. He published (1866) the *Voyage d'Adrien Matham au Maroc 1640–41*, and (1873) the second part, found by him in the library at Vienna, of Jakob von Maerlant's *Spieghel historiael* and other valuable works. His own writings are: *Vlämisches Leben, Geschichten und Bilder* (1867); *Geschichte des holländischen Theaters* (1874); *Geschichte der niederländischen Litteratur*, completed and edited by Schneider (1887).

HELLWALD, FRIEDRICH VON (1842–92). An Austrian writer on geography and the history of civilization; brother of Ferdinand von Hellwald and born at Padua. He entered the Austrian army in 1858 and was lieutenant of cavalry (1866) in the war with Prussia; from 1871 to 1873 at Augsburg, then till 1882 at Cannstatt, he was editor of *Das Ausland*. His first work of any importance bears the title of *Die amerikanische Völkerwanderung*. It was published in Vienna in 1866 and laid the foundation of his reputation as a student. His other works, generally more popular than scientific, include: *Maximilian I, Kaiser von Mexiko* (1869); *Kulturgeschichte in ihrer natürlichen Entwicklung bis zur Gegenwart* (4th ed., 1896–98); *Die Erde und ihre Völker* (4th ed., 1897); *Naturgeschichte des Menschen* (1883–84); *Amerika in Wort und Bild* (1883–85); *Frankreich in Wort und Bild* (1884–87); *Die menschliche Familie nach ihrer Entstehung und natürlichen Entwicklung* (1889); and the posthumous work, edited by Möller, *Kulturbilder* (1894).

HELM, hĕlm (AS. *helma*, Icel. *hjalma*, helm). The steering apparatus of a vessel. It consists of a rudder and tiller, and, in ships, of a steering wheel supplemented in large vessels by a steering engine. The rudder, which may be of either iron or wood, is the part of the apparatus which is in the water. Its shape is variable, but is usually nearly that of a rectangle, with rounded corners, and in old ships slopes upward at the top from the after edge towards the rudder post, to which it is ordinarily pivoted along the forward edge. In many modern ships the rudder is more or less perfectly balanced as to pressure by having the rudder post or pivot nearly in the centre (but always somewhat nearer the forward edge); this reduces the power necessary to put it over and keep it there. The ordinary rudder is supported by *pintles*, or arms bent at right angles and projecting from the rudder post; the balanced rudder, by a skeg or shoe at the heel; and both by a collar around the rudder head. The tiller is the lever which works the rudder. It either passes through a slot in the rudder head or fits over it, and consists of a straight bar of wood or steel; or in some ships it is replaced by a *quadrant*, which consists of a sector of a circle secured to its centre, which is the rudder post or head, and having chains attached to its corners and passing around its surface before leading to the wheel or engine. The *wheel* consists of one or more wheels, with 8 to 16 spokes projecting through the rims to form handles, and a barrel or axle around which the wheel ropes are wound. One

wheel rope winds around its forward end in one direction and the other around the after end in the opposite direction, so that one unwinds as the other winds up, when the helm is put over to one side.

Steering engines are used when the rudder and tiller are large, or when it is desired to effect quick working of the rudder by affording extra power. The engines are operated by electric gear in the pilot house or on the bridge, or by means of small wire ropes leading from the valve gear of the engine to a wheel located in those places. In steering, the terms used to designate the position of the rudder, except in Germany and in the United States navy, refer to the placing of the tiller. Thus, when the *helm* is *aport*, the tiller is pressed over towards the port side of the ship; similarly, we have the helm *amidships* and *astarboard;* the helm is *alee* when the tiller is pressed over to the lee side, i.e., the side away from the wind; the helm is *aweather* when over towards the other side, and it is *hard aport, hard astarboard, hard alee*, etc., when it is pressed as far over as it will go in that direction. To *right* the helm is to put the tiller amidships; to *shift* it is to put it from one side to the other. To *ease* the helm is to let the tiller come more nearly amidships so as to ease the strain on the tiller. When a vessel is turning under control of the rudder, to *meet her* with the helm is to shift the helm and prevent her from turning any farther. *Nothing to starboard* (or port) is a direction to the helmsman cautioning him to steer as good a course as possible, but in any case not to run to starboard (or port) of the desired course. In Germany and in the United States navy the orders to the *steersman* are *right rudder* and *left rudder* instead of *starboard* and *port*. This makes the order simpler and less likely to be misunderstood, because if you wish the ship's head to go to the right you say *right rudder*, if to the left, *left rudder*. Instead of hard astarboard you say *hard right rudder*. Instead of *right the helm*, you say *rudder amidships*, and in place of *ease the helm* you say *ease the rudder*.

Helmsman. In large ships without steering engines two or more men are necessarily stationed at the wheel; in sailing ships the man on the weather side is the helmsman, and the others are assistants. In men-of-war a quartermaster is in charge of the steering; he keeps watch of the course, sees that the helmsman steers correctly, and tends to other matters, such as reading the barometer, thermometer, and hygrometer, and filling in the columns of the log every hour (if there is no junior officer). As stated above, in the United States navy the helmsman is now known as the steersman.

HELM, Israel (c.1615–c.1695). A Swedish colonist in America. Probably a soldier in Sweden, he was one of the earliest settlers on the Delaware; lived at Passyunk (now Philadelphia), where he was collector of customs (1659); in 1668 became a member of Captain Carr's council, and was one of the number who received a grant of Calken Hook in the same year; and, about 1674, was justice "for the river" and probably a member of the earlier Upland Court. Helm did much service as interpreter in conferences with the Indians, especially in 1675, in the meeting of the New Jersey Indians, Governor Andros, and the Swedish authorities at New Castle, Del. He is possibly to be identified with Israel Holms, an old Swede, on whose authority Rudman tells of the end of Peter Minuit.

HELMBOLD, hĕlm'bôlt, Ludwig (1532–98). A German theologian and hymnologist, born at Mühlhausen, Thuringia, where he was a deacon (1571–98). He was educated at Leipzig and Erfurt. At the latter university he taught (1554–86), but was finally forced out because of his bitter opposition to the Catholic members of the faculty. He went back to Mühlhausen and became superintendent of the town. He was a skillful Latin versifier and besides Latin hymns wrote spiritual songs in the vernacular, which won him the name "the German Asaph"; among these mention should be made of: *Von Gott will ich nicht lassen; Du Friedefürst, Herr Jesu Christ; Es stehn vor Gottes Throne.* For his biography, consult Thilo (Berlin, 1851).

HEL'MER, Nora. The heroine of Ibsen's drama of modern life, *A Doll's House.* She is, at the opening of the play, a thoughtless, superficial creature, who is alternately petted and scolded by her narrow-minded husband and thus becomes wholly unfitted to face or even comprehend life's realities. She impulsively commits a heinous crime and only then discovers her own and her husband's actual natures. She escapes paying the legal penalty, but leaves her home with the determination to learn the truth regarding life, humanity, and herself.

HELMERS, hĕl'mĕrs, Jan Frederik (1767–1813). A Dutch poet, born at Amsterdam. His first work, a tragedy, was moderately successful, and he followed it by a poem, *Socrates* (1790). His *Hymn to Napoleon Bonaparte* (1801) first made him famous and *The Dutch Nation* (1812), his masterpiece, an heroic poem in six cantos, added to his reputation. At a time when Holland was under French rule these fiery patriotic poems revived the nation's enthusiasm. A posthumous volume of his poetry appeared in 1815.

HEL'MERSEN, Grégory Petrovitch (1803–85). A Russian geologist, born at Duckershof in the Government of Livonia. He was educated at Dorpat and various German universities, from 1838 to 1863 was professor of geognosy and geology in the school of the mining engineer corps, and from 1865 to his retirement in 1872 director of the Mining Institute. He attained the military rank of lieutenant general and was a member of the St. Petersburg Academy of Sciences. In 1829 he accompanied Alexander von Humboldt in the exploration of the lower courses of the rivers Volga and Ural. His chief published writings were his contributions to the extensive scientific work on the Russian Empire and the adjacent Asian countries, published by the St. Petersburg Academy of Sciences, under the editorship of himself and Von Baer (26 vols., 1839–71).

HEL'MERT, Friedrich Robert (1843–1917). A German geodesist, born at Freiberg, Saxony. He was educated at the Polytechnic of Dresden and Leipzig University, in 1869–70 was observer in the Hamburg Observatory, and in 1870 became instructor in geodesy in the Technical College of Aix-la-Chapelle. In 1886 he was appointed director of the Royal Geodetic Institute of Prussia, and in 1887 professor of geodesy in Berlin University. In addition to numerous contributions to the *Astronomische Nachrichten*, the *Zeitschrift für Vermessungs-*

wesen, and other technical periodicals, he published several volumes, including: *Die Ausgleichungsrechnung nach der Methode der kleinsten Quadrate* (1872); *Die mathematischen und physikalischen Theorien der höhern Geodäsie* (1880–84); *Die Schwerkraft im Hochgebirge insbesondere in den Tyroler Alpen in geodätischer und geologischer Beziehung* (1890); *Beiträge zur Theorie des Reversionspendels* (1898); *Schwerkraft und die Massenverteilung der Erde* (1910).

HEL'MET (dim. of *helm*, Goth. *hilms*, OHG. *helm*, Ger. *Helm*, helmet; connected ultimately with Skt. *śarman*, protection, AS., OHG. *helan*, Ger. *hehlen*, Lat. *celare*, Gk. καλύπτειν, *kalyptein*, to hide, OIr. *celim*, I hide). A covering wholly, or in part, of metal, used in warfare to protect the head. Such protections have been used from the earliest times and have been made in many different forms. The simplest form is in the shape of a close-fitting skullcap. Such helmets are represented on the Assyrian monuments. They were of iron or leather and sometimes were provided with a defense for the neck. A tendency towards decoration is shown in some of the bas-reliefs, where warriors are represented with elevated helmets terminating in a point. The Greeks of the Homeric age are occasionally described as wearing very elaborate helmets. In the *Iliad* Agamemnon places on his brow a lofty helm, four-crested, double-peaked, with horsehair plumes. At a later period the Greeks used helmets of different shapes, usually with protections for the face and neck and sometimes surmounted by figures of birds or animals. Many of these were richly decorated. The Etruscans wore bell-shaped helmets, which often had projecting pieces like wings, which gave them a very peculiar appearance. The Romans ordinarily used a plain, undecorated skullcap, strengthened by crossbands of iron and with a neck guard. On the march this helmet was removed and carried slung from the right shoulder. Under the later Empire the Greek fashion of helmet became common. The Anglo-Saxons appear to have used a skullcap frequently terminating in a point. The Franks, on the contrary, used no protection for the head. But under Charles the Great the Imperial household guards wore helmets of a triangular shape, surmounted by conventionalized scrollwork or foliage. In the Bayeux tapestry the warriors wear conical helmets, with a straight piece descending in front to protect the nose. The most characteristic helmet of the Middle Ages, which was in vogue from the twelfth to the fourteenth century, was cylindrical in form and covered the head and a part of the neck. There were round openings through which the warrior could see and breathe. It was so heavy that it was put on only at the moment of combat and only when the knight fought on horseback. It was a very effective defense against a cut from a mediæval weapon, but no protection against bruises. In great contrast with this was the headpiece worn by the Saracens, with whom the Crusaders came into contact. They used light globular helmets of iron, richly ornamented and adorned with plumes. In the fourteenth century the heavy helmet was to a great extent discarded by the western knights for the lighter basinet; but it continued to be used in tournaments until the eighteenth century. As the employment of firearms became more general, helmets naturally lost their utility, especially as regards the face. Those still remaining are, in the equipment of troops, limited for the most part to heavy cavalry, afford no protection to the face, and must be considered as rather for ornament than use. Firemen wear a heavy headpiece of leather and brass to protect them as far as possible from falling brands and cinders at conflagrations. In India and other hot climates helmets of white felt, with the additional screen of rolls of linen, are worn by the military as well as by members of the civil service to protect them from the hot rays of the sun.

In heraldry, the helmet, from the early simple form known as the Norman, came at a later period to vary in shape according to the degree of the person who bore it, and helmets were set over coats of arms to bear the crest and to indicate by their form the rank of the bearer. The following forms of helmet are in use in English heraldry: 1. The helmet assigned to the King and to the princes of the blood royal; it is full-faced, composed of gold, and has the visor divided by six projecting bars. 2. The helmet of earls, viscounts, and barons is of silver, adorned with gold, has five bars, and is set in profile. 3. The helmet of knights and baronets is of steel, full-faced, with the visor thrown back and without bars. 4. The helmet of esquires is always presented in profile and is of steel with the visor closed. These distinctions are of comparatively recent date. A much greater variety of helmets is in use in continental heraldry. A helmet is never placed over the arms of any woman except the sovereign. Consult Boutell, *English Heraldry* (4th ed., London, 1879), and Ashdoun, *Arms and Armour* (New York, 1909). See Heraldry.

HELMET BIRD. One of the names given to the turacos (q.v.), on account of their high, brilliantly colored crests. An Australian cockatoo, the gangan, is called helmet cockatoo, and African shrikes of the genus *Prionops* are called helmet shrikes for a similar reason.

HELMET CRAB. See King Crab.

HELMET CREST. A South American humming bird of the genus *Oxypogon* (in which there are four species), which has a tall, pointed, erectile crest suggesting a helmet plume and also chin feathers resembling a long beard. See Plate of Humming Birds.

HELMET HORNBILL. See Hornbill.

HELMET QUAIL. A California crested quail (q.v.).

HELMET SHELL (so called from the resemblance of the shell to a helmet). One of a genus (*Cassis*) of large, active gastropods, allied to the strombs and typical of the family Cassidæ. They have thick, heavy shells, boldly ridged and often handsomely colored, and some species, as the black helmet shell of the West Indies (erroneously named *Cassis madagascarensis*) and *Cassis glauca* of the East Indies, are extensively used for making cameos (see Cameo), because the shell is in layers of different colors. About 50 species are known, mostly Oriental; but some inhabit the Mediterranean and West Indian waters, and all are carnivorous, preying mostly on bivalve mollusks.

HELMHOLTZ, hĕlm'hōlts, Hermann L. F. von (1821–94). A German physicist, one of the most distinguished scientific men of the nineteenth century and an authority in several departments of science. He was born at Potsdam and studied medicine in Berlin, subse-

quently serving as a surgeon in the army (1843–47). He then became assistant in the Berlin Anatomical Museum, and a professor of physiology, occupying chairs at Königsberg (1849–58), at Bonn (1855–58), and at Heidelberg (1858–71). In 1871 he became professor of physics at the University of Berlin. In 1887 Helmholtz became in addition director of the Physikalisch Technische Reichsanstalt at Charlottenburg and supervised the researches of this important institution. He was equally distinguished in physiology and in many branches of experimental and mathematical physics. He was selected as honorary president of the International Congress of Electricians held at Chicago in 1893, and it was said then of him that he could easily have been selected as first in several other departments of human knowledge quite distinct and apart from that of electricity. His physiological works are principally connected with the eye and the nervous system. As a physicist, Helmholtz first attracted attention from the scientific world by a paper which he presented to the Physical Society of Berlin in 1847 on the "Conservation of Force." This paper, regarded by many as a fantastic speculation, provoked considerable discussion and established Helmholtz's reputation. His invention in 1851 of the ophthalmoscope (q.v.), an instrument which enables an observer to examine the interior of the eye, gave to the oculist a most useful device now in universal use. His wonderful monograph on *Sensations of Tone* was first published in 1863 and was the most important work on acoustics of the nineteenth century. To Helmholtz, whose great work on *Physiological Optics* appeared in 1856–66, is due the generally accepted theory of color, which is that of Young (q.v.) in a modified form, wherein the perception of color depends upon the three fundamental sensations of red, green, and violet or blue. He also developed the electromagnetic theory of light in a manner which indicated its general possibilities. Another important research was on the theory of vortex motion; and not only did he discover the fundamental properties of such motion, but he so stated his conclusions that they have been used to explain various physical phenomena and in hypotheses concerning the constitution of matter and the luminiferous ether. He was the inventor of many ingenious methods in practical physics as well as new apparatus. In 1883 the German Emperor conferred upon him a title of nobility. He visited the United States in 1893 and died in Berlin, Sept. 8, 1894. The first edition of *Die Lehre von den Tonempfindungen, als physiologische Grundlage für die Theorie der Musik*, appeared in 1863, and several other editions and translations have since been published. The *Handbuch der physiologischen Optik* was published in 1867, and Helmholtz's *Gesammelte wissenschaftliche Abhandlungen* in 1882–83. Helmholtz was a contributor to the leading scientific journals of the world and was the recipient of many honors. An interesting biographical sketch, by Prof. A. W. Rücker, F.R.S., was published in the *Fortnightly Review* for November, 1894, and reprinted in the *Smithsonian Report* of the same year. Consult also: Königsberger, *Hermann von Helmholtz* (Leipzig, 1902; Eng. trans. by Welby, Oxford, 1906); McKendrick, *H. L. F. von Helmholtz* (London, 1899); G. S. Hall, *Founders of Modern Psychology* (New York, 1912).

HELMOLD, hĕl'mōlt. A twelfth-century German historian of the Slavs. He was born in Holstein and was a priest at Bosau. He was intimate with Gerold, the Bishop of Lübeck, once a missionary among the Slavs, who urged him to write a history of the wars with them and the missions among them. This history, *Chronica Slavorum*, extends from Charlemagne to Helmold's own time and the days of Henry the Lion (1172), continued to 1209 by Arnold von Lübeck (q.v.). It is best edited by Lappenberg (1868), separately, and in vol. xxi of *Monumenta Germaniæ;* also in German translation by Laurent (1852).

HELMOLT, hĕl'mōlt, Hans F. (1865–). A German editor and historian, born at Dresden. He studied philology and history at Leipzig and Bonn and was appointed to an editorial post in the Bibliographic Institute at Leipzig. His publications include *König Ruprechts Zug nach Italien* (1892), *Fabricius und Siber* (1895), and the compendious *Weltgeschichte* (9 vols., 1899–1907; Eng. trans., New York, 1902–08), a work based on an ethnographic method, in the preparation of which he was assisted by 37 specialists. Among his other works may be mentioned: *Briefe der Herzogin Elisabeth Charlotte von Orléans*, i (1907), ii (1908); *Ranke-Bibliographie* (1910); *Briefe Gustav Freytags an A. von Stosch* (1913).

HELMOND, hĕl'mŏnt, *Fr. pron.* ĕl'mōN'. A town in the Province of North Brabant, Holland, situated on the Zuid Willems Vaart, 73½ miles by rail southeast of Rotterdam (Map: Netherlands, D 3). There are a number of extensive textile mills, dyeing establishments, cigar factories, and various other manufacturing establishments. It also possesses a remarkable old château dating from 1403. Pop., 1900, 11,436; 1910, 15,147.

HELMONT, hĕl'mŏnt, Jan Baptista van (?1577–?1644). A Belgian physician and chemist, born at Brussels. He studied at Louvain, and received the degree of M.D. in 1599. For several years afterward he traveled extensively in Switzerland, Italy, France, and England. In 1605 he married Margaret van Ranst, a noble lady of Brabant, and in 1609 he settled down at his estate near Vilvorde, where he spent the remainder of his life in medical practice and scientific investigation. Writers on the history of chemistry regard him as one of the greatest chemists who preceded Lavoisier. He paid much attention to the study of gases and is supposed to have been the first to use the word "gas" as a generic name for all elastic aëriform fluids. Of these gases he distinguished several kinds. He was also the first to adopt the melting point of ice and the boiling point of water as standards of the measurement of temperature. In his works the term "saturation" was first employed to signify the combination of an acid with a base, and he was an early investigator of the chemistry of the fluids of the human body. Along with other physiologists of his day, he speculated much on the seat of the soul, which he placed in the stomach.

The most important of his works is his *Ortus Medicinæ*, which was published by his son, four years after his death; it passed through a large number of editions and was translated into Dutch, French, German, and English. A curious volume, containing translations of some of his works, was also published by W. Charlton, in 1650, under the title of *The Ternary of*

Paradoxes; the Magnetic Cure of Wounds; the Nativity of Tartar in Wine; and the Image of God in Man. Consult Rommelaere, *Etudes sur Helmont* (Brussels, 1868).

HELMSTEDT, hĕlm'shtĕt. A town in the Duchy of Brunswick, Germany, situated 25 miles by rail from the city of Brunswick (Map: Germany, D 2). It was formerly famous for its university, which existed from 1575 to 1809. The university buildings now contain the remnants of the university library. Helmstedt manufactures agricultural machinery, pottery, woolens, soap, sugar, tobacco, and textiles. There are lignite and potash mines. About 2 miles from the town are the Helmstedt iron springs. Pop., 1900, 14,259; 1910, 16,421.

HEL'MUND, or **HIL'MEND.** The largest river of Afghanistan. It rises in the Koh-i-Baba chain and flows southwest, receiving numerous tributaries by which it drains the southern part of the country (Map: Asia, Central, K 7). It discharges into the lake, or rather swamp, of Savaran, near the Persian frontier. Its total length is estimated at over 600 miles. The channel of its lower course is very wide and deep, but is filled only during the summer. The region traversed by the lower course of the Helmund is well populated, and the water power of the river is used by numerous mills. The constant shifting of its course has been the source of border disputes between the Afghans and Persians for years.

HELMUND, Erik Meyer-. See Meyer-Helmund.

HEL'MUTH, William Tod (1833–1902). An American homœopathic physician. He was born in Philadelphia and studied medicine in the Homœopathic Medical College of Pennsylvania, where he became assistant dispensary physician in 1854 and professor of anatomy in 1885. In 1888 he received the degree of LL.D. from Yale. He was dean and professor of surgery in the New York Homœopathic Medical College in 1870, resigning to become a surgeon in the Hahnemann and New York State hospitals. In 1886 he opened a private hospital. His works include numerous essays, both literary and medical, such as: *Scratches of a Surgeon* (1879); *A Steamer Book* (1880); *Diphtheria; Medical Pomposity; System of Surgery* (1874; rev. ed., 1887); *Suprapublic Lithotomy;* and several volumes of verse, the most popular of which were *With the Pousse-Café* (1892) and *Various Verses* (1901).

HE'LODER'MA (Neo-Lat., from Gk. *ἥλος, hēlos,* nail, wart + *δέρμα, derma,* skin). A genus of North American lizards, with two species, of which one is the poisonous Gila monster. It represents, according to Cope, a family (Helodermatidæ) and superfamily (Helodermatoidea), characterized prominently by the fact that the 8 or 10 acrodont teeth in each jaw are ankylosed by oblique bases, and each is fanglike and grooved both before and behind, as if designed for conducting fluid poison. For full structural details, consult Cope, *Crocodilians, Lizards, and Snakes* (Smithsonian Institution, Washington, D. C., 1900); for external appearance and habits, see Gila Monster.

HÉLOÏSE, ā'lō'ēz'. See Abélard.

HE'LOS (Lat., from Gk. Ἕλος, from ἕλος, *helos,* marsh). A town of Laconia, near the coast and a short distance east of the mouth of the Eurotas, said to have been founded by Heleus, son of Perseus. When the Dorians invaded the Peloponnesus, Helos defended itself with great stubbornness; it was finally taken, and the inhabitants were made slaves. In Strabo's time it had become a village, and when Pausanias visited it it was already in ruins. The Helots were supposed to have received their name from this town; but the most probable view is that the ethnic term "Helots" is related to the root *ἑλ-, take.* The plain of the lower Eurotas is still called *Helos.* There were several other towns of this name in ancient Greece—one mentioned in the *Iliad* and one situated in Argolis.

HEL'OTISM, hĕl'ot-ĭz'm *or* hē'lot-ĭz'm (from Lat. Helota, Gk. Εἱλώτης, *Heilōtēs,* or Εἵλως, *Heilōs,* Helot). In botany a symbiotic relation in which one form (see Symbiosis) is regarded (perhaps fancifully) as enslaved by another. This relation differs from parasitism in that the enslaved form is not necessarily harmed; it may even be benefited. Lichens (q.v.) have been given as the type of helotism, the algæ being regarded as enslaved by the fungus.

HELOTS, hĕl'ots *or* hē'lots (Lat. *Helotæ,* from Gk. Εἱλώτης, *Heilōtēs,* or Εἱλῶται, *Heilōtaĭ;* probably connected with *ἑλεῖν, helein,* to seize, capture, less plausibly with Ἕλος, *Helos,* a town of Laconia, whence the first Helots were said to have been enslaved. See Helos). The lowest of the three classes into which the population of ancient Laconia was divided. The Helots were serfs of the soil, the property of the state, by whom alone they could be freed, but were assigned to individual Spartans for the cultivation of their allotments of land. If, as many believe, the Helots were originally the descendants of the pre-Dorian population of Laconia, the distinction of dialect and descent was early lost, for there is no indication of any social or linguistic difference between the Helots and the ruling Spartans. The Helots paid the Spartan proprietors a fixed amount of produce, but could keep the remainder and were thus enabled to acquire property. In fact, in general appearance and intelligence they seem to have been much like the free village population in other parts of Greece. In war they served at first as light-armed troops or as rowers on shipboard; after the Peloponnesian War, they were sometimes employed in the heavy infantry, especially in Asia Minor. They were subject to harsh treatment and were in the absolute power of the Ephors (see Ephori), though many of the ancient stories are scarcely trustworthy. Their great superiority in numbers and their known discontent rendered them objects of suspicion; and during the Peloponnesian War 2000 of them, who claimed to have rendered distinguished services, were freed and then secretly murdered (see Thucydides, iv, 80). The Spartan secret service (*κρυπτεία*), in which the young men were sent singly through the land to endure hardships and watch symptoms of discontent, kept the Helots under close observation, and formed a means of getting rid of any Helots who were plotting against the state. The statement that the Ephors annually declared formal war upon the Helots, that they might be free at any time to kill any of them without violating religious scruples, is doubtless an error. See Sparta. Consult Gilbert, *Greek Constitutional Antiquities* (Eng. trans., London, 1895), and Busolt, *Die griechische Staats- und Rechtsaltertümer* (2d ed., Munich, 1892).

HELP'ER, Hinton Rowan (1829–1909). An American author and railway projector. He was born near Mocksville, N. C., graduated at Mocks-

ville Academy in 1848, and from 1851 to 1854 lived in California. In 1857 he published a book entitled *The Impending Crisis in the South, and how to Meet it*, which perhaps did more to arouse a widespread opposition in the North to the institution of slavery than any other book except *Uncle Tom's Cabin*. This book was dedicated to the "nonslaveholding whites" of the South and was written to prove that, wholly aside from its immorality, slavery was an economic curse. Between 1857 and 1861 nearly 150,000 copies of the book were circulated, and in 1860 the Republican party distributed it as a campaign document. From 1861 to 1866 Helper was United States Consul at Buenos Aires, Argentine Republic, and afterward devoted his attention chiefly to the promotion of his projected intercontinental railway, or Three Americas Railway, to extend eventually from Bering Sea to the Strait of Magellan. In addition to *The Impending Crisis* his publications include: *The Land of Gold* (1865); *Nojoque: A Question of a Continent* (1867); *The Negroes in Negroland, the Negroes in America, and the Negroes Generally* (1868); *Oddments of Andean Diplomacy* (1879); *The Three Americas Railway* (1881).

HELPS, Sir Arthur (1813–75). An English essayist and historian, born at Streatham, Surrey. He was educated at Eton and at Trinity College, Cambridge, and, after leaving the university, obtained a post in the civil service, but resigned in 1841 and retired to the country, where he cultivated his taste for literature. In 1860 he was appointed clerk of the Privy Council, a post which he held until his death. For Queen Victoria he edited the speeches of the Prince Consort (1862) and prepared for the press her own Highland journals (1868–69). After beginning his literary career in 1835 with a series of aphorisms entitled *Thoughts in the Cloister and the Crowd*, Helps attempted the essay, the novel, the drama, and history. With the drama and the novel he failed utterly; with history he succeeded moderately. In this field his best work is represented by *Las Casas* (1868), *Columbus* (1869), *Pizarro* (1869), and *Cortez* (1871)—biographies which grew out of his *Conquerors of the New World and their Bondsmen* (1848–52) and *The Spanish Conquest in America* (4 vols., 1855–61). By his essays he won contemporary fame, especially by *Friends in Council* (four series, 1847–59). It consists of conversations on social and intellectual questions. Helps exhibits throughout these dialogues acuteness, humor, a satire which gives no pain, and a quiet depth of moral feeling and sense of man's social responsibilities.

HELSINGBORG, hĕl'sĭng-bôr'y'. A fortified seaport of Sweden, situated at the narrowest point of The Sound, opposite the Danish town of Elsinore, 2¾ miles distant, with which it is connected by ferry (Map: Sweden, E 8). Several railroad lines run into the town, and it carries on a flourishing trade with Denmark. It exports iron ore, bricks, butter, earthenware, grain, and fish; imports coal, minerals, gun metal, and fertilizers. It has considerable manufactures of sugar, chemicals, and machinery, and has a slaughterhouse, shipbuilding yards, and large copper works. Pop., 1901, 24,670; 1911, 33,843. The most remarkable building in the city is the Kärnan, a brick tower 102 feet high, with walls 13 feet thick. It forms part of an ancient fortress now in ruins. Near the city is the royal residence of Sofiero. Helsingborg has played a prominent part in the Scandinavian wars. It was almost destroyed in the war between Sweden and Denmark during the reign of Charles XI and was the scene of a Danish defeat at the hands of Swedish peasants in 1710.

HELSINGFORS, hĕl'sĭng-fôrs'; Finnish, **HELSINKI,** hĕl'sĭng-kĭ. The capital of the Grand Duchy of Finland as well as of the Government of Nyland (Map: Russia, C 2). It is beautifully situated on a peninsula on the Gulf of Finland, 191 miles west of St. Petersburg by sea. The entrance to the harbor is protected by a series of formidable batteries, called the fortifications of Sveaborg and consisting of seven strongly fortified islands and numerous islets, while the harbor itself is further defended by two forts. Helsingfors is next in importance to Kronstadt as a naval station on the Baltic and the largest and handsomest town of Finland. Its streets are broad and regular, and there are a number of handsome squares, with statues of Runeberg and Elias Lönnrot. Of the public buildings, the most prominent are the residence of the Governor, the Senate House, the university buildings, the Lutheran church of St. Nicholas, the Russian church (completed in 1868), the Athenæum (built in 1887), with a picture gallery, and two new theatres. It is well equipped with educational institutions of higher and lower grades. The university, originally founded at Abo in 1640, and removed to Helsingfors in 1827, comprises four faculties, with over 2600 students, a library of 190,000 volumes, a hospital, a zoölogical and botanical museum, a botanic garden, and a valuable observatory. Another prominent educational institution is the Polytechnic Institute. Helsingfors is the seat of many learned societies. Over 40 Finnish and more than 30 Swedish newspapers and periodicals are published here. Since 1840 Helsingfors has been a favorite bathing place and attracts many visitors from St. Petersburg during summer. The town carries on a considerable trade in agricultural and dairy products with St. Petersburg, England, and Swedish and German ports. Helsingfors has a larger industry than any other place in the country. It has manufactures of beer, sugar, tobacco, liquors, carpets, linen, etc. Helsingfors is the seat of the Governor-General of Finland, the Finnish Diet, and numerous consular representatives, including one from the United States. Pop., 1900, 93,217; 1910, 147,218.

Helsingfors was founded by Gustavus I of Sweden in 1550, a short distance inland; it was removed to its present site in 1640. In 1713 it was destroyed by the Russians. It was fortified in 1729, and came with the rest of Finland into the possession of Russia in 1809. In 1812 it became the capital of Finland. During the Crimean War it was bombarded for two days and nights by the allied fleet without any appreciable injury to its fortifications.

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HELSINGÖR, hĕl'sĭng-ĕr. A seaport of Zealand, Denmark. See Elsinore.

HELST, hĕlst, Bartholomeus van der (c.1611–70). A Dutch portrait painter. His

birthplace is uncertain, being assigned to Haarlem and to Dordrecht, and the year of his birth falls between 1611 and 1614. He is reputed to have been a pupil of Frans Hals (q.v.) at Haarlem, and a few of his works, indeed, show this influence. But his art on the whole was directly the opposite of Hals's, and he was more influenced by his other master, Nicolaes Elias, of Amsterdam. The researches of Scheltema show that he was living in Amsterdam in 1636 and probably much earlier. There he married the attractive Constantia Reinst, and in 1654, in conjunction with Nicolaes de Helt Stokade, he founded the Painters' Guild of St. Luke. He died at Amsterdam, Dec. 16, 1670.

His best-known work is the "Banquet of the Civic Guard," now in the Museum of Amsterdam, which was painted to represent the celebration of the Peace of Westphalia in 1648. It contains 24 full-length portraits, characteristic, well modeled, and rich in color. In the same museum are the "Syndics of the Brotherhood of St. Sebastian" (1663), of which there is a replica in the Louvre; the four "Syndics of the Marksmen"; the "Company of Captain Rogloff Bicker" (1639), 32 figures in all; the portraits of the Princess Maria Henrietta Stuart, Burgomaster Andries Bicker, Admirals Kortenaar, Van Ness, and others. Among his other portraits are those of a "Protestant Dame" (1638), and of Paul Potter, at The Hague—one of his most charming works; a "Lady in Blue," in the National Gallery of London; and the portrait of the artist in the Uffizi, Florence. Among those in the United States are portraits of an "Unknown Lady," in the New York Historical Society, and a "Dutch Burgher," "Jean van Male," and the "Guitarist" (the two former being admirable examples of his work), in the Metropolitan Museum, New York. The heads of Helst's portraits are well characterized, and all the details, especially the hands, are carefully drawn. In color he is not so successful, especially in rendering values. The surfaces are smooth but not thin, and he excels in draperies.

HELVE'DIUS. The nom de plume signed by James Madison to his five essays, published in various public journals (1793–96), criticizing the foreign policy of the administration and replying to the letters of Hamilton signed "Pacificus."

HELVELLYN, hĕl-vĕl'ĭn. One of the highest mountains in England, 3118 feet high, in the Lake District, Cumberland, between Keswick and Ambleside (Map: England, D 2).

HELVET'IC CONFESSIONS. See CREEDS AND CONFESSIONS.

HELVETIC REPUBLIC. See SWITZERLAND.

HELVE'TII, hĕl-vē'shĭ-ī. A Celtic people, which, according to Tacitus, *Germania*, 28, originally dwelt between the Rhine, the Main, and the Hercynian Forest. Later, according to Cæsar, they occupied the region between the Jura Mountains on the west, the Rhone on the south, and the Rhine on the east and the north; this region corresponds closely with the western part of modern Switzerland. They are first mentioned as defeating a Roman army in 107 B.C. and in 101 they accompanied the Cimbri (q.v.) on their invasion of north Italy. The great event in their history is their attempted irruption into Gaul, in which they were repulsed by Cæsar. They collected three months' provisions and, to cut off hope of return, burned 12 cities, 400 villages, and all isolated dwellings, and made a general rendezvous by Lake Leman, in the spring of 58 B.C. Cæsar hastened to Geneva, destroyed the bridge there, raised two legions in Cisalpine Gaul, and, when the Helvetians sent delegates to demand a passage westward, delayed them until he had built a wall along the Rhone 19 Roman miles in length, flanked with redoubts. Having vainly attempted to pass this barrier, the Helvetii took another route, but were followed and defeated with terrible slaughter about 15 miles from Bibracte (modern Mont-Beuvray in Burgundy), and the remnant were obliged to return to their own country, where they became subject to the Romans. Of 368,000 who left their homes, including 92,000 fighting men, only 110,000 returned. In the commotions which followed the death of Nero the Helvetians met with another catastrophe. Remaining faithful to Galba, they were attacked by Cæcina, a general of Vitellius, who dealt with them savagely. Under Vespasian the Helvetii flourished, and by degrees the whole country became completely Romanized. Consult: Vulliéty, *La Suisse à travers les âges* (Paris, 1902); Holmes, *Cæsar's Conquest of Gaul* (2d ed., Oxford, 1911); Cæsar, *De Bello Gallico*, i, 1–29, with the notes in various editions, especially in that by Holmes (ib., 1914).

HELVÉTIUS, ĕl'vā'syŭs', *Fr. pron.* ĕl'vā'sē'ŭs', CLAUDE ADRIEN (1715–71). A noted French encyclopædist. He was born in Paris in 1715, educated at the Lycée Louis-le-Grand, and after some practical training at Caen appointed at the age of 23 to the lucrative office of farmer-general; but as he was of a very humane and gentle disposition, the cruel and odious duties connected with the post decided him to resign it subsequently for that of chamberlain to the Queen's household. He wearied of the idle and dissipated life of the court, and, marrying in 1751 the daughter of the Comte de Ligneville, he withdrew to a small estate at Voré, where he spent the most of his life in the education of his family, the improvement of his peasantry, and literary labors. In 1758 appeared his celebrated work, *De l'esprit*, in which he endeavored to prove that sensation (*sensibilité*) is the source of all intellectual activity, and that the grand lever of all human conduct is self-satisfaction. But he admits, at the same time, that self-satisfaction assumes different forms; e.g., the self-satisfaction of a good man consists in the subordination of private to more general interests—first to the circle among which he lives, then to the community, and finally to the world at large. The book was denounced by the doctors of the Sorbonne and condemned by the Parliament of Paris to be publicly burned. He then went to England and to Germany, where Frederick II received him with distinction. He died in Paris, Dec. 26, 1771, leaving behind him, besides some other writings, a work called *De l'homme, de ses facultés intellectuelles, et de son éducation* (published 1772). His collected works were published in Paris in 1791 in 14 volumes. Consult: Morley, *Diderot and the Encyclopædists* (London, 1878); Avezac-Lavigne, *Diderot et la société du Baron d'Holbach* (Paris, 1875); Keim, *Helvétius, sa vie et son œuvre* (ib., 1907).

HELVID'IUS PRIS'CUS. A Roman statesman and Stoic philosopher, of the first century A.D., son-in-law of Thrasea Pætus (q.v.). He was an ardent opponent of the Imperial power. Under Claudius or Nero he was quæstor of Achæa. He served also in Armenia, to the

great satisfaction of the provincials. Because he eulogized Brutus and Cassius he was banished by Nero in 66, but was recalled by Galba in 68. In 70, as prætor, he opposed Vespasian in various ways, and as a result was banished and presently put to death. For writing a panegyric on Helvidius, Herennius Senecio was put to death by Domitian. Consult: Tacitus, *Dialogus*, 5; Suetonius, *Vespasian*, 15; Pliny the Younger, *Epistles*, vii, 19.

HELVIG, hĕl'vĭk, Amalie von (1776–1831). A German poet, born Amalie von Imhoff, at Weimar. She received a careful education and traveled much. In 1803 she married a Swedish officer, Karl Gottfried von Helvig, who entered the Prussian service in 1815. Several of her poems were first published by Schiller in the *Musenalmanach*, and her "Abdallah und Balsora" appeared in the *Horen*. She read Greek, and Goethe taught her to use the hexameter, in which she composed the epic *Die Schwestern von Lesbos* (1800). Her other works include a translation of Tegnér's *Frithjofs Saga* (last ed., 1879); the collection *Taschenbuch der Sagen und Legenden* (1812–13), with Karoline de la Motte-Fouqué; and the poems *Die Schwestern auf Corcyra* (1812), *Die Tageszeiten* (1812), *Die Sage vom Wolfsbrunnen* (1814), and *Helene von Tournon*. For her biography, consult H. von Bissing (Berlin, 1889).

HEL'VIUS CIN'NA, Gaius. A Roman poet, who lived about 50 B.C. He was a friend of Catullus and was considered by Vergil a poet superior to himself. On the day of the funeral of Julius Cæsar he was killed by the infuriated rabble, which, defeated in its attempt to fire the houses of Brutus and Cassius, encountered him and mistook him for Cornelius Cinna. By the ancient historians who narrate this story, he is called a tribune of the plebeians. The story of his dream as given by Plutarch (*Cæs.* 68) has been introduced by Shakespeare into the drama of *Julius Cæsar* (Act iii, Scene 3). His most highly esteemed work was the *Smyrna*, on which he labored nine years, in true Alexandrian fashion. Its subject was the unnatural love of Smyrna for her own father, Cinyras. Its style is shown by two extant fragments to have been epic. He wrote also a poem entitled *Propemptikon Pollionis*. Prior to the publication of the *Æneid*, the *Smyrna* was regarded as the most complete thesaurus of Roman mythology. Consult: Weichert, *Commentationes II de Caio Helvio Cinna, Poeta* (Meissen, 1822–23); Kiessling, "De C. Helvetio Cinna Poeta," in *"Commentationes Mommsenianæ* (Berlin, 1877); Ellis, annotated edition of Catullus (2d ed., Oxford, 1889); Schanz, *Geschichte der römischen Litteratur*, § 107 (3d ed., Munich, 1911).

HELVOETSLUIS. See Hellevoetsluis.

HELYAS, HELIAS, or **HELIS.** See Chevalier au Cygne; Swan, Knight of the.

HE'LY-HUTCH'INSON, John, Baron Hutchinson (1757–1832). An English general, son of John Hely-Hutchinson (1724–94). He was educated at Eton and at Trinity College, Dublin, studied military tactics at Strassburg, and in 1798 was in command at Castlebar when the French landed in Killala Bay; but General Lake succeeded him previous to the flight of the raw Irish troops. Two years after he was appointed a chief of division in Abercromby's army in Egypt and assumed command in the battle of Alexandria when that general was mortally wounded. He succeeded, in spite of disaffection among his officers, in separating the two superior French forces; then forced the surrender of Cairo (June, 1801), and two months later of Alexandria. For these services he was rewarded with titles and a pension of £2000 a year. In 1813 he was made a general, and on the death of his brother Richard, in 1825, he became second Earl of Donoughmore.

HELY-HUTCHINSON, Sir Walter Francis (1849–1913). An English colonial administrator, born in Dublin and educated at Harrow and at Trinity College, Cambridge. He was attaché to Sir Hercules Robinson in Fiji (1874) and conducted the negotiations with Thakombau for the cession of Fijian sovereignty to Great Britain; the ability he then showed led to his subsequent advancement. After serving as Private Secretary for Fiji Affairs (1874–75) and for New South Wales Affairs (1875–77), he became Colonial Secretary of Barbados (1877) and chief secretary to the Governor of Malta (1883), where he was Lieutenant Governor for five years (1884–89). He was then appointed Governor of the Windward Islands (1889) and four years later of Natal, where he introduced "responsible government," and of Zululand, to which he annexed the territories across the Pongola (1895). In 1895 he was made Special Commissioner for Tongaland and in 1901 was transferred to the Cape of Good Hope as Governor of Cape Colony.

HÉLYOT, ā'lyō', Pierre (1660–1716). A French Franciscan scholar. He was born and died in Paris and entered the Franciscan convent of the strict observance, 1683. He traveled extensively among the monasteries and after long study produced the masterpiece, which has been the source whence innumerable writers have drawn, *Histoire des ordres monastiques religieux et militaires et des congrégations séculières de l'un et l'autre sexe, qui ont été établies jusqu'à présent* (8 vols., 1714–19); an enlarged edition in four volumes in alphabetic form by Migne, *Encyclopédie théologique*, vols. xx–xxiv, appeared in Paris (1858–59).

HEM'ANS, Felicia Dorothea (Browne) (1793–1835). An English poet, born in Liverpool. She published a volume of juvenile verse in 1808. This was followed with another volume in 1812, in which year she married Captain Hemans, an Irish soldier who had served in Spain. In 1818, after the birth of five sons, she separated from him. She spent the rest of her life in north Wales, in Lancashire, and in Dublin, where she died. Among her works are: *The Forest Sanctuary* (1825), in the second edition of which, published in 1829, first appeared "Casabianca"; *Records of Women* (1828); *Songs of the Affections* (1830); *Hymns for Childhood; National Lyrics and Songs for Music; Scenes and Hymns of Life* (1834). She also wrote three dull plays and contributed to the magazines. A volume of *Poetical Remains* appeared after her death, and a complete edition of her works, with a memoir by her sister, in seven volumes, in 1839. Mrs. Hemans's verse is sweet, natural, and pleasing, but at moments insipid. Its rhythms are facile, and it lacks depth and force. Still, she was a woman of talent, and, though her zeal for edification was in excess of her poetic faculty, she indubitably performed a useful function in affording a deal of pleasure and consolation to a great many people. Consult: Chorley, *Memorials of Felicia D. Hemans* (London, 1836); *Poetical Works*, with memoir,

edited by W. M. Rossetti (ib., 1873); Espinasse, *Lancashire Worthies* (ib., 1874).

HEM'ATITE (Lat. *hæmatites*, from Gk. *αἱματίτης*, *haimatitēs*, bloodlike, from *αἷμα*, *haima*, blood), or SPECULAR IRON. An iron sesquioxide that crystallizes in the hexagonal system. The specular varieties are crystallized and have a metallic lustre, whence their name. Hematite also occurs in massive fibrous varieties, which have a submetallic or metallic lustre and are brownish red to black in color; while the earthy varieties, known as *red ochre* and *argillaceous hematite*, are red to brownish black in color. It is a valuable ore of iron, containing when pure 70 per cent of that metal, and is widely distributed throughout the world. In North America deposits of great thickness are found in the Lake Superior region, which includes the famous deposits of the Gogebic, Marquette, Menominee, Mesabi, and Vermilion ranges, where the output in 1912 reached a total of 48,211,778 long tons. Deposits at Pilot Knob and Iron Mountain in Missouri were formerly famous, but have not been extensively worked in recent years. See IRON.

HE'MATEM'ESIS, HE'MATIN, HE'MATOX'YLIN, HE'MATU'RIA. See HÆMATEMESIS; ETC.

HEM'EL HEMP'STEAD. A market town and municipal borough in Hertfordshire, England, 23 miles northwest of London (Map: England, F 5). Its industries comprise boat making, paper making, straw plaiting, iron foundries, tanneries, and breweries. Its incorporation dates from 1898, and much activity is being shown in public works and improvements. The town owns fine town-hall buildings and a corn exchange and markets, and is reached by a branch of the Midland Railway from Harpenden. Pop., 1901, 11,300; 1911, 12,888.

HEMENWAY, hĕm'en-wā, FRANCIS DANA (1830–84). An American Methodist Episcopal theologian. He was born in Chelsea, Vt., graduated from the General Biblical Institute, Concord, N. H., in 1853; and from 1857 to 1861 was principal of the preparatory department of Garrett Biblical Institute, to which institution, after four years in the ministry, he returned as adjunct professor of biblical literature. Appointed in 1870 professor of Hebrew and Biblical literature, he served in this position until his death. He was one of the editors of *The Methodist Hymnal* (1877), contributed the comments on Jeremiah and Lamentations to the *Whedon Series of Commentaries*, and with C. M. Stuart was author of *Gospel Singers and their Songs* (1892). Consult *The Life and Selected Writings of Francis Dana Hemenway*, by Bradley, Patten, and Stuart (Cincinnati, 1890).

HEM'ERALO'PIA. See SIGHT, DEFECTS OF.

HEM'EROBAP'TISTS (from Gk. *ἡμεροβαπτιστής*, *hēmerobaptistēs*, from *ἡμέρα*, *hēmera*, day + *βαπτιστής*, *baptistēs*, baptist, from *βαπτίζειν*, *baptizein*, to baptize). A sect of Jews mentioned by Eusebius (*Hist. Eccl.*, iv, 22) on the authority of Hegesippus, by Epiphanius (*Hær.* 17), and Justin Martyr in the *Dialogue with Tryphon*. Their distinguishing feature seems to have been the daily ablution. According to Toseĕta, *Jadajim II*, Palestinian Talmud, *Berakhoth III*, 6 c, and Babylonian Talmud, *Berakhoth* 22 a, there was a Jewish sect called *Tobhile shaḥarith*, or 'those who immersed themselves in the morning,' distinct from the Pharisees. Justin Martyr designates them as Baptists; Hegesippus in Eusebius (l. c.) as Hemerobaptists. Epiphanius distinguishes them from the "scribes and the Pharisees." In the Clementine Homilies (II, 23) John the Baptist is referred to as a Hemerobaptist. Pseudohieronymus (*Indicubus*, I, 10), Honorius (*De Hæresibus*, viii), and Isidore of Spain (*Origines*, viii, 4, 10) speak of these Jewish Hemerobaptists. The custom seems to have been widely practiced among the Jews of West Africa (Tertullian, *De Baptismo*, 15). According to the Clementine Homilies (x, 1; xi, 1) Peter immerses himself daily before the morning prayer; and it is not improbable that the custom passed from a Jewish sect to a Christian. It evidently had a religious significance, as it "cleansed from all guilt" (Epiphanius, *Hær.* xvii, 1). Consult: Oehler, *Corpus hæresiologicum* (Berlin, 1856); Preuss, *Wiener medizinische Wochenschrift* (Vienna, 1904); Krauss, *Bad und Badewesen in Talmud* (Frankfort-on-the-Main, 1908); Brandt, *Die jüdischen Baptismen* (Giessen, 1910).

HEM'EROCAL'LIS. See DAY LILY.

HEM'IANOP'SIA, or HEMIANOPIA. See HEMIOPIA.

HEM'ICEL'LULOSE. A name applied to substances making up a portion of ordinary cell walls and wood walls of plants and composing almost entirely the endosperm of many seeds (date palm, button palm, *Iris*, etc.). Hemicellulose includes a number of different chemical substances and differs from cellulose in certain important characters. It is readily hydrolyzed by dilutions of mineral acids that will not affect cellulose. Upon hydrolysis hemicellulose produces various proportions of mannose, galactose, xylose, or arabinose; while cellulose produces only glucose. Hemicellulose is not soluble in Schweitzer's reagent (ammoniacal copper sulphate), which is an excellent solvent for cellulose; and it is far more commonly digested by the cytases than is cellulose.

HEMICHORDA, hĕm'ĭ-kôr'dȧ. Same as Adelochorda (q.v.). See BALANOGLOSSUS; CHORDATA.

HEMICIDARIS, hĕm'ĭ-sĭd'ȧ-rĭs. One of the common genera of Mesozoic echinoids, appearing in the Permian and ranging through the whole Mesozoic era. It is characterized by its thick-shelled spheroidal form, the narrow ambulacra with numerous plates near the ambulacral system, and two rows of small tubercles, while the broad ambulacra bear two rows of very large tubercles. See ECHINOIDEA.

HEM'ICRA'NIA (Lat., from Gk. *ἡμικρανία*, *hēmikrania*, pain on one side of the head, from *ἡμι-*, *hēmi-*, half + *κρανίον*, *kranion*, skull). A headache affecting one side of the head. See HEADACHE; MIGRAINE.

HEM'ICYCLE (Gk. *ἡμι-*, *hēmi-*, half, and *κύκλος*, *kyklos*, circle). A semicircular seat, used as a convenient resting place or for a group meeting for conversation or discussion; called also *exedra*.

HEMICYCLE, THE. A painting by Paul Delaroche (q.v.) on the wall of the amphitheatre at the Ecole des Beaux-Arts, Paris.

HEM'IEP'IPHYTE. See EPIPHYTE.

HEMIGALE, hĕ-mĭg'ȧ-lē (Neo-Lat., from Gk. *ἡμι-*, *hēmi-*, half + *γαλῆ*, *galē*, weasel). An East Indian weasel-like civet (*Hemigalea hardwickii*), about the size of an ichneumon, and grayish brown, with six or seven dark wide stripes across the back. It feeds on eggs and small animals.

HEM'IMET'ABOL'IC INSECTS (from Gk. *ἡμι-, hēmi-*, half + *μεταβολή, metabolē*, transformation, from *μεταβάλλειν, metaballein*, to transform, from *μετά, meta*, after + *βάλλειν, ballein*, to throw). Insects that have a partial or incomplete metamorphosis. There are often very great differences between the habits and the structure of the young and the adults. For example, in the case of the cicadas, the larvæ live in the ground and have forelegs fitted for burrowing, while the adults, which appear only after a period of pupation, fly about and rest in herbage. In other forms, such as dragon flies, the larvæ are aquatic and have tracheal gills, while the adults are winged and have open trachea. The orders of the hemimetabolic insects are: Plecoptera, or stone flies; Isoptera, white ants or termites; Corrodentia, psocids and book lice; Mallophaga, bird lice; Euplexoptera, earwigs; Hemiptera, cicadas, chinch bugs, squash bugs, bedbugs, plant lice, etc.; and Orthoptera, grasshoppers, crickets, and walking sticks. Fossil insects belonging to this group have been found in Illinois, Pennsylvania, and Colorado. See METAMORPHOSIS.

HEMI'NA, LUCIUS CASSIUS. A Roman annalist who lived about 145 B.C. and wrote a history of Rome from the founding of the city to the end of the Third Punic War (Pliny, *Historia Naturalis*, xiii, 84; xxix, 6). Though the work is frequently cited by Pliny, Nonius, and Aulus Gellius, only a few fragments are preserved. These are given in Peter, *Fragmenta Historicorum Romanorum* (Leipzig, 1883). Consult also Peter, *Veterum Historicorum Romanorum Relliquiæ*, vol. i (Leipzig, 1870; 2d ed., 1914).

HEM'ING, JOHN. Coeditor with Condell of the first folio of Shakespeare. See CONDELL, HENRY.

HEM'IO'PIA, HEM'IANO'PIA, or **HEM'-IANOP'SIA** (Neo-Lat., from Gk. *ἡμι-, hēmi-*, half + *ὤψ, ōps*, eye). A disorder of sight, consisting in loss of vision for corresponding halves or sections of the visual field. It depends upon the arrangement of the nerve fibres running from the brain through the optic nerves to the eyes. The fibres coming from each half of the brain, through the optic tracts, meet at a point called the optic chiasm, where some fibres cross over to the optic nerve of the opposite side and some go to the eye of the same side. From the way in which this crossing and subsequent arrangement of the fibres takes place, the right halves of both retinæ, and so the left halves of both visual fields, are supplied from the right half of the brain through the right optic tract. An affection of one optic tract will therefore cause loss of vision in the corresponding half of each retina, and so loss of the field of vision of the opposite side. This is homonymous or lateral hemiopia. A lesion in the chiasm destroying all the crossing fibres causes loss of vision in the outer half of the field of both eyes, bitemporal hemiopia, known, together with a possible loss of the inner field of both eyes, as crossed hemiopia.

HEM'IPLE'GIA (Neo-Lat., from Gk. *ἡμιπλήξ, hēmiplēx*, smitten on one side, from *ἡμι-, hēmi-*, half + *πλήσσειν, plēssein*, to strike). Paralysis (q.v.) limited to one side of the body. In some cases part of the face is also involved, if the cause of the paralysis affects the origin or the course of the facial nerve. The cause is usually a hemorrhage within the brain cavity, i.e., apoplexy (q.v.), or a collection of fluid, or a tumor. Because of the fact that about 90 per cent of the fibres in the pyramids of the brain pass to the opposite side of the body (see NERVOUS SYSTEM), the paralysis occurs on the opposite side of the body from the site of the lesion in the brain, unless the lesion is situated below the decussation of the fibres. While the motor nerves are principally affected, the nerves of sensation are also more or less involved. Besides the causes named, epilepsy, hysteria, and chorea may also operate to cause hemiplegia, which in these cases is temporary. The treatment varies with the cause and must always be under a physician's direction. Stimulants should never be administered to a paralyzed patient unless ordered by a physician. The prognosis varies according to the cause. If hemiplegia is due, as it very frequently is, to apoplexy, the first attack may terminate in more or less complete recovery; but even then subsequent attacks are likely to occur.

HEM'IPODE (Gk. *ἡμίπους, hēmipous*, half-footed, from *ἡμι-, hēmi-*, half + *πούς, pous*, foot). A book name for certain gallinaceous birds, usually regarded as forming a single family (Turnicidæ), in the order Hemipodii, distinguished by a slender beak and by the want of a hind toe. They are especially notable because all of the vertebræ remain distinct instead of being extensively anchylosed, as is usual in birds. The palate is like that of the Passeres, and Huxley and some other systematists have placed them in a separate order, the Hemipodii or Turnicomorphæ. They are the smallest of gallinaceous birds and inhabit cultivated grounds and sterile sandy plains in warm countries. There are about 25 species, in two genera. See BUTTON-QUAIL; ORTYGAN.

HEMIP'TERA (Neo-Lat. nom. pl., from Gk. *ἡμι-, hēmi-*, half + *πτερόν, pteron*, wing). An order of insects sometimes called Rhynchota, including the bugs, and comprising the suborders Homoptera and Heteroptera. The name "Hemiptera" was suggested by the appearance of the first pair of wings, the proximal half of which in many of the species (suborder Heteroptera) is thickened much like that of beetles. The wings of the suborder Homoptera, when present, are of equal thickness throughout. The mouth parts of the Hemiptera are fitted for sucking, and the young undergo incomplete metamorphosis. The order is one of the most destructive to agriculture of all the insects. A few of the forms are useful in the economy of plants and man, for certain species prey upon injurious insects, while the species producing cochineal and wax furnish materials of commercial value. The injurious species include the loathsome lice and bedbugs, red bugs which do much damage to the cotton and orange crops, the destructive chinch bug, plant lice, scale insects, etc.

Fossil Hemiptera. The oldest-known fossil insect, represented by a fragmentary wing of hemipteran relations, was found in the Upper Ordovician shales of Sweden. The earliest fossil bugs that have the mouth parts preserved have been obtained from Carboniferous rocks and show these parts to have been, at that early period, of the highly specialized lancet form characteristic of the order—an indication of the very early evolution of the type. The scale insects and mealy bugs (Coccidæ), the harvest flies (Cicadidæ), lantern flies (Fulgoridæ), and

tree hoppers (Membracidæ) have their fossil ancestors in the Tertiary rocks. Some of the Heteroptera, such as the water bugs, appear in the Jurassic. Chinch bugs, squash bugs, and bedbugs appear in the Liassic and Tertiary.

Bibliography. Osborn, "Classification of Hemiptera," in *Entomologica Americana*, vol. i (Brooklyn, 1885); Sharp, "Insects," in *Cambridge Natural History*, vols. v, vi (New York, 1900); Comstock, *Manual for the Study of Insects* (Ithaca, 1895); Howard, *The Insect Book* (New York, 1901); Distant and Champion, "Hemiptera-Heteroptera," in *Biologia Centrali-Americana* (London, 1880–1901); Kellogg, *American Insects* (New York, 1908); Banks, *Catalogue of the Nearctic Hemiptera-Heteroptera* (Philadelphia, 1910).

HEM'IRAMPH (from Gk. *ἡμι-, hēmi-*, half + *ῥάμφος, rhamphos*, snout). A fish of the family Hemiramphidæ. See HALFBEAK.

HEM'LING, HANS. A Flemish painter, more correctly MEMLING (q.v.).

HEM'LOCK (AS. *hemlic, hymblicæ*, hemlock), *Conium*. A genus of umbelliferous plants, the members of which have compound umbels of small white flowers. The best-known and only important species is the common, or poison, hemlock (*Conium maculatum*), which grows by waysides on heaps of rubbish and in other similar situations throughout Europe, in some parts of Asia, and naturalized in North America and Chile. It has a root somewhat resembling a small parsnip; a round, branched, hollow, bright-green stem, 2 to 7 feet high, generally spotted with dark purple; large tripinnate, dark shining green leaves with lanceolate pinnatifid leaflets. The whole plant has a nauseous smell, particularly if rubbed or bruised. The leaves and fruits are employed in medicine. The leaves should be gathered just before the time or at the commencement of flowering, and after the removal of the larger stalks they should be quickly dried by a heat not exceeding 120°. As, however, they sometimes yield little or none of the active principles in the plant, the fresh leaves are preferred. The whole plant contains the active principle, coniine, and many fatal cases of poisoning have been attributed to eating the roots under the mistaken idea that they were parsnips.

The uses of hemlock in medicine are few and unimportant and depend chiefly upon its action upon the motor nerves, beginning with their end organs. Although large doses cause complete paralysis by their action upon the peripheral nerves, sensation and consciousness are not affected; death finally occurs by extension of the paralysis to the muscles of respiration. In large or poisonous doses it sometimes gives rise to coma and sometimes to convulsions or violent delirium. Among the ancient Greeks poisoning by hemlock was a common mode of death for condemned criminals. It is generally claimed the juice of the common hemlock was used, but some claim the water hemlock was the plant thus employed. The strength of its preparations is very variable, as its active principles are volatile. Practically the only use of the drug is in tetanus, hydrophobia, strychnine poisoning, and other convulsive disorders. Even in these it is rarely used, and only to prevent exhaustion by lessening muscular contractions. Water hemlock, or cowbane (*Cicuta virosa*), is also an umbelliferous plant, found growing in ditches, the margins of ponds, and wet grounds in Europe and the north of Asia. It has a large fleshy white root, covered externally with fibres; an erect much-branched stem, 2 to 5 feet high; tripinnate leaves, with linear-lanceolate regularly and sharply serrated leaflets, and white flowers. It is a virulent narcotic acrid poison. Cicuta, in Latin, seems to have been the name of the same plant called *coneion* by the Greeks, but it is not known whether this or the previous plant was so denominated. (See CONIINE.) Another species, *Cicuta maculata*, is common in North America, growing in many places. It has a spotted stem, like that of true hemlock, the name of which it very generally receives in North America. The leaves are triternate, the leaflets ternate. It is a very poisonous plant and is the cause of many deaths.

HEMLOCK TREE, or HEMLOCK SPRUCE. A name applied to the coniferous trees which belong to the genus *Tsuga*, especially to *Tsuga canadensis*. This is a large, graceful tree, with much the habit and appearance of some spruces. It is found from Nova Scotia to Alabama and Georgia and west to Wisconsin and Minnesota. The leaves are half an inch long, bright green above and silvery beneath. The cones, which have few thin bracts, are scarcely longer than the leaves. The wood, light, soft, brittle, and light red in color, is extensively used in building. It warps badly when exposed. The bark is largely employed in tanning leather, for which purpose it is preferred and more extensively used than any other American product. Hemlock oil is distilled from the branches and leaves, and pitch is obtained from the trees. There are numerous cultivated varieties which are very ornamental, especially while the trees are young. *Tsuga caroliniana* is a second species, which occurs locally in Virginia, North Carolina, and Georgia. Two species are found on the Pacific coast from Alaska to California—*Tsuga mertensiana*, a tree 70 to 100 feet tall, and *Tsuga heterophylla*, a somewhat larger tree that attains its greatest size in Washington and Oregon. The wood of the last species is stronger and more durable than that of any other American hemlock, and it is largely manufactured into lumber for construction purposes. This species is extensively planted as an ornamental tree in Europe. Other species are found in Asia. See SPRUCE.

HEM'METER, JOHN COHN (1864–). An American physician, born in Baltimore, Md., and educated in Germany, at the Baltimore City College, the University of Maryland (M.D., 1884), and Johns Hopkins University (Ph.D., 1890). At the University of Maryland he was appointed professor of physiology, clinical professor of medicine, director of the physiological laboratory, and regent of the medical department. A specialist in diseases of the digestive organs, he was at one time president of the American Gastro-Enterologic Association, became associate editor of several American and foreign medical journals, and published, among other works, *Diseases of the Stomach* (3d ed., 1902); *Diseases of the Intestines* (2 vols., 1901–02); *Manual of Practical Physiology* (1912).

HE'MODY'NAMOM'ETER. See HÆMODYNAMOMETER.

HE'MOGLO'BIN. See HÆMOGLOBIN.

HE'MOGLO'BINU'RIA. See HÆMATURIA.

HE'MOPHIL'IA. See HÆMOPHILIA.

HEM'ORRHAGE. See BLEEDING.

HEM'ORRHOIDS. See PILES.

HEMLOCK

1. TREE SHOWING FORM OF GROWTH

2. SPRAY SHOWING CONES

HEMP (AS. *henep*, OHG. *hanaf*, *hanof*, Ger. *Hanf;* connected with Lat. *cannabis*, Gk. *κάνναβις*, *kannabis*, OChurch Slav. *konoplya*, Lith. *kanapes*, hemp, and probably with Skt. *śana*, hemp), *Cannabis sativa*. A fibre plant of the natural order Urticaceæ (q.v.), which has the male and female flowers on different plants. There is only one known species of the genus, which varies considerably, however, in different soil, climate, and cultivation. It is an annual, a native of the warmer parts of Asia, but has been cultivated in Europe from the earliest historic times and is now naturalized in many parts of Europe and America. Like flax, it adapts itself to diversities of climate, but is, however, readily injured by frost, particularly when young. In many countries it succeeds only because the summer is sufficiently long for its whole life. Hemp varies from 3 or 4 to 15 or even 20 feet in height, according to the soil and climate. It is sometimes used as an ornamental in shrubberies and large flower borders. The stem is erect, more or less branched; the leaves are five to nine fingered, the flowers yellowish green, small, and numerous. The stem is hollow or filled with a soft pith, surrounded by a tender brittle substance, consisting chiefly of cellular tissue, with some woody fibre, which is called the reed, boon, or shive of hemp. Over this is the thin bark, composed chiefly of fibres extending parallel with the stalk, with an outer membrane or cuticle. The female plants are taller and stronger than the male.

Hemp is cultivated for its fibre in almost all countries in Europe; most extensively in Russia, Italy, and Austria-Hungary. Russia produces about 1,000,000,000 pounds, or two-thirds of the world's annual production of fibre. French hemp is much esteemed in the market, as is also that of England and Ireland, of which, however, the quantity is comparatively inconsiderable. The United States produces about 7,500,000 pounds of hemp fibre annually, valued at about $500,000, which is practically all grown in Kentucky, though some is produced in California, Illinois, and Nebraska. The production has been greatly reduced in the last 30 or 40 years, owing to the introduction of Manila hemp and jute. In British India, however, production increased from 15,000,000 pounds in 1889 to about 75,000,000 pounds in 1909. Limestone soils and alluvial soils are best adapted to this plant. It is very necessary to have the soil so rich, and to sow the seed at such a season, that the plants shall grow rapidly at first, as they thus form long fibres. Hemp sown thinly produces a coarser fibre than that sown thickly. It is not considered an exhaustive crop when the leaves of the plant and the shive, or boon, are returned to the land. As with flax, a thorough preparation of the soil is necessary. With the ground well prepared there is little trouble with weeds, as hemp occupies the entire ground. The crop is ready to cut when the first seeds are ripe, or about 100 days from planting. Cutting is done with a knife or a heavy mower. The treatment of hemp by "retting," etc., is similar to that of flax (q.v.). It is usually dew-retted by spreading evenly over the ground to rot out the gums that hold the filaments together. The hemp stalks are afterward decorticated by hand beating or machinery and cleaned from the fibre by "hackling." The fibre is tied up into "hands" and baled. The average yield of hemp fibre is about 1000 pounds per acre. The fibre of hemp is generally used for coarser purposes than that of flax, particularly for sailcloth, pack sheet, ropes, and the calking of ships.

The seed of hemp is produced in great abundance. It is commonly sold as food for cage birds; and birds are so fond of it that not only the ripening fields, but the newly sown ground, must be carefully guarded against their depredations. Hemp is cultivated in warm countries for a resinous secretion which has narcotic or intoxicating qualities. In India the resin is commonly known as churrus, or charras. See HASHISH.

While, strictly speaking, the name "hemp" belongs to the plant *Cannabis sativa*, by common usage it is now applied to other fibre plants that in a great measure supply the uses once filled by common hemp alone. These are designated as bowstring, Manila, sisal, and sunn hemp (see below). Many lesser-known fibre plants pass under the general name of hemp, though they vary widely in their botanical aspects and relations. Consult S. S. Boyce, *Hemp: A Practical Treatise on the Culture of Hemp, with the History and Nature of the Hemp Plant* (New York, 1912).

HEMP, BOWSTRING. The fibre produced by *Sansevieria* spp., a genus of Liliaceæ with representatives in tropical regions of both hemispheres. The employment of the fibre for making bowstrings led to this name. The plants are stemless perennials which grow wild in the jungles and increase by runners. The leaves, which yield readily to treatment in the fresh state, are thick and fleshy, sword or lance shaped, and rich in fine lustrous fibre which ranges from 2½ to 7 feet in length, does not rot readily in water, and by experiment has been found to be the strongest and best-fitted fibre for deep-sea sounding. The plant, which is propagated readily from cuttings, requires a good rich soil in which under favorable conditions it will reach its full growth in one year. Ordinarily, however, it does not acquire its full size until the second season, and some species do not yield a crop until the third year. When once the land is stocked with it, a full crop may be expected from the roots within 12 months after cutting. It does not appear to exhaust the soil materially and will continue to make vigorous growth for a number of years in the same place. The yield is about 50 pounds of fibre per ton of green leaves, or from 2 to 2½ tons of fibre per acre annually.

HEMP, INDIAN. See HASHISH.

HEMP, MANILA, or ABACA. The fibre of a species of plantain or banana (*Musa textilis*), a native of the Philippine Islands, where it is extensively cultivated. It is most widely grown in the southern part of Luzon and less extensively on the islands of Samar, Leyte, Cebu, and Mindanao. The fibre is white, easily separated, and very tenacious. The harder and stronger outer fibre is used for cordage, the finer inner fibres for weaving delicate fabrics, and the intermediate layers for manufacture of web cloths and gauzes. From the finer sorts of the fibre, veils, crapes, robes, and women's hats of great beauty are made; also various articles of men's wear, as shirts and suitings of remarkable durability. Manila hemp is largely used in the United States for making binding twine and cordage. Manila cordage is now used for every purpose for which rope is employed. The best conditions for the growth of abaca are soil

fertility, wind protection, and abundant moisture, with good drainage. The finest growth is obtained on the slopes of the volcanic mountains. A new plantation is generally made of young shoots, which very quickly throw out suckers. Occasionally the plants are raised from seed. Cultivation consists in keeping down weeds and undergrowth and in loosening the soil by means of hoes and cultivators. As soon as the plants occupy the entire space, weed and other growth is much reduced. Plants raised from year-old seedlings need at least two years, while those raised from suckers require four years, before they will produce fibre of value.

The abaca is cut just before flowering, near the roots, split open longitudinally, and the central peduncle separated from the sheathing layers of fibre. The fibrous coats are dried two or three days in the shade and are then scraped until only the fibres remain. Two natives will cut and scrape about 25 pounds of the fibre in a day. The average yield is about 1000 pounds of good-grade fibre per acre annually. The output of abaca is fairly uniform under natural conditions. The exports from the islands during the last years of the Spanish régime averaged about 100,000 tons annually, but since then they have reached 175,000 tons in a single year. The value of the crop exported in 1913 was $23,045,000. Attempts have been made to develop its production in the Hawaiian Islands, but the quantity produced thus far is comparatively small. Consult *Philippine Bureau of Agriculture, Farmers' Bulletin No. 12* (Manila, 1910).

HEMP, Sisal. The fibre of *Agave sisalana,* order Amaryllideæ, native of Yucatan, Mexico, Central America, and West Indies, and closely related to the century plant. It has been introduced into the Bahamas and Florida. As a cordage fibre, it is second only to Manila hemp in strength. Its straight smooth strands of fibre become white upon drying without washing. The plants yield best on a gravelly, rocky soil in comparatively arid districts only a few feet above the level of the sea. It thrives upon the Florida Keys, upon the almost naked coral rock, but will not thrive when even slightly shaded. Plants set out at 18 inches high from the nursery will produce leaves fit for cutting in three years. The life of a plant when undisturbed is six or seven years, after which it sends up its blossom stalk and then dies. Cutting, however, extends its life 15 to 20 years. No special cultivation is needed except that the land be kept clean and the suckers kept down. The cutting of the leaves is done in Yucatan by Indians, who use a heavy-bladed, sabre-like knife called a machete. The spine at the leaf end is cut off, and the leaves bundled for removal to the machines. On large plantations they are transported by steam power over tramways which reach different parts of the estate. The fibre is separated from the fresh leaf by a specially constructed machine called a raspador. The annual yield of fibre is from 1000 to 1500 pounds per acre, 50 to 70 pounds of fibre being derived from 1000 leaves. Sisal hemp is largely used in the United States in the manufacture of ropes and binder twine, the imports of 1913 being 154,000 tons valued at $17,804,000. See Henequen.

HEMP, Sunn. The fibre derived from the bark of *Crotalaria juncea,* order Leguminosæ, a native of India. The plant has been in cultivation from time immemorial upon the high, sandy lands less suited for the more exacting crops. Seed is generally sown in April or May, and in August the plant, if grown for its fibre, is pulled or cut close to the ground, laid in long rows till the leaves begin to rot and separate from the stalks, which are then steeped in water for a few days, till the bark separates freely. The average yield is about 640 pounds of fibre per acre. The fibre is not so strong as hemp, but good cables, canvas, and cloth are made of it. It is now exported in considerable quantity and is known by various names, as brown hemp, Bengal hemp, etc. Jubbulpore hemp (*Crotalaria tenuifolia*) is considered by some authorities to be a variety of *Crotalaria juncea.* See Crotalaria.

HEMP AGRIMONY. A European medicinal plant. See Eupatorium.

HEM'PEL, Charles Julius (1811–79). An American homœopathist. He was born at Solingen in Prussia and was educated there, at the University of Paris, and, after coming to the United States (1835), at New York University. In 1857 he became professor of materia medica at the Hahnemann Medical College in Philadelphia and later practiced at Grand Rapids, Mich., where he died. A man of considerable literary ability, Hempel, who when a student in Paris had assisted in the preparation of Michelet's *Histoire de la France,* published translations of Hahnemann's *Chronic Diseases* (5 vols., 1846) and of Jahr's *Mental Diseases* (1853), as well as other homœopathic manuals. His most important works, however, were: *A System of Materia Medica and Therapeutics* (1859); *The Science of Homœopathy* (1874); and among several miscellaneous studies, *Christendom and Civilization* (1840).

HEMPEL, Frieda (1885–). A German coloratura soprano, born at Leipzig. After completing the course in piano at the Leipzig Conservatory, she studied singing for three years under Nicklas Kempner in Berlin. She made her début as the Queen in "The Huguenots" at the Royal Opera in Berlin in August, 1905. For the next two years she was engaged at the Schwerin Opera, returning to Berlin in 1907. Her reputation soon spread over all Europe, so that she was in constant demand for "guest" appearances in the principal cities. In 1912 she joined the Metropolitan Opera Company, New York, between seasons resuming her place in Berlin. Her voice is of beautiful and remarkably even quality, wonderfully flexible and vibrant. Her vocal technic is well-nigh flawless.

HEMP'HILL, Joseph Newton (1847–). An American naval officer. He was born at Ripley, Ohio, and graduated from the United States Naval Academy in 1866. He was regularly promoted through the various lower grades and became captain in 1901 and rear admiral in 1906. He served on the *Monongahela* when it was wrecked by the West Indian earthquake in 1867 and was at Manila during the Philippine outbreak and at Venezuela at the time of the Andrade-Castro revolution. He commanded the *Kearsarge* in 1902–04, was captain at the New York Navy Yard in 1904–06, served as president of the Board of Inspection and Survey in 1906–07 and of the Naval Examining and Retiring Boards in 1908–09, and was commander in chief of the Asiatic station and squadron in 1907–08. He retired in 1909.

FIBRE PLANTS

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1 RAMIE - BŒHMERIA NIVEA
2 JUTE - CORCHORUS CAPSULARIS
3 BOWSTRING HEMP - SANSEVIERIA ZEYLANICA
4 HEMP - CANNABIS SATIVA
5 COTTON - GOSSYPIUM HERBACEUM

HEMPL, George (1859–1921). An American philologist, born at Whitewater, Wis. In 1879 he graduated from the University of Michigan, with which he was connected as a teacher from 1889 to 1906, for the last nine years as professor of English philology and general linguistics. Immediately after his college course he had been a principal of high schools, and had then studied abroad (1886–89) at several German universities, receiving his Ph.D. from the University of Jena. In 1906 he accepted the professorship of Germanic philology at Leland Stanford Junior University. He served as president of the American Dialect Society in 1900–05, of the Modern Language Association of America in 1902–03, and of the American Philological Association in 1903–04. Besides his articles on archæology, pedagogy, and philology, he is author of *Old-English Phonology* (1892); *Chaucer's Pronunciation* (1893); *German Orthography and Phonology* (1897); *English Nursery Rimes in German* (1898); *Phonetic Text of Wilhelm Tell* (1900).

HEMP PALM (*Trachycarpus excelsa*). A palm of China and Japan, the fibre of the leaves of which is much employed in those countries for making cordage and for mats. Hats are also made of its leaves, and even cloaks and other garments for wet weather. See Chamærops.

HEMPSEED OIL (*oleum cannabis*). An oil obtained from the seeds of the *Cannabis sativa*, or common hemp. It has a mild odor, nauseating taste, and a greenish-yellow color which turns to brown with age. Its specific gravity at 15° C. is 0.9276. It is freely soluble in boiling alcohol. It has weaker drying properties than linseed, for which it is sometimes used as a substitute in making paints and varnishes. It is also used in soap manufacture. The seeds contain about 30 per cent of oil.

HEMP'STEAD. A village in Nassau Co., N. Y., about 20 miles east of New York City, on the Long Island Railroad (Map: New York, B 3). Its principal interests are in farming and market gardening. The village is a popular suburb of New York and has the Turner Institute, a public library, and two parks. During the Spanish American War Camp Black was established near here for State troops. The water works are owned by the municipality. Hempstead was settled by New Englanders in 1643. The Presbyterian church, organized the following year, claims to be the oldest Presbyterian society in the country. The Episcopal church owns a communion service presented by Queen Anne. Pop., 1900, 3582; 1910, 4964. Consult Onderdonk, *The Annals of Hempstead, 1643–1832* (Hempstead, 1878).

HEMPSTEAD. The county seat of Waller Co., Tex., 51 miles northwest of Houston, on the Houston and Texas Central Railroad (Map: Texas, E 4). It is an important shipping point, especially for garden truck, being situated in a farming and cotton-growing region, and has cotton gins, cottonseed-oil mills, pickling vats, etc. Pop., about 2000.

HEMPSTEAD PLAINS. A prairie on Long Island, N. Y., remarkable for being the only one east of the Alleghanies and interesting on account of its proximity to New York City. It is situated in the central part of Nassau County, around and between Hempstead and Hicksville, and originally covered about 50 square miles. About four-fifths of the area is now occupied by farms and villages, leaving 8 or 10 square miles of native vegetation to represent its primeval condition.

The surface is essentially level, except for a gentle slope to the south and a few broad shallow valleys, most of which contain no permanent streams. The soil is about a foot of brownish sandy loam, resting on coarse gravel, which is believed to be an outwash from the glacial moraine immediately north of it, and its natural productivity is much less than that of neighboring areas which were originally wooded. The native vegetation, outside of the deeper valleys, consists of a few scattered trees and shrubs, and about 60 species of herbs, of which broom sedge (a coarse grass) is the most abundant.

In Colonial days the area was public property and used mostly for pasturage, farming being a later development. More recently it has been a favorite place for equestrian sports, automobile races, and aëroplane flights, all of which are favored by the level topography and the scarcity of trees. The suburbs of New York are constantly encroaching on it.

The scarcity of trees here, as in the case of the great western prairies, has never been fully explained. For a more extended description, consult *Bulletin of the American Geographical Society* (New York, May, 1911).

HEMS. A city in Asiatic Turkey. See Homs.

HEMSTERHUIS, hĕm'stĕr-hois, Franz (1721–90). A Dutch writer on moral philosophy and æsthetics. He was born at Groningen, the son of Tiberius Hemsterhuis, studied at the University of Leyden, and held a subordinate place in the Council of State of the United Provinces. He also devoted himself to literature and art and especially to philosophy and is classed with the sentimentalists of the eighteenth century. His chief works are: *Lettre sur la sculpture* (1769); *Lettre sur l'homme et ses rapports* (1772); *Alexis, ou sur l'âge d'or* (1787; Ger. trans. by Jacobi, 1787); *Des facultés de l'âme* (1791).

HEMSTERHUIS, Tiberius (1685–1766). A celebrated Dutch scholar. He was born at Groningen, studied at the university there, and in 1704 was appointed professor of mathematics and philosophy at Amsterdam. In 1717 he was made professor of Greek at Franeker, although he did not take up his residence there until three years later. In 1740 he received a call to the University of Leyden, where he remained until his death. One of the greatest Greek scholars of his time, he may be said to have created a new school of Greek philology, to which belong his distinguished pupils Ruhnken and Valckenaer. His editions of the *Onomasticon* of Pollux (2 vols., 1706), of the *Colloquia* of Lucian (1708 and 1732), and of the *Plutus* of Aristophanes (1744) are his principal literary works. From Hemsterhuis' manuscripts, *Anecdota Hemsterhusiana* (1825) have been edited by Geel, and *Orationes et Epistolæ* (1839) by Friedmann. Consult: Ruhnken, *Elogium T. Hemsterhusii* (Leyden, 1768; reprinted in the *Bibliotheca Teubneriana*); Lindemann, *Vitæ Duumvirorum T. Hemsterhusii et D. Ruhnkenii* (Leipzig, 1882); Müller, *Geschichte der klassischen Philologie in den Niederlanden* (ib., 1869); Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

HEN. See Fowl.

HÉNAULT, â'nō', Charles Jean François (1685–1770). A French historian. He became president of the *cour d'enquêtes* in 1710 and member of the French Academy in 1723. Later

he was the head of the household of Maria Leszczynska, wife of Louis XV. He wrote much light and graceful verse and some mediocre plays, but is best known for his excellent *Abrégé chronologique de l'histoire de France* (1744), an attempt at a general history of France. His *Mémoires* (1855) are of value mainly because they contain interesting anecdotes of men of note in his day.

HEN'BANE (*Hyoscyamus*). A genus of solanaceous plants, the members of which are mostly annual and biennial herbs, natives of the Mediterranean region. The common henbane (*Hyoscyamus niger*) is not uncommon in waste places in the neighborhood of towns and villages in Europe, northern Africa, Asia, and as an escape in the eastern United States. It is also cultivated to some extent. It is an annual or biennial, somewhat bushy, 1 to 4 feet high, with large sinuated or sharply lobed leaves without leafstalks, and large, dingy yellow flowers, with brownish-red or purple veins. The whole plant is covered with clammy hairs and has a nauseous smell, which gives warning of its strong narcotic, poisonous quality. Cases of poisoning by henbane are not rare, since its root somewhat resembles small parsnips. The seeds contain in largest quantity the peculiar alkaloid hyoscyamine, on which the properties of the plant chiefly depend. The symptoms of poisoning by henbane are similar to those produced by other narcotic poisons, and the proper treatment is the same as in cases of poisoning by opium. In medicine the leaves are commonly used externally. They are gathered and quickly dried when the plant is in full flower. Fomentations of henbane are applied to painful glandular swellings, parts affected with neuralgia, etc., and are often found to afford relief. Their action is almost the same as that of belladonna, and tincture and extract of henbane are often administered in cases of annoying cough, spasmodic asthma, and other diseases that seem to demand sedatives and antispasmodics. Henbane is also employed to calm mental irritation and to induce sleep. For many cases it has one great advantage over laudanum in not producing constipation. The other species of henbane possess similar properties. In Greece the dried stalks of *Hyoscyamus albus* are smoked to allay toothache.

HENCKE, hĕnk'*e*, KARL LUDWIG (1793–1866). A German astronomer, born at Driesen, where he was long postmaster. He discovered the planetoids Astræa (1845) and Hebe (1847) and contributed some additions to previous lists of stellar magnitudes to Peter's *Zeitschrift für Astronomie* (1860) and the *Monthly Notes* of the Astronomical Society (1859).

HENCKELL, hĕnk'el, KARL FRIEDRICH (1864–). A German author. He was born in Hanover and studied at the universities of Berlin, Heidelberg, Munich, and Zurich. He lived abroad, in Switzerland (Lenzburg and Zurich), in Italy (Milan), and in Belgium (Brussels), and was well acquainted with the modern literatures of Europe, on which he frequently lectured, besides giving readings from his own poems. In 1896–1905 he was his own publisher in Zurich and Leipzig. He settled in Munich in 1908. His poetry is revolutionary and socialistic in its tendency. Among his books are: *Skizzenbuch* (1884); *Strophen* (1887); *Diorama* (1889); a collected edition in 1898; *Gipfel und Gründe* (1904); *Mein Lied* (1906); *Schwingungen* (1907); *Im Weitergehn* (1911).

HEN'DERSON. A city and the county seat of Henderson Co., Ky., 12 miles below Evansville, Ind., on the Louisville, Henderson, and St. Louis, the Louisville and Nashville, and the Illinois Central railroads, and on the Ohio River (Map: Kentucky, C 4). A magnificent bridge crosses the Ohio at this point. Among the attractions of the place are Atkinson Park, containing 100 acres, and the county fair grounds. The city has fine public-school buildings, a Carnegie library, and a well-equipped sanatorium. Henderson controls an important trade in tobacco, corn, wheat, and fruit, particularly apples; and among its industrial establishments are cotton and woolen mills, grain elevators, tobacco stemmeries, hominy mills, saw and planing mills, a furniture factory, wagon works, extensive coal mines, box factories, etc. First incorporated in 1797, the city is now governed by a mayor and a common council. The water works, gas plant, and electric-light plant are owned and operated by the municipality. Pop., 1900, 10,272; 1910, 11,452; 1914 (U. S. est.), 11,953; 1920, 12,169. In 1905 two towns, Audubon and Edgewood, were annexed.

HENDERSON. A town and the county seat of Vance Co., N. C., 43 miles north by east of Raleigh, on the Seaboard Air Line and the Southern railroad (Map: North Carolina, D 1). It carries on an important trade in tobacco and cotton and has several extensive tobacco warehouses, cotton mills, bagging mills, cottonseed-oil mills, buggy and automobile factories, etc. Settled in 1820, Henderson was first incorporated in 1842. Under a charter last revised in 1912, the government is vested in a mayor, biennially elected, and a municipal council. Pop., 1900, 3746; 1910, 4503.

HENDERSON. A city and the county seat of Chester Co., Tenn., 18 miles southeast of Jackson, on the Mobile and Ohio Railroad (Map: Tennessee, B 3). It is the seat of the National Teachers' Normal and Business College and a county high school. Henderson is the centre of an agricultural region and has some manufactures and considerable cotton trade. Pop., 1910, 1087.

HENDERSON. The county seat of Rusk Co., Tex., 232 miles by rail north by east of Houston, on the Timpson and Henderson and the International and Great Northern railroads (Map: Texas, E 3). It has a normal college. There are cotton gins, a pottery, an oil mill, a saw mill, a handle factory, a machine shop, and a creamery, and a trade in cotton, live stock, etc. Pop., 1914 (local est.), 4500.

HENDERSON, ALEXANDER (c.1583–1646). One of the greatest men in Scottish history and, next to Knox, the most renowned ecclesiastic of Scotland. He was born in the Parish of Criech, Fifeshire, about 1583, and educated at St. Andrews (M.A., 1603). He was presented to the living of Leuchars (1614) by Archbishop Gladstanes, and, turning from Episcopacy to the ardent support of Presbyterianism, became one of the most influential ministers of Scotland. In 1639 he was transferred to Edinburgh. He was mainly responsible for the National Covenant, which was publicly signed in Grey Friars Church, Edinburgh, 1638. During the troubled times of Charles I's reign Henderson's influence was felt in the negotiations for peace between the Scottish ecclesiastics and the court, and when Charles visited Scotland in state (1641) Henderson attended him as chaplain, and later on went to Oxford to mediate between the King

and Parliament. In 1643 Henderson was elected moderator for the third time in the General Assembly at Edinburgh and in that capacity presented a draft of the famous Solemn League and Covenant, an instrument against prelacy which was generally accepted by the Puritans. With Baillie, Rutherford, and others, Henderson represented Scotland in the Westminster Assembly, when the Solemn League, with slight modifications, passed both Houses and became law for the two kingdoms. When in 1646 the King joined the Scottish army and retired with it to Newcastle, he sent for Henderson and discussed the systems of Church government in a number of papers. Henderson died at Edinburgh, Aug. 19, 1646, and his death was the occasion of a national mourning in Scotland. For his life, consult Aiton (Edinburgh, 1836).

HENDERSON, Andrew (c.1705–75). A Scottish maker and seller of books. He was born in Roxburghshire and was educated at Aberdeen and in Edinburgh, where he afterward was a high-school teacher as well as a tutor in titled families. He was in London when his first book was published, a translation of Voltaire's *Charles XII of Sweden* (1734), but was back in his native land in time to witness the Jacobite uprising and to describe it in *A History of the Rebellion, 1745 and 1746* (1748). He began his bookselling at Long Acre, London, but continued to produce histories such as *Frederick, King of Sweden* (1752) and *William the Conqueror* (1764); memoirs such as *Dr. Archibald Cameron* (1753), *Field-Marshal Leopold, Count Daun* (Fr. trans., 1757), and *Field-Marshal James Keith* (1758); and controversial and miscellaneous writings. His best book is, perhaps, *The Life of William Augustus, Duke of Cumberland* (1766).

HENDERSON, Archibald (1877–). An American professor of mathematics and writer, largely on the drama. He was born at Salisbury N. C., was educated at the University of North Carolina (A.B., 1898; Ph.D., 1902), and studied also at Chicago, Cambridge, and Berlin universities, and at the Sorbonne (Paris). After 1899 he taught at the University of North Carolina, becoming professor of pure mathematics in 1908. His publications include: *Lines on the Cubic Surface* (1911); *Interpreters of Life and the Modern Spirit* (1911); *Mark Twain* (1911); *George Bernard Shaw: His Life and Works* (1911); *Forerunners of the Republic* (1913); *The Life and Times of Richard Henderson* (1913); *European Dramatists* (1913); *The Changing Drama* (1914).

HENDERSON, Charles Hanford (1861–). An American educator, born in Philadelphia and educated at the University of Pennsylvania (B.S., 1882) and at Zurich (Ph.D., 1892). For two years (1883–85) he was lecturer at Franklin Institute, Philadelphia, and then, after a year of editorial work for the *Scientific American*, was connected with the Philadelphia Manual Training High School as science teacher and principal from 1886 to 1896. From 1898 to 1900 he directed the Pratt Institute High School in Brooklyn, and for two years he was assistant literary editor of the Philadelphia *Press*. His publications include: *The Elements of Physics* (1900); *Education and the Larger Life* (1902); *John Percyfield* (1903); *Children of Good Fortune* (1905); *The Countryman* (1907); *The Lighted Lamp* (1908); *Pay-Day* (1911); *What is it to be Educated?* (1914).

HENDERSON, Charles Richmond (1848–1915). An American sociologist, born in Covington, Ind. He graduated at the University of Chicago in 1870 and at Union Theological Seminary in 1873. From 1873 to 1883 he was pastor at Terre Haute (Ind.) and from 1883 to 1892 at Detroit. Appointed in 1892 assistant professor of sociology at Chicago University, he was afterward advanced to the full professorship. In 1898–99 he was president of the National Conference of Charities, in 1902 president of the National Prison Association, and in 1910 of the International Prison Congress. In 1907 he served as secretary of the Illinois Commission on Occupational Diseases. His works include *The Development of Doctrine in the Epistles* (1894); *The Social Spirit in America* (1896); *Social Settlements* (1897); *Social Elements* (1898); *An Introduction to the Study of the Dependent, Defective, and Delinquent Classes* (1898; 2d ed., enlarged, 1901); *Modern Prison Systems* (57th Congress, 2d Session, House Document No. 452, 1903); *Modern Methods of Charity* (1904); *Industrial Insurance in the United States* (1907); *Social Duties from a Christian Point of View* (1909); *Education in Relation to Sex* (1909); *Social Programmes of the West* (1913).

HENDERSON, Sir David (1862–1921). A British military aviator, born in Glasgow, Scotland. He entered the army in 1883, became captain in 1890, served in 1898 in the Sudan, where he was mentioned in the dispatches and was brevetted major; and he participated in the South African War, during which he was wounded, was mentioned in dispatches twice, and was brevetted lieutenant colonel. Subsequently he was promoted to the rank of brigadier general, was made director of military training in 1912, and in 1913 was placed in charge of the organization of the Royal Flying Corps. When the War in Europe (q.v.) broke out in 1914, he went to the front as chief of this corps. For efficient work in locating the German batteries and movements of troops and in destroying the air machines of the enemy, Henderson was mentioned twice in the dispatches of Field Marshal Sir John French, was officially praised by General Joffre, and was promoted major general in November. In June of the same year he had been made K.C.B. He published *The Art of Reconnaissance* (1907).

HENDERSON, David Bremner (1840–1906). An American statesman, born at Old Deer, Aberdeenshire, Scotland. He went to Illinois in 1846, to Iowa in 1849, graduated at Upper Iowa University (Fayette, Iowa), studied law in an office at Dubuque, and was admitted to the bar in 1865. In 1861 he enlisted as a private in the Twelfth Regiment Iowa Volunteer Infantry, was elected and commissioned first lieutenant of Company C, and served until discharged, Feb. 26, 1863, owing to the loss of a leg at the battle of Corinth. From May, 1863, to June, 1864, he was commissioner of the board of enrollment of the Third Iowa District, and then reëntered the army as colonel of the Forty-sixth Iowa Volunteer Infantry, in which rank he served to the close of the war. From 1865 until his resignation in 1869 he was collector of internal revenue for the Third Iowa District, in 1869 began to practice law as member of a Dubuque firm, and in 1869–71 was Assistant United States District Attorney for the Northern Division of the District of Iowa. He was elected to the

Federal House of Representatives in 1882, as a Republican from the Third Iowa District, was chairman of the Committee on Judiciary, and a member of the Committee on Rules in the Fifty-fourth and Fifty-fifth Congresses, and in 1899, at the organization of the Fifty-sixth Congress, was elected to succeed T. B. Reed, resigned, as Speaker of the House. He was also chairman of the Iowa delegation at three national Republican conventions. In Congress he acquired reputation for his skill in debate and the wise conduct of his important legislative office.

HENDERSON, Ebenezer (1784–1858). A Scottish missionary and linguist. He was born of poor and humble parents in Fifeshire, Nov. 17, 1784. He worked as a clockmaker and shoemaker, but in 1803 entered Robert Haldane's seminary in Edinburgh and studied theology. He planned in 1805 to accompany the Rev. John Paterson to India; but as they could not sail from England, they went to Denmark, where he located at Elsinore and devoted himself to the distribution of Bibles in the Scandinavian countries. In the course of his labors he visited Sweden and Lapland, Iceland, Denmark, and Germany. In 1818 he accompanied Dr. Paterson through Russia as far as Tiflis, and until 1825, when the Russo-Greek church induced the Czar to interdict the Bible Society, he resided at St. Petersburg. Returning home, he was appointed tutor of the Mission College, Gosport, and from 1830 till 1850 was professor of Oriental languages in Highbury Congregational College. He died at Mortlake, May 16, 1858. His linguistic attainments were very great; his knowledge included, besides the classical and European languages, Hebrew, Syriac, Ethiopian, Russian, Arabic, Tatar, Persian, Turkish, Armenian, Manchu, Mongolian, and Coptic. The first Bible society in Denmark was organized by him (1814); he was associated with the London Religious Tract Society and the Society for the Propagation of the Gospel among the Jews. He published an account of his travels in Iceland (1818), Russia (1826), *The Vaudois: A Tour to the Valleys of Piedmont* (1845), several volumes of Bible annotations; enlarged Charles Buck's *Theological Dictionary* (1833); and edited numerous volumes of other writers. His *Memoirs* were edited by his daughter (London, 1859).

HENDERSON, George Francis Robert (1854–1903). A British soldier and military historian, born at St. Helier, Jersey, and educated at Leeds Grammar School and at St. John's College, Oxford. Commissioned a second lieutenant in 1878, he served with Graham's brigade in Egypt. His studies while at various stations resulted in *The Campaign of Fredericksburg* (1889; 3d ed., 1891); *The Battle of Spicheren* (1891); *Stonewall Jackson and the American Civil War* (2 vols., 1898; 4th ed., 1911). In 1890 he became a military instructor on tactics and administration at Sandhurst, from 1892 to 1899 was professor of military art and history at the Staff College, in 1900 was director of military intelligence under Lord Roberts in South Africa, and then, returning because of ill health, he revised the infantry drill book and undertook to write a history of the South African War. He came to hold first rank as a military historian. Many of his lectures and papers were collected and published by Captain Malcolm in 1905 under the title *The Science of War.*

HENDERSON, James Pinckney (1808–58). An American soldier and political leader. He was born in Lincoln Co., N. C., practiced law in Mississippi, went to Texas in 1836, and served as brigadier general during the revolution of that year. He was Secretary of State of the Texan Republic in 1837–39, was a minister to England and France to secure the recognition of Texan independence, and went to Washington in 1844 to secure annexation. He was a member of the Texas Constitutional Convention in 1845 and in the following year was elected first Governor of the State after annexation. He served in the Mexican War and was presented with a sword by Congress. In 1857 he was appointed Senator from Texas as a State-Rights Democrat.

HENDERSON, John (1747–85). An English actor of Scottish descent, native of Cheapside, London. In Bath (1772) he made his début as Hamlet, was fairly successful in other Shakespearean rôles, and came to be known as "Bath Roscius." In 1777 he was acting at the Haymarket, London, and for the two following years was with Sheridan at Drury Lane, making himself famous as Shylock and Falstaff, besides creating characters in plays of Shirley, Cumberland, Jephson, and Mackenzie. He was engaged at Covent Garden from 1779 until his death and was ever remembered gratefully by Mrs. Siddons, whom he had encouraged, and by many others of the profession, though Garrick was jealous of him, and he had earned the ill will of Colman, another actor manager, by his powers of mimicry. The deficiencies of Henderson's voice and person were overbalanced by the superior qualities of his mind, and he achieved special renown as a reader and a reciter of dramatic monologues. Gainsborough, his intimate friend, painted his picture, and there are portraits of him also by Stuart and Romney. He was buried in Westminster Abbey. With Sheridan, he wrote *Practical Method of Reading and Writing English Poetry.*

HENDERSON, John Brooks (1826–1913). An American lawyer and public official, born in Pittsylvania Co., Va. He received an academic education, studied law and began its practice in 1848, and was a member of the Missouri Legislature in 1848 and in 1856–57. He participated in the Missouri Convention of 1861–63 to decide the question of secession, served as United States Senator from 1862 to 1869, was special commissioner in 1867 to make peace with the Indian tribes of the West, was Republican candidate for Governor of Missouri in 1872, and as special United States Attorney he aided in the prosecution of the Whisky Ring of St. Louis in 1875. In 1884 he was president of the Republican National Convention at Chicago. He is remembered also as the author of the Thirteenth Amendment to the Constitution (prohibiting slavery).

HENDERSON, Peter (1822–90). A Scottish-American horticulturist, born at Pathhead, Scotland. He came to America in 1843 and engaged in horticultural pursuits. In 1862 he opened a seed store in New York City and in 1871 undertook the seed business on a large scale under the firm name of Peter Henderson & Co. He was not only very successful as a seed merchant, but also did much to develop improved varieties of horticultural plants. He has been deservedly called "the father of horticulture and ornamental gardening" in the

United States. He wrote much for horticultural journals and was the author of the epoch-making book entitled *Practical Floriculture* (1867), which has passed through many editions. Some of his other works are: *Gardening for Profit* (1866); *Gardening for Pleasure* (1875); *Garden and Farm Topics* (1884).

HENDERSON, RICHARD (1734–85). An American pioneer, born in Hanover Co., Va. He removed to Granville Co., N. C., in 1762, studied law, was admitted to the bar, and in 1769 was appointed associate justice of the Superior Court. After the Declaration of Independence and the organization of the State government in North Carolina, he was reëlected judge, but was prevented from accepting that position by his participation in a scheme organized under the name of the Transylvania Land Company, by which in 1775 the Cherokee Indians were induced to transfer to the company all the land lying between the Cumberland River, the Cumberland Mountains, and the Kentucky River, and situated south of the Ohio. This territory, half as large as the present State of Kentucky, was organized by Henderson and his associates into a political community, with president, legislature, and judges; but the State of Virginia annulled the purchase from the Indians, whose chiefs had signed the Treaty of Watauga for the purposes of the transfer. Nevertheless the enterprise and success of Henderson and his friends in colonization and settlement were rewarded by the Virginia Legislature with the grant of a tract of land 12 miles square on the Ohio River, below the mouth of Greene River. In 1779 Judge Henderson was appointed one of six commissioners to run the line between Virginia and North Carolina into Powell's valley. After a short residence in Nashville, Tenn., where he practiced law, he returned to North Carolina and engaged in farming on a large scale.

HENDERSON, THOMAS (1798–1844). A Scottish astronomer, born at Dundee and educated at the academy of that city. He had to go to work at 15, but all his spare time was spent on astronomy. From 1819 to 1831 he was secretary to the Earl of Lauderdale and to Lord Jeffrey and during this period became known to astronomers in Edinburgh and to the Royal Society of London. In 1831 he was made Astronomer Royal at the Cape of Good Hope, succeeding Fellows, but resigned two years later; was appointed Astronomer Royal for Scotland, professor of practical astronomy at Edinburgh, and director of the Calton Hill Observatory. Henderson wrote contributions, on the orbits of several comets, to the *Astronomische Nachrichten* and published five volumes of his observations (1838–43; continued by Smyth, 1843–52). He is best known for his new method of calculating occultations, his determination of the parallax of α Centauri, and his remarkable ability in astronomical computation.

HENDERSON, WILLIAM JAMES (1855–). An American musical critic and scholar, born at Newark, N. J. He graduated from Princeton in 1876 and immediately began work as a journalist, serving in 1883 as a reporter, four years later as the musical critic of the New York *Times*, and in 1902 of the New York *Sun*. Later he received the appointment of lecturer on musical history in the New York College of Music. In 1914 he was elected a member of the National Institute of Arts and Letters. Besides writing the librettos to a number of light operas and also to Damrosch's *Cyrano de Bergerac*, he published: *What is Good Music?* (1898); *How Music Developed* (1899); *The Orchestra and Orchestral Music* (1902); *Richard Wagner* (1901); *Modern Musical Drift* (1904); *The Art of the Singer* (1906); *Some Forerunners of Italian Opera* (1911). Besides these, he published *Pipes and Timbrels*, poems (1905), stories, and a novel, *The Soul of a Tenor* (1912).

HENDERSON, YANDELL (1873–). An American physiologist, born at Louisville, Ky. He was educated at Yale University (B.A., 1895; Ph.D., 1898) and studied at the universities of Marburg (1899) and Munich (1900). At the Yale Medical School he became instructor in physiology in 1900, assistant professor in 1903, and professor in 1911. He served as ensign in the United States navy during the Spanish-American War and became a consulting surgeon for the United States Bureau of Mines. He was a member of the Connecticut House of Delegates, served as vice chairman of the Connecticut delegation to the first National Convention of the Progressive party, and was Progressive candidate for Congress in 1912. He is coauthor of *Report of Pike's Peak Expedition* (1913) and is author of *Shock: or, The Pathological Physiology of Some Modes of Death* (1914).

HEN'DERSONVILLE. A city and the county seat of Henderson Co., N. C., 22 miles south by east of Asheville, on the Southern Railway (Map: North Carolina, C 4). It has a cannery, hosiery mills, creamery, lumber yard, etc., and considerable trade in potatoes, cabbages, and apples. The city is a popular summer resort and contains a Carnegie library, hospital, and the Blue Ridge School for Boys. The water works are owned by the city. Hendersonville has adopted the commission form of government. Pop., 1900, 1917; 1910, 2818.

HEN'DON. A town in Middlesex, England, situated on the picturesque coach route from London to St. Alban's and on the Midland Railroad, 6 miles northwest of St. Pancras Station, London (Map: London, C 6). Pop., 1901, 22,450; 1911, 38,806.

HEN'DRICK, DAVID. See CHASSÉ, BARON.

HEN'DRICKS, THOMAS ANDREWS (1819–85). An American politician. He was born near Zanesville, Ohio, was early taken by his parents to Indiana, graduated at South Hanover College in 1841, and two years later was admitted to the bar. He practiced his profession with success in Indiana, was a Democratic member of the Pennsylvania Legislature and the State Constitutional Convention of 1851, and was a member of Congress from 1851 to 1855. Appointed Commissioner of the General Land Office by President Pierce, he served until 1859. He was United States Senator from 1863 to 1869 and in 1868 was a candidate for the Democratic nomination for President. In the next presidential election, the Democratic candidate, Horace Greeley, having died before the casting of the electoral votes, they were given to Hendricks. He was Governor of Indiana from 1873 to 1877. He ran for Vice President of the United States on the ticket with Samuel J. Tilden in 1876 and was elected Vice President in 1884 on the ticket with Grover Cleveland, but died Nov. 25, 1885.

HEN'DRICKSON, GEORGE LINCOLN (1865–). An American Latinist, born at Win-

chester, Ill. He was educated at Beloit College, the Johns Hopkins University, and the universities of Bonn and Berlin. He was professor of Latin at the University of Wisconsin from 1891 to 1896 and at the University of Chicago from 1897 to 1907. In 1907 he was called to Yale University. His writings include frequent contributions to the *American Journal of Philology* and to *Classical Philology* on subjects relating to the history of Latin literature. Especially worthy of mention are "The Dramatic Satura and the Old Comedy at Rome" and "A Pre-Varronian Chapter of Roman Literary History," in *American Journal of Philology*, xv, xix (1894, 1898); "The Origin and Meaning of the Ancient Characters of Style," in *American Journal of Philology*, xxvi (1905); "Satura—The Genesis of a Literary Form," in *Classical Philology*, vi (1911).

HENDRIX, EUGENE RUSSELL (1847–). An American Methodist Episcopal bishop, born at Fayette, Mo. Graduating from Wesleyan University in 1867 and from Union Theological Seminary in 1869, in 1870 he entered the ministry of the Methodist Episcopal Church South. From 1878 to 1886 he was president of Central College, Fayette, Mo.; in 1886 he was elected Bishop. He was president of the Federal Council of the Churches of Christ in America in 1908–12, and in 1900 was fraternal delegate of his church to the Wesleyan conference of England. He is author of: *Around the World* (1878)—he made official visits to various countries and founded his church's mission in Korea; *Skilled Labor for the Master* (1900); *The Religion of the Incarnation* (1903); *The Personality of the Holy Spirit* (1904); *Christ's Table Talk* (1908).

HENDRIX COLLEGE. An institution of higher learning under the auspices of the Methodist Episcopal Church South, founded at Conway, Ark., in 1884. It is a college of liberal arts only and has no professional departments. It confers only two degrees, B.A. and B.S. The number of students in 1914 was 264, and the instructors numbered 12. The productive endowment in that year was $300,000, and the value of the college grounds and buildings was $100,000. The college has an annual income of about $30,000. In 1913–14 a new president's house was erected by the alumni at a cost of $16,000. The general education board in 1914 awarded $100,000 on condition that the college raise $300,000. Of this sum $250,000 is to be added to the endowment and $150,000 is to be expended on new buildings. The library contains 14,000 volumes. The president in 1914 was Rev. J. H. Reynolds, LL.D.

HENEQUEN, hĕn′e-kĕn; *Mex. Sp.* hĕn′ĕ-kĕn′. The Mexican name of the plant *Agave fourcroydes* and of the fibre produced from its leaves. The plant closely resembles the maguey plant (*A. cantala*) and the true sisal plant (*A. sisalana*) (see HEMP, SISAL), but its fibre, largely used in making binder twine, is not quite so valuable as the fibre of these two species. Henequen is a native of Mexico, where it is largely cultivated, particularly in Yucatan. The plant lives from 15 to 25 years. The stems when mature range from about 2 to 5 feet in height. The fibre, from 3 to 5 feet long, is commercially known as sisal, or Mexican sisal, although the term "sisal" is considered more appropriately applied to the fibre of *A. sisalana*. Mexico exports about 120,000 tons of henequen fibre annually.

HE′NEY, FRANCIS JOSEPH (1859–). An American lawyer, noted as a prosecutor of grafters. He was born at Lima, N. Y., and studied at the University of California (1879–80) and at the Hastings Law School (1883–84). After an adventurous early career in the cattle business in Arizona (1885–89) and as an Indian trader at Fort Apache, Ariz. (1886–88), he practiced law at Tucson, Ariz., until 1895. He participated in the Mexican land-grant cases, three of which he argued before the United States Supreme Court. After serving as Attorney-General of Arizona in 1893–94, he moved to San Francisco in 1895 and took up private practice. Having undertaken, at the request of Attorney-General Knox, the prosecution of land-fraud cases at Portland, Oreg., he obtained the indictment and removal from office of United States Attorney Hall, the indictment and conviction of Senator Mitchell, and the punishment of other politicians and officeholders. During a part of this period he was United States District Attorney for Oregon. In 1906 his investigation of municipal corruption in San Francisco attracted nation-wide attention. The disclosures made at this time resulted in the conviction, among other officeholders, of Mayor Eugene Smitz and of the notorious political "boss," Abe Ruef. Consult Lincoln Steffens, "The Making of a Fighter," in the *American Magazine* (New York, August, 1907).

HENGEST, hĕng′gĕst, or **HENGIST,** AND **HOR′SA.** The legendary leaders of the first Germanic invaders of Britain. About 449 A.D. a band of Jutes landed at Ebbsfleet on the island of Thanet. They came from the peninsula now called Jutland and, according to tradition, were in three vessels. Tradition has assigned to their leaders the names of Hengest and Horsa—one meaning 'the horse' and the other 'the mare.' It is now generally held that these names are mythical. This point of view is confirmed by the fact that Hengest is the name assigned to the hero of many different traditions. The cromlech called Wayland Smithy has sometimes been designated as a monument to Hengest and Horsa. Consult Elton, *Origins of English History* (London, 1882). See ANGLO-SAXONS.

HENGSTENBERG, hĕng′sten-bĕrk, ERNST WILHELM (1802–69). The leader of the Conservative school of theologians in Germany during the first half of the nineteenth century. He was born in Westphalia, Oct. 20, 1802, the son of a clergyman. He studied at Bonn and became tutor in Basel (1822–24). Going to Berlin in 1824 as privatdocent, he put himself at the head of a rising orthodox school and with most conscientious devotedness made the scientific defense of their principles the aim of his labors in the university and through the press. He was made professor extraordinary in 1826 and full professor in 1828. As editor of the *Evangelische Kirchenzeitung*, begun in 1827, he combated rationalism even in its mildest forms, seeking to restore the orthodoxy and Church discipline of the sixteenth and seventeenth centuries. With the same view were written all his principal works: *Christologie des alten Testaments* (1829–35; 2d ed., 1854–57); *Beiträge zur Einleitung ins alte Testament* (1831–39); *Kommentar über die Psalmen* (1842–45; 2d ed., 1850); *Das Hohelied Salomonis ausgelegt* (1853); and others devoted to the defense of the old interpretation and criticism of the Scriptures against the results of modern biblical science. Hengstenberg's

influence in ecclesiastical matters also was employed in carrying out the high Lutheran dogmas of the Church, of Church offices, and of the sacraments, by persecution of sectaries, by opposition to the union of Lutherans and Reformed, and by attempts to depose from their chairs Gesenius, Wegscheider, De Wette, and other rationalistic teachers in the universities. He died in Berlin, May 28, 1869. Among his later works were: *Die Weissagungen des Propheten Ezekiel* (1867–68); *Geschichte des Reiches Gottes unter dem alten Bunde* (1869–71); *Das Buch Hiob erläutert* (1870–75). Most of his exegetical and critical works have been translated. For his life, consult Bachmann and Schmalenbach (Gütersloh, 1876–92). Consult also Lichtenberger, *History of German Theology in the Nineteenth Century* (New York, 1889).

HEN HAWK, Hen Harrier, or Chicken Hawk. A hawk which attacks poultry. This definition includes an extensive list and variety of birds of prey, if the entire English-speaking world is considered, and the accusation is not always a fair one, as the offense is occasional rather than habitual with many of the birds against which it is charged. The term "hen harrier" is British and belongs to the subfamily Circinæ, represented in the United States by the innocent marsh hawk (q.v.). Many of the eagles and larger falcons, as well as some of the smaller ones, do now and then swoop upon domestic fowls; yet these robberies constitute only a small proportion of their food, which mainly consists of small mammals, frogs, grasshoppers, and other insects. In certain places the smaller falcons may become a serious local nuisance to the poultry keeper, especially in winter; but in general the harm they do is far more than compensated for by their service to agriculturists in destroying injurious rodents and insects. The miscellaneous destruction of hawks and owls is therefore unwise. The species commonly called hen hawks includes two birds, the red-tailed and the red-shouldered hawk. See Buzzard.

Red-Tailed Hawk. The redtail (*Buteo borealis*) is one of the largest, most numerous, and most widely distributed of North American buzzard hawks. It is from 19 to 25 inches long, and its spread of wings is from 49 to 58 inches. In maturity the upper surface is blackish brown, variegated with whitish and dull rust color, the last tint growing brighter on the upper surface of the tail, which has a blackish crossband near the end. The undersurface of the body is buffy white, the belly marked with dark streaks. Young specimens show a dark zone across the lower part of the breast, and from 6 to 10 regular dark bands across the gray tail. Western specimens vary a good deal and were described as separate species by early writers. The majority of them leave the Northern States in winter and migrate in large flocks. They build their nests in tall trees. Their food includes all the mammals from the size of a squirrel downward, and all sorts of birds from grouse and rails to sparrows; but this larger game is far outnumbered by the smaller gophers, mice, frogs, insects, and carrion upon which they principally subsist. Fisher declares that it has been demonstrated by careful examination of stomachs that poultry and game birds do not constitute more than 10 per cent of the food of this bird.

Red-Shouldered Hawk. This species (*Buteo lineatus*) is rather less in size than the redtail and generally more reddish in plumage, especially bright on the shoulders, while the lower parts (whitish in the young) are everywhere rusty in color, transversely barred with a darker tint. The tail is black, covered by about six bands of white. It is a rather heavy, sluggish bird and lives throughout the year south of the Great Lakes, frequenting lowlands and marshes, except in the spring, when it retires to the woods for breeding purposes. The great tree-built nest is often begun before the end of February. This hawk's diet is exceedingly varied and includes a larger proportion of frogs and snakes than the redtail's. It preys principally on mice, however, and almost never attacks poultry, so that its reputation as a hen hawk is undeserved. On the contrary, its work is of the highest benefit to farmers, who should carefully preserve it. A similar species, Swainson's hawk, of the Western interior, is equally beneficial and worthy of protection because of the great numbers of gophers, locusts, and the like it kills at all seasons.

Chicken Hawks. Under this head may be mentioned a few of the smaller destructive falcons. The goshawk and gyrfalcon (qq.v.) are so rare that the harm resulting from them is small. The sharp-shinned hawk (*Accipiter velox*) is a true falcon and inhabits all of North America, migrating annually from the northern districts to the warmer parts. It is about 1 foot long. Its pointed wings stretch about 2 feet, and they enable it to fly with extreme swiftness and power. In color it is uniformly grayish above, darker on the crown, and the tail is crossed by several blackish bands; below, the surface is white, with breast and sides barred dusky or rufous. It takes its name from the sharp front of the tarsi. Its courage and boldness are admirable, but they are unfortunately directed mainly against birds, which constitute almost all of its food. Where it settles on a farm it lives upon young chickens, since these are more easily caught than wild birds; and it stays in the neighborhood until it is killed or the supply of poultry is exhausted. It is to be noted in its favor, however, that it preys persistently upon the English sparrows. Cooper's hawk (*Accipiter cooperi*) is nearly twice as large as the sharpshin, but closely resembles it in color. It is not found much north of the St. Lawrence and Saskatchewan valleys, and in winter retreats south of the middle part of the United States. Like the sharpshin, it feeds mainly upon birds and is destructive to English sparrows and poultry, with a special fondness for domestic pigeons. These two smaller falcons and certain owls are responsible for most of the evil reputation attaching to the hawk tribe in the minds of undiscriminating poultry keepers.

Consult Fisher, *Hawks and Owls of the United States* (Washington, 1893) and *Hawks and Owls from the Standpoint of a Farmer* (ib., 1907).

HENKE, hĕnk'e, Heinrich Philipp Konrad (1752–1809). A German Protestant ecclesiastical historian, born at Hehlen. He was educated at Brunswick and at Helmstedt, where in 1778 he became professor of philosophy and theology. He is best known as author of a valuable *Allgemeine Geschichte der christlichen Kirche* (1795–1806). Consult the biography by Wolff and Bollmann (Helmstedt, 1816).—His youngest son, Ernest Ludwig Theodor Henke (1804–72), born at Helmstedt, was also a Church historian. In 1833 he became professor at Jena, and in 1843 at Marburg, where six years afterward he was appointed supervisor of the Theological

Seminary. His works include: *Georg Calixtus und seine Zeit* (1853–60); *Papst Pius VII.* (1860); *Konrad von Marburg* (1861). For his biography, consult Mangold (Marburg, 1879).

HENLE, hĕn'le, Friedrich Gustav Jakob (1809–85). A German pathologist and anatomist, born at Fürth. He studied at Bonn and Heidelberg (1827–32) and then became assistant to Rudolphi in the anatomical museum at Berlin and in 1834 demonstrator of anatomy under Johann Müller. Three years later he became privatdocent in Berlin and made a specialty of microscopic anatomy and pathology. From 1840 to 1844 he was professor of anatomy and physiology at Zurich and in the latter year went to Heidelberg as professor of anatomy, pathology, and physiology. At this time he wrote *Handbuch der rationellen Pathologie* (3d ed., 1855), which put him in the first rank of the members of the rational-physiological school. His most important work was *Handbuch der systematischen Anatomie des Menschen* (3d ed., 1876–79), in connection with which he issued *Anatomischer Handatlas zum Gebrauch im Seziersaal* (3d ed., 1895–96). Henle's other works include: *Pathologische Untersuchungen* (1840); *Handbuch der allgemeinen Anatomie* (1841); *Grundriss der Anatomie des Menschen, mit Atlas* (4th ed., 1901). He also wrote yearly reviews on pathology and anatomy for Müller's *Archiv* (1838–42) and on anatomy in general in Cannstatt's *Jahresbericht* (1844–55). In 1841 he founded with Pfeufer the *Zeitschrift für rationelle Medizin.* For his life, consult Merkel (Brunswick, 1891).

HENLEIN, hĕn'līn, Peter. See Hele.

HEN'LEY, John (1692–1756), commonly known as Orator Henley. An eccentric English clergyman, son of Rev. Simon Henley. He was born at Melton Mowbray, Leicestershire, and educated at St. John's College, Cambridge. While an undergraduate, he sent a witty letter to the *Spectator* (1712). After leaving the university he became headmaster of the grammar school of his native town. He was also ordained and held for some time a curacy there. In 1714 he published a rhetorical poem entitled *Esther, Queen of Persia.* He also compiled at this period a grammar of seven languages called *The Complete Linguist* (1719–21). Removing to London, he was appointed reader at the church of St. Joseph the Martyr. He found it agreeable to retire, in 1724, to the rectory of Chelmondiston in Suffolk. Again, his talents not being appreciated, he left the Church and returned to London, where he opened, in 1726, his famous oratory in Newport Market. His pompous elocution and his strange service drew for a time large congregations. He struck medals of admission to his hall, bearing the device of a star rising to the meridian with the motto *Ad summa,* and below, *Inveniam viam aut faciam.* His pulpit was covered with velvet and adorned with gold and over his altar was raised the inscription "The Primitive Eucharist." In 1730 he became a pensioner of Walpole, editing for him the rather disreputable periodical called the *Hyp Doctor.* He was ridiculed by Pope, and he furnished the subject for two plates by Hogarth. Fifty manuscript volumes of his lectures were deposited in the British Museum. Consult I. Disraeli, *Calamities of Authors* (2 vols., London, 1812), in which Henley is considered.

HENLEY, Robert, Earl of Northington. See Northington.

HENLEY, Walter de (flourished 1250). An English friar and author of the thirteenth century. He wrote in French a work called *Hosebondrie* (date unknown), which for two centuries was the best treatise on agriculture. The book was several times translated into Latin and English and once into Welsh. A unique copy of an English version is in the possession of the Cambridge University Library.

HENLEY, William Ernest (1849–1903). An English poet, critic, and dramatist, born at Gloucester. He was educated at the Crypt Grammar School at Gloucester. While ill at a hospital in Edinburgh in 1874—which experience he afterward embodied in *Hospital Rhymes*—he met Robert Louis Stevenson; and the two men, in many ways alike, were intimate friends for 13 years. Together they wrote the plays, *Deacon Brodie* (1879), *Beau Austin* (an admirable comedy), *Admiral Guinea,* and *Robert Macaire;* and Stevenson contributed to several of Henley's publications. Henley edited *London* (1877–78); the *Magazine of Art* (1882–86); the *Scots Observer,* which was transferred to London as the *National Observer* (1888–93); and the *New Review* (1893–98). There has been adverse criticism of Henley for his arraignment of Balfour's *Life of Stevenson,* which he claimed did not give a true idea of his friend's character. He has also been criticized for his point of view in the essay on Burns, *The Centenary Burns* (1897), with T. F. Henderson (terminal essay by W. E. H., reprinted as *The Life, Genius, and Achievement of Robert Burns* in 1898). He was strong in his likes and dislikes and arrogant, even aggressive, in his statement of them. But the brilliant style, the acute insight, the technique, the pungent felicitous wit, make the work a *tour de force* of criticism. His *Views and Reviews* (1890), concerned with literature, and *Views and Reviews* (1902), concerned with art, are collected from previous publications. They show primarily his own personality, but they are never commonplace and never dull. His learning is solid, whether he touches on literature or art; and he is always suggestive. As a poet, Henley belongs to the "fleshly school." In subject and treatment he is essentially modern and original. Perhaps his most characteristic work is "London Voluntaries," in *Song of the Sword* (1898). His poetry, like his prose, is egotistical; but a certain lyrical passion and intensity entitle a group of his poems to good hope for a long life. Sometimes his imagery is grotesque, and his humor of the grimmest, but he had the gift of original and powerful expression. His *Collected Works* (New York) appeared in seven volumes in 1908. He edited *Lyra Heroica* (1891); *A London Garland* (1895); *English Lyrics* (1897); *The Works of Lord Byron* (1897); *The Poetry of Wilfrid Blunt* (1898), with George Wyndham; and wrote *London Types* (1898), with drawings by W. Nicholson; *A Book of Verses* (1888); *Poems* (1898); *For England's Sake* (1900); *Hawthorn and Lavender, and Other Verses* (1901); *Shakespeare, the Edinburgh Folio* (1901); *A Song of Speed* (1903). *The English Illustrated Magazine,* vol. xxix, contains a useful bibliography. Consult also L. C. Cornford, *W. E. Henley* (New York, 1913).

HENLEY-ON-THAMES, tĕmz. A town in Oxfordshire, England, on the left bank of the Thames, 35 miles west of London (Map: England, E 5). It has a fine situation at the foot

of the Chiltern Hills and is a favorite boating and angling resort, famous for the annual regatta held here since 1839, in which crews from the universities participate. American colleges are frequently represented. An elegant stone bridge which spans the Thames, the old parish church, grammar school, town hall, library and reading rooms, are prominent features. Henley dates from the Roman occupation and received a charter of incorporation from Elizabeth. Pop., 1901, 5984; 1911, 6456. Consult Burn, *History of Henley-on-Thames* (London, 1861).

HENLEY REGATTA. The most famous open rowing contest in the world, held annually at Henley-on-Thames during the month of July. It lasts for three days, during which the gathering of a brilliant assemblage makes the river and its banks a scene of the utmost picturesqueness. This regatta was founded in 1839, when the first eight-oar race was rowed for the Grand Challenge Cup. The course is 1 mile 550 yards in length; owing to the narrowness of the course (which is only 110 feet wide), all races are rowed in heats of only two boats at a time. Four events are open to all amateurs, the eight-oar race for the Grand Challenge Cup, the four-oar for the Stewards' Cup, the pair-oar for the Silver Goblets, and the single scull for the Diamond Sculls. Entries are restricted to the United Kingdom for the Ladies' Challenge Plate for eight oars and the Visitors' Challenge Cup for four oars and also the Wyfold Challenge Cup for four oars and the Thames Challenge Cup for eight oars. Towards the close of the nineteenth century the purely amateur character of the regatta was threatened by the increasing participation of crews trained by professional coaches and competing with all the advantages of professionalism. This gave rise to considerable agitation and a strong demand on the part of some of the English rowing clubs for the exclusion of foreign crews. The culmination of the agitation occurred in 1902, when a regulation was enacted which prohibited all competing crews and individuals from the enjoyment of a professional coach for a period of 30 days immediately preceding the race or regatta. American contestants for the Grand Challenge Cup prior to 1914 have been crews from Cornell University in 1895, Yale in 1896, the University of Pennsylvania in 1901, and a crew from the Vesper Boat Club of Philadelphia in 1905, each of which was beaten. In 1914 there were two entries from America—the Harvard Second Varsity and a crew from the Union Boat Club (Boston) composed of Harvard graduates. Having defeated their opponents in preliminary heats, these crews rowed in the final heat against each other, the Harvard Second Varsity winning—this being America's first victory and England's fifth defeat. Consult: Woodgate, *Boating* (Boston, 1888); H. T. Steward, *Records of the Henley Regatta . . . 1839 to 1902* (London, 1903); T. A. Cook, *Racing at Henley* (ib., 1911).

HENLO'PEN, Cape. See Cape Henlopen.

HENNA. See Enna.

HEN'NA, or **HIN'NA** (Ar. *ḥinnā'*, from *ḥana'a*, to be green). A name given to *Lawsonia alba*, a shrub of the family Lythraceæ. The species was formerly divided into *Lawsonia inermis* and *Lawsonia spinosa;* but both are now grouped under *Lawsonia alba*, the only species. They differed in little but that the one is unarmed and the other thorny, the latter being also the larger plant. Henna grows in moist situations throughout the north of Africa, Arabia, Persia, and the East Indies. It is cultivated in many places for the sake of its flowers, which are much prized for their fragrance, but still more for the sake of the leaves, which abound in coloring matter, and which, being dried, powdered, and made into a paste with hot water and catechu, are very generally employed by women throughout the East to stain the nails and tips of the fingers of an orange color; also by men to dye their beards, the orange color being converted into a deep black by indigo; and for dyeing the manes and hoofs of horses, and to dye skins and leather reddish yellow. Powdered henna leaves form a large article of export from Egypt to Persia and to various parts of Turkey, from which they find their way to more northern countries to be employed in dyeing furs and some kinds of leather. The use of henna for staining the nails appears to have prevailed from very ancient times. See Alkanet.

HENNE-AM-RHYN, hĕn'ne-ăm-rēn, Otto (1828–1914). A Swiss-German historian of civilization. He was born at Saint-Gall in Switzerland and was the son of Anton Henne, a Swiss historian and poet. He studied at Bern and, after holding several positions as teacher and archivist in Switzerland, went in 1872 to Leipzig, where he was editor of the *Freimaurerzeitung*. From 1882 to 1885 he lectured in the University of Zurich, and from 1885 to 1912 he was state archivist at Saint-Gall. In later years he lived in Weiz, Styria. He wrote: *Geschichte des Schweizervolks und seiner Kultur* (last ed., 1879); *Kulturgeschichte der neuern Zeit* (1870–72); *Die deutsche Volkssage* (1879); *Allgemeine Kulturgeschichte von der Urzeit bis zur Gegenwart* (1877–97); *Kulturgeschichte des Judentums* (2d ed., under the title *Kulturgeschichte des jüdischen Volks*, 1892); *Das Jenseits* (1881); *Die Kreuzzüge und die Kultur ihrer Zeit* (1883–84); *Kulturgeschichte des deutschen Volks* (last ed., 1898); *Die Kultur der Vergangenheit, Gegenwart und Zukunft* (last ed., 1892); *Die nationale Einigung der Deutschen* (1891); *Das Christentum und der Fortschritt* (1892); *Die Frau in der Kulturgeschichte* (1892); *Die Gebrechen und Sünden der Sittenpolizei* (last ed., 1897); *Geschichte des Rittertums* (1893); *Die Freimaurer* (1894); *Die Jesuiten* (3d ed., 1894); *Aria, das Reich des ewigen Friedens im 20. Jahrhundert: Ein Zukunftsbild* (1895); *Handbuch der Kulturgeschichte* (1900–01). His autobiography appeared in *Deutsche Denker*, vol. viii (Danzig, 1890).

HENNEBERG, hĕn'ne-bĕrk, Johan Wilhelm Julius (1825–90). A German agricultural chemist, born at Wasserleben. He was educated at Brunswick, Jena, Giessen, the agricultural college at Badersleben, and in England. In 1853 he founded at Celle the *Journal für Landwirtschaft;* four years later he was appointed director of the new experiment station near Göttingen and in 1865 professor in the university. He was the founder of the present theory of the nutritive value of feeding stuffs, based on their chemical composition and digestibility, as opposed to the former "hay values" of Thaer; he developed a method for the analysis of feeds; and he conducted epoch-making investigations upon the function and the requirements of various food nutrients in the animal body. For the latter, he developed and adapted for use with large animals the respiration apparatus of Pettenkofer, which for many years remained the

only apparatus of its kind for agricultural investigation. His writings, including more than 170 numbers, were published mainly in current periodicals; but he wrote also, with Stohmann, *Beiträge zur Begründung einer rationellen Fütterung der Wiederkäuer* (1860–64) and *Neue Beiträge* (1870–71).

HENNEGAU, hĕn'ne-gou. See HAINAULT.

HENNEPIN, ĕn'păn', LOUIS (c.1640–c.1706). A Belgian missionary and explorer in America. He was born at Ath in Hainault and at an early age joined the Recollet branch of the Franciscan Order, becoming a successful preacher in Belgium and northern France. In 1675 he embarked for Canada in the same ship with La Salle, the explorer, and Bishop Laval, of Quebec. The following year he was in the Indian mission of Fort Frontenac and visited the Mohawk country. In 1678 he accompanied La Salle's expedition to Niagara and the upper lakes and constructed a vessel in which they proceeded by the Erie, Huron, and Michigan lakes to St. Joseph's River, which they navigated in canoes. Reaching the Illinois, they built Fort Crèvecœur. Here, in February, 1680, La Salle left them, and Hennepin and his party proceeded down the Illinois to the Mississippi. They were captured by the Sioux and carried up the Mississippi, but were soon released, and Hennepin returned to Quebec. During this journey Hennepin discovered the Falls of St. Anthony, July 3, 1680, and one of his party penetrated as far as Lake Superior. Hennepin soon after sailed for France, where he published his *Description de la Louisiane* (1683–84), containing an account of La Salle's expedition and of the missionary's own discoveries. Hennepin refused to return to America, though ordered to do so by his superiors of the church, and took refuge in Holland. After La Salle's death Hennepin published his *Nouvelle découverte d'un très grand pays situé dans l'Amérique.* In this he claimed to have been the first man to descend to the mouth of the Mississippi—a statement which was easily proved to be false. His works won great popularity and were translated into several languages. Hennepin died at Utrecht about the year 1706. For his life and discoveries, consult: Saint-Genois, *Les voyageurs belges du XIII au XIX siècle* (Brussels, 1867); Van Hulet, *Notice sur le père Louis Hennepin* (Liége, 1845); Shea, *Discovery of the Mississippi* (New York, 1852); Parkman, *La Salle and the Discovery of the Great West* (12th ed., Boston, 1887). Winsor, *Narrative and Critical History of America*, vol. iv (ib., 1884), contains a full account of Hennepin.

HENNEPIN CANAL. See CANAL.

HENNEQUIN, ĕn'kăn', ALFRED (1842–87). A French dramatist, born at Liége, Belgium. He was a pupil at the school of mines in his native town and practiced engineering, but after 1875 confined himself to playwriting. His early works include: *J'attends mon oncle* (1869) and *Les troix chapeaux* (1870). His first Parisian success was *Le procès Vauradieux* (1875). This was followed by *Les dominos roses* (1876), with Delacour; *Bébé* (1877), with Najac; *Nounou* (1879); *Niniche* (1878); *Lili* (1880); *La femme à papa* (1885)—the last three in collaboration with Albert Millaud—and many other gay, daring comedies.

HENNER, ĕ'nâr', JEAN JACQUES (1829–1905). A French figure and portrait painter. He was born at Bernwiller, Alsace, and first studied design with Gutzwiller at the College of Altkirch. He then became a pupil of Guérin at Staatsbourg and studied also the old masters there and at Basel, where he was attracted by the light-and-shade effects of Holbein. At Paris he studied in the Ecole des Beaux-Arts under Drolling and Picot and won the Prix de Rome in 1858 with "Adam and Eve Finding the Body of Abel." In Italy he was especially influenced by Correggio, and from Rome he sent home the "Chaste Susanna," in the Luxembourg Museum. After his return to Paris in 1865 he was soon acknowledged as one of the foremost representatives of the Classical school in France. Among many medals he received the Grand Prix at the Exposition of 1900; he was chosen member of the Institute in 1889, and Grand Officer (the highest rank) of the Legion of Honor in 1903. Henner has well been called the "Modern Correggio"; for he is the painter par excellence of soft velvety flesh tints vibrating in light, contrasted with warm shadows. His favorite subjects are nudes, usually in woodland surroundings in the evening light, or else highly subjective portraits of women with the same pronounced contrast of light and shadow. He has a curious predilection for reddish hair because of its luminous qualities. Among his best nudes are "Biblis Changed into a Spring," a "Reclining Nymph," a "Naiade," in the Luxembourg; "Bara," in the Petit Palais, Paris. Among portraits and figure subjects are "The Blue Ribbon," "The Little Rider," "Magdalen," in the Petit Palais, and, among other portraits, "La Comtesse Diane," in the Luxembourg. He is well represented also in several French provincial museums and in the Metropolitan Museum, New York, the Brooklyn Institute Museum, the Pennsylvania Academy, and the Corcoran Gallery, Washington. Consult Roujon, *Les peintres illustres* (Paris, 1909), and Bénédite, *Gazette des beaux arts*, vols. xxxv–xxxix (ib., 1906–08)—the best account.

HEN'NESSY, JOHN ALOYSIUS (1859–). An American journalist and political reformer, born at Waterford, Ireland. He was early a reporter on the New York *Mail and Express* (now *Evening Mail*), and later night city editor and managing editor of the New York *Press*, until 1912. He served in the State Assembly in 1893. During Mayor Low's administration Hennessy exposed the padding of city pay rolls, and at Mayor Gaynor's request he reduced the cost of publishing the *City Record* more than $700,000. Appointed Executive Auditor by Governor Sulzer in 1913, he investigated the State Highway and other departments against which charges of extravagance or corruption had been made, and in the same year he was prominent in defeating the Tammany mayoralty campaign. In 1914 he was a candidate at the direct primaries for the Democratic gubernatorial nomination, but lost to Martin H. Glynn (q.v.).

HENNET, ĕ'nâ', CHEVALIER ALBERT JOSEPH ULPIEN (1758–1828). A French economist, born at Maubeuge. When he was 19, he became supernumerary in the Ministry of Finance under Necker, and, although a Royalist at heart, acted with such prudence through both Republic and Empire that he became Chief Commissioner of Finance and held that post from 1813 to 1816. He is well known for his work on finance, including *Théorie du crédit public* (1816) and *Essai d'un plan des finances* (1816), which, however, are largely colored by his partisan views,

and also wrote a *Cours d'astronomie* (1820) and some critical work, of which *La poétique anglaise* (1806) may be mentioned.

HENNIGES VON TREFFENFELD, hĕ'nĕgĕs fŏn trĕf'fen-fĕlt, JOACHIM (c.1625–88). A Brandenburg general. He especially distinguished himself in Alsace (1674), was the first to be ennobled by the Elector of Brandenburg, and in 1679 was promoted to the rank of general for his defeat of the Swedish army near Tilsit. In 1890 the chief Brandenburg regiment was named after him. For his biography, consult Kessel (Stendal, 1863) and Bussler (Gotha, 1897).

HEN'NINGSEN, CHARLES FREDERICK (1815–77). An English soldier of fortune and man of letters. In 1834 he took service in the Russian army. He joined Kossuth in the Hungarian revolt, came to the United States, and fought with Walker in Nicaragua. At the outbreak of the Civil War he entered the Confederate army as a colonel. He was promoted to be brigadier general and directed the manufacture of the first Minié rifles made in the United States. He was the author of *Revelations of Russia* (1845); *The Past and Future of Hungary* (1852); and several other works, published chiefly in England.

HENOCH, hā'nŏĸ, EDUARD HEINRICH (1820–1910). A German physician, born and educated at Berlin, where he became privatdocent in 1850 and professor eight years later. Associated with Romberg at the Polyclinic, he edited that physician's *Klinische Ergebnisse* (1846). In 1872 he became director of the clinic for children's diseases in the Royal Charité and retired in 1893. A form of purpura, which he described, is known by his name. He wrote: *Klinik der Unterleibskrankheiten* (3 vols., 1852–58; 3d ed., 1863); *Beiträge zur Kinderheilkunde* (1861; new ed., 1868); and the well-known *Vorlesungen über Kinderkrankheiten* (1881; 11th ed., 1903).

HEN'OTHEISM (from Gk. *εἷς, heis,* one + *θεός, theos,* god). This term is used in three senses: (1) a religion where only one god is worshiped, but others are acknowledged to exist, as in the early Hebrew religion; (2) religions where the various gods represent a divine unity; (3) where the worshiper assigns all divine power to whatever god he chances at the time to be worshiping. In this sense the Vedic hymns present the classic illustrations. This tendency is doubtless more apparent than real. It was but natural that in a hymn to Indra or to Agni the thought of the bard should be focused on the deity in question so that special honors and powers should be assigned him, whichever god he might be. Again, as the religion of the Vedic period was preëminently a nature worship, it is probable that the changes of the seasons led to the apparent exaltation of certain divinities at one time of the year and to their apparent dethronement at another time. There was consequently no constant lord of the Vedic pantheon until the rise of the philosophical speculations which characterized the close of the Vedic age. The origin of henotheism is based on the syncretistic trend of the Hindu mind. It is noteworthy that it is the later deities especially who are treated henotheistically, and herein lies the key to the problem. The Vedic poets, long before the Rig-Veda had been completed, rising in their religious concepts from a low stage of nature worship and crematheism or worship of material objects, especially useful ones, identified each and every god, and at a later age all living creatures and all things, with the All-Soul (called Atman, Brahma, etc.). Each god, being therefore a phase of the supreme deity and not a distinct divinity, might receive as the temporary representative of the All-Soul precisely the same attributes as any other god, controlled, however, by the traditional views held by the priests or the people concerning him. Kathenotheism has also been used for this quality in the Vedic religion. Both terms were introduced by Max Müller, in *Lectures on the Origin and Growth of Religion* (New York, 1879).

The same religious phenomenon occurs elsewhere, as in the philosophical aspects of Greek religion. The term is sometimes used to denote the conception of a special god for each nation or tribe. Nowhere else, however, does henotheism become a distinctive trait of the faith as it did in India. After the close of the Rig-Vedic period it practically vanishes, since by that time the esoteric unitarianism on which it was based had permeated the entire body of the religious and philosophical thought of India. As a term, henotheism is scarcely a fortunate one, and many scholars prefer to call the religious impulse syncretism instead. Consult Hopkins, "Henotheism in the Rig-Veda," in *Classical Studies in Honor of Henry Drisler* (New York, 1894), and Jastrow, *The Study of Religion* (New York, 1901).

HEN'RI, hĕn'rī, ROBERT (1865–). An American portrait, figure, and landscape painter, the most important of the younger men in the early twentieth century. He was born in Cincinnati, Ohio, and studied at the Pennsylvania Academy of Fine Arts, Philadelphia, and at the Académie Julian and the Ecole des Beaux-Arts, Paris. After several years of travel and independent study in France, Italy, and Spain, he settled permanently in New York. He was elected a member of the National Academy of Design (1906), the Association of American Painters and Sculptors, and the National Institute of Arts and Letters. Among his best-known paintings are: "The Equestrian," Carnegie Art Institute, Pittsburgh; "Young Woman in Black," Art Institute of Chicago; "Girl with Fan," Pennsylvania Academy of Fine Arts, Philadelphia; "Laughing Girl," Brooklyn Institute Museum; "Spanish Gypsy," Metropolitan Museum, New York; "Snow" (1899), Luxembourg Gallery, Paris. Other important works are: portrait of Mrs. Robert Henri; portrait of an artist; "The Picador"; "A Little Gypsy"; portrait of Mrs. W. R. Clarke (1909); "The Fish-Market Man" (1911); "La Madrilenita" (1912); "The Working Man" and portrait of W. W. Kean (both in 1913). In 1914 he exhibited several ingratiating studies of Irish types. Of these "Himself" and "Herself" were shown at the Pennsylvania Academy, and "Herself," an Irish washerwoman, received the medal for the best portrait in the exhibition.

Henri became the foremost and best-known representative of the radical movement in American art. His art is highly individual, and its chief characteristics are sincerity of purpose and simplicity of means. The brushwork is broad and vigorous, the color subdued yet luminous, the tonal effects good. His landscapes are daring and original interpretations of nature, and his figure pieces and portraits are strongly characterized, with remarkable psychological insight. As head of the New York School of

Art, or the "Independent School," Henri has exercised a wide influence upon such artists as Bellows and Glackens.

HENRI III ET SA COUR, äN'rē' trwä å så kōōr (Fr., Henry III and his Court). A prose drama by the elder Dumas, produced Feb. 11, 1829.

HENRIADE, äN'rē-åd', La. An epic poem of 10 cantos in Alexandrine couplets, by Voltaire, begun during his confinement in the Bastille in 1717 and first printed at Rouen in the winter of 1722–23 under the title *Poème de la Ligue.*

HENRICI, hĕn-rē'tsĕ, Christian Friedrich (1700–64). A German poet (also called Picander), born at Stolpen, near Dresden, and educated at Wittenberg and Leipzig. He occupied a position in the Postal and then in the Tax department of Saxony. He is now remembered for his hymns, some of which, notably *Wer weiss wie nahe mir mein Ende,* are still sung. Besides these, he wrote some satirical poems, flat and vulgar, e.g., *Ernstscherzhafte und satyrische Gedichte* (1727–37) and *Teutsche Schauspiele* (1726)—obscene dramas, nevertheless of some value in the history of culture. He also wrote the text for Bach's *St. Matthew Passion* (1729). Consult Flossmann, *Picander* (Leipzig, 1899).

HENRICIANS, hĕn-rĭsh'anz, or **HENRICANS.** The followers of Henry of Lausanne, or Henry the Deacon. Grieved at the corruption of the times, Henry left the Benedictine monastery of Clugny, to which he belonged, in southern France. His consistent life and the eloquence of his discourses deeply moved the people. At first Hildebert, his Bishop, favored him, but afterward drove him from Le Mans. Joining the disciples of Peter of Bruys (see Bruys, Pierre de) in Provence, he was arrested by the Archbishop of Arles and at the second Council of Pisa (1135) was declared a heretic and placed in a cell. His doctrine seems to have been an insistence upon personal responsibility in religion, and the rejection of the rites and authority of the Church. Subsequently released, he again went to the south of France, where he had a great influence over the lower classes. He was arrested by Pope Eugenius III and at the Council of Rheims (1148) condemned to perpetual imprisonment. He died in prison in 1149.

HEN'RIET'TA. A city and the county seat of Clay Co., Tex., 96 miles northwest of Fort Worth, on the Little Wichita River, and on the Fort Worth and Denver City, the Southwestern, and the Missouri, Kansas, and Texas railroads (Map: Texas, C 3). As the centre of an agricultural and stock-raising country, Henrietta has a considerable trade in cotton, grain, and live stock; and its industrial establishments include grain elevators, flour mills, cotton gins, cottonseed-oil mill, lumber yards, etc. Building stone is quarried, and natural gas is found in enormous quantities in the vicinity. The water works are owned by the city. Pop., 1900, 1614; 1910, 2104.

HENRIETTA MARIA (1609–66). The queen consort of Charles I of England and daughter of Henry IV of France. She was married to Charles in 1625. The early years of their married life were unhappy because Charles failed to relieve the English Catholics, as he had promised in the marriage contract. The children of the marriage were Charles II; Mary, Princess of Orange; James II; Elizabeth; Henry, Duke of Gloucester; and Henrietta, Duchess of Orléans. Although at first the Queen occupied her time with amusements and plays, later she was very active in political intrigues and in efforts to promote her religion in Great Britain. Protestants were alarmed by her activity. She advised Charles to coerce Parliament, endeavored to save Strafford from his fate, and raised a considerable sum to aid her husband against the Scots. Her attempts to gain support on the Continent, especially from the Pope, were but partly successful. She was in France when Charles was executed (1649) and did not return to England until the Restoration (1660). In 1665 she went back to France and died there the next year. For her portrait, see Plate of Van Dyck. Consult I. A. Taylor, *The Life of Henrietta Maria* (2 vols., London, 1905), and H. Haynes, *Henrietta Maria* (New York, 1912).

HENRIOT, or **HANRIOT,** äN'rē'ō', François (1761–94). A French politician, born at Nanterre, nicknamed, by Marat, *Sauveur de la Patrie.* He was educated as a choir boy, and little is known of him until 1789, when he left his post in the city employ and joined the *sans-culottes,* who made him one of their commanders. He was a leader in the massacres of the Carmes and Saint-Firmin (1792), and in the following year was appointed by the Commune provisional general of the army in Paris. A year later he resigned from this post and was elected general of the National Guard three weeks afterward, but refused to "command the army against the people." He was one of Robespierre's right-hand men. In 1794 his arrest was ordered on the suggestion of Tallien and Delmas; he made a bold attempt to rouse the mob in his behalf, but was taken and guillotined with Robespierre.

HENRIQUEL-DUPONT, äN'rē'kĕl' dy'pôN', Louis Pierre (1797–1892). A French designer and engraver. He was born in Paris, studied painting at the Ecole des Beaux-Arts and with Pierre Guérin, and engraving under Bervic. His first production was a portrait of his father (1818), and his "Portrait of a Young Woman with her Daughter," after Van Dyck, gained the second medal at the exhibition of 1822. He produced in succession a "Portrait of M. de Pastoret"; "Strafford"; "The Interment of Christ," after Paul Delaroche; "The Abdication of Gustavus Vasa," after Hersent; "The Disciples at Emmaus," after Paul Veronese; "The Marriage of St. Catharine," after Correggio; and other works. Ten years of his life were employed in reproducing the "Hemicycle" of Paul Delaroche (q.v.). He was considered the most eminent French engraver of the day; his work is characterized by accuracy of design and purity of style. He became member of the Academy in 1849 and professor at the Ecole des Beaux-Arts in 1853 and was elected an honorary member of the Royal Academy of London in 1869.

HENRÍQUEZ, ĕn-rē'kåth, Francisco Fernández de la Cueva. See Fernández de la Cueva Henríquez, Francisco.

HEN'RY (named in honor of Joseph Henry). The practical unit of induction in the measurement of self and mutual induction. (See Electricity; Electrical Units.) It is the induction in a circuit if the induced electromotive force in it is one volt when produced by the

variation of a current at the rate of one ampere per second. The henry is therefore substantially 10^9 times the C. G. S. electromagnetic unit of induction.

HENRY I (c.876–936). King of the Germans from 919 to 936, surnamed the Fowler. He was the son of Otho, Duke of Saxony, and was distinguished in early youth for the courage and energy with which he warred against the Slav tribes to the east of his native duchy. Otho, who died in 912, appointed Henry his successor, not only as Duke of Saxony, but as Lord of Thuringia and part of Franconia. The German King Conrad I, instigated by certain ecclesiastical advisers whom Henry's independent bearing towards the Church had deeply offended, resisted the claims of the young Duke; but the latter was ultimately left in possession of all the lands over which his father had ruled. After Conrad's death Henry, to whom Conrad had sent the royal insignia, was chosen King by the Franconian and Saxon nobles (919), and he had little difficulty in securing the acquiescence of the rest of Germany. For some years Lotharingia, or Lorraine, had held an uncertain position between the kingdoms of the East and the West Franks, as Germany and France were then called; but in 925 Duke Giselbert transferred his allegiance from the French to the German King. From the time of Louis the Child, Germany had been exposed to the inroads of the Hungarians. In 924 Henry had to purchase a truce of nine years by agreeing to pay an annual tribute to the Hungarians. The King made use of this respite by preparing his subjects for a final struggle with the barbarous invaders. In the northern districts the Germans had hitherto lived for the most part in small villages or on separate settlements. Henry began building fortified cities throughout Saxony and Thuringia, and in the remaining duchies his example was followed. He also trained his vassals to meet the enemy on horseback, thus giving a strong impetus to the movement which resulted in the institution of chivalry. When his arrangements were complete, he tried his new force in a contest with the Danes and with some Slav tribes, whom he utterly defeated. In 933 the Hungarians demanded as usual the tribute which had till then been punctually paid, and when it was refused invaded Thuringia with a great army. Henry defeated them so decisively that they did not again enter Germany for some years and were never again seen in the northern duchies. In 934 Henry fought against the Danes and compelled their King to pay tribute. In the internal affairs of the realm he acted with great precaution and judgment. The dukes by this time had become so powerful that there was some danger of their altogether overshadowing the throne. Instead of directly forcing them to submission, as was afterward done by his son Otho, he attached them to his interests by confirming them in many of their rights and by acting as a mediator in their disputes. Towards the close of his life his position was so secure that he resolved to go to Rome either on a pilgrimage or to claim the Imperial crown; but he died of apoplexy, July 2, 936. Consult Waitz, *Jahrbücher des deutschen Reichs unter Heinrich I.* (3d ed., Leipzig, 1885), and Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. i (ib., 1881).

HENRY II (973–1024). Holy Roman Emperor from 1002 to 1024. He was the son of Henry the Quarrelsome, Duke of Bavaria, and a great-grandson of Henry I (q.v.). He was in Italy with Otho III in 1001 and upon the latter's death, in January, 1002, hastened to secure possession of the Imperial power with the aid of the Archbishop of Mainz. He was crowned at Mainz (June, 1002). His most determined enemy during the greater part of his reign was Boleslas Chrobry (the Brave) of Poland, who annexed Bohemia, and during the King's absence in Italy, in 1004, invaded Lusatia and Meissen. Henry hurried back, defeated Boleslas in 1005, and granted Bohemia as a fief to Jaromir, of the native house of the Premyslides. Boleslas, however, continued the war, which was not ended until 1018, when Henry was obliged to conclude peace on terms favorable to the Polish King. In the midst of this struggle he had to make war on Adalbero, his wife's brother, who had seized the Archbishopric of Treves and was protected in his claim by another brother of the Empress, the Duke of Bavaria. Both were overcome and deprived of their dignities, although Bavaria was ultimately restored to the elder of the two brothers. Henry also put down rebellions in Flanders and Meissen, and probably concluded, in 1006, a treaty with Rudolph III of Burgundy, whereby, after Rudolph's death, his territories were to be united to Germany. In 1013 Henry went for the second time to Italy, where Arduin had raised himself to the throne. The usurper was displaced, and in 1014 Henry was crowned Emperor at Rome by Benedict VIII, whom he had confirmed in the papal see in opposition to the Antipope Gregory. At the request of Benedict the Emperor returned to Italy in 1022, in order to drive back the Greeks, who were steadily pressing northward. Henry died July 13, 1024, and was canonized by Pope Eugenius III in 1146. His wife, Kunigunde, was also ranked among the saints. Henry founded the bishopric of Bamberg, which was given very great privileges, and which the Pope took under his immediate protection. Consult Hirsch and Bresslau, *Jahrbücher des deutschen Reichs unter Heinrich II.* (3 vols., Leipzig, 1862–74), and Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. ii (ib., 1885).

HENRY III (1017–56). Holy Roman Emperor from 1039 to 1056. He belonged to the Franconian or Salic line and was the son of Conrad II. He was crowned Duke of Bavaria in 1027, King of the Germans as successor presumptive to his father in 1028, Duke of Swabia and King of Burgundy in 1038, and became King of Germany at his father's death, in 1039. Henry possessed great natural abilities, had been educated with the utmost care, and succeeded to an exceptionally strong dominion. The three duchies of Franconia, Swabia, Bavaria, as well as Carinthia, were at first in his own hands, and two only, Saxony and Lorraine, had semi-independent dukes. Under him the German Empire attained to very great power. Poland was a subject principality, the Bohemian Duke was compelled to become Henry's vassal in 1041, and for a time the King of Hungary acknowledged his overlordship. In Italy Drogo the Norman became his vassal for Apulia. In 1046 Henry made his first expedition to Italy, summoned to end the troubles caused by the three rivals for the papal throne, Benedict IX, Gregory VI, and Sylvester III. All three were

deposed. Henry was asked to appoint a new Pope, and during the remainder of his reign the occupants of the papal chair were nominated by him. He was crowned Emperor at Christmas, 1046. From this time on, however, Henry was compelled constantly to face revolts in different parts of his dominions. The revolt of Godfrey in Lorraine proved exceedingly formidable, but Henry ultimately triumphed. He died on Oct. 5, 1056. Henry was deeply devoted to the Church and earnestly endeavored to reform the clergy. He aided the papacy in securing the power which was to be so dangerous to his son; but during his life the popes and the Emperor worked in harmony to check the abuses in the Church. Consult Steindorff, *Jahrbücher des deutschen Reichs unter Heinrich III.* (2 vols., Leipzig, 1874–81), and Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. ii (5th ed., ib., 1885).

HENRY IV (1050–1106). Holy Roman Emperor from 1056 to 1106. He was the son of Henry III and was born Nov. 11, 1050. He had been crowned in 1054 and, although only six years old at his father's death, was recognized at once as King of Germany, Italy, and Burgundy, his mother, Agnes of Poitou, ruling in his name. Henry III had exercised great power over the Church and had greatly strengthened the papacy; in Germany he had held the nobles in subjugation against their will. Now both the Church and the nobles seized the opportunity to achieve their independence. The brother of Godfrey of Lorraine (see HENRY III) was elected Pope as Stephen IX, and Godfrey was made Imperial Vicar in Italy. Agnes was not strong enough to rule effectively. She was forced to cede Lorraine to Godfrey and to bestow upon the most powerful of the nobles the great southern duchies of Swabia and Bavaria, as well as Carinthia, thus undoing the work of Conrad II (q.v.). Her authority was not recognized in Italy. Even the bishops in Germany, who had been the chief instruments of her husband, deserted her. In 1062 Anno, Archbishop of Cologne, seized Henry by treachery and governed in his name. Under Anno's regency the German authority was reëstablished over Hungary. The Archbishop, however, was greatly disliked by Henry and was forced to make way for the Archbishop Adalbert, of Bremen, who became the young King's tutor and in 1065 caused him to be declared of age. Henry had been brought up very badly. He had ability, but an ungovernable temper; he was brave, but a poor general; he was surrounded by flatterers and at first gave himself up almost entirely to pleasure. Germany soon sank into a state of feudal anarchy. The Slavs revolted and devastated the northeastern parts of the Empire, while the Danes held the Baltic coast. Henry attempted to reëstablish his authority by degrading the independent dukes in the south, by imprisoning the Duke of Saxony, and by erecting many fortresses in his duchy. The Saxons revolted in 1073, instigated in large measure by their bishops, and Henry barely escaped from their hands. The nobles in the north aided him against Saxony, and in June, 1075, he won a great victory on the Unstrut which temporarily crushed the rebellion; for the first time he seemed to be really powerful.

But the greatest danger came to a head just at this time. After the death of Henry III the papacy had gradually freed itself from Imperial control. In 1059 a decree had been enacted which gave the election of the Pope to the college of cardinals, and during the period of disorder in Germany the Church, under the guidance of Hildebrand, had gained steadily in power. In 1073 Hildebrand was elected Pope as Gregory VII (q.v.) and proceeded with greater energy to carry out the policy of ecclesiastical and papal supremacy with which he had been identified so closely under the two preceding popes. In 1075 a synod at Rome passed a decree against lay investiture, threatening with excommunication secular princes who should presume to confer abbacies or bishoprics on priests. The bishops and abbots in the Empire held great possessions and were great territorial lords. If Henry could not control their appointment, a large part of his resources and power would be taken from him, and a large section of the Empire would become independent. As long as the bishops and abbots continued to hold their temporal possessions as feudal lords, it was absolutely necessary to the King to have them under his control. On the other hand, the Church was determined to appoint its own officials. When Henry therefore appointed an archbishop for Milan, Gregory sent legates to demand that he should obey the decree against lay investiture, charging him at the same time with simony and oppression of the clergy. Henry, however, was elated by his great victory over the Saxons and in no mood to temporize, as he had done previously. He retorted by convoking a German council at Worms, Jan. 24, 1076, which deposed the Pope. The Pope in return excommunicated Henry, decreed his deposition, and released his subjects from their oath of allegiance. All of Henry's enemies seized this opportunity to revolt and proposed to elect a new king, and the most that Henry could obtain was a respite. He was deprived of all authority, and if not absolved within a year was to be deposed.

The Pope seemed to be entirely triumphant, and Henry doomed to degradation; but there was one weak point in Gregory's position which afforded Henry a chance of redeeming his fortunes. As a Christian priest, the Pope was bound to pardon a penitent who sought absolution; when, therefore, Gregory, who had promised to take no action without the consent of the German nobles, with whom he was to hold a council, set out for Germany, Henry hurried to Italy to meet him. The Lombards, who were hostile to the Pope, welcomed the Emperor eagerly, and he might have had an army at his command. Gregory took refuge in the strong castle of Canossa, belonging to Countess Matilda of Tuscany. Henry, however, had not come to fight, but to seek absolution. For three days (Jan. 25–27, 1077) he begged admission to Canossa as a penitent, waiting at the gate of the courtyard of the castle; and finally Gregory had to yield and to grant the desired absolution. Canossa was the deepest possible humiliation for Henry, but his act had won for him a diplomatic victory. He had prevented the meeting between Gregory and the nobles and had placed the latter in the position of rebels if they persisted in their hostility.

Many of them did persist and elected an antiking in the person of Rudolph, Duke of Swabia; but Henry now had many partisans. Civil war raged throughout Germany, and every part of the country except Saxony was divided into two

parties. Gregory VII hesitated, but finally in 1080 recognized the antiking and excommunicated Henry once more. Rudolph, however, was killed soon after, and his death was accepted as a judgment of God. An antipope, Clement III, was elected by the Imperial party, and in 1084 Henry captured the city of Rome and installed the antipope, who gave him the Imperial crown; but in the same year the Emperor, who had been besieging Gregory VII in Sant' Angelo, was driven from Rome by Robert Guiscard (q.v.). Gregory VII died soon after in exile. The strife went on in Germany, where Henry had to contend against two other antikings—Hermann of Luxemburg, who died in 1088, and the Margrave of Meissen, whose death occurred in 1089. Supported by Godfrey de Bouillon (q.v.) and Frederick of Swabia, the ancestor of the Hohenstaufen, Henry was on the whole successfully asserting himself, when his eldest son, Conrad, joined the Emperor's enemies. For a time this weakened the Emperor, but he gradually won the support of the great nobles, all of whom were weary of the strife. Conrad was deposed from his position as heir to the throne, and died in 1101; and Henry, the second son of the Emperor, was declared heir. Henry's difficulties, however, were not over. The Pope, Paschal II, renewed the excommunication against Henry. His second son was induced to rebel, and the Emperor was made prisoner and forced to abdicate (December, 1105). He died soon after (Aug. 7, 1106) while preparing to make war upon his son. As he died excommunicated, his body remained unburied for five years. During the latter part of his life especially, he was very popular with the people, who mourned his loss. Consult: Meyer von Knonau, *Jahrbücher des deutschen Reiches unter Heinrich IV. und Heinrich V.* (Leipzig, 1890–1909); Floto, *Heinrich IV. und sein Zeitalter* (2 vols., Stuttgart, 1855–56); Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. iii (5th ed., Leipzig, 1890); also the authorities referred to under GREGORY VII. See INVESTITURE.

HENRY V (1081–1125). Holy Roman Emperor from 1106 to 1125. He was the second son of Henry IV and was appointed his father's successor in 1098 after his elder brother, Conrad, had forfeited his right to the throne by rebellion. Six years afterward he himself rebelled against the Emperor. The papal party, with which he allied himself, took for granted that, when he mounted the throne, church and state would instantly be reconciled; but their hopes were disappointed. The main point for which Henry IV had contended was the right of investing the bishops with ring and staff. When Henry V succeeded him in 1106, Pope Paschal II demanded that this right should be given up; but Henry replied that he could not resign powers that had been exercised by his predecessors, and the loss of which would imply that the ecclesiastical lands of Germany would be removed from secular control. In 1110 he entered Italy at the head of 30,000 men. Paschal proposed that the Church should give up its property and feudal privileges if Henry would renounce the right of investiture. To this the latter agreed, and a day was appointed for the coronation of Henry as Emperor. The opposition of the Roman prelates made it impossible for the Pope to proceed with the ceremony, whereupon he and his cardinals were made prisoners. Paschal then formally recognized the right of investiture, and Henry received the Imperial crown. When the Germans had recrossed the Alps, Paschal renounced the treaty he had concluded, and the Emperor was excommunicated. As many of the princes were pleased to avail themselves of this opportunity for rebelling, Germany again became the scene of confused contests like those which had plunged the country into misery during Henry IV's long reign. In 1116 the Emperor went a second time to Italy and drove Paschal from Rome, and after Paschal's death he caused the election of Gregory VIII. The papal party, however, selected Gelasius II, who renewed the sentence of excommunication against Henry. The latter returned to Germany in 1119 and at the Diet of Tribur succeeded in allaying the hostility of the more important among his enemies. Pope Calixtus II, who succeeded Gelasius in 1119, now found it necessary to offer a compromise; and the controversy between the Empire and the papacy was for the time closed by the Concordat of Worms (1122), in which it was agreed that at every election of a prelate in Germany the Emperor should have the right of being present in person or through a representative, and that the chosen bishop or abbot, before being consecrated, should receive his lands and secular authority in fief of the crown. In the other parts of the Empire the election was to be free and canonical, and the Emperor to confer the secular authority after the consecration. Henry died at Utrecht, May 23, 1125. Consult: Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. iii (5th ed., Leipzig, 1890), and Meyer von Knonau, *Jahrbücher des deutschen Reiches unter Heinrich IV. und Heinrich V.* (7 vols., Leipzig, 1890–1909). See INVESTITURE.

HENRY VI (1165–97). Holy Roman Emperor from 1190 to 1197. He was the son of Frederick Barbarossa and was crowned King in 1169. He assumed control of the government on his father's departure for the Holy Land in 1189 and on the latter's death, in the following year, succeeded to the throne. He shared the intellectual culture of his time and was distinguished for the splendor of his political schemes; but he was of a stern disposition and in order to attain his ends was guilty of cruelty. Henry the Lion (q.v.), who had been banished to England by Frederick I, had returned to Germany in 1189 and again disturbed the country with his wars. King Henry, after restoring peace, hastened to Rome, where he was crowned Emperor in 1191. Through his wife, Constance, he had a claim to the throne of Sicily; but the Sicilian nobles made Count Tancred, an illegitimate son of Constance's brother, King. After receiving the Imperial crown Henry advanced against Tancred. He was successful in Sicily, but before Naples his army was struck by pestilence, and he was forced to return to Germany. There he suppressed various private wars and compelled Henry the Lion to acknowledge his supremacy. The great ransom which he received from Richard I (q.v.) of England enabled him to fit out a large army, and with this he descended upon Italy in 1194 and without much difficulty conquered the Sicilian kingdom. Tancred was dead, but he had left a number of relatives, who were so barbarously treated that the people were seized with terror. On his return to Germany it was easy for Henry, with the prestige which he had now acquired, to enforce submission; and so great was his authority that,

in 1196, he endeavored to secure the declaration that the crown be made hereditary in his family. Had he lived some years longer, he would probably have succeeded, but he died suddenly at Messina, Sept. 28, 1197. His power was greater than that wielded by any other German Emperor. Aside from his firm control over the Imperial lands, Sicily had been subdued, and Richard of England, the King of Cyprus, and Bohemond of Antioch had become his vassals. Consult: Toeche, *Jahrbücher des deutschen Reichs unter Heinrich VI.* (Leipzig, 1867); Bloch, *Forschungen zur Politik Kaiser Heinrich VI., 1191–1194* (Berlin, 1892); Kneller, *Des Richard Löwenherz deutsche Gefangenschaft* (Freiburg, 1893).

HENRY VII (c.1269–1313). Holy Roman Emperor from 1308 to 1313, the first of the line of Luxemburg. He was the son of Duke Henry III of Luxemburg, and succeeded Albert I as German King in 1308, being crowned at Aix-la-Chapelle in the following year. When he came to the throne, Bohemia was subject to Henry of Carinthia, who was greatly disliked by his subjects. The King displaced him in 1310 and enriched his own family by granting Bohemia, at the request of the Bohemians themselves, to his son John, whose claims were rendered secure by his marriage with Elizabeth, the daughter of Wenceslas II. For some time no German king had sought the Imperial crown; but Henry resolved to revive the traditions which were dying out, and with a view to this result did what he could to compose the differences between the nobles and to gain their allegiance. He was welcomed in Italy with eagerness by the Ghibellines, whose great poet, Dante, saw in Henry VII the savior that was to rescue Italy from anarchy and to bring it peace and honor. The *De Monarchia* of Dante was probably written at this time. In 1312 Henry was crowned Emperor at Rome, having previously received the iron crown of Lombardy in Milan. He was preparing to undertake an expedition for the conquest of Naples, when he died suddenly, near Siena, Aug. 24, 1313. It was generally believed at the time that he had been poisoned by a Dominican monk, but this was not proved. Consult: Dönniges, *Acta Henrici VII.* (Berlin, 1840–41); Barthold, *Der Römerzug König Heinrichs von Lützelburg* (2 vols., Königsberg, 1830–31); Pöhlmann, *Der Römerzug Kaiser Heinrichs VII.* (Nuremberg, 1875); Gräfe, *Die Persönlichkeit Kaiser Heinrichs VII.* (Leipzig, 1911).

HENRY I (1068–1135). King of England from 1100 to 1135. He was the fourth son of William the Conqueror and was born, according to tradition, at Selby in Yorkshire. Unlike his elder brothers, Robert and William Rufus, he was of a studious disposition and received what was for the times an excellent education, being known later in history as Beauclerc. At his father's death he received £5000, but no lands. With £3000 he bought from his brother Robert, Duke of Normandy, the Cotentin and displayed great ability in the government of his territories. In 1091 William Rufus and Robert wrested his possessions from him, after besieging him for a long time in Mont Saint-Michel. For a time he wandered about, a landless man, until the men of the town of Domfront, on the river Varenne, invited him to become their lord. Henry thus obtained possession of a powerful stronghold, which he used as a base of operations in numerous raids against his brother, the Duke of Normandy, and Robert of Bellême. After 1094 he and William were allies, and in 1096 he received from the latter the counties of Coutances and Bayeux. When William Rufus was found dead in the New Forest, where the two brothers had been hunting, Aug. 2, 1100, Henry at once rode to Winchester and seized the royal treasury, and two days later was crowned at Westminster, publishing a charter of rights which was subsequently taken as the basis of Magna Charta. To strengthen his hold on the crown, he recalled Anselm, the exiled Archbishop of Canterbury, thus gaining the support of the clergy, and by his marriage to Eadgyth, or Matilda, daughter of Malcolm Canmore, King of Scotland, and great-granddaughter of Edmund Ironside, he won the affections of his Saxon subjects. Henry successfully defended the throne against his brother Robert. In July, 1101, the Norman Duke invaded England, and Henry was forced by a conspiracy among his nobles to come to terms with his brother, ceding to Robert all his possessions in Normandy excepting Domfront and granting him a pension. War with Robert broke out again in 1105, and on Sept. 28, 1106, Henry defeated the Duke in a bloody battle before the walls of Tinchebrai and took him prisoner. Robert was confined in Cardiff Castle till his death, in 1134. The acquisition of Normandy added greatly to Henry's strength; but he had some trouble in keeping the duchy, as the French King, Louis VI, and the Count of Anjou took part with William, Robert's youthful son. A desultory warfare was carried on from 1109 to 1120, during which a large part of Normandy was devastated and great atrocities were committed on both sides. The death in 1120 of his son William, whom the King greatly loved, was a severe blow to Henry. To prevent the crown from falling into the possession of his nephew William, he caused his barons in 1126 to accept as his successor in England and Normandy his daughter Matilda, who in 1129 became the wife of Geoffrey Plantagenet, Count of Anjou. Henry died on Dec. 1, 1135, near Rouen.

The reign of Henry I was important for the progress that was made towards the amalgamation of the Saxons and the Normans in England. The feeling of English nationality was greatly stimulated by the wars carried on against the French and the rebellious nobles in Normandy. The King continued the policy of the Conqueror in relentlessly crushing down the opposition of the great nobles and in making himself the champion of the common people against their territorial lords. In carrying out this policy the functions of the *curia regis*, or King's court, were greatly increased, and justices as guardians of the King's peace were sent through the country. The great offices of state were conferred by preference on the members of the clergy. Yet in his struggle with Anselm and other prelates over the rights of nomination and consecration of bishops, the King knew how to keep the virtual power in his own hands without arousing the open hostility of the Church. Henry had great natural ability, especially in the line of state intrigue. He was, however, dissolute, cruel, avaricious, and given to acts of meanness. His influence on English history, nevertheless, was lasting. Consult: Freeman, *The Norman Conquest*, vol. v (Oxford, 1879); id., *William Rufus* (ib., 1882); Norgate, *Eng-*

land under the Angevin Kings (London, 1887); Stubbs, *Constitutional History of England*, vol. i (Oxford, 1897); Davis, *England under the Normans and Angevins* (New York, 1905); Adams, *History of England from the Norman Conquest to the Death of John* (ib., 1905).

HENRY II (1133–89). King of England from 1154 to 1189. He was the grandson of Henry I by his daughter Matilda and her second husband, Geoffrey Plantagenet, and was born March 5, 1133, at Le Mans in Maine. From his birth he was regarded as the successor of Henry I; but on the death of the latter, in 1135, the English crown was seized by Stephen of Blois, and a civil war followed, in which the country was devastated and reduced to anarchy. During his minority Henry's affairs were under the care of his mother, Matilda, and her half brother, Robert, Earl of Gloucester. In 1151 Henry received Normandy from the French King; the death of his father soon after left him master of Anjou, Maine, and Touraine; and by his marriage, in May, 1152, to Eleanor, the divorced wife of Louis VII of France, he added to his possessions the immense territories of Guienne (Aquitaine) and Poitou, so that he was the ruler of more extensive domains in France than the French King himself. In 1153 Henry made an attempt to conquer England. After nine months of fighting it was agreed, by the Treaty of Wallingford, November, 1153, that Stephen should reign during his lifetime, and that Henry should succeed him. Stephen's death occurred the following year, and Henry was crowned Dec. 19, 1154, together with his Queen, Eleanor. The early years of his reign were devoted to the restoration of peace and the reduction of the powerful nobles who had taken advantage of the civil war to make themselves virtually independent of the royal authority. The judicial and financial systems were reorganized, and the crown was freed in great measure from its dependence on the great feudatories by the institution of "scutage," or shield money, as a substitute for personal military service, due from the vassal, thus enabling the King to maintain a standing force subject to his will alone. The chief obstacle in the way of Henry's schemes for the aggrandizement of the royal power was the clergy, whose immunity from the jurisdiction of the secular courts made them a disturbing factor in the judicial administration of the country. To aid him in reducing the Church to submission to the civil power, Henry appointed his trusted Chancellor, Thomas à Becket (q.v.), to the see of Canterbury in June, 1162. Becket, however, to the surprise and indignation of the King, became the most fervent champion of ecclesiastical privilege and repeatedly thwarted the royal measures aimed against the Church. Henry succeeded, nevertheless, in wringing from the bishops a ratification of the ancient customs of the land as re-enacted in the Constitutions of Clarendon in 1164. (See CLARENDON, CONSTITUTIONS OF.) The long struggle with Becket was terminated only by the latter's murder, in 1170. Henry did penance at his grave, allowing himself to be scourged by the monks; but though the Constitutions of Clarendon were formally repealed, the King was ultimately successful in reducing the Church to subordination in civil matters. The administration of justice in the criminal courts was regulated in 1166 by the Assize of Clarendon. See CLARENDON, ASSIZE OF.

During Henry's reign occurred the conquest of Ireland. That country was then the home of a number of tribes or clans, and Pope Adrian IV in 1155, by a bull, is said to have given Henry the authority over the entire island and ordered the inhabitants to obey him. In 1166 the intervention of the English was solicited by one of the Irish petty kings, Diarmait of Leinster (see MACMURROUGH), and Henry gave leave to any of his subjects to aid him. Robert Fitzstephen, Constable of Albertivi, Maurice Fitzgerald, and Richard de Clare, surnamed Strongbow, Earl of Strigul, went over with a few hundred men at arms and in four years conquered the coast region from the Nore to the Liffey. Their success was rapid, and Henry in 1171 went over himself with an army of 4000 men to complete the conquest of the country. All Ireland except Connaught submitted for the time, but the majority of Irish tribes and chieftains continued to be independent for centuries. During this reign, also, the first ascendancy of England over Scotland was gained. Henry's sons, incited by their mother, rebelled against him (1173), and their cause was espoused by the kings of France and Scotland. The latter, William the Lion, was ravaging the north of England with an army, when he was surprised at Alnwick and taken prisoner, July 13, 1174. To obtain his liberty, he stipulated to do homage to Henry for Scotland and to cede to him five of his strongest fortresses. In Normandy, Anjou, and Aquitaine, Henry was equally successful in suppressing the rebellion. In the course of a second rebellion of his sons (1183) Henry, the eldest son, died; Geoffrey, the second son, died three years later. Richard Cœur de Lion still remained hostile to his father and with the aid of King Philip Augustus of France drove Henry from Maine and Anjou. Deserted by all his troops, Henry was compelled to come to terms with Richard. On July 4, 1189, peace was concluded at Colombières. One of the stipulations was for an indemnity for all the followers of Richard. The sight of the name of his favorite son, John, in the list, acting upon a constitution weakened by many cares, threw the King into a fever, of which he died, July 6, 1189, at Chinon.

Henry was a man of restless energy, subject to sudden outbursts of a mad temper, but a born ruler, nevertheless, who gave to his subjects justice and peace. During his reign the barons were overawed, and hundreds of their castles were destroyed. Law made very great progress; circuit courts were established, and Henry facilitated the making of appeals to his own courts, in order to bring the people into direct dependence upon the King. The earliest writer on English law, Ranulf de Glanville, was Henry's chief judiciary. In intellect and character he resembled his grandfather, Henry I. He had three illegitimate children; his mistress, the Fair Rosamond (q.v.), may have been the mother of the first of the two that are remembered: William Longsword, Earl of Salisbury, and Geoffrey, who became Archbishop of York, and who was faithful to him when his four legitimate sons took up arms against him. Henry was a great builder of palaces and roads; of the latter, the great embankment, 30 miles in length, erected to prevent floods from the river Loire, still remains in use. He was a lover of learning and an assiduous reader. His great work for England consisted in uniting the con-

querors and conquered into one race and in laying the foundation for the present Greater Britain by the conquest of Ireland. Consult: Norgate, *England under the Angevin Kings* (2 vols., London, 1887); Stubbs, *Constitutional History of England*, vol. i (Oxford, 1897); id., *The Early Plantagenets* (London, 1886); Mrs. J. R. Green, *Henry the Second* (ib., 1888); Ramsay, *Angevin Empire* (ib., 1903); Davis, *England under the Normans and Angevins* (New York, 1905); Adams, *England from the Norman Conquest to the Death of John* (ib., 1905); L. F. Salzmann, *Life of Henry II* (Boston, 1914).

HENRY III (1207–72). King of England from 1216 to 1272. He was the eldest son of King John and of Isabella of Angoulême and was born at Winchester, Oct. 1, 1207. He succeeded his father in 1216, under the regency of William Marshal, Earl of Pembroke. The French Dauphin, who had invaded England during the lifetime of King John, in response to an invitation by a party among the nobles, was defeated in 1217, and the confirmation of Magna Charta in the same year established Henry securely on the throne. The Regent died in 1219, and the chief powers of government were exercised by Stephen Langton, Archbishop of Canterbury, and the Justiciar Hubert de Burgh. The dismissal of Hubert in 1232 was followed by the rule of foreign favorites, which stirred up great dissatisfaction in the nation. Henry was constantly beset with hosts of the Poitevin relations and men from the country of his Queen, Eleanor of Provence, whom he married on Jan. 14, 1236. His weakness was shown also in his failure to make a stand against the ecclesiastical demands of the clergy and the Pope. Schemes for foreign conquest loaded the nation with a heavy debt and increased the general discontent. In 1258 the barons in Parliament, headed by his brother-in-law, Simon de Montfort, Earl of Leicester, rose against him and forced him to transfer his power temporarily to a commission of barons and to enact a number of reforms. He agreed to these demands by the Provisions of Oxford (q.v.). The barons, however, failed to make any use of that power in reforming the state, and the King utilized the opportunity to regain the power which he alleged, with truth, had been taken from him by compulsion, though his action had worn the appearance of free will. The question of the validity of these provisions was submitted by both parties to St. Louis of France, who in the Mise of Amiens (q.v.) annulled the provisions (1264). Leicester and his party refused to be bound by the decision and took up arms against the King. They defeated him and took him prisoner in the battle of Lewes, on May 14, 1264. The battle was followed by an agreement known as the "Mise of Lewes" (q.v.), more humiliating to the King than the Provisions of Oxford. Leicester, being virtual ruler of the country, summoned a Parliament in 1265, to which, for the first time in English history, representatives from both boroughs and shires were called. Knights of the shire had been summoned to Parliament as early as 1254. Leicester's supremacy did not last long. Within a year the powerful Earl of Gloucester deserted his party, and with Prince Edward, the gifted son of the King, who had been taken prisoner at Lewes and succeeded in making his escape, led an overwhelming army against Leicester, who was defeated and slain at Evesham, on Aug. 4, 1265. During the remainder of Henry's reign affairs were under the control of Prince Edward. The weakness of Henry and his father had allowed the development of the power of the barons, and in the struggle between the two the modern system of parliamentary government arose, marked by the concession of representation to the shires and the boroughs. Statute law dates from the time of Henry III, the Provisions of Merton, passed in the twentieth year of Henry's reign, being the first enactment on the English statute book. Consult: Stubbs, *Constitutional History of England*, vol. ii (Oxford, 1897); Bémont, *Simon de Montfort* (Paris, 1884); Prothero, *Simon de Montfort* (London, 1877); Pauli, *Simon de Montfort* (ib., 1876); Green, *History of the English People* (ib., 1874); Gasquet, *Henry the Third and the Church* (ib., 1905); Tout, *History of England, 1216–1377* (ib., 1905); Davis, *England under the Normans and Angevins* (New York, 1905); K. Norgate, *The Minority of Henry III* (ib., 1912).

HENRY IV (1367–1413). King of England from 1399 to 1413. He was the eldest son of John of Gaunt, fourth son of Edward III, and Blanche, the daughter of Henry, Duke of Lancaster, and was born April 3, 1367, at his father's castle of Bolingbroke in Lincolnshire. He is frequently called Henry of Bolingbroke from the name of his birthplace, but to his contemporaries he was more generally known as Henry of Lancaster. About 1380 he married Mary Bohun, one of the heiresses of the Earl of Hereford. He was distinguished for his martial attainments and became a great favorite with the people of London. From 1387 to 1390 he was one of the leaders of the party opposed to Richard II (q.v.), being one of the five lords appellants who in 1387 led an army against London and forced Richard to dismiss his unpopular favorites. In 1390–91 he was engaged on a crusading expedition in Lithuania with the Teutonic Knights. In 1392 he started on a second expedition to Lithuania, but soon changed his purpose and made a pilgrimage to Jerusalem. After his return he joined the King's party and was made Duke of Hereford in 1397. In 1398, as a result of the hostility between Henry and the Duke of Norfolk, the former was banished from England for six years, while his rival was exiled for life. Henry's banishment served to increase his popularity with the people of London, who chose to regard him as a martyr. In 1399 his father died, and Richard, in spite of his promise, confiscated the estates which should have descended to Henry. The latter, profiting by the King's absence in Ireland, landed in England in July, 1399. He was eagerly welcomed by all the discontented and met with no effectual opposition. Richard on his return from Ireland was deserted by his followers and soon fell into Henry's hands. The King agreed to abdicate, his resignation was accepted by Parliament on Sept. 30, 1399, and Henry was chosen King, inaugurating the line of Lancaster. As he was not the nearest heir in line of descent, and as he did not claim England by right of conquest, he owed his title to Parliament, and he is sometimes called the first constitutional monarch. The first half of his reign was filled with wars. At his accession he showed himself lenient to all his former enemies, merely taking from them the dignities which they had won at his expense. An at-

tempt at rebellion in January, 1400, by the lords whom he had degraded was easily put down. Most of the rebels were put to death, and Richard II died soon after, possibly murdered. In the same year the Welsh revolted under Owen Glendower (q.v.). The Scots, who also began war, were defeated at Homildon Hill (q.v.) in 1402. The French gave aid both to the Scots and Welsh and harried the English coast, but accomplished little, on account of their internal dissensions. In 1403 the Percy family, dissatisfied with the rewards bestowed upon them by the new King, rose in rebellion, but were overthrown in the battle of Shrewsbury, in which Harry Percy, the famous Hotspur, fell. In 1405 James I, heir to the Scottish throne, was captured while on his way to France, and this brought peace with Scotland. After this date the wars were less dangerous, but Henry suffered from an illness which gradually sapped his strength. Another rebellion was put down in 1408, and at the same time a number of successes were gained over the Welsh. Henry died March 20, 1413. He was brave, naturally merciful, devout, and able, but subject to fits of passion. He recognized the authority of Parliament and acted as a constitutional monarch. His reign was stained by enactments against the Lollards and by persecutions. He was a patron of Gower, Chaucer, and Christine de Pisan. He had four sons and two daughters by his first wife. In 1403 he married Joan of Brittany as a matter of diplomacy, but he gained nothing by this marriage. For the best modern authorities on his reign, consult: Stubbs, *Constitutional History of England*, vol. iii (Oxford, 1895); Oman, *Political History of England, 1377–1485* (London, 1906); but, above all, Wylie, *History of Henry IV* (4 vols., ib., 1884–98).

HENRY V (1387–1422). King of England from 1413 to 1422. He was the eldest son of Henry IV and of Mary Bohun and was born Aug. 9, 1387, at Monmouth. In 1399, on the accession of his father to the throne, he became Earl of Chester, Duke of Cornwall, Prince of Wales, Duke of Aquitaine, and Duke of Lancaster. In his youth he had acquired great military distinction in operations against Hotspur and Glendower (q.v.), and in 1410 and 1411 he governed in the name of his father, who was ill. Late in 1411 he fell into disfavor with his father and was deprived of his power. At his father's death, March 20, 1413, he became King. He liberated the young Earl of March from the confinement in which Henry IV had placed him and restored the son of Hotspur to the lands and honors which his father had lost by rebellion. He followed in the footsteps of his father in persecuting the Lollards with fire and halter, the celebrated leader of the Lollards, Sir John Oldcastle (q.v.), being put to death in 1417. The great event of his reign was the attempted conquest of France, in which he virtually succeeded. In his first campaign he besieged and took the town of Harfleur and gained the battle of Agincourt (q.v.), Oct. 25, 1415, against enormous odds. Two years after he again invaded France and made Normandy once more subject to the English crown. Rouen was captured in January, 1419, after a long siege, an incapable King and civil discord in France aiding him greatly. On May 21, 1420, a treaty was concluded at Troyes between Henry and the French King, Charles VI, by which Henry obtained the regency of France, the eldest daughter of the French King for his wife, and the succession to the French crown on the death of the King. He was married to Catharine of France, on June 2, 1420. He had hardly returned to England when the defeat at Beaugé of his brother, the Duke of Clarence, whom he had left as Governor of Normandy, rekindled the hopes of the French, who supported the Dauphin Charles in his repudiation of the Treaty of Troyes, to which he had not agreed. Henry returned to France for a third campaign, and his wonted success in arms was following him when he was seized with illness, and died, on Aug. 31, 1422, at Vincennes, at the age of 35 years, leaving an infant son, Henry VI, to succeed him. His private life was exemplary; as a king, he was noted for his strict justice; in war he was one of the ablest generals of his time. Consult: Stubbs, *Constitutional History of England* (Oxford, 1895); Wylie, *History of Henry IV*, vol. iii (new ed., New York, 1914); Kingsford, *Henry V* (Oxford, 1911); Oman, *Political History of England, 1377–1485* (London, 1906); Vickers, *England in the Later Middle Ages* (New York, 1914).

HENRY VI (1421–71). King of England from 1422 to 1461. He was the only child of Henry V and Catharine of France and was born at Windsor, Dec. 6, 1421. He was not quite nine months old at his father's death, when he became King of England, and a few weeks later, on the death of Charles VI of France, he was also proclaimed King of that country. His claim to France was disputed by Charles VII; but the latter was too indolent to make any serious attempt to conquer the kingdom. The Duke of Bedford, brother of Henry V, who was Regent of France, was successful in holding the country for Henry VI until 1429. Then Joan of Arc (q.v.), by her heroism, aroused the valor of the French nation, defeated the English at Orléans, and led Charles VII to Rheims to be crowned. The Maid of Orléans fell into the hands of the English the following year and was burned in 1431, and a few months later Bedford was able to have Henry crowned at Paris. He had already received the English crown at Westminster, on Nov. 6, 1429. But France gradually passed out of the control of the English, as the French united against foreign rule. On Bedford's death, in 1435, the Duke of Burgundy broke off his alliance with the English and joined Charles VII. From this time the English lost ground steadily, and by the end of 1451 Calais was the only English possession in France. During Henry's minority there was no opposition to the King in England; but his marriage with Margaret of Anjou, in 1445, was unpopular, as the bride brought no dowry, and one of the conditions of the marriage was the surrender of some English territory in France. Henry's own weakness, the lack of success in France, and economic troubles at home aroused bitter opposition; for Henry was virtuous and amiable, but unequal to the task of ruling. When he was 32 years old, his weak intellect gave way, and he became insane. At times he recovered his reason, but was always subject to a relapse into insanity.

As the wars ceased in France, disorderly bands of soldiers returned home and sought service with the powerful nobles, who maintained great armies of followers, in defiance of the law. The King was too weak to enforce order in his king-

dom, and many illegal usurpations of property by the great nobles went unpunished. The system of inclosing lands for pasturage threw many agricultural laborers out of employment. The result was a rising on the part of the people. In 1450 the Duke of Suffolk, who had negotiated the marriage with Margaret and was the King's favorite Minister, was impeached by the Commons and condemned to banishment, but was murdered on his way to the Continent. Not content with the fall of Suffolk, the men of Kent, led by Jack Cade (q.v.), rose against his appointees, who still held the chief offices. They demanded a redress of grievances and that the Duke of York should be made the head of the government. The latter was a descendant of Lionel, the third son of Edward III, and consequently by hereditary right his title to the crown was superior to that of Henry VI, who was descended from Edward's fourth son. From this time York was supported by the discontented people and generally opposed by the nobles. During two periods while the King was temporarily insane York was made Protector, but each time the King recovered his reason York was in danger of destruction. In 1455 the battle of St. Albans was fought between the King's favorite, Somerset, and the Duke of York, in which Henry was taken prisoner. This is generally called the first battle in the War of the Roses (q.v.). After some desultory strife Henry VI was again captured by the Yorkists in the battle of Northampton, in 1460, and York asserted his claim to the throne. The lords arranged a compromise that Henry should keep the crown, but that York should be acknowledged as his successor. This arrangement only led to a long war, because Margaret was enraged that her son should be deprived of the succession to the crown. She sought aid in the north, raised an army of 18,000 wild warriors, and won the battle of Wakefield, in 1460, where York was slain. But the depredations and cruelties of her rough followers alarmed the people in the south, who rallied to Edward, Earl of March, the son of York. The latter, by his victory at Towton (March, 1461), gained the throne, and was crowned as Edward IV on June 29, 1461. Margaret and Henry escaped, and there were several engagements before 1465, when Henry was taken prisoner. Margaret was implacable and finally obtained the aid of the Earl of Warwick (see WARWICK, RICHARD NEVILLE, EARL OF), who in 1470 drove Edward out of England. Henry, although an imbecile, was reinstated as King; but Edward returned in the same year. Henry was captured and died in 1471. There is little doubt that he was murdered by order of Edward. Consult: Gairdner, *Paston Letters* (London, 1872–75); Stubbs, *Constitutional History of England*, vol. iii (Oxford, 1895); Oman, *Political History of England, 1377–1485* (London, 1906); Vickers, *England in the Later Middle Ages* (New York, 1914).

HENRY VII (1457–1509). King of England from 1485 to 1509. He was born Jan. 28, 1457, at Pembroke Castle, the son of Edmund Tudor, Earl of Richmond, and Margaret, granddaughter of John of Gaunt, founder of the Lancastrian house. From John Henry derived his claim to the crown. Henry's grandfather was Owen Tudor, a Welsh knight, who married Catharine, widow of Henry V. In 1471, on the death of Henry VI, and Edward, Prince of Wales, Henry became the head of the Lancastrian house. During the reigns of Edward IV and Richard III, the last Yorkist kings, he took refuge in Brittany, until the crimes of Richard III, who murdered his own nephews, "the Princes of the Tower" (q.v.), alienated the Yorkist nobility and drove them to accept Henry as Richard's only possible rival. Henry landed at Milford Haven in 1485, and in the battle of Bosworth, August 22, Richard was defeated and slain. The marriage of Henry with Elizabeth, the Yorkist heiress, cemented the union of the two parties; but Henry was crowned before the marriage and claimed the title of his own right, the first of the Tudor kings.

The numerous disturbances during the first half of Henry's reign were due on the whole rather to the instigation of remnants of the Yorkist faction and its foreign supporters than to the disaffection of his subjects at home. The rising of Lovell (1486), the invasions of the impostors Simnel (1487) and Warbeck (1495 and 1496–97), found little favor among the English people and were easily suppressed, but they had important consequences. In order to prevent the Scottish King from taking further part in these intrigues, a marriage was arranged between Margaret, Henry's eldest daughter, and James IV of Scotland, which led to the accession of a new ruling house in England 100 years later. In order to guard himself from further invasions from Ireland, a stronghold of the Yorkist party, whence danger usually threatened, Henry was forced to resume the fateful policy of English control which had been abandoned during the Wars of the Roses. In 1494 it was provided that English laws then in force should apply to Ireland. The celebrated Poynings's Law of the same year provides for the supremacy of the English Council over Irish legislation. Foreign affairs occupied much of Henry's attention, since the enemies of France, especially Maximilian of Austria and Ferdinand the Catholic, were anxious for Henry's coöperation; but he was too wily to be led into wars from which they would profit more than he. The negotiations led, however, to the marriage, in 1501, of his eldest son, Arthur, to Catharine, the daughter of Ferdinand and Isabella, and after Arthur's death in 1502 to that prince's brother, Henry VIII, in 1509.

During Henry's reign the royal power rapidly increased. Livery and maintenance (q.v.) were suppressed. The Star Chamber (q.v.) offered an effective means of curbing the turbulent nobles. Henry was avaricious, and the wealthy groaned at the heavy taxes; but Parliament was compliant to his will. His power was not based entirely upon force, for he had no standing army, but on the support of the middle classes, to whom his reign brought security and prosperity after the disorders of the Wars of the Roses. He died at Richmond, April 21, 1509. The discovery of the North American continent by John Cabot, in 1497, was but one of the results of Henry's efforts to encourage commerce.

The best biographical accounts are Gairdner, *Henry VII* (London, 1889), in "Twelve English Statesmen Series," and two lectures by Bishop Stubbs in *Lectures* (Oxford, 1887). Five volumes of sources have been printed in the "Rolls Series," under various titles. The admirable French *Histoire générale*, by Lavisse and Rambaud, vol. iv (Paris, 1894), has a chapter on Henry by M. Bémont, somewhat biographical in

character, with a bibliography. Bacon's *Henry VII* is still of interest. Consult: Lingard, *History of England*, vol. iv (London, 1854); Green, *History of the English People*, vol. ii (New York, 1879); Hallam, *Constitutional History of England*, vol. i (London, 1855); Traill (ed.), *Social England*, vol. ii (New York, 1894), with bibliography; A. F. Pollard, *The Reign of Henry VII* (3 vols., London, 1913–14); W. M. Temperley, *Henry VII* (Boston, 1914).

HENRY VIII (1491–1547). King of England from 1509 to 1547. He was the second son of Henry VII and Elizabeth of York and was born at Greenwich, June 28, 1491. He became heir apparent to the English crown on the death of his brother Arthur, in 1502. In the following year he was betrothed to Catharine of Aragon, Arthur's widow, a papal dispensation having been obtained from Julius II on account of their relationship. The marriage was to have taken place on the completion of Henry's fourteenth year; but Henry VII was playing a wily game of diplomacy with Ferdinand, Catharine's father, and postponed the wedding on various pretexts in order to extort concessions. He even caused his son to protest that the whole arrangement was against his will. On April 21, 1509, Henry succeeded to the crown, at the age of 18. On June 11 he married Catharine, and they were crowned together on June 24. Although she was six years his senior, their marriage was for many years a happy one. For some time after his accession Henry gave himself up to festivities and sports. He was described in 1519 by Giustiniani, the Venetian Ambassador, as the handsomest and best-dressed prince in Europe. "He is very accomplished, a good musician, composes well, is a most capital horseman, a fine jouster, speaks good French, Latin, and Spanish, is very religious, hears three masses daily when he hunts, and sometimes five on other days. . . . He is very fond of hunting, and never takes his diversion without tiring eight or ten horses, which he causes to be stationed beforehand along the line of country he means to take, and when one is tired he mounts another, and before he gets home they are all exhausted." On account of his handsome person, his hearty, generous manners, his fondness for the services of the Church, and his appreciation of the new learning, Henry was a favorite with all classes of the English people. He chose his ministers with rare sagacity and, in spite of his gayety, knew what was going on in his administration. He had a violent temper, and no monarch ever held his servants under firmer control. Until 1529 affairs were in the hands of Wolsey (q.v.), whom Henry had raised from a humble station to be Archbishop of York (1514) and Chancellor (1515) and caused to be appointed Cardinal (1515) and *legate a latere* (1518). Wolsey had thus in his hands almost supreme power over church and state, and he rivaled the King in outward splendor; yet no one was in doubt as to who was the real master. Wolsey's precarious tenure depended upon his ability to fulfill, and if possible to anticipate, his young master's wishes.

During approximately the first half of Henry's reign, before the matter of the King's divorce became urgent, his attention was occupied with foreign affairs. For some time subsequent to 1519 Europe was divided into two hostile camps by the rivalry between Charles V and Francis I, and Henry could be depended upon in the long run to take the side of Charles, not so much on account of their relationship (he had married Charles's aunt) as on account of the close commercial relations between England and Charles's possessions in the Low Countries, and because opposition to France was still popular in England. For these reasons Henry always opposed Francis when it came to actual warfare, though he frequently changed sides in the diplomatic struggle. Even before the accession of Charles V and Francis I, the relations of their predecessors had been much the same, and in 1511 Henry had been drawn into the Holy League between the papacy, Spain, Austria, and Venice against France. Early in 1512 Henry had sent an abortive expedition to regain Guienne. In the following year he took part in person in the triumphant campaign in northern France. The French were defeated at Guinegate, August 16, in what is known as "the Battle of the Spurs," from the rapidity of the French flight; Thérouanne surrendered August 24, and Tournay September 25. James IV of Scotland, taking advantage of Henry's employment elsewhere, invaded England, and was defeated and slain at Flodden, Sept. 9, 1513. Henry fully intended to renew the campaign the next year; but when he learned that both Ferdinand of Spain and Maximilian of Germany had deserted him, he secretly made peace, which was cemented by the marriage of his sister Mary with Louis XII. From this time until the outbreak of the first war between Francis and Charles (1521), Wolsey was free to carry out with tolerable success his favorite policy of mediation between the two rivals. There were many interviews, among others the famous "Field of the Cloth of Gold" (1520), and much treachery on all sides; but in the end Wolsey's peace policy had to give way before Henry's warlike spirit. There were campaigns against France in 1522 and 1523; but they had no other result than an increased taxation at home, for which Wolsey was popularly held accountable. In 1525 Francis was not only defeated at Pavia, but taken prisoner, and Henry thought that the time had come to recover the crown of France. With this purpose in view, he demanded an immediate loan from his subjects in proportion to their incomes, but at so extortionate a rate that riots broke out and the loan had to be recalled. Henry, as was his wont, meanly threw the odium upon Wolsey, who was in no wise responsible. The failure of the loan made peace with France necessary, which was signed in 1525. In the following year Francis regained his freedom upon agreeing to Charles's extortionate demands; but he held himself not bound by forced concessions, and war broke out anew (1527–29), in which he found an ally in Pope Clement VII. Henry took no direct part in this war, but he was anxious to join the French and papal side, for the reason that Charles was becoming too powerful and insolent and that he was meditating the divorce of Catharine of Aragon, to which the consent of the Pope was at that time thought necessary.

For some years Henry had been growing tired of Catharine. Her only surviving child was her daughter Mary, and since no queen had ever sat upon the throne of England, it might reasonably be doubted whether the succession was safe without a male heir. Besides, since 1522, there had been at court the young and sprightly Irish beauty, Anne Boleyn, with whom the King had become enamored. Henry's professed motive,

however, was conscientious scruples concerning the validity of his marriage with his brother Arthur's widow, notwithstanding the Pope's dispensation, and in 1527 he asked Clement VII not merely to grant him a divorce, but to declare that the dispensation of Julius II was invalid, and that the marriage with Catharine had been void from the beginning. Apart from other considerations, Clement VII could hardly be expected to impair his own authority by such a ruling; nor was the time propitious for such a request, for in the year in which it was made the Imperial troops had sacked Rome, and Clement VII was at the mercy of Charles V. The most that Henry could obtain was a legatine court, composed of Wolsey and Campeggio; but the Pope's purpose in granting it may have been only delay. Campeggio could neither induce Henry to change his mind nor Catharine to yield, and in 1529 Clement revoked the case to Rome, where Henry knew that it would be useless to press the matter further, especially as Charles and Clement were now in alliance. The result was the fall of Wolsey, and the beginning of momentous changes in the relations between the state and church in England. Henry probably little realized the importance of the steps which he took in order to procure a male heir to the throne. He certainly did not intend to introduce Protestantism, for which he had an aversion. He was no mean theologian, and in 1521 he had written a book against Luther entitled *Assertio Septem Sacramentorum*, which won for him, by the irony of fate, the papal title "defender of the faith," which English sovereigns have borne to the present day. In 1530 Henry was occupied with Cranmer's suggestion that the favorable opinion of the learned doctors of the universities as to the nullity of the marriage would leave him free to marry again without the Pope's consent. Bribery and cajolery were freely used with considerable success; but in 1531 Henry proceeded to more vigorous measures. Upon the suggestion of Thomas Cromwell, an adventurer, who rose to influence soon after Wolsey's fall, he conceived the plan of seizing the papal authority and revenue in England, thereby not only securing the divorce, but vastly increasing the resources and power of the crown. Henry accused the clergy of having violated the Statute of Præmunire (q.v.) in accepting Wolsey's legatine authority, although they would have met with swift punishment if they had presumed to act otherwise, and although Henry himself had called in the legate Campeggio a short time before. Large numbers of the laity were also equally involved; but this was merely a violent and unscrupulous method of securing the clergy at home before proceeding against the authority of the Pope. Henry's complete success and the very moderate resistance of the clergy show how times had changed since the days of Henry II and Thomas of Canterbury. The Pope had never fully regained his prestige after the movement of Wiclif; and the English clergy were not only wealthy and therefore timid, but since Wolsey as Royal Chancellor and papal legate had practically united supreme power in state and church, they had grown compliant to the royal will. The Convocation of Canterbury offered a gift of £100,000 to be freed from the penalties of præmunire, which involved the confiscation of all their property. Henry demanded in addition that he be recognized as the supreme head of the Church of England, which after some resistance they accepted with the vague qualification, "so far as is permitted by the law of Christ." The Convocation of York soon after bought its pardon on the same condition and the payment of £18,000. Henry found support in these measures in Parliament, whose elections he practically controlled, and whose members were either lawyers or country squires, with little affection for the Church. In 1532 the clergy submitted its entire body of canons to the King's examination, and renounced the right to make new canons without royal permission, thus putting an end forever to the freedom of the English church. In 1533 Henry made retreat impossible by secretly marrying Anne Boleyn without a divorce. In the same year he made Cranmer, an able but compliant and vacillating churchman, Archbishop of Canterbury, who on May 23 decided that Henry's marriage with Catharine was void, and on May 28 that his secret marriage with Anne was lawful. About a year after, Clement decided in favor of Catharine, but not until Henry, foreseeing the result, had all but severed the connection between the English church and Rome. In 1534 Parliament changed the provisional Act of Annates of 1532 into an unconditional one, giving the King the annates or first fruits which were formerly paid to the Pope. It also provided for the appointment of bishops without reference to papal authority and abolished appeals to Rome. Henceforth the Pope was merely "the Bishop of Rome," with no more authority in England than any other foreign bishop.

The new royal supremacy found its first expression in three acts which, taken together, assumed an intolerably tyrannical character. The first act of succession of 1533 not only fixed the inheritance to the crown in the issue of Anne Boleyn, and declared that the marriage with Catharine was invalid from the beginning, but required all subjects to take oath affirming their full acceptance of the contents of the act, which no Catholic could conscientiously do; and it further declared that any one who refused should be guilty of high treason. The act of supremacy and the treason act of the following year confirmed the royal title "supreme head of the Church of England," and declared that any one who should deprive the King of his title should be guilty of high treason. The King thus tried not only to rule over men's actions, but over their consciences. Numerous victims met a traitor's death for refusing to swear that Catharine's marriage was unlawful, though otherwise they were willing to accept the new succession. With incredible callousness Henry sent to the block Sir Thomas More, his former friend and boon companion, one of the ornaments of the age, and Fisher, whom the Pope shortly before had made Cardinal. Many friars were burned merely for refusing to take the oath on conscientious grounds. Some of them had spoken against the King's second marriage, but others had not. In 1536 Anne, on little or no evidence, was convicted of many and monstrous offenses and was beheaded. Ten days later Henry married Jane Seymour, and a new act of succession made it treasonable to affirm what it was formerly treasonable to deny.

The resistance of the friars no doubt helped to call the attention of Cromwell, who had been made vicar-general in ecclesiastical matters in 1535, to the rich booty to be acquired through the dissolution of the monasteries, at that time

widely established throughout England. He ventured at first to despoil only the lesser houses. A royal visitation of the year 1535 made the convenient discovery that monasteries "where the congregation of such religious persons is under the number of 12 persons" were the seats of "manifest sin, vicious, carnal, and abominable living," while those with more than 12 persons were not. Parliament thereupon (1536) dissolved the smaller houses and gave their property to the King. The Catholic rising in the northern and more conservative districts in 1536, known as the "Pilgrimage of Grace," involved some of the remaining abbots of that region, and this was a signal for the dissolution of the greater monasteries. Those who were implicated in the revolt were executed for treason, and the others were gradually frightened into surrendering their authority and property into the hands of the King, "of their own free and voluntary minds, good wills and assents, without constraint, coercion, or compulsion of any manner of person or persons," as the Parliamentary Act of 1539 puts it. Henry used the enormous spoils of the monasteries partly for religious objects, partly for military purposes; but much was granted to royal favorites, and many prominent families in England at the present day derive their fortunes from this source. One of the unexpected consequences of the dissolution was the formation of a considerable party keenly interested in maintaining the religious innovations.

It was not, however, Henry's first intention to introduce religious innovations, other than the royal supremacy. If More and Fisher were beheaded for denying the royal supremacy, John Frith was burned for denying the doctrine of transubstantiation. Yet preachers with Protestant tendencies were appearing and criticizing the old order of things with great asperity. To prevent these disturbances, the Ten Articles were promulgated in 1536 by royal order, containing a creed which in the main held to the old order, yet passed over in silence or tried to explain some of the controverted points. In the same year the Bible was translated with royal sanction, though Henry apparently took no great interest in it. The new movement was sure to grow. Its intellectual leader was Cranmer, who was himself under the influence of Ridley. Cranmer and Ridley were slowly changing their views in the direction of Protestantism. Cromwell also favored Protestantism, for political reasons. In 1538 there was much smashing of images and spoliation of tombs, until Henry took alarm. In 1539 he issued, with the consent of Parliament, the reactionary Six Articles, affirming the principal controverted Catholic dogmas. Englishmen found it as dangerous to be too Protestant as too Catholic, and the discreet conformed to Henry's somewhat shifting views. In 1544 Cranmer wrote his celebrated Litany and ordered certain parts of the service to be said in English; but further changes were cut short by Henry's death.

In the meantime Cromwell had come to grief through his arrangement of the marriage of Henry to Anne of Cleves, in order to form a connection with the Protestant princes of Germany. When Anne reached England, she was found to be far from handsome, and Henry's resentment was great. This provided an excuse for immediate action against Cromwell, of whom Henry had grown tired because of the failure of his foreign policy and because of his strong leaning towards Protestantism. He was executed July 28, 1540, as a heretic. Ten days after Cromwell's execution Henry married Catharine Howard, Anne having been divorced shortly before; but she was soon found to have been unfaithful, both before and after her marriage, and was beheaded. In 1543 Henry married his sixth wife, Catharine Parr, who survived him.

Although he had already rid himself of the great wealth his father left him, had grievously oppressed his people with heavy taxes, had been twice absolved by Parliament from repaying his loans, had levied illegal benevolences, and had debased the coinage, his last years were again occupied with foreign enterprises. He tried to establish his authority in Ireland by winning over the native chiefs, stripping the Irish monasteries for their benefit. From 1542 to 1546 he was at war with Scotland and France. The Scots were defeated at Solway Moss in 1542, and James V died soon afterward. Henry took Boulogne in 1544 and made peace two years later. He died Jan. 28, 1547. By Act of Parliament, in 1544, the succession had been given to the offspring of Jane Seymour, Catharine of Aragon, and Anne Boleyn—respectively Edward, Mary, and Elizabeth, who succeeded in this order and died without issue.

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HENRY I (1008–60). King of France from 1031 to 1060. He was the son of Robert I and a grandson of Hugh Capet. The first years of his reign were disturbed by a rebellion participated in by his mother, Constance of Toulouse. After her death, in 1034, he put the rebellion down; but another began almost immediately and was put down only in 1039. In the disorders which followed the death of Robert the Devil, Duke of Normandy, in 1035, Henry assisted William the Bastard, the illegitimate son and successor of Robert (later known as William the Conqueror), in establishing his authority over the rebellious Norman nobles, participating in the battle of Val-ès-dunes in 1047. Subsequently

Henry grew jealous of the power of the Norman Duke. Leaguing himself with the Count of Anjou and calling his brother Eudes into the field, he invaded Normandy from Evreux in 1054. Eudes was defeated at Mortemer, but Henry continued the war till 1058, when he had to admit defeat and make concessions to William. In 1059 he caused his eldest son, Philip, to be crowned as joint King. Henry died Aug. 4, 1060. He was an active prince, who spent a large part of his time in the field, upholding the royal authority against the feudal nobles. His first wife, Maud or Mathilda, niece of Henry III of Germany, died childless; his second wife, Anne, daughter of Jaroslaff, Grand Duke of Kiev, bore him three sons—Philip, his successor; Robert, who died in childhood; and Hugh, Count of Vermandois. Consult: Soehnée, *Etude sur la vie et le règne de Henri I* (Paris, 1891); id., *Catalogue des actes de Henri I* (ib., 1907); Lavisse, *Histoire de France*, vol. ii, part ii (ib., 1901).

HENRY II (1519–59). King of France from 1547 to 1559. He was born March 31, 1519, being the second of three sons of Francis I by his first wife, Claude. From 1526 to 1529 Prince Henry was a hostage in Spain, together with his brother, the Dauphin Francis. In 1533 he married Catharine de' Medici, and in 1536 the death of the Dauphin Francis made him the heir apparent to the throne. The same year he became the lover of the celebrated Diana of Poitiers, a woman several years his senior, but of attractive mind and strong will. In 1547 Henry succeeded his father, Francis I, and at once submitted himself to the influence of his mistress and of Anne de Montmorency, Constable of France, though the Guises also enjoyed a large share of the royal favor. A revolt in Guienne, where the people had risen against the *gabeleurs*, or collectors of the salt duty, was speedily put down by Montmorency. In 1550 Boulogne, which had been taken by the English during the wars of Henry VIII, was recovered by the French, and in a second war, which began in 1557, the English lost Calais and Guines, their last possessions in France (1558). Though a strong Catholic and a persecutor of the Huguenots, Henry made treaties of alliance with the German Protestants, led an army of 38,000 men to aid Maurice of Saxony against the Emperor, and made himself master of the bishoprics of Toul and Verdun, while Montmorency seized Metz by treachery (1552). After the abdication of Charles V (1555–56) Henry embraced the opportunity of attacking the Netherlands and Italy before Philip II could consolidate his newly acquired possessions; but the results of this step were disastrous to France at every point. In Italy the attack on Naples, made by Guise at the head of 20,000 men, utterly failed; while in the Low Countries the French under Montmorency sustained a total defeat, Aug. 10, 1557, at Saint-Quentin and were forced to abandon the town to the Spaniards. This was followed by the defeat of De Thermes at Gravelines in 1558, which with other causes led to the Treaty of Cateau-Cambrésis, April 2–3, 1559. On June 29 Henry II was mortally wounded in a tournament by Count Montgomery, the captain of his Scottish Guards, and died July 10, 1559. He is represented by historians as a bold and handsome man, but cold and indolent. His Queen, Catharine de' Medici, bore him 10 children, of whom three lived to be kings of France. He was succeeded by his eldest son, who became Francis II. Consult the contemporary memoirs of Monthieu, Tavannes, Vieilleville, Villars, and Brantôme; also, Barre-Duparcq, *Histoire de Henri II* (Paris, 1887); Ranke, *Civil Wars and Monarchy in France in the Sixteenth and Seventeenth Centuries* (trans., London, 1852–61); H. N. Williams, *Henri II: His Court and Times* (New York, 1911). See also FRANCE; and consult the authorities referred to there.

HENRY III (1551–89). King of France from 1574 to 1589. He was the third son of Henry II and Catharine de' Medici and was the last of the house of Valois. He was born at Fontainebleau, Sept. 19, 1551, and in his youth bore the title of Duke of Anjou. At the age of 16 he was made a lieutenant general and placed in nominal command of the armies of France, though the real direction of operations was in the hands of Marshal de Tavannes. Henry had a part in the victories over the Huguenots at Jarnac and Moncontour in 1569 and was active in abetting the Massacre of St. Bartholomew. He was elected King of Poland in 1573, but upon receiving news of the death of his brother, Charles IX, in the following year, he fled from Cracow to make certain his succession in France. As King, he continued the war against the Huguenots; but the union of the party of his brother, the Duke of Alençon, with the Huguenots wrung from the alarmed King the Peace of Beaulieu (or of Monsieur) in 1576, confirmed by the Edict of Poitiers or Bergerac in 1577. This peace granted so many privileges to the Huguenots that it exasperated the Catholic party and led to the formation of the Holy League, the avowed object of which was to maintain the supremacy of Catholicism and the secret purpose to secure the reversion of the throne to the Guises. His life was marked by alternate outbursts of licentiousness and moods of gloomy fanaticism. The affection he lavished upon his effeminate favorites, or *mignons*, as they were called, aroused the disgust of the nation. This caused the popularity of Henry of Guise to be strengthened. A renewed war with the Huguenots (1579–80) was concluded by the Peace of Fleix, a renewal of the terms of that of Bergerac. The strength of the League grew rapidly, aided by the Duke of Guise. By the death of the Duke of Anjou (formerly of Alençon), Henry of Navarre became heir to the throne (1584); but the Catholics would not accept him, and Henry III, after an attempt to come to an understanding with his cousin of Navarre, issued the Edict of Nemours (1585), repealing all privileges granted the Huguenots. The so-called War of the Three Henrys then broke out. In 1587 the Huguenots under Henry of Navarre triumphed at Coutras. King Henry found that Henry of Guise, through his commanding position, was becoming master of the kingdom. On May 12, 1588, the so-called Day of the Barricades, the inhabitants of Paris rose against the royal forces and were quelled only by the interposition of Guise. The King fled to Blois, convoked the Estates and summoned Guise to a private audience. Guise was assassinated in the King's cabinet by the guards known as the "Forty-five" (Dec. 23, 1588); and his brother, the Cardinal de Lorraine, was put to death on the following day. This double assassination aroused the hatred of Catholic France. The doctors of the Sorbonne declared the people to be relieved of the duty of obedience to the King, and the heads of the League dissolved the Es-

tates. Henry was distracted by the difficulties of his position and threw himself under the protection of Henry of Navarre. The two kings advanced at the head of an army of 40,000 Huguenots on Paris, which would probably have had to capitulate had not Henry III been assassinated, Aug. 1, 1589, by a fanatical young Dominican, named Jacques Clément. The murderer was slain on the spot by the royal guard, and the King died on the following day, after having declared Henry of Navarre his successor. Although incapable of governing, he was a patron of art and letters and should be ranked with Francis I in this particular.

Consult the memoirs of Tavannes, Vieilleville, Castelnau, Brantôme, and De Thou; also Freer, *Henry III: His Court and Times* (3 vols., London, 1858); Jackson, *The Last of the Valois and the Accession of Henry of Navarre* (2 vols., ib., 1888); Ranke, *Civil Wars and Monarchy in France in the Sixteenth and Seventeenth Centuries* (2 vols., Eng. trans., ib., 1852); E. Armstrong, *The French Wars of Religion, 1559–98* (ib., 1892); De Noailles, *Henri de Valois et la Pologne* (3 vols., Paris, 1867); De la Barre-Duparcq, *Histoire de Henri III* (ib., 1882); Robiquet, *Paris et la Ligue sous Henri III* (ib., 1886); Nolhac and Salerti, *Il viaggio in Italia di Enrico III, re di Francia* (Turin, 1890); J. Nouaillac, *Villeroy, secrétaire d'état de Charles IX, Henri III et Henri IV* (Paris, 1909). See FRANCE: HUGUENOTS.

HENRY IV (1553–1610). King of France from 1589 to 1610, sometimes called the Great. He was born in the castle of Pau, Béarn, Dec. 14, 1553, being the third son of Antoine de Bourbon and Jeanne d'Albret, daughter and heiress of Henry II, King of Navarre and Béarn, and allied through his father with the French royal family. In 1555 his mother became Queen of Navarre and gave her husband the title of King. Henry himself was known as Prince of Viane. His father's death, in 1562, placed him under the sole control of his mother, who was a zealous Calvinist and was careful to select learned men holding her own tenets for his instructors. Upon the outbreak of the third Civil War in France the young prince and his intrepid mother joined the Huguenots at La Rochelle, and after the death of the Prince of Condé at Jarnac (March 13, 1569) Henry was proclaimed by the voice of the army chief of the Protestant cause. On account of his extreme youth, however, the actual command was vested in Coligny (q.v.). Notwithstanding the defeats which the Huguenots had experienced in this campaign, the Peace of Saint-Germain-en-Laye (Aug. 8, 1570) was apparently of great advantage to them and was speedily followed by a contract of marriage between Henry of Navarre and Margaret of Valois, the sister of Charles IX. Jeanne d'Albret died suddenly a few months later (June 9, 1572), and the prospective bridegroom became King of Navarre, under the title of Henry III. After much opposition on the part of both Catholics and Protestants, the marriage with Margaret of Valois was celebrated with great pomp, Aug. 18, 1572, followed within a week by the Massacre of St. Bartholomew. It had been originally intended that Henry should share the fate of his friends and coreligionists, but his life was spared on condition of his professing himself a Catholic. For more than three years he remained at the French court, virtually a prisoner and continually plotting and seeking to escape; but at length, in February, 1576, he contrived to elude the vigilance of his guardians and made his way to the camp of the Huguenots in Gascony, where he repudiated his enforced conversion and resumed the command of the army. In the Peace of Beaulieu, concluded May 6, 1576, the Huguenots obtained several distinct advantages.

The death of the Duke of Anjou (late Alençon) in 1584 made Henry presumptive heir to the crown. Some years previous to this the Catholic League had been formed, the secret purpose of which was the support of the Guise pretensions to the throne. The War of the Three Henrys (Henry III of France, Henry of Navarre, and Henry of Guise) was terminated by the Protestant victory of Coutras, Oct. 20, 1587. In 1588 Henry III of France, hating and fearing the powerful Guises, who had virtually made themselves his masters, caused the Duke of Guise and the Cardinal de Lorraine to be murdered, and in the following year came to an understanding with Henry of Navarre. The two now proceeded to lay siege to Paris, August, 1589. The assassination of Henry III by Clément made Henry of Navarre, as the nearest lineal male descendant of the royal house of France, rightful King of France, the house of Bourbon succeeding to that of Valois. As a Protestant, he had been excommunicated by Sixtus V in 1585 and declared incapable of succeeding to the French crown. His religion, moreover, made him obnoxious to the greater part of the nation, and he found in addition that the dukes of Lorraine and Savoy, and Philip II of Spain, were prepared, each on his own account, to dispute his claims. He withdrew therefore to Normandy until he could collect more troops and obtain reënforcements from England and Germany. His nearly hopeless cause, however, gradually gained strength through the weakness and internal dissensions of the Leaguers, who proclaimed the aged Cardinal de Bourbon King, with the Duke of Mayenne lieutenant general of the kingdom, and thus complicated the interests of their party. After a success at Arques (September, 1589), Henry reappeared before Paris. He won a splendid victory over Mayenne at Ivry (March 14, 1590); but Spanish intervention defeated his plans, and it is probable that he would never have been generally acknowledged had he not, by the advice of his friend and Minister, De Rosny, afterward Duke of Sully (q.v.), formally professed himself a member of the Church of Rome in 1593. "Paris," the light-hearted but astute monarch is reported to have said, "is well worth a mass." His public recantation of Protestantism, before the Archbishop of Bourges, July 25, 1593, filled the Catholics with joy and was followed by the speedy surrender of the most important cities of the kingdom, including Paris, which opened its gates to him in March, 1594. The war with the League was not, however, terminated till 1596. In 1598 peace was concluded between Spain and France by the Treaty of Vervins, which restored to the latter many important places in Picardy and was otherwise favorable to the French King. On April 13, 1598, Henry signed the Edict of Nantes, which secured the Protestants perfect liberty of conscience and the administration of impartial justice.

Henry was now left at liberty to direct his attention to the internal improvement of the

kingdom, which had been thoroughly disorganized through the long continuance of civil war. The narrow-minded policy of the preceding reigns had left the provinces greatly at the mercy of the civil governors and large landed proprietors, who arrogated almost sovereign power to themselves in raising taxes and exacting compulsory services. Such abuses Henry completely stopped. By building canals and roads and opening all parts of his kingdom to commerce, he established new sources of wealth and prosperity for his subjects. The mainspring of these improvements was, however, the reorganization of the finances under Sully, who in the course of 10 years reduced the national debt from 330,000,000 to 50,000,000 livres. In 1601 the districts of Bresse, Bugey, and Valromey were acquired from Savoy and added to France. For 10 years France enjoyed prosperity previously unheard of. In foreign politics Henry devoted his entire energy to the formation of a powerful coalition against the house of Austria, the ancient enemy of France, against whom, since the Treaty of Cateau-Cambrésis in 1559, the distracted country had been too weak to contend. The disputed succession to the duchies of Jülich and Cleves (qq.v.) afforded an opportunity for the opening of hostilities, and the King, who had entered into an alliance with the Protestant Union of Germany, was about to take personal command of the French army, when he was struck down by the dagger of Ravaillac, a religious fanatic, at Paris, May 14, 1610. Nineteen times before attempts had been made on his life, most of which it was thought could be traced to the agency of the papal and Imperial courts, and in the midst of the bitter political strife Ravaillac's crime was laid to the charge of the same influences. The most horrible vengeance was wreaked on the murderer. Henry was succeeded on the throne by Louis XIII, his son by his second wife, Maria de' Medici (q.v.). Time has strengthened the high estimate which the people of France formed of their favorite King, for, although his faults were numerous, they were eclipsed by his surpassing qualities. An inordinate passion for women was his greatest failing. He was without doubt the most imposing figure in France of his day and has taken his place in history as the greatest of Bourbon kings.

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HENRY V OF FRANCE. See CHAMBORD, DUKE OF.

HENRY IV. An historical play by William Shakespeare, in two parts, produced in 1597 and 1598, printed in 1598 and 1600. The sources are Holinshed's *Chronicles* and a popular old play (produced in 1588), *The Famous Victories of Henry V.* In it the royal hero, who had appeared as a spirited youth in *Richard II*, is represented as a careworn monarch, who has passed down his boyish fire to his son, Prince Hal. The plot deals with Hotspur's rebellion and the sobering of the Prince's character through the tempering process of his nation's trial. See FALSTAFF.

HENRY V. An historical drama by William Shakespeare, a continuation of *Henry IV*, and derived from the same sources. It deals with the adventures of Prince Hal after he ascended the throne, especially with his invasion of France, and tells of the death of Henry's former boon companion, Falstaff. It was performed in 1599 and was printed in 1600, imperfectly, by Thomas Creede.

HENRY VI. An historical drama in three parts, produced in 1592–94 and printed in 1594–95, in which Shakespeare's genius can be traced, working over the cruder stuff of possibly Marlowe, Peele, Lodge, Kyd, and Greene, or some unknown dramatists. It deals with the early years of Henry VI's reign, his misfortunes during the Wars of the Roses, and his tragic death. The first part was produced in 1592 and called forth Greene's charge of plagiarism in his *Groat's Worth of Wit.* The second part, founded on an old play, *The First Part of the Contention between the Two Famous Houses of Yorke and Lancaster*, and the third part, founded on *The True Tragedie of Richard, Duke of Yorke*, were evidently elaborated and adapted by Shakespeare from works by unknown writers.

HENRY VIII. An historical drama, produced in 1613, begun by William Shakespeare and completed by Fletcher and Massinger. It is founded on Holinshed's *Chronicles* and Fox's *Christian Martyrs* and was first printed in the folio of 1623. Only Act i, Scene 1; Act ii, Scenes 3 and 4; Act iii, Scene 2; Act iv, Scene 1, can be ascribed to Shakespeare; the rest was written by Fletcher, with possibly some help from Massinger.

HENRY, ALEXANDER (1739–1824). An American fur trader, born in New Brunswick, N. J. He was with General Amherst in the expedition against the French in Canada (1760). After the peace he went to Mackinac to engage in the fur trade and was one of the few survivors when the English garrison of the fort was massacred by the Indians at the time of Pontiac's uprising (1763). Henry remained for a year a captive among the Ojibways at Sault Ste. Marie, whence he came with an Indian contingent to join General Bradstreet's army on the lakes and by the desertion of his battalion regained his liberty. He resumed the fur trade, voyaging between Montreal and the Rocky Mountains, and from 1770 to 1774 made an unsuccessful attempt to float a company for working the copper mines on Lake Superior. His book, *Travels and Adventures in Canada and the Indian Territory between the Years 1760*

and 1776 (1809), is quoted at length in Parkman, *Conspiracy of Pontiac* (London, 1868). Consult also Grinnell, *Trails of the Pathfinders* (New York, 1911).

HENRY, Caleb Sprague (1804–84). An American Protestant Episcopal clergyman and author. He was born in Rutland, Mass., graduated at Dartmouth in 1825, and studied theology at Andover and New Haven. In 1828 he became a Congregational minister at Greenfield, Mass., and in 1833 removed to Hartford, Conn. In 1834 he started the *American Advocate of Peace*, the organ of the American Peace Society. He then entered the ministry of the Protestant Episcopal church and was professor of moral and intellectual philosophy in Bristol College, Pennsylvania (1835–38). In 1837, with the aid of Rev. Francis L. Hawks, he established the New York *Review*. He was professor of history and philosophy in New York University from 1839 to 1852. Later he was rector of various churches, but was chiefly engaged in literary work. He translated Guizot's *History of Civilization* and other works from the French and was the author of several works, including *Compendium of Christian Antiquities* (1837), *Social Welfare and Human Progress* (1860), and *Satan as a Moral Philosopher* (1877).

HENRY, Cape. See Cape Henry.

HENRY, äN'rē', Charles (1859–). A French librarian and editor. He was born at Bollwiller, Haut-Rhin, and was educated in Paris, where in 1881 he became assistant and afterward librarian in the Sorbonne. As a specialist in the history of mathematics, he was sent to Italy to seek some manuscripts of that nature which the government wished to publish. He edited several works upon kindred subjects, as well as memoirs, letters, and other volumes, and wrote critiques upon the musical theories of Rameau and Wronski. He is also credited with the invention of several ingenious devices and instruments still used in psychophysiological laboratories. C. Huet's correspondence he published under the title *Un érudit, homme du monde, homme d'église, homme de cour* (1880), and he issued also *Problèmes de géométrie pratique* (1884) and *Lettres inédites de Mlle. de Lespinasse à Condorcet et à D'Alembert* (1887).

HEN'RY, Edward Lamson (1841–1919). An American genre painter. He was born in Charleston, S. C., Jan. 12, 1841, and studied at the Philadelphia Academy with Peter Weber and from 1860 to 1863 with Suisse and Courbet in Paris. He returned to the United States during the Civil War and sketched on the James River. In 1869 he was elected a member of the National Academy and established a studio in New York. He became a member also of the American Water Color Society. Notwithstanding a foreign training, his art is excessively native in subject and execution. He depicts the life of the middle of the century, particularly country scenes with quaintly dressed people, buggies, farmhouses, in hard outlines, crude colors, and with excessive detail. One of his largest paintings is the "Initial Excursion of the First Railway Ever Constructed in New York State," Albany Historical Society, containing 50 figures. His principal works are: "Old Clock on the Stairs" (1868); "City Point, Grant's Headquarters" (1869), Union League Club, New York; "Battle of Germantown," owned by William Astor; "Declaration of Independence," owned by J. W. Drexel; "Reception to Lafayette"; "In Sight of Home"; "Waiting for an Answer."

HENRY, äN'rē', Etienne Ossian (1798–1873). A French chemist, son of Noël Etienne Henry (1769–1832), born in Paris, and trained by his father, who was director of the Central Pharmacy of the Parisian hospitals and professor in the School of Pharmacy. In 1824 he became director of the chemical laboratory of the Academy of Medicine. He discovered sinapin and studied mineral waters, the milk of various animals, nicotine, and tannin. His works include: *Traité pratique d'analyse chimique des eaux minérales* (2d ed., 1858), with his father; *Mémoire sur l'analyse organique* (1830), with Plisson; *Analyse chimique des eaux de Paris* (1848), with Boutron-Charland; and a translation of the *Codex Medicamentarius* (1827), with Ratier.

HEN'RY, George (?–). A Scottish painter, one of the most prominent of the Glasgow school. He was born in Ayrshire and studied at the Glasgow School of Art, later in Macgregor's studio, but learned most from his nature studies at Kirkcudbright. He was influenced also by his collaboration with E. A. Hornel (q.v.) in such works as "The Druids" (1887), Grosvenor Gallery, London. His "Galloway Landscape" was epoch-making at Glasgow by reason of its higher key of color and essentially decorative character. Following these tendencies, the two friends spent a year and a half in Japan. Henry's importance consists in his influence on the Glasgow school in the direction of richer and more decorative color. In addition to genre and landscape, he also paints portraits, more distinguished by technical ability than by rendition of character. Henry's pictures in public collections include "The Blue Gown," Museum of Cape Town, "The Gray Hat," at Edinburgh, two portraits at Glasgow, and one at Montreal. He was elected a member of the Royal Scottish Academy (1902) and an associate of the Royal Academy. Consult the works cited in the article Guthrie, Sir James.

HENRY, Joseph (1799–1878). An American physicist, born at Albany, N. Y., Dec. 17, 1799. He was educated at the Albany Academy, where in 1826 he became professor of mathematics and natural philosophy. Henry earned the reputation of being one of the greatest of experimenters and did more towards the development of the science of electricity than any other American. At the Albany Academy he developed the electromagnet, which had been invented a few years previously by Sturgeon of England. By insulating the wire with silk and constructing the apparatus according to certain original ideas, he obtained electromagnets of far greater power and efficiency than those of other experimenters and also transmitted the current from the battery through a considerable length of wire to the magnet. The essential feature of his apparatus was the winding of the wire on a bobbin-like thread on a spool. He wound several coils, with separate terminals, on the same bobbin. If these coils were joined in parallel, he had a "quantity magnet," with great lifting power; if they were joined in series, he had an "intensity magnet," which could be used to perform work at a great distance from the battery, provided this last was sufficiently strong. This discovery of Henry's marked an epoch in electricity. In 1831 Henry sent a current through a mile of fine copper

wire and caused the armature of the electromagnet to be attracted and strike a bell, thus producing an audible signal. This is the first electromagnetic telegraph, and Henry is to be regarded as the inventor of the principle now universally applied in modern practice. In further experiments at Princeton, where Henry was appointed professor of natural philosophy in 1832, he devised an arrangement of electromagnets and batteries, where the current transmitted to a considerable distance energized a magnet and attracted an armature which opened a "local" circuit with its battery and caused a powerful electromagnet to perform work by allowing a weight to fall. This experiment contains the principle of the telegraph relay which made possible telegraphy over considerable distances. The apparatus was set up between Henry's residence and laboratory at Princeton, and the earth was used as a return conductor for the first time. Henry was also the first to employ magnetic attraction and repulsion to produce motion and constructed a simple magnetic engine which had the first automatic pole changer or commutator ever applied to the galvanic battery.

Henry's greatest contribution to electricity was the discovery of the method of producing induced currents—the underlying principle of dynamos, transformers, etc. In this he anticipated Faraday by some years, although part of his work was not published for several years. He discovered the phenomena of self-induction in August, 1829, and of mutual induction in August, 1830.

Later, in 1842, while at Princeton, he discovered that in the discharge of a Leyden jar the phenomenon is an oscillating one, and further that this discharge would induce discharges in other circuits at a considerable distance; in other words, he discovered the essential phenomena of wireless telegraphy. In 1846 he was chosen secretary of the Smithsonian Institution at Washington, a position that he held until his death, on May 13, 1878. In 1849 he was elected president of the American Association for the Advancement of Science, and in 1858 he was chosen president of the National Academy of Sciences, of which body he was an original member. Upon the establishment of the Lighthouse Board in 1852, Professor Henry was appointed a member and in 1871 became its head. He carried on in this capacity a number of important tests for the government which resulted in the improvement of fog signals and the various lights and lighthouses. He was also interested in meteorology, and in his reports, as secretary, he urged the government to collect and distribute meteorological information. He suggested the use of the telegraph for this purpose, and for a number of years this important work was under the direction of the Smithsonian Institution. Terrestrial magnetism was also a subject of interest to Henry, and he not only participated in investigations on his own account, but urged upon the government the importance of having such observations made. In acoustics Professor Henry also carried on important researches, his attention being directed to this subject largely through his experiments with fog signals. Henry enjoyed no small amount of European reputation, and in his trips abroad was enthusiastically received by English and continental scientists.

Henry was involved in a controversy with S. F. B. Morse (q.v.) as regards the invention of the telegraph, but it is safe to state that the former is to be regarded as the originator of the principle, while Morse perfected the method for using the electromagnet for commercial purposes. Morse, in the course of his work, met difficulties which he could not overcome until his attention was called to Henry's inventions. Henry's collected writings are to be found in the *Smithsonian Miscellaneous Collection*, vol. xxx (Washington, 1887). In volumes xx and xxi of the same series are to be found excellent biographical and memorial notices. Consult also Dickerson, *Joseph Henry and the Magnetic Telegraph* (New York, 1885).

HENRY, MATTHEW (1662–1714). An English Nonconformist divine and Bible commentator. He was born in Flintshire, near Chester, Oct. 18, 1662. Having qualified himself for the ministry, in 1687 he was settled as Presbyterian pastor at Chester, where he continued for 25 years. In May, 1712, he removed to a charge at Hackney, near London. He died June 22, 1714. His principal work is an *Exposition of the Old and New Testament*, which was commenced in November, 1704, and five volumes appeared in London prior to 1710. He lived to finish it only to the Acts of the Apostles, and the remainder was finished by 13 Nonconformist ministers, whose names are given in some of the editions. For many years, though of no critical value, this was the standard commentary on the Bible. It has been often reprinted; e.g., by Burder and Hughes, with additional matter from Henry's manuscripts (6 vols., London, 1811). Besides his commentary, Henry published numerous volumes, as well as sermons and tracts. His miscellaneous works were republished in London in 1830. For his life, consult Williams (London, 1828; new ed., 1865), and *Diaries and Letters of Philip Henry* (his father), edited by Lee (ib., 1883).

HENRY, O. The pen name of (WILLIAM) SYDNEY PORTER (1862–1910), a prolific and popular American short-story writer, whose work afforded an astonishing amount of diversion to the readers of his day. Born in Greensboro, N. C., he passed his early years in the South and Southwest, wandering from place to place and experiencing the ups and downs of a varied journalistic career. He finally settled in New York. He has written of Western or Southwestern life—in *Heart o' the West* (1907) and *Roads of Destiny* (1909), e.g.—and the scene of *Cabbages and Kings* (1904) is Central America. But it is in his stories of New York that his best work is found. In these tales shop girls, office boys, clerks, tramps, and the flotsam and jetsam of a great city are his favorite subjects, and he presents sympathetically, as the case may be, domestic life, daily tasks, and occasional holidays, or the shifts and expedients of the homeless. A beguiling storyteller, ready in invention, facile in sentiment, rapid in narrative, picturesque in description and characterization, he yet lacked so evidently certain qualities belonging to the enduring work of the past that his chances of future appeal would seem uncertain. Time will perhaps complain of his inordinate delight in the passing slang of the hour, of his indifference to the demands of style, of the limitations of his psychology, and of his emotional leanness. He came to be universally known by his pen name.

His numerous books, in addition to those named above, include: *The Four Million* (1906); *The Trimmed Lamp and Other Stories* (1907); *The Gentle Grafter* (1908); *The Voice of the City: Further Stories* (1908); *Options* (1909); *Strictly Business: More Stories, Let me Feel your Pulse, Whirligigs, The Two Women* (1910); *Sixes and Sevens* (1911); *Rolling Stones* (1912). His *Works* were published in New York, 1912.

HENRY, PATRICK (1736–99). An American orator and statesman, born in Hanover Co., Va., May 29, 1736. His father was a native of Scotland and a cousin of Robertson, the celebrated historian. His mother was one of a family named Winston, of Welsh descent, noted for musical and conversational talent. Patrick was unpromising as a scholar, and when he was 15 years old he was placed at work with a country tradesman. After a year's apprenticeship he was set up in business with his brother William, but before the end of a year the undertaking had to be abandoned. He was slovenly in dress and showed no aptitude for business of any kind. At the time that he married the daughter of a farmer, a Miss Shelton, his business had collapsed, and he was wretchedly poor. He next tried farming for two years, but had neither perseverance nor knowledge, and after one more of many failures he opened a store and failed within the next three years. When no customers appeared, he would close his store and go fishing. But at intervals he read such books as he could find, especially histories of Greece and Rome, of England, and of the American Colonies, and managed to gain a fair idea of Latin and Greek. Having utterly failed in farming and in trade, he made an attempt at the law, and after a period of reading said to have extended over only some six weeks, and confined to *Coke upon Littleton* and a *Digest of the Virginia Acts,* he had the boldness to ask for license to practice. This was granted in 1760, on the condition that he would extend his studies before undertaking to practice. In 1763 he leaped into immediate prominence in his profession. He was then engaged in the place of a more experienced advocate, who refused to continue the defense in a celebrated case known as the "Parson's Cause," and by an unexpectedly brilliant speech aroused such intense excitement that the audience seized him and bore him in triumph on their shoulders. (See PARSON'S CAUSE.) Thereafter his practice was enormous and his prosperity assured. But he was not satisfied with his legal profession. In 1765 he became a member of the House of Burgesses from Louisa County. At the critical period of the Stamp Act excitement he was comparatively unknown to the Assembly, which was composed of the most distinguished men in the Colony, and the rich planters were scandalized at his presumption in offering to the House the brief resolutions which set forth that the burgesses and the Governor had the exclusive right and power to lay taxes and imposts upon the people of the Colony, and that not alone the Stamp Act, but all acts of Parliament which encroached upon the rights of the Colonies, were unconstitutional and therefore void. A storm of opposition from the conservative members naturally followed, and the resolutions were denounced as extreme, impolitic, and dangerous. In the debate he startled even the radicals by his historic outburst: "Cæsar had his Brutus, Charles the First his Cromwell, and George the Third—" [here he was interrupted by the presiding officer and members with cries of "Treason! treason!"]—"may profit by their example," calmly said the orator, completing the sentence, adding, "If this be treason, make the most of it." The resolutions were adopted by a very small majority. They were printed in the newspapers of the North and South as the "Virginia Resolves" and indeed proved "an alarum bell to the disaffected." He was now a power in the Colony, replaced the vacillating planters in the leadership, and became the authorized representative of the people against the aristocratic element. In opposition to parliamentary imposts and in preparing the articles of association to discourage the use of British merchandise, Henry was one of the leaders. He was a member of the new House of Burgesses, elected in 1769, representing Hanover County. He continued his legal business and, though deficient in legal education, was wonderfully successful before juries. At this time he took an active part in the movement for securing the rights of the Dissenters, which finally culminated in the Religious Freedom Act of 1785, by which the Church of England was disestablished in Virginia. Patrick Henry, with Jefferson and others, was ready to precipitate an open rupture with England. He was especially active in the House of Burgesses, and in May, 1774, took a leading part in those acts of the House with reference to the Boston Port Bill which led to its immediate dissolution by Lord Dunmore. Upon the following day (May 27) was held the historic meeting of the former burgesses in the Raleigh Tavern, as a result of which came the first Revolutionary convention of Virginia (August, 1774), of which Henry was a member, and by which he was chosen a delegate to the first Continental Congress. In that famous assembly he was hailed as the champion of constitutional liberty, and his wonderful eloquence was at once recognized. He served on the committee on trade and manufactures, on the committee to prepare an address to the King, and on that appointed to draft a statement of the rights of the colonists. Returning thence to Virginia, his prominence was still further enhanced by his work in the Provincial Convention of March, 1775, where he introduced resolutions to organize the militia and put the Colony in an attitude of defense, which met with great opposition. He replied by a speech in which, according to one version, occur the words: "There is no retreat but in submission and slavery. Our chains are already forged. Their clanking may be heard on the plains of Boston. The next gale that sweeps from the north will bring the clash of resounding arms. Our brethren are already in the field. Why stand we here idle? What is it that gentlemen wish? What would they have? Is life so dear or peace so sweet as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take, but as for me, give me liberty or give me death!" Without an opposing voice the resolutions were adopted, and a committee, with Henry as chairman, was appointed to prepare a plan for the defense of the province. Soon thereafter the royal Governor, Dunmore, caused to be removed on shipboard much of the province's supply of powder. The people took up arms, and being told that the powder would be

returned, they at once disbanded. Henry, however, seized the favorable moment, gathered a force of militia, and marched upon Williamsburg to demand the powder or compensation. An agent of Dunmore's met him and paid him £300 for the powder. Henry was denounced for stirring up sedition; but it was too late to talk of loyalty; the province was aroused, and in June Dunmore took refuge on a man-of-war. A convention assembled at Richmond in July, 1775, and appointed a committee of public safety with most extensive powers. Two regiments were enlisted, and Henry was appointed commander of all the forces to be raised. The first collision was at Great Bridge, where the Virginia militia gained a triumph over trained British troops and drove Dunmore back to his ship. Henry should naturally have been the leader of the troops, but the active command was given to Col. William Woodford. Henry was disappointed and resigned. In the convention of May, 1776, at Williamsburg, when the delegates to the Continental Congress were instructed to demand the independence of the Colonies, he took an active part and was chosen by that convention one of the committee which prepared the first constitution of the Commonwealth of Virginia. In that year he was chosen by the convention, which then exercised the power of election later exercised by the Assembly, to be Governor of Virginia, and was reelected until 1779, when he became ineligible; and more than once during his occupancy of the office the Legislature conferred upon him, in times of crisis, practically dictatorial powers. He returned to the Legislature, in which he served until 1784, and was then once more chosen Governor, without opposition, serving until 1786, when he finally resigned. In 1788 he was a member of the convention which ratified for Virginia the Federal Constitution, which instrument he vigorously opposed, chiefly on the ground that it failed properly to protect the rights of States and individuals against the extreme centralization of power in the Federal government. Seeing that he could not defeat Madison, the great advocate of the Constitution, he used his influence for ratification with amendments. In 1794 he declined a seat in the United States Senate, and in 1795 Washington offered him the position of Secretary of State, but he declined. He also declined the office of Chief Justice of the United States Supreme Court, and Adams's offer of a special mission to France, as well as an election as Governor in 1796. He was elected to the House of Delegates in 1799, but did not live to take his seat, dying on June 6 of that year. Consult: Tyler, *Patrick Henry* (Boston, 1887; new ed., 1899), in the "American Statesmen Series"; Wirt, *Sketches of the Life and Character of Patrick Henry* (2d ed., Philadelphia, 1818); William Wirt Henry, *Life, Correspondence, and Speeches of Patrick Henry* (3 vols., New York, 1891); Morgan, *The True Patrick Henry* (Philadelphia, 1907).

HENRY, äN'rē', Paul Pierre (1848–1905). A French astronomer, born at Nancy. With his brother, Prosper Mathieu Henry (1849–1903), also born at Nancy, he did much for the perfection of astronomical photography, in the course of their labor of completing the *Atlas écliptique* of Chacornac. The brothers joined the staff of the Paris Observatory as assistants in 1864 and were made adjunct astronomers in 1876, while in 1893 Prosper became titular astronomer. From 1887 they confined themselves almost entirely to photographic work in connection with the International Chart of the Heavens. The older brother discovered the Comet III (1873) and the planetoids 126, 141, 152, 159, 164, 177, and 227, and Prosper discovered the planetoids 125, 127, 148, 154, 162, 169, and 186.

HENRY, Philip. See Stanhope, Earl.

HEN'RY, Philip (1631–96). An English Nonconformist clergyman, born in London. He graduated at Oxford in 1652 and was ordained in 1657. His career as a preacher was repeatedly interrupted by the religious persecutions of his time, and it was not until the Act of Toleration was passed in 1687 that he was allowed to pursue his calling unmolested. The remaining years of his life were spent in unceasing labor. His *Diaries and Letters*, published in 1882, gives a detailed account of the Nonconformist life of his period.

HENRY, Prince of Prussia (Heinrich Albert Wilhelm) (1862–). A German admiral. The son of Frederick III, Emperor of Germany, and brother of William II, he was born in the New Castle at Potsdam. He was educated in the Gymnasium at Kassel (1875–77) and in the Marine Academy (1884–86). In 1888 he married Irene, Princess of Hesse; to them were born Princes Waldemar (1889), Sigismund (1896), and Henry (1900; died 1904). He traveled around the world in 1878–80, and visited the United States in 1882–84 and in 1903, and South America in 1914. Everywhere he went he was notably popular. He became a naval officer in 1880 and was rapidly promoted, becoming admiral in 1901, chief of the active battleship fleet in 1906, and general inspector of marine. He was made also a field marshal general in the Prussian army. When the War in Europe (q.v.) broke out in 1914, he held the chief command of the German fleet.

HENRY, Robert (1718–90). A Scottish historian and Presbyterian minister. He was born in St. Ninian's Parish, Stirlingshire, was educated at Edinburgh University, and after a term of school-teaching entered the Church, his first charge being at Carlisle. For the last 22 years of his life he was in Edinburgh churches —New and Old Grey Friars—and found opportunity to compile his *History of England on a New Plan* (6 vols., 1771–93), of which the last volume was published after his death. Henry's "new plan" of grouping social progress in periods is no longer new and has been followed out with greater accuracy since his time.

HENRY, äN'rē', Victor (1850–1907). A French philologist, born at Colmar. He studied both law and philology, but finally devoted himself exclusively to the latter, and was appointed professor of Sanskrit and comparative linguistics at the University of Lille. In 1889 he was transferred to a similar position in the faculty of letters at Paris. A remarkably versatile scholar, his writings cover a wide range of linguistics. Among them are: *Esquisse d'une grammaire de la langue innok* (1878); *Esquisse d'une grammaire raisonnée de la langue aléoute* (1879); *La distribution géographique des langues* (1880); *Esquisses morphologiques* (1882–90); *Précis de grammaire comparée du grec et du latin* (Paris, 1888; Eng. trans. by R. T. Elliot, 1890); *Précis de grammaire comparée*

de l'anglais et de l'allemand (1893; Eng. trans. by the author, London, 1894); *Manuel pour étudier le sanscrit védique* (1890); *Le livre septième de l'Atharva-Véda* (1892); *Lexique étymologique du breton moderne* (1900); *La magie dans l'Inde antique* (1904); *Le dialecte alaman de Colmar (Haute-Alsace) en 1870; grammaire et lexique* (1900); *Eléments de sanscrit classique* (1902); *Les littératures de l'Inde: sanscrit, pâli, prâcrit* (1904); *Précis de grammaire pâlie* (1904); *Le parsisme* (1905); *L'Agnistoma* (1906–07), in collaboration with Caland.

HEN'RY, WILLIAM (1775–1836). An English chemist. He studied chemistry and medicine at the University of Edinburgh and received the degree of M.D. from that university in 1807. Henry devoted himself mainly to investigations in chemistry. He was the author of several papers in the *Philosophical Transactions* (chiefly on the chemistry of gases); and his *Elements of Experimental Chemistry,* originally published (1799) under the title of *An Epitome of Chemistry,* passed through numerous editions. He is remembered chiefly as the discoverer of the important law according to which the amount of any gas absorbed by water is proportional to the pressure exercised upon the gas. The law would (apparently) cease to hold true if the gas and the solvent water entered into chemical combination. But assuming that no chemical change is involved, Henry's law is to-day known to hold true, approximately, not only in the case of water, but for all solvents whatever. In 1914 Henry's law was shown to be deducible thermodynamically, and to be generally reliable in dilute solutions (containing not much more than 5 gram molecules of the dissolved gas or vapor for every 95 gram molecules of the solvent; in other words, not much more than 5 "molecular per cent" of the dissolved gas). Within such limits of concentration Henry's law is all but precisely true in the following form: *The molecular per cent of a gas taken up by a solvent is proportional to the pressure attained by the gas when no more of it goes into solution.*

HENRY, WILLIAM ALEXANDER (1816–88). A Canadian jurist. He was born in Halifax, was called to the bar in 1840, a year later was elected a Liberal member of the Nova Scotia Legislative Assembly, and became mayor of Halifax. In 1849 he was appointed a member of the provincial administration, holding successively the offices of Solicitor-General, Provincial Secretary, and Attorney-General. He was instrumental in establishing a system of telegraphs for the province, and also in revising the provincial statutes. He strongly supported the movement for Canadian confederation, and while Attorney-General was one of the representatives of Nova Scotia at the Charlottetown Conference, and later at the Quebec Conference (1864), held to promote federal union of the provinces. In 1866 he was a delegate in behalf of the continuation between the United States and Canada of the reciprocity treaty abrogated in that year, and in the same year also was one of the delegates who met in London and arranged with the British government the provisions of the British North America Act, which, when finally adopted and enacted by the Imperial Parliament, constituted the Dominion of Canada. In 1875 Henry was appointed a judge of the Supreme Court of Canada.

HENRY, WILLIAM WIRT (1831–1900). An American lawyer and historical writer. He was born at Red Hill, Charlotte Co., Va., was educated at the University of Virginia, and was elected to the State Legislature, where he attended four sessions. In addition to the practice of his profession he was deeply interested in historical studies and became president of the American Historical Association (1890) and of the Virginia Historical Society. He is the author of the *Life, Correspondence, and Speeches of Patrick Henry* (3 vols., 1891), besides historical addresses and essays.

HENRY AND EM'MA. A poem in dialogue, published in the collected edition of Prior's works in 1709. It is founded on the old English ballad *The Nut-Brown Maid.*

HENRY ESMOND, ĕz'mond. A novel by Thackeray, published in 1852, and one of the finest historical romances in English. The scene is laid in England in the reign of Queen Anne. The hero is a young colonel in the army, at first deeply in love with the beautiful daughter of his guardian, but finally married to her mother, the widowed Lady Castlewood. See ESMOND, BEATRIX; CASTLEWOOD, LORD AND LADY.

HENRY OF BLOIS, blwä (1101–71). An English prelate, son of Stephen, Count of Blois, and brother of Theobald, Count of Blois and Champagne, and of King Stephen. He was brought up at Clugny, came to England in 1126, was made abbot of Glastonbury, and, three years later, Bishop of Winchester. After the death of Henry I he did all in his power to gain the crown for Stephen and at the coronation pledged his word that the liberty of the Church would be kept intact. Henry failed in his candidacy for the see of Canterbury (1136–38), but in 1139 he was appointed papal legate. As such, he opposed the imprisonment of the bishops of Salisbury and Ely and at the Council of Winchester charged Stephen with sacrilege. In the quarrel between the King and Matilda he gradually went over to the side of the latter and swore allegiance to her in 1141. But he quarreled with her soon after and was rescued from her besieging army by the forces of Stephen. In 1143, Pope Innocent II having died, the commission of Henry expired, Theobald was appointed as his successor, and Henry's power at Rome was over. Five years later he was suspended because of his advice to Stephen that Theobald should not be allowed to attend a papal council at Rheims. Towards the close of the civil war all Henry's energies were bent on the hastening of peace. He assisted at the coronation of Henry II, but was afterward under the King's displeasure because of his leaving England without the royal consent (1155). Henry opposed Thomas à Becket's policy and defended the King in 1166 and 1167. He died soon after the death of the Archbishop, for which he bitterly condemned the King.

HENRY OF HUNTINGDON (c.1084–1155). An English historian, the son of Nicholas, a churchman, who was possibly Archdeacon of Huntingdon. He spent his early years at Lincoln in the home of Bishop Robert Bloet, where Albinus of Angers was his teacher. In 1109 or 1110 he was made Archdeacon of Huntingdon. In 1139 he went to Rome and at this time became acquainted with the *Historia Britonum* by Geoffrey of Monmouth. This and a request of Alexander, Bishop of Lincoln, prompted him to write his *Historia Anglorum,* which in

the last edition came down to 1154. This work is a mere compilation, with occasional touches of pure imagination, for the period to 1127, where the author's personal knowledge begins. The following works are also ascribed to Henry: *Epigrammata Libri VIII*, of which two books are extant, and one is printed in Wright's *Anglo-Latin Satirical Poets and Epigrammatists of the Twelfth Century* (in the "Rolls Series," 1872); *De Amore; De Herbis; De Aromatibus;* and *De Lege Domini*. The history is reprinted from Savile, *Scriptores post Bedam* (1596); in Migne, *Patrologia*, vol. cxcv (1854), and translated by Forester (1853). For his biography, consult Liebermann (Göttingen, 1878); J. Gairdner, *Early Chroniclers of Europe: England* (London, 1879).

HENRY OF LAUSANNE, lô'zàn'. See HENRICIANS.

HENRY II OF TRASTAMARE, trä'stà-mä'rā (c.1332–79). King of Castile, 1366–67 and 1369–79. He was the oldest son of King Alfonso XI of Castile by his mistress, Leonora de Guzman. Alfonso gave him the County of Trastamare; but when, in 1350, Peter the Cruel, Henry's half brother, ascended the throne, Doña Leonora was imprisoned and soon after murdered, while her sons had to flee for their lives. Peter the Cruel continued in his career of assassination until, in 1356, the nobles began a revolt under the leadership of Don Juan de Albuquerque and the illegitimate children of Alfonso. The rebellion was soon suppressed; Henry escaped, while most of the others were executed. In 1360 the Peace of Bretigny between England and France set free bands of marauders who united under the name of Free Companies. Charles V, King of France, in order to rid his country of them, sent them in 1365, under the leadership of the great General Bertrand Du Guesclin, against Peter the Cruel, who was aided by the English under the Black Prince. In 1366 Henry of Trastamare entered Castile and was crowned as Henry II, and Peter fled to the Black Prince at Bordeaux. By the Treaty of Libourne (Sept. 23, 1366) the English agreed to use their utmost efforts to restore Peter in return for the Lordship of Biscay. They fulfilled their promise, and the Black Prince won the decisive battle of Najera on April 3, 1367, and Henry again became a fugitive. But the departure of the English left Peter defenseless, and in 1369 Henry returned and was welcomed by Madrid and other cities as far south as Cordova. Peter tried to bribe Du Guesclin to help him to escape, but the latter betrayed him to Henry, who put him to death. The crown was now claimed by Ferdinand of Portugal and somewhat later by John of Gaunt, who in 1371 had married Constance, a daughter of Peter the Cruel. But Henry was able to overcome, with French assistance, all attacks and developed into a good and liberal ruler. Consult Burke, *History of Spain*, vol. i (London, 1895), and Altamira, *Historia de España*, vol. i (Madrid, 1901).

HENRY'S LAW. See HENRY, WILLIAM.

HEN'RYSON, ROBERT (c.1430–?1506). A Scottish poet. He seems to have been educated abroad, as his name does not appear in the registers of the University of St. Andrews, the only one existing in Scotland in his youth. When he was admitted, in 1462, to the newly founded University of Glasgow, he was called "the venerable Master Robert Henrysone, Licentiate in Arts and Bachelor in Decrees." He probably took orders, and was schoolmaster and notary public at Dunfermline. Henryson, who had the finest poetic talents of all the followers of Chaucer, wrote a sequel to *Troilus and Cressida* entitled the *Testament of Cresseid*. He resumes the story where Chaucer leaves off, and completes it by inflicting a suitable punishment on the false woman. This continuation displays so much skill that it was included in the earlier editions of Chaucer, as if it had been the work of that poet himself. Another poem, "Robene and Makyne," though short, is remarkable as the first known specimen of pastoral poetry in the Scottish language. Henryson wrote several beautiful lyrics and made a metrical translation of Æsop, adding morals of his own suitable to his time. In these fables he displays admirable sense and humor. The first complete edition —*Poems and Fables* (1865)—was edited by D. Laing. A three-volume edition (1907–08) was brought out by the Scottish Text Society and edited by G. G. Smith. Consult J. H. Millar, *Literary History of Scotland* (New York, 1903), and the second volume of *Cambridge History of English Literature* (ib., 1907).

HENRY THE DEACON. See HENRICIANS.

HENRY THE HYPOCRITE. See HEINRICH DER GLÎCHEZARE.

HENRY THE LION (1129–95). Duke of Saxony and Bavaria. He was the son of Duke Henry the Proud. When only 10 years of age, he lost his father, who had engaged in a war with the Emperor Conrad III of the house of Hohenstaufen, and who had been stripped of his Bavarian possessions. For seven years the young prince's mother, Gertrude, and his grandmother, Richenza, ruled his paternal dominions in Saxony. In 1146 Henry assumed the reins of government, and at the Diet of Frankfort in the following year he demanded of the Emperor Conrad the restoration of the Duchy of Bavaria, which had been wrested from his father. This was refused, and Henry, in concert with his uncle Welf (Guelph), had recourse to arms; but his efforts were crushed by the energetic measures of Conrad. After the death of this Emperor, however, Bavaria was given up to him by his cousin, the Emperor Frederick Barbarossa, who formed with him a close friendship (1156). Henry's possessions now extended (not continuously, however) from the North Sea and the Baltic to the shores of the Adriatic (including some territories in Italy), and he was by far the most powerful prince in the Empire, rivaling in influence the Emperor himself. In 1166 a league comprising the archbishops of Bremen and Magdeburg, the bishops of Halberstadt and Hildesheim, the Margrave of Brandenburg, and the Landgrave of Thuringia, was formed against him. He triumphed only after two years of hard fighting. About this time he separated from his first wife and married Matilda, daughter of Henry II of England, soon after which event he undertook an expedition to Palestine (1172). Henry broke his alliance with the Emperor by refusing to join in the Italian expedition of 1176, thus contributing to Frederick's defeat at Legnano. (See ITALY.) The wrath of the Emperor was kindled, and the numerous enemies of Henry the Lion again combined against him; he was summoned to appear at three different diets, and, refusing, was put under the ban of the Empire in 1180. By 1181 his fortunes were at so low an ebb that he was

forced to ask mercy of the Emperor at Erfurt; but all that he could get was permission to retain his hereditary territories of Brunswick and Lüneberg, and even this was on the condition of his going into exile for three years. Henry, in consequence, went with his family to England; but returned to Brunswick in 1185, where he lived quietly. On the departure of Frederick for Palestine in 1189 Henry again was obliged to withdraw to England; but he soon returned, and engaged once more in wars with the petty princes of the North, achieving little, however. A little later he took up arms against the Emperor Henry VI, but was finally reconciled with the Hohenstaufen. He died at Brunswick, Aug. 6, 1195. Consult: Prutz, *Heinrich der Löwe* (Leipzig, 1865); Philippson, *Geschichte Heinrichs des Löwen* (2 vols., ib., 1867); Giesebrecht, *Geschichte der Kaiserzeit*, vol. v (ib., 1888).

HENRY THE MINSTREL, or BLIND HARRY. A Scottish poet, who flourished 1470–92. Scarcely anything is known of him beyond what is told by John Major in his Latin *History of Scotland* (1521). "When I was a child," he says, "Henry, a man blind from his birth, who lived by telling tales before princes and peers, wrote a book of William Wallace, weaving the common stories (which I, for one, only partly believe) into vernacular poetry, in which he was skilled." In 1490–92 Blind Harry is found at the court of King James IV, receiving occasional gratuities of 5, 9, and 18 shillings. The poem attributed to him, *The Life of that Noble Champion of Scotland, Sir William Wallace, Knight*, was completed before the end of 1488, when it was copied by John Ramsay. This copy, the oldest manuscript of the work now known to exist, does not ascribe it to Blind Harry, nor is his name given to it in the earlier printed editions. The poem, which contains 11,861 lines, composed in the heroic couplet, is altogether a wonderful performance, for the blind minstrel must have carried it all in his memory. The style is simple and vigorous and at times eloquent. While the poem undoubtedly has a basis in fact, it is to be regarded mainly as a fiction woven out of popular traditions and written in the spirit of the metrical romances. The first extant edition is dated 1570. Immensely popular in Scotland for 200 years, its place was supplied in 1722 by the poor modernized version of William Hamilton, of Gilbertfield. Consult Moir, *A Critical Study of Blind Harry* (Aberdeen, 1888), and a critical edition of the original poem, edited by Moir for the Scottish Text Society (Edinburgh, 1885–87).

HENRY THE NAVIGATOR (1394–1460). A Portuguese prince, celebrated as a munificent patron of voyagers and explorers. He was the fifth son of John I, King of Portugal, and was born at Oporto, March 4, 1394. He first distinguished himself at the conquest of Ceuta in 1415. Soon after this he took up his residence at the town of Sagres, not far from Cape St. Vincent, and while prosecuting the war against the Moors of Africa exerted himself in every way to decipher the mystery of the great continent upon which the Portuguese had but recently set foot. Under his inspiration Portuguese sailors reached parts of the ocean which the navigators of the time had long supposed to be inaccessible. The grand ambition of Henry was the discovery of unknown regions of the world. At Sagres he founded an observatory, to which he attached a school for the instruction of youthful scions of the nobility in the sciences necessary to navigation. Subsequently he dispatched some of his pupils on voyages of discovery along the western coast of Africa. Creeping down the coast by short and steady stages, these expeditions during Prince Henry's lifetime succeeded in unraveling the unknown shore line of Africa to within 15° of the equator. The Madeira Islands had been reached in 1420; in 1434 Cape Bojador was doubled; in 1441 Cape Blanco was reached; in 1445 Cape Verde, in Senegambia, was doubled; and in 1455 Cadamosto reached the mouth of the Gambia. Prince Henry died at Sagres, Nov. 13, 1460; but the impulse which he had imparted to the maritime enterprise of the Portuguese continued for more than 50 years after his death and resulted in the circumnavigation of Africa and in the upbuilding of a Portuguese empire in India and in Brazil. The science of navigation, which before his time can hardly be said to have constituted a science at all, is indebted to Prince Henry for many important improvements. Consult: Major, *Life of Prince Henry of Portugal* (London, 1868); id., *Discoveries of Prince Henry the Navigator* (ib., 1877); Beazley, *Prince Henry the Navigator* (ib., 1895); J. P. Oliveira Martins, *The Golden Age of Prince Henry the Navigator* (New York, 1914). See AFRICA, *History and Exploration*.

HENSCHEL, hĕn'shel, SIR GEORGE (1850–). A German-English composer and vocalist, born at Breslau. His first teacher was Schaeffer; subsequently he studied under Moscheles and Wenzel for the pianoforte, Götz for singing, and Reinecke for theory and composition. He was enrolled as a student in the Leipzig Conservatory from 1867 to 1870, after which he studied in Berlin—composition under Kiel, singing under Schulze, and the violin under Schiever. For the next few years he steadily made a reputation for himself as a vocalist of high rank. His first concert in England was early in 1877, and his success was so complete that London became his permanent home, and in 1890 he was legally naturalized. From 1881 to 1884 he was conductor of the Boston Symphony Orchestra, returning to London in 1885. From 1886 to 1888 he was professor of singing at the Royal College of Music, London. After his marriage, in 1881, to Lillian Bailey, a talented American soprano, his appearances in the principal cities of America were in company with his wife. Both artists became famous for their work in Lieder, although they were equally at home in opera and oratorio. His compositions are many, consisting mainly of vocal works and studies, together with a serious opera, *Nubia* (1899), a comic opera, *A Sea Change* (1899), and several works for string and full orchestra. His most important work is the *Stabat Mater* (1899). In 1914 he was knighted.

HENSEL, hĕn'zel, HEINRICH (1874–). A German dramatic tenor, born at Neustadt. He studied with G. Walter and F. Emerich in Milan, making his début at Freiberg in 1897. From 1900 to 1906 he was a member of the Frankfort Opera, after which he went to Wiesbaden. Here S. Wagner heard him and chose him to create the tenor part in his *Banadietrich* (Karlsruhe, 1910). In the summer of the same year he sang Parsifal at Bayreuth. His marked success as a Wagner interpreter led to an engagement at Covent Garden in 1911 and the Metropolitan Opera House in 1912, where he

was regarded as the greatest Siegfried since the days of Alvary. His very extensive repertory includes, besides the Wagner rôles, most of the older standard operas and the works of the modern Italian school.

HENSEL, Luise (1798–1876). A German devotional poet, sister of Wilhelm Hensel the painter. She was born at Linum and after the death of her father moved with her mother to Berlin (1810), where, seven years afterward, she met Clemens Brentano (q.v.), who fell in love with her. She did not accept his love, but referred him to his church, the Catholic, for consolation, and became a Catholic herself in 1818. In 1819 she was companion to Princess Salm and in 1821 became teacher in the family of the Countess Dowager of Stolberg. From 1833 to 1837 she lived in Berlin again, then at Neuberg, Cologne, and Paderborn. In her first book, *Gedichte* (edited by Kletke, 1858), she collaborated with her sister Wilhelmine. Her evening hymn, *Müde bin ich, geh' zur Ruh,* is one of the finest of German devotional lyrics. Her completed works were edited by Schlüter (8th ed., 1898). Consult Binder, *Luise Hensel* (Freiburg, 1885).—Wilhelmine Hensel (1802–93), sister of Luise, besides the poems published with Luise, wrote another volume, *Gedichte* (1882).

HENSELT, hĕn'zelt, Adolf von (1814–89). A distinguished German pianist, born at Schwabach, Bavaria. The progress he had made in his art, together with the evidences he had given of his genius, led King Ludwig I to grant him an annuity, which made it possible for him to take up study with Hummel at Weimar and Sechter at Vienna. In 1837 he made his formal début as a concert virtuoso and scored a remarkable triumph in the several large cities of Germany in which he appeared. The following year he went to St. Petersburg, where his fame had already preceded him, and where he ultimately reaped his richest rewards. Soon after his arrival there he was appointed court pianist to the Empress and music teacher to the Imperial family, an appointment which was followed by that of inspector of musical instruction at the Imperial Educational Institution for Girls. He was not a prolific composer, but all his compositions are marked with his individuality and depend largely for their interpretation on the style of playing in which Henselt excelled. As a performer, he was remarkable for his sympathetic and poetical interpretation, as well as his mastership of legato execution, and what has since come to be known as singing touch. His compositions include the F minor pianoforte concerto; *Poème d'amour,* op. 3; *Ballade,* op. 31; and several other successful pieces, as well as some extremely difficult extension studies for the practice of a legato execution of extended chords and arpeggios. He died at Warmbrunn, Silesia. Consult La Maru, *Adolf Henselt* (Leipzig, 1911).

HENSEN, hĕn'zen, Victor (1835–). A German physiologist, born in Schleswig. He studied medicine at Würzburg, at Berlin, and at Kiel, where he became docent and later professor of physiology. His earlier studies, under the influence of Bernard, were in embryology and in the physiology and anatomy of the organs of sense; but afterward he devoted himself to marine biology, became a member of the Commission for Scientific Research in German Waters, and contributed largely to the development of German fisheries. In 1887 he became a member of the Prussian Landtag, and in 1911 he retired from all active duties. His works include: "Physiologie des Gehörs" and "Physiologie der Zeugung," both in Hermann's *Handbuch der Physiologie* (1880–81); *Reisebeschreibung der Planktonexpedition* (1892); *Die Planktonexpedition und Haeckels Darwinismus* (1891); *Die Entwickelungsmechanik der Nervenbahnen im Embryo der Säugetiere* (1903).

HEN'SHAW, Henry Wetherbee (1850–). An American ornithologist and ethnologist, born at Cambridge, Mass. In 1872–79 he did naturalistic field work in the West, and in 1879–93 he was associated with the Bureau of Ethnology. He studied the biology of the Hawaiian Islands in 1894–1904. He became biologist in 1905 and chief in 1910 of the Biological Survey, United States Department of Agriculture. For a time he was editor of the *American Anthropologist.* His works include: *Animal Carvings from Mounds of the Mississippi Valley* (1883); *Birds of the Hawaiian Islands* (1902), and among other bulletins of the United States Department of Agriculture, *The Mammals of Bitterroot Valley, Mont.* (1911).

HENSHAW, Samuel (?–). An American zoölogist. He received the honorary degree of A.M. in 1903 from Harvard University, and there, after serving as assistant entomologist and librarian, he was appointed in 1904 curator of the Museum of Comparative Zoölogy. He became a member of the American Academy of Arts and Sciences, the Torrey Botanical Club, the American Society of Naturalists, and the American Society of Zoölogists. He published a *List of Coleoptera of America, North of Mexico* (1885), with supplements in 1887, 1889, and 1895; and a *Report on the Gypsy Moth of Massachusetts* (1892).

HENSLOW, hĕnz'lō, John Stevens (1796–1861). An English mineralogist and botanist, born at Rochester. He graduated from St. John's College, Cambridge (B.A., 1818; M.A., 1821). Ordained a priest, in 1824 he became curate of St. Mary the Less at Cambridge. Before this, however, his work in the geology of the Isle of Man and of Anglesea had attracted such favorable notice that in 1822 he had been appointed to the professorship of mineralogy at the university. In 1827 he became professor of botany at Cambridge and shortly afterward gave up his chair of mineralogy. Darwin was one of his favorite pupils, and it was Henslow who recommended him as naturalist for the *Beagle.* He became vicar of Cholsey-cum-Moulsford, Berkshire, in 1832, and rector of Hitcham, Suffolk, in 1837. In 1843 he discovered the valuable beds of phosphatic nodules in the Suffolk Crag. He established the museum at Ipswich in 1847 and was its president after 1850. His publications include: *A Catalogue of British Plants* (1829; 2d ed., 1835); *Principles of Descriptive and Physiological Botany* (1836); *Dictionary of Botanical Terms* (1857; new ed., 1894). Consult the *Memoir* by Leonard Jenyns (1862).

HENSLOWE, Philip (?–1616). An English theatrical manager. In the neighborhood of Southwark, where he lived, he owned much property, including the Boar's Head and other inns, and managed and partly or entirely owned several playhouses. He rebuilt the Rose Theatre, managed the Newington Butts and the Swan, and, in company with Edward Alleyn the actor, built the largest London theatre, the Fortune, in

Cripplegate (1600). He also carried on a general brokerage business. He bought plays of the authors and sold them to various acting companies. A diary which he kept of these transactions is a most important document. This and other valuable papers are preserved in the library of Dulwich College. The *Diary*, with some forged entries, was published in 1845 by J. P. Collier for the Shakespeare Society. Consult *Catalogue of MSS. of Dulwich College*, edited by G. F. Warner (London, 1881), and *Henslowe's Diary*, edited by W. W. Gregg (ib., 1904; enlarged, 1908).

HEN'SON, HERBERT HENSLEY (1863–). An English clergyman and author, born in London and educated at Oxford. He was a fellow of All Souls, Oxford, in 1884–91; head of the Oxford House, Bethnal Green, in 1887–88; select preacher at Oxford in 1895–96 and 1913–14 and at Cambridge in 1901; vicar and rector of several parishes; and canon of Westminster Abbey (1900–12). In 1912 he became dean of Durham. He delivered at Yale University the Lyman Beecher lectures on preaching (*The Liberty of Prophesying*) in 1909 and visited America at other times also. Among his other published works are: *Apostolic Christianity* (1898); *Preaching to the Times* (1903); *Moral Discipline in the Christian Church* (1905); *Westminster Sermons* (1910); *Puritanism in England* (1912); *The Creed in the Pulpit* (1912).

HENSON, JOSIAH (1787–1883). An American Methodist clergyman and lecturer, born a slave in Port Tobacco, Md. His early career is remarkable for the hardships he was forced to endure. He escaped into Canada in 1828 and became a Methodist preacher at Dresden, Ontario. Mrs. Harriet Beecher Stowe met him and drew from the story of his life her character of Uncle Tom. Henson lectured throughout the United States, and made three trips to England during the last years of his life. While upon his final tour in 1876 he was entertained at Windsor Castle by Queen Victoria. He wrote an autobiography (Boston, 1858).

HEN'SON, POINDEXTER SMITH (1831–1914). An American Baptist clergyman, born in Fluvanna Co., Va., and educated at Richmond (Va.) College (B.A., 1848), and at the University of Virginia (M.A.). Ordained to the Baptist ministry in 1855, his more important pastorates were the Broad Street and Memorial Baptist churches of Philadelphia (1861–82), the First Church, Chicago (1882–1901), the Hanson Place Church, Brooklyn (1901–03), and Tremont Temple, Boston (1903–08). His writings include: *Bible Text Book of Christian Doctrine* (1892); *The Royal Scroll* (1896); *The Four Faces, and Other Sermons* (1902; 2d ed., 1911).

HENSZLMANN, hĕn's'l-mân, EMERICH (1813–88). An Hungarian art critic and archæologist, born at Kaschau and educated at Budapest and Vienna. After studying medicine he devoted himself to archæology and æsthetics and traveled extensively. He took part in the revolution of 1848–49, serving in a department of the Ministry of Foreign Affairs. He was imprisoned for eight months, then left Hungary and lived in London and Paris until 1862, when he returned to his home. He was a member of the Lower House of the Hungarian Diet (1869–72) and professor of the history of art at Budapest (1873–88). A member of the Hungarian Academy and of the National Kisfaludy Society, he wrote: *Théorie des proportions appliquées dans l'architecture* (1860); *Die nordfranzösische Abtei- und Kathedralkirche* (1865); *Die Grabungen des Erzbischofs von Kalocsa* (1873); and, in Hungarian, on the relation between Greek tragedy and Christian drama (1846), on mediæval architecture (1866), and on the remains of Gothic architecture in Hungary (1880).

HEN'TY, GEORGE ALFRED (1832–1902). An English author. He was born at Trumpington, Cambridgeshire, and was educated at the Westminster School and at Caius College, Cambridge. He served in the purveyor's department of the British army during the early part of the Crimean War and after returning home invalided was promoted to be purveyor and given service in the Italian Legion. After the close of the war he commanded for a time the Belfast and Portsmouth districts and in 1866 became war correspondent of the London *Standard*. In the service of his paper he accompanied the contestants of the Austro-Italian, Turco-Servian, and Franco-Prussian wars; took part in the Abyssinian expedition of 1868 and the Ashanti expedition of 1873; participated in Garibaldi's Tyrolean campaigns; was present at the opening of the Suez Canal in 1869; attended the Prince of Wales during his travels through India; and made an extended tour of the mining regions of the United States. An enthusiastic yachtsman, he spent much of his time afloat, and died on his yacht, Nov. 16, 1902. He is known as the most prolific and popular of contemporary writers for boys, his books being chiefly historical novels. The best known of his novels are: *All but Lost* (1869); *Gabriel Allen* (1888); *Dorothy's Double; A Woman of the Commune; Colonel Thorndyke's Secret* (1898). Among his books for boys are: *In the Irish Brigade* (1900); *Out with Garibaldi* (1900); *With Buller in Natal* (1900); *At the Point of the Bayonet* (1901); *Malcolm the Water-Boy* (1901); *To Herat and Cabul* (1901); *With Roberts to Pretoria* (1901); *The Treasure of the Incas* (1902); *With the British Legion* (1902); *With Kitchener in the Soudan* (1902).

HENTZ, CAROLINE LEE (1800–56). An American author, born in Lancaster, Mass., a daughter of Gen. John Whiting. At the age of 12 she had produced a novel, a poem, and a tragedy. Her play, *De Lara, or the Moorish Bride*, won a $500 prize offered by the proprietor of the Arch Street Theatre, Philadelphia. She also wrote many poems and short novels and was especially happy in portraying social conditions in the South. Her novels—and they were numerous—in part aimed to dispel the puerile prejudices entertained by Northerners and Southerners against each other. She wrote, notably: *Aunt Patty's Scrap-Bag* (1846); *The Mob Cap* (1848); *The Planter's Northern Bride* (1854); *Ernest Linwood* (1856).

HENTZ, NICOLAS (1750–1820). A French politician, born at Sierck, where he became justice of the peace. Elected to the Convention in 1792, he voted for the death of the King and became a trusted agent of the Revolution. In 1794, when he returned to Paris from a long series of important missions, in which he had had unlimited powers, he was accused of cruelty in La Vendée and was found guilty; but, benefiting by the amnesty of October, he left public life. The law against the regicides passed in 1816 forced him to leave the country. He escaped to the United States and died on an island in Lake Erie.

HENZEN, hĕn'tsen, JOHANN HEINRICH WILHELM (1816–87). A German philologist and authority on Latin inscriptions. He was born at Bremen, studied at Bonn, Berlin, and, after travels through France, England, Italy, and Greece, at Rome, where from 1842 to the end of his life he was closely associated with the German Archæological Institute. With Mommsen and De Rossi he edited for the Berlin Academy the great *Corpus Inscriptionum Latinarum,* in which he personally edited the *Fasti Consulares* to 766 A.U.C. (see FASTI) and the inscriptions of the city of Rome after Cæsar. His other works, besides many contributions to philological journals, to the *Bulletino* and the *Annali* of the archæological institutes and *Ephemeris Epigraphica,* were a supplementary volume to Orelli's *Inscriptionum Latinarum Collectio* (1856) and *Acta Fratrum Arvalium quæ Supersunt* (1874). Consult *Biographisches Jahrbuch für Alterthumskunde* (Berlin, 1888).

HENZEN, WILHELM (1850–1910). A German dramatist, born in Bremen. He studied music and philosophy at Leipzig, where, save for two years (1874–75) at Munich, he lived after the success of his first play, *Die Kypseliden* (1874). He was connected with the Stadttheater as dramaturgist from 1882 to 1885, and in 1893 became director of the National Association of Dramatic Authors and Composers. Besides the dramas *Lügen des Herzens* (1876), *Ossian* (1877), *Zweideutigkeiten* (1878), *Studiosus Lessing* (1879), *Bettina de Monk* (1881), *Luther* (1883), *Ulrich von Hutten* (1888), *Schiller und Lotte* (1891), *Tod des Tiberius* (1895), *Kaiser, König und Bürger* (1900), *Schiller's Todesfeier* (1905), he wrote the valuable study *Ueber die Träume in der altnordischen Sagalitteratur* (1885–89).

HENZI, or **HENTZI,** hĕn'tsê, SAMUEL (1701–49). A Swiss patriot, born at Bümplitz (Canton of Bern). After a very comprehensive training he held subordinate posts under the government of the Canton of Bern; in 1741 was appointed a captain in the military service of the Duke of Modena; and in 1744 with others addressed to the Council of Bern a petition for a revision of the constitution. For this he was sentenced to 10 years' banishment, commuted by pardon in 1748. While an assistant librarian at Bern he entered into a conspiracy which had for its object the subversion of the constitution, but which he supposed intended merely a second petition to the cantonal authorities. The undertaking was, however, discovered, and Henzi was executed on July 17, 1749, with two associates. Lessing planned a tragedy based on the fate of Henzi. Consult Bäbler, *Samuel Henzis Leben und Schriften* (Aarau, 1880), and Krebs, *Henzi und Lessing* (Bern, 1903).

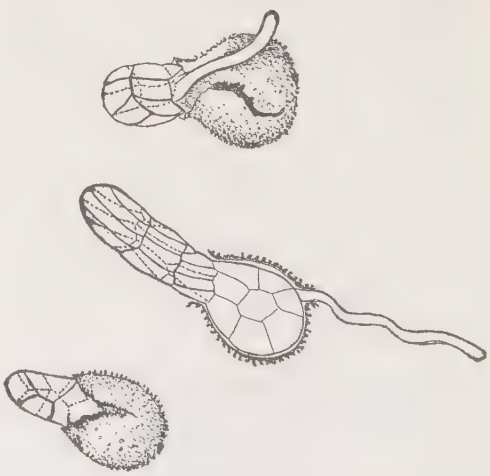
HE'PAR (Lat., from Gk. *ἧπαρ,* liver). A name given by the older chemists to brown or liver-colored compounds of sulphur. *Hepar antimonii,* called also "liver of antimony," is a mixture of antimony trioxide, potassium sulphide, potassium carbonate, and antimony trisulphide, which has been used in veterinary medicine. *Hepar sulphuris,* called also "liver of sulphur," is a mixture of potassium hyposulphite, potassium sulphide, and potassium pentasulphide, with some potassium carbonate, which has also been used in medicine.

HEPAT'ICA, LIVERLEAF (Neo-Lat., from Lat. *hepaticus,* Gk. *ἡπατικός, hēpatikos,* relating to the liver, from *ἧπαρ, hēpar,* liver). A plant of the genus *Hepatica,* which belongs to the family Ranunculaceæ. The best-known species, *Hepatica triloba,* has showy white, pink, or blue flowers that in earliest spring emerge from a hairy bud which is surrounded by the sombre-

HEPATICA.

tinted leaves of the previous year. It is the most beautiful of the early spring flowers of eastern America, and one which by reason of its habitat and mode of blooming furnishes many texts for nature study in elementary schools. The same species is found throughout northern Europe, where it is cultivated and often produces double flowers. The root has powerful astringent properties. Another species, *Hepatica angulosa,* native in Transylvania, is cultivated for the sake of its beautiful pale-blue flowers.

HEPAT'ICÆ (Neo-Lat. nom. pl., from Lat. *hepaticus,* pertaining to the liver). The technical name of the group of plants popularly known as liverworts. The Hepaticæ form one of the two primary subdivisions of Bryophytes (q.v.); the other one includes the mosses. Liverworts grow in a variety of conditions; some float on the water; many live in damp places, and many on the bark of trees, but in general they are mois-

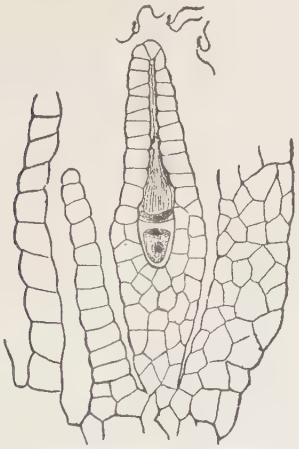


GERMINATION OF SPORES OF CONOCEPHALUS.

ture-loving plants. The prostrate body consists of what is called a "thallus" (q.v.). By virtue of this position the body is "dorsiventral," since the two surfaces are unlike. The upper (dorsal) surface, exposed to the light, develops structures accordingly; while the under (ventral) surface

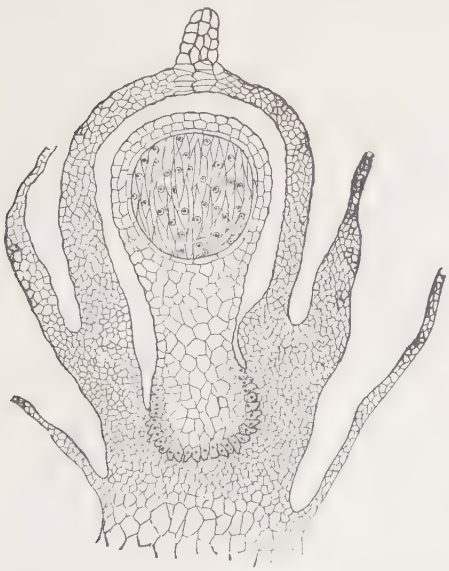
is against the substratum and develops rootlike processes as holdfasts and absorbing organs.

There are three well-defined groups of liverworts, each of which represents a special line of



ARCHEGONIUM OF PORELLA.
With three sperms approaching the neck.

development. In the Marchantiales, the thallus body remains simple in form, like a flat green disk, but becomes thick and rather complex in structure. This thickish body not only produces rootlike processes (rhizoids) from its under surface, but develops reproductive structures from its upper surface. In two genera there is a budding form of reproduction; little cups (cupules) appear often in great numbers in which small disklike bodies (gemmæ) are



VERTICAL SECTION OF SPOROPHYTE OF PORELLA.
Still within the calyptra and showing the globular spore region.

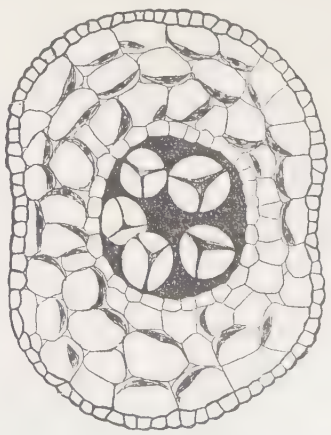
formed. When these gemmæ are scattered, they again produce new plants. Upon the upper surface also the sex organs are carried, and in *Marchantia* itself they are borne upon the summit of a conspicuous erect branch. As a rule, the two sex organs (antheridia and archegonia) are borne upon different plants.

The Jungermanniales include many more species than either of the other orders. These forms often grow in very dry situations, as on rocks, tree trunks, etc., and are often mistaken for delicate mosses. Their resemblance to mosses sug-

EMBEDDED ANTHERIDIUM OF ANTHOCEROS.

gests one of the chief features. The prostrate thallus body remains simple in structure, but becomes very much modified in form, being organized into a central stemlike axis which bears two rows of small foliage leaves. As a consequence, the Jungermanniales are usually spoken of as the "leafy liverworts."

The Anthocerotales comprise comparatively few forms; but these are of great interest, since they are supposed to represent forms which have given rise to the mosses and perhaps to the ferns also. The thallus body is very simple, both in structure and in form, but the chief interest is



CROSS SECTION OF SPOROPHYTE OF ANTHOCEROS.
Showing spores within and surrounded by heavy green tissue.

in connection with the spore case, which is elongated like a slender pea pod, grows continuously in length, is green, and splits into two valves.

The liverworts are thought to have been derived from certain green algæ, and among them alternation of generations (q.v.) is established. The thallus body is the sexual generation (gametophyte, q.v.), since it bears the sex organs. The

fertilized egg produced by these sex organs develops a very different body, viz., the spore case, which is the sexless generation (sporophyte, q.v.). The spores upon germination produce the thallus body or gametophyte again, and so the alternation continues. The structure of the sex organs is also of interest, since they are very different from those of the algæ from which the group has come. The male organ (antheridium, q.v.), a many-celled body, consists of a wall of sterile cells within which very numerous sperm-producing cells occur. These sperms, which are of definite structure, have just two motile cilia. The female organ (archegonium, q.v.), which is very characteristic, is a flask-shaped body, within the bulbous base of which a single large egg is formed. How this archegonium of the liverworts has been derived from the far simpler female organs of algæ is one of the important botanical problems. In any event it continues to be the characteristic female organ through mosses, ferns, and gymnosperms. See CHLOROPHYCEÆ, and Plate of BRYOPHYTES.

HEP'ATI'TIS (Neo-Lat., from Gk. *ἧπαρ, hēpar*, liver). Inflammation of the liver. See LIVER, DISEASES OF.

HEP'BURN, A (LONZO) BARTON (1846–1922). An American banker, born at Colton, N. Y. Graduating from Middlebury College in 1871, he taught in preparatory schools, practiced law at Colton, and was a member of the New York Assembly in 1875–80. He served as superintendent of the State Banking Department (1880–83), United States bank examiner for New York (1888–92), and United States Comptroller of the Currency (1892–93). Thereafter engaged in banking in New York City, he was president of the Third National Bank for four years, vice president of the National City Bank for two years, and president of the Chase National Bank from 1899 to 1911, when he became chairman of the board of directors. In 1912 he was appointed Officer of the Legion of Honor of France; and honorary degrees were conferred on him by St. Lawrence and Columbia universities and by Middlebury and Williams colleges. He published a *History of Coinage and Currency in the United States* (1903); *Artificial Waterways and Commercial Development* (1909; new and enlarged ed., as *Panama, Cape Cod, and Other Artificial Waterways*, 1914); *The Story of an Outing* (1913).

HEP'BURN, JAMES. See BOTHWELL, JAMES HEPBURN, EARL OF.

HEPBURN, JAMES CURTIS (1815–1911). An American medical missionary and scholar, born at Milton, Pa. He was educated at the College of New Jersey (now Princeton University), where he graduated in 1832. He studied medicine at the University of Pennsylvania, and received his degree of M.D. in 1836. In 1840 he offered his services as a medical missionary to the Presbyterian Board of Foreign Missions, and in the following year he sailed with his wife for Siam. His destination was afterward changed to China, five new ports having been opened there by the Treaty of 1842. He arrived at Amoy, one of the newly opened ports, in 1843 and labored in that field until 1846, when, on account of impaired health, he resigned and returned to New York City. Here he was a successful practitioner until the opening of Japan in 1859, when he again volunteered for service. In that year he went to Yokohama and engaged in such medical and evangelistic work as could then be carried on in view of the hostile attitude of the government to Christianity. He mastered the language, and in 1867 brought out his Japanese-English and English-Japanese Dictionary, a work of great learning which has remained the standard dictionary until the present day. In 1873 an abridged edition was published in New York. Dr. Hepburn took a leading part in the translation of the Scriptures into Japanese. His medical work included the training of many young Japanese as physicians. In 1892 he published a valuable *Dictionary of the Bible* in Japanese and in the same year retired and made his home in East Orange, N. J. Consult W. L. Griffis, *Hepburn of Japan* (Philadelphia, 1913).

HEPBURN, SIR JOHN (c.1598–1636). A Scottish soldier of fortune, born at Athelstaneford and probably educated at St. Leonard's College, St. Andrews. He fought under Gray in Bohemia (1620) and under Mansfeld in Holland (1622). Subsequently he served in the army of Gustavus Adolphus and entered the French army in 1633. After two years of brilliant fighting in Lorraine and at the sieges of Hagenau and Saverne, he was killed. He was a Catholic and a prime favorite with Richelieu. Consult Grant, *Memoirs and Adventures of Sir John Hepburn* (Edinburgh, 1851).

HEPHÆSTION, hē-fēs'tī-ōn (Lat., from Gk. *Ἡφαιστίων, Hēphaistiōn*) (c.357–324 B.C.). A Macedonian courtier, known as the friend of Alexander the Great. The two are said to have been companions in childhood; but further than this we do not hear of Hephæstion till 334 B.C., when Alexander visited Troy. Hephæstion is there said to have performed the same service at the grave of Patroclus as Alexander performed at that of Achilles. After that time the two were close friends. In his campaigns Alexander often gave Hephæstion important commissions, such as the founding of colonies and cities and the building of the fleet which was to sail down the Indus, and he rewarded him with a golden crown and the hand of Drypetis, daughter of Darius and sister to his own wife, Statira. When, in 324 B.C., Hephæstion died at Ecbatana, the grief of Alexander was extravagant. He sent to inquire of Jupiter Ammon how he should honor his dead friend and was told to offer sacrifice to him as a hero. The funeral was one of the grandest recorded in history. A funeral pyre was erected at Babylon at a cost of over 10,000 talents, and temples were built in honor of Hephæstion in many places.

HEPHÆSTION. An Alexandrian grammarian of the second century A.D., tutor to the Emperor Verus. He was the author of a work on prosody in 48 books, of which he himself made several abridgments. The manual on metres entitled *Ἐγχειρίδιον Περὶ Μέτρων* (*Encheiridion Peri Metrōn*), which is still extant, is supposed to have been his final abridgment. Though it gives merely a bare sketch of prosody, without any theoretical explanation of the facts, it is of great value; it is the only treatise on Greek prosody preserved complete from antiquity and contains quotations from many lost poets. An incomplete treatise on the different forms of poetry and composition is appended to it. The manual has been edited by Gaisford (Oxford, 1810), by Westphal in his *Scriptores Metrici Græci* (Leipzig, 1866), and by Consbruch (1906). Consult: Consbruch, *De Veterum Περὶ Ποιήματος Doctrina* (Breslau, 1890); Goodell,

Chapters on Greek Metric (New York, 1902); Christ-Schmid, *Geschichte der griechischen Litteratur* (5th ed., Munich, 1913).

HEPHÆSTUS, hĕ-fĕs'tŭs. See VULCAN.

HEP'PLEWHITE, GEORGE (?–1786). The furniture fame of the name of Hepplewhite rests mainly on the *Cabinet-maker and Upholsterer's Guide,* published in 1788 "from drawings by A. Hepplewhite & Co., Cabinet-makers"; but George Hepplewhite, the founder and head of the firm whose business was continued by his wife, had already been dead two years, so that the period of Hepplewhite's personal activity considerably antedated that of Sheraton (q.v.), and must have considerably overlapped that of Chippendale (q.v.). Of Hepplewhite's early life we know only that he served his apprenticeship in the Lancaster shop of the Gillows. The contrast between Chippendale furniture and Hepplewhite furniture is extreme. Although Chippendale, towards the end of his career, did construct classic furniture for Robert Adam, most of his work—all that is illustrated in his book—was in the rococo and mixed styles of the early Georgian period. Hepplewhite, on the contrary, represented the purest and simplest, most graceful and most delicate type of classic developed in England in the Adam period. (See INTERIOR DECORATION.) Hepplewhite's appreciation of the great change in styles is indicated in the preface to the *Guide:* "The mutability of all things, but more especially of fashions, has rendered the labors of our predecessors in this line of little use." The most striking characteristics of Hepplewhite chairs, as compared with those of Chippendale, are their smaller size and apparent fragility; backs shield or heart shaped, supported only by the side posts; slender plain, fluted, or reeded legs tapering often to a spade foot; ornament painted or inlaid instead of carved. For bibliography, consult the works cited under SHERATON.

HEPPNER, hĕp'nĕr. A town and the county seat of Morrow Co., Oreg., 55 miles southeast of Arlington, on the Oregon-Washington Railroad and Navigation Company Line (Map: Oregon, F 2). It is in a productive grain, stock-raising region, the wool product of the county being 2,000,000 pounds in 1914. Pop., 1914 (local est.), 1200.

HEP'TAGON (from Gk. *ἑπτάγωνος, heptagōnos,* seven-cornered, from *ἑπτά, hepta,* seven + *γωνία, gōnia,* angle). A plane geometric figure of seven sides. It has especial interest because the regular heptagon cannot be constructed by elementary geometry. See POLYGON.

HEPTAM'ERON (Gk. *ἑπταήμερον, heptaēmeron,* from *ἑπτά, hepta,* seven + *ἡμέρα, hēmera,* day). The name of a collection of tales made by several writers at the court of Marguerite de Valois. Le Maçon, at the Queen's behest, translated Boccaccio's *Decameron* in 1545. The *Decameron* inspired the form and other elements of the *Heptameron.* The 10 story-tellers of Boccaccio fled from pest-stricken Florence to a beautiful villa, where 10 stories are told every day for 10 days. In the *Heptameron* five elegant men and women, being caught by a storm at the foot of the Pyrenees, determine to while away the time by having each of the company tell a story every day for 10 days. But Marguerite left only seven days and two stories of the eighth day. The *Joyeux Deviz* of Bonaventure des Périers continues the tradition of the old French *fabliaux* and farces, whereas the *Heptameron,* as has been shown, is Italian in genesis and in tone. The body of the work is, like the old *fabliaux,* cynical and often licentious; but the *Heptameron* shows more feeling for natural beauty, and there is an occasional touch of altruistic devotion and even of lyric passion. Thus, the *Heptameron* introduces into French fiction an element of emotional psychology. It makes of a story designed to amuse an instrument of observation and a method of description of human passion. It transfers the interest rarely and tentatively, yet really, from act to motive—bearing witness to the keener psychology that resulted from the Protestant training in controversial dialectics, universal in the court circle of Marguerite, to whom the editing at least of the *Heptameron* is to be attributed. The *Heptameron* was first published in 1558 under the editorship of the Queen's valet de chambre, Claude Crujet. There are many later editions of textual accuracy, and there is a partial and unfaithful English version. There also exists an edition supposedly based on the manuscripts themselves, edited by M. Fred Dillaye (3 vols., Paris, 1879).

HEPTAN'OMIS. A name given by the Greeks to the interior of Egypt from 30° to 27° N., which comprised nearly all the greatest Egyptian cities and monuments.

HEP'TARCHY (from Gk. *ἑπτά, hepta,* seven + *ἀρχή, archē,* kingdom, from *ἄρχειν, archein,* to rule). The name formerly given to the kingdoms established by the Angles and Saxons in England. It was believed that there were seven kingdoms, which were contemporaneous and well established, but all that can be safely asserted is that England before the beginning of the ninth century was peopled by various tribes, which were constantly at war with each other, and that sometimes one tribe was conquered and sometimes another. At no time was there a counterpoise of power among seven of them so that they could be said to have a separate, much less an independent, existence. Still, seven names do survive. Occasionally the King who was most powerful for the time being was styled Bretwalda, but in most instances the power of this supposed ruler, beyond the limits of his own territory, must have been very small. The hegemony among the Saxon states generally rested with one of the three great frontier kingdoms, Northumbria, Mercia, and Wessex. The supremacy of Northumbria was established by Edwin (q.v.), who fell in battle against Penda, King of Mercia, in 633. Under Egbert (802–839) Wessex rose to be supreme and virtually swallowed up the others. The following are the seven kingdoms commonly said to have formed the heptarchy: Kent, Sussex, Wessex, Essex, Northumbria, East Anglia, and Mercia. Consult Ramsay, *The Foundations of England,* vol. i (London, 1898), and Green, *The Making of England* (New York, 1881). See ANGLO-SAXONS; also the articles under the seven names mentioned.

HEP'TASOPHS, IMPROVED ORDER. A fraternal association in the United States, organized in 1878, as an offshoot from the Order of Heptasophs (q.v.), from which it differed by the adoption of death benefits as one of its features. The ritual, governing principles, conditions of membership, and methods of business are identical with the original order. In 1914 the order had one supreme conclave and about 780 conclaves, representing a membership of about 75,000. It paid during the last fiscal year $1,543,168 in death benefits and claimed

to have disbursed since its organization over $20,000,000.

HEPTASOPHS, ORDER OF. A benevolent fraternal order in the United States, founded in New Orleans in April, 1852, by Alexander Leonard Saunders and several prominent Freemasons. It was originally called the Order of Seven Wise Men, but the title was later changed to the Greek form. The ritual is very elaborate, and much significance is attached to the number seven, the membership in each chapter being either seven or a multiple of that number. After 1872 the adoption of a death-benefit system was agitated, but aroused great opposition, leading in 1878 to the secession of the Zeta Conclave of Baltimore, which organized the Improved Order Heptasophs. (See HEPTASOPHS, IMPROVED ORDER.) In 1880 the order finally adopted the benefit feature. Membership is confined exclusively to white male persons, and a belief in the existence of a Supreme Being is required. In 1914 the membership, chiefly in the Southern States, was about 1000.

HEPTATEUCH, hĕp'tȧ-tūk (from Gk. ἑπτά, *hepta,* seven + τεῦχος, *teuchos,* tool, book). A word formed on the analogy of Pentateuch, meaning the first seven books of the Bible. It is applied to an abridgment and translation of these books, with the Book of Job, into Anglo-Saxon, made by Ælfric the Grammarian (q.v.) in the tenth century. There are copies of it in the British Museum and the Bodleian Library. It was first printed in 1698 by Edward Thwaites and is in C. W. M. Grein's *Bibliothek der angelsächsischen Prosa,* vol. i (Göttingen, 1872). The name is also used for a Latin hexameter version, probably by Cyprianus, of the sixth century, edited by Mayor (Cambridge, 1889).

HEP'WORTH, GEORGE HUGHES (1833–1902). An American clergyman and journalist. He was born in Boston, graduated at Harvard Divinity School in 1855, and entered the Unitarian ministry at Nantucket, Mass. He was pastor of the church of the Unity, Boston, from 1858 to 1870, meantime serving as a chaplain in the Union army on the staff of General Banks. In 1870 he took charge of the church of the Messiah in New York; but he resigned within two years, entered the Congregational church, and soon afterward established (in New York) the church of the Disciples. He resigned this charge in 1878 and went abroad for rest. He preached at the Belleville Avenue Congregational Church in Newark, N. J., from 1882 until 1885, when he became connected editorially with the New York *Herald* and *Evening Telegram,* in which he published a series of brief religious writings, later published as *Herald Sermons.* He had charge of a famine relief fund for Ireland in 1880 and later investigated the condition of the Armenian Christians. Among his writings are: *Whip, Hoe, and Sword* (1864); *Rocks and Shoals* (1870); *Hiram Golf's Religion* (1892); *Brown Studies* (1895); *The Farmer and the Lord* (1896); *Through Armenia on Horseback* (1898). Consult his Life by Ward (New York, 1903).

HE'RA. See JUNO.

HERACLEA, hĕr'ȧ-klē'ȧ (Lat., from Gk. Ἡράκλεια, *Hērakleia,* from Ἡρακλῆς, *Hēraklēs,* Hercules). The name of a number of Greek towns in both Europe and Asia. Of these the most important were: 1. Heraclea in Lucania, near the Gulf of Tarentum, not far from the modern Policoro. It was founded in 432 B.C. by Tarentines and Thurians, and the inhabitants of the earlier colony Siris, which continued to exist only as its port. In a fertile territory it seems to have enjoyed great prosperity, but in dependence upon Tarentum. In 280 B.C. the first great battle between Pyrrhus (q.v.) and the Romans was fought near by, and two years later the Romans concluded with Heraclea a treaty of alliance on very favorable terms. It was still a flourishing place in the time of Cicero, but later fell into decay and is now a heap of ruins. Near the ancient site were found in 1732 and later two bronze tablets, the *Tabulæ Heracleenses,* containing on one side a long Greek inscription of the fourth or the third century B.C. relating to certain sacred lands of Dionysus and Athena, whose boundaries had been disturbed in a recent war, and on the other a much more important Latin document, the *Lex Iulia Municipalis* (45 B.C.), which is one of the chief authorities for the municipal law of Italy. These inscriptions have often been published, but may best be found in Kaibel, *Inscriptiones Græciæ, Siciliæ et Italiæ,* 645 (Berlin, 1890); *Corpus Inscriptionum Latinarum,* i (Berlin, 1863); Hardy, *Six Roman Laws Translated with Introduction and Notes* (Oxford, 1911).

2. Heraclea Minoa, on the south coast of Sicily, west of Agrigentum. The city seems to have been originally established by Selinus, but about 510 B.C. it was occupied by Spartans under the leadership of Euryleon. The name "Minoa" was due to a legend attributing the founding of the city to Minos of Crete. In the fifth century it was at various times under the control of the Greeks and of the Carthaginians. About 383 it passed finally under the Carthaginian power. It was afterward destroyed by the Carthaginians, though a small settlement continued to exist under Carthaginian rule, and after 314 B.C. rose to renewed importance and was one of the chief Carthaginian naval stations during the First Punic War. The site, on Cape Bianco, is now wholly deserted, and but few traces of the ancient city are visible.

3. Heraclea Pontica, a Megarian colony on the south coast of the Black Sea, the modern *Eregli* (q.v.). It seems to have been founded about the middle of the sixth century B.C. After a period of party strife it passed under the rule of a moderate oligarchy, which soon made it master of the neighboring territory including some of the lesser Greek colonies. Even when the aristocracy was supplanted by a tyrant, the prosperity of the city continued to increase; but after the overthrow of the Persian Empire by Alexander the growth of the Bithynian power and the wars with the Galatians lessened its influence. It was plundered by the Romans in the Mithridatic war and from that time gradually declined. It was the birthplace of the philosopher Heraclides Ponticus (q.v.). See also CHION.

HERACLEENSES TABULÆ. See HERACLEA, 1.

HER'ACLE'ON (Lat., from Gk. Ἡρακλέων, *Hērakleōn*). A Gnostic Christian, who flourished in Italy during the third quarter of the second century. Clement of Alexandria calls him the most distinguished follower of Valentinus (q.v.). His writings survive only in fragments, and each quotation is accompanied by unfriendly comments by his orthodox opponent. He wrote a Gospel commentary, entitled *Hypomnemata,* which dealt especially with St. John. Origen preserves considerable fragments of this work in his own commentary on the same Gospel.

Clement also quotes from Heracleon, but we are not certain that it is from this work. Hippolytus says that Heracleon and other Western Valentinians taught that Christ's body was of animal substance, while the Oriental school regarded it as spiritual. But we know little about the details of their systems. Heracleon's influence was sufficient to perpetuate his name among his followers, who are called Heracleonites. Consult Brooke, *The Fragments of Heracleon* (Cambridge, 1901). See GNOSTICISM.

HER'ACLE'ONAS (Lat., from Gk. *Ἡρακλείωνας, Hērakleiōnas*) (c.614–?). An Emperor of Byzantium, son of the Emperor Heraclius. He fought with his father in Syria and was appointed Cæsar in 638 or 639. When his father died (641), his mother, Martina, asked that he be permitted to rule with his invalid stepbrother, Constantine III. But Constantine died after a reign of less than five months and Heracleonas became sole Emperor. The Senate suspected that Martina had had this in view and had possibly hurried the death of her stepson; a revolution broke out; Heracleonas was dethroned, his nose cut off, his mother's tongue torn out, and the two were exiled to Constantinople. Constans II, son of Constantine, succeeded to the throne.

HERAC'LEONITES. See HERACLEON.

HERAC'LEOP'OLIS (Lat., from Gk. *Ἡρακλέους πόλις, Hērakleous polis*, city of Hercules). A city of ancient Egypt, on the right bank of the Bahr Yûsuf (Joseph's Canal), about 10 miles west of the Nile. It was called by the Egyptians Henen-suten, whence its Coptic name Hnês, and its modern Arabic name Ahnas and Henassîye. Heracleopolis was the seat of worship of the ram-headed god Hershef, whom the Greeks identified with Heracles. Of the temples and other buildings, for which the place was renowned in ancient times, scarcely anything remains. An extensive necropolis lies upon the opposite bank of the Bahr Yûsuf. Consult Naville, *Ahnas el Medineh*, Egyptian Exploration Fund, vol. xi (London, 1891).

HER'ACLES. See HERCULES.

HERACLEUM, hĕr'â-klē'ŭm. See CANDIA.

HERACLEUM. See COW PARSNIP.

HER'ACLI'AN (?–413 A.D.). A Roman general. At the instance of the Emperor Honorius, he put Stilicho (q.v.) to death (408 A.D.) and received the Government of Africa as his reward. After supporting the Emperor during the invasion of Alaric and the usurpation of Attalus, whom Alaric had made Emperor, Heraclian revolted and invaded Italy. His enterprise failed, however, and on his return to Carthage he was put to death by order of Honorius. Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

HERACLIDÆ, hĕr'â-klī'dē (Lat., from Gk. *Ἡρακλεῖδαι, Hērakleidai*, descendants of Hercules, from *Ἡρακλῆς, Hēraklēs*, Hercules). 1. The name is applied specifically to those legendary descendants of Heracles who were said to have led the Dorians (q.v.) in the conquest of the Peloponnesus. The legend told of an unsuccessful attempt by Hyllus, eldest son of Heracles by Deianira, to recover the inheritance from which Eurystheus (q.v.) had driven him, and then of a successful invasion, 100 years later, led by his great-grandsons Temenus, Cresphontes, and Aristodemus, sons of Aristomachus, with the aid of Oxylus, an Ætolian. They defeated Tisamenus, son of Orestes and grandson of Agamemnon, and gained possession of the Peloponnesus. Argos fell to Temenus; Lacedæmon to Procles and Eurystheus, the sons of Aristodemus; Messenia to Cresphontes; Elis to the Ætolian Oxylus; Arcadia alone remained undisturbed. This story of the return of the Heraclidæ seems to owe its development to the epic rather than to popular tradition, and is an attempt to explain the change from the conditions of the Homeric poems to those of the period after the Dorian conquest. The invasions are not named in Homer or in Hesiod, but the poems of Tyrtæus show the general acceptance of the stories about the Heraclidæ in Sparta about 650 B.C. It is the later legendary account of the Dorian conquest, which from its nature must in reality have been a much more obstinate and protracted struggle. The legends of the Heraclidæ represent, it is held, a joint invasion of the Peloponnesus by Dorians and Ætolians, when the Dorians were driven southward from their northern abode by the Thessalians. Consult the histories of Greece by Thirlwall, Grote (older views), Holm, and Busolt, and especially Meyer, *Geschichte des Altertums*, ii (Stuttgart, 1893).

2. A tragedy by Euripides, brought out about 420 B.C. It tells of the persecution of the sons of the dead Heracles by Eurystheus and their reception and protection by Athens. The children of Heracles, under the leadership of Iolaus, come to Marathon, and the Athenians gain a victory over the Argives through the voluntary sacrifice of Macaria, daughter of Heracles. Eurystheus is taken prisoner and surrendered to Alcmene, who demands his death. The play was meant to represent to Sparta how unnatural would be her contemplated alliance with Argos during the Peloponnesian War, and was directed against the Argive party in Athens.

HERACLIDES LEMBOS. See HERACLIDES PONTICUS.

HER'ACLI'DES PONTICUS (Lat., from Gk. *Ἡρακλείδης, Hērakleidēs*, and *Pontus*). A Greek philosopher of the fourth century B.C., born at Heraclea Pontica. At Athens he became a disciple of Plato, whom he represented during the latter's absence in Sicily. Later, however, he attached himself to Aristotle. His numerous writings covered many fields, including philosophy, grammar, music, physics, rhetoric, political and literary history, and geography. Critical and philosophical ability were apparently not possessed by him in a high degree, for his philosophical works were early neglected. His biographical and grammatical treatises, however, long enjoyed popularity. Diogenes Laërtius praises his style, while Cicero blames him for his fondness for marvelous tales. The extracts, *On Constitutions*, which bear the name of Heraclides, are only a poor compilation from Aristotle's *Politics* and should be attributed to Heraclides Lembos (second century B.C.). This work was edited by Schneidewin (Göttingen, 1847), and by Kaibel and Wilamowitz, as an appendix to their edition of Aristotle's *Constitution of Athens* (Berlin, 1898). The fragments of Heraclides' writings were collected by Müller, *Fragmenta Historicorum Græcorum*, vol. ii (Paris, 1848). Consult: Voss, *De Heraclidis Pontici Vita et Scriptis* (Leipzig, 1896); Schmidt, *De Heraclidæ Pontici et Dicæarchi Messenii Dialogis Deperditis* (Breslau, 1867); Ueberweg, *Grundriss der Geschichte der Philosophie*, edited by Prächter, vol. i (10th ed., Berlin, 1909); Gomperz, *Greek Thinkers*, vol. iv (Eng. trans., New York, 1912).

HER'ACLI'TUS (Lat., from Gk. Ἡράκλειτος, *Hērakleitos*). A Greek philosopher who flourished about 500 B.C., born at Ephesus in Asia Minor. From the obscurity of his writings he was nicknamed "The Dark" (ὁ σκοτεινός). Only one work, that *On Nature*, can be attributed to him. Of this, numerous fragments are preserved by later writers. Heraclitus' philosophy was a development of the Ionic doctrine under the influence of Xenophanes. The principle of all things according to him was fire—a self-determined ether which by condensation and rarefaction creates the phenomena of the sensible world. To the "being" of his predecessors he added the principle of "becoming." He held that all things are in constant flux, and that the appearance of stability is due to the uniformity of motion. His philosophy had a strong influence on later thinkers; Zeno recalled it, and Stoicism was based on its teaching. The fragments of his work are to be found in Mullach, *Fragmenta Philosophorum Græcorum*, vol. i (Paris, 1860); Bywater, *Heraclitii Ephesii Reliquiæ* (Oxford, 1877); Ritter and Preller, *Historia Philosophiæ Græcæ* (9th ed., Gotha, 1913). Consult: Zeller, *Philosophie der Griechen*, vol. i (5th ed., Leipzig, 1892); Patrick, *The Fragments of the Work of Heraclitus* (Baltimore, 1889); Fairbanks, *The First Philosophers of Greece* (New York, 1898); Diels, *Heraclit von Ephesus*, with German translation (2d ed., Berlin, 1909); Gomperz, *Greek Thinkers*, vol. i (Eng. trans., New York, 1905); Ueberweg, *Grundriss der Geschichte der Philosophie*, edited by Prächter, vol. i (10th ed., Berlin, 1909).

HERACLIUS, hĕr-ȧ-klī'ŭs (c.575–641). Byzantine Emperor from 610 to 641. He was a native of Cappadocia and belonged to a distinguished family, his father having been Exarch of Africa. In 610, when the tyranny of the Emperor Phocas had become unbearable, and the mother and bride to be of Heraclius himself were imprisoned, he equipped a fleet in Africa and appeared before Constantinople. The citizens rose in rebellion, Phocas was beheaded, and Heraclius became Emperor in his stead. The condition of the Byzantine Empire at this time was deplorable. Years elapsed before Heraclius could put forth any vigorous efforts for its reorganization. In 619 the Avars plundered the country to the gates of Constantinople and carried off an immense number of captives. In the East the conquests of the Persians threatened the very existence of the Empire. Jerusalem was stormed by the generals of Khosru in 615, and Egypt was overrun in the following year. The stopping of the export of corn from Egypt to Constantinople caused a severe famine in the capital. The Emperor, however, was meanwhile disciplining and equipping an army for the invasion of Persia, and in 622 he took the field. In the plain of Issus he routed a Persian army and forced his way through the passes of the Taurus and Anti-Taurus, into the ancient Pontus, where his soldiers wintered. In 624 he crossed Armenia, conquered several of the Perso-Caucasian countries, and reached the Caspian Sea. There he formed an alliance with the Khazars, and with their assistance attacked Media and carried his arms as far south as Ispahan. Before going into winter quarters he defeated the main body of the Persians, commanded by Khosru himself. In 625 Heraclius descended from the Caucasus into Mesopotamia and thence proceeded into Cilicia, where he routed the Persians once more with immense slaughter. During the next two years (626–628) Heraclius carried the war into the heart of the Persian Empire, and in December, 627, cut to pieces the forces of Rhazates, the Persian general, near the junction of the Little Zab and the Tigris. An immense booty fell into the hands of the victors. Khosru fled into the interior of Persia and was soon afterward put to death by his son Siroes, who concluded a peace with Heraclius, by which the Persians gave up all their former conquests (628). Not the least of the trophies Heraclius brought back to Constantinople was the alleged wood of the true cross, which the Persians had carried off from Jerusalem in 615. The fame of Heraclius was now at its height, but the rise of the Mohammedan power in Arabia brought a new and terrible enemy against the old Empire, where religious dissensions still created bitter factions, whose strife weakened the state. Heraclius seems to have exhausted his splendid energies and ambition in the remarkable Persian campaigns and now spent his time in his palace at Constantinople, partly in sensual pleasures and partly in theological disputations. In his efforts to mediate between the orthodox party and the Monophysites (q.v.) Heraclius sought to impose the Monothelite doctrine on the Empire, arousing thereby great disturbances in the capital. (See MONOTHELITISM.) Before the close of his life Syria, Palestine, Mesopotamia, and Egypt were in the hands of the caliphs. He died Feb. 11, 641. Consult: Bury, *A History of the Later Roman Empire from Arcadius to Irene*, vol. ii (London, 1889); Finlay, *History of Greece* (Oxford, 1877); Gibbon, *Decline and Fall of the Roman Empire*, edited by Bury, vol. v (London, 1898); Drapeyron, *L'Empereur Héraclius et l'empire byzantin au VIIème siècle* (Paris, 1869), with bibliographical notes. There is also a contemporary account by Sepeos, an Armenian bishop, that was published in Constantinople in 1850. See BYZANTINE EMPIRE.

HÉRACLIUS, ā'rȧ'klē-ụs'. A minor tragedy by Corneille (1647).

HERÆ'UM (Lat., from Gk. Ἡραῖον, *Hēraion*), THE ARGIVE. The oldest and most noted sanctuary of Argolis, and the chief seat in Greece of the worship of Hera, situated on a spur of Mount Euboea, between Argos and Mycenæ. The original temple was burned in 423 B.C., and a new one built with great magnificence, under direction of the architect Eupolemos of Argos. Of the second building Pausanias gives a detailed description. It contained two images of the goddess—one of wood, brought from Tiryns, and a statue of gold and ivory by Polyclitus. A few remains of the sculptures are preserved at Athens. The site of the Heræum has been excavated by the American School of Classical Studies (1891–95). Consult: Waldstein, *Excavations at the Heræon of Argos* (Boston, 1892); id., *Argive Heræum* (2 vols., ib., 1902–05); Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909; contains a plan).

HERAKLEION. See CANDIA, MEGALOKASTRO.

HER'ALD (from OF. *heralt, heraut*, Fr. *héraut*, from ML. *heraldus, haraldus*, herald, from OHG. *hari, heri*, Ger. *Heer*, AS. *here*, army + OHG. *-walto*, AS. *-wealda*, power, from OHG. *waltan*, Ger. *walten*, AS. *wealdan*, Eng. *wield*). In England, an officer whose duty consists in the regulation of armorial bearings, the marshaling of processions, and the superintendence of certain public ceremonies. There were heralds in Greece as early as in Homeric times, who sum-

moned the assemblies, proclaimed war and peace, and had various other functions. In Rome some matters of war and peace were intrusted to *fetiales*, who proclaimed war, officiated in treaties of peace, etc. In the Middle Ages heralds were highly honored and enjoyed important privileges; their functions included, in addition to those mentioned, the bearing of messages, whether of courtesy or defiance, between royal or knightly personages; the superintending and registering of trials by battle, tournaments, jousts, and all chivalric exercises; the computation of the slain after battle; and the recording of the valiant acts of the fallen or surviving combatants. The person of a herald, while in the exercise of his duties, was inviolable. The word *heraldus* was used in Germany as early as 1152; the first use in an English document occurs in 1337. The heralds became very influential in the latter half of the fourteenth century. The Heralds' College (q.v.) was incorporated in 1483. Three orders of officials—kings-at-arms, heralds, and pursuivants—are still appointed. There are now in England four kings-at-arms, named by their offices Garter, Clarencieux, Norroy, and Bath; six heralds—Somerset, Chester, Windsor, Richmond, Lancaster, and York; and four pursuivants—Rouge Dragon, Portcullis, Blue Mantle, and Rouge Croix. In Scotland there are at present three heralds—Albany, Ross, and Rothesay—and three pursuivants—Carrick, March, and Unicorn—the principal heraldic officer being Lyon King-at-Arms. Ireland has one king-at-arms, Ulster; two heralds, Cork and Dublin; and four pursuivants, Athlone and St. Patrick I, II, III. The official costume of a herald consists of a satin tabard or surcoat embroidered with the royal arms, and a collar of SS. See HERALDS' COLLEGE; KING-AT-ARMS; PURSUIVANT; SS, COLLAR OF.

HER'ALDRY. Properly, the knowledge of the multifarious duties devolving on a herald (see HERALD); in the more restricted sense, in which it will be considered here, it is the science of armorial bearings.

History. Though there are many instances in remote times of nations and individuals distinguishing themselves by particular emblems or ensigns, nothing that can properly be called armorial bearings existed much before the middle of the twelfth century. The shield of the French knights in the First Crusade presented a plain face of polished metal, and there were only a very few heraldic devices in use by the time of the Second Crusade in 1147. The Anglo-Norman poet Wace, who wrote in the latter half of the twelfth century, mentions devices or cognizances as being in use among the Normans, at the conquest of England, and Wace is corroborated by the Bayeux tapestry of the twelfth century, where there are figures of animals on the shields of the invaders, while the Saxon shields have only borders or crosses. The rude devices on these shields have nothing approaching to an armorial form or disposition, and in some cases the same device is represented on different shields, and the same knight is depicted with different devices in different groups of the tapestry. Heraldry probably developed during the Crusades, where it was necessary for a knight to have some mark by which he might be known; it may have been influenced by the Saracen custom of wearing richly embroidered devices. Some armorial insignia were depicted on the shields used in the Third Crusade, which took place in 1189 and the following years; and in the same half century originated the fleurs-de-lis of France and the lions or leopards of England. The transmission of arms from father to son seems to have been fully recognized in the thirteenth century, and in the practice then introduced of embroidering the family insignia on the surcoat, worn over the hauberk or coat of mail, originated the expression *coat of arms*. Arms were similarly embroidered on the jupon, cyclas, and tabard, which succeeded the surcoat—a practice which survived till the time of Henry VIII, when the tabard came to be entirely disused except by heralds, who still continue to wear on their tabards the royal arms.

It was by slow degrees that the usage of arms grew up into the systematized form which it assumes in the works of the established writers on heraldry. The principal existing data for tracing its progress are English rolls of arms yet extant of the times of Henry III, Edward I, and Edward III. The earliest formal treatises date no farther back than the end of the fourteenth century, before which time the whole historical part of the subject had been obscured by a tissue of gratuitous fiction, which has misled most subsequent writers up to a very recent period. The writers on the subject represented the heraldry of the tenth and eleventh centuries as equally sharply defined with that of the fifteenth and sixteenth. The arms of William the Conqueror and his sons are described with all their differences; arms are ascribed to the Saxon kings of England, to Charlemagne, to biblical characters, and even to half-mythical persons and heroes of classical times.

In the infancy of heraldry every knight assumed what arms he pleased, without consulting sovereign or king-at-arms. Animals, plants, imaginary monsters, things artificial, and objects familiar to pilgrims were all fixed on. Thus, the scallop shell, the emblem of St. James and most generally in heraldry called a "clam," was frequently borne by Crusaders. Often the object chosen was one whose name bore sufficient resemblance in sound to suggest the name or title of the bearer of it. Devices and mottoes were sometimes chosen on account of their allusive associations: e.g., a broken spear for Brakespeare, or *Festina lente* for the Onslows. This is called Canting Heraldry by the English, *Armes parlantes* by the French. The charge fixed on was used with great latitude, singly or repeated, in any way which the bearer chose, or the form of his shield suggested. But, as coats of arms became more numerous, confusion often arose from different knights adopting the same symbol; and this confusion was increased by a practice which crept in of sovereigns or feudal chiefs allowing their arms, or part of them, to be borne as a mark of honor by their favorite followers in battle. Hence different coats of arms came in many instances so closely to resemble each other that it was imperative, for distinction's sake, that the fancy of the bearer should be restrained, and regulations laid down regarding the number and position of the charges, and the attitudes of the animals represented. This necessity led, in the course of time, to the systematizing of heraldry—a process which the rolls alluded to show us was going on gradually throughout the thirteenth and fourteenth centuries. By the time that heraldry was consolidated into a science, its true origin had been lost sight of, and the credulity and fertil-

ity of imagination of the heralds led them to invest the most common charges with mystical meanings, and to trace their original adoption to the desire of commemorating the adventures or achievements of the founders of the families who bore them. It was only when heraldry began to assume the dignity of a science that augmentations of a commemorative character were granted. After the science became thoroughly systematized, augmentations and new coats were often granted with a reference to the supposed symbolical meanings of the charges.

In England the assumption of arms by private persons was first restrained by a proclamation of Henry V, prohibiting their assumption by any one who had not borne arms at Agincourt, except in virtue of inheritance or a grant from the crown. To enforce the observance of this rule, heralds' visitations or processions through the counties were instituted and continued from time to time till the reign of William and Mary.

Jurisdiction in questions of arms is executed by the Heralds' College (q.v.) in England, the Lyon Court in Scotland, and the College of Arms in Ireland. No one within the United Kingdom is entitled to bear arms without an hereditary claim by descent or a grant from the competent authority; and the wrongful assumption of arms is an act for which the assumer may be subjected to penalties. The use of arms, whether rightfully or wrongfully, subjects the bearer of them to an annual tax. It is illegal to use without authority not only a coat of arms, but even a crest. Any figure or device placed on an heraldic wreath is considered a crest in questions with the Heralds' College or Lyon Court.

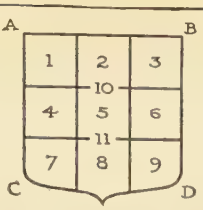
Classification. Besides individuals, communities and states are entitled to the use of arms, and heralds have classified arms, in respect of the right to bear them, under the following 10 heads: 1. Arms of dominion; the arms borne by sovereigns as annexed to their territories. 2. Arms of pretension, which sovereigns have borne who, though not in possession, claim a right to the territories to which the arms belong. Thus, England bore the arms of France from the time of Edward III till 1801. 3. Arms of community; the arms of bishops' sees, abbeys, universities, towns, and corporations. 4. Arms of assumption; arms which one has a right to assume with the approbation of the sovereign. Thus, it is said, the arms of a prisoner of war may be borne by his captor and transmitted by him to his heirs. 5. Arms of patronage, added by governors of provinces, lords of the manor, patrons of benefices, etc., to their family arms, as a token of superiority, right, or jurisdiction. 6. Arms of succession, borne quartered with the family arms by those who inherit fiefs or manors, either by will, entail, or donation. Thus, the dukes of Athole, as having been lords of the Isle of Man, quarter the arms of that island, and the Duke of Argyle quarters the arms of the Lordship of Lorne. 7. Arms of alliance, taken up by the issue of heiresses, to show their maternal descent. 8. Arms of adoption, borne by a stranger in blood, to fulfill the will of a testator. The last of a family may adopt a stranger to bear his name and arms and possess his estate. Arms of adoption can only be borne with permission of a sovereign or king-at-arms. 9. Arms of concession; augmentations granted by a sovereign of part of his royal arms, as a mark of distinction—a usage which, we have already observed, obtained in the earliest days of heraldry; and hence the prevalence among armorial bearings of the lion, the fleur-de-lis, and the eagle, the bearings of the sovereigns of England and Scotland, of France, and of Germany. 10. Paternal or hereditary arms, transmitted by the first possessor to his descendants.

The Escutcheon. A coat of arms is composed of charges depicted on an escutcheon representing the old knightly shield. The shields in use in England and France in the eleventh and twelfth centuries were in shape not unlike a kite—a form which seems to have been borrowed from the Sicilians; but when they became the recipients of armorial bearings, they were gradually flattened and shortened. From the time of Henry III the escutcheon has been most frequently represented on seals as approaching a triangular form, with the point downward, the chief exceptions being that the shield of a lady is lozenge-shaped and of a knight banneret square. To facilitate description, the surface or field of the escutcheon has been divided into nine points, technically distinguished by the following names: A, the dexter chief point; B, the middle chief; C, the sinister chief; D, the honor or collar point; E, the fess point; F, the nombril or navel point; G, the dexter base point; H, the middle base; and I, the sinister base point. It will be observed that the dexter and sinister sides of the shield are so called from their position in relation, not to the eye of the spectator, but to the supposed bearer of the shield.

Tinctures. Coats of arms are distinguished from one another, not only by the charges or objects borne on them, but by the color of these charges and of the field on which they are placed. The field may be of one color or of more than one, divided by a partition line or lines varying in form. The first thing, then, to be mentioned in blazoning a shield—i.e., describing it in technical language—is the color, or, as it is heraldically called, *tincture*, of the field. (See Illustration, *Tinctures.*) Tinctures are either of metal, color strictly so called, or fur. The metals used in heraldry are two—gold, termed *or*, and silver, *argent*—represented in painting by yellow and white. The colors are five—red, blue, black, green, and purple, known as *gules, azure, sable, vert,* and *purpure.* Two other colors have been used occasionally—*tawny*, or *tenné*, and *murrey*, or *sanguiné.* But these are now discarded in most countries. Metals and colors are indicated in uncolored heraldic engravings by points and hatched lines—an invention formerly ascribed to Silvestro di Petrasancta, an Italian herald of the seventeenth century—but a chart from the Duchy of Brabant published in 1600 had the tinctures so indicated. *Or* is represented by small dots; for *argent* the field is left plain. *Gules* is denoted by perpendicular, and *azure* by horizontal, lines; *sable*, by lines perpendicular and horizontal crossing each other; *vert*, by diagonal lines from dexter chief to sinister base; *purpure* by diagonal lines from sinister chief to dexter base; *murrey*, by a combination of vert and purpure; *tawny*, by a combination of vert and gules. The last two are little used. The *furs* were originally but two, *ermine* and *vair.* The former is represented by black spots or tails on a white ground. *Vair*, said to have been taken from the fur of a squirrel, bluish gray on the back and

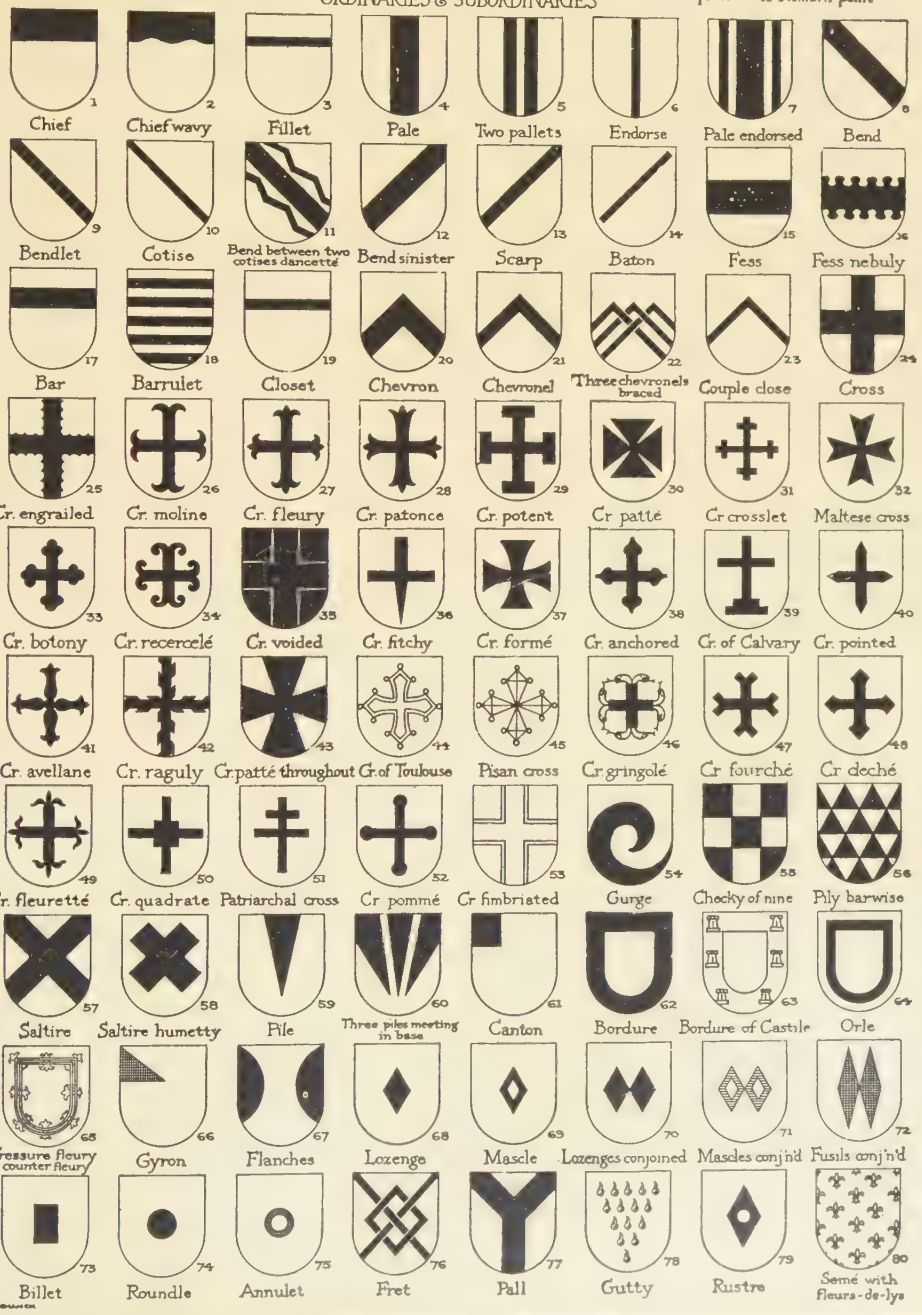
DIVISIONS *of* *the* SHIELD

AB	Upper margin
CD	Lower margin
AC	Dexter margin
BD	Sinister margin
123	Chief
456	Fess
789	Base
147	Dexter tierce
258	Pale
369	Sinister tierce

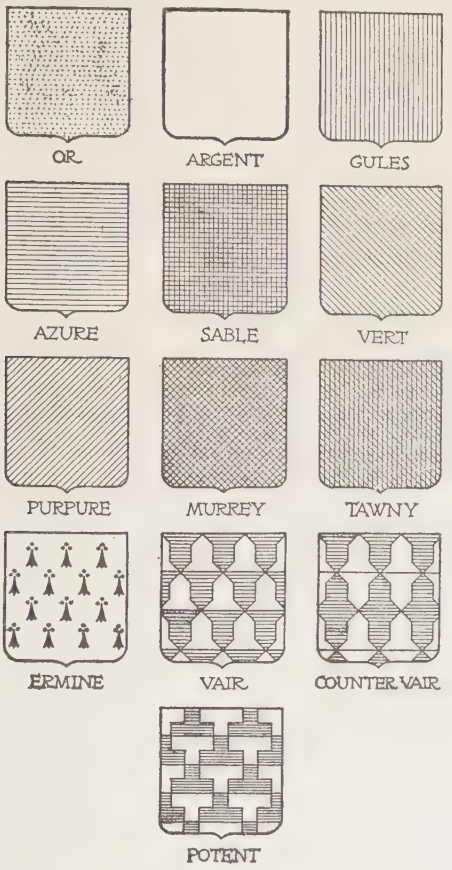


1	Dexter chief canton
2	Chief point
3	Sinister chief canton
4	Dexter flank
5	Center point
6	Sinister flank
7	Dexter canton of base
8	Base point
9	Sinister canton of base
10	Honor point
11	Nombril point

ORDINARIES & SUBORDINARIES



white on the belly, is expressed by blue and white shields, or bells in horizontal rows, the bases of the white resting on the bases of the blue. If the vair is of any other colors than white and blue, they must be specified. Various modifications of these furs were afterward introduced, among them: *ermines*, or ermine with the field sable and the spots argent; *erminitis*,



TINCTURES.

with a red hair on each side of the black spot; *erminois*, with the field gold and the spots black; *pean*, with the field sable and the spots *or; countervair*, or vair with the bells of one tincture placed base to base; *potent*, with figures like the heads of crutches; and counterpotent, with the heads of crutches alternately erect and reversed.

It is an established rule of heraldry that metal should not be placed on metal, nor color on color—a rule more rigidly adhered to in English than in foreign heraldry. Among early arms there is one remarkable transgression of it in the arms of the Kingdom of Jerusalem, founded by the Crusaders, which are five golden crosses on a silver field. A recognized exception exists wherever a charge lies over a field partly of metal and partly of color, or where an animal is attired, armed, unguled, crowned, or chained with a tincture different from that of his body. Marks of cadency, chiefs, cantons, and bordures are also occasionally exempted from the general rule, being, according to some heralds, not laid on the shield, but *cousu*, or sewed to it.

Charges. Everything contained in the field of an escutcheon is called a *charge*. Charges are divided by heralds into the three classes of honorable ordinaries, subordinaries, and common charges. Under the name of ordinaries or *honorable ordinaries* are included certain old and very frequent bearings, whose true peculiarity seems to be that, instead of being taken from extraneous objects, they are representatives of the wooden or metal strengthenings of the ancient shields. Nine are recognized by the best usage. See Plate of HERALDRY, *Ordinaries and Subordinaries*.

1. The *chief* (Fig. 1) is the upper part of the shield separated from the rest by a line, and comprising, according to the requirements of heralds, one-third of the whole, though this proportion is seldom rigidly adhered to. Its diminutive is the *fillet* (Fig. 3), supposed to take up one-fourth the space of a chief, in whose lowest part it stands. The line at the base of the chief may be straight, indented, or irregular.

2. The *pale* (Fig. 4) is a band or stripe from top to bottom, said, like the chief, to occupy one-third of the shield. It has two diminutives—the *pallet*, one-half the breadth of the pale (Fig. 5), and the *endorse*, one-half of the pallet (Fig. 6).

3. The *bend* (Fig. 8) is a band crossing the shield diagonally from dexter chief to sinister base. Its diminutives are the *bendlet*, or *garter*, one-half of its breadth (Fig. 9), the *cost*, or *cotise*, one-half of the bendlet (Fig. 10), and the *riband*, one-half of the cotise. The bend is sometimes borne between two cotises, in which case it is said to be *cotised* (Fig. 11)—a term sometimes applied to the other ordinaries when accompanied with their diminutives.

The *bend sinister* (Fig. 12) is a diagonal band from sinister chief to dexter base. Its diminutives are the *scarp*, one-half of the bend sinister (Fig. 13), and the *baton*, one-half of the scarp (Fig. 14). The baton stops short of the extremity of the field at both ends and has been considered a mark of illegitimacy.

4. The *fess*, or *fesse* (Fig. 15), is a horizontal band in the middle of the shield, said, like the ordinaries already enumerated, to occupy one-third of it. The lines which bound it may be straight or irregular (Fig. 16).

5. The *bar* is similar in form to the fess, but narrower and never placed in the centre of the shield (Fig. 17). It is rarely used singly. When in pairs, they are called *bars gemelles*. The diminutives are the *closet*, theoretically half the width of the bar (Fig. 19), and the *barrulet*, half the width of the closet (Fig. 18). But these terms are seldom used.

6. The *chevron* (Fig. 20) is composed of two stripes forming an inverted V. Its diminutives are the *chevronel* (Fig. 21) of half, and the *couple close* (Fig. 23) one-fourth, its width.

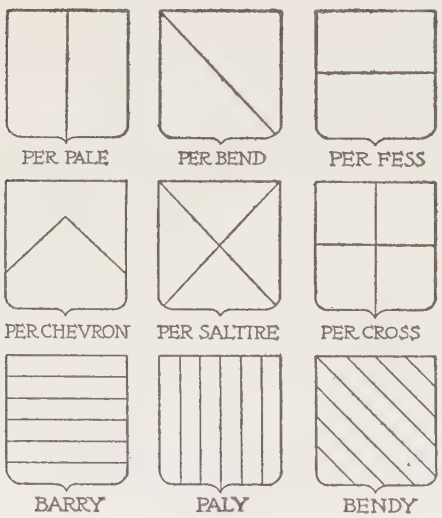
7. The *cross* (Fig. 24) unites the pale and fess, an ordinary which was originally, like the rest, composed of the clamps necessary to the strength of the shield, but had also the deeper meaning of the symbol of the Christian faith. Besides its plain form, the cross was varied in numerous ways, most of these varieties being, however, rather common charges than ordinaries. Of the 39 lesser crosses mentioned by Guillim, or the 385 by Berry in the *Encyclopædia Heraldica*, a few of the most frequently occurring are the following: the *cross moline* (Fig. 26), with the ends turned round both

ways; the *cross fleury* (Fig. 27), of which each limb terminates in a fleur-de-lis; the *cross patonce* (Fig. 28), the limb of which has three points; the *cross potent* (Fig. 29), crutch-shaped at the ends; the *cross patté* (Fig. 30), small in the centre, but widening towards the ends; and the *cross crosslet* (Fig. 31), crossed at the ends. The latter is the most frequent of all and is borne oftener in numbers than singly. Any of these crosses is said to be fitchy when the lower limb terminates in a sharp point, as in Fig. 36. There is also the *cross Maltese;* though not frequent as a heraldic charge, it derives an importance from being the badge of the Knights of Malta, and of many other orders (Fig. 32).

8. The *saltire,* or St. Andrew's cross (Fig. 57), is formed by a junction of the bend dexter and bend sinister.

9. The *pile* (Fig. 59) is a wedge with the point downward. A single uncharged pile should at its upper part occupy one-third the breadth of the shield, but, if charged, it may be double that width. It is used ordinarily either singly or in threes (Fig. 60).

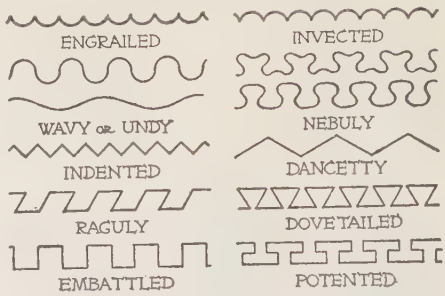
The *quarter,* consisting of the upper right-hand fourth part of the shield cut off by a horizontal and a perpendicular line, is classed by some authorities with the *honorable ordinaries,* but it is more common to consider it one of the *subordinaries* (see below). It is frequently termed a *canton* (Fig. 61).



PARTITIONS.

It has been observed that the field of an escutcheon may be of two different tinctures, divided by a partition line which may vary in direction. (See Illustration, *Partitions.*) When divided by a partition line in the direction of one of the ordinaries, the shield is said to be *party per* that ordinary; thus, we may have a shield party per pale, bend, fess, chevron, saltire, or cross, though *quartered* is a more usual term than *party per cross.* A shield divided into any number of parts by lines in the direction of a pale, bend, or bar, is said to be *paly, bendy, barry,* the number of pieces being specified, as barry of six. When the field is of a metal and color separated by any of the lines of partition, then the charge placed on it is said to be *counterchanged;* this means that the part of the charge which is on the metal is of the color, and vice versa.

The partition line which bounds the field, or the boundary line of an ordinary, is not always straight. The commonest forms of irregular partition lines in use are the *engrailed, invected,*



wavy, nebuly, embattled, indented, and *dancetty.* An ordinary engrailed has the points of the engrailed line turned outward, and an ordinary invected, inward. Dancetty differs from the indented by having much larger spaces between the points. All of these terms, even when unmistakably French in origin, are pronounced as if they were English.

The *subordinaries,* or subordinate ordinaries, are generally enumerated as the following, though there is no very broad line of demarcation between them and the common charges:

The *gyron:* when a shield is at once quartered and party per saltire, the division is called gyronny of 8, and each of the triangles is a gyron (Fig. 66). Gyronny of 6, 10, or 12, also occasionally occurs, so called according to the number of the triangles.

The *fret* (Fig. 76) is a cognizance derived from the banding or ornamenting of the shield, and a shield covered with this latticework decoration is said to be *fretty.*

The *bordure,* or border (Fig. 62), is a band encircling the shield. It is much used to distinguish different branches of a family and is often charged with small devices, on which account it has sometimes been reckoned an honorable ordinary (Fig. 63).

The *orle* (Fig. 64) differs from a bordure in not touching the extremity of the shield and is narrower.

The *tressure,* regarded as a diminutive of the orle, is generally borne double, and fleury counterfleury, as in the arms of Scotland (Fig. 65).

The *pall* (Fig. 77) is the archiepiscopal ornament of that name, sent from Rome to metropolitans, and resembling in form the letter Y. By some authorities this is classed as a common charge and not as a subordinary.

The *flanches* (Fig. 67) are the dexter and sinister sides of the shield cut off by a curved line. Flanches are always borne in pairs and sometimes charged.

The *lozenge* (Fig. 68) is a figure of four equal sides, with the upper and lower angles acute, and the others obtuse.

The *fusil* (Fig. 72) is longer and more acute than the lozenge.

The *mascle* (Fig. 69) is a lozenge perforated and showing a narrower border. Mascles may have been originally links of chain armor.

A field is said to be *lozengy, fusilly,* or *mas-*

cally when divided by diagonal lines in the direction of these subordinaries. A field divided by horizontal and perpendicular lines into squares of different tinctures is said to be *checky;* in the case of a *fess checky* there are three such rows of squares.

The *inescutcheon* is a small shield charged upon the coat of arms.

The *billet* (Fig. 73) is a rectangle about twice as high as it is wide. When the shield is freely sprinkled with billets, it is termed *billety.* Some think the billets represent bricks, stones, or billets of wood; others think they represent letters or billets.

Among subordinaries are sometimes reckoned certain circular charges called *roundles,* or *roundlets* (Fig. 74), distinguished in English heraldry by different names according to their tinctures. When of or, they are called *bezants;* of argent, *plates;* of gules, *torteaux;* of azure, *hurts;* of purpure, *golps;* of sable, *ogresses* or *pellets;* and of green, *pommes.*

Common Charges. The third class of figures occurring in armorial bearings are the *common charges.* These are representations more or less conventional of familiar objects, which have no necessary relation to the shield, but are in some way emblematic as concerns family or individual history and character. We can enumerate only a few of the charges of most frequent occurrence.

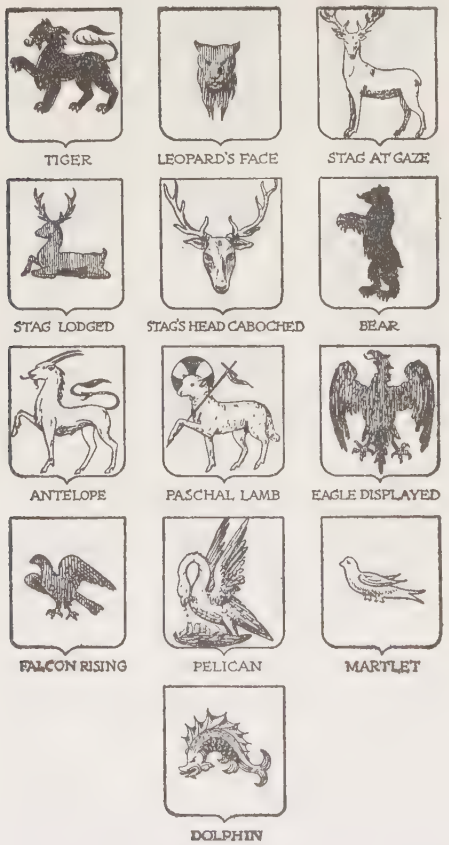
Among the animals borne in coats of arms the lion holds the most important place. As early as the twelfth century the king of beasts was assumed as an appropriate emblem by the sovereign of England. The kings of Scotland, Norway, and Denmark, the native princes of Wales, the counts of Flanders and Holland, and various other European rulers also chose the king of beasts. Lions occur in different positions. The earliest attitude of the heraldic lion is *rampant,* erect on his hind legs, but touching the ground with only one foot, and looking before him, the head being shown in profile, as he appears in the arms of Scotland and originally did in those of England. This was the normal position of a lion; but as the royal animal came to be used by all who claimed kindred with royalty, and to be granted to favorite followers by way of augmentation, a diversity of attitude was adopted for distinction's sake: *rampant gardant,* erect on the hind legs, and affronté, or full-faced; *rampant regardant,* erect on the hind legs and looking backward; *passant,* in walking position, with the head seen in profile; *passant regardant,* walking and with the head looking behind; *statant,* with all the four legs on the ground; *salient,* in the act of springing forward on his prey; *sejant,* rising to prepare for action; *sejant affronté,* rising and full-faced, as in the crest of Scotland; *couchant,* lying down, but with his head erect and his tail beneath him; *dormant,* asleep, with his head resting on his forepaws. Some of these terms are used for the other animals. The lion passant gardant is often blazoned as the *lion of England* and was originally styled a *leopard;* hence the lion passant and rampant gardant came to be called respectively the *lion leopardé* and *leopard lionné.* Two lions may be depicted: *rampant combattant,* i.e., face to face; or *rampant addorsed,* placed back to back, or *counterpassant,* i.e., passing the contrary way to each other. The lion is said to be *naissant* when he appears to be rising out of the centre of an ordinary. Among leonine monsters we have two-headed lions, bicorporate and tricorporate lions, lion dragons, and lion poissons. There is also the Bohemian lion, with two tails, and the more celebrated winged lion of St. Mark, adopted by the Republic of Venice. Two or more lions borne on one shield are

sometimes (though never when on a royal coat) blazoned *lioncels.*

Bears, boars, bulls, and stags are favorite heraldic beasts. A stag walking is said to be *trippant;* when lying down with his head erect, he is *lodged;* when running, he is *courant;* he is *at gaze* when a lion would be statant gardant: he is *attired* of any tincture when his horns are of that tincture. The animals that possess horns and hoofs are said to be *armed* in respect to them. The heads and limbs of animals are often borne as charges, and they may be either *couped,* cut off in a straight line, or *erased,* cut off with a jagged edge. When the head is borne without any part of the neck and full-faced, it is said to be *caboched,* or *caboshed.* When the hair of an animal is of a different tincture from the body, the animal is said to be *crined* of this color. Animals, as well as other common charges, are usually represented in a purely conventional

manner and frequently bear no resemblance to the object for which they are named.

Of birds, there is the *eagle*, which was, next to the lion, the most favorite cognizance of royal personages and was adopted by the German emperors, who claimed to be successors of the Cæsars of Rome. The Imperial eagle had at first but one head; the monstrosity of a second head seems to have arisen from a dimidiation of two eagles to represent the Eastern and Western empires. (See section *Marshaling of Arms.*) The eagle of heraldry is most generally *displayed*, i.e., its wings are expanded; sometimes it is *preying*, or standing devouring its prey. The *allerion*, the cognizance of the Duchy of Lorraine and the family of Montmorency, was originally but a synonym for the eagle (assumed, perhaps, as an anagram for the word Lorraine), but modern heralds have degraded it into a nondescript creature without beak or feet. The *martlet* was originally a martin, which has also in course of time been



deprived by heralds of its legs and beak. (See CADENCY.) The mythical phœnix, the pelican, the swan, the cock, the falcon, the raven, the parrot, or popinjay, and the peacock are all of tolerably frequent occurrence. The pelican generally has her wings placed back to back and is depicted pecking her breast; she is then said to be *vulned*, i.e., wounded. When in her nest, feeding her young, she is called a pelican *in her piety*. A peacock borne affronté with his tail expanded is said to be *in his pride*. Birds of prey are armed of the color of which their beak and talons are represented. Such as have no talons are *beaked and membered;* i.e., the beak and legs are of a different color from the body. The cock is said to be armed *crested and jelloped*, the latter term referring to his comb and gills. Birds having the power of flight are, in respect to their attitude, *close, rising,* or *volant.*

Fishes and reptiles occur as charges: the former are said to be *naiant* if drawn in a hori-

zontal, and *haurient* if drawn in a perpendicular, position; and the *dolphin*, in reality straight, is conveniently borne *embowed*, or bent. Sometimes the conventional heraldic form of an animal differs very greatly from its true form, as in the case of the antelope of heraldry, which has the head of a stag, a unicorn's tail, a tusk issuing from the tip of the nose, a row of tufts down the back of the neck, and similar tufts on the tail, chest, and thighs. Of "animals phantastical," we have, among others, the griffin, wyvern, dragon, unicorn, basilisk, harpy. We have the human body in whole or part, as a naked man or "savage," also arms, legs, hearts, Moors' heads, Saracens' heads, and that strange heraldic freak, the three legs conjoined carried in the escutcheon of the Isle of Man.

Of plants, there are *roses, trefoils, quatrefoils, cinquefoils* (conventional representations of flowers with three, four, and five leaves), *leaves, garbs* (i.e., sheaves of corn), *trees*, often *eradicated* or *fructuated* of some other color, and above all the celebrated *fleur-de-lis*, used as a badge by Louis VIII of France in 1223. When the charge is repeated a large number of times, the term *semé* is applied to it. When a plant, animal, or other charge is blazoned *proper*, what is meant is that it is of its natural color.

The heavenly bodies—the sun, moon, and stars—are also pressed into the service of heraldry, as are things inanimate and artificial without number, particularly such as were familiar to

the warriors and pilgrims of the twelfth and thirteenth centuries. Helmets, buckles, shields, hatches, horseshoes, swords, arrows, battering rams, pilgrims' staves, mullets (or spur rowels), and water boujets, or bags, in which in crusading times water was carried long distances across the desert; also the clarion or war trumpet, sometimes erroneously called a *rest*, because it was supposed to represent a rest for a lance. Even the letters of the alphabet have been used as charges.

When the field or any charge is covered with drops, it is called *gutty;* when adorned with fleurs-de-lis, it is called *fleury*, or *flory*. When an ordinary is made up of squares of alternate metal and color, it is called *compony*, or *gobony*. When an ordinary has a border of different tinctures, it is said to be *fimbriated*.

Charges may be placed either simply on the field or on one of the ordinaries; in some instances one of the ordinaries is placed over a charge, in which case the charge is said to be *debruised* by the ordinary. Three charges of one kind are placed two above and one below, unless blazoned *in fess* or *in pale*. In the fourteenth and fifteenth centuries the simplicity of early heraldry began to be departed from by accumulating a variety of charges on one shield, and in later times we have sometimes a charge receiving another charge like an ordinary. The growing complexity of shields arose from augmentations granted to distinguish the younger branches of a family, or charges assumed from the maternal coat by the descendants of an heiress. In the end of the eighteenth and beginning of the nineteenth century, a practice prevailed for a time of introducing into armorial bearings matter-of-fact landscapes, representations of sea fights, and of medals and decorations worn by the bearer, setting all heraldic conventionalities at defiance, and dealing in details not discernible except on the minutest inspection.

The arms of the different members of a family have been distinguished from one another, sometimes by the use of a bordure or other difference; and sometimes, especially by English heralds, by the use of certain figures called *marks of cadency*. (See CADENCY.) Sometimes the differences and marks of cadency are called *diminutions*.

Besides the heraldic devices depicted on the shield, there are the following borne external to it—the helmet, the mantling, the wreath, the crest, the motto and scroll, the supporters, and the coronet.

The *helmet*, originally a piece of defensive armor, became in the course of time one of the usual accompaniments of the shield; and placed over the arms, it came by its form to mark the rank of the wearer. These distinctions date from the reign of Queen Elizabeth and are applicable only to British heraldry.

The *mantling* is an embellishment of scroll-work flowing down on both sides of the shield, and originating in the *cointoise*, or scarf, wrapped round the body in the days of coat armor.

From the centre of the helmet, within a *wreath* of two pieces of silk usually of the first two colors of the armorial bearings, issues the crest, originally a special mark of honor worn only by heroes of great valor, or advanced to a high military command; now an inseparable adjunct of the coat of arms in English, though not in continental, heraldry, and sometimes assumed or changed arbitrarily, although this is illegal.

The *scroll*, placed over the crest or below the shield, contains a *motto* bearing in many cases an allusion to the family name or arms. The motto was originally the war cry of the bearer.

Supporters are figures or animals standing on each side of the escutcheon and seeming to defend or support it. They were in their origin purely ornamental devices, which only gradually acquired an heraldic character. In England the right to use supporters is confined to the royal family, peers, peeresses, and peers by courtesy, Knights of the Garter, of the Thistle, and St. Patrick, Knights Grand Cross of the Bath, and a very few families whose ancestors bore supporters before their general use was restricted. In Scotland supporters are also used by the baronets of Nova Scotia and the chiefs of various families. They have sometimes been conferred on towns, e.g., Liverpool, Belfast.

The crown of the sovereign, the mitre of the bishop, and the coronet of the nobility are adjuncts appended to the shield of those whose dignity and office entitle them to that distinction.

Blazonry. This is the art of describing, in technical terms, the charges borne in arms—their positions, gestures, tinctures, etc., and the manner of arranging them on the shield. As heraldry, though arbitrary, is very exact, the rules of blazoning are observed on all occasions with the most rigid precision. The following are the most important: In blazoning or describing a coat of arms, avoid repetitions and use as few words as possible. Begin with the field, naming the tincture or tinctures, and mentioning the lines by which it is divided—*per pale, per fess*, etc., if such there be—and noticing if they are indented, engrailed, or the like, it being taken for granted that they are straight unless the contrary is mentioned. The charges are named next, beginning with the most important and nearest the centre, giving their number, position, and tincture; e.g., the Affleck family bears *argent, three bars, sable;* the Aldboroughs, *barry of ten, argent and azure, a lion rampant, gules*. Usually the ordinaries and their diminutives come first; but the *chief, bordure*, or *canton* generally comes last; e.g., the Gainsboroughs bear *or fretty gules, a canton, ermine*. Where the principal charge is not in the centre, its position must be named, as in *first quarter*. When an ordinary *debruises* another charge, the latter is named first unless some other direction is given. Two charges are *in pale*, i.e., one above the other; three are represented two above, one below; when a *fess* or *bend* is between six similar charges, three are in chief and three in base. In all other cases the position of the charges must be described. When the ordinary bears a charge and there are also other charges in the field, the latter are named before the charges on the ordinary. When a tincture occurs twice, it is not repeated, but *of the field, of the first*, etc., are used. The Anglesey family bears *sable, on a cross engrailed between four eagles displayed argent, five lions passant gardant of the field*. When there is an equal number of two charges, "as many" is used instead of repeating the number. The Leiths bear *or, a cross-crosslet fitchy, sable, between three crescents in chief, and as many lozenges in base, gules*. The Parkers bear *gules, on a chevron, between three keys erect, argent, as many*

fleurs-de-lis of the field. Finally the differences, crests, and supporters are described. A full knowledge of blazonry can be acquired only by the careful study of many examples.

Marshaling of Arms. This is the combining of different coats of arms in one escutcheon, for the purpose of indicating family alliance or office. In the earlier heraldry it was not the practice to exhibit more than one coat in a shield, but the arms of husband and wife were sometimes placed *accollé*, or side by side, in separate escutcheons; or the principal shield was surrounded by smaller ones, containing the arms of maternal ancestors; and not infrequently maternal descent or marriage was indicated by the addition of some bearing from the wife's or mother's shield. Then followed *dimidiation*, where the shield was parted per pale, and the two coats placed side by side, half of each being shown. By the more modern custom of impaling, the whole of each coat is exhibited, a reminiscence of the older practice being retained in the omission of bordures, orles, and tressures on the side bounded by the line of impalement. The most common case of impalement is where the coats of husband and wife are conjoined, the husband's arms occupying the dexter side of the shield, or place of honor, and the wife's the sinister side. Bishops, deans, heads of colleges, and kings-at-arms impale their arms of office with their family coat, giving the dexter side to the former.

A man who marries an heiress (in heraldic sense) is entitled to place her arms on a small shield called an *escutcheon of pretense*, in the centre of his achievement, instead of impaling them.

Quartering, or the exhibiting of different *coats* on a shield divided at once perpendicularly and horizontally, is the most common mode of marshaling arms—a practice which, however, was unknown till the middle of the fourteenth century. The divisions of the shield are called quarters and are numbered horizontally, beginning at the dexter chief. The most common object of quartering is to indicate descent. The coats quartered in an escutcheon must all have been brought in by successive heiresses, who have intermarried into the family. In the case of a single quartering the paternal arms are placed in the first and fourth quarters, and the maternal in the second and third. The third and fourth quarters may, in after generations, be occupied by the arms of a second and third heiress. Sometimes an already quartered coat is placed in one of the four quarters of the escutcheon, then termed a grand quarter. We occasionally find a shield divided by perpendicular and horizontal lines into six, nine, or even more parts, each occupied by a coat brought in by an heiress; and in case of an odd number of coats, the last division is inconveniently crowded by the accumulation of coats, including the several coats to which each heiress may in a similar way have become entitled. In Germany sometimes 20 or 30 coats are found marshaled in one escutcheon; but in British heraldry families entitled to a number of quarterings generally select some of the most important.

Sovereigns quarter the ensigns of their several states, giving precedence to the most ancient, unless it be inferior to the others in importance. In the royal escutcheons of the United Kingdom England is placed in the first and fourth quarters, Scotland in the second, and Ireland in the third; the relative positions of Scotland and England being, however, reversed on the official seals of Scotland. Spain bears the arms of Leon in the first and fourth quarters, and Castile in the second and third. An elected king generally places his arms surtout on an escutcheon of pretense.

National Coats of Arms. The coats of arms whose use has obtained official sanction by national governments present in most cases the family heraldic insignia of their sovereigns. The English arms, e.g., have reflected every claim of family inheritance of the royal line since the origin of coats of arms in the twelfth century. They were, under Richard Cœur de Lion and his immediate successors, the three leopards of the Plantagenet house. When Edward III laid claim to the crown of France, he quartered with his arms the lilies of the royal house of that country. The Irish harp was added when Henry VIII took the title of king of that country. Similarly, when the Stuart line succeeded, they placed the rampant lion of Scotland in the upper right-hand field. William III placed a scutcheon with the line of the house of Orange in the centre of the British shield, and the Hanoverian sovereigns replaced this by their family scutcheon. The lilies of France were removed with the disuse of the French title, in 1801, and the scutcheon of the house of Hanover on the accession of Queen Victoria in 1837. Since that time the British coat of arms in its full form has consisted of the shield with four fields—two occupied with the golden leopards of England, the other two occupied by the old arms of Scotland and Ireland respectively. Above the shield is a helmet, and still above this the crown with a golden-crowned lion. Surrounding the shield is the order of the Garter with its legend. Below the shield are two clusters of branches, made up of the English rose, the Scotch thistle, and the Irish shamrock intertwined, and the motto *Dieu et Mon Droit*. As supporters, there are dexter, a golden-crowned lion, and sinister, a silver unicorn with a crown around his neck and a chain hanging from this.

France, after having used at various times the oriflamme, the lilies, the Napoleonic eagle, and other emblems, possesses, under the present Republic, no authoritative or universally applicable coat of arms. By a decree passed in 1870, however, a seal was adopted consisting of a seated female figure holding a bundle of lictor's rods. In 1896 a decorative emblem was authorized consisting of the initials "R. F." (*République française*) surrounded by a crown of laurel leaves, with French flags crossed at the back, oak and laurel branches below, the order of the Legion of Honor and the fasces at the back. A common device, too, is a shield bearing the national colors in three vertical bars, with the fasces in the central space and the letters R and F on olive branches to right and left.

The arms of the German Empire consist of the great double-headed black eagle of the Empire, surmounted by the Imperial crown and bearing on its breast the Prussian coat of arms. This is a silver shield with a single-headed eagle holding in its claws the royal ball and sceptre, with the Hohenzollern arms on its breast. The silver shield is surrounded by the chain and pendant of the Order of the Black Eagle.

Russia and Austria-Hungary also use the double-headed eagle, in both cases both heads

being crowned, and in both with an Imperial crown above. In the Russian arms the eagle bears on its breast a shield with St. George; in the Austrian a shield with the arms of Hapsburg, Austria, and Lorraine.

The coat of arms of Spain consists of a shield on which the arms of Castile and Leon are quartered, a point below bearing the pomegranate of Granada, and a small central shield bearing the arms of Bourbon-Anjou.

The coat of arms of Italy is a shield with the silver cross on a red field, covered with a red ermine-lined baldachin, surmounted by the Italian crown. The cross was granted to the counts of Savoy by the Knights Hospitalers in the fourteenth century as an acknowledgment of help given to them against the Turks.

Similarly the coats of arms of other European countries represent in most cases the origin and fortunes of their royal families.

The newly formed nations of America found it necessary to adopt coats of arms deliberately instead of using the personal devices of their rulers. The Congress of the United States appointed a committee to prepare a coat of arms and a seal for the new nation on July 4, 1776, the very day of the Declaration of Independence. The devices reported by this and by several succeeding committees were not, however, satisfactory, and it was not till June 20, 1782, that the coat of arms was finally approved. Since that time it has not been changed. It consists of an American or bald eagle, displayed; with shield on breast showing 13 pales (vertical stripes), alternately white and red. The shield has a plain blue chief binding the stripes together. The dexter talon holds an olive branch, and the sinister, thirteen arrows. Above the eagle is a golden glory surrounded by a white cloud enclosing blue. Upon this are thirteen white five-pointed stars. The motto on a ribbon in the eagle's beak is, *E Pluribus Unum*. Each State of the American Union has its own coat of arms, though none has an individual flag.

Most of the republics of Central and South America adopted coats of arms on the attainment of their independence, usually introducing into them some objects of local as well as symbolical significance. Mexico, e.g., in 1823, adopted as its national coat of arms a figure of an eagle tearing a snake in its beak and poised upon a "nopal," or cactus, growing on a rock. The rock and the nopal are both connected with the old name of the city and province of Mexico, *Tenochtitlan*. This coat of arms was afterward changed by Maximilian, but was restored on the downfall of his empire. The coat of arms of Peru contains a figure of the llama, the national beast of burden, and of the tree from which the Peruvian bark or cinchona is taken. That of Guatemala shows the bird Quezal, the "pito real," or royal bird, of the old Spanish discoverers. The peaks of the Andes occur in several of the South American national coats of arms. That of the Republic of Brazil, adopted in 1889, consists of a five-pointed star with a round shield placed upon it. On this shield are figured the stars of the Southern Cross, and it is surrounded by 20 silver stars, representing the states of the Republic. Below are a sword and branches of laurel and of the tobacco plant, with an inscription. See Plates accompanying NATIONAL COATS OF ARMS.

The terms and usages of heraldry vary somewhat in the different countries. In this article the rules of English heraldry have been followed. Consult the standard works of Guillim, *Display of Heraldry* (London, 1610; 6th ed., 1724); Edmondson, *Complete Body of Heraldry* (ib., 1780); Nisbet, *System of Heraldry* (ib., 1722–43; 3d ed., 1816); and for a more discriminating view of the subject, Gourdon de Genouillac, *L'Art héraldique* (Paris, 1909); Hulme, *History, Principles, and Practice of Heraldry* (New York, 1892); Woodward and Burnet, *A Treatise on Heraldry, British and Foreign* (Edinburgh, 1896); Eve, *Decorative Heraldry* (New York, 1897); Davies, *Armorial Families* (ib., 1903); Crozier, *General Armory: Register of American Families Entitled to Coat Armor* (ib., 1904); J. Vinycomb, *Fictitious and Symbolic Creatures in Art, with Special Reference to their Use in British Heraldry* (London, 1906); Henry Whittemore, *Origin and Antiquity of Heraldry* (New York, 1908); H. G. Todd, *Armory and Lineages of North America* (ib., 1913); W. H. S. Hope, *Grammar of English Heraldry* (ib., 1913); J. H. Stevenson, *Heraldry in Scotland* (2 vols., ib., 1914).

HER'ALDS' COLLEGE, or COLLEGE OF ARMS. A collegiate body, founded by Edward IV in 1464 and chartered by Richard III in 1483. It consists of the heraldic officers of England. After various charters had confirmed its privileges, it was reincorporated by Philip and Mary, who bestowed on it Derby House, on the site of which in Doctors' Commons the present college was built by Sir Christopher Wren.

The presidency of the college is vested in the Earl Marshal, an office now hereditary in the family of Howard, Duke of Norfolk; he nominates the three kings-at-arms, six heralds, and four pursuivants, who are the members of the collegiate chapter. Persons having an hereditary claim to arms, which has been disused for one or more generations, are empowered by the Heralds' College to resume them on proof and registration of pedigree. A person who has no hereditary claim and wishes a grant of arms must memorialize the Earl Marshal and show that he is in condition to "sustain the rank of gentry." An important department of the college is the recording of pedigrees. Any pedigree showing the existing state or descent of a family may, if accompanied with sufficient evidence, be entered on the books of the college. The members have salaries, but derive their principal income from fees charged for assistance in tracing pedigrees and titles and for the granting and registration of arms. The college has long since lost all authority to enforce its regulations. In Scotland the corresponding functions belong to the Lyon Court (q.v.) and in Ireland to the Office of Arms. See HERALDRY.

HERAPLEION. See CANDIA.

HERAT, hĕr-ät'. The capital of the province of the same name in Afghanistan (q.v.). It is situated in the western part of the country, on the river Heri-Rud, about 50 miles south of the Russian frontier and the same distance east of the Persian border (Map: Afghanistan, K 5). From it radiate caravan routes, north, east, south, and west, to Turkestan, the interior of Afghanistan, India, and Persia. The town, forming a quadrangle about 1 mile square, is surrounded by strong fortifications, having towers and gates, and with a strong citadel at the north end; the streets are narrow and crooked, and the buildings are unsightly. There are an ancient ruined mosque, and a tomb of

Abdullah Ansari, with splendid examples of Oriental sculpture. The surrounding valley is of remarkable natural beauty and fertility. Fine fields of grain and attractive gardens adorn the landscape. The King's Garden was once famous. Herat manufactures and exports carpets, blades, and rosewater. Its position on the route from Persia to India explains its commercial importance, while its proximity to the Russian border lends to it great strategic and political significance, though it is no longer regarded as the key to India. The population, formerly much greater, is estimated at 15,000 and is very heterogeneous. Herat is supposed to have been founded by Alexander the Great. In the seventh century it came under the dominion of the Arabs. It was conquered by Timur in 1381, under whose reign it grew to be a centre of Persian learning and art. In 1510 it passed into the hands of Persia. The Afghans took it in 1749. During the civil wars in Afghanistan Herat became independent and remained so from 1823 to 1863, when it once more became a part of Afghanistan.

HÉRAULT, ā'rō'. A maritime department in the south of France (q.v.), formed from Lower Languedoc, bounded on the southeast by the Gulf of Lyons (Map: France, S., H 5). Area, 2403 square miles. Pop., 1911, 480,484. It is crossed in the north by the Cévennes Mountains, which slope southeast to the Mediterranean plains. The principal rivers are the Hérault, the Orb, and the Livron; the Canal du Midi ends at Cette. Along the coast line from Agde to the Vidoule are numerous marshy lakes, united by the Canal-des-étangs. In this part the climate is unhealthful, but elsewhere throughout the department it is usually fine. Hérault ranks among the foremost wine-growing departments of France, one-third of its land being devoted to the culture of the grape. Silkworms are reared, and woolen, silk, and cotton fabrics, leather, and brandy are manufactured. Coal and copper mines as well as quarries of marbles, building stone, and granite are worked. Hérault supplies a great part of the salt used in France. Capital, Montpellier.

HÉRAULT DE SÉCHELLES, *de* sā'shĕl', Marie Jean (1759–94). A French revolutionist, born in Paris. An author, politician, and advocate, imbued with the teachings of Diderot, he was rather a philosopher than a revolutionist and was at first but moderately attracted by the radical element in the Legislative Assembly, to which he was elected in 1791. But he soon took his stand with the extreme left and supported Danton in the revolution of August and September (1792). He was deputy from the Department of Seine-et-Oise to the Convention of the same year and voted for the King's death. He was president of the convention for several terms and was author of the constitution which was preferred to that of Condorcet (q.v.), but which was never enforced. As a member of the Committee of Public Safety, he aroused the enmity of Robespierre, who, under the pretext that he had had traitorous dealings with the Army of the Rhine, insisted upon his arrest and execution. The best of his writings were printed under the title *Voyage à Montbard* (last ed., 1890). His *Œuvres littéraires* were edited by Dard (Paris, 1907). Consult A. Aulard, *Les orateurs de l'Assemblée Législative et de la Convention* (ib., 1906).

HERB, ĕrb *or* hĕrb (OF., Fr. *herbe,* from Lat. *herba;* probably connected with OLat. *forbea,* food, Gk. *φορβή, phorbē,* pasture, *φέρβειν, pherbein,* to feed). Any small vascular plant that does not develop secondary wood. The term is difficult to define because it depends upon stature and the relative amount of wood tissue. All herbs are woody plants in the sense that they contain woody strands, but ordinarily they do not produce secondary wood, and therefore there is no compact woody cylinder. The herbaceous character is usually associated with the annual habit, at least for the parts aboveground. The original classification of plants was into herbs, shrubs, and trees, so that the term is an exceedingly old one in botany.

HERBA'RIUM (Lat., from *herba,* herb). A systematic collection of dried plants, representing the flora of one or more regions. An herbarium represents the best possible record of plants and is indispensable as a basis for any systematic presentation of a flora. Of course, the study of living plants in their natural surroundings is the ideal method and is employed as far as possible. But such a method is necessarily incomplete and must be supplemented by the complete records of the herbarium. One of the essential features of an herbarium is that it contains the specimens, called "types," from which the original descriptions of species and genera were drawn. These types are kept for reference, so that there may be no uncertainty as to the plants described by different authors; and it may be said that in a certain sense the value of an herbarium is measured by the number of types and authentic specimens it contains. Second only in value to type specimens are the exsiccatæ, which are distributed collections usually made by notable collectors in relatively inaccessible regions. These distributed collections are authoritative and are really cotypes. In addition to types and exsiccatæ herbaria accumulate general collections representing all species possible and all phases of each species. Large herbaria thus become centres of taxonomic work. Owing, however, to the great expense involved in maintaining them, extensive herbaria are not numerous; the local collections possessed by a large number of institutions and individuals are generally quite small.

In the United States there are three herbaria of first rank, and each is the background of continual publication. The oldest is the *Gray Herbarium,* which belongs to Harvard University. Its great value lies in the fact that it contains the vast majority of the older types of American plants, but its annual additions are also very large. The *Herbarium of the New York Botanical Garden,* formerly at Columbia University, was developed remarkably during the closing years of the nineteenth century. Its accumulation of material and wealth of types make it indispensable in any taxonomic work. The *United States National Herbarium,* stored in the United States National Museum, has become a collection of national importance, since it contains a vast accumulation of material brought together by government collectors, and also many of the most important collections of the early government surveys. After these three great collections, those at the Missouri Botanical Garden (St. Louis) and at the Field Columbian Museum (Chicago) are probably next in importance. Many of the larger universities also contain noteworthy collections. The three

greatest herbaria in Europe deal more with the flora of the whole world than do the American herbaria. The greatest of all herbarium collections is that at the Royal Gardens at Kew, which has been enriched for many years by means of the numerous colonial enterprises of the British Empire. The *Herbarium of the Jardin des Plantes* at Paris is rich in older types, especially of American plants. The University of Berlin has built up a large herbarium, which has become one of first importance. Probably next in importance are the herbaria at Geneva, Vienna, and St. Petersburg.

For directions as to the collection of plants and their preparation for the herbarium, consult Bailey, *Botanizing* (Providence, R. I., 1899).

HERBART, hĕr'bärt, JOHANN FRIEDRICH (1776–1841). A German philosopher. He was born at Oldenburg, May 4, 1776. He studied at Jena, where Fichte was just beginning to be an influential factor in the university life, and for a while he was ardent in his loyalty to Fichte's views; but after more reflection he found himself obliged to reject much of that system and to form one of his own. After tutoring for several years in Switzerland he qualified as docent in philosophy and pedagogy at Göttingen in 1802 and three years later was appointed professor extraordinarius. In 1809, at the instance of W. von Humboldt, then at the head of the Department of Public Instruction, he was called to a professorship of philosophy and pedagogy at Königsberg, to succeed Krug, who succeeded Kant; but in 1833 he was recalled to Göttingen, where he continued in incessant pedagogical and philosophical activity until his death, Aug. 14, 1841. His writings were collected and published by Hartenstein (12 vols., Leipzig, 1850) and reprinted in Hamburg (13 vols., 1883–93). Another edition is appearing at Langensalza. His pedagogical works have been published in two volumes at different times (1873, 1875, and 1880). Some of his letters were published in 1871 and in 1877. His chief works are: *Allgemeine Pädagogik* (1806); *Hauptpunkte der Metaphysik* (1806); *Allgemeine praktische Philosophie* (1808); *Lehrbuch zur Einleitung in die Philosophie* (1813); *Lehrbuch zur Psychologie* (1816; Eng. trans. by M. K. Smith, 1891); *Psychologie als Wissenschaft* (1824); *Allgemeine Metaphysik* (1828–29). In addition to the one mentioned above, the following translations should be mentioned: *Application of Psychology to the Science of Education,* translated by Mulliner (New York, 1898); *Herbart's ABC of Sense-Perception, and Minor Pedagogical Works,* translated by Eckoff (ib., 1896); *The Science of Education,* translated by H. M. and E. Felkin (Boston, 1893); *Introduction to the Pedagogy of Herbart,* translated by Zimson (ib., 1894); *Outlines of Educational Doctrine,* translated by Lange and annotated by De Garmo (New York, 1901).

His philosophy is a thoroughgoing atomism (q.v.), according to which the universe is constituted of monads, or "reals," simple, unchangeable, and in their real nature unknowable. These "reals" stand in accidental relations to each other, and it is the changes in these relations that constitute the process of change in the world of experience. The "reals" disturb each other and provoke reaction in each other in self-defense. Such reactions are our ideas, which are called forth by the effort of our unknowable souls to maintain themselves. These ideas in turn tend to preserve themselves, and conscious life is the behavior of these ideas towards each other in the way of conflict or of mutual support—conflict when they are totally or partially opposed, support when they are alike. When conflict occurs, the intensity of ideas is diminished; diminution of intensity beyond a certain point means the disappearance of ideas "below the threshold of consciousness." The relation between ideas is thus a mechanical relation, and psychology is the mechanics of ideas. In the mechanical relation of ideas those already in consciousness have an important part to play with regard to new ideas just appearing. The ideas already present are called the apperceiving ideas, and the new ideas are said to be apperceived. The problem of education is to present such new ideas as can be most easily apperceived, i.e., incorporated with the old ideas to form knowledge. The central principle of all Herbart's reasoning is the abstract law of contradiction, interpreted metaphysically. That is, nothing can be ultimately real of which two contradictory predicates can be asserted. To predicate unity and multiplicity of an object is to predicate contradictions. Hence ultimate reality must be absolutely unitary and without multiplicity, hence also without change. Herbart's influence has been great both in philosophical and pedagogical lines. Among prominent Herbartians of recent times and of the present day may be mentioned M. A. Drobisch, O. Flügel, G. Hartenstein, M. Lazarus, H. Steinthal, L. Strümpell, W. F. Volkmann, T. Waitz, and R. Zimmermann. In America there is a Herbart Society, of which Prof. Charles De Garmo has been the leading spirit, and which issues an important *Year-Book.* Herbartian bibliography is very extensive. For the life of Herbart, consult: Hartenstein, in the introduction to his *Herbarts kleinere philosophische Schriften und Abhandlungen* (Leipzig, 1842); Allihn, "Ueber das Leben und die Schriften J. F. Herbarts," in *Zeitschrift für exacte Philosophie* (ib., 1860), which contains a bibliography; Hennig, *J. F. Herbart* (ib., 1877). For an account or for criticism of his views, consult: Lotze, "Ueber Herbarts Ontologie," in *Zeitschrift für Philosophie* (ib., 1843); Fechner, *Zur Kritik der Grundlagen von Herbarts Metaphysik* (ib., 1853); Kaftan, *Soll und Sein* (ib., 1872); Lipps, *Zur Herbart'schen Ontologie* (Bonn, 1874); Just, *Die Fortbildung der Kant'schen Ethik durch Herbart* (Eisenach, 1876); Wigget, *Pestalozzi und Herbart* (Leipzig, 1891); De Garmo, *Herbart and the Herbartians* (New York, 1895); Adams, *The Herbartian Psychology Applied to Education* (Boston, 1898); Wagner, *Vollständige Darstellung der Lehre Herbarts* (Langensalza, 1899); Hayward, *The Students' Herbart* (London, 1902); Kinkel, *J. F. Herbart, sein Leben u. seines Philosophie* (Giessen, 1903); R. D. Chalke, *Synthesis of Froebel and Herbart* (London, 1912); and various writings of F. H. Hayward; the various writings of the Herbartians mentioned above; also the histories of philosophy, such as those of Windelband, Höffding, Weber, Thilly. See APPERCEPTION.

HERB BENNETT. An aromatic herb. See GEUM.

HERBECK, hĕr'bĕk, JOHANN VON (1831–77). An Austrian musician, born in Vienna. He was practically a self-educated musician, but by hard work rose rapidly from the position of

chorister to that of professor in the Vienna Conservatory. From 1859 to 1870 and again from 1875 to 1877 he conducted the concerts of the Gesellschaft der Musikfreunde, which under his energetic leadership became events of prime importance. In 1866 he was made chief court kapellmeister and from 1871 to 1875 he was director of the Imperial Opera. He wrote many excellent part songs and some instrumental music. Consult E. Hanslick, *Suite (Zwei Wiener Kapellmeister)* (Vienna, 1884).

HERBELIN, âr'blăn', Jeanne Mathilde Habert (1820–1904). A French miniature painter. She was born at Brunoy (Seine-et-Oise) and studied oil painting with her uncle, Jean Hilaire Belloc (1787–1866). Advised by Eugène Delacroix to confine herself to miniatures, she speedily reached the front rank in that branch of art, in which she created a new style. She exhibited 10 miniatures in the Salon of 1848 and received her first-class medal at the Exhibition of 1855 for "Child Holding a Rose," "A Souvenir," and "Girl Playing with a Fan." One of her miniatures was requested for the Luxembourg Gallery, the first of its kind admitted there. Besides ideal heads and genre studies, Madame Herbelin painted notable miniature portraits, such as those of Guizot, Isabey, Robert Fleury, Rossini, E. Souvestre, Rosa Bonheur, and Eugène Delacroix.

HERBELOT, âr'blō', Barthélemy d' (1625–95). A celebrated French Orientalist, born in Paris. After having learned Hebrew, Arabic, Turkish, and Persian, he traveled in Italy and was likewise for a time secretary and interpreter of Oriental languages to the French King. Three years before his death he was appointed professor of Syriac in the Collège de France. His celebrated work, *Bibliothèque Orientale,* was published after his death by Galland (Paris, 1697), and afterward with a supplement (Maestricht, 1776–81); but the best edition is that published at The Hague (4 vols., 1777–82). The work, which was not quite finished, contains extracts from a large number of Arabian, Persian, and Turkish authors, with abundant historical, biographical, and illustrative material relating to the peoples of the East. Among other works left unfinished by d'Herbelot is an Arabic, Persian, Turkish, and Latin dictionary. Consult Goujet, *Mémoires sur le Collège de France,* vol. iii (Paris, 1758); Lefranc, *Histoire du Collège de France* (ib., 1893).

HERBERAY DES ESSARTS, âr'brâ' dā zĕs'sär', Nicolas de (?–1557). A French officer and translator. He was a Picard noble, and an officer in the royal artillery under Francis I, whom he accompanied to Madrid in 1525. Here he read and, at the King's request, translated from the Spanish the romance of *Amadis of Gaul* (1540–48). His other works include: *L'Amant maltraité de sa mye* (1539); *Le premier livre de la chronique de Dom Flores de Grèce, chevalier des Cignes* (1555); *L'Horloge des princes de Guevara* (1555). He has been called the founder of the heroic romance in France, traces of which are again apparent in the idealistic novels of George Sand and Octave Feuillet.

HERBERMANN, hĕr'bĕr-măn, Charles George (1840–1916). An American editor. Born near Münster, Westphalia, Prussia, he came to the United States in 1851, seven years later graduated from the College of St. Francis Xavier, New York City, and afterward taught at the City College, becoming professor of the Latin language and literature in 1869, and librarian, also, in 1873. In 1904 he became editor in chief of the *Catholic Encyclopædia.* He was president of the Catholic Club (1874–75) and of the United States Catholic Historical Society (1898–1913); published editions of Sallust's *Bellum Jugurthinum* and *Bellum Catilinarium;* edited *Unpublished Letters of Charles Carroll of Carrollton* (1902), Thébaud's *Forty Years in the United States* (1904), Waldseemüller's *Cosmographiæ Introductio* (1907), and *Diary of a Visit to the United States by Lord Russell of Killowen* (1910); translated Torfason's *History of Vinland;* and is author of *Business Life in Ancient Rome* (1880).

HER'BERT. An historic British family, dating from the Norman Conquest, which has been ennobled in so many of its branches, by ancient and renewed creations, that it is impossible to ascertain with certainty which is the parent stem. Herbert, Count of Vermandois, who afterward filled the post of Chamberlain under William II, is mentioned in the roll of Battle Abbey and received from his sovereign a grant of lands in Hampshire. His wife, Emma, daughter of Stephen, Count of Blois, was a granddaughter of the Conqueror, and his son, Hĕrbert of Winchester, was Chamberlain and Treasurer of King Henry I. In the reign of Henry V, Sir William Herbert, of Raglan Castle, County Monmouth, received the honor of knighthood in reward of his valor in the French wars. His eldest son, a stanch adherent of the house of York, was created Earl of Pembroke by Edward IV in 1469, but fell into the hands of the Lancastrians after the battle of Danes Moor and was beheaded the following day, when the title became extinct. It was, however, revived in 1551, in the person of his illegitimate grandson, William Herbert, one of the most influential noblemen of his age, both as a statesman and as a soldier. The fourth Earl, Lord Chamberlain to Charles I, and chancellor of the University of Oxford, was the founder of Jesus College in that seat of learning, his representative descendant being hereditary visitor. The eighth Earl held several high offices under Queen Anne, including that of Lord High Admiral. From him the present representative, Sidney, fourteenth Earl of Pembroke and Montgomery (born 1853), is directly descended. The earls of Carnarvon, more than one of whom have gained celebrity in the field of literature, descend from the eighth Earl of Pembroke, mentioned above. The present earls of Powis are descended from the same stock maternally, the only child and heiress of the last Earl of Powis of a previous creation having married the eldest son of Robert Clive, the founder of the British Indian Empire, in whose favor the title was renewed in 1804.

HERBERT, Edward, first Lord Herbert of Cherbury (1583–1648). Commonly reckoned as the first of the English deistical writers. He was born of a noble family at Eyton-on-Severn, near Wroxeter, March 3, 1583. He was sent to Oxford in his twelfth year and by arrangement of his relatives at 16 married an heiress, but kept on with his studies. The marriage was happy, but there appears to have been little affection between Herbert and his wife, who was four years older than himself. In 1600 he removed to London and attracted Queen Elizabeth's notice. On the accession of James I he

was made Knight and invested with various offices. He left home for travel in France in 1608 and from this time resided very much abroad. After a brief return to his native country he set out again for the Low Countries, where he joined the arms of Maurice of Orange; he again offered him his services in 1614. After a campaign he traveled through Germany and Italy on horseback and went as far as Venice, Florence, and Rome. On his return he conducted a troop of Protestant soldiers from Languedoc into Piedmont to assist the Duke of Savoy against the Spaniards (1615), which was unsuccessful and brought him into a brief imprisonment. He soon returned to England and devoted himself to study and philosophical inquiry; but important diplomatic duties awaited him. He was sent to France as Extraordinary Ambassador (1618) to promote the alliance between France and England, and he was so far successful that he was appointed Ordinary Ambassador and continued to reside in Paris. He tried, but without much success, the difficult task of negotiation between Louis XIII and his Protestant subjects, and was abruptly recalled in 1624. He was elevated first to be a peer of Ireland, and then in 1630, five years after the accession of Charles I, to be a peer of England. When the Civil War broke out, he appears to have acted with hesitation, at first siding with the Parliament and then joining the King. His hereditary seat, Montgomery Castle, was attacked and burned. He died in London, Aug. 20, 1648. The result of his religious speculations is contained in his Latin treatises, *De Religione Laici* and *Ad Sacerdotes de Religione Laici*, issued with his *De Causis Errorum* (London, 1645); and *De Religione Gentilium* (Amsterdam, 1663; trans., *The Ancient Religion of the Gentiles and Causes of their Error Considered*, London, 1705). Herbert's position at the fountainhead of English Deism (see DEISM) gives them a peculiar significance. His speculations are those of a philosophical dogmatist rather than of a critical inquirer. He rejects revelation, and regards all religion as deduced from five axioms: God; worship; virtue; repentance; future life. His other works of general interest are his *Life and Reign of Henry VIII* (reprinted 1880); his *Poems* (1665; reëdited by Collins, 1881); and particularly his *Autobiography*, edited by Lee, with introduction and continuation (London, 1886. Other eds., Boston, 1905; New York, 1907).

HERBERT, GEORGE (1593–1633). An English poet, brother of Lord Herbert of Cherbury, born in Montgomery Castle, Wales. He was educated at Westminster and at Trinity College, Cambridge, graduating B.A. in 1612–13, and M.A. in 1616. In 1615 he was elected fellow, and in 1619 he was promoted to the office of public orator. He now made the acquaintance of Bacon; in the hope of preferment he was induced to spend considerable time about the court. On the death of James I he studied divinity and finally took holy orders. He married in 1629, and the next year received the rectory of Bemerton, Wiltshire. Here he lived a most saintly life. But in less than three years he died of consumption and was buried beneath the altar of his church. While at Bemerton he wrote *The Temple, or Sacred Poems* (1633), which, though disfigured by conceits in the manner of the time, contains some of the finest sacred lyrics in our language. He also wrote a prose work, *The Country Parson* (1652), which lays down rules for the guidance of a clergyman's life and may be considered a pendant to *The Temple*. A charming life of Herbert was written by Izaak Walton (*Life of George Herbert*, London, 1670). Consult also: Shorthouse, reprint of *The Temple* (ib., 1882); *Complete Works in Prose and Verse*, with Walton's *Life*, edited by Grosart (ib., 1874); *Poems*, issued by the Society for the Promotion of Christian Knowledge (ib., 1890); and *Life*, by the same society (ib., 1893); *Poems*, edited by A. Waugh (Oxford, 1908); *English Works of George Herbert*, edited in detail by G. H. Palmer (3 vols., New York, 1905); A. G. Hyde's *George Herbert and his Times* (ib., 1906) is a full and careful study. In 1911 a *Bibliography* (pamphlet) was prepared by G. H. Palmer for the Harvard University Library.

HERBERT, HENRY HOWARD MOLYNEUX. See CARNARVON, fourth EARL OF.

HERBERT, HENRY WILLIAM (1807–58). An American novelist, born in London. He studied at Eton from 1820 to 1825, graduated at Caius College, Cambridge, in 1830, emigrated to America in 1831, and for eight years taught Greek and Latin in a private school in New York City. He established in 1833 the *American Monthly Magazine*, which he edited till 1836, and contributed widely to newspapers and magazines. In 1834, under the pen name "Frank Forester," he began to write books on sports and sketches of outdoor life, which formed a series of great usefulness and popularity. His more serious literary work included several carefully written novels, chiefly historical, and translations from the French of Eugène Sue and Dumas. The last years of his life were embittered by domestic troubles and the estrangement of personal friends, and he died by his own hand. His novels and works on history include: *Cromwell* (1837); *Marmaduke Nyvil* (1843); *The Brothers: A Tale of the Fronde* (1844); *The Captains of the Old World* (1851); *The Cavaliers of England* (1852); *The Chevaliers of France* (1853); *The Puritans of New England* (1853); *The Captains of the Roman Republic* (1854); *Memoirs of Henry VIII of England and his Six Wives* (1858). Chief among the "Frank Forester Series" are: *Field Sports of the United States and the British Provinces of America* (1848); *Frank Forester and his Friends* (1849); *Complete Manual for Young Sportsmen* (1852); *Horses and Horsemanship of the United States and British Provinces* (1859). His *Poems* were published in 1887. Consult Picton, *Frank Forester's Life and Writings* (New York, 1881), and Judd, *Life and Writings of Frank Forester* (ib., 1882).

HERBERT, HILARY ABNER (1834–1919). An American Congressman and Secretary of the Navy. He was born at Laurensville, S. C., was early taken by his parents to Greenville, Ala., was educated at the University of Alabama and the University of Virginia, and was admitted to the Alabama bar in 1857. In the Civil War he commanded the Eighth Alabama (Confederate) Regiment and was disabled at the battle of the Wilderness in 1864. He was a member of Congress from 1877 to 1893, serving during several terms on the Committee on Naval Affairs, and hence was prominently connected with the reconstruction of the navy. From 1893 to 1897, during the second administration

of President Cleveland, he was Secretary of the Navy and subsequently practiced law in Washington. He edited: *Why the Solid South? or, Reconstruction and its Results* (1890); *The Race Problem at the South* (1901); *The Abolition of the Crusade and its Consequences* (1912).

HERBERT, Ivor John Caradoc (1851–). An English soldier, born at Llanarth, Monmouthshire. At 19 he became a grenadier guardsman, and he was made a captain four years afterward. He distinguished himself in Egypt (1882), on the Nile expedition (1884–85), and was promoted to the rank of colonel in 1889. As major general, Herbert was at the head of the militia in Canada for five years (1890–95). In 1906 he entered Parliament as Liberal member for Monmouthshire, and in 1908 he retired from the army.

HERBERT, John Rogers (1800–90). An English historical and portrait painter, born at Maldon (Essex). He was a pupil of the Royal Academy and exhibited there in 1830, then for some years did illustrating and subject pictures. Of these, "The Appointed Hour" (1834) attracted some attention, and after several successes he went abroad. In 1840 he became a Roman Catholic, and afterward his subjects were chiefly religious. Among his best works are the frescoes in the Houses of Parliament: "King Lear Disinheriting Cordelia," in the Poets' Hall, and a cycle of nine subjects representing "Human Justice" in the Peers' Robing Room. His well-known easel picture, "Sir Thomas More and his Daughter," is in the National Gallery, London; but he is best represented in the Museum of Hamburg, which possesses seven of his works. He was one of the masters in the School of Design in Somerset House (1841) and a Royal Academician (1846). His art is eclectic in style and possesses little power or real technical merit.

HERBERT, Michael Henry (1857–1903). An English diplomat, the son of Sidney Herbert and Lady Herbert of Lea, known as an authoress, and brother of the Earl of Pembroke. He entered the diplomatic service in 1888, was appointed chargé d'affaires at Washington, and in 1892 was Secretary of the British Legation there. In 1893 he was made Secretary of Legation at The Hague and thereafter held successively similar positions at Constantinople (1894–97), at Rome (1897–98), and at Paris (1898–1902). In the latter year he was appointed Ambassador from Great Britain at Washington as the successor of Lord Pauncefote.

HERBERT, Sir Thomas (1606–82). An English traveler and author, born at York and educated at Oxford and possibly at Cambridge. When he was 21 he set out to Persia with Sir Dodmore Cotton, Ambassador to the Persian King. With letters of safe-conduct from court, Herbert traveled through Persia and made important explorations on his way home. Siding with Parliament in the Civil War, he was commissioned to treat for the surrender of Oxford, and in 1647 was given charge of Charles, whose personality won him to the royal cause. Herbert was the King's constant and sole attendant during his last days and accompanied him to his execution. He was created Baronet after the Restoration. Among his publications are narratives of his travels: *A Description of the Persian Monarchy* (1634), reprinted as *Some Yeares Travels into Divers Parts of Asia and Afrique* (1638), and his reminiscences (1678) of Charles I's captivity, reprinted as *Memoirs of the Last Two Years of the Reign . . .* (1702, 1813).

HERBERT, Victor (1859–). An Irish-American conductor and composer, born at Dublin, Ireland, and a grandson of the famous novelist, Samuel Lover. He was surrounded by musical influences from earliest childhood and at seven years of age was studying music in Germany, in which country he received his musical education. Although trained in the entire range of music, he perfected himself on the cello, and secured his first important engagement as the first cellist of the Court Orchestra at Stuttgart, which, after an interval spent on tour, was followed in 1886 by a similar position with the Metropolitan Orchestra of New York. He afterward played under Thomas, and later Seidl, acting under the latter in the double capacity of cellist and associate conductor. From 1894 to 1898 he was bandmaster of the Twenty-second Regiment (New York City). In 1898 he founded the Pittsburgh Symphony Orchestra, which he conducted until 1904. Meanwhile he had been equally busy with his pen and had published several compositions, chiefly instrumental. Among his comic operas are: *Prince Ananias* (1894); *The Wizard of the Nile* (1895); *The Serenade* (1897); *The Idol's Eye* (1897); *The Only Girl* (1914). His grand opera *Natoma* was produced in 1911 by the Chicago Opera Company; and *Madeleine* (one act) at the Metropolitan Opera House in 1914.

HERBERT OF LEA, Sidney Herbert, first Baron (1810–61). An English administrator, second son of the eleventh Earl of Pembroke. He was born at Richmond, Surrey, Sept. 16, 1810; was educated at Harrow and at Oriel College, Oxford, and entered the House of Commons in 1832 as member for South Wilts, which he represented until his elevation to the peerage in 1861. He began his political career as a Conservative and was Secretary of the Admiralty in Sir Robert Peel's administration from 1841 to 1845, when he became Secretary for War. As a member of this administration, it fell to him to oppose Cobden's motion for a select committee to inquire into the effect of the corn laws on farmers, and afterward to argue in support of the free trade in corn. He went out of office with his party in 1846. In 1852 he was again Secretary for War, in the Aberdeen ministry, and although the sufferings of the army before Sebastopol were laid in a great degree at his door, it was he who sent Florence Nightingale to the Crimea. He was for a few weeks Colonial Secretary in the first administration of Lord Palmerston in 1855, and Secretary for War in his second administration in 1859. Great improvements in the sanitary condition and education of the army, the amalgamation of the Indian with the royal army, and the organization of the volunteer force signalized his army administration. He largely reformed the War Office and was devoting himself with equal zeal and intelligence to his ministerial duties, when, owing to failing health, he resigned his seat in the House of Commons, and in 1861 was called to the Upper House, under the title of Baron Herbert of Lea. He died Aug. 2, 1861. Consult Stanmore, *Sidney Herbert, Lord Herbert of Lea, a Memoir* (London, 1906).

HERBERTSON, hĕr'bĕrt-son, Andrew John (1865–1915). A British geographer, born in

Galashiels, Scotland, and educated at Oxford and at Freiburg-im-Breisgau. He became reader in 1905, and in 1910 professor of geography, at Oxford; was a member of the royal commission on canals and inland waterways in 1906–10; was honorary secretary of the Geographical Association and in 1910 president of the geographical section of the British Association; edited *The Geographical Teacher*, the "Oxford Geographies" and "Oxford Wall Maps"; and wrote: *Man and his Work* (1899), with his wife, who prepared the "Oxford Elementary Geographies"; *Atlas of Meteorology* (1899), with others; *Outlines of PHysiography* (1901); *Distribution of Rainfall* (1901); *Commercial Geography* (1903); *Natural Regions of the World* (1905); *Handbook of Geography* (1911). He was general editor of the great *Oxford Survey of the British Empire* (6 vols., 1913–14).

HER'BICIDE (from Lat. *herba*, herb + *cædere*, to kill). A name applied to any substance used to destroy weeds. Of the various chemicals that have been successfully and inexpensively employed in weed destruction, dilute solution of carbolic acid, strong brine, copper-sulphate solutions, arsenic, sal soda, arsenate of soda, kerosene, etc., have been most extensively used upon walks, drives, courts, etc., in the destruction of dandelions, plantain, knotweed, ragweed, and various grasses. For best results, salt should be applied dry. At the rate of 300 pounds of crude salt per acre, meadows can be freed from the orange hawkweed, a plant that resists all other methods of destruction. The interesting discovery has been made that some weeds, such as charlock, penny cress, wild radish, shepherd's purse, etc., may be destroyed without permanently injuring the crops among which they grow, by spraying the fields with a solution of copper sulphate (bluestone) at the rate of 40 gallons per acre. The most satisfactory strength of solution to use has been found to be one pound of copper sulphate to four gallons of water. The spraying should be made on a calm bright day, when the weeds have attained only three or four leaves. If the solution be well applied, the weeds will be killed. Iron sulphate (copperas) may be substituted for the bluestone, but then a stronger solution is required, viz., one pound of the salt to a gallon of water. This treatment has been repeatedly tried in England, France, Germany, and the United States with great success. If rain falls soon after the spraying is done, or if the plants have been allowed to become too old, a second application should follow the first within a week or 10 days. Young clover growing in the cereals will not be injured by the treatment. Iron sulphate spray has been demonstrated as very efficient for destroying dandelions in lawns, but several applications must be given and the solution applied with considerable force. Grass may be temporarily blackened, but it soon recovers. Gasoline applied to the centre of the rosettes of leaves of dandelions and chicory will quickly kill the plants. Arsenite of soda has been extensively employed for weed control on plantations in Hawaii.

HERBIV'ORA (Neo-Lat. nom. pl., from Lat. *herba*, herb + *vorare*, to eat). A term in the old classifications, variously defined and limited, which designated herbivorous as contrasted with carnivorous animals, but ordinarily referred to such as grazed. The term long ago ceased to have any exact significance in science.

HERBOIS, J. M. Collot d'. See Collot d'Herbois.

HER'BORT VON FRITZ'LAR. A German poet of the twelfth and thirteenth centuries, so called from his residence at Fritzlar in Hesse. He was somewhat read in the classics and was probably in orders. He wrote the *Liet von Troie* (18,458 verses), a poetic version of the Trojan War, and the oldest extant German work on that subject, following rather freely the *Roman de Troie* of Benoît de Sainte-More. The work is in the four-stressed rhymed couplets. The language is Middle German, and the poem is coarser and more realistic than the later court epics. There are some worthy passages, such as the address of Achilles to the dead Hector. Perhaps Herbort von Fritzlar is to be identified with a Herbort who appears as the author of a drama, now lost, on St. Otto. Frommann published *Herborts von Fritzlar Liet von Troie* in 1837. Consult: Dunger, *Die Sage vom trojanischen Kriege in den Bearbeitungen des Mittelalters* (Leipzig, 1869); Fischer, *Der altfranzösische Roman de Troie des Benoît de Sainte-More als Vorbild, etc.* (Paderborn, 1883).

HERB ROBERT. A common weed. See Geranium.

HERBS, Culinary, and Seasoning Vegetables. Aromatic or highly flavored plants or parts of plants used in the preparation of foods for the table. The plants popularly employed owe their flavoring properties to volatile oils, which in most instances are derived from the leaves or leafstalks, either fresh or cured; in other cases the seed is utilized; in others, the flower or the root. Familiar examples of leaves are sage, mint (spearmint), savory, thyme, and marjoram; of leaves and stalks, celery, leeks, and chives; of buds and flowers, capers and saffron; of root portions, onions, garlic, and horse-radish; of seeds, dill and caraway; and of fruits, tomato and green and ripe garden peppers, both sweet and sharp. Edible fungi, like seasoning vegetables, are used for food purposes as well as for seasoning. The most prized of these is the truffle, one of the most costly seasonings. Mushrooms are a common seasoning. Seasoning vegetables are grown like other garden vegetables. Most seasoning herbs may be grown from seed in the garden, and many of them—parsley, chives, mint, etc.—in boxes of good soil on a sunny window sill. No special care is necessary, except to remove weeds and to keep the surface of the soil loose. When well established, the leaves may be gathered without injury to the plants. By spreading the leaves and tops of such herbs as sage, savory, thyme, etc., thinly upon trays in a heat not exceeding 120°, and occasionally turning them, they will soon be dry enough to pulverize—an operation generally performed by rubbing between the hands. Celery leaves trimmed off when celery is served on the table may be dried in the same way. The powder will keep well in air-tight jars, but poorly in paper or pasteboard packages, because the paper absorbs the oil and permits its escape into the air. Herbs may also be preserved in alcohol or vinegar. When this method is employed, a jar is filled with leaves, and enough of the liquid added to cover them completely. After standing a few days the liquor will be ready for use. Tarragon vinegar, very often used in making salad dressing, is perhaps the best known of these products. Dried sage, savory, marjoram, and similar herbs

are generally used where the presence of specks is not objectionable, as in dressings, stews, soups, etc.; home-made or commercial extracts in clear sauces, and the fresh herbs in salads. Custom has much to do with the use of savory herbs and seasoning vegetables. In general they are more commonly employed in continental than in English and American cooking. Parsley, sage, onion, celery, and mint (spearmint) are more common seasoning herbs in the United States and England than are savory, borage, garlic, basil, and saffron. These statements apply to home cooking, for the methods of professional cooks are much the same in all countries. Some herbs once much prized are seldom used to-day. For instance, tansy was once a common herb in English cooking. Savory herbs and seasoning vegetables are used in soups, salads, stuffing (forcemeat), made dishes, sauces, etc., as well as in cheese making (sage cheese) and pickle making (e.g., dill pickles made by fermenting cucumbers with dill seeds in a salt brine). Savory herbs are seldom used in sweet foods to-day, though they were once quite common, as old cookbooks show.

The intelligent use of seasoning herbs and vegetables should be encouraged, as it offers a simple and easy way of making the diet palatable and varied. It is often an economy as well, as in the making of savory dishes from left overs. The seasonings add little to food value, but much to palatability. The use of herbs and seasoning vegetables is discussed in connection with the preparation of foods in most of the standard cookbooks. Individual taste, however, has much to do with the quantity and kind used. Consult: Bardswell, *The Herb Garden* (London, 1911); French, *How to Grow Vegetables and Garden Herbs* (New York, 1911); Kains, *Culinary Herbs—Their Cultivation, Harvesting, Curing, and Uses* (ib., 1912). See VEGETABLES.

HERBST, hĕrpst, EDUARD (1820–92). An Austrian jurist and statesman, born in Vienna. He was professor of criminal law and the philosophy of law at Prague in 1858, was elected a deputy to the Bohemian Diet, and then, in accordance with the February patent of 1861, was elected by the Diet to the Lower House in the Austrian Reichsrat, where he became one of the most conspicuous leaders of the German Liberal, or Constitutional, party. In 1867 he was appointed Minister of Justice in the Liberal cabinet (Bürgerministerium) of Prince Carlos Auersperg. As such, he introduced a number of important reforms—among them the abolition of imprisonment for debt, the introduction of the jury in libel suits against the press, the organization of the district courts, important finance measures, and, above all, the confessional ordinances of 1868. In 1870 his party lost its control of the government, and he led the opposition in the Reichsrat in its attacks on the ministries of Potocki and Hohenwart, until the fall of the latter in October, 1871, brought the German Constitutional party once more into power, when he became a leader of the government forces in the Lower House. In the latter years of his life, during the Taaffe régime, Herbst lost much of his former influence because of a split in his former compact party. Among his writings may be mentioned his *Handbuch des österreichischen Strafrechts* (7th ed., 1882–84).

HERCHER, hĕr'kĕr, RUDOLF (1821–78). A German Hellenist. He was born at Rudolstadt and, after studying at Jena, Leipzig, and Berlin, was appointed to a professorship at the Joachimsthal Gymnasium in Berlin (1861). In 1873 he was made a member of the Berlin Academy of Sciences. His works, which are distinguished by critical accuracy, include editions of *De Fluviis* (1851), which he proved had not been written by Plutarch; Arrian's *Scripta Minora* (1854; 2d ed., by Eberhard, 1885); *Scriptores Erotici Græci* (2 vols., 1858–59); *Ælian* (1858); the *Oneirocritica* of Artemidorus (1864); Plutarch's *Moralia*, vol. i (1872); the *Epistolographi Græci* (1873); Apollodorus' *Bibliotheca* (1874). His *Homerische Aufsätze* on the topography of Ithaca were collected by C. Robert (1881).

HERC'TE. A mountain in Sicily. See HAMILCAR, 7.

HERCULANEUM, hĕr'kû-lā'nē-ŭm (Lat., from Gk. Ἡράκλειον, *Hērakleion*, city of Hercules, from Ἡρακλῆς, *Hēraklēs*, Hercules). An ancient city of Italy, situated at the northwestern base of Mount Vesuvius, about 5 miles east of Naples, a short distance from Pompeii. It was doubtless founded by Oscans, but Etruscans seem to have gained a foothold there. It subsequently was conquered, with all the rest of Campania, by the Samnites, and later it fell into the hands of the Romans. In 63 A.D. the city was seriously injured by a violent earthquake; and in 79 it was buried, along with Pompeii and Stabiæ, by the memorable eruption of Vesuvius (q.v.). It now lies at a depth of from 30 to 120 feet below the surface, owing to successive eruptions of later days, and is filled up and covered with volcanic tufa, composed of *lapilli* and ashes, and consolidated to some extent by water, which is often thrown up in great quantities during volcanic eruptions. Above it, on the modern surface, are the two large villages Portici and Resina. The very existence of Pompeii had been forgotten, but knowledge had never been lost of the burial place of Herculaneum. Finally, in 1719, an Austrian general, Count Elbeuf, sank a shaft which fortunately struck the ancient theatre, from which centre some tunneling was done, and objects of interest were discovered. But after a short time the government stopped the work till 1738, when explorations were begun under royal authority, that of Charles IV of Naples. From that time excavations have been carried on intermittently, being far more difficult than in Pompeii; for the greater part of the city lies deep under the modern villages, and work must be done by tunneling through a troublesome tufa, which needs constant support lest the vaults collapse, and with them the foundations of the houses above. Hence visitors can see only a very small portion of this entombed city. The chief edifice shown is the theatre, which was built but a short time before the fatal eruption. It has 16 rows of stone seats and could accommodate about 3000 persons. A part of the Forum, with adjacent buildings, some private houses, two small temples, and a villa have also been discovered; and from these buildings many beautiful statues, in both marble and bronze, especially the latter, and remarkable paintings have been obtained. The art relics of Herculaneum far exceed in value and interest those found at Pompeii. These are to be seen in the Museo Nazionale at Naples. Most remarkable was the discovery in the villa of over 1800 rolls of manuscript on papyrus,

charred into a coallike condition by their long burial under moist earth. About 350 of these have been unrolled; of these about 200 have been published, e.g., in *Herculanensium Voluminum quæ Supersunt* (Naples, 1793–1809; 2d series, 1862–76; vol. i of the 3d series appeared at Milan, 1904). These contain works by Epicurus, Chrysippus, and others. (Consult also *Fragmenta Herculanensia*, Oxford, 1886.) In 1905 Prof. Charles Waldstein (q.v.) again awakened interest in the site by a proposal for excavations to be conducted under international auspices. In 1906, after long negotiations, the Italian government determined to excavate the buried city, following in principle Professor Waldstein's plan, but keeping the control of the excavations in Italian hands. The scheme was to leave the modern village now over the site undisturbed, and by preserving the crust of lava to create in the buried city as it were an underground museum; but difficulties with landowners at Resina soon caused the abandonment of the work. Consult: Ruggiero, *Storia degli scavi di Ercolano* (Naples, 1885); Waldstein and Shoobridge *Herculaneum, Past, Present, and Future* (London, 1908), which gives a full account of the excavations; Barker, *Buried Herculaneum* (New York, 1908); Baedeker, *Southern Italy and Sicily* (16th Eng. ed., Leipzig, 1912).

HERCULANO (âr'kōō-lä'no) **DE CARVALHO E ARAUJO,** ALEXANDRE (1810–77). A Portuguese poet and historian, born in Lisbon. In 1828, to escape the despotism of Dom Miguel, he went to Paris and two years afterward to London. In 1832 he returned to Lisbon, joined the Liberal party, and gained much fame as an editor of *Panorama*. His *Poesias* (1850), including *A voz do propheta* and *A harpa do crente*, the latter of religious and political importance, were followed by the historical novels: *Eurico, o Presbytero* (1847); *O monge de Cister* (1848); *O Bobo; Lendas e narrativas* (1851). In 1845, as librarian at Ajuda, he began his historical work. The *Historia de Portugal* (1846–53) is an authority on Portuguese history to the end of the thirteenth century; equally important are: *Da origem e estabelecimento da inquisiçao em Portugal* (1854–55); *Questões publicas* (1873); *Controversias e estudos historicos* (1876–84). As a member of the Lisbon Academy, Herculano edited *Portugaliæ Monumenta Historica*. Consult Pimentel, *Herculano e o seu tempo* (Lisbon, 1881), and Romero Ortiz, *La literatura portuguesa en el siglo XIX* (Madrid, 1869).

HERCULES, hēr'kū-lēz. A northern constellation, situated between Lyra and Boötes. It contains no stars brighter than the third magnitude, but has several interesting double stars. α Herculis is a variable which oscillates between magnitudes 3.1 and 3.9; its components form a contrasting pair—the one reddish orange, the other emerald green. ζ Herculis, a binary discovered by Herschel in 1782, has yellow and blue components of the third and sixth magnitudes respectively; its period is about 35 years. 95 Herculis is notable for the color changes which it has undergone since it was first observed by Herschel in 1780; its two components, each of magnitude 5.5, were then bluish white and white respectively, changed to orange and green about 1855, and are now both pale yellow. The most interesting object in this constellation is the globular cluster, *Messier 13*, the finest in the northern heavens.

HERCULES (Gk. *Ἡρακλῆς, Hēraklēs*, also known at Thebes as *Ἀλκαῖος, Alkaios*, and frequently in literature called *Ἀλκείδης, Alkeidēs*, or Alcides, i.e., descendant of Alcæus, father of Amphitryon; Lat. *Hercoles, Hercles, Hercules*). The typical hero of Greek myth and the subject of numberless legends. In general, these may be conveniently treated in three groups, centring in Thebes, Argos, and Mount Œta, near Thermopylæ, and corresponding to the birth, the middle life, and the death of the hero. Thebes seems to have been generally recognized as the birthplace of Hercules, and Amphitryon, the husband of Alcmene, is certainly a Bœotian hero; but when Argos had become the centre of his life it was necessary to connect his parents with that region, and so both Alcmene and Amphitryon become descendants of Perseus and are represented as exiles from Tiryns, living at Thebes. According to the common story, during the absence of Amphitryon, Zeus came to Alcmene in her husband's form, and by him she became the mother of Hercules, while by Amphitryon she conceived his twin brother Iphicles. The jealous Hera, the enemy of Hercules throughout his life, because he was son of Zeus by a mortal mother, sent two serpents to destroy the infants in their cradle; but the hero, who had been gifted by Zeus with superhuman strength, strangled them (see, e.g., Plautus, *Amphitruo*, 1107–19. This play deals throughout with the Amphitryon-Alcmene-Hercules story). Thebes is also the scene of the madness of Hercules, immortalized by Euripides in his play *The Mad Hercules*. In this fit he killed his children—and, in some versions, his wife, Megara—and was ordered by the Delphic oracle to expiate his crime by serving Eurystheus (q.v.), King of Argos or Mycenæ. This feature seems much like an addition to bring the Theban hero into Argolis, and it is quite probable that the original Theban legend contained many exploits afterward transferred to Peloponnesus. The killing of the lion of Mount Cithæron can scarcely be other than a variant of the first labor. At Argos the central feature is the servitude to Eurystheus, to which Hercules was bound even before his birth by a trick of Hera. In this version Zeus had sworn that the sovereignty of the realm of Perseus should pass to the son of Amphitryon or the son of Eurystheus, as one or the other should be born first. Hera delayed the birth of Hercules, and the sovereignty passed to Sthenelus, son of Eurystheus. To this servitude belongs a series of "labors," which were gradually fixed into a canon of 12. The exact date when this was brought about is uncertain. It can scarcely be due to an early epic, for even in the fifth and fourth centuries there is no hard and fast line between the "labors" and the other deeds, and the final classification appears first for us in the mythographers of Alexandria, who also arranged the *parerga* (side deeds), i.e., the other deeds, over and above the "labors," attributed to the hero in appropriate places in the cycle. Traces of an earlier cycle of 10 labors are perhaps to be found in the story that, because in the second labor Hercules had the aid of Iolaus, and in the fifth concealed from Augeas that he was performing the command of Eurystheus, the latter refused to count these and required the performance of the eleventh and the twelfth.

The first labor was to destroy the lion which haunted the forests of Nemea and Cleonæ and

could not be wounded by the arrows of a mortal. Hercules boldly attacked him with his club, but in vain, and he was finally obliged to strangle him with his hands. From this time he wore the lion's skin as armor. The second was to destroy the Lernæan hydra with its many heads, which he accomplished with the assistance of his friend Iolaus. (See HYDRA.) His third was to catch the Arcadian hind of Diana, famous for its swiftness, its golden horns, and its brazen feet. The fourth was to bring alive to Eurystheus a wild boar which ravaged the neighborhood of Erymanthus (q.v.). The fifth was to cleanse the stables of Augeas (q.v.), King of Elis, where 3000 oxen had been confined for many years—a task which he accomplished in one day by turning the river Alpheus, or Peneus, through the stables. His sixth was to destroy the carnivorous birds, with brazen wings, beaks, and claws, which ravaged the country near Lake Stymphalus in Arcadia. The seventh was to bring alive to Peloponnesus a bull, remarkable for beauty and strength, which Poseidon had given to Minos, King of Crete, upon his request, in order that he might sacrifice it. When Minos afterward refused to sacrifice the bull, Poseidon made it mad, and it laid waste the island. Hercules brought the bull on his shoulders to Eurystheus, who set it at liberty. It appears again as the Marathonian bull in the story of Theseus (q.v.). The eighth labor was to obtain the mares of Diomedes, King of the Bistones in Thrace, which fed upon human flesh. The ninth was to bring the girdle of Hippolyta, Queen of the Amazons. The tenth labor was to kill the triple-bodied monster Geryon (q.v.) and bring his herds to Argos. The eleventh was to obtain the golden apples from the garden of the Hesperides (q.v.). Atlas, who knew where to find the apples, brought them to Hercules, who meanwhile supported the vault of heaven; but, according to others, Hercules went himself and stole the apples, after slaying the dragon who guarded them. The last labor was to bring from the infernal regions the three-headed dog Cerberus (q.v.). Hades promised him Cerberus on condition that he should not employ arms, but only force. When Hercules had brought the monster to Eurystheus, the latter, pale with fright, commanded him to be removed. Hercules set him at liberty, whereupon Cerberus immediately sank into the earth. Hercules was now free from his state of servitude.

Into the cycle of "labors" are wrought many of the *parerga* performed by Hercules in his wanderings. Thus, the battle with the centaurs, a favorite subject in archaic art, was localized at Pholoe in Arcadia and connected with the chase of the Erymanthian boar. On his journey to Thrace for the horses of Diomedes he was entertained by Admetus (q.v.), and, after wrestling with Death, restored to him from the grave his wife, Alcestis. The tenth and eleventh labors, with their long journeys, gave opportunity for many scenes. The hero voyages towards the western home of Geryon in a bowl given him by the Sun, and on his return through Italy kills the robber Cacus (q.v.), who stole his cattle, and dedicates the *Ara Maxima* at Rome. While in search of the apples of the Hesperides, he wrestles with Nereus, the Old Man of the Sea, slays in Libya the giant Antæus (q.v.), by his strength escapes from the Egyptian King, Busiris, who seeks to offer him as a sacrifice, and frees Prometheus (q.v.) from his captivity. He frees from Hades the captive Theseus (q.v.). During the period of freedom from Eurystheus we find that Hercules was one of the Argonauts (q.v.), and engaged in an expedition against Troy, because, after he had freed Hesione from a sea monster, her father, Laomedon, had refused him the promised reward. In this period was also placed another fit of madness, in which he killed his friend Iphitus and was in consequence required to serve the Lydian Queen, Omphale.

The legends that cluster about Mount Œta are concerned with the death of the hero. He had won Deianira, daughter of Œneus of Calydon, by overcoming his rival, the river god Acheloüs. With her he now repaired to Trachis. Having arrived at the river Evenus, he encountered the centaur Nessus. Hercules passed through on foot; but Nessus, under pretense of carrying Deianira over, attempted to offer her violence, whereupon Hercules slew him with an arrow dipped in the poison of the Lernæan hydra. Nessus, before expiring, instructed Deianira that a robe dipped in his blood would prove an infallible philtre to regain her husband's love. The hero now made war against Eurytus, King of Œchalia (who had defrauded him), slew him and his sons, and carried off his daughter Iole. Thence he went to Cenæon in Eubœa and erected an altar to Zeus Cenæos. In order to celebrate the rite with due solemnity, he sent Lichas to Trachis for a white garment. Deianira, being jealous of Iole, anointed the robe with the philter she had received from Nessus. Hercules put it on, and immediately the poison penetrated his bones. Maddened by the terrible pain, he seized Lichas by the feet and flung him into the sea. He tore off the robe, but it stuck to his flesh, which was thus torn from his bones. In this condition Hercules was conveyed by sea to Trachis, and Deianira, being informed of what had occurred, destroyed herself. Hercules himself repaired to Mount Œta, where he erected a funeral pile, and, ascending it, commanded that it should be set on fire. The burning pile was suddenly surrounded by a dark cloud, in which, amid thunder and lightning, Hercules was carried up to heaven. There he became reconciled to Hera and married Hebe.

Popular legend represented the great, patient, suffering hero as fond of good cheer and relaxation in his hours of rest, and thus in the comedy of Attica and Magna Græcia Hercules was frequently introduced as a jovial sensualist, whose intellectual powers are by no means equal to his physical. Something of this conception appears also in the *Alcestis* of Euripides.

In Greek art, from the earliest times Hercules is a favorite figure. His labors adorned the metopes of the temple of Zeus at Olympia and the treasury of the Athenians at Delphi. His statues are numerous. Scopas seems to have represented him in youthful vigor, but in the Hellenistic period the type is that of a bearded man, of athletic build, often with the muscular development carried to excess, as in the Farnese Hercules of Glycon, which perhaps is based on a work of Lysippus.

The worship of Hercules was early introduced into Rome. (See above, the reference to the story of Geryon.) Probably the worship was brought to Rome from Greek colonies in Etruria and in Magna Græcia. He was worshiped especially at Tibur. He was patron of athletes and gladiators.

As to the nature and origin of Hercules, there has naturally been the widest diversity of opinion. Some, following the later Greek identification with the Phœnician Melqart, and the resemblances to the Babylonian hero Gilgames, have seen only a Semitic deity adopted by the Greeks. In this view he is a sun god or a solar hero. It seems clear that the story of Hercules in its earliest features is pure Greek; the Oriental elements are, to judge from our sources, later accretions. Whether the hero or the god is the original form is, however, still matter for debate. E. Meyer (*Geschichte des Alterthums*, ii, Halle, 1894) has pointed out that Attica, Bœotia, and the Achæan colonies are the seat of the divine worship of Hercules, and insists that he is originally a nature deity, who, like many others, partakes of the changes of nature, now triumphant, now suffering, and that under the Dorian influence, and especially literary tradition, the god sank to the hero. On the other hand, U. von Wilamowitz-Möllendorff holds that in Hercules we have the perfect ideal of the Dorian man, who became a divinity to the tribes with whom the Dorians were in contact. Much can be said in favor of both views, and a positive decision between them is not as yet attainable; but it must be admitted that the degradation of a god to a hero seems common in the development of Greek mythology, while the reverse is by no means so clearly proved a process.

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HERCULES, Pillars of (Gk. Αἱ Ἡρακλέους Στῆλαι, *Hai Hērakleous Stēlai*, Lat., *Herculis Columnæ*). The name given by the ancients to the two rocks forming the entrance to the Mediterranean at the Strait of Gibraltar, Calpe (Gibraltar) in Europe and Abyla (Ceuta) in Africa. Their erection was generally ascribed by the Greeks to Hercules (q.v.), on the occasion of his journey to the Kingdom of Geryon. According to one version of the story, they had once been united, but Hercules tore them asunder, to admit the flow of the ocean into the Mediterranean; another version represents him as causing them to unite temporarily, in order to form a bridge. The first author who mentions them is Pindar, who seems to connect them with Cadiz. In later times there was much discussion as to their exact location, and especially as to whether they were to be identified with the promontories at the strait, or to be sought in islands, or were pillars erected by Hercules.

HERCULES BEETLE. A scarabid beetle (*Dynastes hercules*), remarkable not only for its great size (5 inches long), but for the singular appearance of the male. An enormous horn projects from the thorax, and is opposed by a similar but smaller projection of the head, the whole resembling a pair of great but unequal pincers. It is a native of Brazil. Two species occur in the United States. *Dynastes tityrus* is

HERCULES BEETLE.
m, male; *f*, female.

a large greenish-gray species of the Southern States; *Dynastes granti*, of the Far West, has a much larger thoracic horn than the former. Cf. Goliath Beetle.

HERCULES' CLUB, Angelica Tree. See Zanthoxylum.

HERCULES' CLUB GOURD. See Bottle Gourd.

HERCULES OF THE UNITED STATES BANK. See Cheves, Langdon.

HERCULES POWDER. See Explosives.

HERCYN'IAN FOREST (Lat. *Hercynia Silva*). A name variously applied by the ancient writers to portions of the central mountain system of Europe. Aristotle makes the Ister (or Danube) and the other great northern rivers take their rise in the Hercynian Forest. Cæsar, who estimates it at nine days' journey in breadth and 60 in length, comprehends under this name a great part of the mountain ranges in Germany north of the Danube; while some identify it with the Bohemian Forest, and others with the Thuringian Forest. Some geographers apply the term to the complex of mountain ranges, mountain groups, and plateaus which stretch from Westphalia across middle Germany and along the northern borders of Austria to the Carpathians.

HERD, David (1732–1810). A Scottish collector of national ballads. He was born in the Parish of Marykirk, Kincardine, where his father had a farm, but early left the country for the town and became a well-known figure among the literary men of Edinburgh. His claim to remembrance rests upon his *Ancient and Modern Scottish Songs, Heroic Ballads, etc.* (2 vols., 1776), of which a modern edition was published in Glasgow in 1869.

HERDER, hĕr'dĕr, Bartholomäus (1774–1839). A German publisher, born at Rottweil in Württemberg. In 1801 he opened a bookstore and printing office in Meersburg on Lake Con-

stance, but soon afterward removed to the city of Constance, and in 1810 to Freiburg, Baden, where he opened the Herdersche Universitätsbuchhandlung. He accompanied the allies to Paris in 1815 as Imperial field printer in Metternich's suite, and on his return added to his printing business establishments for lithography, copper engraving, and plastic art. The Catholic character of the firm was developed under his sons and successors, Karl Raphael Herder and Benjamin Herder, and it became one of the best-known publishing houses of this church in Germany. In 1888 Hermann Herder, a son of Benjamin and grandson of the founder, inherited the business, which became known as the Herdersche Verlagshandlung. The firm also established an office at St. Louis, Mo., U. S. A. Among the important works which the firm has published are *Wetzer und Welte's Kirchenlexikon oder Encyklopädie der katholischen Theologie* (12 vols., 1847–56; 2d ed., 1882–1901) and *Herders Konversations-Lexikon* (9 vols., 1905).

HERDER, Johann Gottfried von (1744–1803). An eminent German philosopher, critic, and theologian, of the classical period, born at Mohrungen in East Prussia. He was the son of a schoolmaster and cantor. His frail health unfitted him for industrial life, and his first earnings were as copyist to Deacon Trescho, a voluminous but forgotten author. Here he was neither appreciated nor justly treated, but he gained a knowledge of books and an easy style. He had begun independent composition when he awakened the interest of a Russian surgeon, with whom he went to Königsberg to study medicine; but for this study his nerves proved too weak, and he turned to theology, getting a small scholarship and eking out a livelihood by teaching. He soon won notice both as teacher and preacher and became acquainted with Kant the philosopher, who, with Rousseau, was the guide of his future metaphysical speculations. In 1764 he accepted a call to the Cathedral School at Riga, where he maintained his reputation and would have remained had he not become involved in a literary controversy with Klotz about Lessing, in the course of which he denied the authorship of articles which he had written. His desire to travel was thus strengthened by the situation in Riga, and he left for France in June, 1769. Too poor to remain longer abroad, he returned to Germany in that year, glad to become tutor to the Prince of Holstein-Eutin. He spent a profitable fortnight with Lessing at Hamburg, found at Darmstadt his future congenial mate in Karoline Flachsland, and accepted a call to the pastorate of Bückeburg. But he spent the winter of 1770–71 in Strassburg for an operation on one of his eyes (unsuccessful), during which time he was a helpful friend and critic of the young Goethe, who was finishing his law studies at the university. He then went to Bückeburg. He had printed the famous critical attacks on the artificial literary spirit of his time, *Fragmente über die neuere deutsche Litteratur* (1767) and the *Kritische Wälder* (1769), and a prize essay, *Ueber den Ursprung der Sprache* (1772). He now began to gather material for the *Ideen zur Philosophie der Geschichte der Menschheit*, his greatest work, though unfinished, published 1784–91 (translated by Churchill), for *Aelteste Urkunde des Menschengeschlechts* (1774), an æsthetic study of Genesis, and for the studies in folk poetry (*Volkslieder*, 1778–79), the works that were to constitute his chief title to fame. In 1773 he married. In 1776 Goethe procured for him the posts of superintendent of the church district of Weimar, court preacher, and member of the upper consistory at Weimar, where he found the environment best suited to his delicately organized genius and labored effectively for Church reform, though he soon found himself gradually becoming estranged from Goethe and his associates. Many of Herder's important publications were completed in the period between 1778 and his journey to Italy in 1788. They consist of theological, æsthetic, philosophic, philologic, and political studies, of *Vom Geiste der ebräischen Poesie* (1782; trans. by Marsh, *The Spirit of Hebrew Poetry*, 1833), of a paraphrase of *Thé Cid* (1805), and of *Stimmen der Völker* (Voices of the Peoples, 1778–80), in which he translated the popular songs of many nations with a felicity and sympathy that preserve in wonderful degree the local color and feeling. Herder's original work in æsthetics, philosophy, literature, and philology has powerfully influenced German thought. He was possibly best as an interpreter of others; for he had a truer perception of the relation of language to human nature and national character than any other of his day. He was considered, if not a systematic, a most stimulating thinker, perhaps more a seer than a scholar, yet by the scope of his intuitional perceptions he abounded in suggestions that have borne fruit in the modern correlation of the sciences. The best critical edition of Herder's complete works is that of B. Suphan in 33 volumes (1877–1909). The literary portion has been also reëdited by Suphan and Redlich (9 vols., Berlin, 1884 et seq.). For Herder's biography, consult his widow's *Erinnerungen aus dem Leben Johannis Gottfricd von Herders* (Stuttgart, 1830), *Lebensbild*, by his son Emil (Erlangen, 1846–47), and his *Letters* (ib., 1846–48). There are lives by Haym (Berlin, 1877–85), Kühnemann (Munich, 1895), Bürkner (Berlin, 1904), and in English by Nevinson (London, 1884).

HERD'S GRASS. See Redtop Grass.

HEREDIA, ā'rā'dē'ā', José de (1842–1905). A French poet, of Spanish parentage, born at Santiago de Cuba. He was the most talented disciple of Leconte de Lisle (q.v.), and one of the greatest masters of the French sonnet. His sonnets are the supreme result of the cultivation of form that the French call Parnassian, very picturesque and as impersonal as lyric poetry can be. Leconte de Lisle was not quite impassive in his pessimism, but in Heredia's work one perceives of the author only the expansion of the heart towards beauty and heroism. The immediate response of the public to the 50 sonnets of *Les trophées* (1893) was significant of the revival of stricter classical taste in a reaction against the fantastic license of the Symbolists and the followers of Baudelaire (q.v.). Heredia's poems resemble Gautier's in polish. They show the reticences of the conscious artist and a vague suggestion of the subjective. He was the most condensed, plastic, and precise stylist of modern France—rich in suggestions of color and melody, incomparable in the union of sonorousness and compression. His subjects reflect in the main the scenes and traditions of his youth at Havana rather than those of his later studies at the Ecole des Chartes. The heroic epoch of Spanish conquest was his most inspiring theme, and he used it also in his sole

picaroon prose romance, *La nonne Alferez* (1894), and in a translation of Bernal Diaz's *Chronicle*. But he is often superb in merely exotic description, as in the brilliancy of *Récif de corail* or the splendor of *Blason céleste*. Heredia was elected a member of the French Academy in 1894. There is a translation of the sonnets into English blank verse in Frank Sewall's *The Trophies* (Boston, 1900). Consult Ernest-Charles, *De Hugo à Mistral* (Paris, 1902), and A. Medeleine, "Chronologie des sonnets de Hérédia," in *Revue d'histoire littéraire* (ib., 1912).

HEREDIA Y CAMPUZANO, ā küm-pōō-zä'nō, JOSÉ MARÍA DE (1803–39). A Cuban lyric poet, born in Santiago de Cuba, Dec. 31, 1803. His father and mother were from Santo Domingo. Very early Heredia was taken to Florida, then to Santo Domingo, and in 1812 to Venezuela. At the age of 10 he began to study philosophy in Carácas, whence he went to Mexico. He returned to Cuba in 1817 and entered the University of Havana. Beginning the practice of law at Matanzas, he became involved in a conspiracy and was forced to flee, after which he was condemned by the government to perpetual exile (1823). He spent the next two years traveling in the United States, and making a scanty livelihood by his poems and by giving lessons in Castilian. After 13 years of banishment Heredia sought and obtained permission for a three months' visit to his mother and sisters at Matanzas. Heredia died at Toluca, Mexico, May 12, 1839. Though he is much less gifted than his cousin, the French sonnetist, José de Heredia (q.v.), still he is one of Cuba's great poets and the first poet of the patriotic group. Heredia's Spanish is remarkably pure. His verses are often rhetorical, sometimes crude, and one is continually impressed by the weakness and the vanity of their author; nor is there ever any great power in Heredia's reasoning, but his verses are often imaginative, and they reflect the melancholy of exile. Their tropical coloring initiated a brilliant epoch in the poetry of Cuba, not only making his name widely popular in all Spanish-speaking countries, but also causing his poems to be translated into the principal tongues of the civilized world. The foremost Spanish critics, as well as distinguished French and English writers, among them Longfellow, paid high tribute to the lyrical productions of the Cuban poet. They passed through numerous editions. His best-known poem is the ode *Al Niágara*, a "most beautiful piece of American verse," which has been translated into many languages. Besides rendering into Spanish verse several dramas by famous French and Italian authors, such as Voltaire, Chénier, Alfieri, and others, he published, in 1830–31, *Lecciones de historia universal*, a work distinguished by lucidity of style and profundity of ideas, entitling its author to an honorable place among Latin-American historians.

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HER'EDIT'AMENT (ML. *hereditamentum*, from Lat. *hereditare*, to inherit, from *heres*, heir). In English law, a comprehensive term including everything that goes to the heir at law. Hereditaments are regularly classified as corporeal and incorporeal. A house or land held in freehold is a corporeal hereditament; while tithes, advowsons, profits *à prendre*, and even future estates in land are incorporeal, being dealt with in our legal system as impalpable rights enjoyed in corporeal things. The term most frequently appears in the phrase "lands, tenements, and hereditaments," technically used by Blackstone and other common-law writers to denote every species of real property. "Hereditaments" is the most comprehensive term of the three, as it includes not only lands, but incorporeal interests, such as those above referred to, and not only tenements, but such things as heirlooms. (See HEIRLOOM.) On the other hand, it does not include interests in lands, such as leasehold estates and life estates, which do not descend to the heir. See HEIR; REAL PROPERTY.

HERED'ITY. Heredity is the measure of resemblance due to common descent. It is otherwise defined as follows: 1. "The influence of parents upon offspring; transmission of qualities or characteristics mental or physical, from parents to offspring." (*Century Dictionary.*) 2. "Understood in its entirety, the law is that each plant or animal, if it reproduces, gives origin to others like itself; the likeness consisting not so much in the repetition of individual traits as in the assumption of the same general structure." (Herbert Spencer, *Principles of Biology*, vol. i, p. 301.) "The phenomenon of correlation in the deviations of blood relatives from the mean."

It is difficult to define a term that comprises under a single conception so large a range of phenomena. Resemblances between parents and offspring, brothers and sisters and near relatives generally, are examples of heredity; but according to the law of descent (evolution) all living things are related by common descent, and therefore the laws of heredity apply to all organisms in proportion to the nearness of relationship.

To study heredity it is necessary to compare corresponding characters, and apparently there may be an indefinite number of these, according to the minuteness of comparison. But it is found that the minuter characters are usually associated and are inherited in groups. These constitute the unit characters of a modern school of biologists (mutationists) who regard the organism as a mosaic of unit characters, which recur in different combinations in related species, and which are as sharply separated from one another as the molecules of chemistry. This conception is obviously radically at variance with the idea of blending and gradual separation of characters that has hitherto been current.

In any case inheritance can be studied only by comparison of characters considered singly, whether these are actual units or arbitrary subdivisions.

Corresponding characters of parents may appear in offspring in one of three different ways: 1. *Blending Inheritance:* in such cases the character of the offspring is intermediate between the corresponding parental characters, e.g., inheritance of color in the mating of a negro and a white person—the offspring is mulatto, i.e., intermediate. 2. *Alternative, or Exclusive, Inheritance:* the character of one parent is inherited to the exclusion of the corresponding character of the other, e.g., the offspring of a gray and a

white mouse is gray. In such cases the character that appears is known as the *dominant* character; that which fails to appear, the *recessive* character. 3. *Particulate, or Mosaic, Inheritance:* in such cases (relatively rare) maternal and paternal characters are intermingled but not blended in the offspring.

The distinction between blending and alternative inheritance is, on the whole, a fairly sharp one, especially in the case of hybrids, where it can best be studied, owing to contrast in the corresponding parental characters. It is doubtful, however, if the dominance of one character is ever absolute; certainly it is often only relative. Thus, the distinction between blending and alternative inheritance is not an absolute distinction, and does not imply any difference in the laws of inheritance.

Cases in which the filial form of a character is unlike its form in either parent are not uncommon and have to be recognized in any theory of inheritance.

Inheritance does not follow fixed, unvarying laws like those of phenomena due to simple causes, but the data of heredity, when formulated in a statistical manner, are found to conform to certain general principles. These are, it must be confessed, only very partially known at the present time. There can be no doubt that the phenomena of heredity are capable of as exact a formulation as any other phenomena of equal complexity; but the data have been studied in a consistent, experimental, and statistical manner only relatively recently, and our knowledge is therefore growing rapidly and not fully formulated. Some of the more general results may be stated: 1. The influence of the two parents is, on the whole, equal in heredity. This comes out clearly from the fact that reciprocal crossings are, on the whole, similar, or, in general terms: a♀ × b♂ = a♂ × b♀. 2. The law of *ancestral inheritance,* as stated by Galton (*Nature,* vol. lvii, p. 293, London, Jan. 27, 1898), is as follows: "The total *heritage* of the offspring is derived as follows: The two parents between them contribute *on the average* one-half of each inherited faculty, each of them contributing one-quarter of it. The four grandparents contribute between them one-quarter, or each of them one-sixteenth, and so on; the sum of the series ½ + ¼ + ⅛ + 1/16, etc., being equal to 1, as it should be. It is a property of this infinite series that each term is equal to the sum of all those that follow: thus, ½ = ¼ + ⅛ + 1/16, etc., ¼ = ⅛ + 1/16, etc., and so on. The prepotencies or subpotencies of particular ancestors, in any given pedigree, are eliminated by a law that deals only with *average* contributions, and the varying prepotencies of sex in respect to different qualities are also presumably eliminated. Corrections for these can of course be made in any particular pedigree, taking care that the corrected series still amounts to 1 exactly."

Pearson has accepted the principle of the law of ancestral heredity, but has modified the mathematical proportions to correspond more nearly with actual statistical data: "In eye color in man and coat color in horses, the mean ancestral coefficients of regression form within the limits of error of random sampling a geometrical series, but it is not Mr. Galton's series:

.5000, .2500, .1250, .0625,

but more nearly .6244, .1988, .0630, .0202."

In other words, actual statistics show that in man and horses the parents are much more, and the grandparents and higher ancestry less, influential than on Mr. Galton's hypothesis.

"Thus the law of ancestral heredity (by which we are to understand the theory of multiple correlation together with the hypothesis that the mean ancestral correlation or the regression coefficients form a geometrical series) fits the data for horse and man remarkably well." (Pearson, "Law of Ancestral Heredity," *Biometrika,* vol. ii, pp. 296, 297, Cambridge.)

3. Mendel's *Principles of Inheritance:* Mendel's principal paper was published in the *Verhandlungen des Naturforschenden in Brünn,* Abhandlungen IV, 1865, and remained entirely unnoticed, except for one or two passing remarks, for 35 years, when it was rediscovered by De Vries, Correns, and Tschermak, who confirmed Mendel's results in all essential respects. Mendel's results have since been confirmed and extended by numerous workers both for plants and animals, but much is still uncertain concerning both the extent to which the principles may be found to occur and also the fundamental physical basis on which they depend.

The two fundamental principles usually termed Mendelian are: (1) that of alternative inheritance, viz., that of two corresponding but contrasted pairs of characters of the parents, only one appears in the offspring. This is known as the dominant character; the character not appearing is the recessive character. (2) The law of segregation of characters, according to which both dominant and recessive characters reappear pure in 25% each of the offspring of hybrids.

To illustrate: the offspring of a gray and an albino mouse is gray; i.e., the gray character is dominant and the white recessive. But of the offspring of such hybrid gray mice, bred inter se, approximately 25% are white, the remainder being gray; furthermore, it is found that the whites continue to breed true indefinitely, but that of the 75% gray, only 25% continue to breed true to color and 50% split up, i.e., behave as hybrids, yielding 25% white and 75% gray. In other words, the offspring of gray-white hybrid mice are 25% white, 50% hybrid, and 25% gray; the hybrids, however, appear gray, owing to the dominance of gray over white. Expressed in general terms: D (the dominant character) × R (the recessive character) = D(R) (the hybrid in which R is recessive). But the offspring of D(R)'s bred inter se are 25% D + 50% D(R) + 25% R. This result comes out clearly only when large numbers are compared; usually the larger the number compared, the closer the approximation to the theoretical formula.

These principles were found by Mendel to apply to the following corresponding characters of peas: (1) difference in form of the ripe seeds: round × angular; (2) color of endosperm: yellow × green; (3) color of seed coat: gray and gray brown × white; (4) difference in the form of the ripe pod: inflated × constricted between seeds; (5) color of unripe pods, the stalks, leaf veins, and calyx: green × yellow; (6) position of the flower: axial × terminal; (7) length of the stem: 6–7 feet × ¾–1½ feet. In each the character named first was dominant in the hybrid, and the offspring of the hybrids were 25% D + 50% D(R) + 25% R.

The same laws have been found to apply to some other plants, to inheritance of color in mice, of various characters in guinea pigs and rabbits, of many characters in poultry, also in insects.

Mendel explained his results by assuming that the germ cells of the hybrids were not themselves hybrid, but consisted of equal numbers of two kinds with respect to any pair of corresponding characters, half bearing the dominant character and half the recessive character in a pure form. Thus, there are supposed to be in the hybrids, with respect to any pair of characters, equal numbers of ovules bearing the D and R characters, similarly of pollen grains. Hence it would follow that, assuming equal fertility between the two kinds of ovules and pollen, the chances of a D pollen grain uniting with a D ovule would be 25% of an R pollen grain uniting with an R ovule likewise 25%, but there would be 50% D(R)'s formed, which is the observed result. This doctrine, according to which the corresponding pure parental characters dissociate in the germ cells of the hybrid, is known as the doctrine of the purity of the germ cells, and is commonly expressed by saying that the germ cells of hybrids are pure with respect to corresponding parental characteristics. This law is really the essence of the Mendelian law of inheritance.

However, it should be noted that a single germ cell may bear some dominant and some recessive characters; it is rarely or never dominant or recessive in all characters. Furthermore, the two principles, viz., of dominance and segregation, are completely distinct and independent. It is at least theoretically possible that segregation may occur when inheritance is blending or particulate; some cases of this kind are actually known. Again, while the principle of segregation has been demonstrated repeatedly for the most diverse organisms and may be used in many cases to predict the probable characters of offspring of parents of known pedigree, the doctrine of the purity of the germ cells used to explain segregation is purely hypothetical and is indeed at least partially discredited by the phenomena of "latency." (Castle.) This is defined as "a condition of inactivity in which a normally dominant character may exist in a recessive individual or gamete." "Latency of pigment characters in albinos is particularly clear in mice, as shown by the investigations of Cuènot (1903), Darbishire (1904), and especially of Allen (1904). For albino mice are, so far as known, wholly unpigmented, yet they ordinarily, perhaps always, transmit latent pigment characters, either singly or in combinations identical with those occurring in pigmented mice." (Quoted from Castle, 1905.) Such "latent" pigment characters may appear in crosses between albinos and pigmented animals. Thus, the germ cells are certainly not pure with respect to the recessive characters in such cases, even though such albinos breed true inter se.

Physical Basis of Heredity. It is an axiomatic principle that no character is inherited in the sense in which property is inherited, by actual transmission. Inheritance, in the biological sense, is always by way of the germ and is due to the laws of development and growth. Heredity is due to development from similar germs, which have a common origin from a preëxisting germ. The starting point of the development of any individual (asexual and parthenogenetic development excepted) is a fertilized ovum which is a single cell produced by the union of the unfertilized ovum (maternal germ cell) and spermatozoön (paternal germ cell). The fertilized ovum multiplies by repeated division, producing a great number of descendants, most of which undergo differentiation to form the cells of the various tissues of the body, or soma, but one or several remain undifferentiated and by subsequent division give rise to the numerous germ cells of the individual. These carry on the species by union with germ cells of the opposite sex, and the line of germ cells in the new generation is preserved in the same way as before.

Thus, in any line of descent the continuity is preserved through the germ cells, and heredity within the line is due to the continuity of the germ cells, which retain their original properties with great constancy. Continuity of germ cells is not a matter of conjecture, but of actual observation in several cases; while the extremely early origin of the germ cells in the embryos of most animals renders the theory that they are unmodified descendants of the ovum the most rational one. Heredity is therefore reduced to the laws of growth and development and is readily understood on the same principle that governs the resemblance between two plants growing from a common root.

It will be seen that the conception according to which heredity depends upon the continuity of the germ cells has far-reaching implications: 1. It implies a radical distinction between the somatic and germinal parts of each individual. The individual does not produce the germs wherewith he perpetuates the species, but the germs which his body contains are independent descendants of the fertilized ovum from which he himself arose. The body is a receptacle only for this imperishable part. 2. The descendants inherit from the germ; therefore the experiences of the particular somatic individual that transmitted the germ are of no significance for the future generation, except so far as they have modified the germ.

The theory of continuity of the germinal protoplasm was first clearly and definitely stated by Jaeger (*Zoologische Briefe*, p. 318, Vienna, 1876) and was subsequently elaborated by Weismann in his successive writings into a complicated theory of heredity and development. Darwin's provisional hypothesis of pangenesis is of great historical interest as the first consistent attempt in the modern period of biology to connect the complex phenomenon of heredity under some general point of view. The statement of the hypothesis in his own words is as follows: "I assume that the units" (i.e., the cells) "throw off minute granules which are dispersed throughout the whole system; that these, when supplied with proper nutriment, multiply by self-division and are ultimately developed into units like those from which they were originally derived. These granules may be called gemmules. They are collected from all parts of the system to constitute the sexual elements, and their development in the next generation forms a new being; but they are likewise capable of transmission in a dormant state to future generations and may then be developed. Their development depends on their union with other partially developed or nascent cells which precede them in the regular course of growth. . . . Gemmules are supposed to be thrown off by every unit, not only during adult state, but during each stage of development of every organism; but not necessarily during the continued existence of the same unit. Lastly, I assume that the gemmules in their dormant state have a mutual affinity for each other, leading to their aggregation into buds or into the sexual elements. Hence it is not the reproductive organs or buds which generate new organ-

isms, but the units of which each individual is composed. These assumptions constitute the provisional hypothesis which I have called Pangenesis. Views in many respects similar have been propounded by various authors." (Darwin, *Animals and Plants under Domestication*, vol. ii, p. 370, New York, 1900.)

Inheritance of Acquired Characters. This has been a much discussed phase of the problems of heredity, and the question, May acquired characters be inherited? may be said to have been provisionally decided in the negative, because, in the first place, there is no instance on record of the inheritance of any single acquired somatic character, and, in the second, no theory can be suggested, consistent with our knowledge of development, that can explain the mechanism of such transmission. It is necessary, however, to justify these statements by a brief definition of the problem. In the first place, we may define an acquired character as a somatic modification that may be produced by use or disuse, disease or accident, or action of the environment. Now every acquired character presupposes a disposition towards such acquisition inherited from the germ; in other words, every acquired character has a germinal basis, which is of course inherited. The question of the inheritance of acquired characters, therefore, resolves itself into this: May any modification of a somatic part produced by use or disuse, action of the environment, disease or accident, produce such modification in the germ as to alter the germinal disposition in the same direction? It would require the demonstration of some such phenomenon to establish the inheritance of an acquired character as such. No such evidence has been offered hitherto.

An apparent effect of environment in heredity may be explained in two ways: 1. High development of any somatic character implies an unusual germinal disposition, and if the acquired character serves to insure the propagation of the individual possessing it, the unusual germinal disposition will be transmitted. Thus, acquired characters may serve to foster unusual germinal aptitudes by insuring their propagation. 2. The germ cells are themselves directly accessible to stimuli and may be directly modified thereby. Thus, in most animals and plants temperature, humidity, or composition of the internal circulating medium may act directly upon the germ cells and cause modification in them. (See Tower, 1907; McDougal, 1906.) Examples of the second kind have been cited as demonstrating the inheritance of acquired characters, but such cases are of course radically different in principle from the definition above.

Bibliography. Bateson, *Mendel's Principles of Heredity* (Cambridge, 1909); Castle, *Heredity of Coat Characters in Guinea-Pigs and Rabbits* (Carnegie Institution of Washington, Pub. No. 23, 1905); Davenport, *Inheritance in Poultry* (Carnegie Institution of Washington, Pub. No. 52, 1906); Darwin, *The Variation of Animals and Plants under Domestication* (New York, 1876); Galton, *Natural Inheritance* (ib., 1889); Jaeger, *Zoologische Briefe* (Vienna, 1876); Nägeli, *Mechanisch-physiologische Theorie der Abstammungslehre* (Munich, 1884); Pearson, *The Grammar of Science* (2d ed., London, 1900); Tower, *An Investigation of Evolution in Chrysomelid Beetles of the Genus Leptinotarsa* (Publications of the Carnegie Institution, No. 48, 1907); De Vries, *Die Mutationstheorie* (Leipzig, 1903); Weismann, *Das Keimplasma, eine Theorie der Vererbung* (Jena, 1892); Wilson, *The Cell in Development and Inheritance* (New York, 1900); A. D. Darbishire, *Breeding and the Mendelian Discovery* (ib., 1911); *Rignano upon the Inheritance of Acquired Characters*, Eng. trans. by B. C. H. Harvey (Chicago, 1911); E. G. Conklin, *Heredity and Environment* (Princeton, 1914); and for a popular résumé, Doncaster, *Heredity in the Light of Recent Research* (Cambridge, 1910). Consult also Parker, *Biology and Social Problems* (Boston, 1914).

See EVOLUTION; LAMARCKISM; USE INHERITANCE; WEISMANNISM.

HEREFORD, hĕr′*e*-ford. The capital of Herefordshire, England, a parliamentary and municipal borough of great antiquity, and an episcopal see, on the Wye, 144 miles west-northwest of London (Map: England, D 4). The chief building is the cathedral, dating from 1079 and the fourth church built on the site; it was restored in 1856–63. The chapter house contains the famous *Mappa Mundi* (Map of the World) of the thirteenth century. Other edifices are the Bishop's Palace, containing a fine Norman hall; the Coningsby Hospital (1614), an asylum for old soldiers and servants; the corn exchange, the shire hall, and a new town hall (built in 1904). Hereford has an endowed grammar school of the fourteenth century. It owns profitable markets and real estate, gas, water, and electric-lighting plant; maintains a fire brigade, free library and museum, and the Castle green. Its industries and trade are chiefly agricultural. The see of Hereford was created in 673; the town was a fortified place in the reign of Athelstan, and numerous charters begin with King John. For its loyalty and sufferings during the Civil War, Charles I bestowed the motto "Invictæ fidelitatis præmium." Hereford was the birthplace of Nell Gwynne and David Garrick. Pop., 1901, 21,400; 1911, 22,568. Consult Duncumb, *History and Antiquities of Hereford* (Hereford, 1804; new ed., London, 1882), and Fisher, *Hereford Cathedral* (ib., 1898).

HEREFORD CATTLE. See CATTLE.

HEREFORDSHIRE. An inland county in the west of England, bounded on the west by South Wales and on the east by the counties of Worcester and Gloucester (Map: England, D 4). The surface of the county is hilly, with occasional valleys. Among the chief hill ranges are the Black Mountains on the west and the Malvern Hills on the east border. The Wye and its affluents, with the Lugg, the Arrow, and the Teme, are the principal rivers. Herefordshire is essentially an agricultural county, with four-fifths of its area of 842 square miles under cultivation. Camden said of it that "for wheat, wool, and water it yieldeth to no shire in England." It is also famous for its perry and cider. Pop., 1901, 114,125; 1911, 114,269. Capital, Hereford.

Herefordshire formed a portion of the territory of the ancient Silures and was conquered by the Romans about 73 A.D. During the heptarchy it was included in Mercia. From its position on the Welsh border—a portion of the county being included in the debatable land called the "Marches"—Herefordshire was long the scene of frequent contests. Consult *Victoria History of the County of Hereford* (London, 1908).

HEREMANS, hĕr′*e*-måns, JACOB FRANS JAN (1825–84). A Dutch philologist, born at Antwerp. He studied at the Antwerp Athenæum

and in 1843 was appointed assistant librarian of the city. In 1864 he was appointed professor of the Dutch language and literature at the University of Ghent. He was a specialist also in Flemish literature and wrote biographies of the Flemish poets Ledeganck (1847) and Van Rijswijck (1850) and of the historian David (1868). His other books include: *Nederlandsche dichterhalle* (2 vols., 1858–64); *Hoffmann van Fallersleben en de nederlandsche letterkunde* (1874); *Over den invloed van Noord-Nederland op de letterkunde in de zuidelijke provinciën gedurende het tijdperk 1815–30* (1874)—all on literary topics; and *Nederlandsche spraakleer* (1846); *Nederlandsche metriek* (1862); and his Dutch-French dictionary (1865–69). He founded the *Nederlandsch Museum*, a Flemish review, in 1874.

HERENNIUS. See Cornificius.

HEREN'NIUS SENE'CIO. A Roman orator, upholder of the Republican ideals. He is often mentioned in the letters of Pliny the Younger, with whom he was associated in the prosecution and condemnation of Bæbius Massa in 93 A.D. See Helvidius Priscus.

HERERO, hâ-rā'rō. A tribe speaking a Bantu language and occupying a portion of German Southwest Africa. They were greatly reduced in the insurrection of 1903–04, possibly to one-half or even one-third of their original number. In 1908 those seeking shelter in government and missionary stations were estimated at 16,000.

The Herero differ from all other Bantu-speaking tribes in their ignorance of agriculture when discovered by the whites. They are essentially a pastoral people; and this fact, together with a supposedly nonnegroid cast of features, had led Passarge to suggest that they are of Hamitic origin. At all events, it must be conceded that their own traditions indicate a relatively recent immigration into the southwest, and there is evidence of relationship with the tribes to the east, in the vicinity of Lake Tanganyika.

For food the Herero depend on the milk, not meat, supplied by their stock, and to a lesser extent on the products of the chase. The aboriginal dress is of skin; the women are distinguished by a unique headgear—a leather helmet decorated with strings of beads or shells, from the back of which there rise three peaks shaped like asses' ears. Their huts are beehive-shaped and are covered with hides during the rainy season. Assegai spears and knobkerries serve as weapons.

Sociologically the Herero are of special interest mainly as following at the same time both maternal and paternal descent: they are divided into about 10 clans of doubtful function with matrilineal descent, while affiliation with one of the 15 religious organizations depends on the father's membership. These religious bodies have distinctive taboos, largely of a dietary character. The kinship terminology is of the classificatory type. The custom of cross-cousin marriages—i.e., unions between children of a brother and a sister, but never of two brothers or two sisters—is generally practiced.

Among the religious usages the maintenance of a sacred fire by the chief's daughter was a distinctive peculiarity. Extinction of the fire was believed to augur tribal extermination. Consult Hanz Schinz, *Deutsch Südwest-Afrika* (Oldenburg and Leipzig, 1891), and S. Passarge, *Südafrika* (ib., 1908).

HERE'ROLAND, hâ-rā'rō-lânt, or Damaraland. A northern part of German Southwest Africa (q.v.), inhabited by the Herero (q.v.) or Ovaherero tribe.

HER'ESY (OF. *heresie*, Fr. *hérésie*, from Lat. *hæresis*, school of thought, from Gk. *αἵρεσις, hairesis*, choice, from *αἱρεῖν, hairein*, to take). The name given to religious opinion held within the Church and declared by ecclesiastical authority to be erroneous and contrary to the accepted standards of the Church. In the Septuagint the word is used without sinister meaning of the various Jewish parties—Pharisees, Sadducees, and Essenes—and similarly in the Acts of the Apostles. Paul employs it to denote the party divisions into which the Corinthian Christians have fallen, and he rebukes them because they destroy the unity of Christ's flock. Once only in the New Testament (2 Peter ii. 1) has the word its later meaning of *wrong belief*. For some time the boundary line between right and wrong doctrine, orthodoxy and heresy, was not perfectly clear; but a distinction was soon rendered possible by the growth of ancient Catholic Christianity. Before the close of the second century the bishops had begun to test doctrinal soundness by the Rule of Faith (q.v.) and the Canon of Scripture as standards, the interpretation of which was held to rest with themselves. Thus judged, the Gnostics (q.v.) are heretics to Irenæus (180) and Tertullian (c.200), both of whom wrote treatises against heretics.

Beginning with Nicæa (325), the ecumenical councils gave united expression to the doctrinal belief of Christendom, so that the determination of what constituted heresy became much easier than before. With the adoption of Christianity as the state religion under Constantine, the civil government was led to take cognizance of heresy, on the ground that it imperiled the public welfare. The first Imperial edicts to be mentioned in this connection are those of Constantine against the Donatists (q.v.) in 316. Under succeeding emperors similar decrees become frequent and increasingly severe. Especially important are the edicts of Theodosius the Great, who set about enforcing orthodoxy throughout his whole Empire and made heresy a capital crime in 382. St. Augustine lent his support to a policy of coercion and sought to rest it upon the authority of Christ, who said: "Compel them to come in" (Luke xiv. 23). The first Christian to suffer death for his belief, at the hands of fellow Christians, was the Spaniard Priscillian (q.v.), who was charged with holding doctrines akin to those of Manichæism (q.v.). Priscillian was executed at Treves, in 385, by order of the usurping Emperor Maximus. In the sixth century Justinian, the great codifier of Roman law, collected the Imperial edicts against heresy in the first book of his celebrated *Codex*. The spirit which had already taken possession of the Christian Church is well illustrated by the saying of Pope Gelasius I (492–496): "Toleration of heretics is more injurious than the worst devastation of the provinces by the barbarians."

Antiheretical laws were more fully developed from the eleventh century onward, when the various sects of the Cathari (q.v.) began to infest southern Europe. It was in connection with the Albigensian Crusade (see Albigenses), in the thirteenth century, that the Dominican courts of inquisition were established. (See Inquisition.) During this period the close alliance between Empire and Papacy made it possible for each to

aid the other in detecting and punishing offenders. The penalties for heresy included loss of civil rights, banishment, and confiscation of property. In addition, the Church could inflict punishments of her own, such as excommunication. A clergyman, if convicted, could be deposed and degraded from office. Like treason, heresy was construed as a capital offense. But it was an established Catholic axiom that "the Church does not thirst for blood." According to mediæval usage, therefore, a heretic, declared guilty by the ecclesiastical courts, was handed over to "the secular arm" for execution. The earliest recorded instance of the legal use of burning, as a form of inflicting the death penalty, occurs in Lombardy in 1224. The English law, *de hæretico comburendo*, was enacted in 1401, in which year the first burning in England took place. The last execution by this means in England was in 1612.

According to the canon law, "formal heresy" (*hæresis formalis externa*) exists, in the case of a baptized Christian, when he consciously adopts and persistently maintains an opinion known to be contrary to the doctrinal standards of the Church. What is called "material heresy" consists in falling into heretical opinion through ignorance, and this is an offense of far less gravity. Previous to the Protestant Reformation the Church was in a better position to carry out a systematic policy of repression than it has been since. In most modern governments church and state are so far separated that the state takes no cognizance of heresy. It remains solely a matter of ecclesiastical discipline. See Discipline, Ecclesiastical.

Different churches differ widely in the extent to which they attempt to control the belief of their adherents. The most effectual system is that of the Roman Catholic church, which in its modern form goes back to the establishment of the Congregation of the Holy Office in 1542. For many years (from Urban V in 1364 to Clement XIV in 1769) the papal bull, *In Cœna Domini*, which enumerated the heresies condemned by the Church, was publicly read in Rome on Maundy Thursday. More recently the Pope has sometimes felt compelled to warn the faithful against prevalent error, which, if adopted and persisted in, might become open heresy. Thus, Pope Pius IX published his celebrated *Syllabus of Errors* in 1864, condemning 80 current opinions as erroneous; and Pius X, the encyclical *Pascendi*, in 1907, against the positions of the Modernists.

Some of the Protestant reformers held almost as stringent views respecting the repression of heresy as did their Catholic contemporaries. Calvin approved the execution of Servetus (q.v.), and Beza and Melanchthon defended it. But most Protestants have gradually tended to rest satisfied with securing, by means of adequate tests, a reasonable degree of theological uniformity among the clergy, trusting the laity to conform their belief to that of their spiritual leaders. Heresy trials have occurred in several denominations in recent times, but their outcome does not encourage the hope that doctrinal agreement can be promoted by such means. The Protestant churches of to-day show an increasing aversion to the thought of trying men for their beliefs, and a desire to emphasize their fundamental principle of the right of private judgment, which was asserted at the Reformation. With the denial of ecclesiastical authority over belief, heresy, in its traditional meaning, has become a word without present significance in the Protestant world.

Bibliography. Burton, *Heresies of the Apostolic Age* (London, 1829), which contains a bibliography; Hahn, *Geschichte der Ketzer im Mittelalter* (Stuttgart, 1846–50); for a history of the heresies down to the Protestant Reformation, Harnack, *History of Dogma* (Boston, 1894–1900); Lea, *History of the Inquisition in the Middle Ages* (New York, 1906). For the Catholic view, De Cauzons, *Histoire de l'inquisition en France* (Paris, 1909); Van Espen, *Jus Ecclesiasticum* (Cologne, 1702), especially on the legal aspects of heresy; Hinschius, *Kirchenrecht der Katholiken und Protestanten* (Berlin, 1869–97); White, *History of the Warfare of Science with Theology* (New York, 1896). See Heretic.

HERETIC. A person within the Church holding an erroneous religious belief or one contrary to the standards of the Church. (See Heresy.) The most important of the individuals and sects commonly classed as heretical may be thus enumerated. The early orthodox writers represent Simon Magus (Acts viii) as the father of heresies. After him, in the first two Christian centuries, come Menander, Cerinthus, the Ebionites, Nicolaitans, Nazarenes, and Elkesaites (Judaizing parties). In the second century, the Gnostics, Saturnilus, Basilides, Valentinus, Ptolemæus, Marcus, and Heracleon; the antinomian sects of Ophites, Cainites, and Sethians, with whom we may class Carpocrates; the representatives of the ascetic tendency, Tatian and the Encratites; Marcion, and his followers, the Marcionites; Montanus and the Montanists; the Alogi, of Asia Minor (who rejected the Logos idea and the fourth Gospel); and among the earlier Monarchians, Theodotus of Byzantium, Theodotus the money changer, Artemon, Praxeas, and Noëtus of Smyrna. In the third century, Sabellius, Paul of Samosata, Mani (from whom come the Manichæans), Novatian and his adherents. In the fourth century, the Arians (who opposed the Athanasian doctrine of the Trinity), the (schismatic) Donatists, who run over into the fifth century, the Macedonians, and the Apollinarians. In the fifth century, in the East, the Nestorians, Eutychians, Monophysites, and Origenists (all of whom were heterodox in Christology); in the West, the Pelagians and Semi-Pelagians, all of whom were combated by St. Augustine. The Semi-Pelagians run over into the sixth century. In the seventh century, the Monothelites (logical successors to the Monophysites). In the eighth, the Paulicians of Armenia, descended from an ancient adoptionist type of Christianity, whose origin is perhaps to be sought in the teaching of Paul of Samosata. In the eleventh century we find the Euchites, inaccurately described as Manichæans. In the twelfth, the Bogomiles, Petrobrusians, Cathari, and Waldenses (the last two having a considerable period of activity). In the thirteenth century, the important and numerous Albigenses. In the fourteenth, the Friends of God and the Brethren of the Free Spirit, and (in England) Wiclif and the Lollards. In the fifteenth, Huss and the Hussites, Taborites, Calixtines, Jerome of Prague, and the Bohemian Brethren. Savonarola (q.v.) was condemned as a heretic. In the sixteenth century came the Protestant movement. The reformers were technically heretics so long as they remained in the Church, for they upheld views contrary to the currently accepted

interpretation of the standards of the Church. When they went out and organized churches of their own, they became schismatics. Their own members who denied their standards became in turn heretics, like the early Unitarians within the Congregational churches in New England, with whom Trinitarian Congregationalists refused to fellowship. The heretic has been so often the prophet of the future that a certain glory has gathered about the word; but it does not necessarily follow because a man differs from the past that the future will agree with him.

The great change in the ecclesiastical situation wrought in the sixteenth century, and the speedy legalizing of new church organizations, has made the whole problem of heresy a different one since that time. See the various titles mentioned in this article; and, for bibliography, see HERESY.

HERETIC BAPTISM. One of the great questions in the Christian Church of the third century relating to the reception into the Church of those who had been baptized by heretics. Up to that time it would seem that the baptism of such persons had been accepted, and the rite had not been repeated. Clement of Alexandria (died c.215), it is true, in passing calls "heretic baptism not proper and true water," but he does not say that it was invalid, and the universal practice was to consider it valid. But in the early part of the third century Agrippinus, Bishop of Carthage, took opposite ground, influenced perhaps by Tertullian, who says: "Heretics have no fellowship in our discipline. . . . Therefore their baptism is not one with ours . . . a baptism which, since they have it not duly, doubtless they have not at all." This Agrippinus presided over a synod held in Carthage between 218 and 222 which pronounced heretic baptism invalid, and the same declaration was made by two Asia Minor synods held about this time. It then became the practice in Carthage and elsewhere to rebaptize those received into the Church from the heretical sects, on the ground that the baptism which they had received was no baptism.

But the Roman church, and apparently the majority of the churches in the West, dissented from Agrippinus, considering that the use by heretics of the baptismal formula made their baptism valid. In so acting these churches followed precedent, and instituted the practice since followed by the Roman Catholic church throughout the world.

When Cyprian, the great Bishop of Carthage, came into his see (in the year 248–249) he accepted the view of the Carthaginian church, and when it was criticized he called synods, in 255 and 256, which confirmed the practice of rebaptism of converts from the heretics. Pope Stephen refused to confirm the decision of the African synods and wrote back severely reprimanding their action.

The position of Stephen found vigorous supporters and probably little opposition in the Western church generally. Thus, Augustine, Bishop of Hippo (died 430), the final teacher of the Western church, lays down the same doctrine in writing against Petilian the Donatist: "When the water of baptism is given to any one in the name of the Father, and of the Son, and of the Holy Spirit, it is neither ours nor yours, but His of whom it was said to John, 'Upon whom thou shalt see the Spirit descending, and remaining on Him, the same is He who baptizeth with the Holy Spirit.'"

But Cyprian's view was accepted and defended in many places, and universally by the Donatists, against whom Augustine wrote *De Baptismo contra Donatistas.*

The Eastern church has followed Cyprian rather than Stephen in denying validity to heretical baptism and insisting upon an orthodox interpretation of the baptismal formula. That this was early the case is shown by the remark of Cyril, Bishop of Jerusalem (died 386): "We may not receive baptism twice or thrice . . . for there is only one baptism . . . heretics, however, are rebaptized since the first [so called] baptism was no baptism"; by the council in the *Apostolic Constitutions*, of uncertain date, but probably prior to the sixth century, which affirms the same doctrine; and yet more strongly by the command in the *Apostolic Canons*, dating from the same period: "If a bishop or presbyter . . . does not baptize him who is polluted by the ungodly [i.e., has received heretical baptism], let him be deprived." Athanasius (died 373) and the Council of Nicæa (325) take the same view; but the Council of Laodicea (somewhere between 343 and 381) distinguishes between heretics upon the ground of their position respecting the Trinity, enjoining rebaptism upon those who came into the Catholic church from the Montanists (canon 8), but not upon those from the Novatians or Quartodecimans (canon 7).

Thus the West universally accepted the teaching of Stephen, that where baptism was administered in the name of the Trinity it is valid; while the East qualified it by insisting that the person baptizing must be orthodox as to the Trinity, otherwise the baptism was invalid. The present teaching of Roman Catholics and Protestants is that of Pope Stephen; while in the *Orthodox Confession of the Greek Church* direct mention is made of the necessity of an orthodox interpretation of the formula, and the same is implied in the *Longer Catechism of the Eastern Church.* If the validity of the baptism is in doubt, a conditional baptism may be administered; and this is usually done in the case of converts to the Catholic church in the United States. See DONATISTS; NOVATIANS.

HEREWARD, hĕr'ē-wērd. An English outlaw who has passed into legend as the last champion of Saxon England against the Normans. He was a native of Lincolnshire and appears in Domesday as the owner of lands in a number of places in that shire. In 1070 Hereward headed a revolt among the inhabitants of Peterborough and with the aid of a Danish fleet burned the town and plundered the abbey. He then retreated to the Isle of Ely, among the fens, where for more than a year he held out against the Normans. Here he was joined by a number of Saxon leaders, among them Morkere the former Earl of Mercia. He was finally driven from his refuge by William the Conqueror. Hereward's subsequent career is unknown, but it would seem that he made his peace with the King, who employed him in his wars in Normandy. The surname of Wake or Watchful dates from a much later period. Charles Kingsley has depicted Hereward as "the last of the English" in his novel *Hereward the Wake.* Consult: Freeman, *History of the Norman Conquest*, vol. iv (Oxford, 1876); Round, *Feudal England* (London, 1895); Davis, *England under the Normans and Angevins* (New York, 1905).

HERFORD, hĕr'fôrt. The capital of a district in the Province of Westphalia, Prussia, sit-

uated at the junction of the Aa and the Werre, 10 miles from Bielefeld (Map: Prussia, C 2). It is a town of great antiquity and contains an old twelfth-century Münsterkirche, a thirteenth-century church, a Gymnasium founded in 1540, and a theatre. It has also an agricultural and trade school and a teachers' institute. The chief manufactures of the town are linen, cotton goods, agricultural machinery, sewing machines, furniture, clothing, chocolate, and confectionery, cigars, tobacco, and carpets. The trade is important. Herford is supposed to owe its origin to the convent founded in 822, whose abbess enjoyed a princely rank. The convent was abolished in 1803. Pop., 1900, 25,109; 1910, 32,546, mostly Protestants.

HERFORD, hĕr'ford, BEATRICE (?–). An American monologuist, sister of Oliver Herford. She was born in Manchester, England, spent her early years in the United States, and was again in England from 1893 to 1897. In the latter year she married Sidney Willard Hayward, of Wayland, Mass., where she afterward resided. Her début as a monologuist was made in London. The best known of her very clever monologues (written as well as presented by her) are "The Shop Girl" and "A Sociable Seamstress." A volume of these sketches, entitled *Monologues,* was published in 1908.

HERFORD, hĕr'ford *or* här'ford, CHARLES HAROLD (1853–). An English scholar, born at Manchester and educated at Cambridge and in Germany. He was appointed professor of English language and literature at University College, Aberystwyth, Wales, in 1887; lectured at Oxford in 1897, at Baltimore and Chicago in 1900; and in 1906 was professor of English literature at the University of Manchester. In 1885 he founded the English Goethe Society. Painstaking scholarship appears in his contributions to the *Dictionary of National Biography,* in his *Studies in the Literary Relations of England and Germany in the Sixteenth Century* (1886), *Age of Wordsworth* (1897), and his *Robert Browning* (1904). He translated Ibsen's *Brand* in the original metres (1893) and *Love's Comedy* (1900). He also edited the "Eversley" Shakespeare in 1902. In 1911 appeared his *Memoir of W. H. Herford.*

HERFORD, HEINRICH VON. See HEINRICH VON HERFORD.

HERFORD, hĕr'ford, OLIVER (1863–). An American artist and writer, brother of Beatrice Herford. He was educated at Lancaster College, England, and at Antioch (Ohio) College, and studied art at the Slade School, London, and at the Académie Julian, Paris. His work as an illustrator has a drollery of an original flavor, and his humor of the pencil happily and fittingly supplements the individual and eccentric comicality and whimsicality of his writings in prose and verse. The following include representative examples of the work done by him in his two fields of activity: *The Bashful Earthquake and Other Fables and Verses* (1898); *Alphabet of Celebrities* (1899); *A Child's Primer of Natural History* (1899); *Overheard in a Garden* (1900); *Rubaiyat of a Persian Kitten* (1904); *Cupid's Almanach* (1908); *Simple Jography* (1909); *Happy Days* (1911); *The Mythological Zoo* (1912); *The Jingle-Jungle Book* (1913); *Capers: His Haps and Mishaps* (1914).

HERGENRÖTHER, hĕr'gen-rē'tĕr, JOSEPH (1824–90). A Catholic theologian of Bavaria. He was born at Würzburg and studied theology there and in Rome. He became a priest in 1848, instructor at Munich in 1850, and in 1852 professor of Church law and history at Würzburg. In 1868 Pius IX made him a member of the canonical commission for the Vatican Council. He is best known for his *Anti-Janus* (1870), an answer to Döllinger's *Janus,* and the *Kritik der von Döllingerschen Erklärung vom 28. März 1871* (1871). In 1879 he was made Cardinal. He was specially interested in the separation of the Greek and Roman churches. Among his historical works are: *Der Kirchenstaat seit der französischen Revolution* (1860); *Photius Patriarch von Constantinopel* (3 vols., 1867–69); *Katholische Kirche und Christlicher Staat in ihrer geschichtlichen Entwickelung und in Beziehung auf die Fragen der Gegenwart* (1872–76); *Handbuch der allgemeinen Kirchengeschichte* (last ed., 1884–86); *Kardinal Maury* (1878); *Abriss der Papstgeschichte* (1879); *Leonis X, Pontificis Maximi, Regesta* (1884–91); and two volumes of continuation of Hefele's *History of the Council* (1887–90). Consult Steiner, "Kardinal Hergenröther," in *Episkopat der Gegenwart* (Würzburg, 1876), and Stamminger, *Zum Gedächtnisse Kardinal Hergenröthers* (Freiburg, 1892).

HER HOR, hĕr hōr, or SMENDES. An Egyptian king, of the twelfth century B.C., founder of the twenty-first dynasty, originally chief priest of Ammon. He built much at Karnak, and it was he who stored away the royal mummies discovered by Brugsch Bey in 1881.

HÉRICART-FERRAND, ā'rē'kär'-fā'räN', LOUIS ETIENNE FRANÇOIS, VICOMTE DE THURY (1776–1854). A French engineer and agriculturist, born in Paris and educated there, at the School of Mines. From 1809 to 1830 he was inspector general of quarries and for the last seven years of this period was director of works. He was a deputy in 1815–27 and in 1824 was elected to the Academy of Sciences. He contributed to the *Journal des Mines* (1799–1815), to the *Annales des Mines,* and to the *Annales de la Société d'Horticulture;* and wrote *Descriptions des catacombes de Paris* (1815), *Considérations sur les puits forés* (2d ed., 1829), and *Du desséchement des terres cultivables* (1831).

HÉRICAULT, ā'rē'kō (DE RICAULT), CHARLES JOSEPH (1823–99). A French historian and romancer, born at Boulogne-sur-Mer. He began his literary career by writing for the *Revue des Deux Mondes* and other journals, and for seven years (1883–90) he conducted one he had himself founded, the *Revue de la Révolution.* His novels include: *La fille aux bleuets* (1860); *Un gentilhomme catholique* (1863); *La reine sauvage* (1869); *Les cousins de Normandie* (1874); *Le premier amour de lord Saint-Albans* (1879); *Le dernier amour de lord Saint-Albans* (1879); *Aventures de deux Parisiennes pendant la Terreur* (1881); *Une reine de théâtre* (1881); while the best of historical work is to be found in *Origine de l'épopée française et son histoire au moyen âge* (1860); *La France guerrière* (1867); *Histoire nationale des naufrages et aventures de mer* (1870); *Thermidor, Paris en 1794* (1872); *La Révolution, 1789–1882* (1882); *Histoire anecdotique de la France* (1887–90). He edited the works of Gringoire, Clément Marot, and Charles d'Orléans.

HERING, hĕr'ĭng, CARL (1860–). An American electrical engineer, born in Philadel-

phia. He graduated in 1880 (M. E., 1887) from the University of Pennsylvania, where he was an instructor for several years, and studied also at Darmstadt, Germany. Engaged in the practice of electrical engineering at Frankfort, Germany, and in Philadelphia, he made a specialty of electric furnaces and electrolytic corrosion. He served as delegate and juror of awards at nine expositions, in 1901 was decorated with the Legion of Honor of France, and was elected president of the American Institute of Electrical Engineers in 1900 and of the American Electrochemical Society in 1906. The University of Pennsylvania conferred on him an honorary D.Sc. in 1912. He compiled a *Digest of Electrical Literature* and is author of *Principles of Dynamo-Electric Machines* (1888; 5th ed., 1890); *Universal Wiring Computer* (1891); *Ready Reference Tables* (1904).

HERING, hā′rĭng, Constantin (1800–80). A German-American physician. He was born in Oschatz, Saxony; studied medicine and surgery at Leipzig, Würzburg, and Dresden, and soon afterward became a convert to homœopathy. In 1833 he emigrated to America and settled in Philadelphia, where he founded the first American homœopathic school, and from 1845 to 1860 was professor of the institutes of medicine and materia medica in that institution. His works include: *Rise and Progress of Homœopathy* (1834); *Effects of Snake Poison* (1837); *Guiding Symptoms and Analytical Therapeutics* (1875).

HER′ING, Daniel Webster (1850–). An American physicist and university dean. He was born in Washington Co., Md., graduated Ph.B. in 1872 and C.E. in 1878 from the Sheffield Scientific School (Yale), and was fellow in engineering at Johns Hopkins University in 1876–78. He was professor of mathematics at Western Maryland College in 1880–84, professor of physics at the Western University of Pennsylvania (now University of Pittsburgh) in 1884–85, and professor of physics and applied mechanics after 1885 and dean after 1902 at New York University. Besides his scientific monographs on church acoustics, compressed air, and X-rays, he is author of *Essentials of Physics for College Students* (1912).

HERING, hā′rĭng, Ewald (1834–). A German physiologist and psychologist. He was born at Alt-Gersdorf in Saxony on Aug. 5, 1834, practiced medicine in Leipzig in 1860, and became docent in physiology at the university there in 1862. Three years later he was appointed professor of physiology at the medicosurgical Josephs-Akademie, Vienna. From 1870 to 1895 he occupied a similar position at the German University at Prague, and in 1895 he was called to Leipzig. His chief works are: *Beiträge zur Physiologie* (1861); *Die Lehre vom binocularen Sehen* (1868); *Ueber das Gedächtnis als eine allgemeine Funktion der organisierten Materie* (1870; Eng. trans., *On Memory as a General Function of Organized Matter*, 1897; 4th ed., enlarged, 1913); *Grundzüge einer Theorie des Temperatursinnes* (1877); *Zur Lehre vom Lichtsinne* (1878); "Raumsinn des Auges—Augenbewegungen" (1879), "Temperatursinn" (1880)—both in Hermann, *Handbuch der Physiologie; Ueber Newtons Gesetz der Farbenmischung* (1887); *Zur Theorie der Nerventhätigkeit* (1899); *Grundzüge der Lehre vom Lichtsinn* (1905–11). He also wrote many articles upon topics connected with visual theory.

Hering won a high place among psychologists by his contributions to psychophysics. His name is especially associated with four features of this science, by (1) his investigations into visual space perception, wherein he argued for the nativistic or physiological theory against the "empiristic" position of Helmholtz; (2) his treatise on memory as a general function of organized matter; (3) his criticism of Fechner's interpretation of "Weber's law"; and (4) his theory of color vision, which stands out in sharp rivalry with that of Helmholtz. Nearly all subsequent theories may be regarded as improvements upon, or modifications of, these two theories. Hering's cardinal postulates are: (1) an independent light process (grays); (2) a paired arangement of the constituent processes (white black, red green, yellow blue); and (3) an antagonistic relation between the colors of each pair. The advantages of this theory as an explanation of the psychological phenomena of vision have won for Hering, in principle, the support of the great majority of psychologists.

HER′ING, Rudolph (1847–). An American engineer, born in Philadelphia. He graduated at the Polytechnic School in Dresden, Germany, and from 1868 on was employed in important hydraulic and sanitary engineering work for cities throughout the United States and Canada. In 1881 he prepared, for the National Board of Health, a comprehensive report on the sewerage of European cities. As consulting engineer, he published also special reports on water supply and purification, sewerage and sewage treatment, the collection and disposal of garbage and other city refuse. In 1913–14 he was president of the American Public Health Association.

HERINGSDORF, hā′rĭngs-dōrf. The principal German summer resort on the Baltic coast, situated on the island of Usedom in the Prussian Province of Pomerania, 40 miles from Stettin. On the land side it is surrounded by a fine beech forest, has numerous fine villas and hotels, and is visited by about 15,000 people annually. Pop., 874.

HERINGTON, hĕr′ĭng-ton. A city in Dickinson Co., Kans., 81 miles southwest of Topeka, on the Chicago, Rock Island, and Pacific, and the Missouri Pacific railroads (Map: Kansas, E 5). It is in a farming district and has railroad shops and a Carnegie library. The water works and electric-light plant are owned by the city. Pop., 1900, 1607; 1910, 3273.

HERIOT, hĕr′ĭ-ot (AS. *heregeatu*, military apparel, from *here*, Goth. *harjis*, OHG. *heri*, Ger. *Heer*, OChurch Slav. *kara*, OPruss. *karjis*, OPers. *kāra*, army + *geatu*, equipment). In old English law, a customary tribute of goods and chattels, payable to the lord of the fee on the death of a freehold tenant. It may have had its origin in the practice of returning to the lord the martial equipment which he had furnished to his vassal. But in course of time it came to be regarded as a form of relief (q.v.), payable by the heir on succeeding to the inheritance, as a sort of inheritance tax or death duty. If a vassal fell in battle in the service of his lord, no heriot was demanded. As heriots were due only of tenants who held by knight's service, they disappeared with the abolition of military tenures. Nominally, however, the right still exists in England in connection with copyhold estates, but it is in practice obsolete. See Tribute.

HERIOT, hĕr′ĭ-ot, George (1563–1624). A Scottish goldsmith and philanthropist, founder

of Heriot's Hospital, Edinburgh. He was the son of a goldsmith of Edinburgh and followed his father's business. In 1597 he was appointed goldsmith to Anne of Denmark, consort of James VI of Scotland, and four years afterward to the King, on whose accession, in 1603, to the English throne, Heriot went to London, where as court jeweler and banker he amassed a large fortune. Of this he left £23,625 to the town council of Edinburgh for the education of the children of decayed burgesses and freemen of that city. According to his will, the hospital or school which he wished to found was to be in imitation of Christ's Hospital, London. The school was opened in 1659; in 1885 it was reorganized for secondary and higher branches. In 1902 the funds yielded upward of £50,000 and, besides supporting the original foundation, furnished many scholarships at the Heriot-Watt College, the university, and other schools of Edinburgh. Heriot figures as "Jingling Geordie" in Scott's *Fortunes of Nigel* (Edinburgh, 1822). Consult William Steven, *History of George Heriot's Hospital with a Memoir of the Founder* (3d ed., Edinburgh, 1872), and Oliver and Boyd, *Edinburgh Almanack* (ib., 1888).

HERIOT, George (1766–1844). A Canadian soldier and author, born on the Isle of Jersey. In 1799 he was at Quebec in the Ordnance Department. The following year he was appointed Deputy Postmaster-General and held the position for six years. He became a soldier during the War of 1812, was next in command to De Salaberry at the battle of Chateauguay, and in 1841 was promoted a major general of militia. He represented Drummond County (1830–34) in the Lower Canada Legislature and wrote a *History of Canada* (2 vols., 1804), wherein he is largely indebted to Charlevoix, and also *Travels through the Canadas* (1807).

HERIOT, John (1760–1833). A Scottish author, born at Haddington. He was educated at Edinburgh High School and University, but left without graduating on account of lack of means, and went to London. Here he entered the marine service, was made a lieutenant at the age of 18, was in several of the naval engagements of the period, and was wounded in Rodney's fight with the French under De Guichen (April 17, 1780). When the war was over, Heriot was retired upon half pay, which he supplemented by making light literature out of his heavy experiences, such as *The Sorrows of the Heart* (1787) and *The Half-Pay Officer* (1789); but more important is his *Account of Gibraltar* (1792). After starting and editing two newspapers, he retired into government positions, and from 1810 to 1816 lived in Barbados as deputy paymaster-general of the troops in the Windward and Leeward Islands. The last 17 years of his life he spent in Chelsea Hospital, where he was comptroller.

HERI-RUD, hĕr'ē-rōōd' (Lat. *Arius*). A river of Central Asia, rising in the Koh-i-Baba Range of the Hindu Kush Mountains, 150 miles west of Kabul (Map: Afghanistan, L and M 5). It flows through Afghanistan, for more than 300 miles through a fertile and beautiful valley past Herat; then, bending suddenly to the north, it flows along the Persian boundary, and afterward northwest through Turkestan, making a farther course of 400 miles, till it terminates in the swamp of Tejend in the Transcaspian Desert. After entering Turkestan the Heri-Rud assumes the name "Tejend." Its chief tributary is the Keshef from the west. The Transcaspian Railroad crosses the lower reaches, and during high-water stages traffic is frequently suspended.

HERISAU, hā'rē-sou. A town of Switzerland, the capital of the Ausser-Rhoden division of the Canton of Appenzell, situated near the river Glatt, 4½ miles southwest of Saint-Gall (Map: Switzerland, D 1). The town is irregularly built, has a church tower reputed to date from the seventh century, a public library, an arsenal, a new town house, and a hospital. The manufactures comprise muslin, cotton, and silk, and the embroideries produced here are much in demand. In the vicinity are iron springs. Pop. (commune), 1900, 13,497; 1910, 15,502. Herisau was ruled by the abbots of Saint-Gall from the ninth century till the middle of the fifteenth, when it entered the Swiss Confederation.

HÉRISSON, ā'rē'sôn', Maurice, Count (1840–98). A French officer and publicist, born in Paris. He entered the army and took part in the Italian campaign and in the Chinese War, under General Montauban. In 1869 he was sent to America to make statistical studies. He returned to France at the outbreak of the Franco-Prussian War, was on the staff of General Schmitz and later an ordnance officer under General Trochu, and was present at the interview between Bismarck and Jules Favre at Ferrières. In 1875 he was sent on an archæological expedition to Tunis and in 1891 was made head of the French militia in Congo. His main works are: *Etudes sur la Chine contemporaine* (1864); *L'Esprit chinois et l'esprit européen* (1869); *Journal d'un interprète en Chine* (1885); *Journal de la campagne d'Italie* (1889); *Les responsabilités de l'année terrible* (1891); *Les girouettes politiques* (1894).

HERISTALL, hĕr'ĭ-stăl. A town in the Province of Liége, Belgium. See Herstal.

HER'ITABLE BOND, or **HERITABLE SECURITY.** In Scottish law, a bond or other obligation secured by the heritable property of the debtor. The security thus gained by the creditor was not unlike that created by a mortgage in the so-called Equity States of the United States, where a mortgage of lands is regarded more in the nature of a lien than as conferring the title to the mortgaged property on the mortgagee. In modern times it has taken on the form of the English and American mortgage of real property. See Mortgage.

HERITABLE JURISDICTIONS. A remarkable class of criminal jurisdictions held hereditarily from the crown of Scotland. These jurisdictions amounted to upward of 100 in number and consisted of sheriffships, stewartries, constabularies, but principally of regalities and bailleries, with some offices of distinction. One of the more important was the office of the Lord Justice General, and the Lordship of Argyle and the Isles, both belonging to the family of Argyle. In virtue of their hereditary rights the possessors of these jurisdictions exercised an arbitrary power over vassals and others within the limits of their domain and could punish them by fines, scourging, imprisonment, and even in some cases with death, without interference of the common law. As repugnant to social policy, and more particularly with the view of extinguishing the authority of Highland chiefs over their clans, these heritable jurisdictions were abolished by Act of Parliament in 1747 (20 Geo. II, c. 43), the possessors receiving pay-

ment for the estimated value of their rights. The abolition of these jurisdictions was followed by the appointment of sheriffs and the placing of the administration of the law in Scotland upon a uniform and modern basis. Consult Hume, *Commentaries on the Law of Scotland Respecting Crimes* (Edinburgh, 1844).

HERJULFSON, hĕr'yŭlf-sŏn, BJARNI. The hero of an ancient Icelandic saga, according to which he was the first Norse discoverer of America. He was the son of Herjulf, one of the early settlers of Iceland. When he grew to manhood, he became a sea rover and spent most of his time abroad, returning only to pass alternate winters at his father's house. During one of his absences Herjulf removed to Greenland with Eric the Red, and, when Bjarni on his return to Iceland the following year (986) found his father gone, he determined to follow. Three days after he had left Iceland a storm arose, and the ship drifted for some time at its mercy. When at last the storm abated, the crew hoisted sail and came to a land covered with trees. As this could not have been Greenland, Bjarni refused to go ashore; so they sailed away, leaving the land on their left. Three times more they made the land, and the third time they found Eric's settlement in Greenland. News of the discovery they had made of a well-wooded country to the southward came to the ears of Leif Ericson (q.v.), son of Eric, and incited him to make his famous voyage to Vinland. Consult Reeves, *The Finding of Wineland the Good* (London, 1890).

HER'KIMER. A village and the county seat of Herkimer Co., N. Y., on the Mohawk River and the Erie and Barge canals, 15 miles southeast of Utica, on the New York Central and Hudson River and the Otsego and Herkimer railroads (Map: New York, F 4). It has a public library, emergency hospital, and the Folts Mission Institute. The village is in a dairying region and manufactures knit goods, paper, office desks, beds, furniture, leather board, paper boxes, hardware, mattresses, etc. The water works and electric-light plant are owned by the village. Fort Dayton, of note in Colonial days, was situated in the northern part of Herkimer, and the village, prior to its incorporation in 1807, was known as Fort Dayton. Pop., 1900, 5555; 1910, 7520; 1920, 10,453.

HERKIMER, NICHOLAS (?1715–77). An American soldier of the Revolutionary War. He was born probably in what is now Herkimer Co., N. Y. Nicholas served as a lieutenant of militia in the French and Indian War and was in command of Fort Herkimer in 1758, when the French attack on German Flats was made. In 1775 he was commissioned a colonel of militia and was chairman of the Committee of Safety of Tryon County. In the following year he was appointed a brigadier general of the New York militia and operated against Sir John Johnson. After Ticonderoga fell into the hands of Burgoyne's advancing army on July 7, 1777, Colonel St. Leger joined Sir John Johnson at Oswego and with a mixed force of 1800 British regulars, Loyalists, and Iroquois Indians under Joseph Brant, advanced towards Fort Stanwix (q.v.). The fort was invested on August 3, and two days later Herkimer, with a force of 800 hastily recruited militia and volunteers, marched to its relief. Apprised by his Indians of the advance of the relieving column, St. Leger arranged an ambuscade in a swampy ravine at Oriskany. The battle that ensued, perhaps the most obstinate and murderous of the entire Revolution, was indecisive. The Americans held the field and drove their opponents off, but lost a third of their force in dead and wounded and were too weak to continue the advance. St. Leger's force, on the other hand, was so crippled and disorganized as to render out of the question both the continuation of the siege and the advance southward. Early in the fight Herkimer had his horse shot under him and his leg shattered by a musket ball; but, seated on his saddlebags underneath a tree, he continued calmly to smoke and shout out his commands until the fight was over. Ten days later he died, as a result of an unskillful operation. A monument 85 feet high was erected to his memory on the field of Oriskany in 1884.

HER'KOMER, SIR HUBERT VON (1849–1914). An English painter, etcher, and mezzotint engraver, of German ancestry. He was born at Waal in Bavaria, the son of a cabinetmaker trained in Munich. In 1851 the family emigrated to the United States, where they spent six anxious years in New York, Rochester, and Cleveland, and in 1857 they settled at Southampton, England, where they continued their hard struggle for existence. Nevertheless, Hubert studied at the local art school and in 1865 in the preparatory school of the Munich Academy. On his return he studied at South Kensington under Frederick Walker and began to attempt illustrative work. His money difficulties being great, he did drawings for the firm of Dalziel Brothers and worked at decorative stenciling on the walls of one of the galleries of South Kensington. The foundation of the *Graphic* brought him his opportunity. One of his chief successes in this paper was "Chelsea Pensioners in Church," the first idea for the painting that established his reputation at the Royal Academy in 1874, sold for £1200, and in 1878 at the Paris Exposition brought him the Grand Medal of Honor. In 1873 he settled with his parents in Bushey, a suburb of London, where he founded the Herkomer School of Art in 1883. (Consult his *My School and My Gospel*, published in London in 1908.) He was Slade professor of fine arts at Oxford from 1885 to 1894, succeeding John Ruskin, and held a life professorship at Munich. He became an associate of the Royal Academy in 1879 and a member in 1890 and was knighted in 1907. He was an associate of the Institute of France and of the Belgian Academy, Officer of the French Legion of Honor, foreign Knight of the Prussian Order "Pour le Mérite," and honorary member of the Madrid Association of Spanish Artists. In 1882 he visited America, where he painted a number of portraits and delivered lectures in New York and Boston, repeating the visit in 1883 and in 1885 opening a studio in Boston. One result of his second visit was "Pressing to the West," a picture of immigrants in Castle Garden, New York. His reputation as a portrait painter was made by his likeness of Archibald Forbes, the war correspondent (1882).

Herkomer's work includes not only oil and water-color painting, but also excellent etchings and mezzotint engravings. He worked successfully in various branches of applied art, such as wood carving, wrought-iron work, and architecture, and also figured as a playwright, actor, magazine writer, musical composer, and singer. His paintings are excellent in drawing and good in color. Among them are: "After the Toil of Day" (1873); "Eventide" (1878); "Life, Light,

and Melody" (1879); "God's Shrine" (1880); "Der Bittgang," Bavarian peasants praying for harvest; "Gathering in the Charter House"; "The Magistracy of Landshut" (1893), which he presented to his native town. His portraits are marked by strong characterization and excellent technique. The best include: The "Lady in White," which took the Medal of Honor at the Berlin Exposition in 1886; the "Lady in Black," an American girl; the artist's father, Lorenz Herkomer, in the series "Makers of my House"; Wagner (1878); Ruskin (1881); Browning; Tennyson; Hans Richter (1883). Among his best-known water colors are: "Im Walde"; "The Wood Cutter's Rest"; "The Poacher's Fate"; "At the Well." Consult: Ludwig Pietsch, *Herkomer* (Leipzig, 1901); A. L. Baldry, *Hubert von Herkomer* (London, 1904); and his autobiography, *The Herkomers* (2 vols., New York, 1910–11).

HERKULESBAD, hĕr'kōō-lâs-bät. See Mehádia.

HERLIN, hĕr'lĕn, Friedrich (c.1435–99). A German painter, who was born in Rothenburg and who settled in Nördlingen in 1461. The only evidence that he studied in Flanders and worked in the studio of Rogier van der Weyden is that he painted in the style of that master, even borrowing from him figures and whole groups, and that in 1467 he was made citizen and town painter of Nördlingen "because of his acquaintance with Flemish methods of painting." In the Nördlingen Museum are his St. George altarpiece of 1460, a large "Ecce Homo," and a family altarpiece of 1488; in the church of St. James at Rothenburg, an altarpiece of 1466 and a picture of the Virgin of 1467; in the church of St. Blasius at Bopfingen, his altarpiece of 1472. Herlin's work is dominated by the religious spirit of the Middle Ages and is far inferior to that of Schongauer. While his Virgin is a beautiful woman and a loving mother, she is above all else a saint with strongly accentuated halo. Consult: Haack, *Friedrich Herlin* (Strassburg, 1900); Heidrich, *Alt-Deutsche Malerei* (Jena, 1909); Burkhart, *Friedrich Herlin, Forschungen* (Erlangen, 1912).

HERM (Lat. *Hermes*, from Gk. Ἑρμῆς. Some, however, derive the name from Ἕρμα, *herma*, a prop or block of stone or wood. The plural is *Hermæ*). A quadrangular pillar, larger at the top than at the bottom, generally surmounted with a head of Hermes or Mercury. Such pillars were erected commonly in many parts of ancient Greece, especially in Attica, where they were used as milestones or as boundary marks, Hermes being the god of traffic, roads, and boundaries. Sometimes heads of other divinities, such as Athena and Eros, were combined with that of Hermes. Such a composite herm was called a hermathena, a hermeros, etc. The mutilation of the *hermæ* was regarded as a grievous misfortune. (See Mercury.) The Romans used them for merely decorative purposes rather than with any religious significance. Many examples are preserved in European museums.

HERMÆ. See Herm.

HERMÆ, Mutilation of. See Alcibiades; Andocides; Herm.

HERMÆA, hĕr-mē'â. 1. Festivals in honor of Hermes. (See Mercury.) 2. A name given at times to the Hermæ. See Herm.

HERMAG'ORAS (Lat., from Gk. Ἑρμαγόρας). A famous Greek rhetorician of Temnos, who taught rhetoric at Rome during the earlier half of the first century B.C., founder of a school of rhetoricians called *Hermagorei*. He paid special attention to *inventio*, the part of rhetoric which dealt with the thinking out of the arguments likely to help one with his case. Strabo and Suidas ascribe to him Τέχναι Ῥητορικαί, *Technai Rhetorikai, Manuals of Rhetoric*. Consult Piderit, *De Hermagora Rhetore* (Hersfeld, 1839); Thiele, *Hermagoras: Ein Beitrag zur Geschichte der Rhetorik* (Strassburg, 1893); Wilkins, Introduction to edition of the *De Oratore of Cicero* (2d ed., Oxford, 1888); Volkmann-Gleditsch, *Rhetoric und Metrik der Griechen und Römer* (3d ed., Munich, 1901).

HERMAN, âr'mäN', Armand Martial Joseph (1749–95). A French revolutionist, born at Saint-Pol. He was a lawyer and an ardent revolutionist, and in 1793, when he became intimate with Robespierre, he was appointed president of the Revolutionary Tribunal, and tried Marie Antoinette, Danton, and many others who were executed in that year. As Minister of Justice (1794) he continued his career of judicial murder. He was also Minister of the Interior and Commissioner of Police. Accused of being bribed by Robespierre in 1794 and of complicity with Fouquier-Tinville (1795), he was condemned on May 6 and guillotined the next day.

HER'MAN, Henry (1832–94). An English dramatist and novelist, born and educated, at a military college, in Alsace. He emigrated to America and served in the Confederate army during the Civil War, losing an eye as a result of a wound received in action. Afterward he removed to London and began to write for the stage. His first play, *Jeanne Dubarry*, was produced at the Charing Cross Theatre in May, 1875, and was followed the next year by *Slight Mistakes*, a farce. In November, 1882, was produced his first great success, *The Silver King*, written in collaboration with Henry Arthur Jones, with whom he also wrote *Breaking a Butterfly* (1884; Ibsen's *Doll's House*) and *Chatterton* (1884). He then wrote *Claudian* (1884), with William Gorman Wills, and *The Golden Band* (1887), with Freeman Wills; *For Old Virginia* (1891); *Eagle Joe* (1892); and *Fay o' Fire* (1885), a romantic opera, for which Edward Jones composed the music. Between 1887 and 1891 he wrote several novels in collaboration with David Christie Murray, such as: *One Traveler Returns* (1887); *A Dangerous Catspaw* (1889); *The Bishop's Bible* (1890); *He Fell among Thieves* (1890); and *Paul Jones's Alias* (1891). He also wrote alone a large number of novels. In the plays in which he collaborated he showed a remarkable faculty of invention, the plots being chiefly of his making, while characterization and the rest were left to his fellow workmen.

HERMANDAD, âr'mân-däd', The (Sp., brotherhood). A name given to the confederations formed by Spanish cities in the Middle Ages for the defense of their liberties and the preservation of public order. The first Hermandad was formed in Aragon about the middle of the thirteenth century; this example was followed in Castile about 1275, and in 1295 34 cities of Castile and Leon formed a very powerful association with the twofold object of defense against the nobles and against unjust taxation; they took a mutual oath to punish summarily any noble who committed a wrong against any member of the Hermandad and was unwilling to make suitable redress, or any one who

levied an unjust tax upon any of the allied cities, even if the tax was authorized by royal decree. The Hermandads were favored by the kings of the various countries, as they were a useful check upon the nobles, whose power was a menace to the royal authority, and were also a means of maintaining public order. In fact, during much of the fourteenth and fifteenth centuries the Santa Hermandad—or Holy Brotherhood, as it came to be called—was the principal instrument for maintaining public peace and curbing the excesses of the unruly nobles, against whom the kings were almost powerless. They were so successful that Isabella of Castile decided to make use of them; in 1476 she had a law enacted by the Cortes for the reorganization of the Hermandad and its extension to include all the cities in her kingdom. After that a general junta was held once a year, and instructions sent to the provincial juntas. The jurisdiction of the Santa Hermandad included burglary, rape, resistance of justice, and all acts of violence or robbery committed on the highways or in the open country; for these crimes the penalties were prescribed very minutely in the codes of law which were enacted in the annual assemblies of the association. The Hermandad maintained a force of officials (the *quadrilleros*) and horsemen to enforce its decrees and arrest defenders; the expenses of equipment and maintenance of this force were met by an annual assessment upon each 100 householders. The Hermandad in Castile exercised its great powers for only about a score of years. It was very much disliked by the nobles, and as soon as public order had been secured and the royal power strengthened, the Hermandad was deprived of most of its authority; this happened about the close of the fifteenth century. Fifty years later it had become little more than a state police. In 1485 the Hermandad of Castile published its code of laws known as the *Quaderno de las Leyes Nuevas de la Hermandad.* In 1487 a similar association was sanctioned in Aragon and later suffered the same fate as the one in Castile. Consult Mariana and Miniana, *Historia General de España* (10 vols., Madrid, 1794), and Prescott, *History of Ferdinand and Isabella* (4 vols., Philadelphia, 1904).

HERMANFRID, hĕr'mȧn-frĕt (?–531). The last King of the Thuringians, son of Basinus. He ruled at first with his two brothers, Baderich and Berthar, but, urged on by his ambitious wife, Amalberga, killed Berthar and joined with Theuderich I, King of the Franks, against Baderich, who was defeated and dethroned in 516. Hermanfrid now refused to give up half of his kingdom, as he had promised, to Theuderich. The latter joined Clotaire I, his brother, and the Saxons, in a grand alliance against Thuringia, and dethroned Hermanfrid in 531. One story says that he was killed by his own armor bearer. Another tells how he was lured to Zülpich and pushed over the city wall. Amalberga went to Italy with her children, the bulk of Thuringia was joined to the kingdom of the Franks, and the Saxons took the northern part. The story of Hermanfrid has been dramatized by Wetzel (1818) and by Schlönbach (1854).

HER'MANN. A city and the county seat of Gasconade Co., Mo., 81 miles west of St. Louis, on the Missouri River and on the Missouri Pacific Railroad (Map: Missouri, E 3). It is the centre of extensive vine-growing interests and manufactures wine, in which there is an important trade, beer, shoes, lumber, flour, foundry products, etc. The picturesque scenery of the vicinity attracts many excursionists during the summer. The water works and sewage system are owned by the city. Pop., 1900, 1575; 1910, 1592.

HERMANN, hĕr'mȧn. The leader of the Cherusci in their celebrated victory over the Roman legions of Varus (9 A.D.), known to the Romans as Arminius (q.v.).

HERMANN, COUNT OF WIED (1477–1552). Archbishop and Elector of Cologne, born at Wied. He was elected Archbishop of Cologne in 1515 and supported the claims of Charles V, whom he crowned at Aix-la-Chapelle in 1520. The next year, at the Diet of Worms, he strongly opposed heresy and endeavored to have Luther declared an outlaw, in spite of the fact that he himself was striving to bring about a reform, though within the Church. In 1542 he invited Bucer and, in 1543, Melanchthon to Cologne. His attempts at reform were fruitless. He was outlawed by the Emperor and banned by the Pope. The Emperor then secured the election of Adolf of Schaumburg to the archbishopric, and Hermann withdrew to his Earldom of Wied, where he died a few years later. Consult M. Deckers, *Hermann von Wied, Erzbischof und Kurfürst von Köln* (Cologne, 1840), and Varrentrapp, *Hermann von Wied und sein Reformationsversuch in Köln* (Leipzig, 1878).

HERMANN, FRIEDRICH BENEDIKT WILHELM VON (1795–1868). A German political economist. He was born in Bavaria and studied at the universities of Erlangen and Würzburg. His attention was early directed to mathematics and political economy. In 1823 he became privatdocent at the University of Erlangen; in 1825 he was called to the professorship of mathematics at the Gymnasium of Nuremberg; and in 1827 he became professor extraordinary of *Kameralwissenschaften* in the University of Munich. His great work, *Staatswirtschaftliche Untersuchungen,* which appeared in 1832, ranks as one of the most important contributions to German economics. In 1835 he was made member of the Royal Bavarian Academy of Science. He was inspector of technical instruction in Bavaria; in 1845 was appointed one of the councilors to the Minister of the Interior; and in 1848 sat as a member for Munich in the National Assembly at Frankfort, where he was one of the founders of the so-called "Great-German party," which opposed the rise of the hegemony of Prussia; in 1850 he assumed charge of the Bureau of Statistics, and in 1855 he became Councilor of State. He published a large number of pamphlets and papers on political, economic, and industrial subjects, and the annual reports which he published as head of the Bureau of Statistics entitle him to the rank of one of the founders of the science of statistics.

HERMANN, GOTTFRIED (1772–1848). A distinguished German classical scholar, born at Leipzig. After study at Leipzig and at Jena he lectured on classical literature at the University of Leipzig and became professor extraordinary of philosophy there in 1798. All the rest of his life was spent at this university; he became professor of eloquence there in 1803, and from 1809 to his death was professor of poetry as well. He showed his originality first in his discussions of the principles of metre;

he used as the groundwork of his metrical theories the philosophical categories of Kant. Noteworthy works on metre were his *Handbuch der Metrik* (1798) and two treatises in Latin—*Elementa Doctrinæ Metricæ* (1816) and *Epitome Doctrinæ Metricæ* (1818); the last-named work reached a third edition in 1852. He gained even greater fame by his method of studying the classics. He regarded the text of the classical authors, together with questions of grammar and metre and style, as the main object of study, on the ground that a thorough knowledge of the Greek and Latin languages is the indispensable foundation for real knowledge of classical antiquity. This method, grammatical and critical in character, in opposition to the historical-antiquarian school represented by Boeckh (q.v.) and Niebuhr (q.v.), he set forth in his *De Emendanda Ratione Græcæ Grammaticæ* (1801); he applied it in his many editions of classical authors, especially of the Greek tragic poets, and in his *Opuscula* (7 vols., Leipzig, 1827–30). Consult: Jahn, *Gottfried Hermann, eine Gedächtnissrede* (ib., 1899); Köchly, *Gottfried Hermann* (Heidelberg, 1874); Bursian, *Geschichte der klassischen Philologie in Deutschland* (Munich, 1883); Sandys, *A History of Classical Scholarship*, vol. iii, pp. 89–95 (Cambridge, 1908). See CREUZER.

HERMANN, KARL FRIEDRICH (1804–55). A German classical scholar. He was born at Frankfort-on-the-Main, was educated at Heidelberg and Leipzig, and studied in Italy. In 1832 he was appointed professor of classical philology at the University of Marburg, and in 1842 succeeded Otfried Müller as professor of philology and archæology at the University of Göttingen, where he remained until his death. Hermann was best known for his studies in Greek antiquities and Greek philosophy. His principal works were his *Lehrbuch der griechischen Antiquitäten* (6th ed., 1882–92), a standard work on Greek antiquities; *Geschichte und System der platonischen Philosophie* (1839); *Kulturgeschichte der Griechen und Römer* (1857–58); and text additions of Plato (6 vols., 1851–52), Juvenal's *Satires* (1854), and Persius (1854). Consult Lechner, *Zur Erinnerung an Karl Friedrich Hermann* (Berlin, 1864), and Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

HERMANN, LUDIMAR (1838–). A German physiologist. He was born in Berlin, studied medicine there, and became (1865) lecturer in physiology at the University of Berlin. He was made professor at Zurich in 1868 and at Königsberg in 1884. To him and to Pflüger is due the commonly accepted explanation of the nature of metabolism. He did much to disprove Du Bois-Reymond's theory of animal electricity; and his studies of phonograph markings and analysis of curves on these records were of prime importance. In 1886 he became editor of the *Jahresbericht über die Fortschritte der Physiologie.* Among his principal books are: *Grundriss der Physiologie des Menschen* (1863; 14th ed., 1910); *Lehrbuch der experimentellen Toxikologie* (1874); the particularly valuable *Untersuchungen zur Physiologie der Muskeln und Nerven* (1867–68); and the *Handbuch der Physiologie* (1879–83), of which he was general editor and part author. His brief discussion of vivisection, *Die Vivisectionsfrage* (1877), was translated into English by Dickson.

HERMANN, ROBERT (1869–). A Swiss composer, born at Bern. Largely self-taught, he was for only a few months at the Frankfort Conservatory in 1891, and in 1893–94 with Humperdinck. In 1895 the Berlin Philharmonic Orchestra gave his *Symphony in C.* Although little known even in Germany, he is one of the most original of contemporary composers, one who makes no concessions to prevailing tendencies or fashions. His art is founded on Bach and is essentially diatonic. Perhaps the most salient feature of his works, setting them entirely apart from those of all contemporaries, is economy in modulation and absence of mere "effects." His themes are wonderfully impressive and plastic and always elaborated with a master's hand. His works include two symphonies, in *C,* op. 7, and *B minor,* op. 11; a concert overture, a *Berceuse* for horn and string orchestra, chamber music, and songs. Consult W. Niemann, "Robert Hermann," in *Monographien Moderner Musiker,* vol. iii (Leipzig, 1909).

HERMANNSTADT, hĕr′mân-stât, Hung. **NAGY-SZEBEN,** nŏd′y′-sĕ′bĕn (Lat. *Cibinium*). An important town of Hungary, formerly the capital of Transylvania, now chief city of the County of Szeben, beautifully situated in the fertile valley of the Cibin (Hung. *Szeben*), an affluent of the Aluta, about 70 miles west-northwest of Kronstadt (Map: Hungary, J 4). Hermannstadt is the seat of a Greek archbishop and of a Lutheran superior consistory; possesses a baronial palace with picture galleries, a museum, a library of more than 100,000 volumes, and a number of fine churches. It has a law school, a theological seminary for the Greek church, and a military school. Tanning, wax bleaching, and the making of cloth, linen, shoes, soap, ropes, combs, paper, and gunpowder are among the chief industries. Pop., 1900, 23,304; 1910, 25,008, of whom two-thirds are Germans and the rest Magyars and Rumanians. Hermannstadt is the principal town in the so-called Saxon Land and is supposed to have been founded by German colonists in the twelfth century.

HERMANN UND DOROTHEA, o͞ont dō′rō-tā′â. An idyllic poem by Goethe (1797).

HERMANN VON FRITZLAR, fŏn frĭts′-lär. A German mystic of the fourteenth century. Of his life we know merely that he came from Fritzlar in Hesse, and that he traveled through Europe, visiting the tombs of the saints. It is surmised that he was a rich layman. He wrote *Die Blume der Schauung,* a speculative work now lost, and a mystical *Heiligenleben,* preserved in a manuscript written under his own supervision. This valuable document for the reconstruction of German mysticism in the fourteenth century is edited by Pfeiffer, in his *Deutsche Mystiker* (Leipzig, 1845).

HERMANN VON REICHENAU, rī′KE-nou, HERMANN DER LAHME, or HERMANNUS CONTRACTUS (1013–54). A German poet and mathematician. He was the son of the Swabian Count Wolverad. From childhood his limbs were painfully contracted, whence the name by which he is generally known. He attended a monastic school at Reichenau and at the age of 30 joined the brotherhood. He was an earnest and successful teacher and drew about him a zealous body of pupils from various places. He wrote a treatise on the abacus (published by Treutlein in the *Boncompagni Bullettino,* vol. x, Rome, 1877) and did much to extend the knowledge

of the column computation. Unlike Gerbert (see SYLVESTER), however, he seems to have had no knowledge of the Hindu numerals. He also wrote on a number game, "Rhitmomachia," and on the use of the astrolabe (q.v.). He is best known, however, for his *Chronicon*, a work on history down to the year of Hermann's death. It was continued by Berthold (ed. by Pertz, vol. v of *Monumenta Germaniæ Historica*, 1844; and trans. by Nobbe, 1892). Among his poems are *De Octo Vitiis Principalibus* (ed. by Dümmler, in *Zeitschrift für deutsches Altertum*, vol. xiii) and the Latin hymns *Salve Regina* and *Alma Redemptoris Mater*. Consult G. H. Pertz, *Die Geschichtschreiber der deutschen Vorzeit*, vol. v (Berlin, 1847), and Hansjakob, *Hermann der Lahme von der Reichenau* (Mayence, 1875).

HERMANN VON SALZA, zäl'tsȧ (c.1170–1239). Grand Master of the Teutonic Order, probably descended from the lords of Salza in Thuringia. He became Grand Master in 1210 and raised the order to an enviable position both in the East and in Europe. He took part in the Fifth Crusade in the company of Frederick II. Although his headquarters were in Venice, his duties kept him continually traveling, in Egypt, Palestine, Italy, and Germany; several times he acted as arbitrator in the quarrels between the Pope and Emperor Frederick II. Carlyle says of him: "He is reckoned the first great Hochmeister . . . fourth in the series of masters; perhaps the greatest to be found there at all, though many were considerable." Consult Carlyle, *History of Frederick the Great*, vol. i (New York, 1899), and Koch, *Hermann von Salza, Meister des Deutschen Ordens* (Leipzig, 1885). See TEUTONIC KNIGHTS.

HERMANRICH, hĕr'mȧn-rĭk (c.269–375). The first historically accepted King of the Ostrogoths, variously called Hermanrich, Ermanarich, Ermanrich, and in myth Ermrich. He was the founder of a great Ostrogothic power about the middle of the fourth century, when he conquered many Slavic and Finnish tribes, so that the saga makes him rule from the Black Sea to the Baltic. The Visigoths recognized his overlordship. A story makes him order that Swanhilde, wife of a defeated prince, be torn asunder by horses, for which Hermanrich is slain by her three brothers. According to another tradition he is said to have put an end to his life, at the age of more than 100 years, when he saw that he was about to be attacked by the King of the Huns, Balamir, who killed his son and took part of his kingdom. Consult Bradley, *The Story of the Goths* (New York, 1888).

HERMAPH'RODITE (Lat. *hermaphroditus*, from Gk. Ἑρμαφρόδιτος, son of Hermes and Aphrodite, from Ἑρμῆς, *Hermēs*, Hermes + Ἀφροδίτη, *Aphroditē*, Aphrodite). An obsolete term in botany, formerly used to designate those flowers that contain both stamens and pistils, these organs then being regarded as sexual.

HERMAPH'RODITE BRIG. See BRIG.

HERMAPH'RODITISM. See SEX.

HER'MAPHRODI'TUS. According to a late story of Greek mythology, the son of Hermes and Aphrodite, born on Mount Ida, where he was brought up by naiads. Going in his fifteenth year to Caria, he rejected the love of Salmacis, the nymph of a fountain in which he bathed. Salmacis finally, embracing him, prayed to the gods to unite her to the boy forever, and a being resulted half male and half female. (See Ovid, *Metamorphoses*, iv, 285–388.) The origin of the dual conception is probably to be found in the Cyprian Aphroditus, worshiped in connection with Aphrodite; there Hermaphroditus was worshiped originally as a deity. The ultimate source of such dual beings was the Orient. The form in which Hermaphroditus is represented in art was fixed by Polyclitus (q.v.). It became a favorite subject for sculpture in the late Greek and Græco-Roman period. Consult "Hermaphroditos," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HER'MAS, SHEPHERD OF (Lat., from Gk. Ἑρμᾶς). The title of a work (in Greek), written by a Christian of the second century who lived in Rome; it is included among the works of the Apostolic Fathers (q.v.). Hermas was a well-to-do freedman and a brother of Pius, Bishop of Rome about the middle of the second century. He was an earnest, simple-minded Christian, with little education or culture, but typical, no doubt, of many in the Church of his day. Some later writers, like Jerome, confuse him with the Hermas mentioned in Rom. xvi. 14, which is not surprising in view of the fact that he refers to persons and events of the Apostolic age as if they were contemporary. Parts of the *Shepherd* may have been written as early as 110 A.D., but other parts are obviously later, and the work was probably complete before 145 A.D.

The book takes its name from one of its principal characters, an old man in shepherd's garb, who appears at the close of the first part and thereafter attends Hermas as a sort of guardian, committing to his charge certain divine commands. The general theme is repentance and the duty of moral strenuousness. The book is divided into (1) five "Visions," which form the introduction; (2) 12 "Mandates," or commandments respecting the Christian life, and (3) 10 "Similitudes," or parables, which picture among other things the progress of the Church. The whole forms an important source for our knowledge of second-century Christianity in Rome, with its temptations to worldliness and the moral insight of its finer spirits. Here and there it shows close resemblances to the Epistle of James. Visions and revelations play such an important part in the book that it is properly classed among early Christian apocalypses. A few recent critics hold that it was originally a Jewish book which received Christian revision and enlargement, but this is doubted by most.

In the early Church the *Shepherd* was often classed among the "Scriptures," i.e., among what we call the canonical books of the New Testament. Irenæus cites it as "Scripture," and Clement of Alexandria and Origen esteemed it highly. It was often read in public worship. Tertullian, on the other hand, speaks slightingly of its moral teaching. In the fourth century it was still held in honor, as Eusebius and Jerome testify, but it was no longer reckoned in the sacred canon.

The Greek text is edited by Gebhardt and Harnack (Leipzig, 1877), by Funk (Tübingen, 1901), and, with English translation, by Lightfoot, *Apostolic Fathers*, edited by Harmon (London, 1893); the *Codex Sinaiticus* of Hermas was edited by Lake (Oxford, 1911). An English translation is given in vol. i of the American edition of *Ante-Nicene Fathers*, edited by Roberts and Donaldson (Buffalo, 1886). In general

consult: Cruttwell, *Literary History of Early Christianity*, vol. ii (London, 1893); Krüger, *History of Early Christian Literature* (New York, 1897); Harnack, *Chronologie der altchristlichen Literatur*, vol. i (Leipzig, 1897); Taylor, *The Shepherd of Hermas* (New York, 1901).

HERMATHE'NA. See HERM.

HERMENEGILD, hĕr'me-ne-gĭld (c.560–c.610). Son of Leovigild, King of the Visigoths, and centre of a Catholic legend. In 580 he rebelled against his father to induce him to become a Catholic, says the story, although there is no evidence that Hermenegild was a Catholic apart from the fact that he married Ingunthis, daughter of Sigibert and Brunhilda, who was orthodox. The son was defeated by his father and driven into exile. The legend makes him martyred by his father, whose second wife was an Arian. He was canonized by Pope Sixtus.

HER'MENEU'TICS. See EXEGESIS.

HER'MEROS. See HERM.

HERMES, hĕr'mēz. See MERCURY.

HERMES, OR A PHILOSOPHICAL INQUIRY CONCERNING UNIVERSAL GRAMMAR. A technical work by James Harris, much influenced by Aristotle, published in 1751.

HERMES, hĕr'mĕs, GEORG (1775–1831). A German Roman Catholic theologian and philosopher, born in Dreyerwalde, Westphalia. His student life was passed in Münster, where he afterward taught at the Gymnasium (1798–1807) and lectured with marked success at the Academy (1807–19). In 1799 he was ordained to the priesthood. In 1820 he went to the University of Bonn, where he spent the remainder of his life. As a professor of theology, Hermes achieved the distinction of being the founder of a "school," known after him as the Hermesians. It was not long before all his colleagues at Bonn recognized him as their leader. It is said that his influence was sufficient to prevent the appointment of Möhler and Döllinger to professorships there. In Breslau, too, he gained many adherents. Spiegel, Archbishop of Cologne, was an active and powerful supporter of the new movement, and until his death (1836) the Hermesians were in high favor throughout the provinces of the lower Rhine. There seems to have been no doubt of their orthodoxy or of their loyalty to Catholicism, and so long as Hermes lived hardly a sign of opposition appeared. He died in 1831, at peace with the Church, and generally recognized as one of the foremost leaders of German Catholicism.

Four years later (1835), to the astonishment of the Hermesian party, Pope Gregory XVI issued a brief condemning Hermes's teaching and prohibiting his writings. The sections especially objectionable related to the nature of faith and of divine revelation, the authority of Scripture and tradition, the necessity of grace, the evidence of God's existence, and the idea that through reason men could gain a knowledge of supernatural truth. Such teaching was declared to lead towards skepticism and indifference.

Since the year 1832 the party had had an organ, the *Zeitschrift für Philosophie und katholische Theologie*. In its columns and elsewhere defenses at once began to appear. The Hermesians declared that the Pope had been misinformed by persons who were ignorant of philosophy and theology alike. It was freely admitted that the doctrines specified in the papal brief were heterodox, but it was alleged that these were not the doctrines of Hermes; that neither he nor his school had ever held or taught them. At this point the similarity of their defense to that adopted long before by the Jansenists should be noticed. So confident were they that the Pope was wrong that two of the Bonn professors (Braun and Elvenich) undertook a mission to Rome to persuade him to withdraw the brief. They found, however, that their hopes were baseless, and they were forced to return without having accomplished anything. About 1838 philosophical criticism began to add its strength to the opposition which had already developed in other quarters, and the decline of Hermesianism was rapid. The two Bonn professors, Braun and Achterfeldt, who had been most active in defense of Hermes's memory, retired in 1844. They were not subjected, however, to any ecclesiastical censure. Before the middle of the century the whole movement had become a matter of history. Hermes was strongly influenced by the critical rationalism of Kant and Fichte, and grounded theology upon reason, which he distinguished as theoretical and practical. The system is an interesting attempt to combine a critical philosophy with catholic orthodoxy.

Hermes's writings are few. Their titles are: *Ueber die Wahrheit des Christentums*, which appeared in 1805; *Einleitung in die christkatholische Theologie*, in two parts (1819 and 1829); *Christkatholische Dogmatik* (1834), published posthumously under the editorship of Achterfeldt. In general consult: Niedner, *Philosophiæ Hermesii Explicatio* (Leipzig, 1838); Braun and Elvenich, *Acta Romana* (Hanover, 1838); Werner, *Geschichte der katholischen Theologie* (Munich, 1866); Lichtenberger, *History of German Theology in the Nineteenth Century* (Edinburgh, 1889). For a bibliography, consult Gla, *Repertorium der katholisch-theologischen Literatur*, vol. i (Paderborn, 1904).

HERMES (hĕr'mēz) **CARRYING THE INFANT DIONYSOS.** A masterpiece of Praxiteles, found in 1877 at Olympia and now preserved in the museum there. The figure of the god is the most perfect example extant of the Greek conception of youthful masculine beauty. Hermes stands leaning his left arm, draped with a cloak, on a tree stump and holding the infant god of wine. His right arm is missing, but evidently the raised hand held some object for the babe's amusement. See PRAXITELES.

HER'MESI'ANAX (Ἑρμησιάναξ). A Greek elegiac poet, who lived in the time of Alexander the Great and was a native of Colophon in Asia Minor. He was popular, even down to the Augustan age. His chief work was Λεόντιον, an elegiac poem in three books, addressed to his mistress, Leontium. The fragment of 98 lines of the third book preserved by Athenæus (q.v.), in book xiii, describes, in a somewhat disconnected though not ungraceful style, the love stories of the poets and sages from Orpheus down to Philetas. Consult the editions by Bailey (London, 1839; this contains an English translation), by G. Hermann in his *Opuscula* (Leipzig, 1828), and by Bergk in his *Anthologia Lyrica* (2d ed., ib., 1868); also Bergk, *De Hermesianactis Elegia* (Marburg, 1845); Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit* (Leipzig, 1892); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HERME'SIANISM. See HERMES, GEORG.

HERMES OF AN'DROS. A statue in the National Museum at Athens, wrongly so called. It does not represent the god, but is a portrait statue belonging to a tomb and is considered the best example of this class of statues. It dates from the fourth century B.C.

HERMES OF PRAXITELES. See HERMES CARRYING THE INFANT DIONYSOS; PRAXITELES.

HERMES, hûr'mēz, or MERCURY, REPOSING. A life-size bronze statue, found at Herculaneum, now in the Museo Nazionale at Naples. It represents the youthful messenger of the gods seated and leaning forward with limbs relaxed. The attitude is lifelike, and the statue is one of the most famous extant representations of the god.

HERMES TRIS'MEGIS'TUS. See HERMETIC.

HERMET'IC (ML. *Hermeticus*, relating to Hermes, from *Hermes*, Gk. *Ἑρμῆς*, *Hermes*). The ancient Egyptians considered the god Dhouti, or Thoth, identified by the Greeks with their god Hermes, as the patron of literature and the scribe of the gods. Therefore several magical and religious texts, partly embodied in the *Book of the Dead* (q.v.), were reputed to have been written by this god with his own hands. As such writings could claim the most direct inspiration, the word "Hermetic" was applied, in Greek times, to writings of the highest degree of sanctity, and served in a general way to designate all inspired books. Clemens of Alexandria states that the Egyptian priests had to study 42 (i.e., the number of assessors of Osiris) sacred or Hermetic books, divided into six subjects: sacred law, ritual, science, astrology, hymnology, and medicine. It is questionable if such a canon existed throughout Egypt. The claim that the great medical papyrus discovered by Ebers was one of these Hermetic books has not been substantiated. In early Christian times it was customary to ascribe a certain type of magical and gnostic writings in Greek to Hermes Trismegistus, who lost his divine personality more and more and came to be regarded as a great magician. These pseudographs often claimed to have been translated from the Egyptian, although they bear a thoroughly Greek character and mostly exhibit un-Egyptian ideas of Jewish, Neoplatonic, etc., origin. They may, however, have been written in Egypt. The most noticeable product among them is *Hermes Trismegistus* (most recent edition by Parthey, Berlin, 1854). These writings exercised a strong influence upon the various secret sciences; hence the term "Hermetic" became very popular in alchemy and astrology, and some mediæval writings claim the title of Hermetic books. Hermetic medicine meant the most mysterious and powerful medicine, and the expression "hermetic sealing," for the most complete air-tight closure, has survived to our own day.

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HERMIA, hēr'mī-ȧ. An Athenian lady in Shakespeare's *Midsummer Night's Dream.*

HERMI'AS (Lat., from Gk. *Ἑρμίας*, *Hermias*, or *Ἑρμείας*, *Hermeias*). A slave of Eubulus, tyrant of Atarneus and Assos in Asia Minor, whom he subsequently succeeded on the throne (347 B.C.). At Athens he had previously made the acquaintance of Plato and Aristotle (q.v.). The latter spent some years at the court of Hermias, but fled when Artaxerxes III captured the tyrant and put him to death. Aristotle, who married Pythias, one of the relatives of Hermias, erected a statue in Hermias' honor.

HERMINJARD, âr'mē'nyär', AIMÉ LOUIS (1817–1900). A Swiss author, born at Vevey, Vaud. He was a teacher and practiced his profession in Russia, Germany, and France, before going to Geneva, where he became a friend of Amiel (q.v.). His great work, the *Correspondance des réformateurs dans les pays de langue française*, began to appear in 1866 (vol. ix, covering the period 1543–44, in 1897).

HERMIONE, hēr-mī'ō-nē. 1. The beautiful daughter of Menelaus and Helen, married against her will to Neoptolemus (Pyrrhus), the son of Achilles, in performance of a promise made by her father. According to late tradition, she was carried off by Neoptolemus (q.v.), who was killed by Orestes, to whom she had already been promised. 2. The much-injured wife of Leontes, the madly jealous King of Sicily, in Shakespeare's *Winter's Tale.* The character is taken from Bellaria, in Greene's *Pandosto.* 3. The scornful love of Pyrrhus and loving mother of Astyanax, in Racine's *Andromaque.* After Andromache has persuaded Orestes to murder Pyrrhus, in the act of ascending the altar with Hermione, the latter becomes Regent of Epirus.

HERMI'ONES, or **HERMIN'ONES.** According to Tacitus, *Germania*, 2, one of the three great divisions of the German peoples, so named from their mythical progenitor Irminus, or Erminas. They were the oldest, best, and most powerful of the West-Germanic stock. Their eastern boundary was formed by the Vistula and the Carpathians. Among the nations to whom the name "Hermiones" was applied were the Suevi, the Hermunduri, the Lombardi, the Vandali, the Heruli, and the Quadi. Their early home was about the basin of the Elbe and the Main. Consult: Stubbs, *Constitutional History of England* (6th ed., Oxford, 1897); Müllenhoff-Roediger, *Deutsche Altertumskunde*, vol. iv (Berlin, 1900); and the editors on Tacitus, *Germania*, 2.

HERMIP'PUS OF SMYRNA (Gk. *Ἑρμίππος*, *Hermippus*). A Greek philosopher who lived about 200 B.C. A disciple of Callimachus of Alexandria, he was called *ὁ Καλλιμάχειος*, the Callimachean. He was the author of *Βίοι*, *Bioi*, a work containing the biographies of Greek philosophers, rhetoricians, historians, and poets. Though it is repeatedly referred to by later writers, only fragments have been preserved. Consult: Müller, *Historicorum Græcorum Fragmenta* (Paris, 1868–83); Leo, *Die griechisch-römische Biographie* (Leipzig, 1901); "Hermippos, 6," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HER'MIT (from OF. *hermite*, *ermite*, from Lat. *eremita*, from Gk. *ἐρημίτης*, *erēmitēs*, hermit, from *ἐρημία*, *erēmia*, desert, from *ἔρημος*, *erēmos*, quiet; connected with Gk. *ἠρέμα*, *ērema*, quietly, Goth. *rimis*, quiet, Skt. *ram*, to rest). Properly any one who lives in solitude. In religious

usage one who retires from the world to solitude in order to develop the spiritual life. Before the rise of Buddhism (500 B.C.) Hindu ascetics had begun to seek freedom from the world by a hermit life, and the Laws of Manu give elaborate rules for the life of the forest hermit. Buddhism carried this form of asceticism into other parts of Asia, so that it may have influenced the growth of the Jewish Essenes (see ESSENES) and the Therapeutæ in Egypt, precursors of the Christian hermits. Hermit life began among the Christians in the period of the early persecutions, but its great popularity arose from the influence of St. Antony. (See ANTONY, SAINT, OF THEBES.) Some hermits always lived lives of solitude, as the name implies (see ANCHORITE); but so strong is the human social instinct that even in the time of St. Antony other hermits took up their abodes near his and sought his leadership. Communities of hermits were formed, each dwelling apart but meeting for a common worship and with sometimes other elements of a common life. The life was called cenobite. Such communities sometimes grew into separate orders, which perpetuated themselves in the Church. (For some of the more important, see AUGUSTINIANS; CELESTINES; HIERONYMITES; PAULITES.) The Church has had all gradations between hermits of complete solitude and communities where solitude was reduced to a short period daily; but the modern emphasis upon social service has largely set aside the hermit ideals. A vivid picture of early hermit life is found in Ebers's story, *Homo Sum*. Consult: Richard Challoner, *Lives of the Fathers of the Eastern Deserts* (New York, 1852); J. O. Hannay, *Wisdom of the Desert* (ib., 1904); Ida, gräfin von Hahn-Hahn, *Fathers of the Desert* (2 vols., ib., 1907).

HER'MITAGE, THE. 1. A celebrated palace and museum at St. Petersburg (q.v.). 2. A garden on the side of a hill overlooking Moscow, Russia, which has become a noted fashionable resort. 3. The name given to Rousseau's retreat in the valley of Montmorency, France. It was built for the philosopher by Madame d'Epinay and was occupied by him from 1751 to 1757. 4. An old house near Nashville, Tenn., where Andrew Jackson resided for a great part of his life, and near which he was buried. The mansion is now owned by the State.

HERMIT CRAB. One of a numerous group of small crabs (see CRAB) of the tribe Paguridea and the family Paguridæ. These crustaceans, common in the rock pools on every coast, live in the deserted shells of whelks and other gasteropod mollusks, which they carry about with them as portable shelters. Their entire body is specialized and adapted to this unusual mode of life. The abdomen, unlike that of lobsters and shrimps, is soft, wholly lacking the hard, chitinous outer skeleton, and is wound in a spiral shape corresponding to the mold of the shell which forms its protection. As there is no need for swimming, the finlike tail fan is adapted for holding the animal firmly in the shell. It forms usually a curved hook, which, often aided by suckers, will not release its hold even when the animal is torn asunder. The remaining abdominal appendages are either absent, asymmetrically reduced, or, in the female, adapted for carrying the eggs. When alarmed, the hermit crab withdraws into the borrowed shell and blocks up the aperture with one of its claws, which is much larger than the other. When the crab remains in one shell for some time, colonies of hydractinias or single anemones usually find a foothold on the surface. The association in the latter case is a commensal one (see COMMENSALISM)—the crab receiving protection from the stinging powers of the anemone, while that sedentary creature is enabled to find an abundance of food in the course of its involuntary travels. That the advantages of this relationship are not wholly unconscious is shown by some hermits, which, when forced to change their dwelling place, carefully detach the anemone and replant it on their new roof. In some cases the anemone dissolves the shell, and thereafter the fortunate hermit dwells within walls, living, fleshy, and elastic. Another species supports the anemone upon its claw, so that the stinging tentacles effectively guard the entrance. Hermit crabs are most amusing inmates of an aquarium, but they are too lively and predacious to be confined with delicate and valuable creatures. They feed on mollusks, small fish, vegetation, and carrion of all sorts. When, from increase of size, they find it necessary to change their shell, they become greatly concerned, trying on shell after shell until they find one which fits, whisking their unprotected abdomens in and out to avoid injury. They are very quarrelsome and constantly strive to rob one another of their shells.

One of the commonest American species (*Eupagurus longicarpus*) is of small size, seldom more than an inch in length, and is found in large numbers in tide pools on rocky coasts from Massachusetts to South Carolina. A somewhat larger species (*Eupagurus pollicaris*) reaches Florida and is usually found in the shell of *Natica*. The whelk-inhabiting *Eupagurus bernhardus* of Europe is also found on the northeastern coast of North America. A bristle-footed worm often lives in its shell and occasionally protrudes its head and snatches bits of food away from its landlord. Species of much larger size inhabit the tropics, and some are found far away from water in the dryest of places. Such is the Diogenes crab (*Cenobita diogenes*), which, when it outgrows shells, takes to coconuts and feeds on the young of sea birds as well as small prey. The palm, or robber, crabs (*Birgus latro*) of the East Indies, being over a foot in length, are too large to find suitable shells or nuts for shelter and, although showing certain signs of ancestral shell life, yet have begun to redevelop a hard dermal protection. These large crabs live in burrows and climb coconut palms for the fruit upon which they feed. All these dry-land crabs, however, visit the water for the purpose of layings eggs.

Many deep-sea forms are symmetrical in claw and abdomen, unlike those which dwell in spiral shells. *Polycheles agassizii*, of the West Indies, manufactures for itself straight, compact tubes of sand, while *Xylopagurus rectus* lives in open tubes of bamboo or mangrove root. *Tylaspis anomala* has been dredged in the South Pacific from a depth of 2375 fathoms. It has a generalized, symmetrical abdomen and distinct segments and legs. Another symmetrical form (*Chœnopagurus*) allows itself to become inwrapped in a living blanket formed of the cœnosarc of a colony of polyps. Other crabs become similarly enveloped by living sponges. The claws of hermit crabs have been found in the Eocene rocks of Hungary.

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yard Sound (Washington, 1874); Emerton, *Life on the Seashore* (Salem, 1880); Edwards and Bouvier, "Description des crustacés de la famille des Paguriens pendant l'Expédition de la Blake," in *Memoirs of Comparative Zoölogy* (Cambridge, 1893); Arnold, *Sea Beach at Ebb Tide* (New York, 1901); Calman, "Crustacea," vii, in Lankester's *Treatise on Zoölogy* (London, 1909); Smith, "Crustacea," iv, in *Cambridge Natural History* (ib., 1909); Calman, *The Life of Crustacea* (New York, 1911); Lowe, *A Naturalist on Desert Islands* (London, 1911). See Plate of CRABS; COCONUT CRAB.

HERMITE, âr'mĕt', CHARLES (1822–1901). One of the best-known French mathematicians of the nineteenth century. He was born at Dieuze, Meurthe, and received his early education in the Lycée Louis-le-Grand. He entered the Ecole Polytechnique in 1842, but left at the end of the year, in order to devote his attention exclusively to mathematics. From 1848 to 1876 he was connected with the Ecole Polytechnique in various capacities, and from 1862 to 1873 was maitre de conférences in the Ecole Normale Supérieure. From 1876 until his death he gave his time to the university, where he held the chair of higher algebra (1869–97). He was a member of the Academy of Sciences and a Grand Officer of the Legion of Honor (1892). His work was chiefly along the line of theory of functions, in which subject he was for many years the leader in France. His first great work, the one which secured for him his election to the Academy of Sciences, was *Sur la théorie de la transformation des fonctions abéliennes* (*Comptes Rendus*, 1855). At about the same time he began his discoveries in the new theory of algebraic forms and in the theory of numbers. His most remarkable memoirs, 26 in number, *Sur quelques applications de la théorie des fonctions elliptiques*, appeared in the *Comptes Rendus* (1877–82). His memoir, *Sur l'équation du 5ème degré* (1866), may be said to have finally settled the great question of the solubility of the quintic equation to the entire satisfaction of the mathematical world. His memoir *Sur la fonction exponentielle* (1874), in which he proved the incommensurability of e, paved the way for Lindemann's proof (1882) of the incommensurability of π. Hermite was a very prolific writer. A substantially complete list of his memoirs may be found in the *Catalogue of Scientific Papers of the Royal Society of London*, vols. iii and vii. Besides his memoirs, which contain his most valuable contributions, he published a *Cours d'analyse de l'Ecole Polytechnique* (1873; 2d ed., 1894) and assisted Serret in editing Lacroix's calculus (2 vols., 9th ed., Paris, 1881). Consult articles by Mittag-Leffler and Picard in *Acta Mathematica*, vols. xxiii, xxiv (Stockholm, 1901–02); *Memoirs and Proceedings* of the Manchester Literary and Philosophical Society for 1901; Gaston Darboux, *Notice historique sur Charles Hermite* (Paris, 1905).

HERMIT HUMMING BIRD. A name given to a group of humming birds which agree in having the beaks much curved and the edge of the mandibles not serrated. The "true" hermits are of the genus *Phaëthornis*, whose 40 or 50 species are found from Mexico to southern Brazil, mostly in the hot lowlands. The "sickle-billed" hermits of the genus *Eutoxeres* have the beak greatly bent downward, sometimes describing a full half circle. The whole group are dull green, gray, or brown in color and keep themselves secluded in dense woods. See HUMMING BIRD.

HERMIT KINGDOM. A popular name formerly given to Korea (q.v.) because of its exclusiveness.

HERMIT THRUSH. See THRUSH.

HERMOC'RATES (Lat., from Gk. *Ἑρμοκράτης, Hermokratēs*) (c.460–407 B.C.). A Syracusan politician and statesman, son of Hermon. His great work was the union of the Siceliots (424), which made possible the successful defense of Syracuse (q.v.) when that city was attacked by the great fleet from Athens (415). He was at the head of the aristocratic party and was opposed by the demagogue Athenagoras. In 412 B.C. he went with a large Syracusan fleet to join the Spartans off the western coast of Asia Minor. Here he was very successful for a time, but lost the battle of Cyzicus and for this was removed from command and exiled. He then fought against Carthage and died in his attempt to reinstate himself in Syracuse. His daughter was married to Dionysius in 405. See "Hermokrates, 1," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HER'MODAC'TYL (from Gk. *ἑρμοδάκτυλος, hermodaktylos*, hermodactyl, from *Ἑρμῆς, Hermēs*, Hermes + *δάκτυλος, daktylos*, finger). The name given to bulbs and roots of an uncertain plant growing east of the Mediterranean, held in high repute among the Greek and the Arabian physicians as a remedy for gout and rheumatism. By some botanists, e.g., Fée, it is thought to be a colchicum; by others, *Iris tuberosa*. As found at the chemist shops, the roots resemble *Colchicum autumnale*, but on analysis yield neither veratrine nor colchicine. The authors of the dispensatory doubt it being the hermodactyl of history. It is mentioned by Alexander of Tralles, who flourished 560 A.D.; by Paulus Ægineta, who lived a century later; by Avicenna, Serapion, and others. By some of the old writers it was termed *anima articulorum*, or *the soul of the joints*. Corms, probably of several species of colchicum, are still sold in Greece and in the East under the name of hermodactyls. See COLCHICUM.

HERMOGENES, hĕr-mŏj'ĕ-nēz (Lat., from Gk. *Ἑρμογένης*). A Greek rhetorician, who flourished about 170 A.D., born at Tarsus. His ability as a lecturer won him the favorable notice of the Emperor Marcus Aurelius, who appointed him, when he was only 17 years of age, a public teacher of oratory. Between the ages of 18 and 20 he published his famous *Manual of Rhetoric* (*Τέχνη Ῥητορική*), which was for centuries regarded as a standard and became the subject of extensive commentaries. At the age of 25 his faculties gave way, and he spent the remainder of his life in a state of intellectual impotency. A large part of the *Rhetoric*, dealing with the "invention" of arguments, the kinds of style, on effective speaking, etc., has survived, and was published by Walz, *Rhetores Græci* (Stuttgart, 1832–36), and by Spengel, *Rhetores Græci* (Leipzig, 1853–56). Consult Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HER'MON. A lofty mountain of Syria, the southern end of the Anti-Lebanon Range, from which it is separated, however, by a deep ravine (Map: Palestine, D 1). It rises to the height of 9166 feet above the level of the sea. Its

crown is divided into three distinct peaks—the western one a little lower than the northern and the southern, which are of the same height. These peaks are always covered with ice and snow and can be seen as far south as the Sea of Galilee. The lower part of the mountain is clothed with forests and a specially rich vegetation, due to the numerous rivulets caused by the melting snow. Hermon was a sacred mountain and is therefore encircled with ruins of ancient temples, most of which were consecrated to the Baal worship. It is often referred to in Hebrew poetry. It is also held by tradition to have been the Mount of Transfiguration. It is now called Jebel-el-Sheikh (the mountain of the old man), or Jebel-el-Thel (the snow mountain).

HERMON'THIS (Lat., from Gk. Ἑρμωνθις). A city of ancient Egypt on the left bank of the Nile, a little above Thebes. Its Egyptian name was On, and, to distinguish it from other places of the same name, it was called On of the South or On of the god Mont. The local deity was the hawk-headed god Mont (q.v.), and hence the city bore the sacred name of *Per-Mont* (house of Mont), of which the Greek *Hermonthis* is a corruption. It was a very ancient town, but was eclipsed by the rise of its neighbor Thebes. With the decline of Thebes On rose again in importance, and finally, as Hermonthis, became the capital of the district. According to Strabo, Apollo (i.e., Horus) and Zeus (i.e., Mont) were worshiped here, and a sacred bull, called by the Greeks Bacis, was also revered. Of the magnificent buildings which adorned the place in ancient times only scanty ruins now remain. The site is occupied by the modern town of Erment, which contains extensive sugar refineries.

HERMOP'OLIS, or **HERMU'POLIS** (Gk. Ἑρμόπολις, city of Hermes). The capital of the Greek Nomarchy of the Cyclades, situated on the east coast of the island of Syra (Map: Greece, E 6). It consists of the old mediæval town and the newer portion constructed since the revolution of 1821 on the site of the ancient Syros. The town is lighted by gas and has a number of churches, two Gymnasia, a marine and trade school, a theological seminary, and a theatre. The chief industry is shipbuilding, and there are manufactures of textiles, leather, and glass. Commercially Hermopolis, with its modern docks and wharves, is one of the most important cities of Greece, being one of the chief centres in the trade with the Levant. It exports tobacco and emery. Hermopolis is the seat of a number of consular agents, of a Greek archbishop and a Roman Catholic bishop. Pop., 1896, 18,760; 1907, 17,773.

HERMOPOLIS, or **HERMU'POLIS MAG'NA.** An ancient city of middle Egypt, on the left bank of the Nile, between the river and the Bahr-Yûsuf (Joseph's canal), opposite Antinoë, not far south of the site of the modern Beni-Hassan (q.v.). The Copts called it Shmûn and the hieroglyphics Khmunu. The village which is on its site bears the name "Ashmunein." The Greek name "Hermopolis" is derived from the ibis-formed or ibis-headed local god Thoth, or Dhouti, who was identified with the Greek Hermes. The city was once very important; but the only remarkable ruin, the portico of a beautiful temple, dating from Ptolemaic times, was destroyed in the middle of the last century. Recently another temple has been discovered there. Another Hermopolis, Hermopolis Parva, is the modern Damanhur in the Delta.

HERMOSILLO, ȧr'mō-sē'lyō. Capital of the State of Sonora, Mexico, situated on the Río de Sonora, in a fertile valley 90 miles by rail north from Guaymas (Map: Mexico, C 3). It has a cathedral, a library, and a mint, and is an important trading centre. It exports ores, hides, and fruit, mostly to the United States, and is the seat of a United States Consul. Pop., 14,574.

HERNÁNDEZ. See FERNÁNDEZ.

HERNÁNDEZ, ĕr-nän'dȧth, JOSÉ CONRADO (1849–). A Porto-Rican jurist. He was born at Aibonito, Porto Rico, and graduated from the Jesuits' College at San Juan, Porto Rico, in 1865, and from the law department of the University of Salamanca, Spain, in 1873. From 1877 to 1891 he served as an assistant prosecuting attorney and judge in Porto Rico and Cuba; he then went to the Philippine Islands, where he was judge of the Supreme Court of Cebu (1891–93) and of Manila (1894–98) and prosecuting attorney of Vigan, Luzon (1893–94). In 1898 he returned to Porto Rico as judge of the Circuit Court at San Juan, and he was afterward associate justice of the Supreme Court (1899–1909) and then Chief Justice.

HERNANI, OU L'HONNEUR CASTILLAN, ȧr'nȧ'nē', o͞o lō'nĕr' kȧ'stē'yäN' (Fr., Hernani, or Castilian honor). A romantic five-act tragedy in verse, by Victor Hugo. See ERNANI.

HERNDON, hĕrn'dŏn, WILLIAM HENRY (1818–91). An American lawyer, born in Greensburg, Ky. When he was two years old, his parents removed to Illinois. In 1836 he entered Illinois College, but was removed by his father in consequence of the abolition sentiments of the faculty. He studied law, and was admitted to the bar in 1844, when he formed a partnership with Abraham Lincoln, which was continued formally until the latter's death. In 1855 he was mayor of Springfield, Ill. In connection with Jesse W. Weik, who assisted in putting into literary form the material he (Herndon) had collected, he published *Herndon's Lincoln: The True Story of a Great Life* (2 vols., New York, 1901), which is of especial value for the account it gives of Lincoln's early life and personal habits.

HERNE, hĕr'ne. A town of Westphalia, Prussia, Germany, 11 miles northeast of Essen by rail. It is the centre of the great coal industry of the Ruhr and manufactures machinery, boilers, fire brick, and gunpowder. It was incorporated in 1897 and has a Gymnasium and a school of mines. Pop., 1900, 27,863; 1910, 57,167.

HERNE, hērn, JAMES A. (1840–1901). An American actor and playwright. He was born at Cohoes, N. Y., of Irish parentage. He ran away from home at the age of 20 and joined a theatrical company in Troy, where he made his first professional appearance in *Uncle Tom's Cabin.* Afterward he played in Baltimore and Washington and then went to California. He had become a popular actor, both East and West, before he produced his first play, *Hearts of Oak,* in 1878. This was very successful; but his subsequent productions, such as *Drifting Apart* and *Margaret Fleming,* were less fortunate, till in the season of 1892–93 his *Shore Acres* at the Boston Museum made its author famous. It is a rural comedy in which he, as "Uncle Nat" Berry, presented a character full of honest humor and touching pathos, and the play kept the boards almost without a break for six years.

In 1899 he produced *The Rev. Griffith Davenport* and the following year *Sag Harbor*. Consult L. C. Strang, *Famous Actors of the Day in America* (Boston, 1900), and M. J. Moses, *The American Dramatist* (ib., 1911).

HERNE THE HUNTER. A character in popular tradition, who, it was believed, walked at midnight by an ancient oak in Windsor Forest. In Shakespeare's *Merry Wives of Windsor* (iv, 4) he is described as a spirit, with huge horns on his head, who disturbs the revels of the fairies. He also plays a part in Harrison Ainsworth's romance entitled *Windsor Castle*. Herne's oak, said to have been 650 years old, was blown down in 1863. A young oak was planted on the spot by Queen Victoria.

HER'NIA. (Lat.) An abnormal protrusion of the whole or a part of an organ of the body from its natural cavity. This may occur through openings already existing or produced accidentally. There may be hernia of the brain, lungs, or any of the abdominal viscera, especially the intestines; the latter being commonly spoken of as *rupture*. This condition should be called by the proper name "hernia" rather than by the old term given when it was supposed to be due to a tear of tissues. The abdominal organs are frequently subjected to great pressure, as in the crying of infants, straining at stool, lifting of heavy weights, or violent attacks of coughing of adults. The unusual strain causes the freely movable intestine to seek escape at the point of least resistance, which is usually at one of the openings at the lower anterior part of the abdomen. The name of the opening determines the name of the hernia —as inguinal if in the inguinal canal, femoral if with the femoral artery in the crural ring, umbilical if the escape is at the navel. (See UMBILICAL HERNIA.) In rare instances the protrusion may be in the median line above or below the umbilicus and is then termed a ventral hernia. Hernia sometimes occurs at or near the wound following operations involving the abdominal wall.

Hernia is most frequent at the extremes of life, being found in 2 per cent of individuals one year old and nearly 2½ per cent in those 75 years old. At the time of the War of the Rebellion in the United States, of half a million men examined, 31 per thousand were rejected because of hernia. Women are subject to this affection in about one-fourth the proportion of men, except as to the femoral and umbilical forms, to which they are peculiarly liable. In some boys hernia is congenital, owing to the nonclosure of the tube of peritoneum that accompanies the testicle out from the abdomen and normally shrinks to become the tunica vaginalis.

A hernia consists of (1) a sac, (2) its contents, and (3) its coverings. The sac is a portion of peritoneum pushed before the hernial body. It usually contains a small amount of fluid. The contents is in most cases a loop of the ileum, or small intestine, and constitutes the variety called enterocele. Should the sac contain only omentum, it is called epiplocele; if both intestine and omentum, it is termed enteroepiplocele. The appendix is occasionally found in the hernial sac. The coverings of hernia vary with its character, but in general are the skin, superficial fascia, muscular layers, deep fascia, and peritoneum.

Hernia is classified as to condition by the terms "reducible," "irreducible," and "strangulated." A reducible hernia is one that by gentle manipulation, called taxis, can be returned into the abdominal cavity. When irreducible, it cannot be replaced. The irreducible may suddenly become strangulated by the accumulation of intestine in such amount as to cause interference with the blood supply. Congestion then results, followed by inflammation, then by gangrene unless the condition be relieved by prompt operation, which is cutting the rigid ring that pinches the gut.

Treatment of hernia depends upon its character and the age of the patient as well as duration of the lesion. In the young it is usual to apply a truss, sometimes of soft material, but more often of steel surrounding the body and terminating in a pad that will press over the abdominal ring, thus preventing escape of the tumor. Umbilical hernia of infants is often cured by a pad made from hard rubber or a button mould or a silver coin secured by a band of adhesive plaster around the abdomen. Such an apparatus must be worn for two or three years. Trusses may be removed at night, but should be adjusted carefully in the morning, while the patient is still lying on his back, so that gravity will aid in reducing the tumor. The person with hernia should keep free from constipation and avoid severe exercise, especially jumping or heavy lifting. In case the tumor is excessively large, a truss will not retain it; and should the patient be too old for an operation, he may have to carry the hernia in a support resting upon the hips or even suspended from the shoulders.

From very early times surgeons had been devising operations that would partly close the abdominal ring and the inguinal canal, but they all failed to prevent a recurrence of the hernia. It remained for Bassini, of Padua, to publish in 1890 the details of a method which has revolutionized the course of hernias. The operation consists in removing all abnormal contents and constructing a new canal by laying the spermatic cord against the muscle and securing each layer of the sac by itself, either with silk or with kangaroo tendon. The operation is done under thorough antiseptic conditions and with practical assurance of success. The gentleman is relieved of discomfort, the laborer enabled to return to hard work. Coley and Bull have reported 1500 operations on children with but five relapses and four deaths. Consult J. G. Mumford, *Practice of Surgery* (2d ed., Philadelphia, 1914); W. B. DeGarmo, *Abdominal Hernia* (Philadelphia, 1907).

HERNICI, hĕr-nē'chē. An old Italian people of Latium (q.v.). Of Sabine connection, they dwelt in the Apennines between the Trerus and the Lacus Fucinus. They held out long against the Romans, with whom they at length formed an equal alliance in 486 B.C., but to whom they had to yield in 306 B.C. Before 225 B.C., probably, they received the rights of Roman citizens. To the north were the Marsi and the Æqui, while the Volsci were on the south. Their capital was Anagnia, now called Anagni (q.v.). Consult Conway, *Italic Dialects* (Cambridge, 1907).

HERNÖSAND, hĕr'nē-sänd. An episcopal town, the capital of the Län of Vesternorrland, Sweden, situated on the island of Hernön, in the Gulf of Bothnia, about 2 miles south of the mouth of the Angerman River (Map: Sweden,

F 5). It is connected by bridges with the mainland. It has a cathedral, a school of navigation, a classical academy, a technical school, and a teachers' institute. Its harbor is good, it has regular steamship communication with other coast towns, and it carries on a thriving trade in tobacco, lumber, and fish. It was founded in 1584 by John III, became a bishop's see in 1772, and capital of the län in 1778. Pop., 1901, 8069; 1911, 9785.

HE'RO (Lat., from Gk. Ἡρώ). A priestess of Aphrodite at Sestos. At a festival of Aphrodite she was seen and loved by Leander, a youth of Abydos (q.v.). She returned his love, and, since she was a priestess, received him secretly in her tower on the Hellespont, which he swam nightly, guided by her lamp. Venturing the passage on a stormy night when the tempest blew out the beacon, he was drowned. His body was washed ashore at the tower, whence Hero at once cast herself that she might be united with her lover in death. The story developed in the romantic poetry of the Alexandrian period and has come down to us in a work of Musæus (q.v.) and in Ovid (*Heroides*, xviii, xix). It is represented on some late works of art and on Roman coins of Abydos and Sestos. It is also the subject of poems by Marlowe, G. Chapman, and Schiller, and of a drama, *Des Meeres und der Liebe Wellen*, by Grillparzer. Consult Köppner, *Die Sage von Hero und Leander in der Literatur und Kunst des Altertums* (1894); Knaack, "Hero und Leander," in *Festgabe für Franz Susemihl* (1898); C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911).

HERO. See Heroes.

HERO. A Greek mathematician and physicist. See Hero, or Heron, of Alexandria.

HERO. The daughter of Leonato and cousin of the gay Beatrice in Shakespeare's *Much Ado About Nothing*.

HERO AND LEANDER. See Hero.

HEROD, hĕr'od (Gk. Ἡρώδης, *Hērōdēs*). The family name of a group of rulers in Palestine, derived from that of its most famous member, Herod the Great. The family had its origin in Antipas, or Antipater, an Idumæan of honorable stock, whom Alexander Jannæus (102–76 B.C.) made governor of Idumæa. The fact that the Idumæans had been subjected to John Hyrcanus in 128 B.C. and compelled to embrace Judaism is the only basis for the claim that the members of the Herodian line were Jews. In his power and influence, and apparently in his official position in Idumæa, Antipater was succeeded by his son of the same name. The latter, with the sagacity which had become characteristic of the family, made the declining fortunes of the Hasmonæan rule and the rising fortunes of Rome serve his political interests until the real control of the country of the Jews rested in his hand—a control which he strengthened by appointing his two sons, Phasael and Herod, governors respectively in Jerusalem and in Galilee.

1. Herod the Great. Son of Antipater and Cypros, an Arabian woman; reigned from 37 to 4 B.C. Upon the assassination of Antipater (43 B.C.) there followed a period of intrigue and warfare on the part of the Hasmonæan Antigonus and the Parthians against the Herodian rule, which resulted in the death of Phasael and the escape of Herod to Rome. There in 39 B.C. he was made King of Judæa by Antony, Octavius, and the Senate. It was not, however, until 37 B.C. that he succeeded in putting down the forces opposing him. The first years of his reign (37–25 B.C.) were troublous, owing to the hostility of the Sadducean and Pharisaic parties, and the enmity of the surviving members of the Hasmonæan house, who secured an ally in Cleopatra of Egypt. Herod ultimately prevailed, partly through murder and confiscation of property, partly through political cleverness and trickery, but mainly through the fall of Antony and Cleopatra before the forces of Octavius. After the battle of Actium (31 B.C.) his title was confirmed by Octavius at Rhodes, and he sought to establish his power at home by the execution of Hyocanus and suppression of the Hasmonæans. It was jealousy, however, and no political motive, that caused the execution of Mariamne, his wife, whom he passionately loved. The years from 25 to 13 B.C. were in the main prosperous. Herod was free to rule and to indulge his passion for building, the results of which showed themselves in the rehabilitation of such places as Strato's Fortress, and such cities as Samaria, Capharsaba, and Anthedon, renamed by him respectively Cæsarea Palestinæ (q.v.), Sebaste, Antipatris, and Agrippæum. At Jerusalem, Jericho, and Cæsarea he erected theatres, amphitheatres, and hippodromes for the Grecian games established in honor of Augustus. He built and rebuilt fortresses such as Alexandrium, Herodium, Hyrcanium, Masada, and others. He rebuilt the temple in Jerusalem with the most lavish expenditure of wealth and careful regard for the religious scruples of the people. This munificence was extended even beyond his domains to cities in Syria, Asia Minor, and Greece. Herod also gratified his Hellenizing tastes by inviting and attaching to his court Greek writers and teachers. With all this he was loyal to the people over whom he ruled, not only bestowing upon them substantial benefits at home, but securing for them large favors in some parts of the Diaspora and significant privileges from Rome. The last years of his reign (13–4 B.C.) were full of misery, occasioned by the ceaseless and complicated political intrigues within his household, which rendered him morbidly suspicious and inflamed his murderous passions to the worst. The enthusiasm shown by the people for his sons by Mariamne, who on their mother's side belonged to the Hasmonæan line, aroused his suspicion and led to their assassination at Sebaste; and his eldest son Antipater was put to death a few days before Herod himself died. It is generally held by scholars that Jesus of Nazareth was born towards the end of Herod's reign—some preferring a date immediately before his death, others assigning various dates from 10 to 6 B.C. Many modern scholars regard the account of Herod's murder of the children in Bethlehem, which is not referred to by any secular writer, as unhistorical. On his last visit to Rome Herod obtained consent of Augustus to dispose of his kingdom as he saw fit. A few hours before his death he made a will, in which he gave Judæa, including Samaria and Idumæa, to Archelaus, with the title of king; Galilee and Perea to Antipas, with the title of tetrarch; and Gaulanitis, Auranitis, Trachonitis, Batanea, and Panias to Philip, with the title of tetrarch. This will was practically confirmed by Augustus, and in spite of disturbances and disorders on the part of the people, who desired to be rid of the Herodian

yoke, was ultimately put into effect. Consult: Chijs, *De Herode Magno Judæorum Rege* (Leyden, 1855); De Saulcy, *Histoire d'Hérode, roi des Juifs* (Paris, 1867); Schürer, *Geschichte des jüdischer Volkes* (4th ed., Leipzig, 1901–09); Schmidt, "Alexandrium," in *Journal of Biblical Literature* (Boston, 1910); Otto, *Herodes; Beiträge zur Geschichte des letzten jüdischen Königshauses* (Stuttgart, 1913); Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914). 2. ARCHELAUS, ethnarch of Judæa, Idumæa, and Samaria. Son of Herod the Great and Malthace, a Samaritan woman; ruled from 4 B.C. to 6 A.D. Though given title of king by his father's will, Augustus withheld this from him, substituting that of ethnarch. He was the worst of Herod's surviving sons. Of his reign we have no details, but Josephus describes it as violent and tyrannical. After nine years the Jews made such complaints against Archelaus that Augustus banished him to Vienne in Gaul. Archelaus is referred to in Matt. ii. 22, as "reigning over Judæa in the room of his father Herod."—3. ANTIPAS (Herod Antipas), tetrarch of Galilee. Son of Herod the Great and the Samaritan Malthace, younger brother of Archelaus; ruled from 4 B.C. to 39 A.D. Though not much is known of his rule, he seems to have been able to govern his country and to have possessed the family passion for building. In Galilee he remade Sepphoris, afterward called Dio-Cæsarea, and in Peræa, Betharamptha, which he named Livias after the wife of Augustus, and in addition reared the magnificent capital which he named Tiberias, for the reigning Emperor. He seems to have had his father's craftiness, though he apparently lacked his diplomacy, as he certainly did his ability in war. The discarding of his first wife, daughter of the Nabatæan King Aretas, for Herodias, wife of his half brother Herod Philip (Mark vi. 17; Matt. xiv. 3), not the tetrarch Philip, brought on a war with Aretas in which Antipas was routed. Later, through the persuasion of Herodias, he went to Rome and demanded of Caligula that he be favored, as Agrippa I had just been, with the title of king. He was confronted, however, by charges from Agrippa himself, was deposed, and banished by the Emperor to Lugdunum (Lyons) in Gaul. This Antipas is the "Herod" most frequently mentioned in the New Testament (Matt. xiv. 1; Luke iii. 1, xiii. 31; Acts xiii. 1 et al.). It was he who imprisoned and beheaded John the Baptist (Mark vi. 14–29, where he is wrongly called "King"). He was designated as a "fox" by Jesus (Luke xiii, 32), and it was to him that Jesus was sent by Pilate (Luke xxiii. 7–15).—4. PHILIP. Son of Herod the Great and Cleopatra, a woman of Jerusalem; ruled from 4 B.C. to 34 A.D. The country over which he ruled as tetrarch was Ituræa, north and east of the Sea of Galilee, consequently outside of strictly Jewish territory and inhabited by a predominantly non-Jewish population. It was owing to this fact that Philip was able to carry out a Hellenizing and Roman policy among his people. He had the family passion for building and founded on the site of Paneas a city which he named Cæsarea, known as Cæsarea Philippi (q.v.), to distinguish it from the larger city on the coast. He also rebuilt Bethsaida, which he called Julias, in honor of the daughter of Augustus. Of his rule nothing is known beyond what may be inferred from Josephus' characterization of the man, as "a person of moderation and quietness" in the conduct of his life and government. He seems to have possessed none of the Herodian ambition, cruelty, or lust. He was married to Salome, the daughter of Herodias, and died without issue.—5. AGRIPPA (Herod Agrippa). Son of Aristobulus, Herod the Great's son by Mariamne, granddaughter of Hyrcanus, and Berenice, daughter of Salome, Herod's sister, and Castobar; ruled from 37 to 44 A.D. His earlier years were spent in Rome, where he fell into spendthrift habits that finally compelled his retirement to Palestine. In the last years of Tiberius' reign he returned to Rome and succeeded in securing the appointment by the Emperor to the care of his grandson. He had been friendly with Caligula in his early life and shortly after the latter's accession received from him the tetrarchies of Philip and Lysanias (viz., Abilene) with the title of king, while the Senate added the honorary rank of prætor. In 40 A.D. he obtained the fortified tetrarchy of Antipas; and in the next year, when Claudius came to the throne, he was given by the Emperor, along with the honor of the consular rank, the additional territory of Judæa and Samaria, thus finally securing the whole region over which his grandfather had ruled. The next three years constitute the real period of his rule. For the sake of peace he followed a pro-Jewish policy, which showed itself in a personal piety of almost Pharisaic legalism and an official furtherance of the interests of the Jews, which brought them to regard him as a brother and alienated from him the regard of the Roman element in his population and of the Roman troops in his domains. This Jewish favoritism, no doubt, was the cause of his persecution of the Christians (Acts xii. 1–19). The account of his death given by Josephus (*Antiq.*, xix, 8, 2) is in substantial agreement with that in Acts xii. 20–23.—6. AGRIPPA II (Herod Agrippa). Son of Agrippa I and Cypros; ruled from 50 to about 100 A.D. Because of his extreme youth at the time of his father's death, Claudius was persuaded not to give him the succession. The whole of Palestine thus passed under direct Roman rule. In 50 A.D., however, two years after the death of his uncle Herod of Chalcis, he received the kingdom which had thus been vacated. This he surrendered in 53 A.D., receiving in return the former tetrarchy of Philip, together with that of Lysanias and the domains of Varus. In 56 A.D. Nero added to this the cities of Tiberias and Julias in Galilee and Tarichæa in Peræa, with surrounding lands and villages. Like all his family, he gave himself to building, improving his capital, Cæsarea Philippi, which he renamed Neronias, and architecturally adorning Berytus (Beirut) in Phœnicia. Unlike his father, he gave no special care to the interests of the Jews—manifesting, in fact, a general indifference to the religious questions of his time, though it was in his rule that the temple at Jerusalem was finished. He tried to combine Hellenism and Judaism and placed the effigies of the emperors on his coins. He strove to dissuade the Jews from their war with Rome and manifested his loyalty to the Emperor even after his Galilean cities had deserted him. In return for this, after the war his territory was extended northward, while in 75 A.D. he had conferred upon him the prætorian rank. He left no children; in fact, it is doubtful whether he ever married. As far as record can be obtained,

he died in the third year of Trajan's reign (100 A.D.). His rule was a feeble one. It was before this Agrippa and his sister Berenice that Paul was brought by Festus in Cæsarea, on the eve of his deportation to Rome, as narrated in Acts xxv. 13–xxvi. 32. For the later Herods, consult especially Schürer, *Geschichte der jüdischen Volkes* (4th ed., Leipzig, 1901–09), and Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

HEROD AGRIP'PA. See HEROD.

HERO'DAS. See HERONDAS.

HERO'DES AT'TICUS. See ATTICUS HERODES.

HÉRODIADE, ā'rō'dyād'. An opera by Massenet (q.v.), first produced at Brussels, Dec. 19, 1881; in the United States, Nov. 8, 1909.

HERO'DIAN (Gk. *Ἡρωδιανός, Hērōdianos*). A Greek historian of the third century A.D. He was a Syrian by birth, but held office under the Roman government, so that he writes with a practical knowledge of the events which he describes. His history, in eight books, covers the years 180–238 A.D., i.e., from the death of Marcus Aurelius to the accession of Gordianus III, and so supplements that of Dio Cassius, which stops with the end of the reign of Alexander Severus. The work was highly valued by later historians, especially the *Scriptores Historiæ Augustæ* (see AUGUSTAN HISTORY), and Johannes Antiochenus, who take long passages from it and try to imitate its style. The history was first made known to the Western world in the translation of Politianus (1493). The first critical edition was published by Bekker (Berlin, 1826); the best is that of Mendelssohn (Leipzig, 1883). There is an English translation by Hart (London, 1749). Consult Peter, *Die geschichtliche Litteratur über die römische Kaiserzeit*, ii (Leipzig, 1897), and Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HERO'DIANS (Gk. *Ἡρωδιανοί, Hērōdianoi*, adherents of Herod, from *Ἡρώδης, Hērōdēs*, Herod). A party among the Jews, twice mentioned in the New Testament and both times in connection with the Pharisees: (1) Mark iii. 6, on the occasion of Jesus' healing of the man with the withered hand in the Capernaum synagogue; (2) Mark xii. 13 (cf. Matt. xxii. 16), on the occasion of placing before Jesus the question about tribute to Cæsar. They were evidently not a religious sect, as the Pharisees and the Sadducees, nor the mere court and family followers of the Herods, but rather a political party, whose object was the reëstablishment of the Herodian kingdom in the spirit of its traditional policy—the union of Judaism with Hellenism. (See HEROD.) Their connection with the Pharisees, consequently, was not due to any sympathy of ideas with them, but to the instinctive conviction that in the spiritual mission of Jesus lay a danger common to them both. They were not necessarily pro-Roman in their feelings; though, in the nature of things, they would be more kindly disposed to the spirit of the pagan government than to that of the old theocracy, as represented by the Pharisees. It is probable that they had more in common with the religiously indifferent Sadducees than with any other Jewish party. Upon such a supposition there may be some bearing in the significant interchange of "Sadducees" and "Herod" in Jesus' warnings to His disciples as given in the parallels, Mark viii. 15 and Matt. xvi. 6.

HERODIANUS. A Greek historian. See HERODIAN.

HER'ODIA'NUS, ÆLIUS. A Greek grammarian of the second half of the second century A.D., son of Apollonius Dyscolus. He was born at Alexandria, but afterward removed to Rome and there gained the favor of the Emperor Marcus Aurelius, to whom he dedicated his chief work, *Καθολικὴ Προσῳδία*, called also *Μεγάλη Προσῳδία*, an exhaustive treatise on prosody, syntax, and etymology, in about twenty books. Of this work we have several epitomes. Though he is highly praised by later grammarians, including Priscian, who calls him *maximus auctor artis grammaticæ*, still, of his treatises on grammar only one, which deals with peculiar or anomalous words, *Περὶ Μονήρους Λέξεως*, has been preserved complete. Fragments, however, of his other works have been preserved in the citations of other grammarians and have been edited by Lentz in his *Herodiani Technici Reliquiæ* (3 vols., Leipzig, 1867–70). Consult: Lehrs, *Herodiani Scripta Tria* (Königsberg, 1848); Hilgard, *Excerpta ex Libris Herodiani* (Leipzig, 1887); Stephen, *De Herodiani Technici Dialectologia* (Strassburg, 1889); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HERODIAS, hē-rō'dī-ăs. Daughter of Aristobulus (second son of Herod the Great and Mariamne, granddaughter of Hyrcanus) and Berenice, daughter of Salome, Herod's sister. She was twice married—first to her half uncle, Herod, called in the Gospels Philip (Mark vi. 17; Matt. xiv. 3), the issue of which marriage was a daughter, Salome, who afterward became the wife of Philip, another half uncle of her mother. Doubtless, through the real attachment of love, Herodias left her husband for his half brother, Antipas—a marriage which, because of its illegality according to the Mosaic law, brought upon the latter the outspoken denunciation of John the Baptist and so led to that prophet's imprisonment and final execution (Mark vi. 17–29; Matt. xiv. 3–12). It was her daughter who danced before Antipas on the occasion of the festival and allured him to the reckless oath that gave Herodias the opportunity to accomplish the death of John. If the marginal reading, "his daughter Herodias," which is better attested, should be substituted for the text, it would indicate that the maid was a namesake of her mother and a child of the present marriage. It is not likely, however, that Herodias would venture to assign Herod's own child to such a degrading task. The general conclusion of scholars is therefore most probable, that the maid was Salome, the daughter of Herodias and Aristobulus, who afterward married Philip, the tetrarch of Trachonitis, her maternal uncle, and, later, Aristobulus, King of Chalcis. It was Herodias' ambition that led her to urge Antipas to his fatal journey to Rome for the securing of the royal title, though her loyal affection for him made her share his exile. See HEROD.

HEROD'OTUS (Lat., from Gk. *Ἡρόδοτος*) (c.484–c.424 B.C.). A Greek historian. He was the son of Lyxes and Rhœo, or Dryo, and was born at Halicarnassus (q.v.), an originally Doric colony in southwestern Asia Minor, at that time ruled by a Queen Artemisia under the sway of the Persians. (See ARTEMISIA, 1.) Herodotus was thus by birth a subject of Persia. His uncle, Panyasis (q.v.), was an epic poet; it was perhaps through him that Herodotus acquired the

comprehensive acquaintance with early Greek literature—prose and poetry both, but especially poetry—which is so conspicuous in his writings. His family was a prominent one. His uncle Panyasis was put to death about the year 457 for conspiring against the tyrant Lygdamis. Herodotus went into exile and is said to have made his temporary home in the island of Samos, an ally of Athens and member of the Confederacy of Delos or the Athenian Empire. Between 467 and 464 he is believed to have traveled extensively on the shores of the Black Sea, in Thrace, Scythia, Asia Minor, and the Persian Empire, including Egypt. The precise extent, direction, and starting points of his travels are matters of inference from his writings and of controversy among scholars. He saw in Egypt the skulls lying on the field of a battle fought in 460. He visited Scythia before 454. His travels in Greece, and possibly in southern Italy, fall much later. By these travels Herodotus gained first-hand knowledge of practically all the regions of which he wrote in his history. When Halicarnassus rose against Lygdamis and joined the Athenian Empire, Herodotus, according to one tradition a leader in the uprising, returned and resumed his citizenship. He was, however, soon attracted to Athens, then, about 447, at the height of the age of Pericles, the centre and focus of Hellenic culture. There he gave "author's readings" from his unfinished histories and won the admiration of the greatest minds of Greece, the personal friendship of the poet Sophocles, and, so the story goes, the more substantial reward of 10 talents voted by the people. A well-invented story, discredited, however, on chronological grounds, relates that the boy Thucydides, present at one of these readings, burst into tears from stress of emulous emotion, and that the historian complimented the boy's father on this indication of a generous nature. In the year 444 Herodotus, with many other brilliant men, joined the colony which Pericles was founding at Thurii (q.v.) in southern Italy and became a citizen there. His subsequent life is a blank. It was probably devoted to the completion and the final publication of his history. An allusion to the Propylæa, or entrance to the Acropolis, is supposed to prove that he visited Athens so late as 430. Nothing in his histories implies that he survived the year 424. Tradition placed his death and tomb at Thurii.

Herodotus was called by Cicero the father of history. This means, if anything, that he was the first to compose an artistic and dramatically unified history, although there were historians before him, the so-called logographers (q.v.), or story-tellers, who continued in prose the work of the garrulous later epic. The only one explicitly named by Herodotus is Hecatæus, of Miletus (q.v.), who traveled in Egypt, is mentioned as a prominent adviser of the Ionians during the Ionic revolt, and is thought by some critics to have been the source of much matter that Herodotus gives out as his own. But Herodotus was the first to grasp firmly a great central international theme and to work up, in due and artistic subordination to it, a vast mass of legendary, local, antiquarian, geographical, and ethnological lore, derived partly from predecessors, but widely supplemented by his own travels and *inquiry* (the original meaning of *history*). This theme, covered by books vii–ix of the history, was the invasion of Greece by Xerxes (q.v.), of which his boyhood had perhaps caught the last echoes in the tales told by his townsfolk of the wondrous exploits of Artemisia at Salamis. He apprehended it as the culmination of the eternal conflict between the East and the West which he conceived as beginning with the Trojan War, and of which we have not yet seen the end. It shaped itself to his imagination in a large, dramatic, and religiously edifying way. Its prologue is the evolution of the free states of Greece, and, in antithesis to them, the history and panorama of the barbarian world of ancient monarchies and outlying peoples (books i–vi). Its dramatic culmination is the overthrow of the myriads of Xerxes by the few thousand Greeks at Salamis, Platæa, and Mycale. Its moral is the lesson of the nemesis that waits upon *hybris* —upon the insolence of those who, drunk with power, forget the limits of mortality. "For God abases the mighty ones of earth and suffers none to think proud thoughts save Himself." There are many theories (none of them verifiable) of the order of composition of the different parts of the history, of the digressions in which it abounds, and of the retouches by which its allusions were brought down to date. But in the final result the general design is so clear, both to Herodotus and to the reader, that, despite the bewildering prodigality of anecdote, digression, retrospect, and description, we never lose our sense of a majestic architectural unity, or fail to feel that we are progressing steadily towards a predetermined goal. The nine books, named after the muses, into which later grammarians aptly divided the work, fall into natural groups of symmetry or antithesis when viewed in connection with the whole. The first three books deal with centuries of time and the vast barbarian world, thus: (i) The overthrow of the Lydian kingdom of Crœsus (see LYDIA; CRŒSUS), and, in retrospect, the establishment of the Persian monarchy as the heir of the immemorial empires of the East. (ii) Egypt in retrospect and description in connection with the Persian Conquest. (iii) The consolidation of the Persian Empire under Cambyses and Darius. The last three books are concerned with 10, or, more strictly, three years of conflict on Greek soil: books vii, viii, and ix, marked respectively by the battles of Thermopylæ, Salamis, and Platæa. The three intervening books at once link and divide the extremes and trace the progress of Persia and the interlacing of Greek and Persian interests to the point where the struggle became inevitable. Their themes are as follows: (iv) The campaigns of Persia, in Scythia and Libya, with vast geographical and ethnological digressions. (v) The subjugation of the north coast of the Ægean—Thrace and Macedon. The beginnings of revolt among the Ionic cities, with anecdotal digressions on Athens and Sparta that prepare us for the rôle to be assumed by those cities. (vi) The revolt of the Ionians aided by Athens and Eretria; its suppression; the avenging mission of Mardonius against Eretria and Athens; his defeat at Marathon. Books i–vi form thus, in effect, an introduction to the main theme of the history.

Herodotus, though an artistic, is not a critical historian. (See GREEK LITERATURE, *History.*) A critical history was possible in that age only to a Thucydides describing on the testimony of documents and eyewitnesses a contemporary war between Greeks. The Greeks of the generation of the Persian wars were too busy making his-

tory to write it, and the tradition of the great struggle was already transfigured by legend and local patriotism when Herodotus took it up. Nor could he deal scientifically with the dim legends and inextricably crossed traditions of the East which he gathered on the frontiers of the Greek and barbarian worlds. Fortunately he did not make the attempt. Ignorant of the languages, unable to decipher the records, if he had applied to the tales told him by dragomans, minor priests, commercial travelers, and Greek mercenaries either his own standards of credibility or ours, he would have deprived us not only of many a delightful story, but of much invaluable information. "It is my business to relate what is told me," he declares, "but I am under no obligation to believe it." He does not believe that the Phœnicians got the noonday sun on their right hand in circumnavigating Africa, but he tells us the story; and, wasting no time on vain critical discussions or pretentious philosophies of history, he contrives to tell us more fascinating stories and more interesting facts to the page than any other writer in the world. In view of this and his evident good faith, genial simplicity, and earnest piety, we may disregard the critics who impugn his honesty because his account of a crocodile would amuse a naturalist, and his description of Babylon would not satisfy a Baedeker.

The charm of his seemingly simple, artfully artless, naïve, Ionic style has been celebrated by all critics, ancient and modern. Andrew Lang's entertaining parody, in his *Letters to Dead Authors*, gives, by exaggeration, a good idea of it to the English reader. Macaulay's essay "On History" contains a picturesque rhetorical characterization.

Bibliography. De Quincey wrote on what he called the "Philosophy of Herodotus," and his essay on "Style" has a fine digression on Herodotus at Olympia. The chief English translation is the classical work of Rawlinson in four volumes, with elaborate notes and introduction (London, 1858–60, often reprinted). The translation of G. C. Macaulay (2 vols., London, 1890) is well spoken of. Stein's annotated German edition (Berlin, 1901 et seq.) is, on the whole, the best short commentary. Sayce, *Herodotus*, i–iii (London, 1883), deserves attention for his introduction, notes, and appendices, though his attempt to discredit Herodotus' reliability has found little support. Macan, *Herodotus*, iv, v, vi, with appendices (ib., 1895), vii, viii, ix (ib., 1908), is rich in historic criticism. So, too, is the commentary on the whole work by How and Wells (2 vols., Oxford, 1912). Hauvette, *Hérodote: historien des guerres médiques* (Paris, 1894), is an excellent monograph. The volume on Herodotus in *Blackwood's Ancient Classics* is readable. Consult also: Kirchhoff, *Ueber die Abfassungszeit des herodotischen Geschichtswerks* (Berlin, 1878); Bauer, *Herodots Biographie* (Vienna, 1878); Delbrück, *Perser und Burgunderkriege* (Berlin, 1887), important; Grundy, *The Great Persian War* (London, 1901); Wright, *A Short History of Greek Literature* (New York, 1907); Bury, *Ancient Greek Historians* (ib., 1909); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (5th ed., Munich, 1908); and the article "Herodotos," in the *Supplement, Zweites Heft*, to Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft* (Stuttgart, 1913).

HEROES, hē′rōz (from Lat. *heros*, from Gk. *ἥρως, hērōs*, hero). In the older portions of the Homeric poems the heroes are warriors; in the *Odyssey* the word has broadened and denotes any distinguished character of the stories of the past. Hesiod (q.v.) applies the term chiefly to those who fought before Troy and before Thebes; he thought of them as demigods. This meaning prevailed later, and the heroes became the semi-divine objects of worship. To such heroes the later noble families, or even whole communities, traced their origin, and it has been, in consequence, held that the original use of the word was to denote the souls of the blessed ancestors; in this view the worship of the heroes is a survival of a primitive ancestor worship. These "heroes" were commonly regarded as sprung from the union of a god and a mortal. Their cult ritual was like that of the gods, but naturally had closest resemblance to that of the chthonic divinities. Their worship was widespread. It seems very clear that in the large majority of cases those worshiped in historic times as heroes were originally gods, who had been superseded by the growth of the great personal gods. These superseded gods were conceived of as living, after their degradation, mortal lives, and, after that life had ended in death, as elevated to the position of heroes. It was natural that eminent men, too, who had seemed to possess somewhat of the divine essence, should receive reverence as supernatural beings after death. Such are the cases of Brasidas, Themistocles, and in later times some of the founders of philosophical schools, as Epicurus. From this it seems to have been easy to worship the living, as in the case of Alexander and some of his successors, who were honored as "savior gods" (*θεοὶ σωτῆρες*; see APOTHEOSIS). In Thrace the conception of the heroized dead as heavenly horsemen is common, but the word "hero" has become the name of a mighty god, to whom dedications are frequent. For the best brief account of the growth and character of the hero worship in Greece, consult Furtwängler, *Sammlung Sabouroff*, vol. i (Berlin, 1883). Consult also: Wassner, *De Heroum apud Græcos Cultu* (Kiel, 1883); Deneken, in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886–90); Usener, *Götternamen* (Bonn, 1896); Stengel, *Die griechische Kultusaltertümer* (Munich, 1898); Rohde, *Psyche* (Freiburg, 1905).

HEROIC HEXAMETER. See VERSIFICATION, *Greek and Latin: Dactylic Rhythms*.

HEROIC STANZA. See VERSIFICATION, *Germanic and English*.

HEROIDES, hē-rō′ī-dēz. An early work of Ovid, a collection of 20 fictitious love letters sent by noble women of the olden time to their estranged husbands or lovers. The theme in all is the same, but their romantic nature and dramatic setting have placed them among the most popular of Ovid's works. The last six of the epistles are believed to be the work of imitators.

HER′OIN. An acetic ester of morphine, chemically known as diacetyl-morphine. It is a white, crystalline, neutral, slightly bitter powder. It is only slightly soluble in water, but freely so when a dilute acid is added. The use of the drug in medicine practically dates from 1898, and there is still a diversity of opinion as to its action and value. Its analgesic effect is inferior to that of morphine or codeine, but it may be used as a substitute when these are not well tolerated. It seems to be chiefly of value in

allaying cough. For the relief of dyspnœa it is sometimes effectual, having given good results in cases due to asthma, cardiac dilatation, aneurism of the aorta, and uræmia. It has been claimed that heroin is to the respiratory system what digitalis is to the heart. The dose should always be small, and it should be used with the same caution as other derivatives of opium. A single dose of two and one-half grains has been followed by great exhaustion, trembling, diminished temperature, a thready pulse of 140, contraction of the pupil, and impaired vision. Recovery followed the administration of caffeine. Of late years, its use has been generally restricted to cases of irritating cough from tuberculosis or bronchitis. It is a habit-forming drug and it is therefore to be given with great caution.

HEROIN HABIT. See DRUG ADDICTIONS.

HÉROLD, ā'rôld', LOUIS JOSEPH FERDINAND (1791–1833). A French dramatic composer, born in Paris. Although his father was a musician, he discouraged his son's musical ambitions, and it was only after his father's death (1802) that the boy was able to follow his natural bent. In 1806 he entered the Paris Conservatory, winning first prize for piano playing in 1810, and the Prix de Rome in 1812 with his cantata *Mlle. de la Vallière.* After studying in Rome for three years he went to Naples, producing there, in 1815, his first opera, *La gioventù di Enrico Quinto.* His next three or four operas, given in Paris, were successful, but, owing to poor libretti, were followed by a series of failures which for a time discouraged the composer. In 1828 Hérold was elected a member of the Legion of Honor. His best works, *Marie* (1826), *Zampa* (1831), and *Le pré aux clercs* (1832), are compositions of genuine merit and still hold the boards in France and Germany. Consult B. Jouvin, *Hérold, sa vie et ses œuvres* (Paris, 1868), and A. Pougin, *Hérold* (ib., 1906).

HER'ON (OF. *hairon, heron,* Fr. *héron,* Prov. *aigron,* heron, from OHG. *heigir,* heron, AS. *higora;* connected with AS. *hcagra,* OS. *hreiera,* MHG. *reiger,* Ger. *Reiher,* heron, Skt. *krakana, krakara,* partridge, and Lat. *crocire,* Gk. κρίζειν, *krizein,* to screech, Goth. *hrops,* cry, OHG. *hruom, ruom,* Ger. *Ruhm,* fame, AS. *hroc,* Eng. *rook*). A bird of the genus *Ardea* (and allied genera), of the family Ardeidæ and suborder Herodii, or Ardeæ. This family includes also bitterns and night herons. In it the bill is long, compressed, and sharp, the tail short, the legs and the toes long and slender, the wings long. Those peculiar patches of soft oily feathers called "powder-down" tracts are always present—three pairs in the true herons (one on the breast, one on the rump, and one under the thighs). In the herons —in which genus are included the species commonly designated egrets (see EGRET), which differ only in unimportant particulars of plumage —the bill is slender but strong, forming a compressed and lengthened cone; the plumage is beautiful, but seldom exhibits very gay colors, white, brown, black, and slate-color, finely blended, being generally predominant. Although the sexes usually are alike in color, few birds show greater variety of plumage than the herons, for the breeding plumage is much finer than that of the remainder of the year, and the young are usually very different from the adults. Furthermore, a number of species are dichromatic; i.e., some specimens show one type of coloration and other specimens another type, absolutely without regard to age, season, or sex. (See DICHROMATISM IN BIRDS.) In the herons one of the color phases is generally pure white; the other phase is more or less colored and is always remarkably different. (For the use of the plumage of certain herons as an ornament of costume and in millinery, which has led to their extinction in some regions, see AIGRETTE.) The body is small in proportion to the length of the neck and limbs; the neck is long and, except in flight, is usually held curved. In flight the heron carries the neck curved back in the form of a letter S, with the head resting against the shoulders, while the long legs trail out in a straight line behind. Herons feed mostly on fish, frogs, and other aquatic animals, and may be seen, particularly very early in the morning and late in the evening, standing patiently motionless in some shallow water, at the margin of a lake or stream, or on the seashore, waiting till prey come within reach. In default of their ordinary food, however, herons sometimes prey on young birds, frogs, reptiles, and the smaller mammalia. They usually go forth singly in quest of prey, but are mostly gregarious in their nidification. The nests are usually built in trees, of coarse sticks with little lining. The eggs are three or four, in color blue or bluish green, without spots. See Colored Plate of EGGS OF WATER AND GAME BIRDS.

Herons are widely distributed over the globe, but are especially abundant in the tropics and warm temperate zones. About 100 species are known, of which about a dozen occur in the United States.

The great blue heron (*Ardea herodias*) is about 4 feet in length from the point of the bill to the end of the tail, and nearly 6 feet across the wings. It is of a delicate gray color on the upper parts, except the quill feathers, which are black, and the tail, which is deep slate-color. This common heron generally builds its nest in a high tree, and many nests are sometimes to be seen in a single tree. In northern parts of the continent the heron is known only as a summer bird of passage, but it remains in the southern United States all the year. Its geographical range extends over most parts of the New World north of the equator. Herons were formerly in great esteem for the table, although now disregarded. The common heron (*Ardea cinerea*) of Europe is very similar to the great blue heron, but has the tibiæ white instead of chestnut. It is famous as the game which was most eagerly sought in falconry. Other well-known American herons are the little green heron (*Butorides virescens*), which is only about 1½ feet long, the prevailing colors dark green and brown, abundant throughout the United States and a little beyond, both north and south; the night heron (*Nycticorax nycticorax nævius*), a mere subspecies of the European night heron, found throughout the United States and Canada. (See NIGHT HERON.) The American egret (*Herodias egretta*) and the snowy egret (*Egretta candidissima*) are southern species, always pure white, the former about 60 per cent larger than the latter. The reddish egret (*Dichromanassa rufescens*), the little blue heron (*Florida cærulea*), and the great white heron (*Ardea occidentalis*) are all dichromatic; the last being the largest American heron, about 4½ feet long and 8 feet in extent. The largest-known species is the giant heron of Africa (*Ardea goliath*), which slightly exceeds these figures. Among other herons of

the Old World may be mentioned the following: the purple heron (*Ardea purpurea*), which is of large size, purplish-blue plumage, and wide distribution (see Colored Plate of WADERS); and the great white heron, or great egret (*Ardea alba*), which is most common in Turkey and eastward. It is an extremely beautiful bird, with perfectly white plumage, much of it loose and flowing. The little egret (*Ardea garzetta*) has also white flowing plumage. Consult: Sclater and Hudson, *Argentine Ornithology* (London, 1888); Newton, *Dictionary of Birds* (New York, 1896); Cooke, "The Distribution and Migration of North American Herons and their Allies," *Biological Survey Bulletin, No. 45* (Washington, 1913); and American ornithologies.

HE'RON. See HERO OF ALEXANDRIA.

HER'ON, MATILDA (1830–77). An American actress. She was born near Londonderry in Ireland and was brought to the United States by her parents in childhood. She first appeared in Philadelphia in 1851 as Bianca in *Fazio*. Her chief parts were Camille in *La Dame aux Camélias* and Ulah in *De Soto*. She played in all the principal American cities and visited London in 1861. She was married to Robert Stoepel, a musician, in 1857, but was divorced in 1869. In the latter part of her life she taught elocution in New York City.

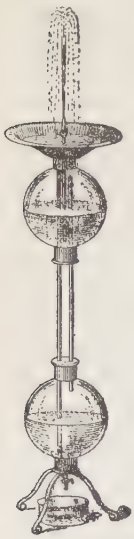
HERON'DAS, or **HERO'DAS** (Lat., from Gk. Ἡρώνδας, or Ἡρώδας). A Greek poet of the third century B.C., born, probably, in the island of Cos. Of his mimes or mimiambi (i.e., mimes in iambic verse), as they are sometimes called (see MIME), nothing was known before 1890 except a few fragments. In that year, however, an Egyptian papyrus was found in the Fayum, which contains seven comparatively complete poems and parts of two others. These are all written in the metre called the choliambus, or lame iambic trimeter. (See VERSIFICATION, *Greek and Latin: Iambic Rhythms.*) Unlike the works of the earlier iambographers, such as Archilochus and Hipponax, the poems of Herondas are not personal in their satire. They may be described as genre pieces descriptive of certain phases of life in the early Alexandrian time, and as such they are extremely interesting. The realism of these pictures, located largely on the island of Cos, is very striking. In them the Alexandrian age lives again in all its hurry and flurry, all its outward brilliancy and spiritual poverty. The new pieces were first published by Kenyon, *Classical Texts from Papyri in the British Museum* (London, 1891). The latest editions are by Crusius, *Untersuchungen zu den Mimiamben des Herondas* (Leipzig, 1892; 4th ed., 1904), and by Nairn (Oxford, 1904). For an English verse translation, consult Sharpley, *A Realist of the Ægean* (London, 1906). Consult also Wright, *A Short History of Greek Literature* (New York, 1907), and Christ-Schmid, *Geschichte der griechischen Litteratur*, vol ii (5th ed., Munich, 1913).

HERO, or HERON, OF AL'EXAN'DRIA. The leading Greek mathematician and physicist of his time. Not only are the dates of his birth and death unknown, but there is great uncertainty as to the century in which he lived. The most recent investigation of the evidence, by Schmidt (1899, work cited below, vol. i, p. ix), leads to the conclusion that he may have lived in the first century A.D.; but other writers, who, it must be said, have not considered the question so fully, have usually placed him in the first or even the second century B.C. There is much confusion concerning the works of Hero of Alexandria, there having been no less than 18 Greek writers of this name. It is, however, fairly certain that he wrote at least 13 books on mathematics and physics. He seems to have been an Egyptian, and it is certain that his style is not that of a Greek. He contributed little to pure mathematics, his chief work on this subject being the extension of the ancient mathematics so as to allow the consideration of the fourth power of lines. Thus, in his geodesy (γεωδαισία) contained in his Μετρικά, upon which subject he was the only Greek writer, he gives the well-known formula for finding the area of a triangle with sides, a, b, c, and semiperimeter s, $\sqrt{s(s-a)(s-b)(s-c)}$, a formula known by his name. (The proof is given, possibly an interpolation, in his Περὶ διόπτρας. He seems also to have had some idea of trigonometry, and in his geometry is to be found the first definite use of a trigonometric formula. He asserts in substance, using modern symbols, that if A represents the area of a regular n-gon of side s, and if c be the numerical coefficient by which s^2 must be multiplied to produce A, i.e., so that $A = cs^2$, then must $c = \frac{n}{4} \cot \frac{180°}{n}$. He proceeds to compute c for the values $n = 3, 4, \ldots 12$, with considerable accuracy, but his method is unknown. He could also solve the complete quadratic equation $ax^2 + bx = c$, where a, b, c, are positive, but not the general form. Hero is credited with a number of mechanical inventions, including a contrivance for utilizing the force of steam and a fountain which bears his name. See ÆOLIPILE; HERO'S FOUNTAIN. Consult: Martin, "Recherches sur la vie et les ouvrages d'Héron d'Alexandrie," in vol. iv of *Mémoires présentées par divers savants à l'Académie d'Inscriptions* (1st series, Paris, 1854); Hultsch, *Heronis Alexandrini Geometricorum et Stereometricorum Reliquiæ* (Berlin, 1864); Schmidt, *Heronis Alexandrini Opera quæ Supersunt Omnia* (Leipzig, 1899); Hermann Schöne, *Vermessungslehre und Dioptera Griechisch und Deutsch* (ib., 1903).

HEROPH'ILUS (Lat., from Gk. Ἡρόφιλος) (flourished c.300 B.C.). A famous surgeon of antiquity, born at Chalcedon in Bithynia. He studied medicine under Praxagoras, one of the followers of Hippocrates, and afterward went to Alexandria in Egypt, where he became famous as a practitioner, and was one of the founders of the medical school in that city. His followers later spread to Pergamum, Laodicea, and elsewhere. Herophilus' greatest services were performed in the field of anatomy. He discovered the nerves and made important observations in connection with the eye. Several names which he gave to different parts of the body are still in use, one such, *torcular Herophili*, recording his own name. He is said to have practiced vivisection upon condemned criminals. His writings were numerous, but we have only fragments thereof. Consult "Herophilos, 4," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HERO'S FOUNTAIN (named from its inventor, Hero of Alexandria). A pneumatic apparatus, in which a vertical jet of water is produced by the pressure of condensed air. A simple form of the apparatus constructed of glass tubes is shown in the annexed figure. The

column of water in the left-hand tube compresses the air in the lower vessel; this causes an increase of pressure on the surface of the water in the upper cistern and causes it to gush out at the jet.



HERO'S FOUNTAIN.

HEROS'TRATUS (Lat., from Gk. Ἡρόστρατος). An Ephesian, whose name is mentioned in connection with the burning of a temple of Diana at Ephesus. (See DIANA, TEMPLE OF.) Herostratus expiated the deed by a painful death, and the Ephesians passed a decree that his name should never be mentioned. It was revealed by Theopompus.

HÉROULT, PAUL (c.1862–1914). A French metallurgist, born in Normandy. He was taken to England by his parents when he was four years old, but he was educated in Paris at the Ecole des Mines. In 1887 he patented a process for the manufacture of aluminium, and in the next year a factory was built to commercialize his process. Héroult was also the inventor of an electric furnace for making high-grade steel, which was adopted by British manufacturers and by the United States Steel Corporation. See IRON AND STEEL, METALLURGY OF, *Electrothermic Process.*

HERPES, hĕr'pēz (Lat., from Gk. ἕρπης, *herpēs,* from ἕρπειν, *herpein,* Lat. *serpere,* Skt. *sarp,* to creep). A cutaneous eruption, characterized by spreading or creeping from place to place. The term was formerly applied to several different diseases, including eczema, psoriasis, lichen, and seborrhœa, as well as zona, to which it properly belongs. Zona, or herpes zoster, is a cutaneous disease of trophic origin, occurring as a sequence of various lesions of the nervous system. The disease is of an acute, inflammatory nature, characterized by a set of vesicles as large as a split pea, occurring in clusters and following the course of a peripheral nerve. The course of the affection is from 10 to 14 days in each locality to which it spreads, each irregular cluster of vesicles going through the process of increase, maturation, and decline, each vesicle drying into a scab. The inflamed areas are exquisitely tender to the touch, sometimes itching at the same time. Soothing and cooling applications should be made, avoiding ointments whose base is grease. Galvanism is of benefit. Appropriate internal treatment for the nerve condition must be employed. Herpes zoster is popularly called shingles, a corruption of *cingulum.*

Herpes simplex (fever blisters, cold sores) occurs on the lips as small vesicles on inflamed red bases, as the result of fever of any type, exposure to the wind, or nervous disturbances. It is occasionally seen in women at the menstrual period. It is probably a mild toxic neuritis of the delicate nerve filaments in this situation. Herpes simplex also occurs on the genitals, both of the male and female. Herpes sometimes attacks the eyelids, conjunctiva, and even the cornea of the eye.

HER'PETOL'OGY (from Gk. ἑρπετόν, *herpeton,* reptile, from ἕρπειν, *herpein,* to creep + -λογία, *-logia,* account, from λέγειν, *legein,* to say). That branch of natural history which treats of reptiles and formerly included the amphibia. Now, however, the term is restricted to the Reptilia proper, which includes lizards, snakes, turtles, crocodiles, alligators, and various extinct aquatic and terrestrial reptiles. The first attempt at a systematic arrangement of reptiles was made by Ray (1693), but he did not clearly comprehend their relationships, nor did he give the group a name. Linnæus (1735–68) classed tortoises, lizards, and serpents as amphibia and recognized two subgroups, (1) those with and (2) those without feet. He included in this class those forms which we to-day call amphibia, and later he added branchiostegous fishes. Of course, such an arbitrary classification, without any morphological foundation, was soon replaced by others. Linnæus recognized 213 species and 10 genera. Cuvier (1817–29) practically adopted the classification of Brongniart (1799), in which four orders were recognized: (1) Chelonia; (2) Sauria (lizards and crocodiles); (3) Ophidia (serpents and provisionally the cæcilians); and (4) Batrachia, the latter corresponding to our present Amphibia minus the cæcilians. The splendid additions to our knowledge of their anatomical structure, made by such men as Johannes Müller in Germany, Owen and Huxley in England, and Cope in America, and an increased knowledge of the embryological development of some puzzling forms, has greatly added to the accuracy of our classification both of the Reptilia and the Amphibia. The light which has been shed on the relationship of the groups by paleontological researches of the past century particularly has also been of inestimable value in the establishment of our present classification, for which see REPTILE.

HER'PETON (Gk. ἑρπετόν, reptile). An extremely rare snake of southeastern Asia. It belongs to a subfamily (Homalopsinæ) of colubrine viviparous water snakes, which prey upon fish and crustaceans, and often moor themselves by curling the prehensile tail about some waterside branch or root. This species (*Herpeton tentaculatum*) is peculiar in having two forward-pointing appendages covered with scales on the snout, supposed to be organs of touch. Cf. LANGAHA.

HERR, EDWIN MUSSER (1860–). An American mechanical and electrical engineer, born at Lancaster, Pa. He graduated from Sheffield Scientific School (Yale) in 1884. Between 1886 and 1900 he was engineer of tests, superintendent of telegraph, and division superintendent on the Chicago, Burlington, and Quincy Railway. He was also division master mechanic on the Chicago, Milwaukee, and St. Paul (1891), general superintendent of the Grant Locomotive Works at Chicago (1892–93), general manager of the Gibbs Electric Company of Milwaukee (1894), assistant superintendent of motive power of the Chicago and Northwestern Railway (1895), and superintendent of motive power for the Northern Pacific (1896–98). From 1898 to 1905 he was general manager of the Westinghouse Air Brake Company, and from 1905 to 1911 vice president and director, and thereafter president, of the Westinghouse Electric and Manufacturing Company. In this latter position he had considerable difficulty with his employees, who went on a strike in 1914.

HERRERA, âr-rā'râ, FERNANDO DE (1534–97). A Spanish poet, born at Seville, the head

of the so-called Seville school of lyric poetry in the sixteenth century. When advanced in life, he took orders. He was master of the Greek, Roman, and Italian literatures, and was a man of prodigious learning. As a poet, he ranked so high in the opinion of his contemporaries that they bestowed upon him the appellation of the "divine." Like his acknowledged master, Garcilaso de la Vega, he sings chiefly in the foreign Italian strains and is particularly successful in the *canción* and the *soneto*. His masterpiece is the *canción* (or ode) *Por la Vitoria de Lepanto*. Many of his erotic poems are remarkable for tender feeling, and his odes frequently display a lofty enthusiasm; but the expression is sometimes cast in too classical a mold and consequently wears a certain air of artificiality. Herrera himself prepared for publication a volume of his verse, *Algunas obras* (Seville, 1582), to which additions were made in an edition by Pacheco (1619). The poems are to be found also in Ramón Fernández, *Poesías castellanas* (Madrid, 1808), and in the *Biblioteca de autores españoles*, xxxii (Madrid, 1872); selections in Ford, *A Spanish Anthology* (New York, 1901). His chief historical work is the *Relación de la guerra de Chipre y batalla de Lepanto* (1572), and he translated from the Latin of Stapleton a life of Sir Thomas More. In 1580 he published an annotated edition of the poems of Garcilaso.

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HERRERA, Francisco de (1576–1656), called El Viejo (the elder). A Spanish religious painter of the school of Seville. He was the first to emancipate himself from the Italian manner then dominant in Spain and to assume the vigorous naturalistic style afterward adopted by his pupil Velazquez (q.v.). He may therefore be regarded as the founder of the new national school of Spain. Herrera was born at Seville in 1576 and studied painting with Luis Fernandez, who painted in the Italian manner. He soon freed himself from this master and founded a school of his own; but his unbearable temper drove away his pupils, among whom was Velazquez, and even his own sons. A carver in bronze, Herrera was accused of counterfeiting money, and in order to avoid arrest he took sanctuary in the Jesuit College at Seville. While there, he painted the "Triumph of St. Hermengild," now in the Museum of Seville—a picture of such merit that when it was seen by Philip IV on his visit to the city he pardoned the artist. After his release Herrera became more unbearable than ever. His wife left him; his elder son, called El Rubio, died of consumption; and his younger, Herrera of Mozo, robbing his father of his money, fled to Italy. In 1650 the father went to Madrid, where he died in 1656.

His subjects are generally sombre and tragic and are mostly of a religious nature, although he sometimes painted genre. They contain all the qualities of a great artist; a design grandiose but correct and true to nature, especially in the nudes; a harmonious color, laid on in great masses. His drawing is good, but his brushwork and rendering of tones are sometimes faulty, and his originality sometimes verges on extravagance. He painted both in oils and al fresco, but most of his fresco work has disappeared. His principal works are at Seville. Among them are the "Last Judgment," in the church of San Bernardo; four great pictures in the archiepiscopal palace, representing the "Fall of Manna," "Moses Smiting Water from the Rock," the "Marriage at Cana," and the "Miracle of the Loaves and Fishes"; "St. Peter," in the cathedral; "St. Basil," in the Museum; "St. Augustus" and "St. Jerome," in the Montpensier collection, Seville. The Louvre has two excellent examples—"St. Basil Dictating his Doctrine" and the "Israelites Gathering Manna in the Desert"; the Museum of Dresden, a "St. Matthew"; the National Gallery in London, "Christ Disputing with the Doctors," formerly attributed to Herrera's son. The frescoes with which he ornamented the façade of the convent of La Merced at Seville have perished, as have also those at Madrid. Luckily the artist himself etched a number of the latter, showing great skill in this branch of art, as is further evident from his print, "St. Peter."

His son, Francisco Herrera (1622–85), called El Mozo (the younger), after he had fled to Italy, painted pictures of various subjects, especially of fish—the latter with such success that he was called "Il Spagnuolo degli Pesci." In 1656, after his father's death, he returned to Seville. In 1660 he was one of the founders of the academy there, but on account of his jealousy of Murillo (q.v.), who was made president, while Herrera was vice president, he went to Madrid in 1661. He became court painter to Philip IV and master of the royal works under Charles II. In this office he figured as an architect, assisting in the renovation of the cathedral of Saragossa. His work as a painter was brilliant, but baroque and manneristic. His works include the "Four Doctors of the Church Adoring the Host," Museum of Seville; the "Immaculate Conception" and "St. Hermengild," now in the Prado Museum; and the frescoes of the chapel of Our Lady of Atocha, "The Ascension of Mary," his chief work. Consult: Bermudes, *Diccionario de los más ilustres profesores* (Madrid, 1800); Sentenach, *Painters of the School of Seville* (London, 1907); Mayer, *Die sevillaner Malerschule* (Leipzig, 1911).

HERRERA, José Joaquin de (1792–1854). A Mexican general, born at Jalapa. He entered the Spanish army as a cadet in 1809, served against the revolutionists (1810–14), and attained the rank of lieutenant colonel. He seconded Iturbide's Plan of Iguala in 1821 and took an active part in securing the Mexican independence. He then aided in the overthrow of Iturbide's empire and became Minister of War under the first President, General Victoria, in 1823. He was Minister of War and Marine in 1833 and later was President of the Supreme Court. He acted as President of the Republic a few months in 1844–45, was Santa Anna's lieutenant in the war with the United States, and was elected President in 1848, serving till 1851. A man of peace and honor, he did what he could

to secure the prosperity of the country, but was hindered by its disturbed conditions.

HERRERA, Juan de (1530–97). A Spanish architect, born in Mobillán, Asturias. He studied in Valladolid and Brussels and, returning to Madrid in 1566, became a pupil of Juan Bautista de Toledo. Upon the death of Toledo, Herrera was named royal architect by Philip II and was placed in charge of the construction of the Escorial (q.v.), in the plans of which he made notable changes. Among the more important structures for which he drew the plans are the Casa de Contratación in Seville, the cathedral at Valladolid, and the bridge of Segovia. He published a *Sumario y breve declaración de los diseños y estampas de la fábrica de San Lorenzo el Real del Escorial* (Madrid, 1589).

HERRERA Y TORDESILLAS, ĕ tôr'dā-sēl'yās, Antonio de (1559–1625). A Spanish historian, born at Cuéllar, the son of Rodrigo de Tordesillas and Inés de Herrera. He was educated in the humanities in Spain and Italy and became the private secretary of Vespasiano de Gonzaga, Viceroy of Navarra and Valencia. Gonzaga recommended him to Philip II, who made him one of the chroniclers of Castile and Chronicler of the Indies, the latter position carrying with it a handsome salary. He held these positions through the two succeeding reigns. His fame rests on his *Historia general de los hechos de los Castellanos en las islas y Tierra Firme del Mar Océano* (Madrid, 1601), which is preceded by *La descripción de las Indias occidentales.* The *Historia* is divided into eight decades and covers the history of America down to 1554. Herrera had access to the archives in its preparation, but he depended largely upon earlier manuscript accounts, including especially the history of Las Casas. He wrote many other works, dealing chiefly with the events of his time, among which are *Historia general del mundo del tiempo del señor rey D. Felipe segundo . . .* (Madrid, 1601, 1612); *Historia de lo sucedido en Escocia é Inglaterra en los cuarenta y cuatro años que vivia María Estuardo* (Madrid, 1589); *Historia de los sucesos de Francia desde el año 1585 hasta el de 1594* (Madrid, 1598). A number of his manuscripts exist in the Biblioteca Nacional at Madrid; his name is given in the *Catálogo de autoridades de la lengua,* published by the Academia Española.

HERREROS, Breton de los. See Breton de los Herreros.

HERRESHOFF, hĕr'rĕs-hŏf, John Brown (1841–1915). An American naval architect, born in Bristol, R. I., a brother of N. G. and J. B. F. Herreshoff, and a descendant of John Brown who headed the attack on the *Gaspée.* He early showed inventive ability and a love of the sea. Although he became blind at 15, he built up and managed, at Bristol, the house of Herreshoff, Stone & Co., which in 1879 became the Herreshoff Manufacturing Company, and which succeeded Edward Burgess as designer of the defenders of the *America's* Cup. Many stories are told of J. B. Herreshoff's wonderful grasp of detail and of his perfect freedom of movement in shop and on board ship.

HERRESHOFF, J(ohn) B(rown) Francis (1850–). An American chemist, a brother of J. B. and N. G. Herreshoff. He was born at Bristol, R. I., and studied at Brown University, where he was professor of analytical chemistry in 1869–72. In 1876 he was superintendent of the Laurel Hill Chemical Works, Long Island. He invented a process for the manufacture of sulphuric acid, became vice president and trustee of the Nichols Copper Company, received the Perkin medal (the first time it was awarded in the United States) for his work in the chemical and metallurgical industries, and was honored by Brown with the degree of Sc.D. in 1909.

HERRESHOFF, Nathaniel Greene (1848–). An American naval architect, born at Bristol, R. I., a brother of J. B. and J. B. F. Herreshoff. He was educated at the Massachusetts Institute of Technology and made a special technical study of engineering in the Corliss Works at Providence, R. I., where he assisted in the construction of the large engine which furnished motive power for all machinery at the Philadelphia Exposition of 1876. He became superintendent in 1881 of the Herreshoff Manufacturing Company, boat builders, at Bristol, R. I., and designed numerous torpedo boats and yachts. Among the high-speed torpedo boats designed by him for the United States government were the *Lightning* and the *Cushing.* His reputation in connection with racing yachts was established by the triumphs of the *Gloriana* in 1891. The success of the four craft built for contests in defense of the famous *America's* Cup, the *Vigilant* (1893), *Defender* (1895), *Columbia* (1899), and *Reliance* (1903), placed him among the foremost of his profession. He also designed the *Resolute* for the *America's* Cup race of 1914, which was declared off on account of the war in Europe. He introduced many innovations in the architecture of racing yachts. See Yacht and Yachting.

HER'RICK, Charles Judson (1868–). An American neurologist. Born at Minneapolis, Minn., he graduated from the University of Cincinnati in 1891, from Denison University (M.S.) in 1895, and from Columbia (Ph.D) in 1899. He taught natural sciences at Granville Academy (1891–92) and at Ottawa University (1892–93), was an associate in comparative neurology of the Pathological Institute of the New York State Commission in Lunacy (1897–1901), and at Denison was an instructor (1895–96) and professor of zoölogy from 1898 to 1907, when he became professor of neurology at the University of Chicago. In 1894 he became managing editor of the *Journal of Comparative Neurology.* His investigations deal particularly with the cranial nerves and with the comparative histology of the medulla oblongata.

HERRICK, Christine Terhune (?–). An American writer on domestic science, daughter of "Marion Harland" (Mary Virginia Terhune, q.v.), born at Newark, N. J. In 1884 she was married to James Frederick Herrick, who died in 1893. She became a contributor to the *Ladies' Home Journal,* the *Woman's Home Companion,* and other women's magazines. In 1908–12 she was one of the managers of the Chamber Recital Company. Her writings include: *Liberal Living upon Narrow Means* (1890); *Chafing-Dish Supper* (1895); *The National Cook-Book* (1897), with Marion Harland; *Like Mother Used to Make* (1912); *My Boy and I* (1913). She edited the *Consolidated Library of Cooking and Household Recipes* (5 vols., 1905).

HER'RICK, Edward Claudius (1811–62). An American meteorologist, born in New Haven, Conn. He was librarian at Yale College from 1843 to 1858 and treasurer from 1852 until his death. He made noteworthy contributions to the

knowledge of meteorology, meteoric showers, the aurora borealis, and the zodiacal light. He was likewise an entomologist of distinction and devoted nine years to the study of the Hessian fly and its parasites. There is a window to him in Battell Chapel, Yale. He published *The Hessian Fly*, United States Patent Office Report, 1844, pp. 161–167 (Washington, 1845).

HERRICK, Francis Hobart (1858–). An American biologist. He was born at Woodstock, Vt., and graduated from Dartmouth College in 1881 and from Johns Hopkins University (Ph.D.) in 1888. He became instructor in 1888 and professor of biology in 1891 at Western Reserve University. Besides publishing the results of his investigations on the origin and development of the instincts, he is author of *The American Lobster* (1895); *Home Life of Wild Birds* (1901, 1905); *Natural History of the American Lobster* (1911).

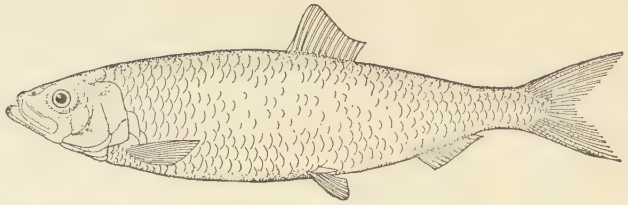
HERRICK, Myron T. (1855–). An American public official and diplomat, born at Huntington, Ohio, and educated at Oberlin College and Ohio Wesleyan University. Admitted to the bar in 1878, he practiced at Cleveland, Ohio, until 1886, when he turned his attention to railroad and banking activities. Becoming interested in politics, he was a member of several Republican national conventions, was a presidential elector in 1892, served as a member of the Republican State Executive Committee and of the Republican National Committee, and was colonel on the staff of William McKinley, then Governor of Ohio. In 1903–06 he himself was Governor of the same State. He was appointed Ambassador to France by President Taft in 1912, and under President Wilson was for some time acting Ambassador. In the latter capacity he was continued until Dec. 1, 1914, some months after the arrival of his successor, because of the unsettled condition of France during the European War and his familiarity with the situation. He rendered conspicuous service in aid of a large number of Americans who were caught in France at the beginning of the war, and was decorated with the Grand Cross of the Legion of Honor. He published *Rural Credits* (1914).

HERRICK, Robert (1591–1674). An English poet, born in London. He was educated at Cambridge and in 1629 was presented to the vicarage of Dean Prior, Devonshire. Ejected from his parish by the Long Parliament in 1647, he repaired to London. In 1648 appeared a collection of his poems, in two parts, bound together, bearing the titles *Hesperides* and *Noble Numbers*. Though, as a matter of fact, the two volumes named appeared in 1648, the latter was dated 1647. Some of these poems, however, had been finding their way into print ever since 1635. On the restoration of Charles II he was reinstated in his old living, where he died. Herrick's poems fall into three groups: his epigrams, which are coarse and heavy-handed in both feeling and expression; religious poems, many of which belong to the rather small company of "divine" lyrics in English that are of fine poetic quality; and perhaps 1000 secular poems, chiefly amatory or descriptive, which constitute the body of his work. Herrick's great distinction lies in the delicious freshness of his diction, the inspired felicity of his phrasing, and the uncloying sweetness and varied cadences of his well-nigh incomparably melodious verse. He is distinguished, too, as a poet whose genius taught him to distill from rural life, rural scenes, and country sports the very essence of their beauty and delight. His contemporaries, if they valued him, have left no record of their appreciation to posterity, and for more than 100 years after his death he was neglected—a neglect for which, however, the numerous editions of him in the nineteenth century handsomely atone. To lovers of poetry of our own time scores of his lyrics are familiar and justly prized for their exquisite sentiment, their descriptive loveliness, and their beauty of form—witness such songs as "Corinna's Maying," "Cherry Ripe," and "Gather ye Rosebuds." There are editions of his poems by Hazlitt (London, 1869), Grosart (ib., 1876), Palgrave (selections, ib., 1877), Pollard, with critical essay by Swinburne (ib., 1891), Saintsbury in *Aldine Poets* (2 vols., ib., 1893), and F. W. Moorman (Oxford, 1914). Consult an essay by Gosse in *Seventeenth Century Studies* (ib., 1883); F. W. Moorman, *Robert Herrick: A Biographical and Critical Study* (New York, 1910); and the study of Herrick in *Cambridge History of English Literature* (ib., 1907–).

HERRICK, Robert (1868–). An American university professor and novelist. His stories include broad pictures of American life, East and West and in town and country; they are much concerned with such problems of sex discord as Ibsen and Sudermann discuss, and with the clash of commercialism and idealism. Born at Cambridge, Mass., he graduated from Harvard in 1890 and afterward taught at Massachusetts Institute of Technology and at the University of Chicago, where he became professor of English in 1905. His first noteworthy novel—preceded by *The Man Who Wins* (1895) and *Literary Love Letters and Other Stories* (1896)—was *The Gospel of Freedom* (1898), its theme the revolt of women against the trammels of social conventions. This book was followed by *Love's Dilemmas* (1898), *The Web of Life* (1900), *The Real World* (1901), *Their Child* (1903), and *The Common Lot* (1904). The last-named book is one of its author's outstanding works—a study of a young architect's struggle between his artistic ideals and the lure of business success—and in the same class is *The Memoirs of an American Citizen* (1905), in which the problems of "big business," honest and dishonest, are worked out in the *milieu* of pork-packing magnates who are miscellaneously potent in other fields of industry and finance. In *Together* (1908) we have a study, frank and thought-provoking, of American marriage and the conditions at war with domestic compatibilities, motherhood, and family solidarity—a novel recognized at home and abroad as reaching a high standard. *A Life for a Life* (1910) is a somewhat tangled presentation in the form of fiction of many social and economic problems now pressing for solution. Books by this author, other than those above named, are: *The Master of the Inn* (1908); *The Healer* (1911); *One Woman's Life* (1913); *His Great Adventure* (1913); *Clark's Field* (1914). Consult F. T. Cooper, *Some American Story Tellers* (New York, 1911), and E. Björkman, *Voices of To-Morrow* (ib., 1913).

HER'RIDGE, William Thomas (1857–). A Canadian clergyman and author. He was born in Reading, England, but was brought to Canada in his youth. After graduating from Toronto University with high honors in 1880, he studied at the Montreal Presbyterian College and at Edinburgh, Glasgow, and London.

HERRING AND SHAD



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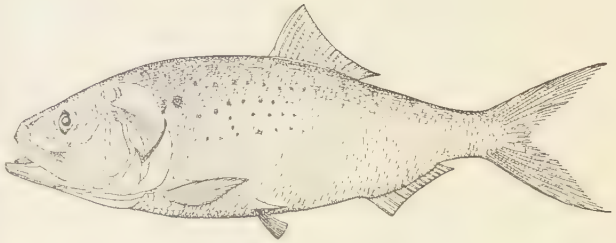

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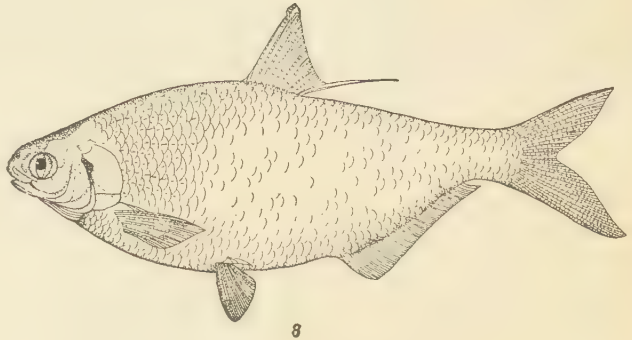

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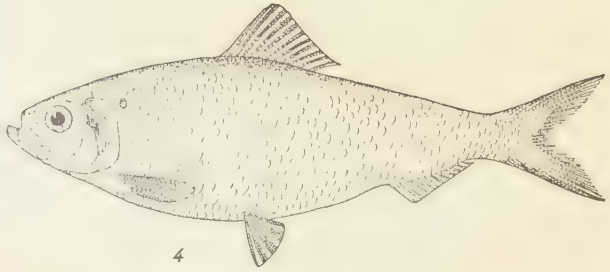

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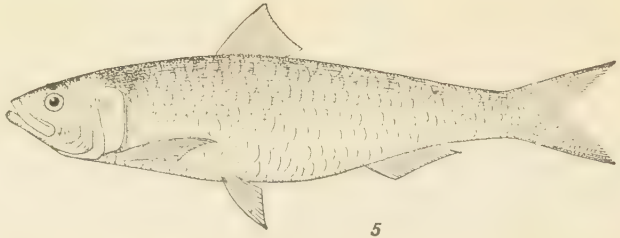


5

1. COMMON HERRING (Clupea harengus).
2. MENHADEN (Brevoortia tyrannus).
3. MUD or HICKORY SHAD (Dorosoma cepedianum).
4. ALEWIFE (Pomolobus æstivalis).
5. PILCHARD (Clupea pilchardus).

In 1883 he was ordained a Presbyterian minister, and in 1884 he became pastor of St. Andrew's Church, Ottawa; in 1906 he was appointed a member of the Committee on Union of the Presbyterian, Methodist, and Congregational churches of Canada; and in 1914 he was elected moderator of the General Assembly of the Presbyterian Church in Canada. He became widely known as an able and eloquent preacher. He published several essays on literary subjects and also *The Orbit of Life: Studies in Human Experience* (1906) and *The Coign of Vantage* (1908).

HERRIG, hĕr'rĭk, HANS (1845–92). A German poet and dramatist, born in Brunswick. He studied law at Berlin and Göttingen, and at first was employed in the Berlin city court, but after 1872 devoted himself entirely to literature, was one of the editors of the *Deutsches Tageblatt* from 1881 to 1889, and wrote many plays that attained wide popularity. His *Festspiel,* written for the Luther Jubilee in 1883, was especially successful. His dramas, which are more distinguished for elegance and force of diction than for positive dramatic skill, comprise: *Alexander der Grosse* (1872); *Kaiser Friedrich der Rotbart* (1873); *Jerusalem* (1874); *Der Kurprinz* (1876); *Konradin* (1881); *Harald der Wiking* (1881), which was set to music by Andreas Hallén; *Drei Operndichtungen* (1881); *Nero* (1883); *Columbus* (1887); and *Christnacht* (1887). His other writings are: *Die Schweine* (1876), an epic; *Mären und Geschichten* (1879); *Der dicke König* (1885); *Die Meininger, ihre Gastspiele und deren Bedeutung für das deutsche Theater* (1879); *Luxustheater und Volksbühne* (1886); *Ueber christliche Volksschauspiele* (1891); and *Das Kaiserbuch* (1891). His collected works appeared in seven volumes (1887–90).

HERRIN, hĕr'ĭn. A city in Williamson Co., Ill., 10 miles northwest of Marion, on the Chicago, Burlington, and Quincy, the Illinois Central, and the St. Louis, Iron Mountain, and Southern railroads (Map: Illinois, F 10). There are 24 coal mines in the city and several others in the vicinity. The industrial establishments include machine shops, a foundry, and a powder plant. The water works are owned by the municipality. Pop., 1900, 1559; 1910, 6861; 1920, 10,986.

HER'RING (AS. *hæring,* OHG. *harinc,* Ger. *Hering,* herring, from AS. *here,* OHG. *hari, heri,* Ger. *Heer,* army; in allusion to the shoals in which the fish moves). A fish of the family Clupeidæ, belonging to the genus *Clupea,* very closely related to the shads and sardines. Herring are soft-rayed fishes, with a compressed body and rather large cycloid scales. The head is naked, and the caudal fin is forked. They occur in all the northern seas, usually never very far from land, and make periodic migrations from the deeper waters still closer to the shore for the purposes of spawning. In the more northern regions this occurs during the spring and early summer; in the more southern regions, in July to December. The average yield of eggs is about 30,000 to the fish, with a maximum of about 55,000. They are laid in shallow waters and are slightly glutinous, sticking in clumps to rocks, etc., on the bottom. The young herring probably remain on the shallow spawning beds all the year. At this period of spawning they swim in great schools and are taken in vast numbers for commercial purposes. The herring fisheries are very extensive both in Europe and America. The estimated annual catch is 3,000,000,000, weighing one-half that many pounds. They are largely smoked, salted, and canned. The young in certain regions are canned as sardines. Fresh herring are much used as bait for cod and other fishes taken by line. See FISHERIES.

Herring live on minute crustaceans and larval forms of a great variety of animals, which they strain out of the water, and are themselves preyed upon to an enormous extent by cod, haddock, sharks, and other fishes, and by sea birds.

The common herring (*Clupea harengus*) frequents both sides of the Atlantic southward to the thirty-seventh parallel. It attains a maximum length of about 17 inches, the usual average being about 12 inches. The California herring (*Clupea pallasi*) strongly resembles the Atlantic one in form and habit and is about equally abundant and an important food fish. There are other less valuable species, belonging to this or a related genus. Thus, the various species of alewife (q.v.) are known as herrings, with distinguishing adjectives. The lake (or Michigan) herring, however, is an entirely unrelated form, being a salmonoid (see CISCO), although greatly resembling the common herring in form and general appearance. Consult, for an extensive natural history of the herring family, Goode, *Fishery Industries,* section i (Washington, 1884), and the fishery reports of Scotland and Germany. See Plate of HERRING AND SHAD.

HERRING, FRANCES ELIZABETH (1853–). A Canadian journalist and author. She was born at King's Lynn, Norfolk, England, and was educated there and at Reading. She went to British Columbia in her youth and for some time was a teacher, but later she took up newspaper work and wrote sketches and descriptions of Western life for the press. She published: *Canadian Camp Life* (1900); *Among the People of British Columbia* (1903); *In the Pathless West, with Soldiers, Miners, Pioneers, and Savages* (1904); *Gold Hunters of the West* (1911); and *Nan and Other Pioneer Women of the West* (1913).

HERRING, JOHN FREDERICK (1795–1865). An English animal painter, born in Surrey. Starting as a carriage painter, his love of horses brought him to the box, and for four years he drove the famous stagecoach known as "the York and London Highflyer." In his leisure hours he studied art and took a few lessons from Abraham Cooper. His racing and coaching pictures, which have often been lithographed, became the fashion, and for half a century, from 1816 to 1868, he exhibited regularly at the Royal Academy and elsewhere. Among his patrons were King George IV, Queen Victoria, and the Duke of Orléans. Frith, whom he helped with the racer in his famous "Derby Day," speaks of him in his *Autobiography* as "one of the best painters of the race horse I have ever known." Besides "A Frugal Meal," a study of three horses' heads, in the National Gallery, there are also paintings by him in the museums at Dublin, Glasgow, Leeds, Leicester, Melbourne, and Reading. He combined minute detail with strong realism.

HERRING, PERCY THEODORE (1872–). A British physiologist, born in Yorkshire and educated at Christ's College, Christchurch, New Zealand, and at Otago and Edinburgh universi-

ties. At Edinburgh he was lecturer on histology and then became Chandos professor of physiology at St. Andrews. In 1898–99 he was president of the Royal Medical Society. His distinctive work was in experiment on animals, e.g., on cold and reflex action and the series of experiments with dogs on which was based the Schäfer method of resuscitation from drowning (1904).

HERRINGBONE MASONRY. See MASONRY.

HERRING GULL. See GULL.

HERRING HOG. A porpoise; especially, in New England, the common small harbor porpoise, also called puffing pig. See PORPOISE.

HERRINGS, BATTLE OF THE. See FASTOLF, SIR JOHN.

HERR'MANN, ALEXANDER (1844–96). An American prestidigitateur, born in Paris. After public performances in various European cities from 1856, he appeared in 1861 in the United States and in the same year was naturalized. He traveled professionally all over the world, even to the Far East, the home of the sleight-of-hand art, where he was received with amazement. In 1874 he made his first transcontinental tour of the United States. As a master of pure sleight of hand, and as a performer who united the entertaining with the mystifying, he has perhaps never been surpassed.

HERRMANN, hĕr'mân, or **HEERMANS,** hār'mâns, or **HARMAN,** här'mân, AUGUSTINE (1605–86). An American colonist, active chiefly in the affairs of New Netherland and afterward in those of Maryland. He was born in Prague, Bohemia, and after receiving an excellent training in modern languages and mercantile life, entered the service of the Dutch West India Company. He settled in New Amsterdam as early as 1643, took an important share in the civic life of the Dutch settlements, and was of much service in regulating the relations of New Netherland with Rhode Island and Maryland. Having been sent to Maryland in 1659 to uphold the rights of New Netherland as against the claim of Lord Baltimore to the Delaware River, he presented the case of his Colony with great force, and the State of Delaware may in some measure owe its existence to the arguments established on that occasion. He made a map of Maryland and Virginia, which was first published in 1670 and is remarkably accurate in the tidewater section. For this map he received from Lord Baltimore an extensive grant of land in Cecil Co., Md., with manorial privileges. He was given the title of Lord of Bohemia Manor, became a member of the Governor's Council, a justice of Baltimore County, and in 1678 was made a commissioner to treat with the Indians. His descendants were lords of Bohemia Manor until 1735.

HERRMANN, hĕr'mân, ERNST ADOLF (1812–84). A German historian, born at Kämmerswalde. He studied at Dorpat, and at Berlin under Ranke, and then lived in Dorpat (1837–39) and in Dresden. In 1847 he became docent at Jena, then professor of history there, and afterward (1857) at Marburg. His work was mostly on the history of Russia; especially important was his completion of Strahl's *Geschichte des russischen Staates* (1846–66). Among his other writings are: *Beiträge zur Geschichte des russischen Reichs* (1843); *Die österreichisch-preussische Allianz vom 7. Februar 1792 und die zweite Teilung Polens* (1861), which contained an attack on the historian Von Sybel; and *Peter der Grosse und der Zarewitsch Alexei* (1880).

HERRMANN, WILHELM (1846–). A German Protestant theologian, born in Melkow (near Jerichow), Saxony, where his father was pastor. He was educated at Halle, where he became lecturer in 1874, after fighting in the Franco-Prussian War. In 1879 he was appointed professor of systematic theology in the University of Marburg. Herrmann is to be classed among the followers of Ritschl, whose work he criticized in *Der evangelische Glaube und die Theologie A. Ritschl's* (2d ed., 1896). Among his other important works are: *Bedeutung der Inspirationslehre für die evangelische Kirche* (1886); *Begriff der Offenbarung* (1887); *Gewissheit des Glaubens* (2d ed., 1889); *Der Verkehr des Christen mit Gott* (1886; 6th ed., 1908; Eng. trans. by Stanyon, 1895); *Römische und evangelische Sittlichkeit* (3d ed., 1903); *Sittliche Weisungen Jesu* (1904; 2d ed., 1907); *Offenbarung und Wunder* (1908); *Ethik* (4th ed., 1909); *Die Not der evangelischen Kirche und ihre Ueberwindung* (1913). Harnack and Herrmann's *Essays on the Social Gospel* appeared in English (trans. by Craik) in 1907.

HERRNHUT, hĕrn'hōōt. A small town in the Kingdom of Saxony, situated on the south slope of the Hutberg, 1120 feet above the sea, 11 miles from Zittau (Map: Germany, F 3). It is noted throughout Germany as the central seat and birthplace of the present Moravian Brotherhood. The town has manufactures of linen, cotton, and bleached goods, and furniture. Its products are famous all over Germany. There are here a monument to Count Zinzendorf, a fine church, a school for choral music, an ethnographic museum, and other institutions belonging to the Moravian church. The community was founded in 1722 by a colony of persecuted Moravians, some of whom were descended from the old Bohemian and Moravian Brethren. In coming into Saxony they were sheltered and protected by the pious Count Zinzendorf, to whom Herrnhut belonged. Pop., 1900, 1242, including 830 Moravians; 1910, 1364.

HER'RON, FRANCIS JAY (1837–1902). An American soldier, born in Pittsburgh, Pa. Graduating at the Western University of Pennsylvania (later the University of Pittsburgh) in 1853, after 1856 he was engaged in business in Iowa. He served in Iowa volunteer regiments in the Civil War, becoming brigadier general of volunteers in July, 1862, for a time commanding the Army of the Frontier, and being made major general of volunteers in November, 1862. At Vicksburg he commanded the left wing of the investing forces and at the close of the war received the surrender of the Confederate forces west of the Mississippi. He resigned in 1865, entered on the practice of law in New Orleans, was United States marshal of the District of Louisiana from 1867 to 1869, and was Secretary of State of Louisiana in 1872–73. Subsequently he practiced law in New York City.

HERRON, GEORGE DAVIS (1862–). An American clergyman and writer, born at Montezuma, Md., and educated at Ripon College, Wisconsin. He held Congregational pastorates at Lake City, Minn., and Burlington, Iowa, and in 1893 became professor of applied Christianity in Iowa College. Opposition to his teachings led him to resign in 1900, and he then initiated a social crusade in Chicago and New York,

founded the *Social Crusader*, and lectured upon "The Economics of the Kingdom of Heaven" and similar topics, chiefly advocating a transformation of the present economic order in conformity with the Christian principle of the brotherhood of men. He aroused great controversy throughout religious circles generally in 1901 by his separation from his wife, his second marriage, and his published theories regarding a free marriage relation. At a meeting of the Iowa Congregational Council he was deposed from membership. Later he took up his residence in Italy, where he devoted his time to literary work. His principal writings are: *The Larger Christ* (1891); *The Call of the Cross* (1892); *A Plea for the Gospel* (1892); *The New Redemption* (1893); *The Christian Society* (1894); *The Christian State* (1895); *Social Meaning of Religious Experiences* (1897); *Between Cæsar and Jesus* (1899); *Why I Am a Socialist* (1900); *Wagner and Parsifal* (1903); *The Day of Judgment* (1904).

HERSART, T. C. H. See La Villemarqué, Vicomte de.

HERSCHEL, hēr'shel, Caroline Lucretia (1750–1848). A German-English astronomer, sister of Sir William Herschel. She was born at Hanover and lived there till 1772, when she went to England to live with her brother at Bath. When he turned astronomer, she became his constant helper, and on his being appointed private astronomer to George III acted as his assistant in the famous observatory at Slough, receiving a small salary from the King. She found time for a series of independent observations with a small Newtonian telescope made for her by her brother. Her special occupation was to scan the heavens for comets, seven of which she discovered, in regard to five of which she has the credit of priority of discovery; and several remarkable nebulæ and clusters of stars included in her brother's catalogues were described from her original observations. In 1798 she published *A Catalogue of Stars taken from Mr. Flamsteed's Observations, etc.* This work was published at the expense of the Royal Society and contained 561 stars omitted in the British catalogue. She lived with her brother during the whole of his career and on his death, in 1822, returned to her native country. In 1828 the Royal Society conferred on her their gold medal for completing the catalogue of nebulæ and clusters of stars observed by her brother. She was afterward chosen an honorary member of the Royal Society. Consult M. C. Herschel, *Memoir and Correspondence of Caroline Herschel* (London, 1876), and Clerke, *The Herschels and Modern Astronomy* (ib., 1895).

HERSCHEL, John (1837–). An English astronomer, son of Sir J. F. W. Herschel, born at the Cape of Good Hope. He served for a few months in 1859 in India in the Bengal Engineers, which he had entered in 1856, and then was appointed to the Trigonometrical Survey, where he served until his retirement in 1886. In 1868 and 1871 he observed total eclipses of the sun for the Royal Society and made important discoveries in regard to the spectrum of the corona.

HERSCHEL, Sir John Frederick William (1792–1871). An eminent English astronomer, the only son of the astronomer William Herschel. He was born at Slough, near Windsor, March 7, 1792, and was educated at St. John's College, Cambridge. His first publication was *A Collection of Examples of the Application of the Calculus of Finite Differences* (1820). In 1822 he applied himself especially to astronomy, using his father's methods and instruments in observing the heavens. For a time he worked with Sir James South in reëxamining the nebulæ and clusters of stars described in his father's catalogues. The results of the reëxamination were given in 1833 to the Royal Society in the form of a catalogue. The catalogue contained observations on 525 nebulæ and clusters of stars not noticed by his father and on a great number of double stars—in all, between 3000 and 4000. His "Treatise on Sound" appeared in the *Encyclopædia Metropolitana* in 1830, and his "Treatise on the Theory of Light" in the same work in 1831, in which year also appeared in Lardner's *Cyclopædia* his "Preliminary Discourse on the Study of Natural Philosophy." In 1836 appeared his "Treatise on Astronomy," in Lardner's *Cyclopædia*. At this time Herschel was at the Cape of Good Hope, where he arrived in January, 1834, with the intention of completing the survey of the sidereal heavens by examining the Southern Hemisphere as he had done the Northern. Here he established his observatory at a place called Feldhausen, 6 miles from Table Bay. On March 5, 1834, he began his observations, which were embodied in his *Results of Astronomical Observations Made during 1834–38 at the Cape of Good Hope; Being a Completion of a Telescopic Survey of the Whole Surface of the Visible Heavens, Commenced in 1825* (1847). On his return to England, in 1838, honors were showered on him. He had been awarded the Royal Society's gold medal in 1826; he now was made a D.C.L. of Oxford, was created Baronet, and succeeded the Duke of Sussex as president of the Royal Society, and in 1848 he became president of the Royal Astronomical Society. In 1849 he published his *Outlines of Astronomy*. In 1850 he was appointed master of the mint. This office, on account of ill health, he resigned in 1855. Consult Clerke, *The Herschels and Modern Astronomy* (London, 1895). For a list of his contributions, consult the Royal Society's great catalogue.

HERSCHEL, Sir William (1738–1822). An eminent German-English astronomer, born at Hanover, Germany, Nov. 15, 1738. The son of an army musician, he was trained in his youth to follow his father's profession. After serving for four years as oboist in the band of the Hanoverian Guards, he went to England in 1757. His first few years in that country were spent in privation, but subsequently he became a military bandmaster at Leeds. In 1765 he became organist at Halifax and a year later removed to Bath, where he was appointed to the post of organist of the Octagon Chapel. At Bath he would seem to have become interested in astronomy and during his spare moments devoted himself assiduously to the study of that and kindred sciences. The wonders revealed to him by a small hired telescope stimulated his desire to become the possessor of a larger instrument, and in 1773 he set about making for himself a Gregorian telescope of 5½-foot focal length, which he completed in the following year. His two great ambitions were "to carry improvements in telescopes to their utmost extent" and "to leave no spot of the heavens unexamined," and with these in view he steadily increased the power of his tele-

scopes, and mirrors of 7-, 10-, and even 20-foot focal length were produced in rapid succession in his workshop. Before 1795 he had constructed no less than 430 mirrors, ranging in focal length from 7 to 20 feet, besides many smaller ones. His supreme achievement in telescope making was the construction of a giant reflector of 40-foot focal length and 4-foot aperture, which was begun in 1785 and finished in 1789.

In 1775 Herschel began the first of his four reviews of the heavens, in which he undertook an exhaustive survey of the stars in regular order, examining them in all their groups through the same instrument. In 1781, while engaged in his second review with the aid of a 7-foot Newtonian reflector, he made his first discovery—a new planet, which at first he supposed to be a comet. The true nature of this object was soon recognized, and its discoverer named it Georgium Sidus, in honor of George III, while continental astronomers gave it the name Herschel; both names, however, were relinquished in favor of Uranus, the name by which the planet is now known. For this discovery he was awarded the Copley medal and elected a fellow by the Royal Society in 1781, and in 1782 he was appointed private astronomer to George III, with a salary of £200 a year. He then went to live at Datchet, where, assisted by his sister Caroline (q.v.), he continued his researches. In 1785 he removed to Clay Hall, near Windsor, and in 1786 to Slough, where he resided until his death. He was knighted by George III, and made a D.C.L. by the University of Oxford; the universities of Edinburgh and Glasgow also conferred honorary degrees upon him, and he was honored by election to membership in the leading scientific societies of Europe and America. In 1821 he became the first president of the Royal Astronomical Society. Partly through his wife's jointure, and partly through the sale of mirrors for reflecting telescopes, he acquired considerable wealth. He died at Slough, Aug. 25, 1822.

Herschel made his first communication to the Royal Society in 1780 and during the next 39 years contributed no less than 69 papers to the *Philosophical Transactions*, forming a collection remarkable for their originality and acuteness of treatment. He also contributed a paper, "On the Places of 145 New Double Stars," to the first volume of the *Memoirs of the Astronomical Society*. He has been justly called the founder of sidereal astronomy. By his comprehensive and systematic sweeping of the heavens he greatly extended our knowledge of the solar system, discovering the planet Uranus and two of its satellites, and adding two more—Enceladus and Mimas—to the satellites of Saturn previously known. He also made the first determination of the period of rotation of Saturn and investigated that of Mars. From his observations of the proper motions of certain stars, he was led to the conclusion that the apex of the sun's way (q.v.), or the point towards which the solar system is traveling in space, is situated in the constellation Hercules, within a few degrees of position assigned to it by the most recent investigators. His contributions to our knowledge of the universe were no less important. By his discovery of the motions of binary stars he established the existence of stellar systems other than our own. His researches on the Milky Way and the constitution of nebulæ may be said to have given us our first real conception of the immensity of the universe. When in 1780 he began his researches, barely 100 nebulæ were known; Messier's catalogue, published in 1781, comprised only 103 entries. Herschel's observations in the course of the next 20 years brought the number up to nearly 2500, and through him the nebulæ acquired a new importance in the universe. In the earlier period of his researches he advanced the theory that the nebulæ were clusters of stars, the component stars being too faint, on account of their immense distance, to be seen separately. Later he revised his views, and, in order to explain some of the nebulæ, among them the nebula in Orion, he reverted to the old theory that the nebulæ were masses of a shining fluid of an unknown nature. His catalogues of double stars and nebulæ, his work on stellar photometry, and his discovery of the infra-red solar rays would of themselves entitle him to the first rank as an astronomer and physicist. Consult: Wolf, *Geschichte der Astronomie* (Munich, 1877); Holden, *Sir William Herschel: His Life and Works* (New York, 1881); Sime, *William Herschel and his Work* (ib., 1900); Dreyer, *A Short Account of Sir William Herschel's Life and Works* (London, 1912). Sir W. Herschel's scientific papers, previously unpublished, were collected and edited, under the direction of the Royal Society and the Royal Astronomical Society, in 1912.

HERSCHELL, Farrer, Lord (1837–99). An English lawyer. After completing his academic training at Bonn and University College, London (B.A., 1857), he was called to the bar in 1860 and, devoting himself to commercial law, was elected queen's counsel in 1872. He was recorder of Carlisle in 1873–80, member of Parliament for Durham (1874–85), and Solicitor-General under Gladstone (1880). Having been knighted in 1880, he was raised to the peerage six years later and made Lord Chancellor. He was president of the royal commission to inquire into the proceedings of the Metropolitan Board of Works (1888), was once more Lord Chancellor (from 1892 to 1895), and from 1893 until his death was chancellor of London University. He died in Washington, D. C., while serving as chairman of the Anglo-American Commission, appointed to settle questions relating to the boundary between the United States and Canada.

HERSENT, ăr'säN', Louis (1777–1860). A French painter and lithographer, born in Paris. He studied under Regnault, and won the second Prix de Rome in 1797 with his "Death of Cato." He reappeared at the Salon in 1804 with great success. In 1824 he became Officer of the Legion of Honor, and in 1825 professor at the Beaux-Arts. His lithographs are attractive—some portraits, others illustrations of La Fontaine and Theocritus. Among his paintings are "Capture of Landshut," "Louis XVI Distributing Charity," "The Duke of Bordeaux and his Sister," at Versailles; "Diana and Endymion," "The Graces and Daphnis," at Sens; "Narcissus," at Arras; portraits of Louis Philippe, at Dieppe; of Marie-Amélie, at Chantilly; of Henry IV, at the Trianon. His figures are ridiculously slender, as was then the fashion, and his style is classical.

HERSFELD, hĕrs'fĕlt. An ancient town in the Prussian Province of Hesse-Nassau, situated on the Fulda, 23 miles by rail from Fulda (Map: Germany, C 3). It still retains a portion of its old fortifications and contains

the thirteenth-century Stadt church, with fine stained-glass windows; the ruins of an eleventh-century collegiate church, destroyed by the French in 1761; the remains of the Benedictine abbey of Hersfeld; and an old Rathaus. There are manufactures of cloth, cotton goods, rope, roofing paper, cement, and leather. The abbey of Hersfeld, founded in 770, by Lullus, Archbishop of Mainz, enjoyed great renown through the Middle Ages. Pop., 1900, 7908; 1910, 9612.

HERSFELD, Lambert von. See Lambert von Hersfeld.

HERSHEY, Amos Shartle (1867–). An American professor of political science, born at Hockersville, Pa. He was educated at Harvard College and Law School (A.B., 1892), and studied also at the University of Heidelberg (Ph.D., 1894) and at Paris (1894–95). On the faculty of Indiana University he served as assistant professor of political science (1895–1900), as associate professor of European history and politics (1900–05), and as professor of political science after 1905. Besides his contributions on political science and law he is author of *The International Law and Diplomacy of the Russo-Japanese War* (1907) and *The Essentials of International Public Law* (1912).

HERSTAL, hĕr'stȧl, or **HERISTALL.** A manufacturing and mining place in the Province of Liége, Belgium, extending along the left bank of the Meuse for about 3 miles below the city of Liége. Some ruins still exist of the castle of Herstal, the birthplace of Pepin le Gros (father of Charles Martel, and great-grandfather of Charlemagne), from which he has his title of Pepin of Herstal. It is an important iron and steel centre; a national arms and cannon factory is located here; it also manufactures bicycles, and coal is mined near by. Pop., 1900, 18,195; 1903, 19,477; 1910, 22,909.

HERTEL, hĕr'tel, Albert (1843–1912). A German landscape and still-life painter, born in Berlin. He studied at the Berlin Academy, where he became professor in 1875, and of which he was elected a member in 1901. His landscapes are notable for style and fine coloring; among them are: "The Via Flaminia" (1872); "Olive Harvest in Capri" (1872); "After the Storm on the Coast of Genoa" (1878) and "Northern Coast Scene with Fishermen Returning" (1883), both in the National Gallery, Berlin; "Road between Rapallo and Santa Margherita" (1892), bought by Emperor William II; and "View in the Roman Campagna" (1896). He also painted decorative subjects.

HERTEL DE ROUVILLE, ȧr'tĕl' de rōō'vĕl', Francis (1643–1722). A Canadian soldier, born in Three Rivers, Maurice Co., Quebec. As a woodsman and Indian fighter, he was widely known for valor and resourcefulness. Captured by the Iroquois in 1681, he bore various tortures with such fortitude that, instead of being put to death, he was adopted by the tribe. After a time, however, he escaped from the Indians and rejoined his comrades. Acting as one of Frontenac's lieutenants in 1690, he ravaged settlements in the lower part of Maine, escaped by adroitness from the greatly superior force of the English colonists, and united with the band attacking Falmouth, now Portland, where his strategy aided in the speedy capture of the village. Louis XIV promised to reward him with letters of nobility, which he did not receive, however, until 26 years afterward.

HERTER, hĕr'tĕr, Albert (1871–). An American decorative and figure painter and designer. He was born in New York City, studied with Carroll Beckwith at the Art Students' League there, and in Paris with Corman and J. P. Laurens, and afterward came under the influence of the art of Japan while in that country. His "Two Boys" is in the Metropolitan Museum, New York. Of great technical ability, in water color as well as in oil, he produced notable work even as a youth. His mural paintings and designs for tapestries and other textiles are usually delicate in color and often gracefully composed; but his easel paintings, though calculated to make themselves felt in a crowded gallery, lack personality and definite point of view. He won numerous medals and prizes and became an associate of the National Academy and a member of the American Water Color Society and of the Society of Mural Painters.

HERTER, hĕr'tĕr, Ernst Gustav (1846–). A German sculptor, born in Berlin. He studied at the Berlin Academy and as a pupil of August Fischer, Bläser, and Albert Wolff, and afterward in Italy. He was elected a member of the Academy in 1885 and became professor there in 1889. His work is careful in execution, but often formal and undistinctive. Among examples of it may be cited such imitations of the antique as "Alexander the Great Studying" (1876) and "The Wounded Achilles" (1879), both in the National Gallery at Berlin; "Moses Breaking the Tables of the Law" (1881); a statue of Helmholtz in the grounds of the Berlin University (1899); a fountain commemorative of Heine, intended for Düsseldorf, but which, owing to Nationalist opposition, was finally erected in New York; a statue of William I at Holtenau (1900); the monuments to Bismarck (equestrian), Wiesbaden, and Emperor William I, Potsdam (1901), and various decorations for public structures. Consult Malkowsky, *Ernst Herter* (Berlin, 1906).

HERTFORD, hȧr'fẽrd. The capital of Hertfordshire, England, a municipal borough and market town on the Lea, 24 miles north of London by rail (Map: England, F 5). The fourteenth-century church of All Saints, destroyed by fire in 1891, has been replaced by a fine Perpendicular edifice; the shire hall, public library, school of art, an old castle, and a corn exchange are the chief of several important public buildings. The town has a preparatory branch of Christ's Hospital, a grammar school, and several charity schools. It owns the water supply, markets, the public library, and the school of art. Its industries and trade are chiefly agricultural, but it has manufactures of iron and print goods. The old castle, of which traces remain, was built about 905. The present castle is of the time of James I and was the temporary home of Haileybury College when its present buildings were being erected. Domesday Book records Hertford as a borough, and it received its charter in 1544 from Queen Mary. Pop., 1901, 9322; 1911, 10,383.

HERTFORD, William Seymour, first Marquis of. See Seymour.

HERT'FORDSHIRE, hȧr'fẽrd-shĭr, or **HERTS,** hȧrts. An inland county of England, bounded on the east by Essex, on the south by Middlesex, on the west by Buckingham and Bedford, and on the north by Cambridge (Map: England, F 5). Area, 632 square miles. Pop., 1901, 258,423; 1911, 311,284. The surface pre-

sents a pleasing succession of finely wooded hill and fertile valley. The chief elevations are those of the chalk downs, a branch of the Chiltern Hills, which skirt the north of the county. The principal rivers are the Lea and the Colne (both affluents of the Thames), the Ivel and the New. Agriculture is the chief industry, over three-fourths of the county being cultivated. Wheat is the staple, and no finer is grown anywhere in England. Immense quantities of hay and straw are sold, and in the southwest there are numerous gardens and orchards, the fruit of which is sent to the London market. Of the great quantities of barley, malt is made. Ware is the chief seat of the malting trade in the kingdom. Paper, straw plait, coaches, and bricks are extensively manufactured. Capital, Hertford.

HERTHA, hĕr'tȧ, **HER'THUS, ÆR'THA,** or **ÆR'THUS.** A deity of the ancient Germans. Tacitus (*Germania,* 40) states that she was worshiped with great solemnity by the Suevi (q.v.), and that her temple stood on an island of the ocean, where her service was performed by a single priest. He identifies her with Mother Earth. On great occasions, which were regulated by this priest, the covered chariot of the goddess was drawn forth from the sanctuary by sacred cows and led in triumph throughout the country. Those districts through which the chariot passed were held to be peculiarly favored, peace was always proclaimed in them, and the occasion celebrated by universal merrymaking, until the priest declared that it was the will of the goddess to return to her shrine. The car, the vestments that covered the car, and some symbol of the goddess were then purified in a secluded spring; the slaves who performed the ceremony of ablution were swallowed up by the lake. These rites resemble those of the Great Mother of the Gods. (See CYBELE.) The island of Rügen was long thought to be identical with the sacred island of Hertha, but the same honor has been claimed for Helgoland and Zetland, for Alsen, off the eastern coast of Schleswig, and for the site of Hamburg, which some believe to have been formerly an island. See the editors on Tacitus (*Germania,* 40).

HERT'LING, GEORG, BARON VON (1843–1919). A German administrator and Catholic philosopher. He was born in Darmstadt and was educated at Münster, Munich, Berlin, and at Bonn, where he became professor extraordinary in 1880 and in 1882 regular professor. In 1876 he founded the Görres-Gesellschaft and became its president. He was made a lifelong member of the Bavarian Chamber of the Reichsrat in 1891 and was leader of the Centre in the Imperial Diet from 1876 until 1912, when he became Bavarian Foreign Minister and cabinet President. He wrote: *Albertus Magnus* (1880); *John Locke und die Schule von Cambridge* (1892); *Naturrecht und Sozialpolitik* (1893); *Augustin* (1902; 3d ed., 1904). Consult Schindele, "Georg, Freiherr von Hertling als Philosoph," in *Historisch-politische Blätter für das katholische Deutschland,* vol. clii (Munich, 1913).

HERTOGENBOSCH, hĕr-tō'gen-bŏs', or **HERZOGENBOSCH.** The capital of the Dutch Province of North Brabant. See BOIS-LE-DUC.

HERTS. See HERTFORDSHIRE.

HERTWIG, hĕrt'vĭK, OSCAR (1849–). A German embryologist, born at Friedberg. He studied medicine in Jena under Haeckel and Gegenbaur and at Zurich and Bonn. In 1878 he was made professor at Jena and in 1888 professor of anatomy in Berlin, where he was also rector in 1904–05. He studied with Haeckel and with his brother, Richard Hertwig, at Lesina on the Adriatic in 1871, in Corsica and Villefranche in 1875, and afterward with his brother in Messina and Naples. One of the most influential embryologists of his time, his most important publications include: *Beiträge zur Kenntnis der Bildung, Befruchtung und Theilung des tierischen Eies* (1876), an epoch-making work, because it established the fact that fertilization consists of the conjugation of the two equivalent sexual cells; *Studien zur Blättertheorie* (1879–83), with R. Hertwig; *Die Cölomtheorie: Versuch einer Erklärung des mittleren Keimblattes* (1881), with R. Hertwig; *Entwicklung des mittleren Keimblattes der Wirbelthiere* (1883), with R. Hertwig; *Das Problem der Befruchtung und der Isotropie des Eies, eine Theorie der Vererbung* (1884); *Vergleich der Ei- und Samenbildung bei Nematoden* (1890); *Lehrbuch der Entwicklungsgeschichte des Menschen und der Wirbelthiere* (1886; 9th ed., 1910; trans. as *Text-Book of Embryology,* 1892); *Die Zelle und die Gewebe* (1892, 1898); *Ueber den Werth der ersten Furchungszellen für die Organbildung des Embryos* (1893); *Zeit und Streitfragen der Biologie* (1894); *Der Kampf und Kernfragen der Entwickelungs- und Vererbungslehre* (1909); *Die Elemente der Entwickelungslehre des Menschen und der Wirbeltiere* (4th ed., 1910); *Die Radiumkrankheit tierischer Keimzellin* (1911); *Allgemeine Biologie* (4th ed., 1912). He was editor and contributor to the *Handbuch der vergleichenden und experimentellen Entwicklungslehre der Wirbelthiere* from 1901 to 1906.

HERTWIG, RICHARD (1850–). A German zoölogist, born at Friedberg. He studied medicine in Jena under Haeckel and Gegenbaur and also in Zurich and Bonn. In 1874 he became privatdocent and in 1881 professor extraordinarius in Jena. He was made professor of zoölogy in 1881 at Königsberg and in 1885 at Munich. He studied with his brother, Oscar Hertwig, and with Haeckel on the Adriatic at Lesina in 1871 and in Corsica and Villefranche in 1875 and later with his brother in Messina and Naples. His publications include: *Zur Histologie der Radiolarien* (1876); *Studien zur Blättertheorie* (1879–83), with O. Hertwig; *Die Cölomtheorie: Versuch einer Erklärung des mittleren Keimblattes* (1881), with O. Hertwig; *Die Aktinien der Challenger Expedition* (1882); *Ueber Kernstruktur und ihre Bedeutung für Zelltheilung und Befruchtung* (1888); *Ueber die Konjugation der Infusorien* (1889); *Ueber Befruchtung und Conjugation* (1892); *Lehrbuch der Zoologie* (1893; 10th ed., 1911); *Kerntheilung, Richtungskörperbildung und Befruchtung von Actinosphærium Eichhorni* (1898); *Ueber physiologische Degeneration* (1904).

HERTZ, hĕrts, ALFRED (1872–). A distinguished German conductor. He was born in Frankfort and was educated at the Gymnasium and at the Raff Conservatory. His career as conductor began in 1892 at Altenburg, and he held positions at Elberfeld and Breslau. In 1902 he became first conductor at the Metropolitan Opera House (New York), where in 1903 he attracted the attention of the musical world through his excellent performances of *Parsifal* (the first outside of Bayreuth). Although one of the finest interpreters of Wagner, he never

conducted at Bayreuth because the Wagner family always resented his "desecration" of *Parsifal*. In 1914 he married the concert singer Lilli Dorn of Vienna.

HERTZ, Heinrich (1857–94). A German physicist, born at Hamburg. He studied at first to become a civil engineer, but forsook this profession for the study of mathematics and pure science, which he pursued at Munich and Berlin, becoming Helmholtz's assistant at the latter university in 1880. In 1883 Hertz became privatdocent at Kiel and two years later was called to the Polytechnic Institute at Karlsruhe as professor of physics. His earlier experiments with electromagnetic waves were performed during his occupancy of this professorship and made for Hertz such a reputation that he was in 1889 called to the important chair of physics at Bonn, previously occupied by Clausius. To Hertz are due the realization and detection of the electromagnetic waves which Maxwell had discovered in his theoretical consideration of the nature of electricity. Hertz found that waves produced by the spark of an electrical machine could be received by a circular loop of wire and was able to show the reflection, refraction, diffraction, and polarization of the waves. The first paper describing these wonderful discoveries was published in 1887, and the series continued for several years in *Wiedermann's Annalen*. In 1890 was published *Ueber die Beziehungen zwischen Licht und Electricität*, while his *Gesammelte Werke* were published in Leipzig the year after his death. English translations entitled *Electric Waves*, by D. E. Jones, with a preface by Lord Kelvin (1893), and *Miscellaneous Papers*, by D. E. Jones and G. A. Schott, with an introduction by Philipp Lenard (1896), have been published. Consult H. Bonfort, *Sketch of Heinrich Hertz*, published by Smithsonian Institution (Washington, 1896). See Waves; Wireless Telegraphy.

HERTZ, Henrik (1797–1870). A Danish dramatist, born in Copenhagen. A Jew, early orphaned, afterward Christianized and brought up in a literary atmosphere for the law, he abandoned this gradually for the drama (*Mr. Burchardt and his Family*, 1827; *Love and Police; The Moving Day*, 1828; *Amor's Strokes of Genius*, 1830), and for satiric criticism in Baggesen's vein (*Letters of a Ghost, or Poetic Epistles from Paradise*, 1830). Continuing dramatic work, Hertz fell into the romantic movement in *Svend Dyring's House* (1837) and gained cosmopolitan recognition for *King René's Daughter* (1845), a charming bit of Provençal chivalric romance from the last "Court of Love" (trans. by Theodore Martin). A tragedy, *Ninon* (1848), is also noteworthy. He was also an editor and poet. His *Dramas* are collected in 18 volumes (1854–73), his *Poems* in four (1851–62).

HERTZ, Joseph Herman (1872–). A Hebrew theologian, born in Rebrin, Hungary, and educated at the College of the City of New York, at Columbia University, and at the University of the Cape of Good Hope. He was rabbi at Syracuse, N. Y., in 1894–98, at Johannesburg in 1898–1911, and in New York City (Congregation Chayim) in 1912, and in 1913 became chief rabbi of the United Hebrew Congregations of the British Empire. Besides sermons and contributions to the new Jewish version of the Bible and to the *Jewish Encyclopædia*, he wrote *The Ethical System of James Martineau* (1894) and *The Jew in South Africa* (1905).

HERTZ, Martin Julius (1818–95). A German classical scholar. He was born at Hamburg and after studying at Berlin and Bonn was appointed professor of classical philology at Greifswald in 1855. He was called to a similar chair at Breslau in 1862 and remained there until 1893, when he retired. He is celebrated chiefly for his text edition (1853; 2d ed., 1886) and his great critical edition (1883–85) of Aulus Gellius (q.v.), and for various monographs on that author. Of his other works, the best known are *Karl Lachmann: Eine Biographie* (1851); a critical edition (the standard text) of Priscian's *Institutiones Grammaticæ* in Keil's *Grammatici Latini*, vols. ii and iii (1855–59); and his recensions of Livy (4 vols., 1857–63) and of Horace (1892).

HERTZ, Wilhelm (1835–1902). A German poet, born in Stuttgart. He studied at Tübingen, and during residence there he was encouraged in Germanic researches by Uhland and wrote the major portion of his *Gedichte* (1859). In 1858 he became a member of the so-called "Munich school" of poets that numbered Lingg, Heyse, Geibel—to whose *Dichterbuch* (1862) he was an original contributor—Bodenstedt, and others. From 1869 until his death he was professor of German language and literature in the Munich Polytechnic School. His intention was directed notably to rendering into the modern language the Middle High German poets, of whose thought and spirit he was a skillful interpreter. He made a brilliant adaptation of *Tristan and Isolde*, supplementing Gottfried with the fragments of the troubadour Thomas (1877; 4th ed., 1904); but his translation of Wolfram's *Parzival* (1898) is not so successful. The epic *Lanzelot und Ginevra* (1860; done into English by Bruce, London, 1865) and the collection *Gesammelte Dichtungen* (1900; 2d ed., 1904) comprise his chief original verse. He wrote also: *Der Werwolf* (1862); *Deutsche Sage im Elsass* (1872); *Aristoteles in den Alexanderdichtungen des Mittelalters* (1890); and others.

HERTZBERG, hĕrts'bĕrk, Ewald Friedrich, Count (1725–95). A Prussian statesman and historian, born at Lottin, near Neustettin. He studied history and the classics at Stettin and received his doctor of laws degree from Halle in 1745. Two years later he entered the state service and by 1763 had become Chief Minister in the Foreign Office. During the Seven Years' War he supported the policies of Frederick the Great—the chief of his literary works, *Mémoire raisonné* (1756), based on dispatches between the courts of Vienna and Dresden, justifies the Prussian invasion of Saxony; and he was a strong supporter of Frederick's idea of a *Fürstenbund* (q.v.) to offset the encroachments of Austria. It was largely through his efforts that the Peace of Hubertsburg (Feb. 15, 1763) was consummated. His last public act under Frederick the Great was to sign a commercial treaty in 1785 with the United States. Hertzberg at first was received with favor by Frederick William II, who succeeded to the throne in 1786. The policy followed was based on bitter hatred for the house of Hapsburg and strong opposition to the new democratic principles of the French Revolution. But gradually Hertzberg's popularity declined, because of his efforts to use diplomatic means when the King favored war; and he was dismissed in July, 1791, be-

cause of open criticism of the King's foreign policy. His literary work after 1786, in connection with the Berlin Academy, was of great importance. It consisted largely of reports on statistics, history, and political science.

HERTZBERG, hĕrts'bĕrĸ, Gustav Friedrich (1826–1907). A German historian and archæologist. He was born at Halle and from 1843 to 1848 studied in the university there and at Leipzig. He became privatdocent of history at Halle in 1851 and taught also in a Gymnasium until 1855. In 1858 he became editor of the *Preussisches Wochenblatt.* In 1860 he was appointed professor of history at Halle. Among his writings are: *Alkibiades, der Staatsmann und Feldherr* (1853); *Das Leben des Königs Agesilaos II. von Sparta* (1856); *Geschichte Griechenlands unter der Herrschaft der Römer* (1866–75); *Geschichte der Perserkriege nach den Quellen erzählt* (1877); *Geschichte Griechenlands vom Absterben des antiken Lebens bis zur Gegenwart* (1876–79); *Rom und König Pyrrhos* (1871); *Die Feldzüge der Römer in Deutschland* (1872); *Geschichte von Hellas und Rom* (1879–80); *Geschichte des römischen Kaiserreichs* (1880–82); *Geschichte der byzantiner und des osmanischen Reichs* (1882–84); *Geschichte der Stadt Halle* (1889–93); *Kurze Uebersicht über die Geschichte der Universität Halle* (1894).

HERTZIAN WAVES. See Waves; Wireless Telegraphy.

HERTZKA, hĕrts'kå, Theodor (1845–). An Austrian political economist, born at Pest. He studied at Vienna and at Pest, was editor of the economics section of the *Neue Freie Presse* of Vienna from 1872 to 1879, and in the latter year established the *Wiener Allgemeine Zeitung,* which he edited until 1886. His earlier volumes, such as *Die Gesetze der Handels- und Socialpolitik* (1880) and *Das Wesen der Geldes* (1887), recommend for Austria free trade and a gold-standard currency. In his *Gesetze der sozialen Entwicklung* (1886) he promulgated ideas of social reform which he extended in *Freiland, ein soziales Zukunftsbild* (1890; 10th ed., 1896), the description of a communistic Utopia located in Central Africa. His summons to the formation of such a colony resulted in the organization of nearly 1000 unions for the realization of that object, general direction of the enterprise being assigned to a central committee. An attempt towards the execution of the plans was made in 1893, but failed. The *Reise nach Freiland* (1893; Nos. 3051–62 of Reclam's *Universalbibliothek*) was an amplification by Hertzka of the previous volume. His *Entrückt in die Zukunft* (1895) is especially important.

HERTZOG, hĕr'tsôg, J. B. M. (?–). A South African general, leader of the Old Boer element. In 1907–10 he was Attorney-General and Director of Education in the Orange River Colony. Uncompromising in his insistence that Dutch as well as English be taught in the schools, his policy in this regard met bitter opposition. He was appointed Minister of Justice in the Union of South Africa in 1910 and continued in office until December, 1912, when his antagonism to imperialism and to Premier Botha led to a ministerial crisis. In 1913 he led a secession of the Old Boer and anti-imperialist section from the South African party. See South Africa, Union of, *History.*

HERULI, hĕr'ụ-lī, or **ERULI,** ĕr'ụ-lī. A savage, undisciplined, and warlike tribe of Germanic stock that appears frequently in history from the third to the sixth century A.D. We first hear of them as settled north of the Black Sea at about the middle of the third century and joining in the marauding expeditions of the Goths (q.v.) on the eastern confines of the Roman Empire, on the coasts of the Black Sea and the Ægean. They even captured Athens in 262 A.D. (See Dexippus, Publius Herennius.) In the following century they were subjugated by Hermanrich, King of the Ostrogoths, and later still allied themselves with the Huns and fought in the battles of Attila. (See Attila.) By this time their main body had moved to the west and was settled in the middle basin of the Danube in close proximity to the Gepidæ, with whom they formed a sort of loose alliance. They joined in large numbers the army of Odoacer (q.v.) and helped to overthrow the Western Empire in 476. Their Danubian kingdom was destroyed by the Lombards in the sixth century, and the race was dispersed, soon disappearing from view. Most of them had been converted to Christianity under the Emperor Justinian. Consult: Aschbach, *Geschichte der Heruler und Gepiden* (Frankfurt, 1835); Thomas Hodgkin, *Italy and her Invaders,* vol. ii (Oxford, 1892); Pasquale Villari, *Barbarian Invasions of Italy* (2 vols., New York, 1903).

HERVAS Y PANDURO, âr-väs' ē pàn-dōō'rō, Lorenzo (1735–1809). A Jesuit priest and celebrated philologist, born at Horcajo de Santiago (Cuenca), Spain. He entered the Society of Jesus at Madrid in 1745; studied in the Jesuit College at Alcalá de Henares, devoting himself especially to linguistics and architecture; taught in the Royal College in Madrid and at Murcia in the college of his order. Soon after he went to America as a missionary, but in 1767, by the expulsion of his society, he was driven to Rome, where he studied mathematics, physics, and afterward linguistics. In 1799 he returned to Barcelona and after a few months to his native town. But in 1803 or 1804 he again went to Rome, and Pius VII made him librarian of the Quirinal, where hard work hastened his death. He may be called the founder of comparative philology in Spain and Italy, because of his *Catálago de las lenguas conocidas* (6 vols., 1800–05), in which he studied the characteristics of more than 300 languages and attempted to classify them; the *Vocabulario poliglota* (1787); an *Ensayo práctico de las lenguas* (1787); and *Orígen, formación, mecanismo, y armonía de los idiomas* (1785). He wrote both in Italian and Spanish. His most famous work was *Idea del Universo* (21 vols., 1778–87), a huge treatise on cosmography. He wrote: *La escuela española de sordo-mudos ó arte para enseñarles á escribir y hablar el idioma español* (2 vols., 1795–99), which was followed by other educational works for deaf-mutes; *Descripción de los archivos de la corona de Aragón en Barcelona, etc.* (1801); and the following unedited works: *Historia de la escritura; Paleografía universal,* with alphabets of a great number of languages; *Moral de Confucio; Historia de las primeras colonías de América.*

HERVÉ, âr'vâ', Aimé Marie Edouard (1835–99). A French journalist, born at Saint-Denis, Réunion Island. He was successively editor of the *Courrier du Dimanche* (1863), *Le Temps* (1864), *L'Epoque* (1865); after which the gov-

ernment censorship silenced him in France till in 1867 he, with J. J. Weiss, founded *Le Journal de Paris*. On Weiss's withdrawal he edited that paper alone until 1873, when he founded *Soleil*, which he conducted with great ability. He was elected to the Academy in 1886. Hervé was a supporter of a liberal constitutional monarchy and wrote in this connection a history of liberal ideas in England, *Une page d'histoire contemporaine* (1869). Consult Avenel, *Histoire de la presse française* (Paris, 1900).

HERVÉ (properly FLORIMOND RONGER) (1825–92). A French musical composer, librettist, and comedian. He was born at Houdain, near Arras, went to Paris when a child, studied vocal and instrumental music under Saint-Roch, and was for eight years organist of Saint-Eustache. He made his début as a composer with a light opera, *Don Quichotte* (1848), and in 1851 was made leader of the Palais-Royal orchestra. Three years afterward he assumed the direction of the Folies-concertantes on the Temple Boulevard and became literally man of all work, as he wrote the score and the words, delivered both, led the orchestra, painted and shifted scenery. His first great success was in his original rôle of *Le compositeur toqué*, and he produced a number of light operas, such as *L'Œil crevé* (1867) and *Le petit Faust* (1869), performances not lacking in melody, imagination, and originality. Hervé was the originator of French opera bouffe, but his work was afterward overshadowed by that of Offenbach.

HERVÉ, GUSTAVE (1871–). A Radical French Socialist leader, born near Brest. The publication of antimilitarist articles in 1901 cost him his position as professor of history in the lycée of Sens. In 1905, and often thereafter, he was imprisoned for inciting opposition to compulsory military service, but popular agitation, led by Anatole France, Octave Mirbeau, and Jean Jaurès, was stronger than the courts. For a time he practiced law, but in 1908, for an article on national brigandage in Morocco, he was disbarred. His editorial defense of a man who had killed a gendarme, with a revelation of the methods of the Paris police, in 1910 brought Hervé a sentence (not carried out) to four years at hard labor for "inciting to murder." As editor of *La Guerre Sociale* (founded 1905), he voiced his antinational views, which he claimed were not anarchistic, encouraged strikes among workmen, and refused to condemn sabotage. His book *Leur patrie* (in English, *My Country, Right or Wrong*, 1910) attacks organized government as the foe of labor; yet in 1914, when France was drawn into the European War, like other Socialists he laid down his antagonism and supported the national cause. See SOCIALISM; MILITARISM.

HERVÉ RIEL, âr'vâ' rê-ĕl'. The hero of Browning's poem of the same name (1867).

HER'VEY, JOHN, LORD HERVEY OF ICKWORTH (1696–1743). An English politician, the eldest son of John, first Earl of Bristol. He was educated at Westminster and at Cambridge and afterward traveled on the Continent. After his return he frequented the court of the Prince of Wales at Richmond and in 1720 married Mary Lepell, maid of honor to the Princess. He entered the House of Commons in 1727 as member for Bury St. Edmunds and at first opposed Walpole, though he was brought over by a pension, the office of vice chamberlain (1730), and a seat in the House of Lords (1733). In 1740 he succeeded Lord Godolphin as Lord Privy Seal and held this office until Walpole's fall from power in 1742.

Hervey was an intimate friend of the Queen and in spite of miserable health continued to take an active part in politics until his death. He was a man of doubtful morals and no religion, but intellectually by no means justified Pope's bitter epithets of Lord "Fanny," "Sporus," and "Narcissus." The wordy quarrel between Hervey and the poet was probably concerning Lady Mary Wortley Montagu, to whom the former was friendly for many years. During his political career Hervey wrote a number of vigorous controversial pamphlets, and in 1778 the Rector of Ickworth published a volume of *Letters between Lord Hervey and Dr. Middleton Concerning the Roman Senate*. His *Memoirs* were not published until 1848. They are ably written, in a cynical style throughout, and contain valuable information about the inner court life of his time.

HERVEY, WALTER LOWRIE (1862–). An American educator, born at Mount Vernon, Ohio. In 1886 he graduated from Princeton University (Ph.D., 1892). After teaching Latin and Greek in secondary schools for three years he was connected with Teachers College, New York (later part of Columbia University), as professor of the history and institutes of education, dean of the faculty (1889–91), acting president (1891–92), and president (1892–97). In 1898 he became a member of the board of examiners of the department of education of New York City. He also served as dean of the Chautauqua School of Pedagogy (1894–99) and as a member of the National Council of Education. He edited the *Horace Mann Readers*, lectured and wrote articles on education, and is author of *Picture Work* (1896), *Daily Lesson Plans* (1912), and *Introductory Second Reader* (1914).

HERVEY DE SAINT-DENYS, âr'vâ' de săn'-de-nê', MARIE JEAN LÉON, MARQUIS D' (1823–92). A French historian and Orientalist, born in Paris. He studied Eastern languages in the College of France, and in 1867 was appointed commissioner general for China at the Universal Exposition at Paris in 1867. He had for years devoted himself especially to the study of Chinese and in 1874 was made professor of that language at the College of France and four years afterward was elected a member of the Académie des Inscriptions et Belles-Lettres. His first works were the outcome of an interest in Spanish literature—*Le poil de la prairie* (1847), a translation of a Spanish comedy, and *Histoire du théâtre en Espagne* (1850); but his great service to literature lay in his writings about China and his translations from the Chinese, notably: *Recherches sur l'agricultures des Chinois* (1850); *Poésies de l'époque des T'ang* (1862), translations; *Li-Sao: poème du IIIe siècle avant notre ère* (1870), a translation; *Trois nouvelles chinoises* (1885); *Mémoire sur les doctrines religieuses de Confucius* (1887); *Six nouvelles nouvelles* (1892), translations.

HERVEY ISLANDS. See COOK ISLANDS.

HERVIEU, âr'vyê', PAUL ERNEST (1857–1915). A French author, born at Neuilly-sur-Seine. He studied at the Lycée Condorcet, was admitted to the bar in 1877, and in 1879 became connected with the Secretary's office of the presidency of the Council. In 1881 he was appointed Secretary to the French Legation in Mexico, from which post he resigned in the same year. He con-

tributed to numerous periodicals. He afterward collected a series of essays, first published in the *Gaulois*, as *La bêtise parisienne* (1884). His books, involved in manner, but marked by skillful character drawing, include: *Les yeux verts et les yeux bleux* (1886); *L'Inconnu* (1887); *Deux plaisanteries* (1888); *L'Exorcisée* (1891); *Peints par eux-mêmes* (1893); *L'Armature* (1895), dramatized in 1905 by Eugène Brieux; *Le petit duc* (1896); *Amitié* (1900). Among his dramas are: *Les tenailles* (1894); *La loi de l'homme* (1897); *La course du flambeau* (1900); *L'Enigme* (1901); *Théroigne de Méricourt* (1902); *Le dédale* (1902), given in New York as *The Labyrinth; Le réveil* (1905); *Bagatelles* (1912). In 1900 he was elected to the French Academy, and he became an Officer of the Legion of Honor and honorary president of the Society of Dramatic Authors and of the Society of Men of Letters.

HERVIEUX, âr'vyē', Léopold (1831–1900). A French advocate and author. He was born at Elbeuf, was educated at the Lyceum of Rouen, and studied law in Paris, where he afterward had some important cases. He was elected municipal councilor for the Saint-Vincent de Paul District in 1884 and retired to private life in 1890. Between 1860 and 1870 he wrote under the nom de plume "Saint-Amand." His writings include: *Premiers essais poétiques* (1853); *Mémoires d'une femme du monde* (1860); *Poésies complètes* (1866); *Théâtre complet* (1867); *Les déclassés* (1882); *Le forçat ou la nécessité du divorce* (1880); *Harmonies intimes* (1889); *Etapes amoureuses d'un sonnetiste* (1889); *Des pécules du fils de famille dans la législation romaine* (1890); *Phèdre et ses imitateurs* (1884–93), perhaps his most notable work; *Les fabulistes latins* (1884–94).

HERVILLY, âr'vē'yē', Ernest-Marie d' (1839–1911). A French poet, romancer, and playwright, born in Paris. He was educated for civil engineering, but left his railroad appointment and his overseeing of bridges and highways to go into journalism. Thence he emerged as a poet with such work as *La lanterne en vers de couleur* (1868), *Les baisers* (1872), *Le harem* (1874), and *Bêtes à Paris* (1886), while he made his name as a novelist with *Mesdames les parisiennes* (1875) and *La dame d'Entremont* (1884), after which he wrote acceptably for young people—*Les aventures d'un petit garçon préhistorique en France* (1887) and *Jack-le-Gal et ses contes* (1891), for example. Essays, tales, and fantasies of his in prose have been collected under the titles *Contes pour les grandes personnes* (1874), *Histoires divertissantes* (1876), etc. He wrote also a number of one-act comedies in verse that have met with favorable receptions, such as *Le magister* at the Théâtre Français, *Le bibelot* at the Palais-Royal in 1877, and *Molière en prison* at the Odéon, 1886. In 1892 appeared his *Notre ami Drolichon.*

HERWARTH VON BITTENFELD, hĕr'värt fŏn bĭt'ten-fĕlt, Karl Eberhard (1796–1884). A Prussian general. He was born at Grosswerther in Prussia, and entered the army in 1811. He gained his first laurels in the War of Liberation (1813–15), especially in the battle of Leipzig. In 1848 he commanded the First Regiment of the Guards. During the war with Denmark in 1864 he acquired fame through his daring crossing of the Sound and capture of the Isle of Alsen. In the campaign of 1866 he was in command of the right wing of the army which advanced into Bohemia through Saxony. He bore the brunt of the fighting at Hühnerwasser and Münchengrätz and contributed materially to the victory of Sadowa. On the outbreak of the War of 1870 he was appointed Governor of the Rhenish Provinces, and in the next year he was raised to the rank of general field marshal.

HERWEGH, hĕr'vāk, Georg (1817–75). A German poet. He was born at Stuttgart; was educated there, at Maulbronn, and at the theological seminary at Tübingen; forsook theology, which he had begun to study, for literature; and returned to Stuttgart, where he coöperated in Lewald's *Europa.* In 1841 he was living in Switzerland and published *Gedichte eines Lebendigen* (last ed., 1896; named in contrast to Pückler's *Briefe eines Verstorbenen*), political poetry full of the unrest, the dissatisfaction with the existing conditions, and the uncertainty as to what would take its place, that marked the period. These fervent effusions became immensely popular, so that when, after a short trip to Paris, Herwegh journeyed through Germany in 1842, he was greeted with enthusiasm everywhere. King Friedrich Wilhelm IV gave him an audience and assured him that he liked a thoughtful opposition. But the young man lost his head and overstepped all the bounds of conventionality in a letter to the King in December, 1842, and was hurried out of Prussia. At Zurich he found no pleasant reception; he married a rich Jewess and took up his abode in Paris, where he wrote a second volume of *Gedichte eines Lebendigen* (1844). In this republican tendencies were more plain than ever, but his inspiration seemed weaker. He translated all of Lamartine into German (1843–44). After the revolution of February, 1848, Herwegh made several attempts to carry out his republican ideas by invading Baden at the head of a legion of German and French workingmen, but was defeated by the Württemberg troops and escaped only through the bravery of his wife. Thereafter he lived in retirement in Paris and later in Zurich, at Lichtenthal, near Baden-Baden, and at Liestal, near Basel. The most important work of his later years was the translation of many of Shakespeare's plays. Consult Marcel Herwegh (his son), *Briefe von und an Georg Herwegh* (Zurich, 1896).

HERZ, hĕrts, Henri (1806–88). A French pianist, born in Vienna. He studied music under Hünten at Coblenz and at the Paris Conservatory, where he won first prize for piano playing. He made a number of tours which were highly successful—in Germany, with the violinist Lafont (1831); in London, appearing with Moscheles and Cramer (1834); in the United States, Mexico, and the West Indies (1845–51). From 1842 to 1874 he was professor of piano playing at the Paris Conservatory. He founded a piano factory, and in 1855 his instruments received first prize at the Paris Exhibition. Herz's compositions were confessedly written to catch the popular fancy, and are forgotten to-day. But during the decade 1825–35 he was regarded as the world's greatest pianist. He published *Mes voyages en Amérique* (1866), a series of letters describing his American tour.

HERZ, Henriette (1764–1847). A German woman, distinguished for her rare beauty and culture as well as by her relations to many of the most distinguished men of her time. She was born in Berlin, the daughter of a Jewish

physician, Benjamin de Lamos, and at 15 years of age became the wife of Markus Herz, a rich and elderly physician. Her home became the centre of the literary life of Berlin, especially after her conversion to Christianity in 1817; and such men as the Humboldts, Friedrich and August Wilhelm Schlegel, Fichte, Varnhagen von Ense and his wife Rahel, Schleiermacher, and Börne were her intimate friends. She became a widow in 1803. Most of her letters from the distinguished people of her day she burned. Consult Fürst, *Henriette Herz: Ihr Leben und ihre Erinnerungen* (Berlin, 1850); Ludwig Geiger, *Briefwechsel des jungen Börne und der Henriette Herz* (Oldenburg, 1905); *Schleiermacher und seine Leben nach Briefen der H. H.* (Leipzig, 1910).

HERZEGOVINA, hĕr'tsâ-gō-vē'nâ. The smaller of the two territories of Austria-Hungary prior to October, 1908, belonging to Turkey, but virtually an Austro-Hungarian protectorate, in accordance with the Treaty of 1878 (Map: Austria-Hungary, F 5). It is bounded by Bosnia proper on the north, by Montenegro on the east, and Dalmatia on the southwest. Its area is 3528.5 square miles. In the formation of its surface it resembles Bosnia (q.v.). It is generally somewhat barren and is mountainous, having a number of peaks exceeding 7000 feet in height, the highest being the Maglić on the eastern boundary, which rises about 7850 feet above the sea. The eastern part is especially barren and rocky, in contrast with the part adjoining Bosnia and Dalmatia, which is fertile and invites the cultivation of the vine, tobacco, and southern fruits. In this latter district is found the largest river, the Narenta, whose valley forms the characteristic feature of the region. Administratively the Herzegovina is a dependency of Bosnia and forms the district of Mostar. The population, exclusive of the military, in 1895 was 219,511; in 1910, 267,038 (132,830 males, 134,208 females). Roman Catholics in 1910 numbered 112,149; Servian Orthodox, 90,712; and Mohammedans, 63,619. The great bulk of the inhabitants are Slavs. The largest town is Mostar (q.v.), which is connected by rail with Sarajevo, the Bosnian capital.

Herzegovina was originally a part of Dalmatia and was occupied by a Slavic population in the seventh century. The most important of the mediæval principalities of the region was that of Zachlum, or Chulm, which in the fourteenth century was annexed to Bosnia. Regaining its independence, Herzegovina was erected into a dukedom by the Emperor Frederick III in 1440. (Hence the name "Herzegovina," from Ger. *Herzog*, Slav. *herceg*, duke.) About 1463 the country became tributary to the Turks and 20 years later was completely subject to them, remaining for more than two centuries afterward a battlefield between Christians and Mohammedans. In 1875 a serious insurrection, arising from the Turkish oppression of its Christian inhabitants, broke out in Herzegovina, which rapidly spread into Bosnia and was supported by Montenegro and Servia. This ultimately led to the War of 1877–78 between Russia and Turkey. The Berlin Congress of 1878 determined that Herzegovina, like Bosnia, should be handed over to Austria-Hungary for administration and military occupation. The Mohammedan inhabitants rose against the Austrian army of occupation and were subdued only after a desperate resistance. The introduction of a new recruiting law was the occasion for an insurrection in 1881–82. In October, 1908, the Austro-Hungarian government, which had done much to promote the welfare of the whole region, formally extended the full sovereignty of Austria-Hungary over Herzegovina as well as Bosnia; and in this practical repudiation of the Treaty of Berlin the Great Powers subsequently acquiesced, despite the loud protests of Servia. A new constitution was proclaimed in February, 1910, vesting the government of the two provinces jointly in a representative of the Austro-Hungarian Finance Minister at Vienna and a popularly elected Diet at Sarajevo. See Bosnia.

HERZEN, hĕrt'sĕn, Alexander Ivanovitch (1812–70). A Russian publicist and author, born at Moscow. He was the illegitimate child of a rich nobleman, Ivan Alexeévitch Yakovlev. He received the fashionable French education of the time, and while at school became a great admirer of the contemporary French Socialists. Arrested in 1834 with his comrades for his revolutionary sympathies, he was exiled to Perm and then to Viatka, where he held a position in the Governor's office. Transferred to Vladimir, he married, bringing his bride secretly from Moscow. In 1840 he was allowed to return to Moscow. A close study of Hegel and Feuerbach brought him to conclusions quite opposite to those of most of his friends and made him the leader of one school of political philosophers, just as Belinsky (q.v.) was of the other—the school which clung to Hegel's "Whatever is, is right" theory even in the face of Russian despotism and absolutism. Under the influence of the doctrines of Proudhon, Cabet, and Louis Blanc, he became a rabid Westerner as distinguished from the Slavophils. He resigned his government position in 1842 and left Russia in 1847, after having published, under the pseudonym "Iskander," two works on philosophy as well as several novels. He settled in Paris, was in full sympathy with the events of 1848, although not actively connected with them, and later was on intimate terms with Proudhon, Garibaldi, as well as with many revolutionists in France, Italy, and Switzerland, in a systematic agitation against the absolutist government of Russia. Forced by the police to leave Paris, he was naturalized in Switzerland and, founding a free press in London, published after 1857 his weekly *Kolokol* (The Bell). From 1864 to 1867 he published it at Geneva, moving in 1869 to Paris, where he soon died of pneumonia.

His literary activity began as early as 1830. His works are strikingly brilliant, characterized by depth of thought and artistic form. His best-known novel, *Who Is to Blame?* (1891), deals with the questions of feelings *versus* reason, family relations, and woman's position in marriage. Its dominant idea is that it is futile to seek happiness by locking one's self up within the narrow family interests away from society and the world. A great admirer of Western civilization, he was completely disappointed in it when viewing it at close range and was disgusted with the *bourgeoisie*. He saw a bright future for the working classes, however, and expected much from the regenerative power of Russia, with her system of village communes. These ideas he embodied in his *Vom andern Ufer* (1850; published in Russian, 1855, in French, 1870) and in his *Letters from France and Italy* (1855), in which he gives a keen analysis

of the causes that brought on the revolutionary events of the time. Herzen was a freethinker in the broadest sense of the word, hence his negative attitude towards all parties and creeds. His influence was overwhelming, the greatest secrets of the state and the Imperial household immediately finding their way into his paper, which was so interesting that even the Emperor read it regularly. But his popularity was undermined by his advocacy of the Polish rebellion, to which he was persuaded by his friend Bakunin (q.v.). The circulation of the *Kolokol* from over 3000 fell to about 500, and Herzen finally stopped its publication.

Besides the works already mentioned, the following are among his best: *Dilettantism in Science* (1842); *Letters on the Study of Nature* (1845–46); *From the Memoirs of Doctor Krupov* (1847); *Recollections of my Travels* (1848); *On the Development of Revolutionary Ideas in Russia* (1851); *Baptized Property* (1853), or "Serfism"; *Prison and Exile* (1854); *My Exile* (1855); *Interrupted Tales* (1856); *France or England* (1858); *The Old World and Russia*, and *The New Phase of Russian Literature* (1864). His collected works in Russian were published at Geneva (1875–85; the latest edition, in 7 vols., at St. Petersburg in 1905). In French his works appeared as follows: *Mémoires*, vols. i–iii (Paris, 1860–62); *Récits et nouvelles* (ib., 1873); *Correspondance de Michel Bakounine: lettres à Herzen et à Ogareff* (ib., 1896). The *Kolokol* articles were collected and published at Brussels in 1863–65, under the title *Cloche*. Consult: Eckhardt, in *Jungrussisch und Altlivländisch* (Leipzig, 1871); Sperber, *Die sozialpolitischen Ideen A. Herzens* (ib., 1894); Bogucharsky, *Alexander Ivanovitch Herzen* (St. Petersburg, 1912).

HERZL, hĕrts'l, THEODOR (1860–1904). Founder of political Zionism (see ZIONIST MOVEMENT), born in Budapest. He studied law, became literary editor of the Vienna *Neue Freie Presse*, and wrote plays, essays, and stories. In 1896 he published *Der Judenstaat*, advocating the establishment of an autonomous Jewish state in Palestine. He soon became the leader of the Zionist movement. In 1897 he brought about the meeting of the first Zionist congress at Basel, over which he presided. In *Alt Neuland* (1902) he depicted the Jewish state as an accomplished fact.

HERZLIEB, hĕrts'lĕp, MINNA (1789–1865). A friend of Goethe. She became acquainted with the poet when she was 18 years old, married Professor Walch in Jena in 1826, lived unhappily with him, fell a victim to mental disease, and was placed in a sanitarium. In his *Wahlverwandtschaften* Goethe is supposed to have represented her under the name "Ottilie." Some of Goethe's sonnets refer to her. Consult Gädertz, *Goethes Minchen* (Bremen, 1888).

HERZOG, hĕr'tsōg, EDOUARD (1841–). First Bishop of the Old Catholic church of Switzerland. He was born at Schongau, Switzerland. He studied theology at Tübingen and Freiburg, was ordained priest in the Roman Catholic church (1867), and was professor of exegesis in the theological seminary at Lucerne (1868–72). He resigned his professorship and joined the Old Catholic organization (1872) and was pastor of Old Catholic churches at Krefeld, Germany (1873), and at Olten, Switzerland (1874), and professor of New Testament exegesis in the Old Catholic faculty at the University of Bern. He was called to be Bishop by the national synod in 1876. He wrote extensively, mostly on the problems of the Old Catholic church.

HERZOG, ERNST VON (1834–1911). A German classical philologist, born at Esslingen. He was appointed a professor in the University of Tübingen in 1867. His publications relate chiefly to the constitutional history of Athens and Rome. The most important among them are: *Galliæ Narbonensis Historia* (Leipzig, 1864); *Geschichte und System der römischen Staatsverfassung* (ib., 1884–91); *Zur Verwaltungsgeschichte des attischen Staats* (Tübingen, 1897).

HERZOG, HANS (1819–94). A Swiss general, born at Aarau and educated there. He volunteered in the Württemberg artillery in 1846 and in 1860 was appointed by the Federal Council inspector general and colonel of the Swiss artillery. He introduced new arms for both infantry and artillery. At the beginning of the Franco-Prussian War he was put in command of nearly 40,000 men to guard the Swiss frontier. At the beginning of 1871 he entered into a convention with General Clinchant at Verrières by which Bourbaki's army was allowed to cross into Swiss territory on laying down its arms. In 1875, upon being appointed commander in chief, he completely reorganized the artillery. Consult Bluntschli, *Karl Johann Herzog* (Zurich, 1895).

HERZOG, JOHANN JAKOB (1805–82). A religious editor and scholar. He was born at Basel, Sept. 12, 1805. He studied at Basel and Berlin and filled the position of professor of historical theology at Lausanne, Halle, and Erlangen. He retired in 1877 and died at Erlangen, Sept. 30, 1882. He was a voluminous writer and published a sketch of Calvin (1843), a life of Œcolampadius (1843), works on the Waldenses (1848 and 1853), and *Abriss der gesamten Kirchengeschichte* (1876–87; 2d ed. by Koffmann, 1890–92). His greatest work was the religious encyclopædia known as *Real-Encyclopädie für protestantische Theologie und Kirche* (22 vols., Gotha, 1853–68; 3d ed. by A. Hauck, 1896–1909), of which he was editor and to which he contributed 529 articles. See his life in the *Real-Encyclopädie*, 3d ed., vol. vii.

HERZOG, KARL JOSEPH BENJAMIN (1827–1902). A German statesman, born at Brieg and educated in law at Breslau. He was assistant in the ministerial Department of Commerce (1859) and representative of the North German Federation at the Paris Exposition (1867); in 1871 he was a member of the commission on the government of Alsace and Lorraine, and later (1876) became Assistant Secretary of State in the department for these provinces, and (1879) Secretary of State in their first ministry, from which he resigned a year later because of his opposition to the policy of Von Manteuffel. He traveled in America (1881–82) and wrote *Reisebriefe aus Amerika* (1884). From 1885 until his death he was first a director and then a trustee of the newly organized New Guinea Company.

HERZOG, RUDOLF (1869–). A German novelist, born at Barmen and educated in the schools of his native town. In 1884 he entered a chemical house in Düsseldorf as an apprentice and later worked as an expert in a large paint house in Elberfeld. During the years 1891–93 he studied philosophy in Berlin and in 1894 became literary editor of the fortnightly periodical

called *Schwarz-Rot* in Darmstadt. Three years later he went to Hamburg as editor in chief of the *Hamburger Neue Nachrichten* and then to Berlin as member of the staff of the *Berliner Neue Nachrichten*. He began his literary career with *Vagantenlieder* (1892) and tried the drama with varying success. In 1895 he made a decided hit with his excellent novel *Die Wiscottens* (100th ed., 1913), describing the rise of a manufacturer's family and painting charming pictures of the Wuppertal and its people. Among his other works may be mentioned: *Die Condottieri* (1909), drama; *Der alten Sehnsucht Lied* (35th ed., 1913), short story; *Abenteuer* (1907; 45th ed., 1912), novel; *Hanseaten* (1908; 60th ed., 1912), novel; *Es gibt ein Glück* (1910; 70th ed., 1913), short stories; *Die Burgkinder* (1911; 80th ed., 1913), novel; *Herrgottsmusikanten* (2d ed., 1912), comedy; the poems *Wir sterben nicht* (5th ed., 1913); and *Sons of the Rhine* (1914).

HERZOGENBERG, hĕr'tsō-gen-bĕrK', HEINRICH VON (1843–1900). An Austrian musician, born at Graz. He studied at the Vienna Conservatory (1862–64) and in 1874, at Leipzig, founded the Bach-Verein in conjunction with Spitta, Holstein, and Volkland. In 1875 he succeeded the latter as its director. He was professor of composition at the Berlin Hochschule für Musik (1885–92) and also a member of the Academie and director of the Meisterschule for composition and one of the greatest contrapuntists of the century. His compositions include the oratorio *Die Geburt Christi;* a symphonic poem, *Odysseus;* two symphonies; many psalms for chorus and orchestra; and instrumental pieces. Consult W. Altmann, *Heinrich von Herzogenberg* (Leipzig, 1903).

HERZOG ERNST, hĕr'tsōG ĕrnst. A poem of the twelfth century, of Bavarian origin, but of unknown authorship. Its subject is the exploits of Ernst of Swabia in the Orient during his banishment. Consult George Voss, *Die Sage vom Herzog Ernst unter dem Einflusse Wolframs von Eschenbach* (Colmar, 1886), and F. A. Ahlgrimm, *Untersuchungen über die Gothaer Handschrift des Herzog Ernst* (Kiel, 1890).

HESEKIEL, hā-zā'kĕ-ĕl, GEORG LUDWIG (1819–74). A German novelist, born at Halle, the son of Friedrich Hesekiel, a religious poet, and educated at Halle, Jena, and Berlin. He was editor of *Die Rosen* at Altenburg (1846), of the *Patriotischer Hausfreund* at Zeitz (1848), of the Berlin *Kreuzzeitung* (1849), and of the *Berliner Revue* (1855); but he is known for his poems and novels, which are marked by a distinctly conservative and monarchical patriotism, but have no great literary worth. Among the former are: *Gedichte eines Royalisten* (1841); *Zwischen Sumpf und Sand* (1863); *Aus dem Dänenkrieg* (1864); *Neue Gedichte* (1866); *Gegen die Franzosen* (1870). His novels include: *Das liebe Dorel* (1851); *Vor Jena* (1859); *Von Jena nach Königsberg* (1860); *Stille vor dem Sturm* (1862); *Unter dem Eisenzahn* (1864); *Refugiert und emigriert* (1869); *Graf d'Anethan d'Entragues* (3d ed., 1861); *Von Turgot bis Babeuf* (2d ed., 1873); *Lilienbanner und Tricolore* (1859). *Preussenlieder* (1846 and 1864) is his best work. He also wrote *Das Buch vom Grafen Bismarck* (3d ed., 1873). Consult Theodor Fontane, *Von Zwanzig bis Dreissig* (Berlin, 1898).

HESEKIEL, LUDOVICA (1847–89). A German novelist, daughter of the preceding, born at Altenburg. She early entered journalism and in literature devoted herself to historical fiction and to biography. She married Wilhelm Johnsen, pastor at Neustadt, in 1887. Among her novels, which are no better than her father's, the most important are: *Eine brandenburgische Hofjungfer* (1868); *Von Brandenburg zu Bismarck* (1873); *Unterm Sparrenschild* (5th ed., 1903); *Deutsche Träumer* (2d ed., 1897); *Prinz Wilhelm* (2d ed., 1897); *Jesus meine Zuversicht* (3d ed., 1894); *Des Kaisers Gast* (3d ed., 1894); *Andernach und Clairveaux* (1889). She also wrote the sketches *Barackenleben* (1872) and the biographies, *Elisabeth Luise* (1881), *Agnes Fürstin Reuss jüngerer Linie* (1887), and *Augusta, Kaiserin-Königin* (1890).

HESILRIGE, hĕz'el-rĭg, or **HA'ZLERIGG,** SIR ARTHUR (?–1661). An English statesman, member of the Long Parliament, and one of the famous Five impeached by King Charles. He took an active part in the Civil War as commander of a regiment of horse called "The Lobsters" by the Royalists and was equally prominent in Cromwell's Parliament, but opposed to the protectorate. Ultimately he voted for the restoration of the Stuarts, though too late in so doing to save more than his life, for he died in the Tower.

HE'SIOD (Gk. *Hσιοδος, Hēsiodos*). After Homer, the earliest Greek poet whose works have survived. The date at which he lived is uncertain. Herodotus regarded him as contemporary with Homer and dated both of them 400 years before his own day, i.e., in the middle of the ninth century B.C. Ephorus (q.v.) thought him older than Homer; the Parian Chronicle (q.v.) also takes this view and makes him 30 years the elder; but the Alexandrian scholars, Eratosthenes and Aristarchus, held that the treatment of the myths and the geographical knowledge shown in Hesiod's works proved him to be younger than Homer. Modern criticism has shown clearly that the Hesiodic works exhibit a knowledge of the *Iliad* and the *Odyssey* in their present Ionic dialect and in very much their present form; on the other hand, it is certain that Hesiod's *Works and Days* was known to Simonides and Archilochus, so that we may safely place Hesiod in the second half of the eighth century, or perhaps about 700 B.C.

Our knowledge of his life is derived almost solely from his poems; the ancient scholars had no better source of information. Notices in his *Works and Days* and other scattered sources seem to show that his father, under stress of poverty, came to Bœotia as an emigrant from Cyme, an Æolian town in Asia Minor, and settled in the petty village of Ascra beneath Mount Helicon. Here probably Hesiod was born. In his youth he watched the sheep on Helicon. At his father's death his brother Perses succeeded in cheating him of his proper inheritance by corrupting the judges; but later this unjust brother was reduced to such poverty that he was forced to appeal for aid to Hesiod. (For a careful discussion of this common version of Hesiod's life, consult the Introduction to Mair's translation of Hesiod, Oxford, 1908.) Under the impulse of his homely muse, Hesiod, like other early bards, became a wandering singer, visiting not simply the cities of his native Bœotia, but also traveling to the west past Delphi, until he reached Naupactus in Ozolian Locris. Tradition says that the Delphic oracle had warned him that he was destined to die in the shrine of the

Nemean Zeus; but the poet in the course of his travels came to Œneon in Locris, quite unaware that here also was a temple of the god whose sacred precinct he was to avoid. In this town he is reported to have met his death at the hands of two brothers who without foundation suspected him of wronging their sister. The tradition may well have this truth, that Hesiod died in Locris. At Naupactus a school of Hesiodic poetry developed, one product of which was the genealogical poem *Ναυπάκτια*, fragments of which are embodied in the scholia to Apollonius Rhodius. In later times a grave of Hesiod was to be seen in the market place at Orchomenus, to which tradition said the poet's bones had been removed at the command of the Delphic oracle.

Hesiod was the founder of Greek didactic poetry (q.v.), as Homer was of epic song. In form Hesiod's poetry was throughout epic, because it used the hexameter verse. The following works are extant under his name: *Works and Days* (*Ἔργα καὶ Ἡμέραι*), in 828 verses, which the Bœotian tradition current on Mount Helicon (q.v.) regarded as his only genuine work. The first part of its name (*Works*) comes from the directions for various kinds of labor, especially farm labor, which it contains; the second (*Days*) is due to the calendar it gives, showing the days of the month on which certain tasks should be performed. The poem in its present form no doubt contains some later additions, but scholars are not agreed about the extent of these interpolations. The *Theogony* (*Θεογονία*), in 1022 verses, is an attempt to bring Greek mythology into an ordered system and to incorporate into the ranks of the older divinities the new gods from abroad, who were not known to the Homeric poems. In it theosophic and cosmogonic speculations are combined with ancient hymns and accounts of cults. Under the epic form Hesiod gives a history of the creation and of the generations of the gods; the close of the poem contains a list of the daughters of Zeus who bore sons to mortals. We have to regret the loss of the *Catalogue of Women* (*Γυναικῶν Κατάλογος*), which gave a list of the mortal women who had become the mothers of heroes and some account of those heroes' exploits. The poem was divided into five books, of which probably the last two bore the special title *Hoῖαι* from the fact that each division began with *ἢ οἵη*, 'or such a woman as was.' The extant *Shield of Hercules* (*Ἀσπὶς Ἡρακλέους*), in 480 verses, borrowed its introduction from the fourth book of the preceding work. The greater part of the poem is occupied with an account of the shield of Hercules, which is an inferior imitation of the description of Achilles' shield in the *Iliad*. There were a number of other Hesiodic poems in antiquity; of these only scanty fragments are left. The *Contest between Homer and Hesiod* (*Ὁμήρου καὶ Ἡσιόδου Ἀγών*), usually printed with Hesiod's works, is a product of the time of Hadrian. See Mair's work, referred to above.

Hesiod exhibits none of the splendid imagination and vivid power of Homer; his verses are filled rather with proverbial sayings and homely precepts; they offer a calendar and a mythology for the common people. But the form is the same as that of the Homeric poems, and the dialect on the whole shows little divergence from that seen in Homer. (See GREEK LANGUAGE, *Dialects, Ionic.*) Hesiod was, however, highly prized for his moral precepts, and the poems played an important part in Greek education. Their influence, especially that of the *Works and Days*, was not confined to Bœotia and Locris, where a Hesiodic school developed, but extended to Ionia and can be seen in the development of iambic poetry. In his *Georgics* (q.v.) Vergil (q.v.) was indebted to Hesiod. The poems formed the subject of learned comment from the Alexandrian age to the Byzantine period. The best editions are by Lennep (Amsterdam, 1843), Schömann (Berlin, 1869), Flach (Berlin, 1874), Göttling-Flach (Leipzig, 1878), Paley (1883), Rzach (Leipzig, 1902), Sittl (Athens, 1890). The *Theogony* was edited, with notes, by Aly (Heidelberg, 1913). There are translations of the *Works and Days* by Chapman (London, 1858); of the entire poems by Elton (2d ed., London, 1832), by Banks (London, 1892), and by Mair (Oxford, 1908). Consult also: Flach, *Die hesiodischen Gedichte* (Berlin, 1874); Fick, *Hesiod's Gedichte* (Göttingen, 1887); Grote's *Greece*, vols. i and ii passim (5th ed., London, 1888); the histories of Greek literature; Adam, *Religious Teachers of Greece* (Edinburgh, 1908); Rzach, in Bursian's *Jahresbericht* (full bibliography, Berlin, 1908); Meyer, "Hesiods Erga," etc., in *Genethliakon Carl Robert* (Berlin, 1910); Rand, "Horatian Urbanity in Hesiod's 'Works and Days,'" in *American Journal of Philology*, xxxii (Baltimore, 1911).

HES'PELER. A town in Waterloo Co., Ontario, Canada, on the Speed River and on the Grand Trunk Railway, 9 miles south of Guelph and about 45 miles southwest of Toronto (Map: Ontario, D 7). The Galt, Preston, and Hespeler Electric Railway connects Hespeler with the Canadian Pacific Railway at Galt. There are manufactories of woodworking machinery, furniture, blacksmiths' tools, stoves and furnaces, textiles, woolen-mill machinery, sashes and doors, lightning rods, and enameled iron. The town contains two parks and owns a hydro-electric power plant. Pop., 1901, 2457; 1911, 2368.

HESPE'RIA (Lat., from Gk. *Ἑσπερία*, from *ἑσπέρα, hespera, ἕσπερος, hesperos*, evening star, evening, the west, Lat. *vesper*, evening). The land of the west—a term applied by the ancient Greek poets to Italy and by the Roman writers sometimes to Italy and sometimes to the Iberian Peninsula (Spain).

HESPERIDES, hĕs-pĕr'ĭ-dēz (Lat., from Gk. *Ἑσπερίδες, Hesperides*, from *ἑσπέρα, hespera*, evening). In Greek mythology, in the earliest version, the daughters of Erebus and the Night, who on an island far in the west, at the borders of the western ocean (aided by the sleepless dragon Ladon), keep in a garden the golden apples which Gæa produced as a wedding gift for Zeus and Hera. The number and names of the Hesperides varied, but the common version seems to have known three—Ægle, Erythea, and Hesperis, or Hesperethusa. Later genealogists represented them as daughters of Hesperis and Atlas (q.v.), who was also localized in the Far West. With the aid of Atlas, Hercules (q.v.) secured three of the apples for Eurystheus, but they were restored by Athena. Apples from the garden of the Hesperides, as symbols of love and fruitfulness, figure in the stories of the marriage of Cadmus (q.v.) and Harmonia (q.v.), and of Peleus (q.v.) and Thetis (q.v.), and of the race of Atalanta (q.v.). Some have thought of the apples of the Hesperides as

typifying the sun, which, in Germanic legends, is described as hanging by night on a tree, while a dragon keeps the light from men till he is overpowered by some beneficent force. Consult C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911).

HESPERIDES. The title of the collection of Robert Herrick's poems published in 1648.

HES'PERIS. See DAME'S VIOLET.

HESPERORNIS, hĕs'pĕr-ôr'nĭs (Neo-Lat., from Gk. ἕσπερος, *hesperos*, west + ὄρνις, *ornis*, bird). A primitive, flightless, toothed sea bird,

THE HESPERORNIS.

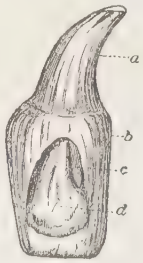
After a drawing by Joseph Gleeson, representing an ideal figure, in the attitude of swimming; based upon skeletons in the National Museum.

found fossil in the Middle Cretaceous shales of western Kansas and, excepting *Archæopteryx*, the oldest bird known. The first skeleton was discovered in 1871 by Prof. O. C. Marsh, near the Smoky Hill River, in marine deposits of yellow chalk and calcareous shales, and was named *Hesperornis regalis*. Several other species have since become known; and *Enaliornis*, of the Upper Greensand of Cambridge, England, appears to be a closely allied form. It was a large, well-feathered water bird, having the general habits of a loon, perhaps, ranging the open sea, and scrambling upon land only for breeding. Its food was mainly fishes, which it pursued by swimming and diving, for it had no wings. There is reason to believe that this winglessness was due to degeneracy from fully winged ancestors. *Hesperornis* was more than 5 feet in length, and if its ancestors were equally bulky their wings were quite too large to use under water, but would be folded close against the body when the bird dived or swam. This constant disuse, as the race became more and more exclusively aquatic, would permit the wings to dwindle. By the time the wings were small enough to be of use as paddles under water, as modern auks use theirs, the muscles had become too feeble to move them in so dense a medium, and so degeneration continued until only a remnant of humerus remained. Correlative with this was a constant growth and strengthening of the legs, which became of great size (though the bones remained hollow, like those of an aërial bird) and so twisted as to turn edgewise when the foot was brought forward after each stroke, thus offering least resistance to the water. The original skeleton set up by Marsh, and depicted in his *Odontornithes*, stood erect like a penguin. When an attempt was made at the National Museum to mount another skeleton in a swimming attitude, it was discovered that this position required an altogether novel arrangement of the legs, such as is shown in the accompanying sketch of a restoration based by Lucas (see above) upon this skeleton. It appears that the

SKULL AND TOOTHED BEAK OF HESPERORNIS REGALIS.

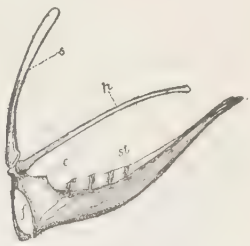
legs of this bird must have stood out almost at right angles and have acted like a pair of oars.

To this most powerful apparatus for swimming and chase was added the best of means for seizing and holding the agile, slippery, and often bone-incased prey, in the form of a long neck, capable of rapid flexure and thrust, and long slender jaws, armed with sharp recurved teeth resembling those of reptiles. They were set in



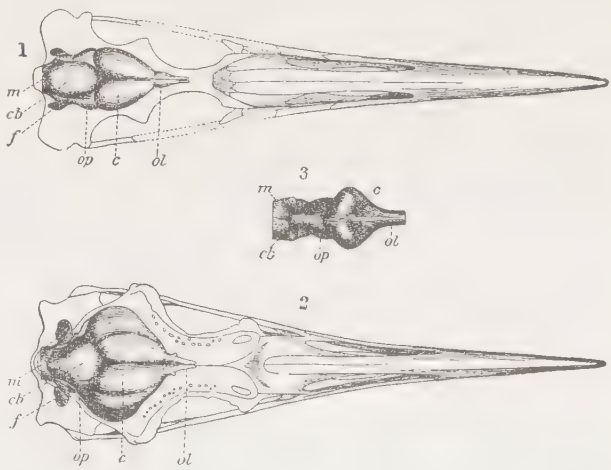
A TOOTH OF HESPERORNIS.

a, crown; *b*, root; *c*, absorbed cavity in the root, containing a young tooth (*d*).



SHOULDER GIRDLE.

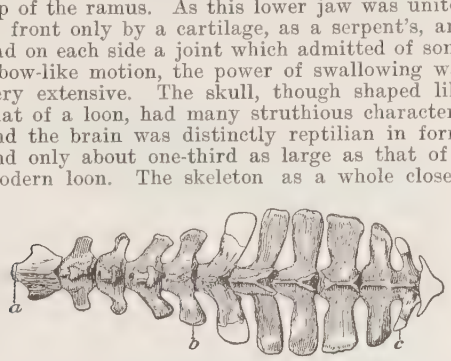
Hesperornis regalis; *s*, scapula; *h*, humerus; *f*, clavicle or furculum; *c*, coracoid; *st*, sternum.



COMPARISON OF SKULLS AND BRAINS.

1. Skull and brain cavity of *Hesperornis regalis*, from above. 2. Skull and brain cavity of modern loon. 3. Cast of brain cavity of a young alligator; *ol*, olfactory lobes; *c*, cerebral hemispheres; *op*, optic lobes; *cb*, cerebellum; *f*, flocculi; *m*, medulla. (After Marsh.)

a common alveolar groove (holcodont dentition) —a fact which differentiates *Hesperornis* from the higher *Ichthyornis* and its relatives, whose teeth were implanted in separate sockets (thecodont). (See BIRD, FOSSIL.) In the upper jaw the teeth were confined to the maxillary bone alone, but in the lower jaw they extended to the tip of the ramus. As this lower jaw was united in front only by a cartilage, as a serpent's, and had on each side a joint which admitted of some elbow-like motion, the power of swallowing was very extensive. The skull, though shaped like that of a loon, had many struthious characters, and the brain was distinctly reptilian in form, and only about one-third as large as that of a modern loon. The skeleton as a whole closely



BONES OF THE TAIL.

Caudal vertebræ of *Hesperornis regalis*, seen from above: *a*, anterior convex face of first caudal; *b*, tranverse process.

approximates that of modern birds. The vertebræ resemble those of a loon. The shoulder girdle, in its original structure as well as in its degeneracy, and the sternum, which has no keel, are ostrich-like; and it is in the pelvic arch more than elsewhere that traces of reptilian ancestry are evident. The tail contained 12 vertebræ—more than are or have been possessed by any other known bird since *Archæopteryx;* and they were solid, firmly locked together and winged, so that the outline of the caudal skeleton is spatulate. This, with the evidently strong musculature, would give great power, similar to that of a beaver's tail, and doubtless the organ was an important aid in swimming, by a sculling motion, as well as in steering and controlling progress. Whether it bore quill feathers in pairs, as did the long tail of *Archæopteryx*, is not known. The legs and feet resemble those of a grebe on a large scale, and it is fair to suppose that they were externally lobed in a similar way. The feathers on the legs, at least, as is known from impressions in the rocks, were soft and rather scanty.

Hesperornis survived for a long period, during which the interior of North America was a shallow sea, stretching from the Alleghanies to the Rocky Mountains, broken by little except the island summits of the Ozark Hills. Professor Marsh says that apparently there was an absence of enemies in the air to be feared by this great diver, since it was more than a match for the huge but toothless pterodactyls, which hovered over the waters in great numbers. The warm sea teemed with fishes and other food; but it also teemed with great swimming lizards (mosasaurs), turtles a dozen feet in length, and large predacious fishes. As the gradual rise of the land towards the close of the Cretaceous epoch more and more inclosed the sea and modified conditions, the struggle for life became too hard for many of its denizens, and *Hesperornis* was among those which early succumbed. With it disappeared forever a primitive type of bird life, for this branch of the avine stock seems to have terminated without leaving any descendants.

Bibliography. The fullest descriptions and illustrations of *Hesperornis* are contained in O. C. Marsh, *Odontornithes: A Monograph of the Extinct Toothed Birds of North America* (Washington, 1880). Consult also: E. D. Cope, *Cretaceous Vertebrates of the West* (Washington, 1877); S. W. Williston, various papers in the *Annual Reports of the University Geological Survey of Kansas* (Lawrence); F. A. Lucas, *Animals of the Past* (New York, 1913); Alfred Newton, *Dictionary of Birds* (ib., 1896). See BIRD, FOSSIL; ICHTHYORNIS.

HES'PERUS (Lat., from Gk. *Ἕσπερος*). The name given by the Greeks to the evening star Venus. He is the son of Astræus, or Cephalos, and Eos. As the morning star, he was early called Phosphorus by the Greeks (Lat., Lucifer, q.v.).

HESPERUS. A surname given to the Green Knight, Sir Pertolope, in the legend of King Arthur. With his three brothers he guarded the approaches of Castle Perilous. In Tennyson's *Idylls of the King* he is called the "Evening Star," but his famous combat takes place at dawn.

HESS, HEINRICH, BARON VON (1788–1870). An Austrian general, born in Vienna. He entered the army in 1805, distinguished himself at Aspern and Wagram, and served in the campaigns of 1813 and 1814. In 1815 he was employed in the War Department, but soon returned to active service under Schwartzenberg, and in 1821 was in the army of occupation in Piedmont. Transferred to the general staff under Radetzky in 1831, he served in Lombardy, where he greatly improved the organization of the army. Hess was promoted to the rank of brigadier general in 1834 and to be field marshal lieutenant in 1842. In 1849 his ability as quartermaster-general was recognized by Radetzky, as contributing largely to the success of the campaign in Italy. During the Crimean War (1854–55) Hess commanded the observation corps in Galicia and Transylvania. In 1859 he was sent to Italy and was involved in the Emperor's defeat at Solferino. For his part in the truce of Villafranca he was made field marshal. Two years afterward he was named a member of the House of Lords for life.

HESS, HEINRICH VON (1798–1863). A German painter, born at Düsseldorf. He studied with his father, Karl Ernst Christoph von Hess (1755–1828), an engraver, born at Darmstadt. He attracted attention at an early age and was sent to Italy in 1821 to complete his studies. In 1828 he was made professor at the Munich Academy and in 1849 director of all the galleries in the city. The frescoes in the basilica of St. Boniface, 22 scenes from the life of that saint, in the execution of which he was assisted by Koch and Schraudolph, and those in the church of All Saints (both in Munich), are probably his best works. He also produced other notable frescoes and many cartoons for windows. His oil paintings include "St. Luke," "Christmas Eve," and "Faith, Hope, and Charity." One of his best portraits is that of Thorvaldsen.

HESS, JOHANN (1490–1547). A German preacher of the Reformation, born at Nuremberg and educated at Leipzig and Wittenberg. He returned to Wittenberg (1520), after acting as secretary to the Bishop of Breslau and traveling in Italy, where he came under the influence of the Humanists. In 1519 he received the de-

gree of doctor of theology from the University of Ferrara. Strongly influenced by Luther and Melanchthon, he went back to Breslau and did much for the spread of the Reformation there. Consult Köstlin, "Johann Hess, der Breslauer Reformator," in the *Zeitschrift des Vereins für Geschichte und Altertum Schlesiens*, vols. vi, xii (Breslau, 1893–99).

HESS, Johann Jakob (1741–1828). A Swiss theologian, born at Zurich, where he became deacon (1777) and (1795) superintendent of the churches in the canton. He wrote original studies on the life of Christ: *Geschichte der drei letzten Lebensjahre Jesu* (1768–73); *Jugendgeschichte Jesu* (1773); and, including these, *Lebensgeschichte Jesu* (8th ed., 1822–23). Consult Escher, *Johann Jakob Hess* (Zurich, 1837), and Zimmermann, *Die zürcher Kirche von der Reformation bis zum dritten Reformationsjubiläum* (Zurich, 1877–78).

HESS, Ludwig (1877–). A German composer and Lieder singer, born in Marburg. At the age of five he began to study the piano and a little later also the violin. From 1895 to 1900 he studied composition and singing at the Hochschule für Musik in Berlin. Then he went for one year to Milan to complete his vocal studies with M. Vidal. His beautiful and splendidly trained tenor voice, coupled with high musical intelligence and dramatic power, in a very short time secured him recognition as one of the greatest of Lieder singers. He sang in every country of Europe and met with great enthusiasm during his American tour of 1911. He made a specialty of the most modern songs (Strauss, Reger, Schillings, Hausegger). Especially as an interpreter of Hugo Wolf, he has few equals. As a composer, he attracted attention through a symphony, several choral works with orchestra, and about 100 songs.

HESS, Moses (1812–75). A German-Jewish Socialist. He was born and educated at Bonn, but early left home because of disagreements with his orthodox father. After a precarious life in England and France he returned to Germany, where reconcilement with his father brought him employment. His first writing in the field of philosophy was *Die heilige Geschichte der Menschheit* (1837), in which he attempted to unify the philosophies of Hegel and Spinoza. Later he wrote *Die europäische Triarche* (1841), which advocates a triple alliance between England, France, and Germany against "barbaric" Russia. He also gave his support to Socialism. Like Karl Marx, Bruno Bauer, Max Stirner, and other famous contemporaries, Hess was greatly impressed with the views of Proudhon—so much so that he became an enthusiastic exponent of philosophical anarchism. After the Moslem atrocities at Damascus in 1860 he advocated a general exodus of his brethren to Palestine, his views appearing in *Rom und Jerusalem* (1862; 2d ed., 1899). In 1863, on his second return to Germany, he became actively connected with Lassalle's famous workingmen's movement. Afterward he made France his adopted country, and it was there that death interrupted what was to be his greatest work, *Dynamische Stofflehre*, the opening chapters of which were published posthumously in 1877. Consult Theodore Zlociste, *Moses Hess: Jüdische Schriften* (Berlin, 1905).

HESS, Peter von (1792–1871). A German battle painter, born at Düsseldorf. He was the son of Karl Ernst Christoph von Hess, the engraver, and the brother of Heinrich von Hess. He studied under his father and then in the Munich Academy and was with the German army in the campaign of 1813–15. His first large picture was the "Battle of Arcis-sur-Aube" (1817). Afterward he was appointed painter to the Bavarian court. In 1839 he went to Russia and painted two pictures from scenes in the War of 1812 for the Emperor Nicholas. His other works include genre pictures; a series of oil sketches for the Munich Hofgarten, representing Greek stories; "The Entrance of King Otho into Nauplia"; "St. Leonard's Festival in Bavaria"; "Plundering Cossacks"; "A Marketing Scene"; a "Surprise"—all minutely painted and of good color.—His brother Karl (1801–74), born at Düsseldorf, was an animal, landscape, and genre painter. Notable works by him are: "On Lake Starnberg" (1835); "A Tyrolese Landscape" and "Cattle in a Pasture" (1822), both in the National Gallery, Berlin. He was also an engraver.

HESS, Richard (1835–1916). A noted German forester. He was born at Gotha, studied at Aschaffenburg and at Göttingen, and at the age of 23 entered the forestry service at Gotha. After 1868 he was for many years director of the Academic Institute of Forestry at the University of Giessen, where he also occupied a chair as one of the professors. His chief book is *Der Forstschutz* (Leipzig, 1876–78; 3d ed., 2 vols., 1896–99). Among his numerous other writings may be mentioned: *Grundriss zu Vorlesungen über Forstbenutzung und Forsttechnologie* (2d ed., Berlin, 1901); *Der akademische Forstgarten bei Giessen als Demonstrations- und Versuchsfeld* (2d ed., Giessen, 1890); *Die Eigenschaften und das forstliche Verhalten der wichtigern in Deutschland vorkommenden Holzarten* (2d ed., Berlin, 1895); *Encyklopädie und Methodologie der Forstwissenschaft* (Nordlingen, 1885–92).

HESS, Willy (1859–). A German violinist, born at Mannheim. He was educated by his father, and when only nine years of age began his career as a virtuoso. For eight years he played in the United States, Holland, and Germany. Then he studied for two years (1876–78) with Joachim, through whose recommendation he was appointed to the important post of concert master of the Frankfort Opera and Museum Concerts. In 1886 he went to Rotterdam as professor at the conservatory, and from 1888 to 1895 he was concert master of the Hallé Orchestra in Manchester. Then he was in Cologne as concert master of the Gürzenich Orchestra until 1903, when he returned to England as successor to Sauret at the Royal Academy of Music in London. In 1904 he succeeded Franz Kneisel as concert master of the Boston Symphony Orchestra, filling that position till 1910, when he returned to Germany, this time succeeding Karl Halir in Berlin. Wherever he resided he established a string quartet which immediately rose to prominence. His playing is distinguished by intellectual grasp, breadth of style, and a certain impetuosity.

HESSE, hĕs (Ger. *Hessen*). A former landgraviate of Germany. The region was occupied in early times by the *Catti*, or *Chatti* (Ger. *Katten*). Their first appearance in history is in 15 A.D., when Germanicus destroyed their principal settlement, Mattium, the site of the present villages of Grosse and Klein Maden, near Gudensberg, in the Prussian District of

Cassel. In the course of time the Catti became merged in the Frankish tribes, who, when they migrated into Gaul, left Hesse uninhabited, whereupon the Saxons took possession. The Carolingians ruled the country by means of counts, and the power soon became hereditary in one family, the head of this family being elected in 911 King of Germany as Conrad I. After his death and that of his brother Eberhard, the country fell into many divisions, until in 1137 Count Louis I of Thuringia married the daughter of Count Geiss IV of Gudensberg, who belonged to the most powerful family in Hesse, and soon thereafter the Hessian nobles accepted Louis as their overlord; but the Thuringian line of landgraves died out in 1247, with Heinrich Raspe, the opponent of Frederick II. In 1263, after a long contest, Sophia (died 1284), niece of Heinrich Raspe, obtained full possession of Hesse, and from her son and successor, Henry I, surnamed the Child (died 1308), all the various branches of the Hessian family still trace their descent. His descendants added many valuable territories to their old patrimony. After the possessions of the house had been for a time divided, William II in 1500 was in complete control of all Hessian territories, to which he added Homburg, and in 1509 his five-year-old son, Philip the Magnanimous, succeeded him. He was declared of age in 1518 and thereafter played a very prominent rôle in German affairs and to some extent in Europe, being a leader in the German Reformation. He founded the University of Marburg. (See PHILIP THE MAGNANIMOUS; LUTHER.) Philip, on his death, in 1567, divided his territory among his four sons. The eldest, William IV, obtained half of the Hessian domains, with Cassel for his residence; Louis, a fourth part, with Marburg; Philip, an eighth part, with Rheinfels; and George, an eighth part, with Darmstadt. The death of Philip and Louis left all the Hessian dominions in the two main lines of Hesse-Cassel and Hesse-Darmstadt. See HESSE (grand duchy); HESSE-CASSEL.

HESSE. A grand duchy of Germany, the eighth German state in size, lying between lat. 49° 24′ and 50° 50′ N. and long. 7° 51′ and 9° 39′ E., consisting of two main divisions and 11 small exclaves. The northern main division, called the Province of Upper Hesse (Oberhessen), is surrounded by the Prussian Province of Hesse-Nassau, and the southern lies between Prussia, Bavaria, Baden, and the Bavarian Palatinate (Map: Germany, C 3–4). Area, 2965 square miles. The southern division of the duchy consists of the provinces of Rhine-Hesse and Starkenburg. Five of the exclaves border on, or are inclosed by, Baden and Württemberg. The remainder of the exclaves are within Prussian territory.

Physical Features and Climate. The surface consists of level, hilly, and mountainous sections. Upper Hesse is mountainous and is identified with the basaltic Vogelsberg, situated in the east, and rising from the prevailing Triassic rocks to a height of about 2500 feet. From this group radiate spurs and outliers west and north through the province, leaving in the south the Wetterau, an extensive, undulating, and arable tract of Upper Hesse. Into the southwest part of the province extends the north end of the Taunus, about 2000 feet high. The east half of Starkenburg is also mountainous, being occupied by the Odenwald Range, with four peaks reaching about 2300 feet—Krähberg, Hardberg, etc. The western part is in the Rhine valley proper, and in the north lies the low region bordering on the Main. Rhine-Hesse is mostly in the Rhine plain. The western part of this province consists of a rolling country of hills. The Hardt Mountains enter on the southwest, but their highest point (the Eichelberg) has an altitude of only about 1050 feet. The Rhine and the Main form the north border of the southern division of Hesse. The whole grand duchy, except the Vogelsberg district, belongs to the Rhine basin. The Neckar barely reaches Hesse on the southeast. Other Rhine tributaries from the right are the Lahn, the Weschnitz, and the Modau. On the left the Rhine receives the Selz and Nahe. To the Weser basin section of Upper Hesse belong the Fulda and the Schwalm.

The climate differs somewhat in the two main divisions of the duchy, being rather raw and cold in most of the northern part, while the southern division (except the Odenwald) and the Wetterau have the mild climate of south Germany. The mean annual temperature in Darmstadt is 49° F.—in summer 65° F., in winter 29.7° F.; average rainfall, 33 inches. There are several mineral springs and salt-water baths in Hesse; viz., at Salzhausen, Bad Nauheim, etc.

Industries. The number of people whose main occupation is agriculture is about 25 per cent smaller than that of those engaged in industry and mining. In 1907 there were enumerated 147,078 agricultural holdings, of which 93,132 were under 2 hectares, 52,389 between 2 and 20 hectares, 1444 between 20 and 100 hectares, and 113 over 100 hectares (one hectare equals 2.47 acres). Over 63 per cent of the area is under cultivation. There is 31 per cent in forest, nearly one-third of which is state property. The forests constitute an important source of income-producing wealth. About one-half of the total area is arable, and one-eighth is in meadows and pastures. Rye, barley, wheat, and oats are cultivated. Hay and potatoes are produced in large quantities, and fruit is extensively grown. The cultivation of the vine, together with the production of fine wines, is a very important industry, not only in Rhine-Hesse, but on the slopes of the Odenwald. There were about 7500 acres in sugar beets in 1912. Agriculture is promoted actively by a government board of agriculture at Darmstadt, by numerous associations, and excellent agricultural schools which instruct in all branches of farming, fruit growing, etc. Fishing and hunting yield well commercially. Stock raising as a separate industry can hardly be said to exist. In 1913 there were 62,912 horses, 324,488 cattle, 53,838 sheep, 142,008 goats, and 409,372 hogs.

The mining region of Hesse is found chiefly in the northern part and produces coal, iron, and salt. In 1911 the mined minerals amounted to $1,122,000, and salt $128,000. In 1913, 25 iron and steel foundries, employing nearly 2000 persons, produced 31,407 tons, valued at $1,613,000. Peat is an important output, and Hainstadt-am-Main exports famous clays. The manufacturing industries are generally in a prosperous condition. Hesse is known for its manufactures of leather and leather goods. Other chief manufacturing products are tobacco and cigars, metal articles, paper, sugar, chemicals,

spirits, etc. There are four beet-sugar factories. The duchy has many handicraft schools.

Commerce and Transportation. The trade of Hesse is of considerable importance and is favored by many organizations and industrial banks as well as by the central position of the grand duchy and the excellent transportation facilities. The exports consist mainly of agricultural and manufactured products; the chief imports are raw and half-finished materials. The river commerce is extensive, including much Belgian and Dutch trade. On Jan. 1, 1913, Hesse owned 358 canal and river boats, having a carrying capacity of 110,055 tons. There are 928 miles of railway, nearly all owned by Hesse, Prussia, and Baden.

Government and Finance. The government is that of a hereditary constitutional monarchy. The Grand Duke is very largely dependent on the civil list, which amounts to about $300,000. The constitution was adopted in 1820 and has been repeatedly modified. The executive power lies in a responsible Ministry of three members, who are the heads of the departments of the Interior, Justice, and Finance. The Minister of Justice is President of the Ministry, and is the Minister of Foreign Affairs and of the Ducal House. The legislative power is represented by two Chambers. The Upper Chamber is composed of all the princes of the reigning house, the heads of several noble families, the Roman Catholic Bishop, a Protestant church dignitary, the chancellor of the University of Giessen, a representative of the technical school, two representatives of the landed nobility, three members representing agriculture, commerce, and industry, and not over 12 life members nominated by the Grand Duke. The Lower Chamber consists of 15 members elected by the large municipalities and 43 members returned by the small towns and rural communities. The members of the Lower Chamber are elected for six years, one-half retiring every three years. The Chambers meet each year. The three provinces are divided into 18 circles. The provinces and circles have local councils elected by a restricted suffrage. The duchy is represented by three members in the German Bundesrat and returns nine members to the Reichstag. The budget for 1913–14 was estimated at $26,829,000. The chief items of revenue are from public domains, Imperial customs, and direct taxes. The chief articles of expenditure are for education, public health, the public domains, service of the debt, and contributions to the Empire. The public debt amounted in 1913 to $103,442,500, nearly all incurred for railways.

Population and Religion. The population was 992,883 in 1890, 1,119,893 in 1900, and 1,282,051 in 1910, showing an increase of nearly 15 per cent in 10 years. Hesse ranks seventh as to population among the German states. Number of inhabitants per square mile, 432. Emigrants are few; in 1913 only 145 left the country. Darmstadt (q.v.) is the capital; the largest city, Mainz; other large towns are Offenbach and Worms. Over 66 per cent of the inhabitants are Protestants. The Grand Duke is Protestant and is the head of the Evangelical church (embracing the Lutheran and the Reformed). It is governed by a synod and a consistory. The seat of the Roman Catholic Bishop is at Mainz. The state contributes to both the leading faiths. This item was $114,567 in 1913.

Educational and Other Institutions. Education is free, compulsory, and maintained partly by the government and partly by the communes. In 1913 there were 979 public elementary schools with 4053 teachers and 215,709 pupils. Secondary education is represented by 102 institutions, of which 22 are schools for girls. Included in the 102 are 11 Gymnasia, 2 Progymnasia, 3 Realgymnasia, 9 Oberrealschulen, 9 Realschulen, 1 agricultural college (at Gross Umstadt), 32 incomplete Realschulen (höhere Bürgerschulen), 29 preparatory schools, and 6 higher girls' schools. There are numerous continuation schools for scholars leaving the elementary schools. Higher education is supplied by the University of Giessen and also by the Technical School of Darmstadt. The latter had 1578 students in the winter semester of 1913–14. Both institutions are supported in part by the state. There are, in addition, not only the industrial schools, but numerous special institutions, as, e.g., a merchants' school and an ivory-carving school. The important libraries and museums number three each, besides six smaller public libraries. Hesse has a state fire-insurance company, and institutions or pensions or insurance funds for all classes of needy, ill, or otherwise unfortunate persons, including indigent ladies of the nobility. In this respect Hesse is one of the most highly organized commonwealths in the world.

History. (See preceding article.) The line of Hesse-Darmstadt, the second main branch of the house of Hesse, is derived from George I, the fourth son of Philip the Magnanimous, Landgrave of Hesse, who on the death of his father, in 1567, obtained the Principality of Katzenelnbogen, with the town of Darmstadt for his residence, and received in 1583, on the death of his brother Philip without heirs, a third of the patrimony of the latter. (See HESSE-CASSEL.) At his death, in 1596, he was succeeded in the greater part of his possessions by his eldest son, Louis V (1596–1626), while another son, Frederick, became the founder of the Hesse-Homburg line (q.v.). Louis V acquired a portion of Upper Hesse and is noted as the founder of the University of Giessen (1607). His son, George II (1626–61), and grandson, Louis VI (1661–78), did much to promote learning and the arts. During the Thirty Years' War and the reign of Louis XIV of France, the country was laid waste by the Swedish and French armies. The finances became disorganized, and Louis VIII (1739–1768) did little to mend them. Louis IX (1768–90) was a wise and able ruler, a patron of art and letters. As a result of the French Revolutionary wars, under Louis X (1790–1830), Hesse-Darmstadt changed its boundaries materially, on the whole to its gain. Louis X joined the Confederation of the Rhine in 1806 and assumed the title of Grand Duke as such (Louis I). He aided Napoleon with troops until 1813, but at the Congress of Vienna (1814–15) was obliged to make large cessions of territory to Prussia and Bavaria, receiving, however, by way of indemnification, a large district on the Rhine, including the towns of Worms and Mainz, in right of which he assumed the traditional title of Rhenish Grand Duke. At this time Hesse-Darmstadt became a member of the German Confederation. In 1820 Louis promulgated a constitution establishing a parliamentary form of government. He instituted various reforms and joined the Zollverein (q.v.) in 1828. The

reactionary policy of Louis II (1830–48) evoked a strong opposition in the Landtag, but the Grand Duke finally succeeded in subordinating the Chambers to his will. The February revolution of 1848 in France, however, lent renewed strength to the Liberal party. In answer to the popular demand for constitutional reform, the heir to the throne was named Coregent with the King; Gagern, the great leader and apostle of German unity, was made Minister of the Interior; and a far-reaching programme of reform adopted, many features of which were carried out only to be abrogated and followed by a period of strong repression. Louis III succeeded his father in 1848. His chief adviser, Dalwigk, was a bitter enemy of Prussia, and in 1866 Hesse-Darmstadt sided with Austria against the former. The Grand Duke made a vain appeal to Napoleon III, of whom he was a personal friend, for assistance. The Hessians were defeated at Laufach (July 13), and Prussian troops occupied the grand duchy. The Grand Duke was forced to cede some territory, including the recently acquired Hesse-Homburg (q.v.), to pay a heavy war indemnity, to receive a garrison in Mainz, and to enter into an offensive and defensive alliance with Prussia. The Hessian troops played a conspicuous part in the war against France, and Hesse-Darmstadt became a part of the new German Empire. Louis IV (1877–92) did much to restore the finances and increase the prosperity of the duchy. He was succeeded in 1892 by his son, Ernst Ludwig (q.v.), the present (1914) ruler. See HESSE-CASSEL.

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HESSE, hĕs'se, HERMANN (1877–). A German author. He was born in Calw, Württemberg, had no university training, but studied in a secondary school, and was in turn a mechanic, a bookseller, and an antiquarian. His very quiet life was spent at Gaienhofen on the Bodensee. His few books—all the later ones popular and constantly reprinted—have a particular value as studies of childhood and youth. They include *Hermann Lauschers Nachlass* (1901); *Gedichte* (1902); *Peter Camenzind* (1904), the experiences of a Swiss peasant in the great world; *Unterm Rad* (1905), the development of a dreamy boy; *Diesseits* (1907); and short stories.

HESSE, hĕs'se, LUDWIG OTTO (1811–74). A German mathematician. He was born in Königsberg and studied and taught there from 1840 to 1856. After that he held professorships of mathematics successively at Halle, Heidelberg, and in the Polytechnic School at Munich. He was a disciple of Jacobi and contributed chiefly to geometry and the theory of determinants. His important mathematical works include: *Vorlesungen über die analytische Geometrie des Raumes* (1861; 3d ed., 1876); *Vorlesungen aus der analytischen Geometrie der geraden Linie, des Punktes und des Kreises* (1865; 3d ed., 1881); *Vier Vorlesungen aus der analytischen Geometrie* (1866; completed in 1874); *Die Determinanten elementar behandelt* (1871); *Die vier Species* (1872). A list of his memoirs may be found in the *Catalogue of Scientific Papers of the Royal Society of London*, vols. iii and vii. The name of Hesse is connected with an important determinant form known as the Hessian, or Hessian covariant, which is of great value in the study of curved lines and surfaces. (See DETERMINANTS.) An edition of his works was published by the Bavarian Academy of Sciences (Munich, 1897). Consult Noether, "Otto Hesse," in the *Zeitschrift für Mathematik und Physik*, vol. xx (Leipzig, 1875).

HESSE'-CAS'SEL, or ELECTORAL HESSE (Ger. *Hessen-Kassel*, hĕs'sen kä'sel). A former landgraviate, later electorate, of Germany, forming at present the district of Cassel in the Prussian Province of Hesse-Nassau.

History. The house of Hesse-Cassel, representing the elder line of the house of Hesse, was founded by William IV the Wise, the eldest of the four sons of Philip the Magnanimous (1509–67). (See HESSE.) William, who ruled as Landgrave from 1567 to 1592, was a good administrator and left a well-consolidated little principality to his son, Maurice, who resigned the government in 1627 to his son, William V., and died in retirement five years later. William (1627–37) fought on the side of Sweden during the Thirty Years' War, for which he was put under the ban of the Empire and forced to cede some of his territory. His two brothers, Hermann and Ernest, founded the lines of Hesse-Rothenburg and Hesse-Rheinfels. In 1637, on the death of William V, Amelia Elizabeth, his widow, assumed the regency for their young son, William VI, and ruled with vigor and ability. In the Peace of Westphalia (1648) the greater part of Schaumburg and the secularized Principality of Hersfeld were acquired. William VI died in 1663 and was succeeded by his sons, William VII (1663–70) and Charles I (1670–1730). The latter inaugurated the practice, continued by his successors, of hiring out Hessian soldiers to fight in the service of foreign princes, by which the finances of the state were considerably augmented at the expense of the welfare of the people. On the death of Charles his son, Frederick I, who in 1720 had become King of Sweden, in right of his wife, the Princess Ulrike Eleonore, sister of Charles XII, resigned the government of his Hessian territories to his brother, William VIII, who succeeded him as Landgrave in 1751 and ruled until 1760. He fought under the British and Hanoverian flag in the Seven Years' War and gained considerable military renown for himself and his troops. Frederick II (1760–85) kept up a splendid court on the subsidies received from England for the services of the Hessians (see HESSIAN) who fought against the Americans in the War of Independence and expended much of his treasures in the patronage of art and in the erection of public edifices. Frederick, who had become a convert to the Roman church, was succeeded by William IX (1785–1821), who reigned as William I after his elevation to the rank of Elector in 1803. This prince frequently shifted sides during the French

wars. In 1806, at the time of Prussia's struggle against Napoleon, he remained neutral; but Napoleon, nevertheless, seized his electorate, which was incorporated in the newly formed Kingdom of Westphalia (1807). In 1813, after the defeat of Napoleon at Leipzig, William returned to his dominions and began to restore the old order of things as far as he could, while he sought to recover the state lands that had been sold during his exile and appealed so strongly for indemnification that he obtained various important concessions at the Congress of Vienna, although he failed to secure the title of king. In accordance with a promise which he had made on his restoration he summoned a body of jurists to construct a constitution; but no sooner was the draft completed than he refused to abide by it. His death, in 1821, was regarded as a fortunate event. But his son and successor, William II (1821–47), by his narrow policy increased the rapidly growing disorders of the state, while his prodigality towards his mistress, the Countess of Reichenbach, rendered him peculiarly unpopular with his subjects. In 1831, as a result of the July revolution in France, William was compelled to promulgate a constitution. At the same time his son, Frederick William, was appointed Coregent. The history of the 16 years' regency of Prince Frederick William exhibited a retrogressive policy, pursued at first under the guidance of Hassenpflug (q.v.), which left Hesse far behind other German states in material prosperity. The death of the old ruler occurred at Frankfort in 1847. The revolutionary movement of 1848 extorted from Frederick William I (1847–66) many liberal promises of reform, some of which were redeemed; but in 1850, after revoking many of his pledges, he summoned again the obnoxious reactionist Hassenpflug to govern the country. The elector and his Minister resorted to the most arbitrary measures to force the excited people to submission, and Hassenpflug persuaded the sovereign that his personal safety would be endangered if he remained longer among his subjects, and Prince and Minister fled from Cassel to Wilhelmsbad. Hassenpflug appealed for federal intervention, and Austrian and Bavarian troops entered the country. The friends of liberal government looked to Prussia for support. On Nov. 2, 1850, a Prussian army entered Hesse-Cassel; but the Prussian King was timid, and the war was principally limited to angry protocols. External force was now applied to quell all opposition to the despotic sway of Frederick William, who in 1852 returned to Cassel. A new constitution was promulgated, which in no way satisfied the people, whose conduct throughout the trying crisis had been marked by forbearance and moderation. But the policy of the government remained unchanged. Not until 1862, after much agitation and powerful pressure from Prussia, was the Prince forced to accede to the constitution of 1831. After this concession, however, he still ruled in such a way as to paralyze the political activities of the country. In the Seven Weeks' War of 1866 Hesse-Cassel sided with Austria. A Prussian army entered the principality, June 16, 1866, and Frederick William was taken prisoner and conveyed to Stettin, where he remained till September 17. Three days later Hesse-Cassel was incorporated with Prussia. The deposed Prince died Jan. 6, 1875, leaving no direct heir. Most of his property was given to cadet branches of the same line.

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HESSE-DARMSTADT. See HESSE.

HESSE-HOMBURG, hĕs'-hŏm'bûrg (Ger. *Hessen-Homburg*). Formerly a landgraviate, containing about 106 square miles, composed of the district of Homburg vor der Höhe on the right of the Rhine and that of Meisenheim on the left. The landgraviate was an integral part of Hesse-Darmstadt till it was transferred in accordance with the disposition made by the Landgrave, George I (died 1596), to his youngest son, Frederick I, in 1622. In 1768 it became a completely separate landgraviate. It was mediatized in 1806 and constituted a part of Hesse-Darmstadt till the Congress of Vienna (1815), when its independence was restored and its territory augmented by the addition of Meisenheim. The opening of the springs and baths at Homburg in 1833 proved an unexpected source of wealth to the state, and after the addition of gambling saloons the establishment constituted a very important branch of the revenue. Attempts were more than once made by the Diet to put down the gambling tables; but whenever the pressure of federal intervention was removed, gambling was always resumed with fresh spirit, and the system continued till 1872. In 1848 a liberal constitution was granted, but was not long in effect. In March, 1866, on the death, without heirs, of the last landgrave, Ferdinand, who had succeeded his brother, Gustavus Augustus, in 1848, Meisenheim went to Prussia, and the landgraviate fell to Hesse-Darmstadt, but remained united with that duchy only a few months, being ceded to Prussia on Sept. 3, 1866, on account of its support of Austria. Consult Herget, *Das landgrafliche Haus Homburg* (Homburg, 1903).

HESSE-NASSAU, hĕs'-năs'ą (Ger. *Hessen-Nassau*, hĕs'sen-näs'sou). A province of Prussia, the southwestern part of the kingdom, lying between the Rhine and the Weser, and composed chiefly of the larger portions of Hesse-Cassel, Nassau, and Hesse-Homburg. It also contains the city of Frankfort (q.v.) (Map: Germany, C 3). The main body of the province is bordered by the Rhine Province, Westphalia, Waldeck, Hanover, and Prussian Saxony, Saxe-Weimar-Eisenach, Bavaria, and the southern division of Hesse, and incloses the Hessian Province of Upper Hesse. Among the several exclaves that belong to Hesse-Nassau are the Countship of Schaumburg and the Thuringian district in which Schmalkalden is situated. Area, 6051 square miles.

Topography. The province is generally an elevated region. In the south are the rich valleys of the Main and Rhine; in the north lies the Weser valley; but, as a whole, the province belongs to the mountain region of middle Germany and consists of high, rolling districts broken by peaks and rather prominent spurs and outliers. In the east are the Kaufunger Wald and portions of the Rhöngebirge, Vogelsberg, and Spessart. The Westerwald is in the west, and the important Taunus Range in the extreme southwest. The western part of the province is traversed by the Lahn, an affluent of the Rhine. In the north-

east are the Fulda and the Werra which unite to form the Weser. The climate is mild and generally even.

Industries. The principal occupations are agriculture and its allied industries. Of the total area, about 40 per cent is under crops and gardens, about the same proportion is in forests, and the remainder is chiefly in meadow and pasture. Most of the land is distributed into small holdings. According to the industrial census of 1907 there were 137,836 holdings of less than 5 acres each, 88,390 holdings ranging from 5 acres to 50 acres, and 4044 holdings of over 50 acres each. The chief agricultural products are rye, wheat, potatoes, flax, oats, and hay (including clover and alfalfa). Tobacco and beans are cultivated to a considerable extent. Among the well-known wines of the province are the Johannisberger, Hochheimer, and Rüdesheimer. The forests are the most extensive of all the provinces in Prussia and belong mostly to the state and the communities. The trees are conifers, oaks, and beeches. The commercial yield of the forests is large. They abound in game, and the streams are rich in fish. Live-stock raising is not carried on extensively as a separate industry. In 1913 there were 89,520 horses, 622,349 cattle, 151,490 sheep, 197,404 goats, and 767,495 swine.

The mineral deposits are important, principally iron ore and coal. Of the former, about 400,000 tons are obtained annually; of the latter, over 600,000 tons. Hesse-Nassau is one of the leading iron producers among the Prussian provinces. There are some deposits of zinc, lead, and copper. Good clay is found. The mineral springs and health resorts of the province are both numerous and famous, including those of Homburg, Wiesbaden, Ems, Schwalbach, and Selters. Several of the waters, especially the Selters, are exported extensively to all parts of the civilized world.

The manufacturing industries, with some exceptions, are on a small scale. The industrial census of 1907 gives the total number of mining and industrial establishments at 71,472, employing 349,336 persons. The chief manufactured products are cotton and woolen goods, tobacco, cigars, and sugar. Also worthy of mention are the exports of marble, dressed stone, and burnt clay, and wooden wares, leather, and jewelry. There were 327 distilleries in operation in 1912–13, the yearly production amounting to over 400,000 gallons. The province has important fairs and markets, especially horse markets, and the trade and manufacturing interests are furthered by means of numerous chambers of commerce. The banks of Frankfort, the financial centre of this part of Germany, are celebrated for their strength and the extensive scope of their undertakings. The transportation facilities are fully adequate to the needs of the province. The railways, with a total mileage of 1325 in 1912, are mostly controlled by the state. The splendid roads and natural waterways aid very materially in the distribution of products. The commerce is concentrated largely in Frankfort, Cassel, and Wiesbaden. Other important business towns are Hanau and Fulda. In 1907 there were 45,883 commercial establishments employing 129,122 persons. These figures include hotels and transportation concerns.

Government and Education. Administratively Hesse-Nassau is divided into the two districts of Cassel and Wiesbaden, subdivided into 24 and 17 circles respectively. The former district is about twice the size of the latter, but has less population, Frankfort being included in the latter. Cassel (q.v.) is the capital. The province is represented in the Prussian Landtag by 26 deputies in the Lower Chamber and by 17 members in the House of Lords (1913). The highest educational institution is the University of Marburg, founded in 1527. There are an academy for the social and commercial sciences at Frankfort, forestry schools at Spangenberg and Hachenburg, schools of design at Hanau and Cassel, an agricultural school at Weilburg, a farmers' association at Cassel, and an agriculture and forestry association at Wiesbaden. There are also several unions for bee and bird raising and gardening.

Population. The population was 1,664,426 in 1890, 1,897,981 in 1900, and 2,221,021 in 1910, showing an increase of 17 per cent in 10 years. Population per square mile, 366.3. About 68 per cent of the inhabitants are Protestant, 28 per cent Catholic, and over 2 per cent Jews. For the history of Hesse-Nassau, see HESSE-CASSEL; HESSE-HOMBURG; NASSAU.

HESSE-WARTEGG, hĕs'se-vär'tĕg, ERNST VON (1851–). An Austrian traveler, born in Vienna. His travels covered most of the habitable globe. He married Minnie Hauk (q.v.), the opera singer, in 1881. He wrote, among many books of travel: *Prairiefahrten* (1878); *Nordamerika, seine Städte und Naturwunder u. s. w.* (4 vols., 1879); *Tausend und ein Tag im Occident* (1896); *Chicago* (1893); *Curiosa aus der neuen Welt* (1893); *Korea* (1895); *China und Japan* (2d ed., 1900); *Schan-tung und Deutsch-China* (1898); *Siam* (1899); *Samoa, Bismarckarchipel und Neuguinea* (1902); *Amerika als neueste Weltmacht der Industrie* (1909); *Die Balkanstaaten* (1910).

HESSHU'SIUS, TILEMANN (1527–88). A German Lutheran theologian, born at Wesel and educated at Wittenberg, Oxford, and Paris. From his post as lecturer of New Testament exegesis in Wittenberg, he went to Goslar (1553), then to Rostock (1556), to Heidelberg as professor of theology (1558), and then preached at Bremen and (1560) at Magdeburg. In all these places his love of strife, his extreme orthodoxy, and his absolute opposition to Crypto-Calvinism or to any form of Lutheranism less rugged than his own, brought him into trouble. He had to leave Magdeburg and, driven from one town to another, settled at Neuburg in 1565 as court preacher. From there he went to Jena (1569), but left and became Bishop of Samland at Königsberg (1574). He retired in 1577 and became professor at Helmstedt. Hesshusius wrote: *Von Amt und Gewalt der Pfarrherren* (last ed., by Schütz, 1854); *Antidotum contra Dogma M. Flaccii, quod Peccatum Originis Sit Substantia* (1572); *Assertatio Testamenti Christi* (1574). Consult Wilkens, *Tilemann Hesshusius* (Leipzig, 1860), and Helmolt, *Tilemann H. und seine sieben Exilia* (ib., 1859).

HESSIAN, hĕsh'an. In American history a term for the German conscripts who were hired and sent over by England to help subdue the revolting colonists. They came from six of the small states of Germany; but as over half of them were from Hesse-Cassel and Hesse-Darmstadt, the name "Hessian" was generally applied to them. They were first commanded by Lieut. Gen. Philipp von Heister, but he was succeeded by Wilhelm von Knyphausen (q.v.) in 1777.

They took a prominent part in the battles of Long Island, White Plains, Trenton, Bennington, Brandywine, Germantown, Guilford Court House, Yorktown, and several other smaller engagements. The Hessians made excellent soldiers, being ever ready to bear the brunt of the heaviest fighting and hardly ever desirous of deserting. Of the approximate 30,000 who came over to America, only 17,000 returned to Germany. About 2200 were killed outright or died of their wounds. The rest settled in various parts of the United States and Canada. Grants were given to many of them in Nova Scotia, but they gradually drifted southward over the boundary.

HESSIAN COVARIANT. See DETERMINANTS; HESSE, L. O.

HESSIAN FLY. A dipterous insect (*Cecidomyia destructor*), which, from the damage which the larva does to wheat in North America and also to some extent in Europe, has become one of the most widely known of insects. It is dark in color, nearly black, with dusky wings and pale-brown legs. While distinctively a wheat insect, it will breed also in barley and rye. Over a large part of the wheat area of the United States there are two principal broods, viz., a spring brood and a fall brood. There are, however, supplemental broods both in spring and fall, particularly in the southern wheat areas; but in the extreme northern area of the spring wheat belt there may be only a single generation. Each generation is represented by four distinct states, viz., egg, larva or "maggot," pupa or "flaxseed," and the mature winged insect. The eggs are small, white in color, and are usually deposited in rows of three to five or more on the upper surface of the leaf. Sometimes they are thrust beneath the sheaf of the leaf on the lower joints. The whitish maggots hatch and crawl down to the base of the sheath, developing on the substance of the stalk, causing a distortion or enlargement of the stalk at the point of attack. In a few weeks the larva contracts into a flaxseed-like object, which is the puparium. With the spring brood the insect remains in the flaxseed state during midsummer. With the fall brood the insect passes the winter in the flaxseed state at the base of the winter wheat.

The best remedies are the late planting of winter wheat or the early planting of a narrow strip in which the flies will lay their eggs and which may afterward be plowed under, the bulk of the crop being planted late. The copious and prompt use of fertilizers enables the wheat to tiller sufficiently to yield a partial crop even when badly attacked. Consult: *Hessian Fly in Wheat* (Pennsylvania Department of Agriculture, Harrisburg, 1890); H. Osborn, *Hessian Fly in the United States* (Department of Agriculture, Washington, 1898); Lugger, *Hessian Fly* (Minnesota Agricultural Experimental Station, St. Paul (1899); F. M. Webster, *Hessian Fly* (Department of Agriculture, Washington, 1906). See HERRICK, E. C.

HESS'ITE. A silver telluride crystallizing in isometric forms. It usually occurs in compact gray masses and is found with other teluride ores in Boulder Co., Colo. Hessite frequently contains gold.

HES'TIA. See VESTA.

HES'TON AND ISLEWORTH, ĭ'z'l-wûrth. A suburban municipality of London, in Middlesex, England, on the Thames, 12 miles southwest of St. Paul's (Map: London, E 4). Market gardening is carried on, and it is a favorite residential place of London merchants. Pop., 1901, 30,863; 1911, 43,313.

HESYCHASTS, hĕs'ĭ-kăsts (from Gk. *ἡσυχαστής, hēsychastēs*, quietist, from *ἡσυχάζειν, hēsychazein*, to be quiet, from *ἥσυχος, hēsychos*, quiet). Mystics of the Greek church, and particularly the monks of Mount Athos. (See ATHOS.) In all probability mysticism never entirely died out among the Oriental monastic bodies; but the mystics attracted an unusual share of attention, not only at home but in the Western church, in the earlier half of the fourteenth century. A Basilian monk, named Barlaam (q.v.), in the course of a visit to the monasteries of Greece, observed several practices and doctrines which he considered reprehensible. The monks of Mount Athos especially provoked his reprobation and ridicule. Believing that in the soul lay a hidden divine light, which it was the office of contemplation to evoke, they withdrew at stated times to a retired place, seated themselves on the earth, and fixed their eyes steadfastly on the navel (whence the sobriquet by which they were known, *ὀμφαλόψυχοι*, navel souls); and they averred that, after the allotted time of contemplation, a kind of heavenly light beamed forth upon them from the soul (whose seat, they held, was in that region) and filled them with ecstasy and supernatural delight. They declared that this light was the glory of God Himself, the same light which appeared at the transfiguration of the Lord. The belief was explained and defended by Gregory Palamas, the Archbishop of Thessalonica; and in order to settle the controversy, a council was held in Constantinople in 1341 which terminated in the triumph of Palamas and the monks. Barlaam held that a divine uncreated light could only be the essence of God; and so that this belief gave two gods, a visible and an invisible. Palamas held that the light was not the essence, but the energy of God, and so the belief was not polytheistic. Other councils were called one of which, in 1531, again pronounced in favor of the monks, through the influence, it was said, of the court and of John Cantacuzenus, who was a patron of the Hesychasts. But the public voice was hostile to the sect, and on the retirement of their patron, Cantacuzenus, who in 1355 became a monk, they fell into obscurity. The belief in the uncreated light was decreed an article of faith in the Council of 1351, reaffirmed in 1368, and is still a part of the orthodox Greek doctrine. The works of Barlaam are in Migne, vols. cl–cli; of Palamas, vol. cli. Consult: Stein, *Studien über die Hesychasten des XIV. Jahrhunderts* (Vienna, 1874); Karl Holl, *Enthusiasmus und Bussgewalt bei dem griechischen Mönchtum* (Leipzig, 1898); Adolf Harnack, *History of Dogma*, vols. iii, iv (Boston, 1899).

HESYCHIUS, hē-sīk'ĭ-ŭs (Lat., from Gk. *Ἡσύχιος*). A Greek grammarian of Alexandria, belonging probably to the fifth century A.D. He was the author of a Greek lexicon, or rather a glossary, of unusual words, taken partly from earlier works of a similar character, especially that of Diogenianus (q.v.), with the addition of new words and examples from the writings of poets, orators, historians, and physicians. Its value is very great, since it is the largest of our extant ancient Greek lexicons, and since it helps us to the correct readings in many texts, especially of Æschylus and Theocritus, and contains no little information concerning the Greek dialects and about Greek religion and social life.

It was used by Suidas (q.v.). The best edition is that of Schmidt (4 vols., Jena, 1858–68). Consult: David Ruhnken, *Opuscula*, vol. i, preface (Leyden, 1823); Wentzel, "Hesychiana," in *Hermes* (1898); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HESYCHIUS. According to Jerome, a reviser of the New Testament and also of the Septuagint, in the third century. He is generally identified with a Hesychius said by Eusebius (*History*, 8: 13) to have been Bishop of Alexandria and to have died a martyr during the Galerian persecution, about 311.

HESYCHIUS OF MILE'TUS (flourished probably c.550 A.D.). A Greek chronicler, surnamed The Illustrious (ὁ Ἰλλούστριος). We hear of three works by him: (1) a universal history, in six books, beginning with the Assyrian King Belus and coming down to the reign of the Byzantine Emperor Anastasius (518), of which a part of the sixth book, covering the history of Constantinople from the earliest times to the reign of Constantine (324), has been preserved, under the title Πάτρια Κωνσταντινουπόλεως; (2) a history of the reign of Justin (518–527) and the earlier years of Justinian (527–565), now lost; (3) a biographical dictionary of Greek writers (Ὀνοματολόγος ἢ πίναξ τῶν ἐν παιδείᾳ ὀνομαστῶν), which was extensively excerpted by Photius (q.v.) and Suidas (q.v.). Photius praises Hesychius' style and his veracity. The fragments of his works are collected by Müller, *Fragmenta Historicorum Græcorum*, iv (Paris, 1841–70), Flach (Leipzig, 1882), and Preger, in *Scriptores Originis Constantinopolitanæ*, vol. i (ib., 1901). An attempt to "recover" Hesychius from Suidas and other excerpters has been made by Flach, *Hesychii Milesii Onomatologi quæ Supersunt* (Leipzig, 1882). Consult Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HETÆ'RÆ (Neo-Lat., from Gk. ἑταίρα, *hetaira*, fem. of ἑταῖρος, *hetairos*, comrade, companion; connected with ἕτης, *hetēs*, kinsman). In ancient Greek society, women of more or less unconventional life. They were apt to be slaves or foreigners and, skillful in dance or music, gave private or public entertainments. As, under the Athenian law, only a citizen's daughter could marry a citizen, many women, often of otherwise excellent character, were constrained, if they desired companionship, to accept concubinage. Some —e.g., Aspasia (q.v.), the instructor of Socrates and the friend of Pericles—were highly accomplished and exerted great and wholesome influence upon state policy. Others, like Leontium (see HERMESIANAX), Phryne (q.v.), Thais (q.v.), and Theodota, while possessed of personal grace and charm and more or less intellectual distinction, were more properly courtesans. The various words for women of irregular life should be sharply distinguished. *Hetæra*, like *concubina*, implies fidelity to a single man, and such relation may well have been a true marriage. *Meretrix*, *pornē*, and *scortum* signify a quite different thing—the harlot or prostitute. There was still another class represented by the words *pallakē*, *pallakis*, and *pellex*, signifying a mistress kept by a man already married. In the New Attic comedy and so in the Latin adaptations of Plautus (q.v.) and Terence (q.v.) the hetæræ are a conspicuous feature of the plot, and the *Letters* of Alciphron (q.v.) find in this their source, as do also the *Conversations of Hetæræ* by Lucian (q.v.). Consult William Smith, *Dictionary of Greek and Roman Antiquities*, vol. i (3d ed., London, 1890).

HETÆRIA PHILIKE, hĕt'ā-rē'ȧ fē-lē'kē (Gk. ἑταιρία φιλική). A secret society of Greek sympathizers—chiefly orthodox Russian partisans—founded at Odessa in 1814, to promote the liberation of Greece from Turkish rule; and although its members were more or less mistrusted by the Greeks, it was, under the leadership of Prince Alexander Ypsilanti, an important contributory cause of the Greek War of Independence in 1821. Consult George Finlay, *History of the Greek Revolution* (2 vols., Edinburgh, 1861).

HETCH'EL. See HACKLE.

HETCH HETCHY VALLEY. See SAN FRANCISCO.

HETEROCHTHONOUS, hĕt'ĕr-ŏk'thŏ-nŭs. See AUTOCHTHONOUS.

HET'EROCŒ'LA (Neo-Lat. nom. pl., from Gk. ἕτερος, *heteros*, other + κοίλος, *koilos*, hollow). One of the two orders of calcareous sponges, including those in which the endoderm is composed of flagellate collared cells. In the other order, Homocœla, collared cells are restricted to flagellate chambers, and flattened cells compose the remainder of the endoderm. See SPONGE.

HET'EROCYST (from Gk. ἕτερος, *heteros*, other + κύστις, *kystis*, bag). A term applied to certain cells, empty or with watery contents, found in the filaments of blue-green algæ. See ALGÆ; CYANOPHYCEÆ.

HET'EROG'AMY (from Gk. ἕτερος, *heteros*, other + γάμος, *gamos*, marriage). A condition in plants, contrasted with isogamy (q.v.), in which the pairing sex cells (gametes) are differentiated into sperms and eggs. Most plants are heterogamous in this sense. It should be understood that heterogamy refers only to a difference in the appearance of the pairing gametes, so that they can be recognized as male and female. In fact, pairing gametes are always differentiated physiologically, whether they look alike or unlike. The term is also used when two kinds of flowers exist on the same plant; as, e.g., in certain Compositæ, where the development of stamens and pistils differs in the disk and the ray flowers. See FERTILIZATION.

HET'EROGEN'ESIS (Neo-Lat., from Gk. ἕτερος, *heteros*, other + γένεσις, *genesis*, generation, from γίγνεσθαι, *gignesthai*, Skt. *jan*, to be born). A term bearing various meanings and relations. 1. The equivalent of abiogenesis, or spontaneous generation. (See BIOGENESIS.) 2. A mode of reproduction in which the parent produces offspring unlike itself, as opposed to *homogenesis*, or the production of offspring like the parent or parents. See ALTERNATION OF GENERATIONS.

HET'EROG'ONY. See PARTHENOGENESIS.

HET'EROPHO'RIA (Neo-Lat., from Gk. ἕτερος, *heteros*, other + -φορία, *-phoria*, carriage, from φέρειν, *pherein*, to carry), or INSUFFICIENCY. A condition in which the eyes are only prevented from deviating by constant muscular effort. Exophoria is the term applied to the tendency of an eye to look outward while the other is fixed upon an object; esophoria, to the tendency to deviate inward. The trouble is due to relative weakness of an eye muscle, the result of some error of refraction or in persons generally run down. In severe cases there are headache, pain in the eyes, occasional double vision,

blurring of point, and irritability of the eyelids. The difficulty is treated by attention to the general health and correction of errors of refraction by eyeglasses. Exercise of the weak eye muscles is also employed with, sometimes, partial tenotomy of the overactive muscle.

HET'EROPHYL'LY (from Gk. *ἕτερος, heteros,* other + *φύλλον, phyllon,* leaf). That condition in which there are two or more forms of leaf on the same plant—a condition particularly well shown in amphibious plants in which the water leaf is finely divided, but the air leaf is entire and compact. See LEAF.

HETEROPHYTES, hĕt'ĕr-ō-fīts (from Gk. *ἕτερος, heteros,* other + *φυτόν, phyton,* plant). Heterotrophic plants, or those that do not obtain their food materials from inorganic matter, but are dependent upon antecedent or coexistent organic forms for their food supply. They may be divided into saprophytes, which obtain their food from dead organic matter, and parasites, which obtain food or food materials from living organisms. The contrasting term is "autotrophic," applied to green plants because they manufacture their own food and are thus independent of other organisms. The terms are convenient, but not exact, for in autotrophic plants only those parts are really autotrophic (self-nourishing) which contain chlorophyll. See PARASITE; SAPROPHYTE; SYMBIOSIS.

HET'EROP'ODA (Neo-Lat. nom. pl., from Gk. *ἑτερόπους, heteropous,* having uneven feet, from *ἕτερος, heteros,* other + *πούς, pous,* foot). A suborder of small pelagic pectinibranchiate Gastropoda (q.v.). They swarm at night at the surface of the ocean and swim rapidly about with their backs downward and their ventral surfaces uppermost. Their bodies are small, delicate, and often transparent, with well-demarcated heads, and well-developed sense, circulatory, breathing, and reproductive organs. The foot is compressed to form peculiar bladelike swimming organs. Most heteropods are naked; but some genera, among them *Atlanta, Carinaria,* and *Oxygyrus,* have delicate involute shells. These resemble in some respects those of certain fossil bellerophons of Paleozoic age, and the resemblance has led many authors to include the Bellerophontidæ with the Heteropoda in spite of their larger size and heavier and thicker shells. See BELLEROPHON; GASTROPODA.

HET'EROP'ORA (from Gk. *ἕτερος, heteros,* other + *πόρος, poros,* passage, pore). A very common genus of bryozoans in the Mesozoic era, its numerous species being especially abundant in Jurassic and Cretaceous times, while in Tertiary and recent times it has become quite rare. Its zoarium, though variable, is generally ramose, sometimes composed of several layers of tubes and with the walls of neighboring tubes thoroughly amalgamated. The apertures of the zoœcia are rounded, those of the numerous interstitial tubes angular and surrounding the zoœcia. See BRYOZOA.

HET'EROP'TERA (from Gk. *ἕτερος, heteros,* other + *πτερόν, pteron,* wing). A suborder of the Hemiptera, including the "true" bugs, characterized by dissimilarity in the wings. The proximal half of the anterior pair of wings is thickened, much like those of beetles. The suborder includes a number of aquatic forms, some of which occur out at sea hundreds of miles from land. The water boatman (*Corixa undulata*), with a pair of oarlike legs, the large water bug or "electric-light bug" (*Belostoma americanum*), and the long-legged water striders are, perhaps, the best known of the aquatic forms. The bedbug, red bug, chinch bug, squash bug, and stinkbugs (qq.v.) are other familiar and important Heteroptera. See HEMIPTERA; HOMOPTERA.

HET'EROS'POROUS. See HETEROSPORY.

HET'EROS'PORY (from Gk. *ἕτερος, heteros,* other + *σπόρος, sporos,* seed). The production, by plants, of two kinds of asexual spores. Heterospory is one of the most important phenomena in connection with the evolution of the plant kingdom, since through it the seed has appeared, and a clear conception of flowering plants is impossible without some knowledge of the beginnings of heterospory. The phenomenon appears first, and in its simplest form, among certain of the fern plants (Pteridophytes) and is universal among the seed plants (Spermatophytes). To understand the significance of heterospory it will be necessary to read the article on ALTERNATION OF GENERATIONS, since this deals with the two kinds of spores produced by the sexless generation (sporophyte).

HETEROSPORY.
Megasporangium of a club moss containing four megaspores.

HETEROSPORY.
Microsporangium of a club moss containing numerous microspores.

In ordinary ferns the spores are alike, and in germination each one produces a sexual plant (gametophyte), which bears both the male and the female sex organs. Such a condition is called homospory (q.v.), or isospory, which means in

each case "spores similar." In certain club mosses the spores differ in size, some being very much larger than others. The large spores are called megaspores and the small ones microspores. More important than the fact of difference in size, however, is the other fact that the microspores produce sexual plants which bear only male organs, and the megaspores sexual plants which bear only female organs. There is a very definite relation between the amount of nutrition and the appearance of the female organs, so that the larger and hence better-nourished spore is expected to produce a female plant. In consequence of heterospory, therefore, the gametophytes become distinctly male and female. In short, the most significant result of heterospory is the sexual differentiation of individuals. The unfortunate thing is that the sexual character has often been attributed to the microspores and the megaspores, which are simply the asexual spores of a sporophyte, which necessarily produce gametophytes.

When spores become thus differentiated in size and in product, the spore cases (sporangia) are also differentiated, so that certain sporangia produce only microspores, and others produce only megaspores. The former were naturally called microsporangia and the latter megasporangia. The megasporangia and the microsporangia of the heterosporous Pteridophytes are indistinguishable up to the mother-cell stage, i.e., the stage at which all the sporogenous tissue has been formed. If all the mother cells, or approximately all of them, produce spores, these very numerous spores will be microspores. If, on the other hand, only one mother cell produces spores, all the others contributing nutrition towards its increase in size, the four very large spores produced by this large mother cell will be megaspores. The primordium of a sporangium, therefore, is often indifferent, resulting in a microsporangium or a megasporangium, dependent upon the conditions that determine the number of functioning mother cells. These sporangia are ordinarily produced upon leaflike structures, and later the leaves bearing sporangia become differentiated in the same way, so that certain leaves bear only microsporangia and other leaves only megasporangia. Naturally the former were called microsporophylls and the latter megasporophylls. These names are used in connection with those fern plants which are heterosporous, as the water ferns, the little club mosses (*Selaginella*), and the quillworts (*Isoetes*). Among the seed plants (flowering plants), however, the corresponding structures already possessed names long in use and not to be discarded. It is important, however, to know the structures among the seed plants that correspond to those among the heterosporous fern plants. It is found that the stamen (q.v.) of a flowering plant is a microsporophyll, that its pollen sacs are microsporangia, and that the pollen grain is a microspore. The interesting conclusion is reached, therefore, that the pollen grain is an asexual spore—a conclusion quite contrary to the general impression that it is a male cell, and that the stamen is a male organ. It is found that the carpel (q.v.) of a flowering plant, which organizes the ovary, style, and stigma, is a megasporophyll; that the ovules are megasporangia; and that the so-called embryo sac is a single large unshed megaspore. It follows, therefore, that the ovule is by no means the egg which its name would imply, but the spore case (sporangium) of a sexless plant.

An important further fact in connection with heterospory is that upon its development the sexual plants (gametophytes) become very much reduced in size, for the most part not escaping from within the spores which produce them. As a consequence, the male plant or generation in a flowering plant is contained entirely within the pollen grain; and the female plant or generation is completely inclosed within the ovule. For further development of the subject in connection with the evolution of the seed, see SEED.

HET'MAN. See ATAMAN.

HETTINGER, hĕt'tĭng-ẽr, FRANZ (1819–90). A German Catholic theologian, born at Aschaffenburg and educated at Würzburg and at the German College in Rome. He became a priest in 1843, in 1847 returned to Würzburg as assistant in the theological seminary, and nine years afterward was appointed professor in the university. Hettinger wrote: *Apologie des Christentums* (8th ed., 1899–1900); *Lehrbuch der Fundamentaltheologie* (2d ed., 1888); *Timotheus: Briefe an einen jungen Theologen;* and many studies on Dante, of which the most important is *Die göttliche Komödie nach ihrem wesentlichen Inhalt und Charakter dargestellt* (2d ed., 1889). Consult the biography by Kaufmann (Frankfurt, 1891).

HETTNER, hĕt'nẽr, ALFRED (1859–). A German geographer, son of Hermann Hettner. He was born at Dresden, studied at Halle, Bonn, and Strassburg, and was professor of geography at Leipzig, Tübingen, and Heidelberg. He made two expeditions to South America—to Colombia (1882–84) and to Peru and Bolivia (1888–90)—and in 1895 became an editor of the *Geographische Zeitschrift,* for which he wrote on anthropology and geographical methodology. He published: *Gebirgsbau und Oberflächengestalt der sächsischen Schweiz* (1887); *Reisen in den colombianischen Anden* (1888); *Die Cordillere von Bogota* (1892); the text in Spamer's *Atlas* (1896; 2d ed., 1900); *Europa* (1907).

HETTNER, HERMANN THEODOR (1821–82). An important German literary and art critic, born at Leisersdorf (Silesia). He studied in Berlin, Halle, and Heidelberg. He had traveled extensively in Italy and become known through various volumes on literary and critical subjects before he was made professor of æsthetics at the University of Jena (1851). Afterward he became director of the cabinet of antiquities in Dresden (1855) and professor of the history of art in the Academy of Fine Arts. In 1868 he was appointed director of the Historical Museum. His most important work is *Litteraturgeschichte des achtzehnten Jahrhunderts* (1856–70; parts i and ii, 5th ed., 1894; part iii, 4th ed., 1893–94); parts i and ii deal with English and French literature. He also wrote *Die romantische Schule in ihrem Zusammenhange mit Goethe und Schiller* (1850); *Griechische Reiseskizzen* (1853); *Das königliche Museum der Gipsabgüsse zu Dresden* (4th ed., 1881); *Italienische Studien: Zur Geschichte der Renaissance* (1879). Consult H. H. Stern, *Hermann Hettner: Ein Lebensheld* (Leipzig, 1885), and Hugo Spitzer, *H. Hettners Kunstphilosophische Anfänge und Literarästhetik* (Graz, 1903).

HET'TON. A town in the County of Durham, England, 5 miles northeast of Durham. The mining of extensive coal deposits in the vicinity constitutes its principal industry. Pop., 1901, 13,633; 1911, 15,678.

HETZEL, ā'tsĕl', PIERRE JULES (1814–86).

A French publisher and littérateur, born at Chartres. From 1835 he was associated with Paulin, the French publisher, and afterward took part in politics as a Republican. After the revolution of 1848 he was chief of a department in the Ministry of Foreign Affairs and Secretary General of the provisional government. After the coup d'état he was exiled and lived in Brussels until the amnesty of 1859. During that time he published a series of French classics. Upon his return to France he published, among other volumes, the romances of Jules Verne. He had founded, with M. J. Macé, a *Magasin d'éducation et de récréation* (1854), which was very successful, and his best claim to general interest, although his stories for children have always been popular. Under the pseudonym of P. J. Stahl he wrote, notably: *Le diable à Paris* (1842); *Voyage où il vous plaira* (1842–43), with Alfred de Musset; *Théories de l'amour et de la Jalousie* (1853); *L'Esprit des femmes et les femmes d'esprit* (1851); *Les quatre fils du docteur Marseh* (1880); *Les quatre peurs de notre général* (1881).

HETZER, hĕts'ẽr, Ludwig. See Hätzer, Ludwig.

HEUBERGER, hoi'bĕrg-ẽr, Richard (1850–1914). An Austrian composer, born at Graz. By profession a civil engineer, he did not take up music seriously until 1876. Two years later he became conductor of the Vienna Singakademie, but gave up that post in 1881 and devoted himself to musical criticism. He composed much instrumental music and the operas *Abenteuer einer Neujahrsnacht* (1886); *Manuel Venegas* (1889), which was rewritten as the grand opera *Mirjam, oder das Maifest* (1894); *Barfüssele* (1905); and several ballets and operettas.

HEUBNER, hoip'nẽr, Otto (1843–). A German physician, born at Mühltroff. He studied at Leipzig and Vienna, was long connected with the former university, and in 1894 went to Berlin as professor and manager of the clinic for children. In 1913 he resigned his professorship. Among his writings are: *Die leutische Erkrankung der Hirnarterien* (1874); *Die experimentelle Diphtherie* (1883); *Klinische Studien über die Behandlung der Diphtherie mit dem Behringschen Heilserum* (1895); *Syphilis im Kindesalter* (1896); *Lehrbegriff der Kindheilkraft* (1911).

HEUCHERA, hū'kẽ-rȧ. See Alum Root.

HEUGLIN, hoi'glīn, Theodor von (1824–76). A German traveler and ornithologist, born at Hirschlanden, Württemberg. From 1850 to 1865 he spent most of his time in Africa. While attached to the Austrian consulate at Khartum, he visited Dongola and Abyssinia, and afterward described his travels in a volume entitled *Reisen in Nordostafrika* (1857). He became Consul at Khartum in 1853. He visited the White Nile, the Sudan, and the west coast of the Red Sea; in 1860 set out with a party for the interior of Africa to determine the fate of the explorer Eduard Vogel, and returned to Europe with rare collections. He published *Ornithologie Nordostafrikas* (1869–75) and *Reise in das Gebiet der westlichen Zuflüsse des weissen Nil* (1869). Journeys made in 1870 and 1871 to Spitzenberg and Nova Zembla he described in *Reisen nach dem Nordpolarmeere* (1872–74).

HEULANDITE, hū'land-īt. A hydrous calcium and aluminium silicate occurring in monoclinic crystals and crystalline aggregates. The lustre is pearly to vitreous and the color white, red, or brown. Heulandite occurs with the other zeolites in basaltic rocks and in gneiss.

HEUMANN, hoi'mȧn, Christoph August (1681–1764). A German scholar. He was born at Allstedt, studied at Jena, and in 1717 became head of the Gymnasium at Göttingen. In the university he was made professor of the history of literature (1734) and of theology (1745). His great works, *Acta Philosophorum* (last ed., 1717–24) and *Conspectus Reipublicæ Literariæ* (last ed., 1791–97), by the use of the analytical system, founded modern German literary history. He also translated, with a commentary, the New Testament (1750–63). Consult the life by Cassius (Cassel, 1768).

HEUMANN VON TEUTSCHENBRUNN, fŏn toit'shen-brōōn, Johann (1711–60). A German jurist and writer on diplomacy, born at Muggendorf in Bavaria, and educated in history and law at Altdorf, where in 1740 he became professor. The first jurist to approach the study of diplomacy in a scientific manner, he wrote: *Commentarii de Re Diplomatica Imperatorum ac Regum Germaniæ* (1745–53); *Exercitationes Juris Universi* (1749–57); *Initia Juris Politiæ Germaniæ* (1757); *Geist der Gesetze der Deutschen* (2d ed., 1779).

HEUN, hoin, Karl Gottlieb Samuel (1771–1854). A German novelist, known under the pseudonym "H. Clauren," born at Dobrilugk, and educated at Leipzig and Göttingen. He became in 1792 Secretary in the departments of Mining and Foundries in Westphalia. In 1811 he received a place in a bureau of the Chancellor Hardenberg, and in 1820 became editor of the *Preussische Staatszeitung*. Heun is best known by the first line of a poem on the War of Liberation, *Der König rief, und alle, alle kamen*. His novels include: *Erzählungen* (1819–20); *Die graue Stube* and *Mimili* (4th ed., 1824); *Scherz und Ernst* (10 vols., 1820–28). He also wrote dramas, *Lustspiele* (2d ed., 1827). His works show a sentimental and sensual character that made them popular for a time with the lower classes. A collection of his works appeared at Leipzig in 25 volumes (1851).

HEUSLER (hois'lẽr) **ALLOYS.** In 1903 F. Heusler proved that it was possible to magnetize certain alloys of nonmagnetic elements. Thus, an alloy of manganese and tin, one of manganese, copper, and tin, one of manganese, aluminium, and copper, etc., could be magnetized, although not to any marked extent. Since this work of Heusler's many other alloys have been investigated which have similar properties. Heusler himself, as well as other investigators, has attempted to develop a theory; but little progress has been made beyond an experimental determination of the exact proportions of the various constituents and the alloys which give the highest magnetic permeability. Consult Guthe and Austin, "Experiments on the Heusler Magnetic Alloys," in *Bulletin of the United States Bureau of Standards* (Washington, 1906). See Magnetism: Alloys, Magnetic.

HEUZÉ, ẽ'zā', Louis Gustave (1815–1907). A French agriculturist, born in Paris. He was educated at the National School of Agriculture at Grignon and was appointed director of the agricultural school at Grand-Jouan in 1840. In 1846 he became professor of agriculture at Nantes. Later he was made administrator of the farm school at Nozay, then professor of

agriculture at Grignon in 1849, and was appointed to the same chair at the opening of the Institute in Paris. In 1880 he was made also inspector general of agriculture and was sent by the French government on various missions to study foreign agriculture. For 50 years he was one of the editors of the *Journal d'Agriculture Pratique* and was a voluminous contributor to popular and scientific agriculture, both foreign and domestic. Among his more important works were: *Les plantes alimentaires* (1873); *Les plantes industrielles* (1893–95); *Cours d'agriculture pratique; Les plantes céréales* (1896–97); *Les plantes alimentaires des pays chauds et des colonies* (1899).

HEVEA, hē'vē-ȧ. A genus of about ten species of trees, natives of tropical South America, of the family Euphorbiaceæ, characterized by trifoliate leaves, loose panicles, apetalous flowers, and a trivalved capsular fruit. The species, especially *Hevea braziliensis,* furnish the highest grade of South American India rubber.

HEVE'LIUS, HEVEL, hȧ'vĕl, or **HÖWELKE,** hȧ'vĕl'ke, JOHANNES (1611–87). An astronomer, born at Danzig. He studied mathematics and law in Leyden, and, after making the "grand tour," in the course of which he became acquainted with Wallis, Gassendi, and other noted scientists of that day, returned about 1634 to his native place, where he served as town councilor till his death in 1687. In 1641 he erected an observatory in his own house, furnished it with large telescopes constructed by himself, and devoted himself to astronomical observations. He was the first astronomer, with the exception of Gassendi, to observe a transit of Mercury (1661). He ranks next to Flamsteed among the astronomers of his day. Towards the end of his life he opposed the notion of using telescopic sights for astronomical instruments of precision, believing that the old method of observing through pinholes, etc., was superior. Halley (q.v.) was sent to Danzig by the Royal Society of London to examine into this question, and the controversy was decided against him. Hevelius' observatory and library were burned in 1679. His extant works include: *Selenographia, seu Descriptio Lunæ* (1647); *De Natura Saturni* (1656); *Prodromus Cometicus* (1665); *Cometographia* (1668); *Machina Cœlestis* (1673); *Prodromus Astronomiæ* (1690). His letters were published by Olhof in 1683. Consult Brandstätter, *Hevel's Leben und seine Bedeutsamkeit* (Danzig, 1861), and Seidemann, *Johannes Hevelius* (Zittau, 1864).

HEVESI, hĕ'vĕ-shē, LUDWIG (1843–1910). A German-Hungarian journalist and humorist, sometimes writing under the pseudonym of *Onkel Tom.* He was born at Heves, studied classical philology and medicine at Vienna, and entered journalism in 1865. In the following year he became one of the editors of the *Pester Lloyd;* then helped launch the humorous Hungarian journal *Borsszem Jankó;* from 1871 to 1874 edited the Vienna juvenile *Kleine Leute;* and in 1875 became the art and dramatic critic of the *Fremdenblatt.* He wrote mainly in German. His works include the humorous sketches of travel and collections of stories: *Des Schneidergesellen Andreas Jelky Abenteuer in vier Welttеilen* (1875); *Auf der Sonnenseite* (1886); *Buch der Laune* (1890); *Ein englischer September* (1891); *Regenbogen* (1892); *Von Kalau bis Säkkingen* (1893); *Glückliche Reisen* (1895); *Die Althofleute* (1897); *Blaue Fernen, neue Reisebilder* (1897); *Das bunte Buch: Humoresken* (1898); *Wiener Totentanz* (1899); *Der zerbrochene Franz nebst andern Humoresken* (1900); *MacEck's sonderbare Reisen zwischen Konstantinopel und San Francisco* (1901); his biographies, which are more valuable, *Zerline Gabillon* (1894) and *Wilhelm Junker* (1896); and books of southern travel, *Ewige Stadt, Ewiges Land* (1903), and *Sonne Homers* (1904); *Die fünfte Dimension* (1906); *Den Zug um den Mund* (1907); *Gutmunkeln* (1909); and the art critique, *Osterreichische Kunst im 19. Jahrhundert* (1903). Consult his biography by L. Speidel (Berlin, 1910).

HEWES, hūz, JOSEPH (1730–79). A signer of the Declaration of Independence, born at Kingston, N. J. He was educated at Princeton and then went to Philadelphia, where he engaged in business. In 1763 he moved to Edenton, N. C., and in the same year was elected to the Legislative Assembly. In 1774 he was elected to the Continental Congress, of which, with the exception of a brief period when he declined to serve, he continued a member until his death, signing the Declaration of Independence in 1776.

HEWETT, hū'ĕt, EDGAR LEE (1865–). An American archæologist, born in Warren Co., Ill., and educated at Tarkio (Mo.) College, at the Colorado State Teachers College, and at the University of Geneva. After serving in various places as teacher and superintendent of schools, he had charge of the training department of the Colorado State Teachers College (1894–98) and was president of the New Mexico Normal University (1898–1903). In 1906 he became director of American archæology for the Archæological Institute of America, and in 1907 also director of the School of American Archæology and the Museum of New Mexico at Santa Fe. Under his supervision were excavated the ancient Maya city of Quirigua, Guatemala, and the ancient cliff dwellings and pueblos of the southwest—especially did he make known the famous cliff-dwelling region of Pajarito Plateau, N. Mex. He is author of many papers on archæology and anthropology.

HEWETT, EDWARD OSBORNE (1835–97). A Canadian military engineer. He was born in Glamorganshire, Wales, and was educated at Cheltenham College and the Royal Military Academy at Woolwich, where he subsequently became an instructor. In 1854 he was commissioned lieutenant, and in 1860 captain, in the Royal Engineers. In 1861, in anticipation of war with the United States on account of the Trent Affair, he was placed in command of a field company of Royal Engineers for active service in Canada. After his arrival he was appointed Commanding Royal Engineer of Upper Canada (Ontario), west of Toronto, and was for some time engaged in investigating the military resources and defences of Canada, on which he made elaborate reports for the British War Office. He designed and supervised the construction of the military and naval fortifications of Halifax. He was promoted major in 1872, lieutenant colonel in 1879, colonel in 1881, and lieutenant general in 1886. During the Civil War he was present for some months with both the Federal and the Confederate armies. In 1875 he was appointed commandant of the

newly founded Royal Military College, Kingston, and until 1890 labored to perfect its organization and equipment. In the latter year he resigned and returned to London, England.

HEWETT, Waterman Thomas (1846–1921). An American Germanic scholar, born at Miami, Mo. He graduated from Amherst College in 1869, studied at several foreign universities, and (1879) received a Ph.D. from Cornell University, where he was assistant professor of German in 1870–83 and thereafter professor until he retired in 1910. In 1895 he became general editor of Macmillan's "German Classics." His publications include: *The Frisian Language and Literature* (1879); *University Administration* (1882); *The House of Orange* (1885); *Introduction to the Life and Genius of Goethe* (1886); *William Scherer* (1887); *Ministers and Sovereign in Germany* (1888); *Homes of the German Poets* (1889); *University Life in the Middle Ages* (1898); *Sources of Goethe's Printed Texts* (1898); *Cornell University: A History* (3 vols., 1905); *Bibliography of the Writings of Goldwin Smith* (1912).

HEWINS, William Albert Samuel (1865–). An English economist, born near Wolverhampton. He was educated at Pembroke College, Oxford, was director of the London School of Economics in 1895–1903, taught economic history in the University of London in 1902–03, and was Tooke professor of economics at King's College, London, in 1897–1903. He contested the Shipley Division of Yorkshire and Southeast Lancashire in 1910 in the Unionist interest, and in 1912 was elected to the House of Commons for North Herefordshire. Besides contributions to reviews, to the *Dictionary of National Biography,* and to Traill's *Social England,* he wrote *English Trade and Finance, chiefly in the 17th Century* (1892), edited the *Whitefoord Papers* (1898), and published *Imperialism and its Probable Effect on the Commercial Policy of the United Kingdom* (1901). He edited *Studies in Economic and Political Science.*

HEWIT, hū'ĭt, Augustine Francis (1820–97). An American Roman Catholic clergyman, superior of the Paulist Fathers. He was born in Fairfield, Conn., the son of Nathaniel Hewit, and was baptized as Nathaniel Augustus. He graduated at Amherst in 1839; entered the Congregational ministry in 1842, but a year later joined the Episcopal church. In 1846 he was received into the Roman Catholic church and in 1850 entered the Redemptorists. He joined Fathers Hecker, Walworth, and other members of that order in founding, in 1858, the Congregation of St. Paul the Apostle, and was made professor of theology, philosophy, and Holy Scriptures in their seminary. On the death of Father Hecker he became superior of the Paulists. He edited the *Catholic World* (1869–74) and was a regular contributor to the *American Catholic Quarterly Review.* Among his works are: *Reasons for Submitting to the Catholic Church* (1846); *Problems of the Age* (1868); *The King's Highway, or the Catholic Church the Way of Salvation* (1874). He received the degree of D.D. from Amherst College in 1874.

HEWITSON, William Chapman (1806–78). An English naturalist, born at Newcastle-on-Tyne, and educated at York. He practiced land surveying until a bequest from a deceased relative enabled him to study the natural sciences. He gave great attention first to the Coleoptera and Lepidoptera of Great Britain, then to the study of birds' eggs, in 1833 making a trip to Norway to search for the breeding places of some of the migrating species of England. He devoted the last years of his life to the diurnal Lepidoptera of the world, gradually forming a large and valuable collection, which he left to the natural history section of the British Museum. His library was bequeathed to the Natural History Museum of Newcastle. He contributed many papers on entomology and ornithology to scientific journals, and published: *British Oölogy* (1833–42); *Colored Illustrations of the Eggs of British Birds* (1846); *The Genera of Diurnal Lepidoptera* (1846), with E. Doubleday; *Illustrations of Diurnal Lepidoptera* (1863–78); *Illustrations of New Species of Exotic Butterflies* (1851–76); *Descriptions of One Hundred New Species of Hesperidæ* (1867); *Descriptions of Some New Species of Lycænidæ* (1868); *Equatorial Lepidoptera* (1869–70); *Bolivian Butterflies* (1874).

HEWITT, hū'ĭt, Abram Stevens (1822–1903). An American manufacturer and public man, born at Haverstraw, N. Y., and educated at Columbia College, where he was acting professor of mathematics in 1843. He studied law and was admitted to the bar in 1844, but defective eyesight prevented him from practicing, and he engaged in the manufacture of iron with Edward Cooper, the son of Peter Cooper, and a college classmate, who later became his brother-in-law. In 1862 Mr. Hewitt learned in England the process for making gun-barrel iron, and upon his retirement in 1876 as president of the American Institute of Mining Engineers, he delivered a widely read address upon *A Century of Mining and Metallurgy in the United States.* In 1890 he was again president of this society. He served in Congress in 1871–79 and 1881–86, was chairman of the National Democratic Committee which directed the Tilden campaign in 1876, and was a Democratic member of the House committee which in 1877 conferred with a similar committee from the Senate in regard to the choice of an electoral commission to settle the disputed presidential election. In 1886 he was elected mayor of New York City, defeating Henry George and Theodore Roosevelt. He was an earnest worker for good government and labored with much success for municipal reform. After his administration of two years he remained closely identified with municipal movements, and for his services in furthering the rapid-transit plan in New York City he was awarded a gold medal by the New York Chamber of Commerce in 1901. As a public benefactor, he gave great aid to numerous institutions, and the present educational prominence of Cooper Union, founded by his father-in-law in New York City, is due largely to his services as trustee and secretary. He was chosen chairman of the trustees of the Carnegie Institution at its organization in 1901.

HEWITT, John Napoleon Brinton (1859–). An American ethnologist and linguist. He was born on the Tuscarora reservation, near Niagara Falls, N. Y.; with some Tuscarora blood in his veins, he learned the language of that tribe while a child. He was educated in the public schools of Wilson and Lockport and was successively farmer and journalist till 1879, when, employed by the department of American ethnology in the Smithsonian Institution, he

devoted himself to Indian ethnology and the languages of the Tuscaroras and Iroquois.

HEWITT, John Theodore (?–). An English chemist, educated at Cambridge, the University of London, and Heidelberg. He became professor of chemistry in East London College and the University of London. His chemical papers appeared in German as well as English technical journals. Among his important studies are those on the chemistry of fluorescence and on the azo- compounds. He patented a method for removing furfurol from alcoholic spirits, thus lessening their ill effects as a beverage.

HEWITT, Peter Cooper (1861–1921). An American inventor and electrical engineer, born in New York City, the son of Abram Stevens Hewitt and the grandson of Peter Cooper. He became a director of the Cooper, Hewitt Electric Company, of Cooper, Hewitt, and Company, and of other corporations; was made a trustee of Cooper Union, and of the House of Rest for Consumptives; and is known as the inventor of the Cooper Hewitt mercury vapor electric lamp, the Cooper Hewitt mercury vapor rectifier—which reduced by more than half the amount of apparatus needed to change alternating current to direct storage batteries—and several mechanical appliances. In 1914 he announced that he had made an important advance in the field of wireless telegraphy, as one result of his 18 years' study of mercury vapor in a vacuum.

HEW'LETT, Maurice Henry (1861–). An English novelist, born in London and educated there. He was called to the bar in 1891 and in 1896 was made Keeper of the Land Revenue Records and Enrollments. He gained his reputation in 1898 with a romance entitled *The Forest Lovers.* His other books include: *Earthwork out of Tuscany* (1895); *The Masque of Dead Florentines* (1895); *Songs and Meditations* (1897); *Pan and the Young Shepherd* (1898); *Little Novels of Italy* (1899); *Richard Yea-and-Nay* (1900); *New Canterbury Tales* (1901), short stories exquisite in sentiment and execution; *The Queen's Quair* (1904); *The Road in Tuscany* (2 vols., 1904); *Fond Adventures* (1905); *Fool Errant* (1905); *Works* (10 vols., 1905); *The Stooping Lady* (1907); *Brazenhead the Great* (1911); *Mrs. Lancelot: a Comedy of Assumptions* (1912); *Bendish: A Study in Prodigality* (1913); *Love of Proserpine* (1913); short stories and sketches. Hewlett achieved success in various kinds of fiction. In novels like *The Forest Lovers, Richard Yea-and-Nay,* and *The Queen's Quair,* and in certain of his short stories, he essayed historical romance and surpassed his contemporaries in interpreting mediæval and renaissance thought and sentiment. *The Fool Errant,* with its intimate transcripts of the ins and outs of Italian social life in the early eighteenth century, and with its substitution of the romance of chicanery for the romance of violence, exemplifies his skill in the picaresque story; and *The Stooping Lady,* with its background of early nineteenth-century struggles for reform and its general modernity, is representative of the Hewlett who has read Meredith and taken a leaf from his book. At his best Hewlett is master of a style that is picturesque, quaint, impassioned, and impressive; but his manner is often strained—even tortured, fantastic, and full of conceits. Artificiality is indeed of the essence of him, and he will probably be remembered rather as a landscape and figure painter than as a penetrating analyst of motive or creator of character.

HEXACHORD, hĕks'ä-kôrd (from Gk. ἕξ, *hex,* six + χορδή, *chordē,* chord). In mediæval music, hexachord denotes the six diatonic degrees of which Guido formed his scale, better known by the six syllables, ut, re, mi, fa, sol, la, to which the scale was sung. See Gamut.

HEX'ACORAL'LA (Neo-Lat., from Gk. ἕξ, *hex,* six + κοράλλιον, *korallion,* coral). A subclass of zoantharian corals, so named by Haeckel because the radiating septal walls of the polyps are arranged in series of six or multiples of six. Recent researches have shown that the Hexacoralla constitute an artificial group. See Coral.

HEX'ACTINEL'LIDA (Neo-Lat. nom. pl., from Gk. ἕξ, *hex,* six + ἀκτίς, *aktis,* ray). One of the two orders of siliceous sponges (see Sponge), comprising those with six-rayed siliceous spicules; they live at considerable depths and include the glass sponge (*Euplectella*) and other hyaline forms. The other order is Desmospongiæ, including "Silicispongiæ devoid of six-rayed spicules." The group is an ancient one, present in geological formations from the Ordovician down to present times. Remains attributed to this group occur in pre-Cambrian rocks at St. John, N. B.

HEX'AGON (Lat. *hexagonum,* from Gk. ἑξάγωνον, from ἕξ, *hex,* six + γωνία, *gōnia,* angle). A geometric figure of six sides. When the sides and angles are respectively equal, the hexagon is said to be regular. If a regular hexagon is inscribed in a circle, each side is equal to the radius of the circle, and by joining the angular points to the centre of the circle six equilateral triangles are formed. Hence the perimeter of the circle may be divided into six equal parts by laying off in succession six chords, each equal to the radius. Each angle of a regular hexagon is equal to 120°, and the sum of all the angles of any hexagon is equal to 720°. See Polygon; Hexagram.

HEXAGONAL SYSTEM. See Crystallography; Plate of Crystal Forms.

HEX'AGRAM (from Gk. ἑξαγράμματος, *hexagrammatos,* consisting of six letters, from ἕξ, *hex,* six + γράμμα, *gramma,* letter), Mystic. In 1639 Pascal, at the age of 16, published the proof of the proposition that the three pairs of opposite sides of a hexagon—or *hexagramma mysticum,* as he termed it—inscribed in a conic, intersect in three collinear points. This is a fundamental proposition of modern geometry, and its reciprocal is Brianchon's theorem, that the lines joining the three pairs of opposite vertices of a hexagon circumscribed about a conic are concurrent. See Concurrence; Hexagon.

HEX'AHE'DRON (from Gk. ἕξ, *hex,* six + ἕδρα, *hedra,* base). A solid geometric figure of six faces. A regular hexahedron is called a cube. The square of the edge of a regular hexahedron is one-third of the square of the diameter of the circumscribed sphere, and hence the diameter of a sphere is to the side of the regular inscribed hexahedron as $\sqrt{3}$ is to 1. See Cube; Polyhedron.

HEXAM'ETER (Lat., from Gk. ἕξ, *hex,* six + μέτρον, *metron,* measure). The name of a verse composed of six feet or measures. The name "hexameter" usually refers to the dactylic hexameter, the heroic or epic verse of the Greeks and Romans, the best examples of which are

Homer's *Odyssey* and *Iliad* or Vergil's *Æneid*. The last foot of every verse must be either a spondee (two long syllables, as in *anno*) or a trochee (a long and a short syllable, as in *qualis*), and the penultimate must be a dactyl (a long and two short syllables, as in *tēgmĭnĕ*). The rest may be either dactyls or spondees. Thus constructed, the verse is called dactylic. Homer offers a regular dactylic hexameter in the verse:

δεινὴ | δὲ κλαγ | γὴ γένετ' | ἀργυρε | οῖο βι | οῖο.

Vergil gives this example:

Tītўrĕ | tū pătū | lāĕ rĕcŭ | bāns sūb | tēgmínĕ | fāgī.

The dactylic hexameter has often been employed in modern poetry, especially in English and in German. Thus, in Longfellow's *Evangeline*, we read these lines:

This is the | forest prim | eval. The | murmuring | pines and the | hemlocks
Bearded with | moss and with | garments | green, indis | tinct in the | twilight,
Stand like | Druids of | old with | voices sad and pro | phetic,
Stand like | harpers | hoar with | beards that | rest on their | bosoms.

And Klopstock's *Messias* begins with the line:

Sing', un | sterbliche | Seele, der | sündigen | Menschheit Er | lösung.

The last line of the Spenserian stanza consists of an iambic hexameter; thus:

And often knocket his brest, as one that did repent.

See VERSIFICATION.

HEXAMETHYLENE TETRAMENE. See FORMALDEHYDE.

HEXAMETHYLENIN. See UROTROPIN.

HEX'APLA (Gk. *ἑξαπλᾶ*, sixfold). The name given to the work compiled by Origen for the purpose of restoring the purity of the earliest Greek version of the Old Testament, usually called the Septuagint, and bringing it into closer agreement with the original Hebrew. (See BIBLE, heading *Versions.*) It consisted of a six-column text: (*a*) the Hebrew text; (*b*) the same text transliterated into Greek characters; and the Greek translations of (*c*) Aquila; (*d*) Symmachus; (*e*) the Septuagint; (*f*) Theodotion. In case of a number of books, Origen added comparisons with three other Greek translations. The omissions in the Septuagint were generally supplied from Theodotion and marked by an asterisk, while additions in the Septuagint, as compared with the Hebrew text, were indicated by an obelisk. In consequence, however, of the neglect of these distinguishing signs in manuscripts of the Hexapla, great confusion arose, so that it has been well-nigh impossible to recover the original Septuagint text. The Hexapla, as a whole, has long been lost; several editions of those fragments which it has been possible to recover, have been printed; that by the Benedictine Montfaucon (2 vols., Paris, 1713), which retains, so far as it was retained in the manuscripts, the arrangement and even the asterisks and obelisks of Origen, long enjoyed high favor, but is now superseded by the admirable edition of Frederick Field (2 vols., Oxford, 1867–75), with additions and supplements by Pitra in *Analecta Sacra Spicilegio Solesmensi*, vol. iii (Paris, 1883). See ORIGEN.

HEXAP'ODA (Neo-Lat. nom pl., from Gk. *ἑξάπους*, having six feet, from *ἕξ*, *hex*, six + *πούς*, *pous*, foot). The name of a class of arthropods, the insects, equivalent to Insecta.

HEXATEUCH, hĕk'sȧ-tūk (from Gk. *ἕξ*, *hex*, six + *τεῦχος*, *teuchos*, implement, book). A term used to denote the first six books of the Bible, viz., Genesis, Exodus, Leviticus, Numbers, Deuteronomy, and Joshua. While *Pentateuch* (q.v.) as a title of the five books ascribed to Moses, and *Octateuch* as a designation of these with Joshua, Judges, and Ruth, go back to antiquity, *Hexateuch* is a modern term that has come into vogue chiefly through Kuenen and Wellhausen. It represents a critical view, according to which the Book of Joshua was compiled from the same sources as the Pentateuch and once formed with it a separate work. See EZRA; PENTATEUCH; and the articles on the individual books.

HEXHAM, hĕks'ȧm. A market town in Northumberland, England, on the Tyne, 21 miles west of Newcastle (Map: England, D 2). It has the interesting twelfth-century abbey church of St. Andrew, erected on the site of a structure built by St. Wilfrid about 675, the crypt of which was recently discovered. Hexham with Newcastle constitutes a Roman Catholic diocese. The manufactures consist of gloves and other goods; coal and barytes are mined, and market gardening is carried on in the vicinity. The town was the scene of a Lancastrian defeat in 1464. Pop., 1901, 7071; 1911, 8417. Consult: James Raine, *The Priory of Hexham: Its Chroniclers, Endowments, and Annals*, Surtees Society (London, 1864–65); James Hewitt, *Hexham and its Antiquities* (Hexham, 1879); Bateson and Hinds, *History of Northumberland*, vol. iii (Newcastle-on-Tyne, 1896).

HEY, hī, JULIUS (1832–1909). A German singing teacher, important for his efforts to further Wagner's views on vocal training. He was born at Irmelshausen and studied music under F. Schmitt and F. Lachner. He was introduced to Wagner by King Louis II and, in connection with the Munich School of Music, attempted a revolution of the national system of singing. His attempts failed, and on Wagner's death, in 1883, he retired from public life to complete his work on singing, *Deutscher Gesangsunterricht* (1886). Although unsuccessful in his efforts to overturn the existing methods of voice culture, Hey exercised a powerful influence on the contemporary schools of singing, and was one of the most successful practical teachers of his day. He also published a valuable book on musical interpretation, entitled *Richard Wagner als Vortragskünstler* (1908).

HEY, WILHELM (1790–1854). A German fabulist. He was born at Leina, was educated at Jena and Göttingen, and successively became pastor at Töttelstädt (1818), court preacher at Gotha, and district church superintendent at Ichtershausen. His more famous works, issued anonymously, *Fünfzig Fabeln für Kinder* (1833) and *Noch fünfzig Fabeln* (1837), were followed by poems called *Erzählungen aus dem Leben Jesu* (1848). Consult F. Bonnet, *Der Fabeldechter W. Hey* (1885), and Theodor Hansen, *Wilhelm Hey* (Gotha, 1886).

HEY'BURN, WELDON BRINTON (1852–1912). An American legislator, born in Delaware Co., Pa. After receiving an academic education he was admitted to the bar in 1876, practiced law in Pennsylvania and at Shoshone, Idaho, and, entering politics, was a delegate to the Republican national conventions of 1888, 1898, and 1900. He was defeated for Congress in 1898 by a fusion of Democrats, Populists, and Silver Re-

publicans, but in 1903 was elected to the Senate, and in 1909 was reëlected for the term ending 1915. Extremely conservative in regard to innovations in methods of government, and an ardent supporter of "stand-pat" republicanism, he was especially prominent just before his death because of his opposition to a congressional inquiry into 1912 campaign contributions. He was the only Senator to be chairman of two important committees—the committee on manufactures and the joint committee on the revision of the laws of the United States.

HEYDEBRAND UND DER LASA, hī'dĕ-brănt ụnt dĕr lä'zȧ, TASSILO VON (1818–99). A German authority on chess, born at Potsdam. He was for a time German Ambassador to Copenhagen. The possessor of one of the largest libraries on chess in the world, he wrote the *Handbuch des Schachspieles,* which appeared under the name of Bilguer, with whom he began the work, and *Leitfaden für Schachspieler* (6th ed., 1894). With Frank he edited the old Portuguese work on the game by Damiano (1857). His last work was *Zur Geschichte und Litteratur des Schachspiels Forschungen* (1897).

HEYDEMANN, hī'dĕ-mȧn, HEINRICH (1842–89). A German classical archæologist. He was born at Greifswald and studied at Tübingen, Bonn, Greifswald, and Berlin. His specialty, the study of vases, took him to Italy and Greece, and in 1869 he became instructor in archæology at the University of Berlin. Five years afterward he went to Halle as professor of archæology. Most of his writing was for the journals *Annali dell' Instituto, Archäologische Zeitung,* and *Zeitschrift für bildende Kunst.* Among his other works are: *Iliupersis* (1866); *Griechische Vasenbilder* (1870); *Die Vasensammlungen des Museo Nazionale zu Neapel* (1872); *Terrakotten aus dem Museo Nazionale zu Neapel* (1882); *Dionysos' Geburt und Kindheit* (1885); *Pariser Antiken* (1887).

HEYDEN, hī'dĕn, ADOLF (1838–). A German architect, born at Krefeld, pupil of Schlüter in Berlin, where he worked at first independently, but after 1868 was associated with Walter Kyllmann in the erection of important structures there and in other cities of Germany. He also executed a great deal of decorative work and strongly influenced the development of industrial art by his numerous designs in this branch.

HEYDEN, AUGUST VON (1827–97). A German historical and mural painter, born at Breslau. After several years spent in mining, he gave it up for art and studied in Berlin with Holbein and Steffeck and in Paris with Gleyre and Couture. His "St. Barbara, Patron Saint of Miners" was awarded a gold medal in the Salon of 1863. Among his paintings are: "The Meeting of Luther and Georg von Frundsberg at the Diet of Worms, 1521" (1866), Germanic Museum, Nuremberg; "Morning Festival" (1870), National Gallery, Berlin; "Ride of the Valkyries" (1872), owned by the German Emperor; "The Rescue of Wittich" (1880), Karlsruhe Gallery; mural decorations in the City Hall and the National Academy of Berlin, where he was professor of the history of costume from 1882 to 1893. Among his writings are: *Die Tracht der europäischen Kulturvölker* (1889); the miners' fairy tales, *Aus der Teufe* (1878), and *Die Perlen* (1881), illustrated by himself.

HEYDEN, FRIEDRICH AUGUST VON (1789–1851). A German poet, born at Nerfken, near Heilsberg, in East Prussia, and educated at Königsberg, Berlin, and Göttingen. He wrote some dramas, unsuccessful on the stage and now forgotten, but was successful as a writer of poetic tales, the best known of which are: *Die Gallione* (1825); *Reginald* (1831); *Das Wort der Frau* (1843; 23d ed., 1881); *Der Schuster von Ispahan* (1850); *Die Königsbraut* (1851). His *Gedichte* (1852) contains his best work. Consult Alexis Gabriel, *F. von Heyden* (Breslau, 1901).

HEYDEN, JAN VAN DER (1637–1712). A Dutch architectural painter. He was born at Gorkum, where he studied with a glass painter. Then he settled in Amsterdam and began to paint views of cities, churches, and public squares. Most of the figures were supplied by Adrian van der Velde, after whose death in 1672 Heyden found less time for painting, having invented a new kind of fire engine and been appointed head of the fire department of Amsterdam. Among the six pictures by him in the National Gallery, London, are "A Street in Cologne" and the "House in the Wood, at The Hague" (where the world's first peace conference was held). Of the three in the Louvre, one illustrates the "City Hall of Amsterdam." All of his paintings are diminutive in size. He had the finest sense of perspective and paid such scrupulous attention to detail that his works are valuable as historical documents. He could not paint trees well, but had good feeling for values and atmosphere.

HEYDEN, OTTO (1820–97). A German historical and portrait painter, born at Ducherow, Pomerania. He was a pupil of Wach and Kloeber at the Berlin Academy (from 1843), then of Cogniet in Paris (1847–48), and later continued his studies independently in Italy (1850–54). Although the bulk of his work is devoted to the delineation of national history, he also painted religious subjects, genre scenes, and landscapes, besides many portraits. From his sojourn in Italy dates "Job and his Friends," Stettin Museum; followed after his return by "Foundation of Greifswald University, 1455" (1856), in the Aula of the University; "Duke Boguslav X on his Pilgrimage to Jerusalem Attacked by Pirates, 1497," Stettin Museum; "Field Marshal Schwerin in the Battle of Prague," Royal Palace, Berlin. The Austro-Prussian War, in which he took part in the suite of Crown Prince Frederick William, brought "The Battlefield of Königgrätz" (1868), National Gallery, Berlin, and three episodes in the battle of Königgrätz, all owned by the German Emperor, and several reminiscences of the Franco-German War of 1870–71, in which he also accompanied the army. "Emperor William I Visiting the Wounded," in the National Gallery of Versailles, is especially noteworthy. A visit to the East in 1869 resulted in several genre and landscape scenes from the Nile, and for the Dankeskirche in Berlin he executed the mural paintings of "The Last Supper," "The Adoration of the Magi," and "The Resurrection" (1883).

HEYDRICH, hī'drĭĸ, GUSTAV MORITZ (1820–85). A German poet, born at Dresden and educated at Leipzig and at Berlin. His principal works are the tragedies *Tiberius Gracchus* and *Leonore von Portugal* (1861); the farce *Prinz Lieschen* (1861); and a collection of poems, *Sonnenschein auf dunklem Pfade* (1869).

HEYDT, hīt, AUGUST, BARON VON DER (1801–74). A Prussian administrator. He was born at Elberfeld, where with his two brothers he carried on the banking business founded by his father. After an extended trip through England and France he was elected a deputy in 1847 and a member of the National Assembly in 1848. In the latter year he became Minister of Trade. Three years afterward he was made director of the Prussian Bank. His cabinet post he held through the period of reaction, as his politics were not extremely radical. In 1862 he became Minister of Finance in the Hohenlohe-Itzenplitz cabinet and attempted to please both sides in the growing conflict between crown and legislature. He retired on Bismarck's assumption of control later in the year, but was recalled in 1866 to the same post to face the question of raising funds for the war with Austria. He clashed with the Diet, but held his place until 1869.

HEYDUK, hī'dŭk, ADOLF (1835–). A noted Czech poet, born at Reichenburg and educated at Brünn and Prague. After 1860 he was professor in the Realschule at Pisek. Heyduk draws his inspiration from folk poetry. His poems, mostly lyric, but many in the idyllic manner, include among others: *Lesní kvíti* (Forest Flowers, 1875); *Dřevorubec* (The Wood Cutter, 1882); *Cymbal a husle* (1876), which deals with the Slovaks; *Písně* (Songs, 1885); *Zaváté listy* (Blown Leaves, 1886); *Na vlnach* (On the Waves, 1890); *Bohatýři* (Heroes, 1894); *Dědův odkaz* (Grandfather's Bequest, 1880).

HEYER, hī'ĕr, GUSTAV (1826–83). A distinguished German forester, son of Karl Justus Heyer (q.v.). He was born at Giessen and studied at the University of Giessen, where at the age of 27 he became professor of forestry. In 1868 he was appointed director of the Academy of Forestry at Münden, a post which he resigned in 1878 to accept a professor's chair in the University of Munich. From 1856 to 1878 he edited the *Allgemeine Forst und Jagdzeitung.* Among his many works on forestry may be mentioned: *Lehrbuch der forstlichen Bodenkunde und Klimatologie* (Erlangen, 1856); *Anleitung zur Waldwertrechnung* (4th ed., Leipzig, 1892); *Handbuch der forstlichen Statik* (ib., 1871).

HEYER, KARL JUSTUS (1797–1856). A noted German forester. He was born at Bessungen near Darmstadt, studied at Giessen and at Tharand, and at the age of 21 took active part in practical forestry, especially in the vicinity of Darmstadt, where he was then lecturing on forestry. In 1825 he was appointed instructor in the school of forestry at the University of Giessen, where, after having been also practical forester for Count Erbach-Fürstenau for four years, commencing in 1831, he became professor of forestry in 1835, a post he held until his death. During his incumbency he made many interesting contributions to the subject of forestry, in recognition of which a monument was erected in his honor at Giessen in 1892. Among his works may be mentioned: *Beiträge zur Forstwissenschaft* (Giessen, 1842 and 1847); *Anleitung zu forststatischen Untersuchungen* (ib., 1846); *Der Waldbau oder die Forstproduktenzucht* (Leipzig, 1854; 4th ed., by Richard Hess, 1891–93).

HEYLLI, å'yĕ', EDMOND-ANTOINE POINSOT, called GEORGES D' (1833–1902). A French bibliographer and editor. He was born at Nogent sur-Seine and in 1877 became chief of the Bureau of the Legion of Honor. He is best known as a collector of anecdotes about celebrities, Louis XV, Countess du Barry, Mademoiselle Emile de Girardin, Marshal Ney, Madame Rachel, and others, and published a number of books, such as *Le scandale au théâtre* (1864); *Dictionnaire des pseudonymes* (1867), of which a third and enlarged edition came out 20 years later. He founded (1876) the *Gazette Anecdotique, Littéraire, Théâtrale,* brought out curious editions of *Manon Lescaut* and of *Paul et Virginie,* and collected a number of interesting documents relating to the War of 1870 and the Commune.

HEYLYN, hī'lĭn, or **HEYLIN,** PETER (1600–62). A Church of England divine. He was born at Burford in Oxfordshire, Nov. 29, 1600. He studied at Oxford and through the interest of Laud, in whose theory of church and king he devoutly believed, was appointed chaplain in ordinary to King Charles in 1630. Subsequently he held a variety of livings, but was deprived of them during the period of the Commonwealth and lived in poverty and partial blindness, but continued his bitter anti-Puritan controversies. At the Restoration he was made subdean of Westminster as a reward for his literary services to the royal cause. He died in London, May 8, 1662. Heylyn was a very voluminous controversial writer, but his works are of no value now, except as illustrative of the age in which he lived and the High Church Royalist party to which he belonged. For his life, consult Robertson in his edition of Heylyn's *Ecclesia Restaurata,* where the *Life* of his son-in-law, Barnard, is reprinted (London, 1849).

HEYN, or HEIJN, hīn, PIET (1578–1629). A Dutch admiral. He was born at Delftshaven, near Rotterdam. In 1624 he engaged and utterly defeated the Portuguese in All Saints Bay, Brazil, and returned to Holland with an immense booty. Only two years after this he captured, in the Bay of Matanzas, almost without a blow, the grand Spanish silver flotilla, the value of which was estimated at 12,000,000 Dutch guilders. As a reward, he was named admiral of Holland, in 1629. Shortly after, he met his death in a naval encounter off Dunkirk.

HEYNE, hī'ne, CHRISTIAN GOTTLOB (1729–1812). A German classical scholar, born at Chemnitz in Upper Saxony. His father was a poor weaver. The pastor of Chemnitz, himself very poor, had Heyne educated at a school in the suburbs, and afterward sent him to the University of Leipzig, where he suffered from extreme poverty. In 1753 he obtained a situation as copyist in the library of Count von Brühl, then Prime Minister, at Dresden. While in this office, he prepared his edition of *Tibullus,* which appeared in 1755 and roused the admiration of Ruhnken, of Leyden. In 1756, unfortunately for Heyne, the Seven Years' War broke out. Frederick the Great marched against Dresden and burned, among other things, the Brühl library, but not before Heyne had edited, from a *codex* there, the *Enchiridion* of Epictetus; an edition of Lucian, however, which he had nearly completed, was destroyed. For some time he led a precarious life, being often without employment and without bread. In 1761 he married and supported himself as best he could by writing for the booksellers; in 1763 he was appointed professor of rhetoric at Göttingen on the recommendation of Ruhnken. This closed his

period of misfortune. The rest of his long life was spent in comfort and professional activity. The principal works of Heyne, besides those mentioned, are his editions of Vergil (1767; 6th ed., 1803), Pindar (1774), Apollodorus (1787), Pliny (1790), Conon and Parthenius (1798), and Homer (8 vols., 1792; 2d ed., 1804). He published many translations, besides some 10 or 12 volumes of minor works, of which six volumes were published separately under the title of *Opuscula Academica* (Göttingen, 1785–1812); and, finally, a great many reviews of books, etc. (7000 pieces or more in all) in the *Göttinger Gelehrte Anzeigen*, of which he was editor from 1770. In addition to this work he had a seminar for the advanced study of philology and classical antiquity, from which he sent forth no fewer than 135 professors. Consult: the Life of Heyne by his son-in-law, Ludwig Heeren (Göttingen, 1813); Hermann Sauppe, *Göttinger Professoren* (ib., 1872); Carlyle's essay, *On the Life of Heyne;* J. E. Sandys, *History of Classical Scholarship*, vol. iii (Cambridge, 1908).

HEYNE, Moritz (1837–1906). A Germanic philologist. He was born at Weissenfels, studied at Halle, and became instructor there in 1864, and assistant professor in 1869. In the following year he went to Basel as professor of German language and literature and in 1883 was called to a similar chair at Göttingen. His most widely known work is that in the continuation of Grimm's *Deutsches Wörterbuch* (in which he edited the letters H, I, J, L, M, R, and part of S) and his own *Deutsches Wörterbuch* (1890–95). More important possibly is his work in phonetics and old Germanic literature: *Kurze Laut- und Flexionslehre der altgermanischen Dialekte* (3d ed., 1880); *Altsächsische und altniederfränkische Grammatik* (1873); editions of Beowulf (6th ed., 1898; also a metrical translation of Beowulf, 1898); a translation of the Ruodlieb (1897); of the Heliand (3d ed., 1883); and *Altdeutsch-lateinische Spielmannsgedichte des zehnten Jahrhunderts* (1900); and in antiquities, *Kunst im Hause* (1881–83) and *Fünf Bücher deutscher Hausaltertümer* (1899–1901, the first two parts). Posthumously appeared *Das altdeutsche Handwerk* (1908).

HEYNLIN, hīn'lĕn, Johann (c.1425–96). A prominent theologian and humanist of the fifteenth century, variously called *a Lapide* and *Lapidanus*. He studied at Leipzig, Freiburg, Basel, and at Paris, where in 1468 he was made rector of the university and in the same year and in 1470 prior of the Sorbonne. After teaching at Basel and the new University of Tübingen (1478), he was preacher in the cathedral of the former city (1484), but retired to a cloister three years afterward. With Fichet he introduced the art of printing in Paris (1470). Consult Friedrich Fischer, *Johannes Heynlin, genannt a Lapide* (Basel, 1851).

HEYNRICHS, hīn'rīĸs, J. N. The pseudonym of the German author and reformer Jenny Hirsch (q.v.).

HEYSE, hī'ze, Johann Christian August (1764–1829). A German grammarian and lexicographer, born at Nordhausen and educated at Göttingen. He taught at Oldenburg, in his native town, and in Magdeburg. His writings, practical rather than scholarly in nature, are: *Allgemeines Fremdwörterbuch* (17th ed., 1892); *Deutsche Schulgrammatik*, under the new title *Deutsche Grammatik* (26th ed., by Lyon, 1900); *Leitfaden zum Unterricht in der deutschen Sprache* (27th ed., 1904).

HEYSE, Karl Wilhelm Ludwig (1797–1855). A German philologist, son of Johann Christian August Heyse, father of the German novelist Paul Heyse, born at Oldenburg. In 1816 he began his studies of philology and linguistics under Böckh and Bopp at Berlin, where he became assistant professor of philosophy in 1829. His work at first was mainly in Latin and Greek, but after his father's death he took up Germanics as well, and revised many of his father's works, especially the *Allgemeines Fremdwörterbuch*. His own works are: *Handwörterbuch der deutschen Sprache* (1833–49), both practical and scholarly; *Ausführliches Lehrbuch der deutschen Sprache* (1838–49), popularizing the results of historical and comparative linguistics; and *System der Sprachwissenschaft*, his most important work, edited by Steinthal (1856).

HEYSE, Paul (1830–1914). A distinguished German author, the son of Karl Wilhelm Ludwig Heyse, the lexicographer (q.v.), and Julie Salomon, a distant relative of Felix Mendelssohn. He was born in Berlin and was educated there and at Bonn, where he began to specialize in Romance languages and literatures under Diez. A stipend of 500 thaler enabled him to spend the year 1852–53 in study and travel in Italy. Even earlier, however, he had made his first dramatic effort on a subject which the Romantic revival had made very popular, *Francesca da Rimini* (1850). A little later appeared his epics, *Die Brüder* (Berlin, 1852) and *Urica* (ib., 1851), which, when they were republished in 1854, aided Geibel (q.v.) to secure Heyse's call to Munich (1854), to join the galaxy of poets at the court of King Maximilian. Here he made his home for the rest of his life, with frequent visits to Italy, whose culture influenced all his writing deeply. In later life he spent much of his time in Italy on the banks of Lake Garda. He was ennobled in 1910 and in 1911 was awarded the Nobel prize for literature. He died in April, 1914. The sum of Heyse's many and varied productions has made him a dominant figure among German men of letters. His prose fiction has been chiefly in the shape of short stories (about 165 in number), for which he came to hold a high position in German letters. These tales are models of their kind, masterpieces in miniature, cameos in which every line leaves an impression. The best collection of them is *Das Buch der Freundschaft* (1883); the most famous single example is *L'Arrabbiata* (1853). He also produced a few longer novels, tinged with radical thought on social and religious questions, especially: *Kinder der Welt* (1873); *Im Paradiese* (1875); and *Ueber allen Gipfeln* (1895), pessimistic in tendency, but fresh in style and gracefully light in movement. A large number of lyric and epic poems testify to a ripe culture, a warm imagination, and a suavity of expression which at times sacrifices strength to sweetness. The best known of his longer poems is the epic *Thekla* (1858). In his dramas (about 60 in number) he set himself a high standard, although he has not in any of them attained the highest dramatic rank. They lack genuine dramatic action. *Die Sabinerinnen* (1859), *Ludwig der Bayer* (1862), and *Hans Lange* (1866) are noteworthy among his plays; his later work includes *Maria von Magdala* (1899), *Das verschleierte Bild zu Sais* (1901), *Der Heilige*

(1902), *Ein Kanadier* (1905), and *Die Tochter der Semiramis* (1905), the first of which had a pronounced American success in 1902. Dramatic sketches from ancient life appeared, as *Mythen und Mysterien* (1904). In collaboration with Kurz and Laistrer he collected and edited *Der Novellenschatz des deutschen Volkes* (1871 et seq.), a large collection of the best German short stories, and *Der Novellenschatz des Auslands*, a similar collection of short stories in other tongues. The latest edition of his novels appeared in 12 volumes (1902–12), of his short stories in 24 volumes (1904–10). His dramatic writings are contained in 34 volumes (1864–1903). His reminiscences, *Jugenderinnerungen und Bekenntnisse*, appeared (vol. i) in 1901; vol. ii in 1912. Consult: Georg Brandes, *Moderne Geister* (Frankfort, 1887); Otto Kraus, *Paul Heyses Novellen und Romane* (ib., 1888); Friedrich Kummer, *Deutsche Literaturgeschichte des 19. Jahrhunderts* (Dresden, 1909); Erich Petzet, *Paul Heyse als Lyriker* (ib., 1913); A. H. Biese, *Deutsche Literaturgeschichte* (Munich, 1913).

HEYWARD, hā'wērd, Thomas, Jr. (1746–1809). An American jurist, one of the signers of the Declaration of Independence. He was born on the estate of his father, a wealthy planter of St. Luke's, S. C., and was educated in his native parish and in London, where he went to finish his law studies. His observations there and in other parts of Europe sent him home with strong republican ideas. From 1775 to 1778 he represented North Carolina in the Continental Congress; he became a judge of the civil and criminal court in his native province in 1780, was a captain of artillery in the war, and became a prisoner of the British at the surrender of Charleston. He was a member of the State convention for framing a constitution in 1790 and retired into private life the following year.

HEYWOOD, hā'wụd. A town and municipal borough in Lancashire, England, on the Roach, 9 miles north of Manchester (Map: England, D 3). It owes its present enterprise to the father of the first Sir Robert Peel, who first introduced manufactures. It is an important centre of the cotton manufacture, has extensive iron and brass foundries, boiler-making, steam-locomotive, and chemical works. It possesses handsome churches and other fine buildings. Coal is mined in the neighborhood. The municipality provides water, gas, markets, baths, fire brigade, technical school, free library, hospital, cemeteries, and owns a spacious park and recreation ground. It was incorporated in 1881. The corporation is composed of a mayor, six aldermen, and 18 councilors. Pop., 1901, 25,458; 1911, 26,697.

HEYWOOD, John (c.1497–c.1580). An English author, sometimes called "The Old Epigrammatist." The place of his birth has not been definitely ascertained, but it was probably London or North Mimms, Hertfordshire. At an early age he came to court, introduced, according to some traditions, by Sir Thomas More; and the "Book of Payments" of Henry VIII shows him to have been in the royal service in 1515, probably as a singer and a player on the virginals. He found great favor at the courts of Edward VI and Mary, where his quickness at repartee and his witty imagination, besides the literary flavor of his writings, made him the superior intellectually of the usual court jester. Shortly after the accession (1558) of Queen Elizabeth, he withdrew to Malines, Belgium. Of his literary remains the first chronologically were five *Interludes*, printed between 1533 and 1569. There are frequent plagiarisms from Chaucer; but they contain some original humor and vigorous satire, and the semidramatic form in which they are cast places them among the precursors of English comedy. A more ambitious but less successful production was *The Spider and the Flie*, which was printed in 1556. Written partly as a compliment to Queen Mary for her theological attitude, it represented Roman Catholics as the flies and Protestants as the spiders, with the Queen as the housemaid wielding her destroying broom. His best-known and most popular writings were the *Epigrammes*, the first extant edition of which bears the date 1562. The *Interludes* included: *A mery Play betweeen the Pardoner and the Frere, the Curate and Neybour Pratte* (1533); *A mery Play between Johan the Husbande, Tyb the Wife, and Syr Han the Priest* (1533); *The Four P's* (1569); *The Play of the Wether* (1533); and *The Play of Love*. His other works besides those mentioned were *A Dialogue on Wit and Folly* (reprinted in 1846) and another dialogue larded with proverbs and epigrams (reprinted in 1867), both of which appeared in 1562, and several ballads. Consult: J. O. Halliwell, *Dictionary of Old English Plays* (London, 1860); Sharman's Introduction to an edition of the *Proverbs* (ib., 1874); J. A. Symonds, *Shakspere's Predecessors in the English Drama* (new ed., New York, 1900); *Dramatic Writings of John Heywood*, edited by J. S. Farmer for the Early English Drama Society (London, 1905).

HEYWOOD, Thomas (c.1575–c.1650). A celebrated English dramatist and general writer, born in Lincolnshire. He seems to have studied at Cambridge. By 1596 he was apparently writing for the stage, and two years later he was engaged by Philip Henslowe as an actor. Heywood was a most prolific writer. In 1619 he became one of the Queen's players. In 1633 he claimed to have had "an entire hand, or at the least a main finger," in 220 plays. His career was not yet ended. Of these plays only 24 are extant. The best of them is a domestic drama entitled *A Woman Killed with Kindness*, performed in 1603. This play brings us close to the heart of English middle-class life. Somewhat similar to it is *The English Traveller* (1633). Representative of his work in low life is *The Wise Woman of Hogsdon* (1638). There are three admirable comedies of adventure: *The Captives* (ed. by Bullen, 1885), *The Fair Maid of the West*, and *Fortune by Land and Sea*. Besides his 220 plays, Heywood wrote many pageants, triumphs, elegies, a long heroic poem entitled *Troia Britannica*, a universal chronicle history (1609); *An Apology for Actors* (1612; reprinted for the Shakespearean Society, 1841); *Nine Books of Various History Concerning Women* (1624); *The Hierarchy of the Blessed Angels* (1635); and much else. He also made translations from Sallust, Lucian, Erasmus, and others. He died about 1650. Consult: *Dramatic Works* (ed. by Pearson, 6 vols., London, 1874); *Thomas Heywood*, a selection from his plays (ed. by J. A. Symonds and A. W. Verity, "Mermaid Series," ib., 1888); *Old English Plays* (ed. by Bullen, vol. iv, ib., 1885); Ward, *History of English Dramatic Literature* (New York, 1899); *The Best Plays of Thomas Heywood* (ed. by A. W. Verity, ib., 1904).

HEZ'EKI'AH (Heb. *Khizkiyāh*, Yahwe is my

strength). King of Judah, son of Ahaz. His reign may be approximately fixed as extending from 715 to 686 B.C. He ascended the throne at an early age—probably less than 20—and appears to have been early influenced by the discourses of the prophet Isaiah, through whom it is supposed that he was induced to remove from the cult at Jerusalem certain practices, such as the worship of the brazen serpent (2 Kings xviii. 3, 4). We possess but little authentic information about Hezekiah's reign. The most important event was an invasion of Palestine by Sennacherib (q.v.), King of Assyria (701 B.C.). With the help of the cuneiform annals of Sennacherib we can obtain a tolerably clear idea of this campaign, which was undertaken to offset the efforts of the Chaldæan King, Merodach-Baladan (cf. 2 Kings xx. 12–19), to make alliances with nations to the west whom Assyria claimed as vassals. Hezekiah and other rulers, such as the chiefs of the Philistines, of Edom, and of Moab, promised Merodach-Baladan aid in making Babylon independent of Assyria. Sennacherib, after overthrowing Merodach-Baladan, proceeds to the west to wreak vengeance on Hezekiah and his allies. He succeeds in quelling the uprising and removes those who had shown themselves faithless to him. Sennacherib advances within a few miles of Jerusalem, but, after exacting a heavy tribute, withdraws without capturing the Judæan capital (2 Kings xviii. 13). The King of Ekron, Padi, who had been sent to Hezekiah in chains by the war party, is handed over to Sennacherib, who restores him to his throne. The tribute is forwarded by Hezekiah to Nineveh. The probable reason for the withdrawal was the receipt of news of the insurrection of Belibni in Babylonia, which obliged Sennacherib to return to his land, content with having once more made his authority recognized in the west. It is not considered probable that after this Hezekiah ventured on any campaigns, so that the account (2 Kings xviii. 8) of a successful conflict with the Philistines is probably to be placed at the beginning of his reign. Many scholars maintain that it was on a subsequent expedition, nearer the end of Sennacherib's reign, that the catastrophe to his army occurred to which allusion is made in 2 Kings xix. 35, where the angel of Yahwe is said to have smitten 185,000 men, and also in Herodotus (ii, 141), where Sethos is said to have been delivered from an attack by Sennacherib, King of the Arabians and the Assyrians, by a multitude of field mice devouring all the quivers, bowstrings, and shield thongs, so that the unarmed host had to flee on the next morning. Sethos is probably another name for Tirhaka, who began to reign c.689 B.C. A recently published inscription of Sennacherib refers to an invasion of Arabia after the destruction of Babylon in 689 B.C. From certain notices (e.g., Proverbs xxv) it would appear that in his days considerable literary activity prevailed, though it is highly improbable that the King himself wrote anything. The song in Isaiah xxxviii, ascribed to the King as having been composed by him after a severe illness, belongs to the postexilic period, on the evidence of the language and contents, and the entire story of this illness is probably a bit of legendary lore that has found its way into an historical narrative because it served to illustrate the view taken by a later age of Hezekiah, who had become idealized like David and Solomon into a model king. Consult the histories of Israel and the commentaries on the Books of Kings and, especially for the second invasion of Sennacherib, Rogers, "Sennacherib and Judah," in *Studien Julius Wellhausen gewidmet* (Giessen, 1914).

H. H. The initials denoting the authorship of Helen Hunt, *née* Fiske. See JACKSON, HELEN F. H.

HIAWATHA, hī'ȧ-wą'thȧ. A city and the county seat of Brown Co., Kans., 40 miles northwest of Atchison, on the Missouri Pacific and the St. Joseph and Grand Island railroads (Map: Kansas, G 3). It has Hiawatha Academy and the Morrill Public Library, in a Carnegie library building. The city is chiefly important as the commercial centre of a fertile agricultural country, and has lumber yards, grain elevators, a flour mill, foundries, machine shops, etc. There are municipal water works and two electric-light plants, one of which is owned by the city. Hiawatha adopted the commission form of government in 1914. Pop., 1900, 2829; 1910, 2974.

HIAWATHA. A narrative poem by Henry Wadsworth Longfellow, founded on an Indian legend preserved in Schoolcraft's *Algic Researches*, and *History, Condition, and Prospects of the Indian Tribes of the United States*. However, the miraculously born hero is declared to be an Iroquois and not an Ojibway, according to other sources. Longfellow adopted the metre of the Finnish epic *Kalevala* and was accused of taking the entire plan from that poem. But the incidents common to both show merely the recurrence of early myths.

HIB'BARD, FREEBORN GARRETTSON (1811–95). An American Methodist Episcopal clergyman, born at New Rochelle, N. Y. He was the eighth son of the famous and eccentric Billy Hibbard. Entering the ministry in 1830, he served four terms as presiding elder and was a member of six general conferences; was editor of the *Northern Christian Advocate*, Syracuse, N. Y., for four years; and was the author of 10 volumes, the most important of which are: *Christian Baptism* (1841; 23d ed.); *Palestine: Its Geography and Bible History* (1850); *The Psalms Chronologically Arranged, with Historical Introductions* (1857); *The Religion of Childhood* (1864); and a biography of the Rev. Leonidas L. Hamline (1880).

HIB'BEN, JOHN GRIER (1861–). An American university president. He was born at Peoria, Ill., and in 1882 graduated from Princeton University (Ph.D., 1893). He also studied at Princeton Theological Seminary and at the University of Berlin. Ordained to the Presbyterian ministry in 1887, he was thereafter pastor at Chambersburg, Pa., until 1891. He then took up the teaching of logic at Princeton, where he was professor from 1897 until 1912, when he was chosen president of the university. Besides editing the *Epochs of Philosophy* (12 vols.), he is author of *Inductive Logic* (1896); *The Problems of Philosophy* (1898); *Hegel's Logic* (1902); *Deductive Logic* (1905); *The Philosophy of the Enlightenment* (1909); *A Defense of Prejudice, and Other Essays* (1911).

HIB'BERT LECTURES, THE. A course of lectures given annually in London, discussing some unsettled problem in religion or theology. The lectures are supported from a fund left by Robert Hibbert, a Jamaica merchant, who died in 1849, leaving his property in trust for the promotion of scholarship, particularly among Unitarians. By a wise provision the trustees were empowered to revise the terms of adminis-

tration from time to time, and in the exercise of this power they established the lectures in 1878. The first series was delivered in that year by F. Max Müller on "The Origin and Growth of Religion," and succeeding series have been given by Kuenon, Beard, Reville, Page Renouf, Renan, Rhys Davids, Pfleiderer, Rhys, Sayce, Hatch, Montefiore, Drummond, Farnell, and others. The lectures are published, and many of them are of great importance for the history of religion. The *Hibbert Journal* is also supported in part by the same fund.

HIB'BING. A village in St. Louis Co., Minn., 84 miles northwest of Duluth, on the Duluth, Missabe, and Northern and the Great Northern railroads (Map: Minnesota, E 3). It is situated in the famous Mesaba Iron Ore Range (see IRON), which has since 1892 produced more than 282,000,000 long tons. In 1912 the output was 32,600,000 tons, a considerable increase over the previous year, and more than 59 per cent of the total production of the United States. Within the village limits there are five of the country's largest mines. The water works and electric-light plant are owned by the municipality. Pop., 1900, 2481; 1910, 8832; 1914 (U. S. est), 12,211; 1920, 15,089.

HIBERNACULA, hī'bēr-năk'ū-lȧ (Lat. nom. pl., tents for winter quarters). A term often applied to the winter buds of certain aquatic plants, such as the bladderwort (*Utricularia*). They are heavier than water, and, being developed at the approach of cold weather, they become detached, sink to the bottom of the pond, and thus survive the winter. In the spring they enlarge, developing air spaces, rise to the surface, and reproduce their species. See BLADDERWORT.

HIBERNATION, hī'bēr-nā'shŭn (Fr. *hibernation, hivernation,* from Lat. *hibernare,* to hibernate,. from *hibernus,* winter, from *hiems,* winter, Gk. *χιών, chiōn,* Skt. *hima,* Av. *zima,* winter), AND ESTIVATION (Fr. *estivation,* from Lat. *æstivare,* to pass the summer, from *æstivus,* pertaining to the summer, from *æstas,* summer; connected with Lat. *æstus,* heat, Gk. *αἴθειν, aithein,* to burn, AS. *ād,* funeral pile, Skt. *idh,* to kindle). A physiological state of dormant vitality in which many animals in northern countries are able to pass the winter. It should not be confused with the torpor of freezing, which is a pathological and usually a fatal condition. The immediate cause of hibernation is not cold, for many animals go into their winter sleep some time before winter is on. Nor is it the lack of food, for the great bat begins sometimes to hibernate as early as the end of July, at a time when its insect food is still abundant. Moreover, the winter season is not the only one passed by animals in this kind of torpor. In dry countries, at the approach of the dry season, when moisture, herbage, and consequently animal food will be scarce, many kinds of animals are enabled to survive until the time of plenty again by going into a prolonged stupor, which seems not to be very different in kind or duration from the hibernation of northern forms. The Germans have for these two conditions the words "Winterschlaf" (winter sleep) and "Sommerschlaf" (summer sleep). The latter state is known in English as estivation.

Dormant Vitality, or rigor, is a term used for an apparent suspension of vital activity, distinguished from death by the possibility of resuscitation. Two general classes may be distinguished: (1) dormant vitality induced by external conditions; and (2) dormant vitality determined by internal conditions. The first class is of three kinds: (*a*) *Desiccation rigor.* There are certain animals, notably rotifers, tardigrades, and nematodes, which can be dried in a vacuum until they become immobile and can remain thus immobile for days or even months until, on the addition of water, they become active again. The organism has probably not lost all of its water, but has passed into an encysted condition; it is not dead, but its metabolism is greatly reduced. Even snails and other animals which can protect their internal tissues from complete loss of water may live for months without showing external activity. (*b*) *Dark rigor* is induced in green plants and even in certain fungi by their removal for several days from the light. The sensitive plant treated thus becomes immobile. Light is essential to movement. The reverse, or "light rigor," has been seen in bacteria. (*c*) *Heat rigor.* The sensitive plant, muscle, and various other forms of protoplasm become quiescent at a temperature a few degrees below that at which they are killed by heat. The rigor seems to be due to the beginning of the death changes. Cold rigor occurs in simple protoplasm as it approaches the zero (centigrade) temperature. The chlorophyll granules of Vallisneria move only about 1 millimeter per minute at 1° C. and not at all at 0°; the rotation of *Nitella* ceases at 0° C.; in *Tradescantia* hairs, movement is wholly arrested on freezing the cell cap. Even in seeds and bacteria, which are not killed by the lowest temperatures, all vital activities have probably ceased at 0°, for De Candolle found that in only one species out of 10 could he get a seed kept at 0° to germinate, and even then germination was so retarded that it took from 11 to 17 days as opposed to 4 days at 5.7°. Likewise, bacteria do not multiply below 5° to 10°. Among animals Kuhne found *Amœba* cooled to near 0° almost motionless. Purkinje and Valentin first noticed that the ciliated epithelium of the frog ceased its movements at 0°. Muscles of the frog were found by Kuhne to become at −3° to −7° a solid lump, which did not, however, wholly lack irritability. The evidence of all these cases shows that activity nearly ceases in protoplasm at or near 0° C.

Determined by internal conditions, seeds, resting spores, cysts, gemmules of sponges, and statoblasts of *Bryozoa* are all conditions of natural dormant vitality. The period of dormancy is not unlimited, however, the alleged germination of seeds many hundred years old not being confirmed. This indicates that even with a slow rate of living the food material eventually becomes exhausted.

Belief in human dormancy rests largely upon a certain collection of cases observed in India and published by James Braid.

Phenomena of Hibernation and Estivation. The physiological facts mentioned above must be considered in studying the phenomena of habitual animal dormancy under conditions of winter, seasons of drought, and so on. The respiration in winter sleep is diminished much more than in ordinary sleep, and consequently the heart beat is very slow. The digestive organs are practically inactive. Many animals void almost no fæces during this period, and the anal opening of those bears that hibernate is closed by a resinous plug known to hunters as the seal. The temperature of the body is lowered to that or nearly that of the air. The voluntary control of

the muscles is lost, but there is an increased muscular irritability, an unusual sensitiveness to external stimuli. The slightest touch possible, even on the end of a quill of a hibernating porcupine, will result in deep breathing and perhaps muscular movements. There can be no sharp line drawn between normal sleep and the lethargy of hibernation, for there are all gradations in the depth and duration of this lethargy, beginning at the one end of the scale with what might perhaps be simply termed sleep, and ending with animals that do not once wake up from the hibernating stupor until the time for its final termination has come.

Nearly all of the burrowing rodents are hibernators, especially, in the United States, the woodchuck. A number of animals indulge in alternate periods of waking and hibernation. The English squirrel, the hedgehog, and the mourning-cloak butterfly are frequently awake on warm days in winter. Grain-storing animals spend a great deal of their time in sleep, but when hungry they awake to partake of their food supply or go outside in search of fresh food if weather permits. In the case of the northern brown, black, and polar bears only the female hibernates in the strict sense of the word, probably because she must remain quiet until her young is born, often before the snow releases her. The males sleep a great deal, but they go out now and then in search of food. A number of animals of wide range of distribution hibernate in the northern but not in the southernmost parts of their range. Such is the case with the American prairie dogs and the skunk. In the centre of their range they are awake and active during warm winters or warm days in winter. Thus, there are all degrees of torpidity, and likewise gradations between ordinary periodical sleep and hibernating dormancy. Although we cannot understand why animals of one species should be active in winter while those of a nearly related species should hibernate, as is the case among mice, nevertheless, it is probably of advantage in the struggle for existence, since it enables animals to remain in certain geographical areas in which they could not possibly survive without long and perilous migrations twice each year. This is especially true of the small vegetable-eating animals of northern plains.

Mammals usually hibernate in hollow logs, in trees, in caverns, or even in burrows in the ground. Usually their winter homes are made additionally fitting by a bed or nest of dry grass and autumn leaves. Most of the hibernators are entirely or in part vegetable feeders. All the grain-storing species are active all winter, or else are intermittent hibernators.

Reptiles, amphibians, and some fishes hibernate. The land reptiles and amphibians bury themselves in the ground below frost line and there remain until spring. Aquatic species, such as the water turtles, burrow in the mud at the bottom of streams. A few fishes, such as carp, chub, minnows, and eels, likewise lie throughout the coldest part of the winter in the mud and débris at the bottom of the water. Various snakes crawl into crevices between rocks, or into hollows beneath stumps, or take possession of gopher burrows and the like, or even burrow themselves into loose soil, and pass the winter often wrapped in a tangled mass composed of scores of individuals of the same species. The temperature of these sinks to that of the water or mud in which they lie; and those of a northern habitat can endure a stress of cold to which individuals of the same species living in a warmer region will succumb.

Among the invertebrates land snails hibernate within their closed shells. They also afford the most conspicuous American example of estivation. When the dry, hot weather of midsummer approaches, many species secrete two or three diaphragms across the aperture of their shells and behind these remain as torpid as in winter until tempted out by a prolonged shower, until the autumn coolness and dampness arrive. Slugs bury themselves in the ground, and the bivalve mollusks in the mud at the bottom of streams and ponds. A great many of the other land invertebrates survive as eggs or spores which remain inactive during the winter and begin to develop on the return of spring. Spiders, more or less active, hide under fallen leaves or bark and in other secluded places. Insects pass the winter in all stages of development. A number of beetles, flies, bugs, and a few butterflies winter as adults in northern climates. A large number of butterflies and moths pass the winter as pupæ, frequently protected by a silken cocoon. Several kinds of caterpillars are able to survive the winter either in spun nets or in sheltered hollows or chinks. A vast host of insects survive as eggs, whose development is delayed until spring.

Upon waking from their stupor the heat of the body of hibernating animals very quickly increases to the normal. Hunger is probably the chief agent that calls such animals to activity again. The most profound sleepers can scarcely be kept awake when brought into a warm room and stimulated. Partial hibernators, after a hearty meal in winter, resume their torpor again. The air under a bell jar, in which a hibernating dormouse is put, remains unchanged. Hall kept a hibernating bat under water 15 minutes without fatal effect, while a wakened bat will succumb after three minutes. Carbon dioxide, which is speedily fatal to active animals, has no effect on a torpid marmot. Hibernators lose their weight in winter to the extent of 30 to 40 per cent. This loss of weight indicates that, notwithstanding their great diminution, the vital processes are going on in the hibernating animal all the time.

Consult: Hall, "Hibernation," in Todd, *Cyclopædia of Anatomy and Physiology*, vol. ii (London, 1838); Browne, *Animal Torpidity and Hibernation* (Philadelphia, 1847); Semper, *Animal Life* (New York, 1881); Gadow, Beddard, Sharp, and other writers in the *Cambridge Natural History* (London, 1895–1903).

HIBERNIA, hī-bĕr′nĭ-ȧ, **IVERNA**, ĭ-vĕr′nȧ, **JUVERNA**, jū-vĕr′nȧ, or **IERNE**, ĭ-ĕr′nē (probably connected with Welsh *Ywerddon*, MBret. *Yuerdon*, Ir. *Erin*, *Herin*, Ireland, akin to Gk. Πιερία, *Pieria*, name of a district in Greece, Skt. *pīvan*, fat; cf. also MWelsh *Ewyrdonic*, Irish). Names by which Ireland is designated in the classical writers. Aristotle speaks of two islands situated in the ocean beyond the Pillars of Hercules, which were called "Albion, and Ierne, beyond the Celtæ." Both Diodorus Siculus and Strabo report the natives to be addicted to cannibalism, but without proof. Pomponius Mela declares the herbage to be so luxuriant that the cattle which feed on it sometimes burst. Pliny repeats this statement and adds that the Hibernian mother trains her child from the very first to eat food from the point of a sword. The

most important of all classical authorities on Hibernia is Ptolemy, who describes the country and gives the names of the principal rivers, promontories, seaports, and inland towns. The island was never conquered by the Romans. See IRELAND.

HIBER'NIANS, ANCIENT ORDER OF. A prominent Catholic Irish organization. The society was instituted originally for the protection of the Catholic priesthood and religion in Ireland, but it has now for its main object "the advancement of the principles of Irish nationality." According to some authorities the order was first instituted in 1642, following the great uprising in the north; according to others, in 1651, when Cromwell had proclaimed nearly the whole native population outlawed and had put a price upon the head of every priest and made it death to attend a Catholic service. The founder was Rory O'Moore, and the society was at first known as *The Defenders*. On the establishment of Catholic emancipation, in 1829, the society was reorganized under its present name as a beneficial and Nationalist organization. It was soon afterward extended to England and Scotland, was introduced in the United States in 1836, and later into Canada, Mexico, and Hawaii. Its membership is restricted to persons of Irish birth and descent and of Catholic faith. The order is an active supporter of the present Gaelic movement (see GAELIC LEAGUE), having endowed a Celtic chair at the Catholic University of America and contributed generously towards the support of Gaelic organizers in Ireland. In 1914 the American branch, including the ladies' auxiliary, had a membership of over 250,000. In the fiscal year 1913 there were disbursed over $2,500,000 for charitable, educational, and patriotic purposes. The American branch is closely affiliated with the parent body in Ireland as well as with those in England, Scotland, Australia, and other parts of the world.

HIBER'NICISM. A term used to denote any turn of expression that belongs to, or is generally attributed to, Irish speech, and especially the Irish bull, which involves the advancing of a self-contradictory proposition or ludicrous inconsistency that a moment's thought would show to be absurd. A famous bull was made, it is said, by Sir Richard Steele when inviting a certain lord to visit him: "If, sir, you ever come within a mile of my house, I trust you will stop." Curran also used to relate a fine specimen. He started one day to attend a levee at the castle in Dublin. There was a long line of carriages, and he was suddenly startled by the pole of the carriage behind crashing into the back of his own carriage. He hastily called to his coachman to stop, saying, "The pole of the carriage in the rear is driven into ours." "And, sure, it's all right again, thin, your honor," cried Pat, "for I've just drove me pole into the carriage in front." Richard and Maria Edgeworth wrote an amusing treatise entitled *An Essay on Irish Bulls* (1802); and Maria Edgeworth's *Castle Rackrent* (1800) is full of the most delightful examples of this peculiarly Irish form of blunder. See BULL; ROCHE, SIR BOYLE.

HIBIS'CUS (Lat., from Gk. *ἰβίσκος, hibiskos*, mallow). A genus of plants of the family Malvaceæ, the numerous species of which are shrubs or trees, but mostly large herbaceous annuals and perennials, natives of warm climates. The flowers of many are very beautiful. *Hibiscus syriacus*, a native of Syria and Carniola, has long been in cultivation as an ornamental shrub and has proved hardy in Great Britain and parts of the United States, where it is often known as shrubby Althæa. Some are favorite hothouse plants. The characteristic mucilaginous and fibrous properties of the Malvaceæ are very strongly developed in this genus. *Hibiscus abelmoschus* so abounds in mucilage that it is used in the northwest of India for clarifying sugar. The unripe fruit of *Hibiscus esculentus*, an annual plant with a soft herbaceous stem 3 to 5 feet high, crenate leaves, axillary sulphur-colored flowers, and pyramidal, somewhat pod-like capsules, is in general use both in the East and West Indies and southern United States for thickening soups and otherwise as an article of food. It is called okra, gumbo, gombo, gobbo, and ochro in the West Indies and southern United States; bandikai, ram-turai, and denroos in different parts of India; and bammia in the west of Africa. The bark of *Hibiscus tiliaceus*, a tree 20 feet high with a very thick bole, abounds in

HIBISCUS SYRIACUS.

mucilage and is sometimes used by natives of the South Sea Islands when food is scarce. This tree, the bola of Bengal, and the moho, majagua, or mohaunt of the West Indies, is one of the most abundant trees of the South Sea Islands; and the wood, which is light, tough, and durable, is used for many purposes. The very porous bark is made into cordage and matting in various tropical countries. Many other species yield fibres; but the most important in this respect is *Hibiscus cannabinus*, the Ambaree hemp, and Deccan hemp of western India, called palungoo at Madras, and mesta pat in Bengal—a plant very generally cultivated in all parts of India, although nowhere to a great extent. It is an annual herb with a straight, unbranched stem, 3 to 7 feet high. The fibre is not so strong as hemp and is useful only for ropes and coarse fabrics. It has been suggested that many species of *Hibiscus* might be found valuable for the manufacture of paper. *Hibiscus sabdariffa*, Jamaica sorrel or roselle, is very generally cultivated in warm countries, on account of its calyx, which, as the fruit ripens, becomes fleshy and acquires a very pleasant acidity. It is used for making tarts and jelly, resembling the cranberry in this respect, and a decoction of it, sweetened and fermented, affords a refreshing beverage. *Hibiscus abelmoschus*, sometimes called musk mallow, common in tropical countries, is cultivated for its seeds, called ambrette, or *graines d'ambrette*, which have a fragrance in-

termediate between musk and amber, and are much used by perfumers. In Egypt and Arabia these seeds are mixed with coffee, and stimulant and stomachic qualities are ascribed to them. The petals of *Hisbicus rosa-sinensis* are astringent and are used by the Chinese to blacken their eyebrows and their shoes. A number of species of *Hibiscus* are cultivated as ornamental plants in the United States, while others are extensively grown as ornamental hedge plants in the tropics. A large number of ornamental hybrids have been produced. There are several indigenous species in eastern and southern United States. See Plate of YAM, SWEET POTATO, ETC.

HICCOUGH, hĭk'kŭp, or **HICCUP.** SINGULTUS. Sudden short, convulsive inspirations, attended with a peculiar sound produced in the larynx by the inrush of air. The movements concerned in the production of hiccough are a spasmodic contraction of the diaphragm and a certain degree of constriction in the glottis. The incoming column of air striking the partly closed glottis occasions the peculiar sound. These convulsive inspirations commonly succeed each other at intervals of a few seconds. The paroxysm may last only a few minutes, or may extend to hours or days, in which case it may be dangerous to life, from the exhaustion which it causes. Overdistention of the stomach by food or drink or by gas is the most frequent cause. Certain diseases are frequently attended by hiccough. It occurs occasionally after severe hemorrhage, in debilitating diseases, pneumonia, peritonitis, appendicitis, etc., in which cases it is a grave symptom. In typhoid fever it is often the sign of perforation or general peritonitis.

When the attack is slight, it may often be stopped by making a very full inspiration, and then holding the breath as long as possible, the diaphragm being thus held in a state of voluntary contraction. A drink of water gives relief in many cases. In more obstinate cases aromatic spirit of ammonia, camphor, musk, or an emetic, may be resorted to. When hiccough continues for an hour or more and the exhaustion is great, a general anæsthetic may be necessary. Hypnotism has proved successful in neurotic individuals; sticking the tongue far out of the mouth and holding it there for two minutes or more has cured others. Lastly, counterirritation over the back of the neck is sometimes efficacious.

HICH'BORN, PHILIP (1839–1910). An American naval officer. He was born in Charlestown, Mass., studied in the Boston High School, was a shipwright apprentice in the Boston Navy Yard, and, having gone to California in 1860, became master shipwright of the Mare Island Navy Yard in 1862. He entered the navy in 1869 with rank of lieutenant and served as assistant naval constructor until 1875, when he was commissioned full constructor. Four years afterward Hichborn was sent to Europe to report on foreign dockyards, and his book on this subject became a standard textbook. For a time he served on the board of inspection and survey, and in 1881 he was appointed to the naval advisory board. In that capacity and as chief constructor, in which position he served in 1893–97, he was prominently connected with the construction of the new navy. He was retired in 1901, with the rank of rear admiral.

He was the author of *European Dockyards, Standard Boats,* and *Sheathed and Unsheathed Ships,* and was the inventor of the Franklin life buoy and the Hichborn balanced turrets.

HICH'ENS, ROBERT SMYTHE (1864–). An English novelist, born at Speldhurst in Kent. He was educated at Clifton College, the Royal College of Music, and the London School of Journalism. He began early to write lyrics for music, and stories. His *Green Carnation* (1894), published anonymously and attributed to Oscar Wilde, created a sensation. It is a satire on the decadents. Among succeeding novels are: *An Imaginative Man* (1895); *Flames* (1897); *The Slave* (1899); *Tongues of Conscience* (1900), short stories; *The Prophet of Berkeley Square* (1901); *Felix* (1902); *Black Spaniel, and Other Stories* (1905); *The Garden of Allah* (1905), elaborately presented as a play in New York; *Bella Donna* (1909), in which Madame Nazimova starred in 1913; *The Dweller on the Threshold* (1911); *The Way of Ambition* (1913). He also collaborated in successful plays, as *The Medicine Man* and *Becky Sharp.* In 1914 he published *The Spell of the Holy Land.*

HICKES, GEORGE (1642–1715). An English nonjuring clergyman, philologist, and author. He was born at Newsham, Yorkshire, studied at Northallerton Grammar School, then proceeded as sizar to Oxford, where he graduated B.A. in 1662. In 1664 he received a fellowship of Lincoln College and the following year received his M.A. degree. He was ordained at Lincoln College in 1666, was a tutor for a time, visited France in 1673, was appointed rector of St. Elbe, Oxford, in 1675, and in 1676 became chaplain to the Duke of Lauderdale, whom he accompanied on his journey as High Commissioner to Scotland. Several rapid promotions culminated in a chaplaincy to James II and the deanship of Worcester (1683). At Worcester his study of the Germanic languages resulted in the publication of the *Anglo-Saxon and Mœso-Gothic Grammar* (1689). At the time of the revolution he refused to take the oath of allegiance to William and Mary and was deprived of his benefices. In 1693 he visited the exiled King at Saint-Germain, with a mission from the nonjuring clergy for coördinate action in regard to the continuance of their episcopal rights, and in 1694 he was consecrated by their leaders as Suffragan Bishop of Thetford. His subsequent publications in controversial and practical divinity were numerous. His greatest work is *Linguarum Veterum Septentrionalium Thesaurum Grammatico-Criticum et Archæologicum* (3 vols., 1703–05). Among his other writings are *Controversial Letters* (1710), *Sermons* (1711), and a volume of *Posthumous Discourses,* published in 1726.

HICK'EY, EMILY HENRIETTA (1845–). An English poet and prose writer, born at Macmine Castle, Wexford, Ireland. With F. J. Furnivall she founded the Browning Society (1881), and she became known as a lecturer. In 1902 she edited, and rendered from old English, the romance *Havelock the Dane.* Her other publications include: *A Sculptor and Other Poems* (1881); *Verse Tales* (1889); *Michael Villiers, Idealist, and Other Poems* (1891); *Poems* (1896); *Our Lady of May and Other Poems* (1902); *Thoughts for Creedless Women* (1905); *Lois* (1908); *Our Catholic Heritage in English Literature* (1910); *Later Poems* (1913).

HICKEY, JAMES A. HARDEN-. See HARDEN-HICKEY.

HICK'OK, LAURENS PERSEUS (1798–1888). An American writer on philosophy. He was

1. BITTERNUT HICKORY (Carya amara).

2. SHAGBARK HICKORY (Carya alba).

born in Bethel, Conn., was pastor at Newtown, Kent, and Litchfield, Conn. (1822–36), professor of theology in Western Reserve College, Ohio (1836–44), professor in Auburn Theological Seminary (1844–52), professor of mental and moral science in Union College, and vice president (1852–66) and president (1866–68). After his resignation of the last-named office Dr. Hickok resided at Amherst, Mass. Among his published works are: *Moral Science* (1853); *Mental Science* (1854); *Rational Cosmology* (1858); *Rational Psychology* (1861); *Humanity Immortal* (1872); *Creator and Creation* (1872); *Logic of Reason* (1874).

HICK'ORY. A city in Catawba Co., N. C., 67 miles by rail northwest of Charlotte, on the Southern and the Carolina and Northwestern railroads (Map: North Carolina, A 2). It is the seat of Lenoir College (Lutheran), opened in 1891, of the Claremont Female College, opened in 1880, and has a hospital.

There are furniture, chair, and cotton factories and manufactures of flour, lumber, foundry products, compressed-air pumps, hosiery, gloves, overalls, horse collars, carriages and wagons, leather, etc. Hickory adopted the commission form of government in 1913. The city owns its water works. Pop., 1900, 2535; 1910, 3716.

HICKORY (formerly *hiccory, pohickery*, from the North American Indian name). *Carya*, or *Hicoria*. A genus of trees formerly included among walnuts (*Juglans*) in the family Juglandaceæ. The hickories are exclusively North American, but some are grown in European forests for their valuable timber. They are large and beautiful trees, with pinnate leaves, and attain a height of 70 or 80 feet. Their timber is very heavy, strong, elastic, and tenacious, but decays speedily when exposed to heat and moisture and is peculiarly liable to injury from worms. Great quantities of hickory are used to make hoops for casks. It is much used for handspikes, axe handles, baskets, agricultural implements, etc.; the second growth, being tougher, is preferred for these purposes. When used for baskets, the logs are cut into sections of the required length, steamed in vats, and cut in a veneering machine, after which they

SHELLBARK HICKORY (*Carya ovata*).

are chopped into splints of the required width. Shafts of carriages, handles of whips and golf clubs, large screws, etc., are made of hickory. It is greatly esteemed for fuel. The fruit of the hickory is a smooth, hard-shelled nut covered by a four-parted husk, which in most species separates to the base upon maturity. The nuts of some of the species are of excellent flavor. The shellbark and shagbark hickories are so called from their shaggy outer bark which peels off in long, narrow plates. The hickories are found from Maine to Florida and west to Minnesota, Kansas, and Texas, and extending into Mexico, several species occurring throughout the entire range. The trees are mostly slow-growing. In forests they grow tall with few limbs, but in the open they branch widely and have many desirable qualities desired in park trees.

The principal species, according to different authorities, are:

	Gray (Seventh Edition).		Britton and Brown.	
Pecan	*Carya*	*illinoensis*	*Hicoria*	*pecan*
Shellbark hickory	"	*ovata*	"	*ovata*
Big shagbark hickory	"	*laciniosa*	"	*laciniosa*
Mockernut hickory	"	*alba*	"	*alba*
Pignut hickory	"	*glabra*	"	*glabra*
Bitternut hickory	"	*cordiformis*	"	*minima*
Water hickory	"	*aquatica*	"	*aquatica*
Nutmeg hickory	"	*myristicæformis*	"	*myristicæformis*
Small pignut hickory	"	*microcarpa*	"	*microcarpa*

The Mexican hickory, *Carya mexicana*, and the Texan hickory, or bitter pecan, are other important species.

HICKORY-POLE CANVASS. The name given to the canvass for Andrew Jackson in the presidential election of 1828.

HICKORY SHAD. See MUD SHAD.

HICKS, ELIAS (1748–1830). An American minister of the Society of Friends, born at Hempstead, L. I. While still a young man of 20, he began to feel a deep interest in religion. He began the work of a minister in 1775, and within a few years his upright life and his ability as a speaker gained for him universal recognition. During the next half century he traveled widely through the Eastern States from Maine to Maryland, preaching and organizing new meetings. He was an earnest and influential advocate of abolition, not hesitating to speak against slavery even in such a slaveholding community as Maryland. To his efforts was due in large measure the passing of the act (in 1817) which emancipated all slaves in New York in 1827. He first became the leader of a faction in the society in 1817. For a number of years before that there had been a determined effort made by some of the members to effect a closer union with the Friends of the English society, and as a step towards this was proposed the adoption of an orthodox creed, the main points of which were the deity of Christ and the vicarious atonement. The proposition met with considerable favor in Philadelphia, and a number of Friends from that city went down to the Baltimore yearly meeting in 1817 to advocate it there. Hicks, who was present, spoke eloquently against the measure and secured its rejection. From that time may be dated the schism in the society which became complete in 1828. Hicks was charged with denying the atonement and the divinity of Christ. Those who agreed with him—called Hicksites as a term of reproach—formed a separate body, and for many years there was great bitterness of feeling between the two factions. Of late, however, this has largely disappeared. Hicks published: *Observations on Slavery* (1811); *Sermons* (1828); *Journal of the Life and Religious Labors of Elias Hicks* (1832); *Letters* (1834). Consult his life, by Wilbur (Philadelphia, 1910). See FRIENDS.

HICKS, John Braxton (1823–97). An English gynæcologist and anatomist, born at Rye and educated at Guy's Hospital in London and at the University of London. He was obstetric physician at Guy's Hospital from 1858 to 1883, and at St. Mary's Hospital from 1888 to 1893. He became a fellow of the Royal Society in 1862 and was president of the Obstetrical Society (1871) and of the Hunterian Society (1879). He wrote *The Honey Bee* (1860), with James Samuelson, besides many contributions to the *Guy's Hospital Reports*, to the *Transactions* of the Obstetrical Society, to the *Proceedings* of the Medical Society, and to the *Lancet*.

HICKS (Edward) Seymour (1871–). An English actor, playwright, and manager. He was born in St. Heliers, Jersey, the son of an English captain in the Forty-second Highlanders. He was educated for the army, but could not pass his entrance examinations, and went on the stage before he was 17. He married Ellaline Terriss and played with her in England and on five tours of the United States. In 1892 he played in *Walker, London*, J. M. Barrie's first play, at Toole's Theatre, London; dramatized with Laurence Irving Le Fanu's *Uncle Silas;* and wrote a military one-act sketch, *The New Sub*, which ran 400 nights. In *Under the Clock*, a theatrical travesty, or *revue*, which he wrote with Charles Brookfield, Hicks first had a dancing and singing part of the kind he later made famous. In 1893–98 he was leading light comedian of the Gaiety Company, and his great success after that time was due to his part in developing the typical Gaiety shows —musical comedies such as *The Shop Girl* (1894), *My Girl* (1895), *The Circus Girl* (1896), *The Runaway Girl* (1898), *The Cherry Girl*, which he wrote with Caryll (1903), and *The Earl and the Girl*. His best rôle in the legitimate was Scrooge in the *Christmas Carol*. He became lessee of the Aldwych and Hicks theatres in London. Consult his brightly written autobiography *Seymour Hicks, Twenty-Four Years of an Actor's Life* (London, 1910).

HICKS, Thomas (1823–90). An American portrait painter. He was born in Newtown, Pa., and studied at the Philadelphia Academy and afterward at the National Academy, New York. Visiting Europe from 1845 to 1849, he studied with Couture in Paris. He was elected member of the National Academy in 1851 and established studios in New York and Trenton, N. J. His color is good, his drawing is carefully executed, with elaborate accessories, and his composition is well balanced. Some of his best-known portraits are: Edwin Booth as Iago, Henry Ward Beecher, Longfellow, Dr. Kane, William M. Evarts, Bayard Taylor, Hamilton Fish, Luther Bradish (1857); Henry Abbot (1863), New York Historical Society; Parke Godwin (1879); Mrs. S. F. Billings (1883); Dr. James R. Wood (1884), New York Academy of Medicine.

HICKS, Thomas Holliday (1798–1865). An American politician, born in Dorchester Co., Md. He became sheriff in 1824 and a member of the State Legislature a few years later, was a member of the State Electoral College and was again elected to the Legislature in 1836, and in 1837 served on the Governor's Council. From 1858 to 1862 he was Governor of the State. He strongly sympathized with the South and was indignant with the Northern people for their general attitude towards slavery and in particular for their refusal to enforce the Fugitive Slave Law. When actual hostilities between the two sections began, he seemed to think that the State could assume a neutral attitude and largely by his refusal to call a special session of the Legislature managed to block radical measures. He saw that secession for Maryland meant devastation, and his policy gradually evolved itself until he found himself vigorously opposing secession and defying the Legislature. Rumors were current in the early part of 1861 of a plot in which 3000 citizens of the State were organized to prevent Lincoln's inauguration and seize the city of Washington. He made preparations to thwart the attempt, caused State arms to be seized, suspended the writ of habeas corpus, planned the arrest of suspected persons, and indorsed the administration in establishing a censorship of the press and in breaking up the Legislature. This body at his summons had met in special session at Frederick in April, 1861, and had declared against secession. The proximity and alertness of the Federal headquarters was in reality all that prevented a serious secessionist movement, Hicks being the only prominent official of the State who stood by the government. At the expiration of his term as Governor, a new Legislature passed resolutions thanking him in its name and in the name of the people of Maryland for his attitude during the crisis and declaring that it was he who had kept the State from joining the Confederacy. In 1862 Lincoln offered him the rank of brigadier general, but ill health prevented his acceptance. In the same year he was appointed to the Senate to supply the vacancy occasioned by the death of Senator Pearce and served in that body during the remainder of his life. Although he was at the same time denounced for selling the State to Lincoln and praised for saving it by his remarkable ability, it is largely the uniqueness of the position in which he was placed which makes him especially memorable. Consult: G. L. P. Radcliffe, "Governor Hicks of Maryland and the Civil War," in the *Johns Hopkins University Studies in Historical and Political Science* (19th series, nos. xi, xii, Baltimore, 1901).

HICKS, William. See Hicks Pasha.

HICKS, William Mitchinson (1850–). An English physicist, born in Launceston, Cornwall. He was educated at St. John's College, Cambridge, of which he became fellow in 1876. In 1883–1905 he was principal of Firth (after 1895, University) College, Sheffield, and professor of physics. In 1912 he received the Royal Society's gold medal. Besides contributions to the *Transactions* of that society on many branches of mathematics and physics, most notably perhaps on spectroscopy, he wrote *Elementary Dynamics of Particles and Solids* (1890; 2d ed., 1897).

HICKS-BEACH, Michael Edward, Viscount St. Aldwyn (1837–1916). An English administrator and financier, born in London. He was educated at Eton and at Christ Church, Oxford, entered Parliament in 1864 for East Gloucestershire, and from 1885 to 1906 represented West Bristol. He was Chief Secretary for Ireland in 1874–78 and 1886–87 and Secretary of State for the Colonies in 1878–80. In 1885 Lord Salisbury appointed him Chancellor of the Exchequer and leader of the House of Commons, and he held office for a year. He was President of the Board of Trade from 1888

to 1892. In 1895, after the fall of the Gladstone ministry, he again became Chancellor of the Exchequer and administered this office with marked ability until his resignation, in 1902, immediately after the retirement of Salisbury. He assailed the new tariff policy of Joseph Chamberlain and founded the Unionist Free Food League. In 1904–06 he was chairman of the Royal Commission on Ecclesiastical Discipline; after the retirement of the Balfour ministry in December, 1905, he was raised to the peerage as Viscount St. Aldwyn, and after 1908 he was a member of the Ecclesiastical Commission. Consult Justin McCarthy, *British Political Portraits* (New York, 1903).

HICKSITES. See FRIENDS; HICKS, ELIAS.

HICK'SON, SYDNEY JOHN (1859–). An English zoölogist, born in London and educated at University College School and at Downing College, Cambridge, of which he became honorary fellow. In 1882 he was appointed an assistant at Oxford, in 1888 deputy professor of zoölogy, and in 1890 lecturer in advanced morphology. In 1894 he was appointed professor of zoölogy in Victoria University, Manchester. He traveled in the Malay Archipelago in 1885–86 and wrote: *A Naturalist in North Celebes* (1889); *The Fauna of the Deep Sea* (1894); *The Story of Life in the Seas* (1898); and chapters in vol. i of the *Cambridge Natural History* (1906) and in Lankester's *Treatise on Zoölogy* (1909).

HICKS PASHA, pâ-shä' (properly, WILLIAM HICKS) (1830–83). An English soldier. He entered the British East Indian army as an ensign in 1849 and left the service in 1880 as an honorary colonel. Three years later he was appointed to the command of the Egyptian army in the Sudan and with a force of from 10,000 to 12,000 native troops went against the Mahdi. He at first won what seemed a decisive victory near Khartum in April; but in September, when he crossed the desert of El Obeid with a force of 10,000 to suppress a rebellion, he found himself betrayed into an ambuscade, and after a battle of three days, ending with the massacre of nearly all his army, he fell in a last desperate charge of his mounted staff (November 5). Consult Colborne, *With Hicks Pasha in the Sudan* (London, 1884).

HIDAGE, hīd'āj (from *hide*, AS. *hīd, hīgid, hīged*, a certain portion of land, from ONorthumbrian *hīgan*, AS. *hīwan*, members of a family). An extraordinary tax, usually of two shillings, paid to the Norman and early Angevin kings of England on every "hide" (q.v.) of land. It was gradually superseded by the carucage. See CARUCATE.

HIDALGO, ē-däl'gō. A central state of Mexico, bounded by the State of San Luis Potosí on the north, Vera Cruz and Pueblo on the east, Tlaxcala and Mexico on the south, and Querétaro on the west (Map: Mexico, K 7). Area, 8917 square miles. The northern and northeastern portions are traversed by the east range of the Sierra Madre and form a wild and rough mountain region, rising in its highest elevation to over 10,000 feet. The southern and western parts are mostly flat and traversed by fertile valleys. The climate is warm in the lower regions, and the agricultural products include cereals, sugar cane, tobacco, coffee, maguey, and cotton. The state has extensive mineral wealth, and mining is the chief industry. The chief mineral products are silver, quicksilver, copper, iron, lead, and zinc. Coal and marble are found. Cotton and woolen goods, bricks, and pulque are the principal manufactured products. The southern part is traversed by several railway lines. Pop., 1910, 646,551; 1912 (est.), 655,187. Capital, Pachuca (q.v.).

HIDALGO. See PACHUCA.

HIDALGO DEL PARRAL, dĕl pär-räl'. See PARRAL.

HIDALGO Y COSTILLA, ē kō-stē'lyä, MIGUEL (1753–1811). A Mexican priest and revolutionist. He was born at Corralejo, studied at Valladolid in Mexico, and was given charge of the parish of Dolores in the State of Guanajuato. Dissatisfied with the government, he conspired with the Indians to raise a general insurrection on Nov. 1, 1810. The betrayal of the plot to the government forced him to hasten his plans, and the revolt began in September in the town of Dolores. His eloquence had a powerful effect on the people, and to heighten the enthusiasm he carried aloft the banner of Our Lady of Guadalupe, patron saint of Mexico, and gave to his insurrection the character of a crusade. He took the towns of Guanajuato and Guadalajara and with an army of 80,000 men marched on Mexico, defeating on the way a small force of soldiers sent to oppose him; but the decree of excommunication launched against him, and the discord prevailing among his lieutenants, caused his forces to melt away and forced him to retreat. He succeeded, however, in reuniting his men to meet the army sent against him by the government; but his disorderly mob of 100,000 men were pitilessly crushed by the onset of 6000 Spanish veterans, Jan. 17, 1811. Hidalgo fled and set out for the United States to procure assistance, but was captured, degraded from his priestly office, and shot. Some years later he was extolled as a saint, and the newborn Republic erected a magnificent statue to him. Consult A. H. Noll and A. McMahon, *Life and Times of Miguel Hidalgo y Costilla* (Chicago, 1910).

HIDATSA, hē-dät'sä. See MINITARI.

HID'DENITE. A yellow-green to emerald-green variety of spodumene, discovered in 1879 by W. E. Hidden, in Alexander Co., N. C. The transparent crystals, when cut and polished, resemble the emerald in lustre, although the color is not so intense as in the finer varieties of the latter gem. The green color to which hiddenite owes its importance is probably due to a very small amount of chromium. Hiddenite has a specific gravity of 3.19, and gems of 2½ carats in weight have been cut from it. When first introduced, it aroused considerable interest on account of its novelty as an American gem. It is sometimes called the *lithia emerald.*

HIDE (AS. *hīd, hīged, hīgid*, from ONorthumbrian *hīgan*, AS. *hīwan*, members of a family). In Anglo-Saxon law, the family estate, corresponding to the *huba* of early Germanic law. It consisted apparently of a farm, or allotment, of definite extent, though its size varied in different places and at different periods of German and English history. The normal hide at the time of the Conquest was probably 120 acres. But the term does not seem to have been employed so much to denote a unit of land measurement as a definite parcel of land in the nature of a homestead, owned in severalty by the head of a family. As such, however, it was used by the Saxon kings as a unit of taxation,

the amount assessed on each hide being known as *hide-gild*. After the Conquest the term gradually changes its meaning and comes to designate a measure of land, but its signification is not free from obscurity at any period of its history. Consult: Frederic Seebohm, *English Village Community* (London, 1890); J. H. Round, *Feudal England* (ib., 1895); William Stubbs, *Constitutional History of England* (Oxford, 1896); F. W. Maitland, *Domesday Book and Beyond* (Boston, 1897); Pollock and Maitland, *History of English Law* (2d ed., 2 vols., ib., 1899).

HIDES. See LEATHER.

HIDEYOSHI, hē'dā-yō'shē, TOYOTOMI (1536–98). A Japanese warrior and statesman, the son of a peasant. He was born in the village of Nakamura, Aichi Ken, Province of Owari, in 1536; became groom to Nobunaga (q.v.), who made him a soldier. He speedily distinguished himself by his military talents, and in 1575 was by Nobunaga created Lord of Chikuzen and was allowed to change his family name to Hashiba. On the death of Nobunaga, in 1582, he took such vigorous action that he became in 1586 the practical ruler of the Empire under the title of Kwambaku, or regent—a high office that had been reserved exclusively for members of the Fujiwara (q.v.) family. In 1591 he nominally retired in favor of his son Hidetsugu, taking, as was customary in such circumstances, the title of Taikō, hence popularly known as Taikō-sama. In 1592 he dispatched a large army to Korea to conquer it as a preliminary step in the conquest of China; but the expedition met with disaster, the Emperor of China having sent a large army to the assistance of the Koreans, and after his death at Kyoto, in 1598, it was recalled. Displeased with the conduct and teachings of the Jesuits, he ordered their expulsion; but no steps were taken to carry out this edict until 1596, when several Franciscan priests, Jesuits, and native Christians were crucified at Nagasaki. A monument in his honor was erected at Kyoto in 1896. He had many names; Toyotomi he received from the Emperor. His posthumous name is Toyokuni. Consult: Adams, *History of Japan* (London, 1874); Dening, *Life of Hideyoshi* (Tokyo, 1889); W. E. Griffis, *The Mikado's Empire* (11th ed., New York, 1906); Frank Brinkley, *Japan: Its History, Arts, and Literature* (8 vols., Boston, 1910).

HIEL, hēl, EMANUEL (1834–99). A Flemish poet, born near Dendermonde. At first he was a wool spinner, then a bookseller; then he obtained a minor government appointment and later the position of professor of oratory at the Brussels Conservatory and librarian of the Industrial Museum in the same city. He is generally considered the chief Flemish lyrist of recent times. Among his longer poems are the drama *Jacobœa van Beieren* (1867; new ed., 1880) and *Bloemardinne* (1877). In addition to these there are the collections *Nieuwe liedekens* (1861), *Gedichten* (1863), *Bloemeken een liederkrans* (1877), and some verses for children, *Liederen voor groote en kleine kinderen*, many of which were adapted to well-known melodies, and some of which were set to music by Van Gheluwe, *Liedersolfege* (1875). Hiel's greatest works are the poems *Lucifer* and *De Schelde*, for which Benoit composed oratorio settings; *Vrijheidshymnus* (music by Richard Hol); and *Prometheus* (1868). An edition of his poetry, *Volledige dichtwerken*, was published in three volumes in 1885.

HIEN, hyĕn. A governmental district in China. See CHINA.

HIEN-FUNG, fŭng, or **HSIEN-FÊNG,** syĕn-fōng, meaning "universal plenty," the title assumed by the seventh Emperor of the late Manchu dynasty of China. Hien-Fung was the fourth son of the Emperor Tao-kuang, was born in 1831, and succeeded to the throne in 1850; but his reign, according to custom, dates only from the following year. He proved to be strongly antiforeign. At the beginning of his reign the Taiping Rebellion broke out in Canton Province; hordes of fanatics and lawless persons joined the standard of the "Prince of Peace," as the leader, Hung Hsiu-ch'üan, who claimed to be a Christian, styled himself; half the country was devastated, and 20,000,000 are said to have been put to the sword. The rebellion would have taxed a stronger man; but able statesmen and generals arose, and in 1864 this greatest of all rebellions was crushed. Meanwhile a war with Great Britain had been precipitated in 1857 by an outrage on the British flag. Canton was for a second time taken by British troops, the Taku forts at the mouth of the Peiho were captured, and a treaty was concluded in 1858 opening more new ports, throwing the country open to travelers, permitting the preaching and the practice of Christianity, and calling for more indemnity. In the following year, as the British envoy was on his way to Peking to exchange ratification as previously arranged, he was fired upon, and his party driven back. This made another expedition necessary, and in 1860 another army (France joining) and fleet took the Taku forts a second time, captured Tientsin, and proceeded to Peking. Hien-Fung fled to Jehol (q.v.), where he died in the following year, leaving his brother, Prince Kung, to negotiate a new treaty of peace, which in the circumstances was more rigorous than that of 1858. Additional ports were to be opened, Christianity was to be tolerated, along with the ratification of the entire Treaty of Tientsin of 1858, and it was agreed that henceforth a British envoy or ambassador was to be allowed to reside at Peking, which concession China had for centuries steadfastly refused to any European nation. Further, a Department of Foreign Affairs—the Tsung-li yamen (now the Waichiaogu)—was established, Prince Kung becoming its first President.

HIER'ACAS. See HIERAX.

HIERACITES, hī-ĕr'a-sīts. See HIERAX.

HIERACIUM, hī'ĕ-rā'shĭ-ŭm. See HAWKWEED.

HIERAPOLIS, hī-ĕ-răp'ō-lĭs (Lat., from Gk. Ἱεράπολις, sacred city, from *ἱερός*, fem. *ἱερά*, *hieros*, *hiera*, sacred + *πόλις*, *polis*, city). 1. A city in southwest Phrygia, about 6 miles north of Laodicea. It was the religious centre of the native worship of the district and was an important seat of the mysteries of the Phrygian nature goddess (who was here called Leto), her daughter, Cora, a male deity, and a son. It possessed warm springs, more or less sulphurous, which had, and still have, a remarkable power of forming calcareous incrustations. Its religious fame was also increased by the Plutonium or Charonium—a narrow but deep chasm, from which issued a noxious vapor, supposed to

be fatal to all except the eunuch priests of the goddess. This chasm had disappeared in the fourth century A.D. Extensive ruins of Hierapolis, including remains of a long avenue of tombs, a theatre, well preserved, and a large bath into which the water of the springs had been conducted, have been found. Epictetus the philosopher was born at Hierapolis. Consult: Ramsay, *Cities and Bishoprics of Phrygia*, vol. i (Oxford, 1895); Humann, *Altertümer von Hierapolis* (Berlin, 1888); Baedeker, *Konstantinopel, Balkanstaaten, Kleinsasien, etc.* (2d ed., Leipzig, 1914).

2. A city in the Glaucus valley in central Phrygia (now Kotch-Hissar), which seems to have been the old centre of a pentapolis and is known in early Christian history from the life of St. Abercius, or (better) Avircius, of the second century A.D., who caused a remarkable protest against Montanism to be inscribed on his tomb. The original document has survived and is now in Rome. It is so drawn up that it bears a double meaning, and the esoteric Christian sense was clear only to "him who comprehends." It has also been interpreted as a heathen document. Consult Ramsay, *Cities and Bishoprics of Phrygia*, vol. ii (Oxford, 1897), and Dietrich, *Die Grabschrift des Aberkios* (Leipzig, 1896).

3. A city of Syria Cyrrhestica, known also as Bambyce (Gk. Βαμβύκη), situated about 25 miles south of the ancient Carchemish, on the hills southwest of the meeting of the Euphrates and Sajur rivers. It is now in ruins, but in the times of the Seleucids was a city of much commercial importance, chief station on the main road between Antioch and Seleucia-on-Tigris. It was called "Sacred City" because it was the centre of the worship of a Syrian nature goddess, Atargatis, described by Lucian (q.v.) in his *De Dea Syria*. In the reorganization of the Roman Empire under Diocletian it became the capital of the Province of Euphratensis, or Commagene, and was a very flourishing city. In the time of Justinian it had retrogressed, but the fortifications were restored by the Arabs, and it endured many vicissitudes during the Crusades. Near Bambyce silk was manufactured; from one Roman name for silk, *Bombycina vestis*, comes the word "bombazine."

HIERARCHY, hī'ẽr-ärk-ĭ (from ML. *hierarchia*, Gk. *ἱεραρχία*, *hierarchy*, from *ἱεράρχης*, *hierarchēs*, hierarch, from *ἱερός*, *hieros*, sacred + *ἄρχος*, *archos*, leader, from *ἄρχειν*, *archein*, to lead). The term was introduced by the writings of Dionysius the Areopagite, in the sixth century. The name used by theological writers to designate the whole governing and ministering body in the Church, distributed according to its several gradations. The word, in its strict acceptation, is applicable only to the Roman Catholic church and to those Christian communities which retain the prelatical form of Church government, or at least the distinctions of ecclesiastical order and gradation. The hierarchy is divided into that of *order* and of *jurisdiction*. I. Considered under the head of *order*, the hierarchy embraces all the various orders or classes of ministers to whom has been assigned the duty of directing public worship, administering the sacraments, and discharging the various other offices connected with the preaching of the gospel, through which the Church held that divine grace was given; and these are of two kinds—the orders directly instituted by divine authority and those established by ecclesiastical ordinance. Theologians commonly distinguish a *hierarchy of divine right* and a *hierarchy of ecclesiastical right*. 1. The first includes the three ranks of bishops, priests, and deacons. The bishops are believed, as successors of the Apostles, to have inherited the integrity of the Christian priesthood. The order of episcopate, however, is not believed to be a distinct order from that of priesthood, but only a fuller and entirely unrestricted form of that order. In all that regards what Roman Catholics believe to be the Christian sacrifice of the eucharist, they hold that the priest possesses the same powers *of order* with the bishop; but he cannot confer the sacrament of orders, nor can he validly exercise the power of absolving in the sacrament of penance without the approbation of the bishop. 2. To the three ranks thus primitively instituted several others have been added by ecclesiastical ordinance. (See ORDERS, HOLY.) II. The *hierarchy of jurisdiction* directly regards the government of the Church and comprises all the successive degrees of ecclesiastical authority—beginning with the Pope as primate of the universal Church and extending to the patriarchs as ruling their several patriarchates, the primates in the several kingdoms as national churches, the metropolitans or archbishops within their respective provinces, and the bishops in their dioceses.

In the Anglican church, with the office of the episcopate, the theory of a hierarchical gradation of rank and of authority has been retained. The Anglican hierarchy comprises bishops, priests, and deacons. In the other reformed churches a hierarchical government is practically nonexistent.

HI'ERAT'IC WRITING. See HIEROGLYPHICS.

HI'ERAX, or **HIER'ACAS** (Lat., from Gk. Ἱέραξ). An Egyptian ascetic of the third century. He is said to have lived to the age of 90 and devoted himself to scientific and literary pursuits. He was the author of biblical commentaries, both in Greek and Coptic, and is said to have composed many hymns. He became leader of the sect of the Hieracites, an ascetic society from which persons living in the married state were excluded. On other points Hierax followed Origen in allegorizing Scripture. Because of his view of matrimony, his denial of the resurrection and of a visible paradise, and his assertion that infants, as incapable of "striving lawfully," cannot inherit the kingdom of God, Hierax was regarded as a heretic. Consult Harnack, *History of Dogma*, vol. iii (Boston, 1897).

HIERO (hī'ẽ-rō), or **HIERON, I** (Lat., from Gk. Ἱέρων). A tyrant of Syracuse, who succeeded his brother Gelo in 478 B.C., having already, a short time before, distinguished himself in the battle of Himera. Being jealous of his brother Polyzelus, who had command of the army, he dispatched him on an expedition against Crotona (q.v.); but Polyzelus fled to his brother-in-law, Theron of Agrigentum. Hiero undertook to make war on the two; but a reconciliation was effected, it is said, by the poet Simonides. Some time after this reconciliation Hiero assisted the people of Cumæ (q.v.) in driving off the Etruscan pirates, by whom they were harassed. He transferred the inhabitants of Naxos and Catana to Leontini and, repeopling Catana with citizens from Syracuse, Gela, and elsewhere, called it Ætna. After the death of

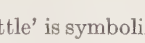
Theron, about 472 B.C., war broke out between Theron's son, Thrasydæus, and Hiero. The former was defeated and compelled to flee from Sicily. Hiero was now supreme in the island. He died, however, shortly after, having reigned 10 years. As a ruler, Hiero was jealous, cruel, and rapacious; fearing for his life, he surrounded himself with mercenaries and spies. He was, however, a patron of poets and philosophers, and he competed successfully at the Grecian games. Consult Eduard Lübbert, *Syrakus zur Zeit des Gelon und Hieron* (Kiel, 1876), and "Hieron, 2," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HIERO II (c.308–216 B.C.). A king of Syracuse, illegitimate son of a noble Syracusan named Hierocles. He first distinguished himself in the wars with Pyrrhus, and then, after Pyrrhus's departure from Sicily (275 B.C.), by his successes in the war with the Mamertines (q.v.). In consequence of his military triumphs he was, in 270 B.C., chosen King of Syracuse. In 264 he assisted the Carthaginians in the siege of Messana against the Mamertines; but when the Mamertines secured the aid of Rome, he was himself defeated by the Roman consul, Appius Claudius, and in 263 concluded a treaty with the Romans, to whom he thereafter remained faithful. The treaty secured to him the control of southeastern Sicily and of the eastern coast as far as Tauromenium (Taormina). In both Punic wars he assisted the Romans with money and troops. During the interval of peace between the two wars he visited Rome and was received with great honors, while he himself on this occasion distributed a vast quantity of grain to the people. Hiero was a wise and merciful sovereign, simple in his ways and just in his rule. We are told that he was prevented from laying aside the kingly power only by the unanimous votes of his subjects. He bestowed great care upon the financial department of his government, and his agricultural laws (*leges Hieronicæ*) were in force in Cicero's time. He was also a patron of the arts and beautified his city with many fine public buildings. His kinsman Archimedes (q.v.) he employed in the construction of a number of powerful engines of war. Consult "Hiero, 13," in Pauly-Wissowa (cited above).

HIEROCLES, hī-ĕr'ŏ-klēz (Lat., from Gk. Ἱεροκλῆς, *Hieroklēs*). 1. A Greek writer of the sixth century A.D., who composed, under the title *Traveling Companion* (Συνέκδημος), a work containing a description of the 64 provinces of the Byzantine Empire and of 912 cities in it. It is best edited by Burckhardt (Leipzig, 1893). 2. An Alexandrian Neoplatonist of the fifth century A.D. He wrote a Commentary on the Golden Verses of Pythagoras (q.v.), and a treatise *On Providence and Fate*. The former work was popular in the Middle Ages and in the Renaissance and was translated into many languages. The latter work is extant only in a few extracts, preserved by Photius (q.v.), and in an anonymous abridgment. The Commentary is printed by Mullach, *Fragmenta Philosophorum Græcorum*, vol. i (Paris, 1875). Under the name "Hierocles" we also possess a very old collection of jokes and amusing stories (Ἀστεῖα), edited by Eberhard (Berlin, 1869). This belongs, however, to a later time. 3. A Stoic philosopher, contemporary with Epictetus (q.v.), of whose Ἠθικὴ Στοιχείωσις, *Elements of Ethics*, fragments have been preserved by Stobæus (q.v.). Consult Prächter, *Hierokles der Stoiker* (1901), and Von Arnim, *Berliner Klassikertexte*, iv (Berlin, 1906).

HIEROCLES OF BITHYN'IA. A Roman proconsul in the reign of Diocletian (284–305 A.D.), governor in Bithynia and in Egypt, said to have been the instigator of the fierce persecution of the Christians under Galerius Cæsar in 303. He was a man of considerable intellectual culture and wrote a work called Φιλαλήθεις (Lovers of Truth), in two books, in which he endeavored to persuade Christians that their sacred books were full of contradictions, and that in moral influence and miraculous power Christ was inferior to Apollonius of Tyana. This treatise has not come down to our times and is known to us only through Lactantius and still more through Eusebius, who wrote a refutation. See Apollonius of Tyana.

HI'EROGLYPH'ICS, or **HI'EROGLYPHS** (Lat. *hieroglyphicus*, from Gk. ἱερογλυφικός, *hieroglyphikos*, hieroglyphic, from ἱερογλύφος, *hieroglyphos*, carver of hieroglyphics, from ἱερός, *hieros*, sacred + γλύφειν, *glyphein*, to carve). The term applied to those systems of writing in which figures of objects take the place of purely conventional signs, and especially used to designate the writing of the Egyptians and Mexicans. The system of Babylonia (whence the cuneiform writing developed) and that of China were likewise originally picture writings, but were very early simplified and conventionalized and thus lost their hieroglyphic character. These two systems present so many striking analogies to the Egyptian that a connection is often assumed; but these analogies appear merely to afford an illustration of the tendency of the human mind to run, under certain conditions, in the same channel; and this view is strengthened by some analogies from American pictographs and hieroglyphics. Hieroglyphic systems are also represented by the monuments of the Hittites and the early Cretans, both as yet undeciphered; an Egyptian origin would in these cases be less improbable than in the cases of Babylonian and Chinese characters. The Phœnician alphabet cannot be proved to descend from a hieroglyphic system; the names of the letters (ox, house, etc.) seem to have been merely mnemotechnic helps for learners. Evidence exists for the belief that at the time of the middle Minoan period in Crete (practically contemporary with the twelfth dynasty in Egypt) a well-organized hieroglyphic writing was in use in Crete. This came to a close in the third middle Minoan period; most interesting is the terra-cotta disk discovered in 1908 by the Italians at Phaistos. The writing, according to Evans, is non-Cretan, but probably from Anatolia. The Egyptian system is the most remarkable of all, because it always retained the most primitive form, although developing to a high degree of philological perfection. It is impossible to trace this system back to its origin in descriptive pictures; such pictures, e.g., as the North American Indians sometimes used for communications, though without developing a real writing. The very earliest monuments of Egypt, anterior to Menes, the first historical King, exhibit the system already perfected, differing in many details from the later orthography; but what were then the principles are the same as at all later periods. The invention must therefore belong to a very remote age.

The most primitive part is represented by the so-called ideographs, or word signs. Some of these are shown in the accompanying illustrations. It is very easy to represent a man (*romet*), a woman (*himet*). Both taken together mean 'mankind'; one repeated three times, 'men' or 'women.' A soldier is easily characterized by his arms and costume; a chief by his staff; a king by the addition of the crown; a child (*khrod*) by sucking its finger. Animals can be figured to a large extent, also some plants, the parts of the human body, etc. But wood (*khet*) can be represented only by a twig ; grain (*yot*) by three grains ; water (*mou*) by wavy lines . From indications of this nature there is but a step to symbolism. 'Hearing' (*sotem*) is expressed by the ear of an ox , while the human ear means only 'ear'; 'weeping' (*remy*) by a weeping eye  ; 'drinking' by a man drinking (the arm and bowl alone suffice). 'Fighting battle' is symbolized by weapons ; 'going' by a pair of legs ; 'returning' by an inversion of this sign; 'bringing' (*eny*) by a vessel, in combination with the sign for 'going' ; 'giving' (*day*) by an arm presenting a cake . 'Rain' can, of course, be easily represented by a sky with water falling from it ; but the ideas 'night,' 'darkness,' must be symbolized by a star hanging from the sky; 'cool' (*qohh*) is indicated by a water sprinkler . A great many words and ideas, however, cannot be represented at all; and here the writer surmounts the difficulty by using the signs for homophonous words or for words of somewhat similar sound, exactly as such signs are employed in our modern rebus. For example, *khun*, *khen*, 'inside, in,' and *kheny*, 'to approach,' have no etymological connection whatever with the pictorial sign for 'hide,' 'skin' (*khen*) , but the same picture is used for all three words. Thus, many signs pass from the ideographic into the phonetic class; i. e., they merely represent sounds without regard to the meaning, and from word signs they develop into syllabic signs of two consonants (e.g., the figure of the hide becomes the syllabic sign *khn*, representing any syllable with the two consonants *kh* and *n*); a few signs finally obtain the value of single consonants and form the alphabet.

The rebus system, however, would have led to many obscurities. Some inscriptions, indeed, simply use the sign for *khn* for all three words and leave it to the reader to decide from the context whether 'skin,' 'in,' or 'approach' is meant. The majority of scribes, however, use as helps the so-called determinatives. For example, they place after the sign *khn* the hieroglyph for 'house' to indicate that it means 'within,' and distinguish the word 'approach' by the addition of a pair of legs, indicating a verb of motion. Again, (writing implements) means 'writing,' 'write,' 'scribe'; but, by applying the proper determinatives, the writer can readily indicate which of these meanings he wishes to convey. By placing after this sign the figure of a man he makes it clear that 'scribe' is intended, while the addition of a roll of papyrus indicates that 'writing,' 'book' is meant. These determinatives are not arbitrary, but are used in accordance with certain fixed principles. Thus, all words for quadrupeds which cannot be easily represented are written phonetically and determined by , a piece of skin; all names of persons are determined by the figure of a man or woman; all names of trees by a tree ; small plants by ; drugs, sand, etc., by round grains ; actions of the mouth (eating, speaking, etc.), or thought by ; violent actions by a man or an arm in the act of striking ; localities by a house, etc. To these determinatives belongs also the so-called cartouche (q.v.), or frame surrounding royal names. Perfectly analogous determinatives are found in Babylonian (where, however, they are rather sparingly employed) and in Chinese.

A great many of the ideographs are polyphonous, i.e., they admit of more than one pronunciation; as, e.g., the picture of a horse might be understood by an Englishman as standing for 'horse,' 'steed,' 'mare.' To prevent such ambiguity, many signs receive what is called the phonetic complement. For example, the sign *mn* (originally representing a draught-board) is very rarely used alone; an *n* is generally placed after it to fix the pronunciation. Therefore *men*, 'to remain,' is usually written , i.e., the syllabic sign *mn* + the phonetic complement *n* (not to be pronounced separately) + the determinative 'book,' indicating that the word belongs to the category of abstract ideas. In classical orthography many signs are invariably followed by a phonetic complement. With some signs the phonetic complement precedes, while others have two or even three complements. For example, the word *seshem*, 'to lead,' is always written *s* (phonetic complement); the word sign *sshm* + *m* (second phonetic complement) + the determinative of a verb of motion. Thus arises a very complicated but quite regular orthography, which is of special service to the reader in that it enables him to distinguish between the different values of the polyphonous hieroglyphs. The sign 'star,' e.g., may be read *sb* or *dw*; if the latter reading be intended, a *w* follows as phonetic complement, while for the former reading an *s* is prefixed.

Word signs having several synonymous values do not always have phonetic complements. The reader, e.g., may be left to discover from the context whether the sign 'horse' is to be read *sesem*, 'horse,' *sesmet*, 'mare,' *nofer*, 'colt,' etc. The sign ⊙ (the sun) may be understood as 'day' (*hrow*) or as 'sun' (*rê*).

The alphabet developed from signs for very short words containing only one firm consonant. The opinion of the first decipherers, that the alphabet was acrophonic—i.e., that the phonetic value of each letter was taken from the initial sound of the word represented by its sign—has not been confirmed. The alphabetic signs ought, of course, to be the latest element of the system; but we find them fully established on the earliest monuments, so that they certainly go back to the fifth millennium B.C. The Egyptian alphabet is as follows: *

(1) the Semitic Aleph (ʾ), i.e., the general indication of a vowel beginning a syllable; later treated as a vowel.

(2) (a reed leaf) *y*, as a consonant; at a very early period confounded with the preceding letter, and later distinguished from it by doubling. Thus, in the later orthography a single reed leaf stood for Aleph, a double reed leaf for the consonant *y*.

(3) (an arm, *ê*), the Semitic guttural Ain.

(4) *w*, or, secondarily, *u;* later variant from about 1500 B.C.

(5) *b*.

(6) or, more elaborately, *p* (representing a mat?).

(7) *f* (representing a viper or snail).

(8) *m* (an owl); later variant .

(9) *n* (water); later variant .

(10) *r* (*ro*, 'a mouth').

(11) *h* (*hay*, 'a hall').

(12) *h* (a rough *h;* the lighter sound of Hebrew Kheth, Heth).

(13) *kh* (the Scottish and German guttural *ch*).

(14) *h* (similar in sound to the preceding, but somewhat softer). The sign originally stood for *hêt*, 'a belly,' and represented an animal cut open; the form here given is partially conventionalized.

(15) *s* (originally different from the following, but soon after 3000 B.C. confounded with it). The sign represented a door bolt.

(16) *s* (sharp *s;* early confused with the preceding).

(17) *sh;* a conventional representation of a lake (*Shei*).

(18) *q*. Hebrew Koph, Qoph, a guttural *k*. The sign represents a hill (*qay*).

(19) *k*. It represents a working basket (*kay*?).

(20) *g*.

(21) *t*. Perhaps another kind of basket, or a vase.

(22) *t*, a sibilant dental which is usually assumed to have been *th* or *z*, but seems to have been quite a peculiar sound. It was later commonly pronounced *t*.

(23) *d*. Probably represents a hand.

(24) *z*, or, more correctly, the Hebrew emphatic *s* (Sade).

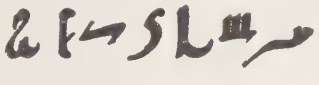
In later times the variants increased considerably, as the scribes were continually inventing new and playful forms of the letters; in Roman times hundreds of signs were in use for the alphabet, but several of the original sounds were lost or confused in later pronunciation. However, down to 1000 B.C. the variants enumerated above were the only ones, and all these sprang up after 1600 B.C. It will be observed that originally the letters expressed only the consonants, and the vowels were, with the exception of a few vague indications, left for the reader to fill in, exactly as in unpointed Hebrew or Arabic. The group *hbs*, e.g., may be read *hobs*, *hbos*, *hebos*, etc. Later orthography attempted to express the vowels in certain cases, especially in foreign names which demanded a more exact notation, but neither consistently nor successfully. All this adds greatly to the difficulties of the Egyptologists. They have not only to supply the vowels from Greek and other traditions, from the corresponding Coptic words, from variants, etc., but they must also reckon with the tendency of the Egyptian scribes to abbreviate and to omit consonants, where they were supposed to be readily supplied by the reader. For example, *henqet* (beer) is always spelled *hqt*. See, however, below on the present degree of certainty of reading. Foreign names and words were, in the time of dynasties 18–22, written in a strange orthography called the syllabic system. The vowels were copiously expressed by placing syllabic signs for every consonant, even where no vowel followed. For example, the Palestinian name of a city, *Shalem*, was spelled: *Sha-ra-ma*, the word *markabt* (chariot), *ma-(i)ra-ka-bu-ti*, etc. This wild heaping of vowels is of little advantage to the reader and has led to many errors.

The hieroglyphics were commonly written from the right to left; more rarely from left to right. On early monuments they are frequently written from above downward, like the earliest Babylonian and Chinese writing; the arrangement called *boustrophedon* (q.v.) by the Greeks is never met with. The number of signs is in a certain sense unlimited, as the artist could vary the details of each hieroglyphic according to his individual taste. But the sculptors did not greatly abuse this liberty and usually kept within the bounds of intelligibility. As a matter of fact, the signs commonly used are only from 500 to 600 in number. The artists found full play for their fancy in the minor details of execution; in the case of some magnificent buildings they have actually designed and painted every feather of a bird, every finger of a human figure, etc., in inscriptions containing

* The arrangement is, of course, modern; explanations are added only where they are quite certain.

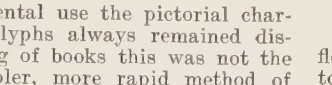
many thousand signs. The decorative effect of the brightly painted signs is exquisite. In other cases, however, when the sculpture had to be inexpensive, the signs were reduced to the simplest possible forms; in cheap funerary inscriptions they are often mere indications of figures, and their recognition calls for all the skill and ingenuity of the trained reader.

While in monumental use the pictorial character of the hieroglyphs always remained distinct, in the writing of books this was not the case. Here a simpler, more rapid method of writing was required, and even on the monuments of the first dynasty we find the hieroglyphs simplified to a few strokes, where the pen is used instead of the chisel. On papyrus the writing soon assumed a cursive character, bearing no closer resemblance to the original pictorial hieroglyphs than our cursive script bears to our printed letters. The cursive style thus developed was called by the Greeks "hieratic," or the style for sacred writings, in contradistinction to the demotic character (see below), which was exclusively employed for profaner matters. This cursive style is found on the earliest books which have been preserved (dating from the fifth dynasty). To give an idea of hieratic, we reproduce here the first seven letters of the alphabet (without variants)



in the cursive style of about 1400 B.C. One can still recognize the original form of the arm, the *b* (leg), and the *f;* but the two birds have become mere flourishes in which only the boldest fancy can detect a resemblance to the original pictures. Of course, this style of writing changed more than the monumental forms, and every century had its marked peculiarities. The Greek name must not be misunderstood; all literature, secular and religious, history, novels, love songs, business documents, letters, used the more convenient rapid style. Only funerary texts are frequently written in a simplified hieroglyphic character. It was only after the demotic had become prevalent that hieratic was reserved for books of a religious character (after 600 B.C.). Hieratic runs from right to left, like most Oriental writings; in the earliest times, however, it was sometimes written perpendicularly.

Demotic, or popular, writing, while occurring more or less in all periods of the hieratic style, is really a later development of it. The Egyptians themselves called it "the documental or epistolary style," as it seems to have been developed in the law courts and offices where the necessity of tachygraphy led to constant abbreviations, until finally a real stenography resulted. Its origin goes back to the seventh century B.C. In 400 B.C. it had assumed a convenient form, and came into general use, so that the Greeks found it employed for everything except religious literature (see above), and called it therefore the demotic (the common, popular) style or the enchorial (the writing of the country). In Roman times even religious texts were frequently written in demotic. As specimens, we give here the same seven letters of the alphabet which were reproduced above in hieratic. The second of these characters is more commonly represented by a single vertical stroke. It will be observed that two forms of the letter *p* are given, of which the first is more elaborately formed. The sign representing a crouching lion was reduced to a slanting stroke, etc. Whole groups of five or six hieratic signs were combined in a single



flourish. Thus the writing became rapid enough to equal in speed our modern writing and the stenographic systems of the Romans; but its study was complicated, and it became unintelligible where not written very distinctly. The number of demotic signs was smaller than that of hieratic (not over 200). Like hieratic, demotic was written from right to left. It is a common error to suppose that demotic means "popular language"; the term properly designates a style of Egyptian writing, and a phase of the language, although documents written in the demotic script are usually composed in a later form of Egyptian. The Egyptian language, of course, underwent great modifications in course of time; the language of the earliest texts known to us—the religious texts in the pyramids—seems to have offered great difficulties to the Egyptian scholars of about 2500 B.C.

The use of the contemporary vernacular language was rarely allowed in literature, and in general the hierogrammates (sacred scribes) sought to write in as archaistic a style as possible. After 1600 B.C. they found it more and more difficult to write the old language correctly, and from about 1400 to 1100 B.C. the living vernacular language was used for letters, legal documents, and entertaining literature. The language of this period, the so-called Neo-Egyptian, has been treated by Erman, in his *Neuägyptische Grammatik* (Leipzig, 1880). After 1000 B.C. the scribes reverted to an exaggerated archaistic style, and the texts became more and more ungrammatical; the barbarous age began after 500 B.C., and in Roman times the monumental texts are so wild in grammar and orthography that their decipherment is especially difficult. In demotic literature a mixture of ancient and modern language prevailed. The vernacular language finally came into literary use in Roman times through the influence of Christianity. The heathen and their priests continued to write hieroglyphics on the monuments, hieratic and demotic on papyrus, almost to the end of heathenism. The last datable hieroglyphic inscription is found in the temple of Esne (q.v.) and contains the name of the Emperor Decius (250 A.D.). A demotic inscription at Philæ (where paganism lingered on after the edict of Theodosius, 379 A.D.) is dated in the year 453 A.D. Even later, some sporadic knowledge of the old writing may have existed; but, stamped with the reproach of heathenism, it soon sank into oblivion.

Some attempts to write the living language in the Greek alphabet, supplemented by some demotic signs, had been made in pagan times, and we possess a papyrus, containing a horoscope, which seems to have been written about 100 A.D. It was, however, the desire to make the sacred Christian writings accessible even to the unlearned that led to the origin of Coptic writing and literature. The date of the Coptic version of the Bible is disputed; but it does not

seem to be older than the third century, perhaps later. Coptic was written with 24 Greek and 7 demotic letters. On its history and its extinction as a living language at the end of the Middle Ages, see COPTS.

Interest in the lost knowledge of hieroglyphics was awakened in Europe in the sixteenth century. About 1650 the learned Jesuit Athanasius Kircher endeavored to interpret them by a fanciful method of his own, finding long theological and philosophic systems in groups which contained only the names of kings, etc. The few monuments with hieroglyphics which were then known were explained by means of Hebrew, Chaldee, Chinese, etc., rarely by means of Coptic, which was known only imperfectly in Europe before the eighteenth century. The Greek traditions on hieroglyphics in Horapollo, Tsetses, etc., were not incorrect, as has now been recognized, but insufficient. The basis for decipherment was furnished by the French expedition to Egypt under Napoleon. Through it a much larger number of the Egyptian monuments became known, above all the famous inscription of Rosetta, which proved the key to the decipherment. This stone, found by a French artillery officer in building a fort near Rosetta in 1799 and brought to London after the capitulation of the French army (see ROSETTA STONE), contains a decree of the Egyptian priests in honor of Ptolemy V Epiphanes and his Queen Cleopatra, written in Greek and preceded by a translation into hieroglyphics and demotic. Unfortunately the hieroglyphic text was much mutilated and for some time defied the efforts of the decipherers. The demotic part was better preserved, and De Sacy, Ackerblad (1802), especially Thomas Young (1773–1829), correctly established the sense of many groups and sentences. Dr. Young came very near finding the correct value of some hieroglyphic letters (1819); but the merit of the decipherment belongs entirely to J. F. Champollion (q.v.), even if he did not work quite independently of Young, as he always claimed. He took as starting point the two names "Ptolemy" and "Cleopatra," furnished by the Rosetta Stone and an obelisk at Philæ. These two names yielded 13 signs, the phonetic value of which Champollion determined correctly or approximately. He next identified the name "Alexander," which furnished three more signs, and thus went on step by step, through the names of the Ptolemaic kings and Roman emperors found on the monuments, and if he had not died prematurely (1832) he would doubtless have succeeded in reading more than single sentences and in perfecting his system, which even in his posthumous works does not do full justice to his genius. His discoveries were continued by Rosellini, Salvolini, later by Birch, Lepsius, De Rougé, and Chabas. For a long time the errors of Seyffarth and Uhlemann exercised a confusing and hindering influence. The French and Tuscan expeditions under Champollion and Rosellini, and especially the Prussian expedition under Lepsius (q.v.), furnished rich material from the monuments. Grammars of the language of the hieroglyphics were published by De Rougé, *Chrestomathie égyptienne* (Paris, 1867–75); Birch, in Bunsen, *Egypt's Place in the World's History* (London, 1887); Brugsch, *Hieroglyphische Grammatik* (Leipzig, 1872), also in French (1867); later grammars by Lepage Renouf, *Elementary Grammar of the Egyptian Language* (London, 1875); Budge, *First Steps in Egyptian* (ib., 1895); Loret, *Manuel de la langue égyptienne* (Paris, 1889). Erman's book, *Aegyptische Grammatik* (2d ed., 1902), is very brief, but best represents the present knowledge. On his grammar of Neo-Egyptian, see above; his *Sprache des Papyrus Westcar* (Göttingen, 1889) treats of an early vernacular phase of the language. A copious dictionary is in preparation under the auspices of the Berlin Academy, as Brugsch's *Hieroglyphisch-demotisches Wörterbuch* (7 vols., Leipzig, 1867–80), although the best Egyptian dictionary at present in existence, is rapidly becoming antiquated. The dictionaries of Birch (in Bunsen V.), Pierret, *Vocabulaire hiéroglyphique* (Paris, 1875), and Levi, *Vocabolerio geroglifico Copto Ebraico* (Turin, 1887), are less reliable than that of Brugsch. Several journals are devoted to Egyptology, viz., *Zeitschrift für ægyptische Sprache und Altertumskunde* (Berlin), *Receuil de Travaux Rélatifs à la Philologie et à l'Archéologie Egyptiennes et Assyriennes* (Paris), *Sphinx* (Upsala); and the literature of the subject is growing immensely. The success which attended the study of hieroglyphics attracted the attention of students to this branch of Egyptology, and demotic was for a long time neglected. In 1855 Brugsch published his *Grammaire démotique*, which, though now antiquated, formed the basis for all subsequent investigations. Again neglected for a considerable time, the study of demotic was revived by Revillout, who devoted special attention to the legal documents written in demotic script (*Chrestomathie démotique*, Paris, 1880); but his works are to be used with great caution. In more recent times the most meritorious publications on the subject of demotic are those of F. Ll. Griffith and W. Spiegelberg. The hieratic documents were first made intelligible by the works of Chabas and Goodwin. The paleography of hieroglyphics has recently been treated by Griffith in several volumes of the Archæological Survey of Egypt. (See EGYPTOLOGY.) It may be remarked that the question as to whether the decipherment of Egyptologists rests on a better basis than the vagaries of Kircher was frequently asked as long as the fragmentary Rosetta Stone was the only bilingual (or rather trilingual) text. After the discovery of the larger and perfectly intact trilingual text, called the Decree of Canopus, containing a decree of the priests in honor of Ptolemy III Euergetes, in the year 238 B.C. (found by L. Reinisch, 1886, near Tanis; his companion Lepsius also claimed the discovery), such doubts became impossible. Since that time various bilinguals have been found, and other sources which control the decipherment are now available. The exact pronunciation of the vowels, which were never perfectly expressed in Egyptian writing and changed frequently in course of time, is much disputed and will possibly never be settled with absolute certainty in all points. The texts, however, are now, generally speaking, at least as well understood as any Phœnician inscription or as the Hebrew text of the Bible. The time when they will be understood as well as Greek or Latin writers may not be far distant. That the Phœnician alphabet, the mother of our modern writing, was derived from the Egyptian hieratic signs was claimed by De Rougé (*Mémoire sur l'origine égyptienne de l'alphabet phénicien*, Paris, 1874), and this hypothesis has become very

popular; it is, however, highly improbable and is losing ground among scholars.

Much less perfect was the hieroglyphic writing of the Aztecs or Mexicans, which was used also in Central America, especially by the Mayas. Unfortunately the literature written in those hieroglyphs was destroyed so thoroughly by the Spanish priests that only a very few manuscripts (preserved in Rome, Dresden, etc.) have survived, besides a few inscriptions on stone. The Spanish writers of the sixteenth century have left the explanation of a few signs only, so that the Aztec writing is almost entirely unintelligible. However, what we understand of it seems to show that the Mexicans did not advance much beyond the pictographic stage, though the pictures they used were highly conventionalized. They could express the names of persons, places, months, etc., by painting the objects or beings after which they were called, and went so far as to use symbolical signs of plants and animals to express grammatical forms, so that their pictures were not read but interpreted. Where, e.g., they recorded historical events, they had to picture these, as the inscriptions alone would have been insufficient. The majority of their books seem to have been calendars, lists of omina, etc., for which their imperfect writing system sufficed. It is said that some Spanish monks made use of hieroglyphic signs for expressing Latin prayers. For example, they are said to have expressed the words *pater noster* by a flag (*pantti* = *pa*), a stone (*tetl* = *te*), a cactus fruit (*nochtli* = *noch*), and a stone (= *te*, see above). Rude as this system seems, it marked, nevertheless, a step in advance, as the hieroglyphs from word signs became phonetic signs. Such attempts, however, remained perfectly isolated; the Spanish missionaries usually showed the greatest hostility to anything recalling the former Aztec idolatry. The term "hieroglyphic" was used by the writers of emblemata, or devices, symbolizing gnomic sentences taken from the Greek and Latin poets and having no relation to Egyptian hieroglyphics. In recent times, also, the astrological almanacs have had their symbolical representations and supposed prognostics of future events, which they called hieroglyphs.

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HIERON, hī'ĕr-ŏn. The name of two rulers of Syracuse. See HIERO I and II.

HIERONYMITES, hī'ĕr-ŏn'ī-mīts. The common name of four associations of hermits in Spain and Italy, who all regarded St. Jerome as their patron and example and hence derived their name. 1. The Spanish congregation founded in the reign of Alfonso XI of Castile (1312–50) by some disciples of Tommasuccio of Siena, a hermit who had considerable following in northern Italy and observed the Franciscan rule. Their two earliest settlements were in the mountains near Toledo. Their numbers soon grew and included many persons of rank and station, such as Ferdinand Pecha, principal chamberlain to Pedro IV, and his brother Alfonso, Bishop of Jaén. The former obtained confirmation for their association from Gregory XI in 1373, under the rule of St. Augustine, and is regarded as the real founder of the order. By 1415 they had 25 cloisters, among them that of San Gerónimo de Yuste, in which the Emperor Charles V passed his last years. That of Belem, near Lisbon, became the burial place of the Portuguese royal family. A female branch of the order was founded by María García (died 1426). 2. The congregation of the Observance or of Lombardy, founded by the Spaniard, Lope de Olmedo (1370–1433), who became general of the foregoing order in 1422. His purpose in establishing a separate congregation was the attainment of still greater strictness. The rule which he drew up was confirmed in 1429, but after his death was exchanged for that of St. Augustine. The seven Spanish cloisters of the order were in 1595 united by Philip II with the foregoing, but the 17 Italian retained their separate existence under a general residing at Hospitaletto, near Lodi. 3. The congregation of Peter of Pisa (Pietro Gambacorta, 1355–1435), who turned from a worldly to a hermit's life in 1377 and built a church and hermitage on Montebello, near Urbino. Several small communities of Franciscan tertiaries associated themselves with him; the principal settlements were at Vicenza and Mantua. Only simple vows were taken until 1568; but Pius V imposed the solemn vows and the Augustinian rule. The order had at one time over 50 houses, including one founded at Walchensee in Bavaria in 1688 and removed to Munich in 1725. 4. The congregation of Fiesole, founded by Carlo di Montegranelli and confirmed by Innocent VII in 1406 and given a constitution by Eugene IV in 1441. It came to possess more than 40 houses, including the convent of Saints Vincent and Anastasius in Rome, but was suppressed as a separate organization by Pope Clement IX in 1688. See BROTHERS OF COMMON LIFE.

HIERON'YMUS CARDA'NUS. See CARDAN.

HIERON'YMUS OF CARDIA. A Greek general in the service of Alexander the Great and also a historian. After Alexander's death he served Eumenes (q.v.), his fellow townsman. Having been wounded and captured by Antigonus, he served under the latter and later under Antigonus Gonatas, at whose court he died at the age of 104. He wrote a history of the Diadochi, as the successors of Alexander were called, and their successors, extending to 272 B.C., to the death of Pyrrhus (q.v.). Plutarch used this work in his life of Pyrrhus; it was a chief source of Diodorus Siculus (q.v.). The work was written in a plain and simple style, but was marked by careful use of official papers. He paid attention also to the history of the Romans. Consult Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HIEROPHANT, hī-ĕr'ō-fănt (Lat. *hierophanta, hierophantes*, from Gk. *ἱεροφάντης, hiero-*

phantēs, hierophant, from *ἱερός, hieros*, sacred + *φαίνειν, phainein*, to show). The head of the secret worship of Demeter, at Eleusis, who at the celebration of the mysteries (q.v.) showed and explained the sacred objects and explained also the ceremonies. He was required to be one of the old priestly family of Eleusis, the Eumolpidæ (see EUMOLPUS), and probably was prohibited from holding any other office. The hierophant was required to be of mature age and clear voice; he seems to have held the office for life, but the statement that celibacy was required is of doubtful value. The hierophant laid aside his own name on assuming his office and henceforth was known only as Hierophantes, though his father's name and his deme are appended as in the case of personal names. Since he had inherited the functions of the old priest king, his costume was that usually worn by kings in tragedy. Consult: Johannes Töpffer, *Attische Genealogie* (Berlin, 1889); Foucart, *Les grands mystères d'Eleusis* (Paris, 1900); Pringsheim, *Archäologische Beiträge zur Geschichte des eleusinischen Kults* (1905). See MYSTERIES.

HIEROSOLYMA, hī'ĕr-ō-sŏl'ĭ-mâ. See JERUSALEM.

HIG'DEN, RANULF (?–1364). An English chronicler and monk of the Benedictine Order. He entered St. Werburgh's monastery at Chester in 1299 and is remembered chiefly for his *Polychronicon*, printed in the English version (dated 1387) of John of Trevisa, by Caxton in 1482, by Wynkyn de Worde in 1495, and by Peter Treveris in 1527. It is a universal history in seven books, extending down to Higden's own day. The events after 1342 are recorded by other pens, and the whole has been edited and translated for the "Rolls Series" (9 vols., 1865–86).

HIG'GINS, ANTHONY (1840–1912). A United States Senator, born at Red Lion Hundred, Del. He graduated at Yale in 1861, studied at Harvard Law School for one year, and in 1864 was admitted to the Delaware bar. From 1869 to 1876 he was United States District Attorney for Delaware and in 1881 received the Republican vote of the Delaware Legislature for United States Senator. In 1889 he was elected to the Senate. He was counsel for Judge Charles Swayne in his impeachment before the United States Senate in 1905.

HIGGINS, DAVID WILLIAMS (1834–). A Canadian editor and legislator. He was born in Halifax, Nova Scotia, but early came to the United States and was educated in Brooklyn, N. Y. Removing to California in 1856, he founded the San Francisco *Morning Call*, which he published until 1858. He then went to Victoria, British Columbia, where he established the *Morning Chronicle;* this paper was later amalgamated with another journal, and from 1862 to 1886 he edited and published it under the name of the *Colonist*. In 1906–07 he edited the Vancouver *World*. Activity as a Conservative brought him a seat in the British Columbia Legislature in 1886. He remained a member until 1898 and for the last eight years of his service was Speaker. In 1892 he was a member of the Royal Commission on Fisheries. He published *The Mystic Spring and Other Tales of Western Life* (1904) and *The Passing of a Race* (1905).

HIGGINS, FRANK WAYLAND (1856–1907). An American politician, born at Rushford, N. Y., and educated at Riverview Military Academy, Poughkeepsie, N. Y., where he graduated in 1873. He was successively sales agent and partner in a Michigan mercantile firm and became interested in timber lands. He was New York State Senator for the Fiftieth District from 1894 to 1902 and Lieutenant Governor for the term 1903–05. He was elected Governor on the Republican ticket for the term 1905–07.

HIGGINS, MATTHEW JAMES (1810–68). An English essayist and pamphleteer, often called by his pen name "Jacob Omnium." He was born at Benown Castle and was educated at a school near Bath, at Eton, and at Oxford. In 1847 he became an ardent Peelite and wrote for the *Morning Chronicle*. He was most famed for his letters to the *Times*, over such signatures as "Paterfamilias," "Mother of Six," and "A Thirsty Soul," in which he exposed many abuses; and for his contributions to the *New Monthly Magazine*, where he first (1845) appeared as "Jacob Omnium," in a satire on mercantile dishonesty; for his essays in the *Edinburgh Review*, the *Cornhill*, under the editorship of his friend Thackeray, and in the *Pall Mall Gazette*. Several of his essays were reprinted under the title, *Essays on Social Subjects* (1875), with a memoir by Sir William Stirling-Maxwell.

HIG'GINSON, FRANCIS (1587–1630). An English Puritan clergyman and one of the first ministers of Salem, Mass. He graduated B.A. at Cambridge University, England, in 1609 and M.A. in 1613, received his first charge in the Anglican church in Claybrooke, Leicestershire, two years afterward, and later was appointed preacher at St. Nicholas, Leicester. Falling under the influence of the Rev. Arthur Hildersam, he became a Nonconformist and was suspended about 1627, but continued working among his parishioners as a lecturer and as a tutor to young men preparing for a university course, until, proceedings being instituted against him in the High Commission Court, he applied for a position as minister to one of the settlements of the Massachusetts Bay Company. He arrived at Salem in June, 1629, and was appointed assistant minister to Samuel Skelton, but died 14 months later, Aug. 6, 1630. He was author of "A True Relation of the Last Voyage to England, etc., written from New England, July 21, 1629," printed in chap. xi of Young's *Chronicles of the First Planters, etc.* (1846), and of *New England's Plantation, or a Short and True Description of the Commodities and Discommodities of that Country* (3d ed., London, 1630). Consult Felt, "Life of F. Higginson," in *Annals of Salem* (Boston, 1845), and Higginson, *Life of Francis Higginson* (New York, 1891).

HIGGINSON, FRANCIS JOHN (1843–). An American naval officer, born in Boston. Graduating from the United States Naval Academy in 1861, he served throughout the Civil War, participating in the bombardment and passage of Forts Jackson and St. Philip, in the attack on the Chalmette batteries, in the capture of New Orleans, and in the engagement at Fort Sumter. Thereafter he served with various squadrons and at different naval stations, had charge of the Naval Training Station at Newport, R. I., in 1887–90, and became captain in 1891. During the Spanish-American War he commanded the *Massachusetts* and was promoted to commodore in 1898 and rear admiral in 1899. He served as chairman of the lighthouse board from 1898 to 1901, was commander

in chief of the North Atlantic fleet in 1901–03, and had charge of the Navy Yard at Washington from 1903 until his retirement in 1905. He published *Naval Battles in the Century* (1903).

HIGGINSON, HENRY LEE (1834–1919). An American banker and philanthropist, born in New York. He entered Harvard in 1851, spent some time in a counting house, then went to Vienna and studied music. During the Civil War he served with the First Massachusetts Cavalry and was brevetted lieutenant colonel. In 1868 he became a member of the banking and brokerage firm of Lee, Higginson & Co.; later he was made president of the Submarine Signal Company and of the Gauley Coal Land Company and director in other important corporations. An appreciative and liberal patron of music, he served as president of the New Boston Music Hall and as trustee of the New England Conservatory, and founded (1881) and maintained the Boston Symphony Orchestra. In 1893 he was elected a fellow of the Corporation of Harvard, to which university he gave largely. His benefactions to charity were also notable. His prominence in all these fields of activity throughout a long life gave him the name of "Boston's first citizen." He received the Harvard honorary A.M. (1882) and the Yale LL.D. (1901). See BOSTON SYMPHONY ORCHESTRA.

HIGGINSON, THOMAS WENTWORTH (1823–1911). An American author and soldier, born in Cambridge, Mass., of a distinguished New England family descended from Francis Higginson. He graduated at Harvard in 1841 and after studying at Harvard Divinity School became pastor in 1847 of the First Religious Society (Unitarian) in Newburyport; but in 1850 he gave up this charge because of antislavery convictions and in the same year was an unsuccessful candidate for Congress. After a six years' pastorate in Worcester, Mass. (1852–58), he left the ministry, was active in the antislavery agitation, especially in Kansas, served with distinction in the Civil War as colonel of the first regiment of freed slaves, was wounded in 1863, and, after peace, devoted himself to literature, education, and the political rights of women. He resided till 1878 in Newport, but afterward made his home at Cambridge. He was a member of the American Academy of Arts and Letters. Among the more noteworthy of many volumes are: *Outdoor Papers* (1863); *Malbone: An Oldport Romance* (1869); *Army Life in a Black Regiment* (1870); *Atlantic Essays* (1871); *Oldport Days* (1873); *Young Folks' History of the United States* (1875; trans., French, 1875; German, 1876); *Short Studies of American Authors* (1879); *Common Sense about Women* (1881), in which, as in his later *Women and Men*, he stands for equality of rights and opportunities for men and women; *Life of Margaret Fuller Ossoli* (1884); *Larger History of the United States* (1885); *Women and Men* (1887); *Concerning All of Us* (1892). His later volumes, beginning with *Cheerful Yesterdays* (1898), continued by *Old Cambridge* (1899) and *Contemporaries* (1899), mainly deal with the interesting group of which he was almost the sole survivor. He wrote also: *Longfellow* (1903), in the "American Men of Letters Series"; *Whittier* (1903), in the "English Men of Letters"; the autobiographic *Part of a Man's Life* (1905); *Life of Stephen Higginson* (1907). His books are of a piece with his character as a man of generous and fine ideals, forward-looking, and with the full courage of his convictions. He was an optimist, a lover of his kind, finding delight in nature and in art, and expressing himself with the vigor of strong opinions, the lucidity of a clear thinker, and the point and grace of an accomplished man of letters. Higginson's collected works were published in seven volumes in 1900. Consult: F. B. Sanborn, *Recollections* (2 vols., Boston, 1903); M. E. Phillips, *Boyhood of T. W. Higginson* (ib., 1908); M. P. Higginson (Mrs. T. W. Higginson), *T. W. Higginson: The Story of his Life* (ib., 1914).

HIG'GINSVILLE. A city in Lafayette Co., Mo., 55 miles east of Kansas City, on the Chicago and Alton and the Missouri Pacific railroads (Map: Missouri, C 2). A State Confederate Home is situated here. The city is of importance as a grain, poultry, and coal market, several coal mines being operated in the vicinity, and has flour mills, machine shops and foundry, brickworks, a large beehive factory, etc. The water works and electric-light plant are owned by the municipality. Pop., 1900, 2791; 1910, 2628.

HIGGS, HENRY (1864–). An English economist and administrator. He was educated at University College, London, and at the University of Berlin, became a barrister in 1890, and after serving in the Post Office was transferred in 1899 to the Treasury. He was private secretary to several eminent men, including Sir Spencer Walpole, Austen Chamberlain, the Duke of Devonshire, and Sir Henry Campbell-Bannerman. In 1902–03 he reorganized the civil service of Natal and afterward became acting inspector general of the Egyptian Department of Finance. In 1892–1906 he was an editor of the *Economic Journal*. He edited Jevons's *Principles of Economics* (1905) and Giffen's *Statistics* (1913), and wrote a standard work on the *Physiocrats* (1897), which appeared in a Russian version.

HIGH'BIND'ERS (probably *high*, in slang sense + *binder*, variant of *bender*, spree). A name used in California to designate certain disorderly and dangerous Chinamen domiciled there. They are not connected with the Six Companies (q.v.), nor are they regularly organized, but act in an irresponsible, lawless way for and among themselves. They are men without definite occupation, living as best they can upon the Chinese communities, as keepers of evil resorts, gamblers, parasites upon prostitutes, thieves, and criminals generally. The name was originally applied to any rough and was in use in New York and Baltimore as early as 1849, but has gradually become restricted to its present application.

HIGH COMMISSION, THE COURT OF. An extraordinary tribunal, famous in English history, originating under the Act of Supremacy during the first year of Elizabeth's reign, which authorized the Queen to appoint an ecclesiastical commission to reform or correct all "heresies, errors, schisms, abuses, contempts, and enormities whatsoever." In July, 1559, Elizabeth granted a commission to "Matthew Parker, nominate Bishop of Canterbury, and Edmund Grindall, nominate Bishop of London," with 17 laymen, constituting them a court for the whole realm. The laymen seldom served, and the work of the court was prosecuted chiefly by bishops and lawyers. It might proceed by witness, with or without a jury, or in any way it should deem proper. It might compel attend-

ance on mere suspicion, examine either the witnesses or the accused "upon their corporal oath," and commit them to "ward" for disobeying its summons or any of its decrees.

The tribunal was created primarily to administer the Acts of Supremacy and Uniformity. As already seen, this first commission authorizes the use of the oath ex officio, through which the accused might be forced to convict himself. "This procedure, which was wholly founded on the canon law, consisted in a series of interrogations so comprehensive as to embrace the whole scope of clerical uniformity, yet so precise and minute as to leave no room for evasion, to which the suspected party was bound to answer" upon his "corporal" oath. According to Strype, the oath ex officio was the ground of much of the popular hatred of the High Commission. That tribunal was regarded as a kind of ecclesiastical star chamber; and, in fact, the relations of the two bodies were very close. The real activity of the High Commission began in 1583, immediately following a Jesuit plot to assassinate the Queen, and on the succession of Whitgift to the office of Archbishop of Canterbury. He established practically a new commission with enlarged powers and administered the oath with such rigor that his inquisition was comparable to those of Rome and Spain. The operation of the commission was continued during the reigns of James I and Charles I, until, hated by the people and opposed by the law courts, it together with the Star Chamber was abolished by the Long Parliament in 1641. It was restored in a modified form by James II in 1686, but was definitely abolished in 1688. The commission issued by Elizabeth authorized the commissioners to act throughout the whole kingdom; but in practice their jurisdiction was restricted to the Province of Canterbury or southern England. "There is evidence to show that during, at all events, the greater part of the period 1559–1640, a northern commission was sitting at York, Durham, Ripon, or elsewhere, and discharged functions analogous to those discharged by the southern commission at Lambeth, Fulham, Croydon, or Canterbury." (Prothero, *Select Statutes*, xlv.) There was also a commission for Ireland, and until 1606 commissions were sometimes issued for particular dioceses. The text of the principal commissions and other documents may be found in Prothero's *Select Statutes* (Oxford, 1894). Consult also: Hallam, *Constitutional History* (new ed., London, 1876); Strype, *Annals*, vol. iii (4 vols., new ed., Oxford, 1824); Burn, *The Star Chamber: Notices of the Court and its Proceedings, with Notes on the High Commission;* Gardiner, *Report of Cases in the Court of Star Chamber and High Commission, 1631–32*, in Camden Society, new series, vol. xxxix (Westminster, 1886); and the histories of Green, Ranke, and Gardiner.

HIGH COURT OF JUSTICE. In the English judicial system that part of the Supreme Court of Judicature which has general original jurisdiction in all causes, civil and criminal. It is organized in three divisions for the administration of justice, viz., the Chancery Division, the King's Bench Division, and the Probate, Divorce, and Admiralty Division. An appeal lies from any of the divisions to the other part of the Supreme Court, the Court of Appeal, and from that tribunal to the House of Lords. The High Court is the modern successor of the numerous independent tribunals which had sprung into being to meet the demands of an expanding civilization, and which had for many centuries divided the administration of justice among them. The principal of these were the Superior Courts of Common Law (King's Bench, Common Pleas, and Exchequer), the High Court of Chancery, the Court of Admiralty, and the Probate and Divorce Court. These were all merged in one by the enlightened piece of legislation known as the Judicature Act (q.v.), passed in 1873. (See also COURT; SUPREME COURT.) The term "high court" was also formerly applied to the Court of Chancery (see CHANCERY), to Parliament when acting in a judicial capacity (see PARLIAMENT), and to the Court of Delegates (see DELEGATES, HIGH COURT OF).

HIGHER CRITICISM. See BIBLICAL CRITICISM.

HIGHER LIFE, THE. A term which became current particularly in certain circles of Protestantism, about the middle of the nineteenth century, for a Christian life of complete harmony with God. It is also called entire holiness, full salvation, and Christian perfection. The doctrine has various forms. 1. Complete sinlessness may be reached by a single act of complete consecration to God, continuing according to some during life, according to others for indefinite periods. The objection to this claim is twofold. Complete sinlessness does not seem to be established as a fact. Nor is any previous state, founded on a consecration of self to God which is less than complete, truly a Christian state at all. 2. The state is one of perfection of Christian love, by grace made supreme in the soul. Most sin would necessarily be excluded by such a love, and errors that were objectively wrong would not be subjectively sins, because not intended as such. The question as to this form of the doctrine is one of fact. Is there reason to believe that given individuals are thus under the domination of uninterrupted, perfect love? 3. The state is attained by conformity to the actual demands of God, which are lowered from the strict standard of ideal perfection to meet the capacity of our feeble natures. This theory confounds the standard of conscience and the demands of God with what may be effected as a rational probability that men shall attain. Consult Boardman, *The Higher Life Doctrine of Sanctification, Tried by the Word of God* (Philadelphia, 1877), and Johnson, *The Highest Life* (New York, 1901).

HIGHGATE, hī'gāt. A northern, hilly section of metropolitan London, in Middlesex, 5 miles north-northwest of St. Paul's (Map: London, C 7). It commands a fine view of the city and has many elegant villas. In Waterlow Park are the Lauderdale House, once occupied by Nell Gwynne, and the Cromwell House. Very famous are the Whittington almshouses, founded by London's famous lord mayor. The Highgate, or North London, Cemetery contains the graves of numerous celebrities, including Lord Lyndhurst, George Eliot, Herbert Spencer, Coleridge, and Faraday.

HIGH'HOLE' (variant of *highhoe, heighaw, haihow*, possibly onomatopoetic in origin; connected by popular etymology with *high* + *hole*). A local name in the United States for the flicker (q.v.), heard in many forms, and having many relatives in the provincial speech of both Great Britain and America. Consult *Bulletin Nuttall Ornithological Club* (Cambridge, 1881).

HIGH'LAND, or KY'LOE, CATTLE. A

race of small hardy cattle, of the western "Highlands" of Scotland, descended from ancient stock and noted for their shaggy, usually reddish, coats and hardy constitutions. They are comparatively short-horned and feed in a semiwild condition upon the hilly moors. See Plate of WILD CATTLE, under CATTLE.

HIGH'LANDERS. Scottish regiments of the British army, the oldest of which is the Black Watch (q.v.), founded in 1668. The Scottish social structure and conditions generally offered peculiar facilities for good recruiting—which fact, together with their proved military qualifications, encouraged the British government in the organization of the following regiments:

ORIGINAL TITLE	Date of formation	Present territorial title
Black Watch, The...	1704	Royal Highlanders, The
71st Highlanders....	1777	Highland Light Infantry
Ross-shire Buffs.....	1777	Seaforth Highlanders
74th Highlanders....	1787	2d Batt. Highland L. I.
Duke of Albany's Own	1793	2d Batt. Seaforth Highl'ders
Cameron Highlanders	1805	Queen's Own, Cameron Highlanders
Gordon Highlanders.	1796	2d Batt. Gordon Highl'ders
Sutherland Highl'ders	1800	2d Batt. Argyle and Sutherland Highlanders
Other Scottish regiments (not Highlanders) are:		
Cameronians.....	1688	Scottish Rifles
The Douglas Reg't...	1660	Royal Scots, Lothian Regt.
Scots Fusilier Guards	1660	Scots Fusiliers

The personnel of the Highland regiments is no longer confined to Scottish officers and men.

HIGH'LAND FLING. One of the distinctive national dances of Scotland. It is ordinarily danced by three or four persons to the music of the strathspey (q.v.). The time is $\frac{4}{4}$, and most of the music is distinguished by an extended use of syncopation. Its name is derived from the peculiar, flinging action of the steps as the performer dances alternately on each leg, throwing the other out in front and behind. Like all Scottish dances, the Highland fling is animated, sharp, and vigorous.

HIGHLAND MARY. A poem by Robert Burns (1792), celebrating his affection for Mary Campbell, a nursemaid in the family of Gavin Hamilton and daughter of a sailor settled near Dunoon. She died shortly after their betrothal.

HIGHLAND PARK. A city in Lake Co., Ill., 23 miles north of Chicago, on Lake Michigan, and on the Chicago and Northwestern Railroad (Map: Illinois, J 1). Picturesquely situated on wooded bluffs 100 feet above the lake, it is a popular residential suburb of Chicago and has the Northwestern Military Academy, Deerfield-Shields High School, and a Carnegie library. There are also municipally owned water works. Fort Sheridan (q.v.) adjoins the city north. Pop., 1900, 2806; 1910, 4209.

HIGHLAND PARK. A village in Wayne Co., Mich., about 10 miles north of Detroit (Map: Michigan, F 6). The chief industry is the manufacture of motor cars and motors. One of the largest automobile plants in the country is situated here. Under a revised charter of 1912 Highland Park is governed by a president and four councilmen. Pop., 1900, 427; 1910, 4120; 1920, 46,499.

HIGH'LANDS. A name applied to the mountainous region north of and including the Grampian Mountains in Scotland. This district has no political or civil boundary and is separated by only a vague line of demarcation from the division called the Lowlands. It may be briefly described as that portion of the north and northwest of Scotland in which the Celtic language and manners have lingered until modern times. See GREAT BRITAIN. Consult also Browne, *History of the Highlands and the Highland Clans* (4 vols., 1838).

HIGHLANDS OF THE HUD'SON. A group of mountains extending in a southwest-northeast direction through Rockland, Orange, Putnam, and Dutchess counties, N. Y., and forming a northerly continuation of the Blue Ridge of Pennsylvania and New Jersey. The Hudson River crosses the mountains through a winding gorge whose sides rise abruptly in places to peaks about 1500 feet above the water. The region abounds in beautiful scenery and has great historic interest. Stony Point and West Point, two promontories on the west side of the river, were the scenes of stirring struggles during the Revolution. See HUDSON RIVER; NEW YORK.

HIGH LIFE BELOW STAIRS. An amusing farce by James Townley (1759). See LADY BAB.

HIGH'NESS. See TITLES OF HONOR.

HIGH PLACE (Heb. *bāmāh*, height). An expression frequent in the Old Testament and invariably used (except in poetry) as a designation of a sanctuary. All worship in ancient Israel was conducted at high places, and there was therefore a very large number of such shrines. Generally they were located on the top of a hill or a mountain, which accounts for the name; but sometimes a *bamah* was within a city, at the gate, or in a valley, not necessarily even on an artificial mound, as has been supposed. At such a high place there would be an altar, a sacred stone of phallic shape, a wooden post, a sacred tree, or often a sacred fountain. While some may have been only small shrines, others had large halls where the worshipers took part in the sacrificial meal, as well as an *adytum* for the image of the deity. There probably was an idol in every such temple. At Bethel and Dan there were bull images of Yahwe, at Jerusalem a brazen serpent as well as bulls. The worship at these sanctuaries was in earlier times characterized by joy, by eating, drinking, dancing, and sexual indulgences. This rejoicing was hallowed by offerings of sacrifices, libations, and intercourse with the hierodules. As most of these high places were taken over from the Canaanites, and the denunciations of the prophets show the continuance in Israel, even at a late date, of the worship of the Baals, it is probable that with Yahwe other deities, also, especially the *Baalim* or *Elim* (lords or gods) to whom the sanctuaries had once belonged, were recognized by sacrifices in these temples. That these high places were once regarded as altogether legitimate is evident from the fact that Samuel conducted worship at a number of them, David, Solomon, and all his successors down to Josiah sacrificed in them, and at these sanctuaries the stories of the patriarchs were told. Many of the stories of Genesis cluster about the high places of Shechem and Bethel, Mizpah and Mahanaim, Hebron and Beersheba, and Beer-lahai-roi. But the prophets of the eighth century, men like Amos and Hosea, Isaiah and Micah, denounced these temples of the nation and the sacrificial cult

there carried on. They maintained that Yahwe had not commanded that sacrifices be brought to Him, that Israel was happiest and most pleasing to Yahwe when no sacrifices could be offered, viz., in the wilderness. While the earliest law of Israel, the Covenant Code (Ex. xxi–xxiii), regards worship at those sanctuaries where Yahwe had revealed Himself as perfectly legitimate, the Deuteronomic law introduced by King Josiah about 620 declares that sacrifices shall be offered in only one place. This centralization of the cult in Jerusalem may have been an ideal of the local priesthood as early as the days of Hezekiah, and some Judæan temples may have been closed and destroyed as is stated in 2 Kings xviii. 4, 22; xxi. 3, though some scholars hold that the author of these verses has wrongly given Hezekiah credit for the same reformatory work as Josiah. That Josiah attempted to carry out the change proposed in Deuteronomy and did so with a high hand, there can be no doubt (2 Kings xxiii). But it is equally certain that the affection of the people could not by his violent measures be diverted from their ancient temples. The destruction of the temple in Jerusalem by Nebuchadnezzar naturally enhanced the importance of the smaller shrines and caused a reaction against the Yahwe cult in favor of the worship of other gods. There is evidence in parts of the Book of Isaiah written during the Persian and Greek periods of the survival of licentious and idolatrous rites that can scarcely be connected with the temple in Jerusalem. A positive proof of the existence of other temples besides that in the capital at a very late time is found in the Aramaic documents belonging to the Jewish military colony on the island of Elephantine in Egypt, where a Yaho temple existed probably from the end of the seventh century to 411 B.C. (see ELEPHANTINE PAPYRI), and also in the letter of Onias to Ptolemy and Cleopatra, quoted by Josephus (*Ant.*, xiii, 3, 1), in which he states that the Jews of Egypt, Cœle-Syria, and Phœnicia have many temples of different patterns and therefore wishes to have permission to build his temple in Leontopolis (see ONIAS'S TEMPLE), on the model of that in Jerusalem. From this it must be concluded that the idea of the illegitimacy of all worship except at Jerusalem cannot have been universally cherished among the Jews.

Consult: Von Gall, *Altisraelitische Kultstätten* (Giessen, 1898); Moore, "High Place," in *Encyclopædia Biblica* (1903); Schmidt, *Journal of Biblical Literature*, vol. xxxiii (Boston, 1914).

HIGH POINT. A city in Guilford Co., N. C., 78 miles northeast of Charlotte, on the Southern and the Carolina and Yadkin River railroads (Map: North Carolina, C 2). It has several furniture and wood-working mills, car shops, and produces furniture, safes, buggies, cotton, tobacco, hosiery, silk, bricks, etc. Settled in 1840 and first incorporated in 1858, the city has adopted the commission form of government. It owns and operates its water works and electric-light plant. Pop., 1900, 4163; 1910, 9525; 1914 (U. S. est.), 11,810; 1920, 14,302.

HIGH PRIEST (Heb. *hakohen hagadol*). The chief of the Jewish priesthood. There is no evidence that in the preëxilic period there was any distinctive office of high priest. In early days among the Hebrews the rulers united in their persons priestly and civil functions, and to a certain extent the kings of Israel and Judah continued to perform offices of a priestly character. By the side of the king priest there were guardians of the sanctuaries scattered throughout the country, and as some of those (e.g., at Shiloh, Bethel, Samaria, and Jerusalem) grew in importance, an ecclesiastical government gradually developed, and naturally in such significant centres as Samaria and Jerusalem there was always one priest who was regarded as supreme over the others. In the Deuteronomic code there is no reference as yet to the high priest as such, nor does Ezekiel make mention of such an office in his sketch of the future theocracy. Deuteronomy makes no distinction between priests and Levites; in Ezekiel the priests are members of the Zadokite family, to whom is assured control of the temple at Jerusalem, while the Levites are the body servants of the priests and represent those attached to the old sanctuaries of the country, which were set aside with the establishment of the principle of central authority for the temple of Jerusalem. (See DEUTERONOMY.) After the fall of the Davidite dynasty, and after Judah became a part of the Chaldæan and Persian empires, the chief priest in Jerusalem became the head of the theocracy and the official representative of the nation. This seems to be reflected in the Pentateuch. In certain priestly additions to this work probably made in the Persian period (see EZRA; LEVITICUS; PENTATEUCH) the prerogatives of the Zadokites are thrown aside, and the priesthood is fixed by Moses himself in the family of his brother Aaron. The latter is accorded the dignity of high priest, and the office is handed down to Aaron's third son, Eleazar, and by the latter to his son, Phinehas, and so in regular succession. The regulations for the office are set forth in great detail in Lev. viii, x, xxi, and other passages; but it must be borne in mind that these regulations remained to a certain extent in the domain of theory. Many more restrictions were attached to the office than belonged to the ordinary office of a priest. The high priest was allowed to marry none but a virgin and one of his own tribe; every impure contact, even of the dead bodies of his own parents, he was strictly forbidden, besides many other things that might cause defilement. His functions consisted principally in the general administration of the sanctuary and all that belonged to the sacred service. He alone was allowed to enter the Holy of Holies on the Day of Atonement and to consult the Urim and Thummim (q.v.). His costume was of surpassing costliness and splendor, comprising numerous vestments in addition to those of the ordinary priests. This costume was laid aside by the high priest when, on the Day of Atonement, he went to perform the service in the Holy of Holies; a simple garb of white linen—the funeral dress of the Jews in later times—was all he wore on that occasion. The revenues of the high priest were in the main the same as those of the other priests; but, according to the Talmud, he was to be richer than these, and if his own means were insufficient, he was to be provided with means by his brethren, in virtue of his position. The other priests never addressed the high priest but by *ishi kohen gadol* (my lord high priest). Before the law, however, the high priest was equal to any other Israelite. See AARON; LEVITE; LEVITICUS; PRIEST.

HIGH SCHOOLS. A term that has been

variously employed in different countries at different times to indicate a type of schools. In Germany in official language it is customary to refer to the universities as high schools (*Hochschulen*). In the middle of the sixteenth century in Edinburgh the designation was applied to a famous educational institution of a liberal character, but in grade below the university. In the United States it is very generally used to indicate an important and definite type of schools which forms a component part of the public-school system. This term came into use between 1820 and 1850, when, in place of or by the side of schools called "academies," which were maintained by endowment or at private expense, schools of a corresponding grade were established at public expense. Such institutions were variously designated at first. In Philadelphia the Central High School yet retains its original name; in New York the corresponding institution was known first as the Free Academy and later as the College of the City of New York. This institution has since expanded in scope until it offers approximately the ordinary college course. The Boston Latin School, founded in early Colonial times, is a free public high school, fitting boys for college.

The term "high school" came into use in Boston when in 1821 the English High School was established as complementary to the Latin School. A few years later the Girls' High School was founded. During the period of Horace Mann's secretaryship of the Massachusetts Board of Education (1837–48) a system of high schools was instituted. This example of Horace Mann was followed by other educational leaders, notably by Henry Barnard in Connecticut. From the middle of the nineteenth century the movement in the establishment of high schools became very general. In many of the Western States high schools have from the first formed a part of the public-school system, and in some instances their maintenance is recognized by the constitution of the State. During the year 1912–13 there were reported to the United States Commissioner of Education 11,277 public high schools, having an attendance of 1,134,771 pupils. The proportion of high-school students to the scholastic population was about three times as great as in 1890, while about 23 per cent of the children of this generation in the United States receive some education in the high schools. The courses of study, the terms of admission, and the length of time required for completing the instruction differ widely; but in general the term "high school" in the United States means a school supported from the public treasury, where tuition is usually (but not necessarily) free, and where pupils of both sexes are carried forward from the grammar schools to the study of "higher" branches, and thus fitted for active life or for admission to universities, colleges, and technical schools. In its origin the high school, as also the academy, arose in answer to the demands for schools of a lower grade than colleges, appealing to a wider constituency and satisfying more needs. For the most part the high school yet retains these characteristics. In the central and western Commonwealths of the Union it fits directly for colleges and especially for the State university; but this is due to the fact that there is a very great freedom of choice in regard to the subjects essential for entrance to college and university courses. The adjustment has been made by the college rather than by the high school, and this adjustment has been adopted very extensively throughout the country. By far the larger part of high-school graduates do not enter college. However, high schools seek to meet various needs, either by offering a variety of courses or in large cities through distinct schools. Thus, there are the classical courses or schools, which are distinctively college preparatory in their nature; the scientific or English courses or schools, which furnish preparation for professional schools or simply equipment in general; there are also of recent years specialized high schools or courses, giving a technical or industrial preparation, and commercial high schools, with a corresponding purpose in view, and more recently agricultural high schools have sprung up. No part of the educational system of the United States is so responsive to local demands and to public opinion. Hence arises the greatest variety of local conditions in these schools in city and country. For the most part they are wholly under local control and are subject to general State supervision of only a nominal character. In some States, such as New York, this supervision is more intimate; in others, such as California or Michigan, it is exercised chiefly through the State universities. This adaptability to local influences constitutes the greatest element of their strength, while at the same time the absence of general standards constitutes a most serious element of weakness. That the public high school is the representative secondary school of the United States is indicated by the fact that during 1912–13 private secondary schools numbered only 2168, with an attendance of 148,238 pupils. From 1896, when the number of private schools was 2100 and the number of pupils 108,000, there was a steady decline in both the number of private schools and in the attendance as well until 1908–09; but since that date there has been an upward tendency.

Bibliography. Butler, *Education in the United States* (Albany, 1900); Brown, *The Making of our Middle Schools* (New York, 1902); *Reports of the United States Commissioner of Education* (Washington); J. F. Brown, *The American High School* (New York, 1909); H. A. Hollister, *High School Administration* (Boston, 1909); C. H. Johnston, *High School Education* (New York, 1912–14); Monroe, *Principles of Secondary Education* (ib., 1914). See Elective Courses and Studies; Grammar Schools; National Education, Systems of; Secondary Schools.

HIGH SEAS. In the most general sense, the open sea, constituting the highway of the ships of all nations. In law, however, the expression has received more specific definition—first, in international law, as describing the public waters lying beyond the territorial waters of a particular nation, and, second, in English and American law, as applied to the waters in which the admiralty courts, as distinguished from the ordinary municipal courts, exercise jurisdiction.

In international law, territorial waters comprise all ordinary arms of the sea—bays, harbors, straits, and tidal rivers, lying wholly within the confines or bounded wholly by the shores of a single nation, together with the littoral strip, 3 miles in width, extending out from the low-water mark of the tide from the shore of a nation. In this sense, then, the high seas may be said to begin at the 3-mile limit.

Within its territorial waters a nation exercises an extensive jurisdiction which is not conceded to any nation on the high seas. Formerly, indeed, certain nations claimed and exercised an exclusive jurisdiction over certain seas or parts thereof, as Venice and Genoa in the Middle Ages over the Adriatic and Ligurian seas, Portugal at a later period over the Indian Ocean, Sweden and Denmark over the Baltic and the Arctic seas, England over the narrow seas, the North Sea, and the Atlantic from Cape Finisterre in Spain to Stadland in Norway, and Russia in the Bering Sea. It was not till the early part of the last century that the last of these pretensions was abandoned, when Great Britain and the United States (1824) united in rejecting the claim of Russia to exclusive dominion over the waters of the Bering Sea, though this claim was revived in part by the United States government in connection with the seal fisheries in those waters. (See BERING SEA CONTROVERSY.) For nearly a century, accordingly, the principle of the freedom of the seas has been accepted in principle and in practice by all nations. What this comes to in practice is that the open sea is free to the ships of all nations, whether for purposes of trade or of warfare, subject only to such regulations as may be imposed by international agreement. A ship on the high seas and all those on board are subject to the jurisdiction of the nation whose flag the ship flies, and any nation may regulate the use of the seas by its own ships for the safety of ocean travel, for the prevention of illegal trade or other unlawful practices, and for protecting its interests and fulfilling its obligations as a neutral in time of war. But no nation, unless empowered by treaty, can in any way in time of peace restrict the use of the high seas by the ships, public or private, of other nations, either with respect to navigation or the right of fishing. The only exceptions are the British pearl fishery off Ceylon, which extends to a distance of 20 miles from the shore, and which is based on immemorial usage, and the right of every nation to suppress piracy on the high seas. In time of war, however, a belligerent may exercise the right of search over neutral vessels on the high seas for the purpose of detecting violations of the neutrality laws or of a blockade maintained by it. See BLOCKADE; NEUTRALITY; SEARCH, RIGHT OF.

As a term of admiralty law in England and the United States, the high seas include that "part of the sea which lies not within the body of a country." It is used in contradistinction to bays, harbors, and arms of the sea inclosed within the *fauces terræ*, or narrow headlands or promontories of a nation. The high seas—or "the main sea," to use Sir Matthew Hale's expression—are deemed within the exclusive jurisdiction of the Admiralty, up to high-water mark when the tide is full.

This means that the jurisdiction of the admiralty courts in cases of collision, claims to salvage, prize, and other matters coming properly within the cognizance of those tribunals, is not limited to the high seas as defined in international law, but extends to the littoral strip and other waters comprehended within the description of territorial waters as well. Consult the authorities cited under ADMIRALTY LAW and INTERNATIONAL LAW; also United States *v.* Rodgers, 150 United States Reports, 249 (Washington, 1893).

HIGH STEWARD. In English history, the highest official of state under the Norman kings. The office was brought over by the Conqueror from Normandy; but while it survived in name and in importance for centuries, it did not long retain its preëminence. As early as the reign of William Rufus the great man of the realm next to the King bore the title of Chief Justiciar (*Justiciarius capitalis*). Later the office of Lord High Steward of England—still one of great distinction, but shorn of much of its power—became hereditary in the earls of Leicester. It survives to this day, but only as an honorary or ceremonial office, exercised in connection with the coronation of a new monarch.

HIGH-TEMPERATURE MEASUREMENT. See PYROMETER; THERMOMETER.

HIGH TREASON. See TREASON.

HIGHTS'TOWN. A borough in Mercer Co., N. J., 14 miles east by north of Trenton, on the Pemberton and Hightstown and the Pennsylvania railroads (Map: New Jersey, C 3). It contains the Peddie Institute for boys. There are nurseries, brickyards, and manufactories of rugs and shoes. The borough is situated in a rich agricultural district and owns its water works and sewer system. Pop., 1900, 1749; 1910, 1879.

HIGH'WAY. A place over which the public generally has a right to pass. As a term of the common law, it includes roads, streets, footpaths, bridle paths (or ways along which the public is entitled to ride or lead a horse), driftways (or places along which the public may drive cattle), public canals, ferries, bridges with their approaches, and navigable streams. In statutes, however, it is generally used in a narrower sense, being limited to roads or streets.

Ordinarily the right of the public in a highway is that of user, not of ownership; i.e., it is a right to use the land of a private owner for passing and repassing. To this extent it partakes of the nature of an easement (q.v.), but it is not a true easement, because there is no dominant estate to which it is appurtenant, as in the case of a private way. But while this is the usual nature of the highway in England and the United States, it sometimes happens that the "fee" or ownership of the highway, i.e., of the land itself, is vested in the state or the local, municipal authority, as the county or city. Whether a place of passage is a highway or not does not depend upon its being a thoroughfare, i.e., open at both ends or leading to a public place. If the public is entitled to pass and repass, the place is a highway, although its terminus is at the gate of a private house.

Highways are created either by act of the public authorities or by dedication of the landowner and acceptance by the public. Dedication may be either express or implied. It is of the first kind where a landowner formally lays out a public road or street and gives notice that the public may use it. The dedication is implied where the public makes use of a way without objection of the landowner and under circumstances indicating his assent to such use. But mere user by the public, however general and however long-continued, will not of itself and without the owner's assent result in a dedication.

One who sells lots of land purporting to be bounded by a strip of land described as a road or street does not thereby convert such strip into a highway, but only into a private way, or

easement, for the benefit of the holders of the lots so conveyed. But such grants are evidence of a dedication to the public, which becomes effective on its acceptance by the public, evidenced by general user. In the absence of such acceptance the grantor may, by buying back the lots so conveyed or otherwise, extinguish the private easements of the grantees and make whatever use he may choose of the intended highway.

The acceptance by the public, as above indicated, is usually necessary in any case to make a dedication effective so as to prevent the owner of the land from revoking it, but is not in itself always effective to the extent of imposing on the authorities the common-law obligation of keeping the dedicated strip in repair as a highway. But a general user by the public continued for a long time has usually been held to have the effect of giving the dedicated strip the character of a highway for all purposes, including the obligation of the authorities to repair. The acceptance of the dedication is, however, more properly evidenced by some formal act of the authorities chargeable with the duty of repairing or by actual acts of repair or other control exercised by them.

In the United States highways are created more frequently by the act of the public authorities than by private dedication. At times they are established by special legislation, but, as a rule, by local authorities under general statutes. These differ in the various States, although their principal provisions are much alike. They ordinarily require formal application by interested parties for the laying out of a highway; the survey and location of the proposed way by the proper authorities; due notice to the various persons whose property will be directly affected, a proper hearing before certain officers, a proper assessment of damages or of benefits, and a complete record of the proceedings. After a highway has been established, it can be lawfully altered or vacated only by act of government. This may be accomplished by special legislation, though, as a rule, the State delegates its authority over highways to county, town, or city officials. In the United States even the State cannot make, change, or vacate a highway except in strict conformity with the procedure established by law, nor without making compensation to landowners whose property rights are taken away thereby. This is because of constitutional prohibitions against the taking of private property for public use except by due process of law and without just compensation. In England Parliament is not thus hampered by constitutional limitations, although in practice due legal process and compensation are always provided for in such cases by statute.

As has been said above, the ordinary rule, both in England and in the United States, is that the public has only a user of the surface of the highway; the fee of the land remains in the adjoining owner. By virtue of this right of user the public is entitled to use every part of the highway and is not limited to the traveled or beaten part only. Accordingly, if any portion of a highway is unlawfully occupied by a fence, gate, wall, or building, such obstruction is a nuisance and may be abated either by the public authorities or by any traveler whose right to use the road is interfered with. This is one of the few cases surviving in English and American law in which a person is allowed to take the law into his own hands. It is his duty in such cases to proceed in a peaceable manner, doing no more injury than necessary to the property which constitutes the nuisance. The person who is responsible for the nuisance is liable in damages to any one injured thereby. In some circumstances a traveler has a right to deviate from the highway and go upon adjoining lands. Highways being established for the use and benefit of the whole community, a due regard for the welfare of all requires that, when temporarily obstructed by storm or flood, travel should not be interrupted. A person traveling on a highway is in the exercise of a public right, and if he is compelled by impassable obstructions to leave the thoroughfare and go upon private lands, he is still in the exercise of the same right. But this right of deviation rests upon necessity, not upon the personal convenience of the traveler. It is properly exercisable, therefore, only when the obstructions are due to sudden or recent causes, and when the traveler cannot conveniently make his journey by other ways.

But the owner's rights in his land are not exhausted by his dedication of them for highway purposes. His ownership of the fee is a real thing, subject only to the public right of user which he has conceded or which has been acquired by the condemnation proceedings. He may still exercise all rights of use and dominion not incompatible with the public right. Thus, if a mine were discovered under the road, the adjoining owner would have the sole right to dig it and keep the contents, subject only to the duty of leaving sufficient support for the surface of the road. So, in like manner, where there are strips of land at the side of the road on which trees grow or grass, these belong solely to the adjoining owner, and the public have no right to them. Another consequence of the same rule is that, if a person is loitering on a highway, not with the intention of using it as a traveler, but for some unlawful purpose, such as creating a disturbance or abusing an adjoining property owner, he may be dealt with as a trespasser by the owner of the fee.

The English common law imposed upon the parish the duty of maintaining and repairing all highways. If the duty was neglected, the parish was indictable and was liable for damages sustained by travelers through its negligence. At present the maintenance and general control of highways and bridges in England and Wales are committed chiefly to district and county councils, in accordance with the Local Government Act, 1894 (56 and 57 Vict., c. 73).

In the United States, while every highway is subject to the control of the State or Federal government, comparatively few roads are constructed and maintained directly either by a State or the nation. The power to establish them and the duty of keeping them in repair are generally delegated to some subdivision of the State, such as the township, the county, or the city. The liability of these political subdivisions for their negligent performance of this duty varies in the different States. As a rule, however, they must respond in damages for injuries caused to travelers by defects in highways of which the proper authorities had notice. In some States a township is divided into road districts, and all ordinary repairs are made by the inhabitants of these several divisions, while extraordinary repairs, as well as the maintenance of bridges, devolve upon the township

at large. In other States the unit of highway administration is the county or city.

The Legislature has power to commit the work of improving and repairing highways to private corporations. Accordingly turnpike and similar companies receive from the State authority to construct roads and keep them in good repair and to reimburse themselves by tolls levied upon the members of the public using the roads. By this system the cost of maintaining proper roads is shifted from the property owners of a particular territory to the traveling public; but the cost is still borne as a tax which the State has a right to impose. It is also established that the Legislature of a State may lawfully authorize temporary obstructions in highways and may delegate the exercise of this power to municipal corporations. Hence come city ordinances providing for permits to deposit building materials in city streets, to erect stands, to use apparatus for hoisting goods, and the like. Gas and water companies receive authority to excavate highways and lay pipes; telegraph and telephone companies are permitted to erect poles and string wires along public thoroughfares, and even railroad companies are allowed to lay tracks and run cars over their surface. If the use which such companies are thus authorized to make of the street subjects adjoining property to injuries not contemplated or provided for when the street was laid out, it may give the property owners the right to compensation for these injuries from the users. The use of city and village streets for gas and water mains is generally deemed to be within the scope of the original dedication, but not so in the case of country highways. Railroads, on the other hand, are usually regarded as an encroachment on the rights of the owner of the fee of a road, whether urban or rural, though the contrary has usually been held in the case of street railways.

In England teams meeting upon a highway turn to the left; in the United States they turn to the right. This "rule of the road" has received legislative sanction in some of the States, and penalties are imposed for its violation. Consult: Woolrych, *The Law of Ways* (2d ed., London, 1847); Elliott, *Treatise on the Law of Roads and Streets* (Indianapolis, 1900); *Consolidated Laws of New York—Highway Law.* See PAVEMENT; ROAD; STREET.

HIKONE, hē'kō-nā. A town in the Japanese Prefecture of Higo, situated in the central part of Nippon, on the east shore of Lake Biwa (Map: Japan, E 6). Its chief attraction is the remains of a fine feudal castle, the former seat of a famous Daimio. Pop. (est.), 22,000.

HILĀLI, hē-lä'lē, BABR UD-DĪN. A Persian Sufi poet of the first third of the sixteenth century, born in Astrabad and educated at Herat. In 1532–33 he was imprisoned and then killed by Ubaid Khan, as a Shiite heretic, although it seems certain that he had long before forsaken the national heresy and become an orthodox Sunnite. His poems include the allegorical epics, *Sifat al-Ashikīn* (On the Ways of Lovers) and, most famous of all, *Shāh u Darvish*, or *Shāh u Gadā* (King and Beggar, or King and Dervish), translated by Ethé in *Morgenländische Studien* (1870), and the lyric *Divan*, published at Cawnpore in 1864.

HILA'RIA (Lat. nom. pl. of *hilaris*, Gk. ἱλαρός, *hilaros*, gay). A Roman festival, belonging to the later Empire, celebrated in honor of Cybele at the vernal equinox. It began on March 22 (or, perhaps, even on the 15th) and closed on the 25th. The last day of the feast was the most important, and on it the inhabitants of the city abandoned themselves to the most extravagant merrymaking. The only religious ceremony in connection with it was the solemn procession of the priests who bore round the streets the statue of the mother of the gods. (See CYBELE.) The festival celebrated the departure of winter and hailed the approach of spring. Consult Marquardt, *Römische Staatsverwaltung*, vol. iii (2d ed., Leipzig, 1885), and Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912).

HILA'RION, ST. (c.290–371). The reputed founder of monachism in Palestine. According to the legendary and untrustworthy account of his life, he was born at Tabatha, near Gaza, was converted at Alexandria, and, attracted by the fame of St. Antony, went to visit the latter in his hermitage and became his disciple. Returning to Palestine with some companions, while still only a lad of 15, he gave away all the property which he had inherited by the recent death of his parents and withdrew into the desert of Majemra, south of Gaza. He observed the most rigid asceticism and after 20 years of this life was rewarded with rapidly growing fame, miraculous gifts being attributed to him; disciples and imitators multiplied to the number of 2000 or 3000, all under the spiritual control of Hilarion. When 63 years old, the death of St. Antony being revealed to him, he went to Egypt and visited the scene of that saint's labors; afterward he proceeded with a favorite disciple, Hesychius, to Sicily, where his popularity rendered the quiet and retirement which were congenial to him impossible. A further migration to Epidaurus thus became necessary, and ultimately he found a resting place in Cyprus, the diocese of his friend Epiphanius, where in a lonely cell among some almost inaccessible rocks he died in 371. He is commemorated by the Roman church on October 21. The original source is Jerome's "Vita S. Hilarionis," in Migne, vol. iii, translated. Consult Israel, "Die Vita Hilarionis des Hieronymus," in *Zeitschrift für wissenschaftliche Theologie* (Jena, 1880), and Winter, *Der literarische Character der Vita S. Hilarionis* (Zittau, 1904).

HIL'ARY, ST. (Lat. *Hilarius*). Pope, 461–468 A.D. He was an earnest promoter of the faith and strengthened the ecclesiastical organization, especially in France and Spain. During his pontificate canons were adopted forbidding the ordination of men who had married a second time or those who had married widows and also forbidding bishops to nominate their successors. He is a saint in the Roman calendar, and his day is September 10. Some of his letters are in *Epistolæ Romanorum Pontificum*, edited by Theil, vol. i (Braunsberg, 1868).

HILARY, ST., BISHOP OF ARLES (401–449). A churchman whose name occupies a conspicuous place in the history of the fifth century. He was born at Arles and was made Bishop there in 426. As Metropolitan Bishop, he became involved in a serious controversy with the Pope, Leo the Great. A bishop, Cheldonius, whom he had deposed, appealed to Rome and his condemnation was reversed; but Hilary refused to submit to the decision, maintaining that the authority was uncanonically exercised. Hilary was excommunicated and at last submitted to

the Pope, and the dispute was amicably terminated. The occurrence was of importance for the later relation of the French church to the papal see. Hilary died at Arles in 449. His works are in Migne, *Patrol. Lat.*, i. His day is May 5.

HILARY, St., Bishop of Poitiers (c.300–367). He was born of pagan parents at Poitiers. His conversion to Christianity was mainly the result of his own study. About the year 353 he was elected Bishop of his native city and immediately rose to the first place in the Arian controversy. Having provoked the displeasure of the court party, he was imprisoned and sent into exile in Phrygia (356), but appeared in the Council of Seleucia in 359 and was permitted to resume possession of his see, where he died. The Church holds his day on January 14. Hilary's theological writings are especially valuable for the history of the Arian party and particularly for the doctrinal variations of that sect and the successive phases through which it passed between the Council of Nicæa and the first Council of Constantinople. The best edition is that of the Benedictine Dom. Constant (Paris, 1693), or the reprint of it with additional matter by Maffei (Verona, 1730; in Migne, *Patrol. Lat.*, ix and x). His selected works, with biographical and critical introductions, have been translated in the *Nicene and Post-Nicene Fathers*, vol. ix (2d series, New York, 1890). His determined opposition to Arianism won him the epithet "Athanasius of the West." Consult Adolf Harnack, *History of Dogma*, vol. iv (Boston, 1899), and for his life, J. G. Cazenove (London, 1883) and Largent (Paris, 1902).

HILARY TERM. In English law, one of the four terms held for the administration of justice by the Supreme Court of Judicature and named from the saints' days nearest to the date of beginning the terms. Hilary term was named from the festival of St. Hilary of Poitiers and was formerly appointed to commence on January 11 and to end on January 31. It is now, by statute, a movable term, opening on January 11 and ending on the Wednesday before Easter. See Term, of Court.

In the Inns of Court Hilary Term is one of the four dining terms of the year, beginning on January 11 and ending February 1. See Inns of Court.

HILBERT, David (1862–). A German mathematician, born at Königsberg. He studied at the University of Heidelberg and later at the university of his native city, where he graduated in 1884, and where he became an instructor in 1886, associate professor in 1892, and professor in 1893. In 1895 he accepted the professorship of mathematics at the University of Göttingen. Hilbert early gained distinction as author of the theorem that any system of algebraic forms can be expressed in terms of a finite number among them. This includes as a particular case the finiteness of the system of invariants of any given forms, the proof of which had long been sought. But his chief reputation is as a leader in the reduction of geometry to a system of axioms, a great advance beyond the Euclidean system. The fourth edition of his *Grundlagen der Geometrie* appeared in 1913.

HIL'DA, or **HILD**, St. (614–680). Abbess of Streaneshalch, later Whitby. She was a member of the royal family of Northumbria and was baptized by Paulinus (q.v.), with her great-uncle, King Edwin, April 11, 627. During the pagan reaction which followed Edwin's defeat and death Hilda was tempted to settle with her widowed sister Hereswid at the monastery of Chelles, 10 miles from Paris; but she was recalled to England by Bishop Aidan (q.v.), and in 649, two years after her consecration as a nun, she was appointed to succeed Heiu, the abbess of Heortea, or Hartlepool. When, in fulfillment of the vow which he had made before the decisive battle with Penda (Nov. 15, 655), Oswy dedicated his infant daughter to God, it was to the care of Hilda that he intrusted her. In 657 the abbess founded the famous monastery on the cliffs of Streaneshalch, or Whitby, and for the rest of her life ruled over her double community of monks and nuns, among whom were St. John of Beverley and the poet Cædmon. Her day in the Roman calendar is November 17. Nearly all knowledge of her comes from Bede, *Ecclesiastical History*, edition by Plummer (Oxford, 1896); by Mayor and Lunsley (Cambridge, 1879). Consult also Dunbar, *Dictionary of Saintly Women* (London, 1902).

HIL'DEBERT OF TOURS, tōōr (c.1055–c.1133). A French prelate and author, born at Lavardin, near Vendôme. Tradition says he was the pupil of Berengarius of Tours, but this is not established. In 1091 he was made archdeacon and in 1096 Bishop of Le Mans. After some difficulties with the Count of Le Mans, the Bishop found a new enemy in William Rufus, who took the city about 1099 and carried him to England as a prisoner for about a year. He had constant quarrels with the neighboring prelates and finally was in almost open rebellion against the King, Louis VI (the Fat). In 1125, somewhat against his will, he was elected Bishop of Tours. Two years afterward he presided at the Synod of Nantes. Towards the end of his life he was on more amiable terms with the King. The works of Hildebert were edited by Antoine Beaugendre (1708), but far from perfectly, and in part by Baluze and Muratori. They consist of sermons, letters, theological writings, and poems. A collection of the latter was published under the title *Mélanges poétiques d'Hilibert de Lavardin* (1882). The treatise *Tractatus Theologicus*, formerly attributed to Hildebert, is by Hugues of Saint-Victor. Consult Dieudonné, *Hildebert de Lavardin: sa vie, ses lettres* (Paris, 1898).

HIL'DEBRAND. See Gregory.

HILDEBRAND, hil'de-brānt. The pseudonym of the Dutch poet Nikolaas Beets (q.v.).

HILDEBRAND. An aged warrior and sage in German legend, the tutor of Dietrich von Bern. He appears in the *Hildebrandslied* and plays a leading part in the *Nibelungenlied* and other legends.

HILDEBRAND, Adolf E. R. (1847–). A German sculptor, born in Marburg. He studied at the Art School in Nuremberg under Kreling and in Munich with Zumbusch and later worked in Berlin with Siemering. His first great public success was at the Vienna Exposition of 1873, with his marble figure of a "Sleeping Shepherd Boy," his bronze statuette of a "Drinking Boy," and his bust of the philologian Theodor Heyse, which were much admired for their lifelike realism combined with classic perfection of form. Hildebrand had studied in Rome in 1867 and 1868, and in 1874 he settled down in Florence, where he resided for 18 years,

modeling portrait busts, heads, and half figures that reproduce life with extreme realism in the manner of the Florentine artists of the fifteenth and sixteenth centuries, but refined by the nobility of the antique. Among his Florentine busts are those of Clara Schumann, the Grand Duke of Saxe-Weimar, the Duke Karl Theodor, and Ludwig of Bavaria; among his Florentine nudes are the marble "Adam," in the Leipzig Museum, and the "Young Man," in the Berlin National Gallery. For the market place in Jena he designed a fountain in memory of the visit of Prince Bismarck in 1892, and for the Broglie Square in Strassburg a fountain with the bronze figure of "Father Rhine." For Meiningen he created a monument of Brahms, and one of the poet Otto Ludwig as Hermes. Portrait busts by him include Hermann von Helmholtz, Max von Pettenkofer, in the Berlin National Gallery, and Wilhelm von Bode. His best-known portrait relief is that of the German Kaiser. In 1887 he received the great gold medal at the Berlin Exposition, and he became a member of the Berlin Academy in 1892, after which year he lived in Munich. His work shows marked individuality and great constructive ability. Consult Alexander Heilmeyer, *Adolf Hildebrand* (Leipzig, 1902).

HILDEBRAND, Bruno (1812–78). A German economist and statistician, born at Naumburg-an-der-Saale and educated at Leipzig and at Breslau, where in 1839 he became professor. In 1841 he was appointed to a professorship at Marburg, from which he was suspended in 1846 because of the tone of a contribution to a London paper. He was elected to the National Assembly at Frankfort from Marburg in 1849, after having been reinstated in his academic position. He went to Zurich as a teacher in the Hochschule in 1851, and five years later to Bern as the head of the new Swiss Bureau of Statistics, which he founded. But, as a result of differences with his superiors, he was dismissed and in 1861 became professor in the University of Jena and director of the Bureau of Statistics. His works comprise: *Nationalökonomie der Gegenwart und Zukunft* (1848); *Die kurhessische Finanzverwaltung* (1850); *Statistische Mitteilungen über die volkswirtschaftlichen Zustände Kurhessens* (1853); *Beiträge zur Statistik des Kantons Bern* (1860). He edited *Jahrbücher für Nationalökonomie und Statistik* (1863 et seq.).

HILDEBRAND, hĭl'dĕ-brănd, Hans Olof (1842–1908). A Swedish historian and antiquarian, son of the archæologist and numismatist Bror Emil Hildebrand (1806–84). He was born at Stockholm, studied at Upsala, in 1865 was made amanuensis of the archæological museum, and in 1879 succeeded to his father's position of state antiquarian. In 1895 he became a member of the Swedish Academy. His special study was Norse archæology and the related subjects, and his works are: *Svenska folket under hednatiden* (last ed., 1872); *De förhistoriska folken i Europa* (1873–80); *Fynder i Troas och Homeros' Troja* (1878); *Lifvet på Island under sagotiden* (last ed., 1883); *Sveriges medeltid* (1879–97), a history of civilization; the second volume of *Sveriges Historia*, dealing with the mediæval period; *Från äldre tider* (1882); *The Industrial Art of Scandinavia in the Pagan Time* (1882); *Zur Geschichte des Dreiperiodensystems* (1886); *Visby och dess minnesmärken* (1892–93); *The Industrial Art of Scandinavia in the Middle Ages* (1893); *Sveriges mynt under medeltiden* (1895). In 1872 he founded the *Kunglig Vitterhets Historie och Antiquitets Akademiens Månadsblad* and in 1880 became editor of *Antiqvarisk Tidskrift för Sverige.*

HILDEBRAND, hĭl'de-brănt, Rudolf (1824–94). A Germanic philologist. He was born in Leipzig and studied there. From 1848 to 1868 he taught in the Thomasschule. In 1864 he began to act as one of the editors of Grimm's *Deutsches Wörterbuch* and five years later became professor of modern German literature and language in the University of Leipzig. His most important works are *Vom deutschen Sprachenunterricht in der Schule und von deutscher Erziehung und Bildung überhaupt* (12th ed., 1910) and *Gesammelte Aufsätze und Vorträge zur deutschen Philologie und zum deutschen Unterricht* (1890). Consult Burdach, *Zum Gedächtnis Rudolf Hildebrands* (Hamburg, 1896), and Laube, *Hildebrand und seine Schule* (Leipzig, 1903).

HILDEBRANDSLIED, hĭl'de-brănts-lēt'. A fragmentary Old High German poem, the oldest-preserved specimen of German heroic poetry. It is written in alliterative verse and dates from the eighth century. It is known only through a manuscript preserved in the museum at Kassel and written by two monks of Fulda at the beginning of the ninth century on two blank pages of a religious work. It narrates the combat of Hildebrand and his son, Hadubrand, who after many years of separation meet and unknown to each other engage in a duel. The account breaks off without completing the story of the combat. The facsimiles of the manuscript have been published by W. Grimm (1830) and E. Sievers (1872), and a number of annotated editions of the text have appeared. Consult: B. Busse, "Sagengeschichtliches zum Hildebrandslied," in *Beiträge zur Geschichte der deutschen Sprache* (Halle, 1900); Braune, *Althochdeutschen Lesebuch* (ib., 1902); M. Trautman, *Finn und Hildebrand* (Bonn, 1903); F. B. Gummere, *Oldest English Epic* (New York, 1909); I. von Grienberger, *Das Hildebrandslied* (Akademie der Wissenschaften zu Wien, 1908); H. Collitz, *Hildebrandslied* (Göttingen, 1910).

HILDEBRANDSSON, Hugo Hildebrand (1838–). A Swedish meteorologist, born at Stockholm. He was educated at the University of Upsala, where he became lecturer (1866) and where he was professor and director of the meteorological observatory (1878–1908). In 1869 he traveled over a large part of Europe, and the next year he wrote *Om organisationen af den meteorologiska verksamheten i utlandet samt förslag till dess ordnande i Sverige*, which became the foundation for meteorological observations in Sweden and Copenhagen. From 1899 to 1907 he was secretary of the International Meteorological Committee, and from 1900 to 1910 a member of the committee on the award of the Nobel prize for physics. He wrote also *Essai sur les courants supérieurs de l'atmosphère dans leur relation aux lignes isobaromètriques* (1874); *Atlas des mouvements supérieurs de l'atmosphère* (1877); *Sur la classification des nuages* (1879; 2d ed., 1880), with photographs; *Die meteorologischen Beobachtungen während der Vega-Expedition* (1881), also in French; *Les orages dans la péninsule scandinave* (1888), with Professor Mohn, and *Wolken-Atlas* (1890), with Koppen and Neu-

mayer—both published in French, German, English, and Swedish; *Atlas international des nuages* (1896), with Riggenbach and Teisserane de Bort; *Les bases de la météorologie dynamique* (1898–1907), with Teisserane de Bort; *Rapport sur les observations internationales des nuages* (1903–05).

HILDEBRANDT, hĭl'de-brănt, EDUARD (1818–68). A German landscape and marine painter, whose most important work was in water color. He was born at Danzig. Starting as a house painter, he studied under Krause in Berlin and under Isabey in Paris. Like many other landscape painters of the period, he roamed the world over in search of "striking views." By 1858 he had already exhausted the possibilities of the Canary Islands, Italy, Sicily, North Africa, Egypt, Nubia, the Sahara, and the Arctic Ocean. In 1862, at the mandate of Frederick William II, he undertook a voyage around the world "to learn from personal view the phenomena that the sea, the air, and the solid earth bring forth beneath the most various skies." He returned after two years with 400 water colors that were exhibited in London in 1866. In 1855 he was made member of and professor in the Berlin Academy. Among his works are: "Brazilian Primeval Forest," "Cave at Staffa" (1865), "Castle Kronborg" (1857), in the National Gallery, Berlin; "Moonrise in Madeira," Corcoran Gallery, Washington; "The Bay of Naples," Metropolitan Museum, New York. His paintings, though full of affectation, are not without technical merit, especially in color.

HIL'DEBURN, CHARLES SWIFT RICHÉ (1855–1901). An American bibliographer and librarian. He received his education in the private schools of his native city, Philadelphia, and in 1876 became librarian of its Athenæum. His literary work includes the compilation, *A Century of Printing: The Issues of the Press in Pennsylvania, 1685–1784* (2 vols., 1885–86); *Sketches of Printers and Printing in Colonial New York* (1895); and the editorship of the *Statutes at Large of Pennsylvania Prior to 1800* (1888–).

HIL'DEGARD, ST. (c.1098–1179). A German nun, a friend of Bernard of Clairvaux, born at Böckelheim. She founded an abbey near Bingen in 1147, boldly attacked ecclesiastical abuses, and composed many mystical works, of which the best known is the *Scivias* (= *Sci vias domini;* edited in Migne, *Patrologia Latina*, vol. cxcvii) (1513). Consult: Roth, *Die Lieder und die unbekannte Sprache der heiligen Hildegard* (Wiesbaden, 1880); Biography by Schneegans (Barmen, 1891); Pal Frauche, *Sainte Hildegarde* (Paris, 1903).

HIL'DEN. A town of the Prussian Rhine Province, on the river Itter, situated 9 miles east-southeast of Düsseldorf. It is a growing place, with manufactures of silk and cotton goods, carpets, machinery, steel, iron, tinware, building materials, and furniture. Pop., 1890, 8600; 1900, 11,296; 1910, 16,903.

HILDESHEIM, hĭl'dĕs-hīm. The former capital of the bishopric of Hildesheim, in the Prussian Province of Hanover, situated on the Innerste, 21 miles south-southeast of Hanover (Map: Prussia, C 2). It has narrow, irregular streets, old monuments, some quaint, mediæval, highly ornamented façades, and many excellent examples of architecture owing to its having been a German home of the Romanesque and Renaissance art, including particularly the timber framework features. The surrounding walls of the town have been converted into promenades. There are five Roman Catholic and four Evangelical churches and a synagogue. The Roman Catholic cathedral, erected in the eleventh century and greatly modified, is built partly in the Romanesque and partly in the late Gothic. Its ancient cloisters are exceptionally curious and interesting. Its treasury is rich in objects associated with the lives of Charlemagne, Bishop Bernward, and others. The brass doors and bronze Easter column are richly ornamented with reliefs; there are also a number of gilded sarcophagi, including that of Bishop Godehard. Against the wall of the cathedral stands a rosebush which is 25 feet high and reputed to be 1000 years old. Two of the best examples of Romanesque architecture in Germany are the Roman Catholic church of St. Godehard, erected in the twelfth century and recently restored—a basilica-shaped edifice surmounted by three towers—and the large Evangelical church of St. Michael, founded by Bishop Bernward at the beginning of the eleventh century and containing his tomb. St. Michael has an interesting interior, with good mediæval ceiling paintings.

Hildesheim contains also a number of interesting secular buildings, notably the late-Gothic Rathaus (built in the fifteenth century and restored in 1883–92), adorned with rare frescoes by Prell and possessing valuable archives; and the former butchers' guild house, regarded as perhaps the finest wooden building in Germany. There is an interesting mediæval public square, Altstädter Markt. The environs are pleasant and not without interest. In recent times Hildesheim has been brought into special prominence by the collection of elaborate Roman silver plate (known as the Hildesheimer Silberschatz) discovered near the town in 1868. The collection consists of a complete service for three persons (69 pieces) and is believed to belong to the Augustan age. It is in the Berlin Museum. The educational institutions of Hildesheim include a Roman Catholic Gymnasium, originally founded as a cathedral school in the ninth century, a Lutheran Gymnasium, a seminary for teachers, a theological seminary, an agricultural school, etc. There are also two museums of art and antiquities, including the valuable Römer Museum, and a municipal library of about 50,000 volumes. Hildesheim manufactures iron products, tobacco, sugar, cotton and woolen goods, machinery, church bells, carpets, preserves, wagons, glass, stoves, etc. The chief articles of commerce are grain, wool, leather, and building materials. Pop., 1890, 33,481; 1900, 42,973, including 14,300 Roman Catholics; 1905, 47,061; 1910, 50,239.

The town existed before the ninth century. It came into great prominence after it was made in 818 the seat of the bishopric of Hildesheim. Under Bishop Bernward (993–1022) Hildesheim became famous for its fine ecclesiastical buildings and religious art productions executed under the supervision of the Bishop. In the thirteenth century the town joined the Hanseatic League and acquired considerable privileges. After continuous struggles with its bishops Hildesheim came, upon the secularization of the bishopric, into the hands of Prussia in 1803, was annexed to Westphalia in 1807 and to Hanover in 1813, and with Hanover passed to Prussia in 1866. Consult: Gottlieb Wachsmuth, *Geschichte von Hochstift und Stadt Hildesheim* (Hildesheim,

1863); Holzer Holzer, *Der Hildesheimer antike Silberfund* (ib., 1870); Karl Lachner, *Die Holzarchitektur Hildesheims* (ib., 1882); Karl Bauer, *Geschichte von Hildesheim* (ib., 1891).

HILDESHEIMER SILBERSCHATZ. See HILDESHEIM.

HIL'DRETH, RICHARD (1807–65). An American historian, born at Deerfield, Mass. He graduated at Harvard College in 1826, studied law, and began to practice in Boston in 1830. In 1832, however, he abandoned his profession to become editor of the Boston *Atlas*. In the autumn of 1834, being out of health, he went to the South, where he resided nearly two years on a slave plantation in Florida and used his opportunity to study the workings of slavery. The result was a powerful antislavery novel, published in 1836 under the title of *The Slave, or a Memoir of Archy Moore*. It was reprinted in England and in 1852 was republished in America under the title of *The White Slave*. When the annexation of Texas began to attract attention, he published in the Boston *Atlas* a series of articles which did much to intensify the hostility of the Northern people to that scheme. After publishing a *History of Banks* (1837) he passed the winter of 1837–38 in Washington as correspondent of the *Atlas* and, upon his return to his editorial chair, entered warmly into the campaign for the election to the presidency of General Harrison, a life of whom he published in 1839. A year later (1840) he translated Dumont's version of Bentham's *Theory of Legislation*. The same year appeared his *Despotism in America*, a work on the political, economical, and social aspects of slavery. A second edition with an added chapter was issued in 1854. From 1840 to 1843 he resided in Demerara, British Guiana, busying himself in editing two free-labor newspapers. After his return he published a *Theory of Morals* (1844) and a *Theory of Politics* (1853). The work, however, for which he is most remembered is his *History of the United States*, in six volumes (1849–56), in which he attempts to present the founders of the Republic in their true character, without trying to heighten their virtues or disguise their mistakes and faults. The first three volumes treat the period from 1492 to 1789; the second three from 1789 to the close of Monroe's first term (1821). The bias is Federalist, the treatment accurate and vigorous; but the graces of style are lacking, and the work is more consulted than read. In 1855 Hildreth published *Japan as It Was and Is*, and in 1856 *Atrocious Judges*, a compilation from Campbell's *Lives*. For several years, ending with the inauguration of Lincoln as President, he was engaged on the staff of the New York *Tribune*. He went abroad in the summer of 1861 as United States Consul at Triest and died in Florence.

HILF, ARNO (1858–1909). A German violinist, born at Bad Elster (Saxony). He received his first instruction from his uncle, Christian Hilf, who was concert master in Bad Elster. In 1872 he entered the Leipzig Conservatory, where he studied under David, Röntgen, and Schradieck. From 1878 to 1888 he lived in Russia, occupying the positions of concert master and professor at the conservatory in Moscow. In the same capacities he went to Sondershausen, but remained only one year. In 1889–91 he filled the post of concert master in the Gewandhaus Orchestra of Leipzig, and in 1892 succeeded A. Brodsky as principal violin professor at the conservatory, which position he retained until his death. He was not only one of the foremost virtuosos and quartet players, but also one of the most successful teachers of his instrument.

HILFERDING, hĭl'fĕr-dĭng, ALEXANDER FEDOROVITCH (1831–72). A Russian author, born at Moscow, of German stock. He studied in the city of his birth and after travels abroad devoted himself to historical and ethnographic studies. An ardent Panslavist, he wrote: *On the Servians and Bulgarians* (trans. into German by Schmaler, 1856–64); a history of the Baltic Slavs (1855); a history of their struggle with Germany in the Middle Ages (1861); and the very unscientific discussions of the relation of the Slavic languages to Sanskrit and to the allied languages (1853). His greatest work is the collection of Russian popular songs, in the search for which he lost his life. The collection was edited by Hiltebrant (St. Petersburg, 1873). Hilferding's collected works were published in 1868–74.

HILFERDING, RUDOLF (?–). A German economist and Socialist. His writings, which deal mainly with the theories and tactics of scientific Socialism, were published largely in the *Marx Studien*, established in 1904 and edited by Hilferding and Max Adler. In this periodical appeared his "Böhm-Bawerks Marx Kritik" (1904) and "Das Finanzkapital, eine Studie über die jüngste Entwicklung des Kapitalismus" (1910).

HIL'GARD, EUGENE WOLDEMAR (1833–1916). A German-American agricultural chemist and geologist, born at Zweibrücken, Rhenish Bavaria. He came to America in 1836, but returned to study at Zurich, Freiberg, and Heidelberg (Ph.D., 1853). In 1858 he was appointed State geologist of Mississippi, which position he retained until 1872. He was professor of chemistry at the University of Mississippi from 1866 to 1873 and for the following two years was professor of geology and natural history in the University of Michigan. In 1875 he was made professor of agricultural chemistry and director of the agricultural experiment station at the University of California. In 1894 he received the Liebig medal for distinguished services to agriculture from the Munich Academy of Sciences. As a member of the Northern Transcontinental Survey, he devoted three years (1880–83) to a study of the agricultural capabilities of Oregon, Washington, and Montana. He retired from active service in the University of California and the experiment station in 1909, becoming professor emeritus. His investigations on the chemistry and physics of soil and the reclamation of alkali lands resulted in important contributions to agricultural science. Much of his work may be found recorded in the publications of the California Agricultural Experiment Station. He is the author of *Soils* (New York and London, 1906), *Alkali Lands, Irrigation, and Drainage in their Mutual Relations* (Sacramento, 1890); and joint author, with Osterhout, of *Agriculture for Schools of the Pacific Slope* (New York, 1910).

HILGARD, JULIUS ERASMUS (1825–91). An American engineer. He was born in Zweibrücken, Rhenish Bavaria, went to Illinois in 1835, studied engineering, and was employed in the Coast Survey service. During the Civil War he assisted the Northern army and navy by the construction of maps and charts and by surveys as well as by tidal and other information. He

was one of the members of the International Metric Commission at Paris in 1872 and was made a member of the permanent committee. In 1875 he was president of the American Association for the Advancement of Science and from 1881 to 1885 superintendent of the United States Coast Survey.

HILGARD, Theodore Charles (1828–75). An American physician and scientist, born in Zweibrücken, Germany. He came to America in 1835 and began his professional work in St. Louis. He gave especial attention to microscopic studies of lower organic life until his health failed. Then he came to New York and engaged in the study of terrestrial physics with his brother Julius. His published works, besides papers appearing in the annals of various scientific societies, include: *Experimental Observations on Taste and Smell* (1854); *Exposition of Natural Series in the Vegetable Kingdom* (1858); *Phyllotaxis: Its Numeric and Divergential Law* (1859).

HILGENFELD, hĭl'gen-fĕlt, Adolf (1823–1907). An eminent German Protestant theologian, of the Tübingen school, born at Stappenbeck and educated at Berlin and Halle. In 1847 he became privatdocent, three years later professor, and in 1869 honorary professor, at Jena. Editor, after 1858, of the *Zeitschrift für wissenschaftliche Theologie,* he wrote: *Die Clementinischen Rekognitionen und Homilien* (1848); *Das Evangelium und die Briefe Johannis nach ihren Lehrbegriff* (1849); *Ueber die Evangelien Justins, etc.* (1850); *Das Markusevangelium* (1850); *Der Galaterbrief* (1852); *Das Urchristentum* (1855); *Die jüdische Apokalyptik* (1857); *Der Kanon und die Kritik des neuen Testaments* (1863); *Novum Testamentum extra Canonem Receptum* (2d ed., 1876–84); *Historischkritische Einleitung in das neue Testament* (1875); *Ketzergeschichte des Urchristentums* (1884); *Judentum und Judenchristentum* (1886); an edition of Hermas's *Pastor* (1887); *Acta Apostolorum Græce et Latine Secundum Antiquissimos Testes* (1899); *Ignatii Antiocheni et Polycarpi Smyrnæi Epistulæ et Martyria* (1902).

HILL, Aaron (1685–c.1750). An eccentric English author, born in London. He treated in his verse many themes, from the creation of the world to doomsday. His activities were not limited to literature; in 1713 he took a patent for extracting oil from beech mast, and in 1718 he proposed a scheme for the colonization of Georgia. *Elfrid* (1710) is the earliest of eight dramatic pieces, either original or adapted. In conjunction with William Bond he edited an imitation of the *Spectator,* called the *Plain Dealer* (1724). His poems and letters were collected in 1753 and his plays in 1760. Consult D. Brewster, *Aaron Hill, Poet, Dramatist, Projector* (New York, 1913).

HILL, Abigail. Favorite of Queen Anne of England. See Masham, Abigail.

HILL, Albert Ross (1869–). An American university president, born in Nova Scotia. He graduated from Dalhousie University in 1892 and from Cornell University (Ph.D.) in 1895; studied at Heidelberg, Berlin, Strassburg, and at Clark University; taught in Nova Scotia (1885–87); was professor of psychology and education at the State Normal School at Oshkosh, Wis., in 1895–97, and associate professor in 1897–98 and professor of philosophy and director of the psychological laboratories from 1898 to 1903 at the University of Nebraska. He then became professor of educational psychology and dean of Teachers College at the University of Missouri, of which university he was appointed president (after one year at Cornell as professor of the philosophy of education, director of the School of Education, and dean of the College of Arts and Sciences). In 1904–05 he was president of the Western Philosophical Association.

HILL, Ambrose Powell (1825–65). An American soldier, prominent on the Confederate side in the Civil War. He was born in Culpeper Co., Va., graduated at West Point in 1847, and served in the United States artillery in the Mexican War, in Florida against the Seminoles in 1849–50, and on the Coast Survey, attaining the rank of captain, but resigned in March, 1861, to accept a commission as colonel in the Confederate service. At the battle of Beaver Dam Creek, June, 1862, his troops took part in the attack on the Federal position, and on the retreat of the latter to Gaines's Mill and New Cold Harbor pursued and again attacked them, only to be again repulsed. At Antietam, Sept. 17, 1862, he arrived just in time to stay the Federals, who were sweeping all before them, and so afforded Lee an opportunity to draw off his exhausted army. He commanded a division under Jackson at Fredericksburg, Dec. 13, 1862. At Chancellorsville, May 2–4, 1863, he commanded the reserve; and it was his troops who, on being moved to the front to take the place of the decimated regiments that had borne the brunt of the first day's fighting, mistook Jackson's escort for Federals and fired the fatal volley which caused Jackson's death. On May 10, 1863, General Lee reorganized his army, making three corps instead of two, and gave one corps to Hill, who at the same time was made a lieutenant general. This corps he led in the battle of Gettysburg and from the Wilderness until he met his death while reconnoitring at Petersburg, April 2, 1865.

HILL, Benjamin Harvey (1823–82). An American legislator. He was born in Jasper Co., Ga., graduated at the State University in 1844, and within a year began the practice of law. In 1851 he was elected to the State Legislature as a Whig. He was a Unionist member of the State Secession Congress in 1861, but after striving vainly to prevent his State from seceding supported the movement. He was a member of the Provisional Confederate Congress the same year and was soon afterward chosen to the Confederate Senate. In 1865 he was for a short time a prisoner of war in New York. After the war he was an earnest Democrat and denounced the reconstruction acts of Congress, his *Notes on the Situation* (1867–68) attracting wide attention. He supported Horace Greeley for the presidency in 1872 and was defeated for the United States Senate in the following year. He became a member of the House of Representatives in 1875 and in 1876 was elected to the United States Senate, in which body he served until his death. A statue of him was erected in Atlanta in 1886. Consult H. Hill, Jr. (ed.), *The Life, Speeches, and Writings of Benjamin Harvey Hill* (Atlanta, 1891).

HILL, Charles Shattuck (1868–). An American editor. He was born at Fairfield, Vt., and graduated in civil engineering from the university of his native State in 1888. He was engaged in engineering work at Burlington, Vt., until 1888, and thereafter until 1906 served on

the editorial staff of the *Engineering News*. In 1906 he became editor of *Engineering and Contracting*. He is author of *The Chicago Main Drainage Canal* (1896); *Reinforced Concrete* (1904); *Concrete Construction* (1908); *Concrete Inspection* (1909); and he contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA.

HILL, DANIEL HARVEY (1821–89). An American soldier in the Confederate service and an educator, born in York District, South Carolina. He graduated at West Point in 1842 and served in the Mexican War, for his gallantry in which he was brevetted major. He resigned in 1849 and became professor of mathematics in Washington College (now Washington and Lee University), Lexington, Va., and later filled a similar position in Davidson College, North Carolina. In 1859 he became superintendent of the North Carolina Military Institute, at Charlotte, but resigned in 1861 to enter the Confederate service. He commanded at the battle of Big Bethel, June 10, 1861, and was soon afterward promoted to be a brigadier general. He fought against McClellan in the Peninsular campaign and was especially conspicuous at the battle of Seven Pines and Fair Oaks, May 31 and June 1, 1862. He was with A. P. Hill at the battle of Beaver Dam Creek and participated in that of Gaines's Mill. At South Mountain, Sept. 14, 1862, with only 9000 men, he managed to hold the whole Federal army in check until Lee was able to get his trains and artillery out of danger, and then joined the main army in time to take part in the battle of Antietam on the 17th. He was appointed a lieutenant general by President Davis in July, 1863, and was placed in command of a corps in General Bragg's army, with which he fought at the battle of Chickamauga, Sept. 19–20, 1863. In the last year of the war he fought under Joseph E. Johnston at the battle of Bentonville, N. C., and laid down his arms at Durham Station on April 26, 1865. After the war he was for a number of years editor at Charlotte, N. C., of a monthly magazine entitled *The Land We Love* and later he edited *The Southern Home*. From 1877 until 1884 he was president of the Arkansas Industrial University and from 1885 until the year of his death of the Middle Georgia Military and Agricultural College. His publications include *Elements of Algebra* (1858), a number of religious tracts, and several articles in *Battles and Leaders of the Civil War* (Johnson and Buel, eds., New York, 1887).

HILL, DAVID BENNETT (1843–1910). An American politician. He was born at Havana, N. Y., Aug. 29, 1843, was admitted to the bar in 1864, and practiced law at Elmira, N. Y. He was a Democratic member of the New York Assembly in 1871 and 1872, and was elected mayor of Elmira in 1882. He early became prominent in State and national politics and was chairman of the Democratic State Convention in 1877 and again in 1881 and in the following year was elected Lieutenant Governor on the ticket with Grover Cleveland, upon whose resignation in 1885, preparatory to assuming the duties of the presidency, he became Governor. He continued to hold this position until 1891, when he succeeded William M. Evarts as a member of the United States Senate, where he took a prominent part in the debates, especially in those concerning the Wilson Tariff Bill in 1894. During his senatorial term he opposed various measures approved by President Cleveland and was instrumental in preventing the confirmation by the Senate of the nominations of William B. Hornblower and Wheeler H. Peckham as justices of the United States Supreme Court. He was a prominent candidate for the presidential nomination before the Democratic National Convention of 1892; but the methods by which he had risen to political domination were becoming very unpopular, and in 1894 he was badly defeated for Governor of New York by Levi P. Morton. After the expiration of his term in the Senate (1897), Mr. Hill practiced law in Albany, though he continued to take an active part in politics. He died at Wolfert's Roost, his country home near Albany, Oct. 20, 1910.

HILL, DAVID JAYNE (1850–). An American diplomat and historian, born at Plainfield, N. J., and educated at Bucknell University (A.B., 1874; A.M., 1877), where he was professor of rhetoric in 1877–79 and then for eight years president. From 1888 to 1896 he was president of the University of Rochester. Subsequently he spent nearly three years in Europe in the study of public law and diplomacy, returning to this country to be Assistant Secretary of State (1898–1903). In 1903 Dr. Hill was appointed United States Minister to Switzerland and in 1905 Minister to the Netherlands, and from 1908 to 1911 he was Ambassador to Germany. In 1914 his candidacy for the Republican senatorial nomination (to succeed Elihu Root) received notable approval, but he was defeated at the direct primaries by James W. Wadsworth. During his residence in Washington he was professor of European diplomacy in the School of Comparative Jurisprudence, and he was a member of the Permanent Administrative Council of The Hague Tribunal. His writings include: *Science of Rhetoric* (1877; new ed., 1905); *Life of Washington Irving* (1879); *Life of William Cullen Bryant* (1879); *The Elements of Psychology* (1886); *The Social Influence of Christianity* (1888); *Genetic Philosophy* (1893); *The Conception and Realization of Neutrality* (1902); *The Contemporary Development of Diplomacy* (1904); *World Organization as Affected by the Nature of the Modern State* (1911; French and German trans.); and *A History of Diplomacy in the International Development of Europe* (1905–), of which three of six volumes had been published up to 1914.

HILL, FRANK PIERCE (1855–). An American librarian, born at Concord, N. H. Graduating from Dartmouth College in 1876, he served as librarian at Lowell, Mass., in 1881–85, started the first public library in New Jersey at Paterson in 1885 and also the Salem (Mass.) Public Library in 1888, and from 1889 to 1901 was librarian of the Newark Free Public Library. He then became librarian of the Brooklyn (N. Y.) Public Library. In 1906 he was president of the American Library Association. He compiled and edited *Lowell Illustrated* (1884).

HILL, GEORGE BIRKBECK (1835–1903). An English author, born at Tottenham, Middlesex, and educated at Pembroke College, Oxford. From 1859 to 1876 he was head master of the Bruce Castle School; in the latter year he resigned to devote himself to literature. He is best known as a Johnsonian scholar and editor. His numerous published works include: *Dr. Johnson: His Friends and his Critics* (1878); *Life of Sir Rowland Hill* (1880); *Colonel Gordon in Central Africa* (1881); *Wit and Wisdom of Dr. Johnson* (1888); *Footsteps of Samuel Johnson in Scot-*

land (1890); *Writers and Readers* (1892); *Harvard College, by an Oxonian* (1894); *Talks about Autographs* (1896); *Johnsonian Miscellanies* (1897); *Life of Edward Gibbon* (1900). He edited: *Boswell's Correspondence* (1879); *Boswell's Life of Johnson* (6 vols., 1887); *Rasselas* (1888); *Select Essays of Dr. Johnson* (1889); *Letters of Johnson* (1892); *Letters of Dante Gabriel Rossetti to William Allingham* (1897); *Unpublished Letters of Dean Swift* (1899); *Johnson's Lives of the English Poets* (1905). Volumes of his own *Letters* appeared in 1903 and 1906.

HILL, George William (1838–1914). An American astronomer, born in New York and educated at Rutgers College. He became an assistant on the staff of the *American Ephemeris* and of the *Nautical Almanac* in 1861; was elected to the National Academy of Sciences in 1874; was a corresponding member of the Paris Academy of Sciences and of the Bavarian and Belgian Academies of Science, foreign member of the Royal Societies of London, Edinburgh, and Christiania, foreign associate of the Royal Astronomical Society, honorary member of the London Mathematical Society and the American Philosophical Society, and president (1894–96) of the American Mathematical Society. He was awarded a gold medal by the Royal Astronomical Society, London, in 1887, for his work on the lunar theory; and he received the Damoiscan prize from the Paris Academy of Sciences in 1898. From 1898 to 1901 he lectured on celestial mechanics at Columbia University. He wrote largely on celestial mechanics and mathematics, and contributed to the governmental *Astronomical Papers* (especially 1882, 1890, 1891, 1895) and to the *Year Book* of the Agricultural Department (1898). His most valuable work is *A New Theory of Jupiter and Saturn* (1890). His *Collected Mathematical Works*, vols. i to iv, were published in 1905–07.

HILL, Henry Barker (1849–1903). An American chemist, son of Thomas Hill, president of Harvard (1862–68), and born at Waltham, Mass. He was educated at Harvard and the University of Berlin. He was assistant in the chemical laboratory at Harvard (1870), assistant professor (1874), full professor (1884), and director of the chemical laboratory (1894), and was elected to the National Academy of Sciences in 1883. He contributed to its *Proceedings* (1881 et seq.), to the *American Journal of Chemistry*, to Silliman's *American Journal*, and to the *Berichte der deutschen chemischen Gesellschaft* (vols. ix–xxxiii), and wrote *Notes on Qualitative Analysis* (1874).

HILL, James J(erome) (1838–1916). An American railway promoter. Born near Guelph, Ontario, of Scotch-Irish descent, he early left his father's farm for a business career in Minnesota. In 1870 he formed the Red River Transportation Company, which was the first to open communication between St. Paul and Winnipeg. Eight years afterward he helped to form the syndicate which under another name ultimately built the Canadian Pacific Railway. He secured control of the St. Paul and Pacific Railroad and, having reorganized it under the name of the St. Paul, Minneapolis, and Manitoba, was its general manager in 1879–81, vice president in 1881–82, and president from 1882 to 1890, when it became a part of the Great Northern System. The main line of the Great Northern—extending from Lake Superior to Puget Sound, with northern and southern branches and a direct steamship connection with China and Japan—was built, with Hill as principal promoter, between 1888 and 1893. Of this road, or rather system of roads, he was president (1889–1907) and chairman of the board of directors (1907–12). He was also president of the original and the reorganized Northern Securities Company (see Northern Securities Case), and a director in a number of railroad and other corporations; and he served as vice president of the New York Chamber of Commerce. He gave $500,000 towards the establishment of a Roman Catholic theological seminary in St. Paul, Minn. In 1910 he published *Highways of Progress*. His collection of paintings of the modern French school is considered important.

HILL, John Fremont (1855–1912). An American capitalist and public official, born at Eliot, Me. He graduated from the Medical School of Maine (Bowdoin College) in 1877 and studied at the Long Island College Hospital Medical School, but practiced medicine only a year. In 1879 he became a member of the law firm (later a publishing house) of Vickery and Hill, and he was active in many railroad, steamship, telephone, and banking enterprises. He was best known as a Republican politician, serving as a member of the Maine House of Representatives in 1888–92, of the State Senate in 1892–96, and of the Executive Council in 1898–99; and he was Governor of Maine from 1901 to 1905. He was acting chairman in 1908–11, and chairman in 1911–12, of the Republican National Committee.

HILL, John Henry (1791–1882). An American educator, chiefly identified with teaching and missionary work in Greece. He was born in New York City, graduated at Columbia College, and was ordained a deacon in the Protestant Episcopal church in 1830. In the same year he went as a missionary to Greece, and at Athens he and his wife established a girls' school, afterward a school for boys, and also a high school for the training of teachers. His work at first received little encouragement, but prospered after pupils from prominent and wealthy Greek families began to attend the school. Dr. Hill was chaplain of the British Legation in Greece from 1845 to 1875 and continued his teaching during that time. On his death, at Athens, the Greek government, in recognition of his educational work among the women of Athens, buried him with the honors of a taxiarch, and the Athenian municipality erected a monument to his memory. After his death the school was conducted by his wife.

HILL, Joseph Adna (1860–). An American statistician. Born at Stewartstown, N. H., he graduated from Harvard University in 1885 and from the University of Halle (Ph.D.) in 1892. He lectured at the University of Pennsylvania in 1893, was instructor at Harvard in 1895, and in 1897 investigated European systems of taxation, for the Massachusetts Tax Commission, publishing as a result *The English Income Tax with Special Reference to Administration and Method of Assessment* (1899). In 1898 he took up statistical work for the United States Census Bureau, of which he became chief statistician in 1909. In this connection he had charge of census reports on child labor, illiteracy, marriage and divorce, women at work, and a report for the Immigration Commission on occupations of immigrants. He was elected a

vice president of the American Statistical Association.

HILL, Leonard (Erskine) (1866–). An English physiologist, son of George Birkbeck Hill. He was educated at Haileybury and at University College, London, where, after being demonstrator at Oxford, he became assistant professor of physiology. He was afterward Hunterian professor to the Royal College of Surgeons, Oliver Sharpey lecturer to the Royal College of Physicians, and professor of physiology, London Hospital. He made important studies of the circulation, of cerebral anæmia, caisson disease, arterial pressure, etc., and published: *The Physiology and Pathology of the Cerebral Circulation* (1896), *Manual of Human Physiology* (1899), *Physiology for Beginners* (1902), and, as editor, *Further Advances of Physiology* (1909), and a series of *International Medical Monographs*, in which his work *Caisson Disease* appeared in 1912.

HILL, Louis Warren (1872–). An American railroad president, son of James J. Hill. He was born at St. Paul, Minn., and graduated from Yale University in 1893. After holding various positions on the Great Northern Railway and in connection with other railroad properties of his father, he succeeded the latter as president of the Great Northern System in 1907 and as chairman of the board of directors in 1912.

HILL, Octavia (c.1836–1912). An English social reformer, born in London. At an early age she began her efforts to improve the homes of the London poor. She first began this work under Frederick D. Maurice and later, in 1864, was associated with John Ruskin. The latter advanced the money for purchasing the houses and improving them or erecting new ones. She taught multitudes to help themselves, impressing upon them ideas of cleanliness, order, and self-respect. She was a member of the Royal Commission on the Poor Laws in 1905. Her publications include: *Homes of the London Poor* (1875) and *Our Common Land* (1877). Consult *Life of Octavia Hill as Told in her Letters*, edited by C. Edmund Maurice (London, 1913).

HILL, Robert Thomas (1858–). An American geologist, who became connected with the United States Geological Survey in 1886. He was born at Nashville, Tenn., and in 1886 graduated at Cornell University. During his explorations on the southern borders of the United States and Mexico and in Central America and the West Indies, he demonstrated the existence of the Lower Cretaceous formations in the United States and proved that artesian wells might be procured over a vast area of Texas. For two years he was professor of geology at the University of Texas. He was prominently connected with the Martinique expeditions of 1902. Besides bulletins and governmental reports, he is author of *On Occurrence of Artesian and Underground Waters in Texas, Eastern New Mexico, and Indian Territory* (1892), and of *Cuba and Porto Rico, with Other Islands of the West Indies* (1898), his chief work.

HILL, Rowland (1744–1833). An English preacher of great popularity. His father was a baronet, and he was born at Hawkstone Park, Shropshire, on the border of Wales, Aug. 23, 1744. He graduated B.A. at Cambridge in 1769, and while there made the acquaintance of Whitefield, preached in the surrounding villages before taking orders, and conducted religious services in the houses of the sick and poor. He was appointed in 1773 to the parish of Kingston, Somersetshire, where he preached in the open air and attracted great crowds to the services which he held nearly every day of the week. Having, on the death of his father in 1780, inherited considerable property, he built for his own use Surrey Chapel, on the Blackfriars Road, London. The chapel was opened June 8, 1783. Although he now occupied a position as a dissenting minister, yet he remained a member of the Church of England and used its liturgy in Surrey Chapel. His chapel soon became filled with a larger congregation than any other in London. In the summer months he made what he called "gospel tours" into all parts of the country, sometimes extending them to Scotland and Ireland, attracting, wherever he went, crowded and interested audiences. After these tours he used to return to his duties at the Surrey Chapel, where he continued to officiate to the end of his life. He published accounts of two journeys through England and Scotland (1799 and 1800); a very popular hymn book (1783); numerous sermons, but especially *Village Dialogues* (1801; 34th ed., 1839). He was among the founders of the Religious Tract Society and the British and Foreign Bible Society, an early and courageous defender of vaccination, and himself vaccinated thousands of persons. He wrote in favor of the practice, *Cow-pock Inoculation Vindicated and Recommended from Matters of Fact* (London, 1806). He died in London, April 11, 1833. His life has been written several times—by Sidney (4th ed., London, 1844), Sherman (ib., 1857), Charlesworth (ib., 1879).

HILL, Rowland, Viscount (1772–1842). An English soldier, nephew of the preacher of the same name, born at Prees, Shropshire, Aug. 11, 1772. He entered the army when he was 15 and studied a year at Strassburg. He served under Abercromby in Egypt (1801) and accompanied Wellesley to Portugal in 1808. Throughout the Peninsular War he showed ability second only to his chief's. In 1811 he utterly defeated the French army at Cáceres, and in 1812 he took the fortress of Almarez, thus separating the two French armies. At Vitoria, in 1813, his forces made the initial attack, and in the same year, on the Nive, he again defeated the French. He had been promoted to lieutenant general in 1812; two years later he was created Baron Hill of Almarez and Hawkstone and received an annual grant from Parliament of £2000. During the Hundred Days he was no less active and prominent. After a diplomatic errand to the Prince of Orange he commanded a division in the allied army. His horse was shot under him at Waterloo, and he was so stunned that in the thick of the fight he was for some time lost and supposed to have been killed. Hill remained with the army of occupation in France as second in command. He was promoted general in 1825, and three years later succeeded Wellington as commander in chief; but in 1842 he resigned because of failing health and turned over the command to Wellington. He became Viscount in the same year, a few months before his death, Dec. 10, 1842. Consult Sidney, *The Life of Lord Hill* (London, 1845), and Shand, *Wellington's Lieutenants* (ib., 1902).

HILL, Sir Rowland (1795–1879). The reformer of the English postal system. At 12 he became a teacher in his father's school at Birmingham, and before he reached his majority

he had organized a remarkable system of discipline which came to be known as the Hazelwood method (from the name of the school). This system was described by his elder brother, Matthew Davenport Hill, in a pamphlet entitled *Public Education: Plans for the Government and Liberal Instruction of Boys in Large Numbers* (1822). The school became widely popular and was carried on with success by the family. Rowland finally withdrew, however, partly because he recognized the defects of his scholarship and partly because he was oppressed by the religious observances required. He thought of joining Robert Owen in his communistic schemes, but in 1833 became secretary of the commission for colonizing South Australia. From childhood he had a strong bent towards invention. About this time he devised a successful rotary printing press; but it was not then adopted, because the Treasury demanded that each single sheet for a newspaper should be previously stamped and forbade the attaching of the stamps by machinery. But his great work was that of securing the adoption of penny postage. The franking privilege was widely used by members of Parliament and high officials for themselves and their friends. The great body of the people, however, sent few letters, and postage on them had to support the whole service. Rates depended upon distance, and as they were rarely prepaid, to receive a letter was often a hardship. Under this system rates of postage were advancing and postal revenues diminishing. After making a careful study of the statistics, in 1837 Hill published a pamphlet, *Post-Office Reform*, in which he recommended a penny rate for half-ounce letters, regardless of distance, inside the United Kingdom, and the use of adhesive stamps. His plan was adopted, and in 1840 he was given an appointment in the Treasury, where against great opposition he was working out the system when he was dismissed by a change of ministry. In 1846 a fund of £13,000 was raised by public subscription for him. The same year the Whigs again came into office, and he was made Secretary to the Postmaster-General and in 1854 Chief Secretary. In 1864 he retired on full salary and received a parliamentary grant of £20,000. He wrote a *History of Penny Postage*. This was published in 1880, with an introductory memoir by his nephew, Dr. G. Birkbeck Hill. Consult E. C. H. Smyth, *Sir Rowland Hill: The Story of a Great Reform* (London, 1907).

HILL, Thomas (1818–91). An American educator and Unitarian clergyman, born in New Brunswick, N. J., of English parentage. He was left an orphan when about 10 years old and in 1830 was apprenticed to a printer for a term of three years. He spent the year 1834–35 at the Lower Dublin Academy, near Philadelphia, where his eldest brother was principal, and then apprenticed himself to an apothecary in New Brunswick. In 1839 he decided to go to college and entered Harvard the following year in the class of 1843. His preëminence in mathematics won him an offer of a high position at the National Observatory in Washington; but he intended to go into the ministry and, contrary to the advice of his professors, entered the divinity school, from which he graduated in 1845. For the next 14 years he was pastor of the Unitarian Church in Waltham, Mass. In 1859 he succeeded Horace Mann as president of Antioch College. Although the college was in such financial straits that he was obliged to supplement his salary by preaching in Cincinnati, 70 miles distant, he continued his services until elected president of Harvard in 1862. Failing health compelled him to resign this position in 1868. In 1871 he was elected to the Massachusetts Legislature. In the same year he went to South America with Louis Agassiz. On his return he accepted a call to the First Parish Church in Portland, Me. He was a man of unusual versatility and gained distinction in many of the pursuits in which he interested himself. He was one of the foremost natural scientists of the time and an accomplished classical scholar as well as a mathematician. He invented several mathematical machines, among which his occultator is of the most importance, and made valuable contributions to the knowledge of curves in simplifying their expression and in discovering new forms. Besides publishing essays, textbooks, and volumes of sermons, he edited Eberty's *Stars and the Earth* (1849) and wrote *Christmas and Poems on Slavery* (1843); *Geometry and Faith* (1849); *Curvature* (1850); *Liberal Education* (1855); *True Order of Studies* (1859); *Jesus the Interpreter of Nature, and Other Sermons* (1870); *Statement of the Natural Sources of Theology, with Discussion of their Validity, and of Modern Skeptical Objections* (1877); *In the Woods and Elsewhere* (1888), verse.

HILL, Thomas (1829–1908). An American landscape painter, born in Birmingham, England. After 1861 he lived most of his life in San Francisco, having come to America in 1840. He studied in Philadelphia at the Pennsylvania Academy and in Paris under Paul Meyerheim. Among his paintings are "Yosemite Valley," "White Mountain Notch," "The Home of the Eagle," "Donner Lake," "Grand Cañon of the Sierras," "Muir Glacier." His exhibit at the Centennial Exhibition was well received, but had the faults common to most American landscape painters of the period.

HILL, Wills. See Hillsborough, Earl of.

HIL'LAH. The capital of a sanjak in the Vilayet of Bagdad, Asiatic Turkey, situated on the Euphrates, 60 miles south of Bagdad. It is not far from the ruins of Babylon, from which most of its building material has been taken (Map: Turkey in Asia, E 4). It is poorly built, has a large number of mosques, and is a stopping place for pilgrim caravans on the way to the holy cities of Meshhed-Ali and Meshhed-Hussein. It has manufactures of cotton goods and woolen mantles and a number of good bazars. The cultivation of the palm is the chief occupation of the surrounding country. Pop. (est.), about 20,000, largely Arabs and Jews.

HIL'LARD, George Stillman (1808–79). An American lawyer and author. He was born in Machias, Me., graduated at Harvard in 1828, studied law and acquired an extensive legal practice in Boston. He also served in the State Legislature and from 1866 to 1870 was United States district attorney for Massachusetts. At earlier periods he collaborated with George Ripley in editing the *Christian Register*, a Unitarian paper, and with Charles Sumner in publishing the *Jurist*. In 1856 he bought an interest in the Boston *Courier* and was for some time associated in its editorial management. Among his numerous works are: *Six Months in Italy* (1853); *Life and Campaigns of George B. McClellan* (1864); and, with Mrs. Ticknor, a *Life of George Ticknor* (1873). He also edited *The*

Poetical Works of Edmund Spenser (5 vols., 1839).

HILLEBRAND, hĭl'le-brănt, JOSEPH (1788–1871). A German philosopher and historian of literature, born at Grossdüngen, near Hildesheim. He was originally a Catholic, studied at Hildesheim and at Göttingen, and in 1815 entered the priesthood and taught at Hildesheim, but resigned his position on accepting Protestant views. Upon Hegel's departure from Heidelberg in 1818 he was appointed professor of philosophy there and in 1822 took a like position at Giessen. He was President of the Lower House of the Hessian Chamber in 1848, but retired in 1850. His most important work is *Die deutsche Nationallitteratur seit dem Anfang des 18. Jahrhunderts* (3d ed., 1875). Of less importance are his philosophical works, which show tendencies towards the views of Jacobi: *Die Anthropologie als Wissenschaft* (1822–23); *Lehrbuch der theoretischen Philosophie und philosophischen Propädeutik* (1826); *Litterarästhetik* (1826); *Universalphilosophische Prolegomena* (1830); *Der Organismus der philosophischen Idee* (1842); *Philosophie des Geistes* (1835).

HILLEBRAND, KARL (1829–84). A German historian and publicist, son of Joseph Hillebrand. He was born in Giessen and studied law there and at Heidelberg. He was imprisoned for participation in the insurrection at Baden in 1849, but escaped to France and completed his studies at Bordeaux and the Sorbonne. He next taught German at the Military Academy at Saint-Cyr and in 1863 was appointed professor of foreign literature at Douai. At the outbreak of the Franco-German War he went to Italy as correspondent of the London *Times* and settled at Florence. He contributed numerous articles to French, English, Italian, and German periodicals and published many separate works, including the prize essay *Des conditions de la bonne comédie* (1863); *La Prusse contemporaine et ses institutions* (1867); *Zeiten, Völker und Menschen: Gesammelte Aufsätze* (1874–85); *Geschichte Frankreichs von der Thronbesteigung Ludwig Philipps bis zum Fall Napoleons III.* (1877–79); *Lectures on German Thought during the Last Two Hundred Years* (1880). Consult Homberger, *Karl Hillebrand* (Berlin, 1884).

HIL'LEBRAND, WILLIAM FRANCIS (1853–). An American chemist. He was born at Honolulu, Hawaiian Islands, attended Cornell University (1870–72), graduated from the University of Heidelberg (Ph.D., 1875), and studied at the University of Strassburg and at the Mining Academy of Freiberg, Saxony. He was an assayer at Leadville, Colo., in 1879–80, served as chemist of the United States Geological Survey from 1880 to 1908, and thereafter was chief chemist of the Bureau of Standards, Washington. From 1892 to 1910 he held the professorship of general chemistry and physics at the National College of Pharmacy. In 1906 he was president of the American Chemical Society. In 1908 he became editor of the *Journal of Industrial and Engineering Chemistry*, and he is author of *Some Principles and Methods of Rock Analysis* (1900; 2d ed., 1902) and *The Analysis of Silicate and Carbonate Rocks* (1907; 2d ed., 1910).

HILLEBRANDT, hĭl'e-brănt, ALFRED (1853–). A German Sanskrit scholar, born at Grossnädlitz. He studied at Breslau and Munich and became professor in the former university. His especial branch of study is Vedic mythology. *Varuna und Mitra* (1877) was a prologue to his great work *Vedische Mythologie* (1891–1902, 1910). Hillebrandt also wrote: *Das altindische Neu- und Vollmondsopfer* (1880); *Vedachrestomathie* (1885); a section on religious antiquities in Bühler's *Grundriss der indoarischen Philologie und Altertumskunde* (1897); *Alt-Indien, kulturgeschichtliche Skizzen* (1899); an edition of Viśākhadatta's *Mudrarākṣāsa* (1912); *Die Lieder des Rigveda* (1913).

HIL'LEL, called HA-BABLI (the Babylonian), or HA-ZAKEN (the elder). A Jewish rabbi who died a few years after the beginning of the Christian era. By birth a Babylonian, he left his home and went to Jerusalem to study the law. By doing manual labor he was enabled to support himself while attending the lectures of Shemayah and Abtalion, the president and vice president respectively of the Sanhedrin. His progress was rapid. His solution of a difficulty which arose concerning the lawfulness of slaughtering the paschal lamb on the Sabbath led to his being appointed president of the Sanhedrin (30 B.C.), and he held this position till about 10 A.D. Hillel's character was gentle, patient, and peace-loving. It is Hillel to whom is ascribed the maxim, "What is hateful unto thee do not unto others." He plays an important part in the history of Jewish legal science. He introduced a set of seven rules by which the Scriptures are to be interpreted and laws derived from them. Entirely the opposite of Hillel in character was Shammai (q.v.), the vice president of the Sanhedrin. His teaching was marked by a strict adherence to the letter and great vigor. The difference between the leaders was continued by their followers, so that, years afterward, we still encounter the school of Hillel and the school of Shammai. The honor and respect won by Hillel were so great that his position of president of the Sanhedrin remained in his family.—HILLEL HA-NASI (the prince). A descendant of the preceding, who lived about 350 A.D. He was also president of the Sanhedrin and had charge of the school at Tiberias. His great work was the arranging of the Hebrew calendar. In this he followed the system instituted by Meton.

HIL'LER, FERDINAND (1811–85). An eminent German pianist, conductor, and composer, born at Frankfort. From early boyhood he was a student of music, his concert début taking place at 10 years of age, followed two years later by the production of his first composition. His first teachers were Hofmann for the violin, Aloys Schmitt for the pianoforte, and Vollweiler for harmony and counterpoint. Later (1825) he became a pupil of Hummel at Weimar. For seven years (1828–35) he was engaged as teacher of composition at Choron's School of Music, Paris, but eventually gave up his position, returned to Frankfort the following year (1836), and devoted himself to composition. His abilities were recognized and attracted the notice of Rossini and Mendelssohn, the former assisting him to launch his first opera, *Romilda* (which was a failure), at Milan, and the latter obtaining for him the entrée to the Gewandhaus and affording an opportunity for the public presentation of his oratorio *Die Zerstörung Jerusalems* (1840). After a year of study in Church music at Rome he returned to Leipzig and during the season of 1843–44 conducted the Gewandhaus concerts. By this time his position in the musical world was established, and honors and appointments were showered upon him. He became

municipal kapellmeister of Düsseldorf in 1847 and in 1850 received a similar appointment at Cologne, in which latter city he founded the well-known Cologne Conservatory. He was conductor at the Italian Opera in Paris during the season of 1852–53. Meanwhile he had increased his reputation and prestige by his conductorship of the Gürzenich concerts and the Lower Rhine music festivals. His compositions include six operas, six cantatas, and pieces in every form and variety of composition. He was also a very successful lecturer and a forceful writer, his contributions to reviews and newspapers having been since collected in book form. He also published among others: *Musikalisches und Persönliches* (1876); *Wie hören wir Musik?* (1880); *Goethes musikalisches Leben* (1880); *Erinnerungsblätter* (1884). He died at Cologne.

HILLER, Johann Adam (1728–1804). An important German dramatic composer, born at Windisch-Ossig, near Görlitz. He was of musical parentage and was endowed with a fine soprano voice, which obtained for him a course of free instruction at the Görlitz Gymnasium, from which he went to the Kreuzschule at Dresden, where he became a pupil of Homilius for pianoforte and thorough bass. Later he went to Leipzig for study at the university, and while there earned a bare existence as flutist and singer in local concerts and by private teaching. His first good fortune came with his appointment as tutor to the son of Count Brühl at Dresden, with whom he went in 1758 to Leipzig. It was during his stay here at this time that he conceived the idea of reviving the old subscription concerts, an attempt which ultimately led to the founding of the famous Gewandhaus concerts, of which he was the first conductor. From 1789 to 1801 he was music director of the Thomasschule. He also founded a singing school in 1771. To him has been given the credit of being the originator of the *Singspiel*, the beginning of German comedy opera as distinct from the French and Italian developments. The most important of these were: *Lottchen am Hofe* (1760); *Der Teufel ist los* (1768); *Poltis, oder Das gerettete Troja* (1782). The lyrics of all his *Singspiele* were of considerable musical value and have been long popular. Among his sacred compositions are *A Passion Cantata, Funeral Music in Honor of Hasse*, the One Hundredth Psalm, and a few symphonies. He also edited many important collections of music and wrote considerably concerning musical topics. He was one of the most important German musical scholars and writers of the eighteenth century. His *Wöchentliche Nachrichten und Anmerkungen* (1766–70) is the oldest musical periodical. He died at Leipzig. Consult K. Peiser, *Joh. Ad. Hiller* (Leipzig, 1895).

HIL'LERN, Wilhelmine von (1836–). A German novelist, born at Munich, daughter of the popular dramatist Charlotte Birch-Pfeiffer. She is best remembered for her satire of bluestockings in *Der Arzt der Seele* (1869) and for a charming tale of Freiburg-im-Breisgau in Reformation days, *Höher als die Kirche* (1871). Worthy of mention also are *Die Geier-Wally* (1873), cleverly dramatized by her in 1881, the historical novel *Und sie kommt doch* (1878), and the Black Forest sketches *Ein Blick ins Weite* (1897). Among her later works are *Der Gewaltigste* (1899), *Ein Sklave der Freiheit* (1903), and some comedies.

HILLER VON GÄRTRINGEN, hĭl'ẽr fŏn gẽrt'rĭng-en, Friedrich, Baron (1864–). A German classical archæologist, born in Berlin and educated at the universities of Tübingen, Berlin, and Göttingen. Between 1890 and 1910 he undertook 11 important archæological expeditions in Greece, Italy, and Turkey, working after 1892 on Greek inscriptions for the Royal Prussian Academy of Science and publishing in 1895, 1898, 1903, 1904, 1909, and 1913 volumes of the *Inscriptiones Græcæ*. In 1896–1902 he had charge of excavations at Thera; and he published: *Die archäische Kultur der Insel Thera* (1897); *Thera, Untersuchungen, Vermessungen, und Ausgrabungen* (1899–1904); with others, *Arkadische Studien* (1911).

HILLES, hĭl'ẽs, Charles Dewey (1867–). An American politician, born in Belmont Co., Ohio. From 1890 to 1902 he was financial officer and superintendent of the Boys' Industrial School of Ohio, and from then until 1909 he was superintendent of the New York Juvenile Asylum at Dobbs Ferry, N. Y., of which he later became president. In 1909 he was appointed Assistant Secretary of the United States Treasury; but he resigned from that office in 1911 to become secretary to President Taft for the remainder of the presidential term. In 1912 he was chosen chairman of the Republican National Committee. He became a stockholder and one of the resident managers of the Employers' Liability Assurance Corporation of New York in 1913.

HILL FORTS. Defensive positions on hills. The customs of early groups of people as to defensive locations for residence on elevations have determined the foundation of many of the most famous cities. Hill forts of various periods from the most ancient are common throughout the world and refer to the monuments and settlements of small groups of men, both securing them from attack and forming a base for industrial occupations and forays. Rome, Athens, and Jerusalem were such hill forts. Settlements on plains or shores represent either times or localities of greater security or the weight of large bodies of men discounting attack, and they supply the means of building great artificial fortifications. The history of nearly every nation gives evidence of this period, and these forts are still found among the more primitive tribes, especially in India.

HILL'HOUSE, James (1754–1832). An American legislator, born at Montville, Conn. After graduating at Yale in 1773, he practiced law in New Haven. He took an active part in the War of the Revolution and, when New Haven was attacked by the English under Tryon in 1779, was captain of the Governor's Guards. He became a Federalist member of Congress in 1791 and from 1795 to 1810 was a member of the United States Senate. In 1815 he was a member of the Hartford Convention. That New Haven is known as the Elm City is largely due to Senator Hillhouse, who set out with his own hands many of these trees.

HILLHOUSE, James Abraham (1789–1841). An American poet. He was born in New Haven, Conn., the son of Senator James Hillhouse, graduated at Yale in 1808, and for some time was engaged in business in New York City. After 1822 he devoted himself almost wholly to literature. His chief works are *The Judgment: A Vision* (1812) and the dramas *Percy's Masque*

(1820) and *Hadad* (1825). An edition of his works was published in two volumes in 1839. His heavy, ambitious dramas were once highly praised.

HILLIARD, hĭl′yard, FRANCIS (1806–78). An American jurist, born in Cambridge, Mass. He graduated at the Harvard Law School in 1823, practiced law in Boston, and served for a time as judge, but is known principally as a writer of legal textbooks. His best-known works are: *American Law of Real Property* (2d ed., 1846); *American Jurisprudence* (2d ed., 1848); *Law of Mortgages of Real and Personal Property* (1853); *Treatise on Torts* (1859); *The Law of Injunctions* (1864).

HILLIARD, HENRY WASHINGTON (1808–92). An American lawyer, born in Fayetteville, N. C. He graduated in 1826 at South Carolina College, removed to Athens, Ga., and was admitted to the bar in 1829. From 1831 to 1834 he was a professor in the Alabama University, Tuscaloosa, and in 1838 was elected to the State Legislature. In 1842–44 he was chargé d'affaires in Belgium and from 1845 to 1851 was a member of Congress from Alabama. He opposed the secession of the South, but subsequently accepted the posts of commissioner to Tennessee and brigadier general in the provisional Confederate army. From 1877 to 1881 he was United States Minister to Brazil. He published: *Roman Nights* (1848), from the Italian; *Speeches and Addresses* (1855); *De Vane* (1865).

HILLIARD, NICHOLAS (1537–1619). The first great English miniature painter. He was born in Exeter, the son of Richard Hilliard, afterward high sheriff of the city and county. He was goldsmith, carver, and portrait painter to Queen Elizabeth, and "royal enamel painter and embosser of his gold medals" to James I. His model was Holbein, as he himself says in the important treatise on miniature painting preserved in the Bodleian Library; but his work, compared with that of his master, lacks body and tone. He excels, however, in delicacy and in decorative value, and takes every advantage of the stiff Elizabethan collar and ruff, the embroidered bodices, and the jeweled headdresses. Hilliard is best known by his numerous portraits of Queen Elizabeth, of which there are two fine specimens in the Montague House collection. His portrait of James I in its contemporary diamond setting was sold at the Hamilton sale for £2855. In the J. Pierpont Morgan collection of miniatures, loaned to the Metropolitan Museum, New York, are 20 portraits by, or attributed to, Nicholas Hilliard—among them one of Elizabeth before her accession to the throne; Mary, Queen of Scots; Lord Darnley; Henry, Prince of Wales, the eldest son of James I. Consult: Horace Walpole, *Anecdotes of Painting*, vol. i (London, 1849); *Catalogue of Exhibition of Portrait Miniatures in Burlington Fine Arts Club* (ib., 1889); G. C. Williamson, *Illustrated Catalogue of the J. P. Morgan Collection* (ib., 1906–07).

HIL′LIS, NEWELL DWIGHT (1858–). An American Congregational clergyman and writer, born at Magnolia, Iowa. He graduated from Lake Forest University in 1884 and from McCormick Theological Seminary in 1887. Ordained to the Presbyterian ministry in 1887, he was pastor at Peoria and Evanston, Ill., until 1895, of the Central (Independent) Church, Chicago (1895–99), and of Plymouth Congregational Church, Brooklyn, after 1899. He became widely known as a speaker and writer, some of his books being: *A Man's Value to Society* (1896); *Great Books as Life Teachers* (1899); *Influence of Christ in Modern Life* (1900); *Success through Self-Help* (1903); *The Fortune of the Republic* (1906); *Contagion of Character* (1911); *Prophets of a New Era* (1912); *Lectures and Orations of Henry Ward Beecher* (1913); *The Story of Phædrus* (1914).

HILL MUSTARD. See BUNIAS.

HILL MY′NA (*hill* + *myna*, from Hindi *mainā*, starling). The common name, in India, of the grackles of the family Eulabetidæ. These starling-like birds belong to the group called glossy starlings, and especially to the genus *Eulabetes*. They are birds of moderate size and glossy-black plumage, marked by fleshy yellow or orange wattles on the head. The shortness and squareness of the tail are noticeable. The best-known species is that of southern India and Ceylon (*Eulabes religiosa*), which is distinguished from the others by two long patches of bare skin on the neck, also by a white spot at the base of the wing quills. They live in the forest and feed on small fruits. They are excellent mimics, learn easily to whistle and talk, and are not only highly prized as cage birds in India, but are exported in large numbers. Other species are known in northern India and eastward. See MYNA.

HILL PAR′TRIDGE, or TREE PARTRIDGE. One of a numerous group of partridges (genus *Arboricola*) which frequent elevated forested regions from the Himalayas eastward to Formosa. They are mostly of very dark colors. The plumage is alike in both sexes, and the eggs are pure white. They frequently alight on trees when flushed by dogs, but live upon the ground like other partridges. They are favorite game birds in northern India.

HILL′QUIT, MORRIS (1869–). An American Socialist. He was born at Riga, Russia, attended the Gymnasium of his native city in 1881–86, and, having emigrated with his parents to the United States in 1886, he graduated in 1893 from the New York University Law School. After joining the Socialist party in 1888, his ability as a speaker and debater quickly gained him prominence in that organization, and as a delegate to various national conventions he played an important part in shaping the party policies. He served as National Committeeman from New York in 1902–06 and as a member of the National Executive Committee of the party after 1907, was delegate to several international Socialist congresses, and in 1904 was appointed a representative on the International Socialist Bureau at Brussels, Belgium. His writings on Socialism, considered authoritative, include: *History of Socialism in the United States* (1903; 5th ed., 1910); *Socialism in Theory and Practice* (1909); *Socialism Summed Up* (1912; 2d ed., 1913); and a series of debates with Rev. John Augustine Ryan, *Socialism—Promise or Menace?* (1914).

HILLSBORO, hĭlz′bŭr-ō. A seaport town of Albert Co., New Brunswick, Canada, on the right bank of the Petitcodiac estuary, just above its outlet into Shepody Bay, 24 miles from Salisbury, 15 miles southeast of Moncton, on the Salisbury and Albert Railway (Map: New Brunswick, E 3). It has manufactures of plaster, which, with mineral oil from the depleted "albertite" coal mines in the neighbor-

hood, it exports in considerable quantities to the United States. Other manufacturing establishments are carriage factories, flour mills, a woodworking factory, and railway machine shops. There is an annual output of 120,000 tons of gypsum from mines in the vicinity. The town was founded in 1763 by a member of the Steeves family, whose descendants number a large part of the total population. Pop., 1914 (local est.), 1250.

HILLSBORO, hĭlz'bŭr-ō. A city and the county seat of Montgomery Co., Ill., 58 miles northeast of St. Louis, Mo., on the Chicago and Eastern Illinois, the Cleveland, Cincinnati, Chicago, and St. Louis, and the Illinois Traction railroads (Map: Illinois, F 7). It has coal mines, a glass-jar factory, zinc and lead smelters, a milk condensary, and a brickyard. There are municipal water works and a Carnegie library. Hillsboro adopted the commission form of government in 1911. Pop., 1900, 1937; 1910, 3424.

HILLSBORO. A city and the county seat of Orange Co., N. C., 40 miles northwest of Raleigh, on the Southern Railway (Map: North Carolina, C 1). It is one of the oldest cities in the State. Situated on the Eno River, at the foot of a low range of mountains, Hillsboro is surrounded by beautiful natural scenery. The chief industries are general farming, tobacco raising, the manufacture of cotton goods. The city contains a public library and a courthouse, and a town clock presented to Hillsboro by King George III of England. Pop., 1900, 707; 1910, 857.

HILLSBORO. A village and the county seat of Highland Co., Ohio, 59 miles by rail east of Cincinnati, on the Baltimore and Ohio Southwestern and the Norfolk and Western railroads (Map: Ohio, C 7). It has a public library, county hospital, and a fine soldiers' monument of granite. There are cane, feed, and grinding mills, and manufactures of lumber, furniture, flour, foundry products, safes and vaults, chairs, overalls, etc. The village owns its water works. Pop., 1900, 4535; 1910, 4296.

HILLSBORO. A city and the county seat of Hill Co., Tex., 34 miles north of Waco, on the Missouri, Kansas, and Texas, the St. Louis Southwestern, and the Trinity and Brazos Valley railroads (Map: Texas, D 3). It is the centre of a fertile agricultural district, with an important trade in cotton, grain, and live stock, and has cotton gins and compresses, a cotton mill, a cottonseed-oil mill, a creamery, flour and planing mills, and manufactures of advertising novelties, candy, hay presses, etc. Hillsboro is governed by a mayor and four aldermen. The water works and sewage system are owned by the city. Pop., 1900, 5346; 1910, 6115.

HILLSBOROUGH, hĭlz'bŭr-ō, Wills Hill, Earl of (1718–93). A British statesman, first Marquis of Downshire, a native of Fairford, Gloucestershire. He was elected to Parliament for Warwick in 1741 and the following year succeeded his father as Lord Lieutenant of Downshire. He became a peer of Ireland in 1751, but went from the Irish to the English Privy Council (1754), George II having made him comptroller of his household. After entering the English House of Lords (1756) as Baron Harwich, he held various political appointments. While Secretary of State for the Colonies (1768), his stubbornness and bad judgment contributed much to the ill feeling between them and the mother country, and he showed little tact in advocating the union of England and Ireland.

HILLS'DALE. A city and the county seat of Hillsdale Co., Mich., 65 miles south of Lansing, on the Lake Shore and Michigan Southern Railroad (Map: Michigan, E 7). It is the centre of a fertile dairying and stock-raising region and manufactures fur and fur-lined overcoats, flour, window screens and screen doors, shoes, gas engines, wagons, wagon wheels, condensed milk, etc. The city has a public library, fine Federal and city hall buildings, a beautiful private park, and south of the city limits is Baw Beese Park, a popular summer resort. Hillsdale College (q.v.) was established here in 1855. Hillsdale, settled about 1840, is governed under a charter of 1896, by a mayor, elected annually, and a unicameral council, of which the executive is a member. The water works and electric-light plant are owned by the city. Pop., 1900, 4151; 1910, 5001.

HILLS'DALE COLLEGE. A coeducational institution for higher education at Hillsdale, Mich. It was founded at Spring Arbor, Mich., in 1844 as the Michigan Central College. In 1853 the institution was removed to Hillsdale and reorganized as Hillsdale College. It was open for students in 1855. The departments of the college include the liberal arts, or collegiate; preparatory, eleventh and twelfth grades; Christian workers; music, instrumental and vocal; fine arts; oratory and expression; household economics; and business. The total attendance in all departments in 1913–14 was 475, of whom 272 were women and 203 were men. In the collegiate department were 131 women and 145 men. The faculty numbered about 25 members. The library contains about 30,000 volumes. The productive funds of the college amount to about $275,000, and the annual income to about $30,000. The president in 1914 was Joseph William Mauck, A.M., LL.D.

HILL STAR. Any humming bird of the genera *Diplogena* and *Oreotrochilus*. These are among the largest of the tribe, very gay in color, and inhabit the Andes from Ecuador to Bolivia. Those of the former genus are remarkable for their brilliant crown spots. In the latter genus are many species, each of which is limited in its range to a single mountain or very limited area of high elevation. See Humming Bird.

HILL TIT. One of a numerous subfamily (Liotrichinæ) of small insect and berry eating birds, often brightly colored, which inhabit the Himalayan region and eastward. Among them is the red-billed hill tit (*Liothrix luteus*). It has brilliant colors, a sweet song, and gentle manners.

HILL-TOUT, Charles (1858–). A Canadian educator and ethnologist. He was born in England and was educated by private tutors and at Lincoln and studied for the ministry of the Church of England; but later he went to British Columbia and entered educational work. He was for some time principal of Buckland College, Vancouver, and later was appointed organizing secretary of the Ethnological Survey of Canada. In 1903 the Royal Society of London, England, awarded him funds to aid him in his ethnological studies among the native races of British Columbia. In 1913 he was elected a fellow of the Royal Society of Canada. Among his papers contributed to the

Transactions of the Royal Society of Canada are: "Later Prehistoric Man in British Columbia," "The Oceanic Affinities of the Kwakiuth-Salish Tribes of British Columbia," and "Origin of Totemism of the Native Races of British Columbia." He published also *The Native Races of British North America* and *The Far West, the Home of the Salish and Déné* (1907).

HILL'YARD. A city in Spokane Co., Wash., 5 miles northeast of Spokane, on the Great Northern Railroad (Map: Washington, H 3). It has extensive railroad shops and a high school and carries on a large trade in the products of the surrounding agricultural region, particularly fruits, berries, and grain. There are also planing mills. Pop., 1910, 3276.

HILMEND, hĭl'mend. See HELMUND.

HILMI PASHA, hĕl'mĕ pä-shä', HUSSEIN (?–). A Turkish public official. He was successively Vali, or Governor-General, of Adana, then of the Yemen, inspector of the Roumelian vilayets, and inspector general in Macedonia. He became Minister of the Interior in 1908, served as Grand Vizier from May to December, 1909, and for part of 1912 was Minister of Justice. In the latter year he served also as Ambassador to Austria. In 1913 he was a second time offered the premiership, but he accepted instead the post of inspector general of the Syrian vilayets. In 1914, however, he did become Grand Vizier again, and in that office, during the European War, supported a policy of opposition to German influence and protection of British interests in Mesopotamia. See TURKEY, *History*.

HILO, hē'lō. The second town in size and the best seaport of the Hawaiian group, situated on Hilo Bay, on the eastern coast of the island of Hawaii (Map: Hawaii, F 4). It has a protected harbor with a lighthouse and contains a courthouse, a customhouse, and a library. The town is surrounded by luxuriant tropical forests, with extensive lava fields in the vicinity. There are delightful drives, and an excellent carriage road winds from the town up towards the crater of Kilauea. The population (district, 21,992 in 1910) is extremely heterogeneous, and the American element is prominent.

HILONGOS, or **ILONGOS,** ē-lông'ŏs. A town on the southwestern coast of the island of Leyte, Philippines, 96 miles from Tacloban (Map: Philippine Islands, E 5). Pop., 1903, 12,478.

HILPRECHT, hĭl'prĕkt, HERMANN VOLLRAT (1859–). An Assyriologist, born at Hohenerxleben, Germany, and educated at Bernburg and Leipzig. In 1885 he was "repetent" in Old Testament theology at Erlangen and in the following year came to Philadelphia to become editor of the Oriental department of the *Sunday-School Times*. From 1887 to 1911 he was Clark research professor of Assyrian and professor of comparative Semitic philology at the University of Pennsylvania. He studied the Assyrian inscriptions (1882) in the British Museum, traveled in Syria, Babylonia, and Asia Minor, and became an authority on cuneiform paleography. Between 1893 and 1909 he reorganized the Babylonian department of the Imperial Ottoman Museum in Constantinople. In 1888 he accompanied the University of Pennsylvania expedition to Nippur and between 1895 and 1914 was in charge of four expeditions to the same place. The results of his excavations were of great importance. (See NIPPUR.) He was decorated with numerous orders, received several medals, and was chosen to honorary membership in various foreign learned societies. His main works are: *Freibrief Nebuchadnezar's I.* (1883); *Assyriaca* (1894); *Old Babylonian Inscriptions, Chiefly from Nippur* (1893); *Business Documents of Murashû Sons, of Nippur* (1898); *Ausgrabungen in Assyrien und Babylonien* (1904); *The Oldest Version of the Babylonian Deluge Story and the Temple Library of Nippur* (1910; also in Ger. ed.); and many contributions to the *Theologisches Litteraturblatt* and other theological and Oriental journals. He was editor in chief of *The Babylonian Expedition of the University of Pennsylvania* (4th series).

HILT'ED (from Eng., AS. *hilt*, Icel. *hjalt*, OHG. *helza*, hilt; probably connected ultimately with *hold*). A term used in heraldry (q.v.), to indicate the tincture of the handle of a sword.

HILTL, hĭl't'l, JOHANN GEORG (1826–78). A German actor and author, born in Berlin. After studying for the stage and acting in Hanover from 1843 to 1845, he was engaged at the Berlin Court Theatre, of which he was the manager from 1854 to 1861. His best acting was in serio-comic parts. He translated many French dramas and wrote a series of historical novels which had considerable popularity, though they lacked permanent literary value. The best known of these are: *Gefahrvolle Wege* (1865); *Unter der roten Eminenz* (1869); *Der alte Derfflinger und seine Dragoner* (1871); *Das Roggenhauskomplott* (1873); *Die Damen von Danzig* (1874); *Auf immer verschwunden* (1878). His works on history are: *Der böhmische Krieg und der Mainfeldzug* (4th ed., 1873); *Der französische Krieg von 1870–71* (7th ed., 1895); *Preussische Königsgeschichten* (1875); *Unser Fritz* (5th ed., 1891); *Der grosse Kurfürst und seine Zeit* (3d ed., 1893).

HILTON, hĭl'ton, JOHN (1804–78). An English surgeon and anatomist. He was born at Castle Hedingham in Essex, was educated at Chelmsford, and in 1824 entered Guy's Hospital, where he became a demonstrator of anatomy in 1828, assistant surgeon in 1844, and full surgeon in 1849. In 1843 he accepted a fellowship in the Royal College of Surgeons, of which he was president in 1867; and as professor of anatomy and surgery in 1860–62 he delivered at the college his famous "Rest and Pain" lectures which were subsequently published in many editions. His lectureship at Guy's ended in 1870, and the rest of his life was spent in private practice. With the help of the artist Joseph Towne he constructed a large number of fine anatomical models for Guy's Hospital.

HILTON, WILLIAM (1786–1839). An English historical and portrait painter, born at Lincoln. He was a pupil of J. R. Smith the engraver and studied also at the Royal Academy, where his first work was exhibited in 1803. In 1813, having exhibited his "Miranda and Ferdinand," he was made A.R.A.; in 1819, R.A., his diploma picture being "Ganymede"; in 1827, keeper. His masterpiece, "Christ Crowned with Thorns" (1823), was bought for the Tate Gallery, which also possesses his "Diana at the Bath" and "Nature Blowing Bubbles." In the National Gallery are "Serena and the Red Cross Knight," illustrating canto 7 of book vi of Spenser's *Faerie Queene;* "Edith and Harold"; "Cupid Disarmed"; "Rebecca and Abraham's Servant." In the National Portrait Gallery is Hilton's portrait of John Keats, whom he knew personally.

HILVERSUM, hĭl′vĕr-sŭm. A town in the Gooi Hill District, Province of North Holland, Netherlands, 18 miles southeast of Amsterdam (Map: Netherlands, D 2). It manufactures cotton goods, horse blankets, and carpets, is a favorite summer resort for Amsterdam residents, and has numerous schools, a convalescent home, and a town hall. Pop., 1900, 20,238; 1911, 32,938.

HIMALAYA, hĭ-mä′lå-yå (Skt., the abode of snow, from *hima,* snow + *ālaya,* abode). A mountain system in south central Asia, the most elevated and stupendous on the globe (Map: India, D 2). It is not, as sometimes represented, a single chain, but a system, consisting of several parallel and converging ranges, with a vast number of rugged, snowy peaks, separated by great elevated valleys and plateaus. On the north it descends to the elevated plateau of Tibet; on the south to the lowland drained by the Ganges and the Indus. It starts with the Karakorum in the Pamirs, whence it trends southeast and east, sweeping in a broad curve, convex southward. The mass of the Himalaya proper extends from the great bend of the Indus in the west to the great bend of the Brahmaputra in the east, or from long. 73° 23′ to 95° 40′ E., a distance of nearly 1500 miles. Their average breadth is about 150 miles. The mean elevation of the range is from 16,000 to 18,000 feet, but 45 of its peaks are now known to exceed 23,000 feet in height. Of these there are, in Kumaon, Nanda Devi, 25,600 feet; in Nepal, Dhawalagiri, 26,826 feet, Mount Everest, 29,002 (the highest known point on the globe); in Kashmir, Mounts Godwin-Austen, 28,278, Gusherbrum, 26,378, Masherbrum, 25,600, and Kakapushi, 25,560 feet; in Bhutan, Chumalari, 23,946 feet, and Kutha Kangir, 24,740 feet; and on the borders of Sikkim and Nepal, Kunchinjinga, 28,156 feet, for a long time thought to be the second summit of the entire system. The south base of the Himalaya comprises three distinct regions—first, adjoining the plains of Hindustan, the *Terai,* a jungle or grass-covered marshy plain; next, the great belt of *Saul Wood,* stretching along a great part of the range; and beyond it the *Dhuns,* a belt of detritus, extending to the foot of the true mountains. In the foothills above these regions, which are extremely ŭnhealthful, are placed the sanitaria for troops—Darjeeling, Simla, Murree. The first is connected by a mountain railway with the Bengal system. There are no plains and but few lakes of large size in the Himalaya; the chief of the latter are Naini Tal in Kumaon, 6520 feet, and the Lake of Kashmir, 6125 feet above sea level. Small glacial lakes are abundant in the heads of the gorges.

Snow falls at rare intervals in the mountains as low as 2500 feet, but at 6000 feet it snows every winter. The limit of perennial snow in the main or central Himalaya is 16,200 feet on the south and 17,400 feet on the north side—an anomaly without doubt due to the dry atmosphere of Tibet and the small quantity of rain and snow that falls there. The high range of the Himalaya forms a vast screen, which intercepts and condenses nearly all the moisture carried by the southwest monsoons which blow from the Indian Ocean from May to October and deposits it on the southern face of the mountains; hence at Cherra Punji, 4200 feet above sea level, as much as 600 inches of rain has been known to fall in one year. The rainfall, however, varies greatly at different stations and altitudes, being but 30 inches per year where the Indus issues from the mountains. Glaciers are found in every part of the range above the snow line and reach down to 13,500 feet at Sikkim and to 11,500 feet in Kumaon; one of these, that of Deotal in Garhwal, is 17,945 feet above sea level. Among the largest of the glaciers are the Baltoro (33 miles in length) and Biafo (90 miles long) in the Karakorum Range. The passes in the Himalaya are the most elevated of the globe, and the greater number are upward of 17,000 feet in height. The highest known is Ibi-Gamin Pass into Garhwal, 20,457 feet, and the highest used for traffic is the Parang Pass in Spiti, 18,500 feet above sea level. All the passes above 16,000 feet are closed with snow from November till May. While the upheaval of the system probably commenced in early geologic times, the principal uplift occurred in the middle or late Tertiary period, in the mountain-making epoch which was signalized by the elevation of the alpine system of Europe. The geological structure of the Himalaya consists chiefly of gneiss mixed with mica schist in the north and bands of granite and syenite in the south. Earthquakes are of frequent occurrence in the central range. The Sanpo, or Brahmaputra, and Indus—which rise in close proximity to each other on the Tibetan side of the Himalaya—with their magnificent tributaries, derive their chief supplies from the melting of the snows of these mountains, and consequently are in flood at the hottest season of the year, when the moisture they supply is most needed. Trees and cultivated grains ordinarily attain their highest limits in the mountains at 11,800, and shrubs at 15,200 feet above sea level, a limited number of flowering plants attaining 19,500 feet. The tea plant can be cultivated along the entire southern face of the Himalaya to an elevation of 5000 feet, but the best is produced at from 2000 to 3000 feet above sea level. Tigers and apes are found at an elevation of 11,000, and the leopard at 13,000 feet, while the dog follows the herds over passes 18,000 feet high. Snakes are found at an elevation of 15,000 feet, but the highest limit of the mosquito is 8000 feet above sea level.

On account of the majestic height of this mountain range, and the apparent impossibility of reaching its summit, the imagination of the ancient Hindus invested it with the most mysterious properties and connected it with the history of some of their deities. In the Puranas (q.v.) the Himalaya is placed to the south of the fabulous mountain Meru, which stands in the centre of the world (see MERU), and described as the king of mountains, who was inaugurated as such when Prithu was installed in the government of the earth. As the abode of Siva, he is the goal of penitent pilgrims, who repair to his summit to win the favors of Siva. His wife was Mena, whom the Pitris, or demigods, engendered by the power of thought.

Peaks ascended in recent years are: Crystal Peak (19,400) and Pioneer Peak (23,000) in 1892 by Sir Martin Conway; Daimirai Peak (19,000) by Mummery and Collie in 1895; Siegfried Horn (18,600), Bullock-Workman (19,450), Kosen Gunge (21,000), in 1898; Mount Chogo (21,500), Mount Lungma (22,568), in 1903; Pinnacle Peak in 1906; Mount Nieves Penitentes (19,080) and D (20,571) in 1906 by Dr. and

Mrs. W. H. Workman; Kabru Peak (24,015) in 1907 by Longstaff. Consult W. H. Workman, *Call of the Snowy Hispar* (New York, 1911). See HINDU KUSH.

HIMALAYAN SUBREGION. (hĭ-mä'lå-yan *or* hĭm'å-lā'an) A faunal district of the Oriental region (q.v.), also styled Himalo-Chinese, because its most characteristic forms occur along the lower slopes of the Himalaya Mountains and their extension into China. See INDO-CHINESE SUBREGION.

HIMEJI, hē-mā'jē. The capital of the Japanese Province of Harima, situated in the southern part of Hondo, 34 miles by rail from Kobe and at the junction of three highways (Map: Japan, D 6). It has a well-preserved castle dating from the fourteenth century and the second in size in Japan. Cotton and stamped leather are among the products. Pop., 1903, 36,509; 1908, 41,028.

HIM'ERA (Lat., from Gk. Ἱμέρα). A city on the north coast of Sicily, founded 649 B.C. by colonists from Zancle (Messana) and exiles from Syracuse. In 481–480 B.C. the tyrant Terillus, expelled by Theron of Agrigentum, invoked the aid of the Carthaginians. They sent a large army under Hamilcar I, but were totally defeated at Himera by the Greeks under Gelon of Syracuse. Thrasydæus, son of Theron, brought a large body of Doric emigrants to the city in 476; but a few years later, after the death of Theron, Thrasydæus was driven from Agrigentum by Hiero, and Himera became free. It seems to have enjoyed great prosperity during the remainder of the fifth century. In 415 it sided with Syracuse against Athens. In 409 it was razed to the ground by the Carthaginians. A new city, Thermæ Himerenses (or Himerææ), was founded in 407 B.C., about 8 miles west of the former site. The name of this new city was derived from the famous hot spring in which Hercules was said to have bathed. The new city remained in Carthaginian hands until it was taken by the Romans during the First Punic War. It was peculiarly favored by them and was left a free city under its own laws. In the time of Cicero it was a flourishing town, though not very large. Under Augustus it became a colony. Ergoteles, an Olympian victor, celebrated by Pindar, was a citizen of Himera. Stesichorus (q.v.) the poet was a native of the city, and his statue was preserved at Thermæ in the time of Cicero. Agathocles (q.v.), the great tyrant of Syracuse, was a native of Thermæ. Consult "Himera," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HIME'RIUS (Lat. from Gk. Ἱμέριος) (c.315–c.386). A Greek teacher of rhetoric. He was born at Prusa in Bithynia and lived for some time at Antioch at the court of the Emperor Julian as his secretary. After Julian's death he settled in Athens as a teacher of rhetoric. Among his pupils were Gregory Nazianzen and Basil the Great. He was a pagan, but did not attack Christianity. His works, of which 24 orations are preserved complete, with fragments of 10 others (ed. by Dübner, 1849), were in a florid, artificial style. They are valuable because of references to events of the time or quotations from a more classic period, especially from the lyric poets. Consult Eduard Norden, *Die antike Kunstprosa* (2d ed., Leipzig, 1909).

HIM'EROS (Lat., from Gk. ἵμερος, longing, yearning). In Greek mythology, the personification of longing and desire. He is the companion of Eros and of Aphrodite.

HIMIL'CAR. See HIMILCO, 2.

HIMIL'CO (Phœnician, grace of Milkar, Gk. Ἱμίλκων, *Himilkōn*). 1. A Carthaginian general, son of Hanno, who commanded the expedition against Sicily (406 B.C.), and conquered the western part of that island. When Dionysius of Syracuse renewed the war (397 B.C.), Himilco again commanded the Carthaginians, at first with success; but subsequently Dionysius attacked Himilco when the latter was greatly disabled by pestilence and forced him to capitulate. Himilco abandoned his allies and mercenaries to the mercy of the enemy and paid a large gratuity for permission to withdraw with his native Carthaginians. The disgrace of this surrender so weighed upon him that soon after returning to Carthage he committed suicide. Consult "Himilkon, 1," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913). 2. HIMILCO, or HIMILCAR. An early Carthaginian navigator of uncertain date, who explored the northwest coast of Europe at the same time that Hanno (see HANNO, 1) explored the west coast of Africa. Avienus has preserved some fragments of the history of this voyage, in which mention is made of the Hiberni and Albioni and of a promontory, Œstrymnis, thought to be Cornwall, and a group of islands, Œstrymnides, thought to be the Scilly Islands.

HIMLY, ăN'lē', LOUIS AUGUSTE (1823–1906). A French author, born at Strassburg. He studied paleography at the Ecole des Chartes from 1845 to 1847 and then became *agrégé* in history and *Docteur ès lettres*, professor of history at Rollin College, and (1863) professor of geography in the faculty of letters, Paris, where he was dean from 1881 to 1898. In 1884 he was chosen a member of the Institute (q.v.), section of the Académie des Sciences Morales et Politiques. Besides his thesis, *Wala et Louis le Débonnaire* (1849), he wrote *De la décadence carlovingienne* (1851) and a well-known *Histoire de la formation territoriale des états de l'Europe centrale* (2 vols., 1876).

HIMMALEH, hĭm-mä'lĕ. See HIMALAYA.

HIM'YARITES. The name of a people in southwestern Arabia, the Homerites of Ptolemy. The earlier history of the Kingdom of Himyar before its conquest by the King of Saba and Raidan in 115 B.C. is not known. It was probably with the aid of the Arsacid dynasty in Persia that it recovered its independence. In the time when Saba and Raidan were ruled by kings of Axum (300–378 A.D.) the importance of Himyar grew, and, assisted in all probability by the Sasanid rulers, its power spread in the fifth century. Its most famous King, Dhu Nuwas, was, however, conquered by the Axumites, who seem to have been aided by the Byzantine Emperor, Justin, in 525 A.D. The capital of Himyar was at Zafar. Since the Himyaritic Kingdom flourished in the days when Greek writers became familiar with Arabia, the term was long used as a designation of the people of Jemen in general; but this use of it has now been abandoned in view of the greater importance of the Minæan and Sabæan kingdoms. See ARABIA; MINÆANS; SABÆANS.

HINCKLEY, hĭŋk'lĭ. A manufacturing and market town in Leicestershire, England, 14 miles southwest of Leicester (Map: England,

E 4). Its chief buildings are the Gothic church of St. Mary, the Roman Catholic priory and Academy of St. Peter, a grammar school, and a town hall. It has manufactures of cotton hosiery, boots, bricks, tile, and lime. In the neighborhood are mineral springs. Hinckley stands on old Watling Street, the famous Roman road; it was created a barony soon after the Conquest and had a castle and a Benedictine priory; its borough privileges were annulled by Edward IV. Pop., 1901, 11,304; 1911, 12,837.

HINCKLEY, Allen (1877–). An American dramatic bass, born in Boston. While a student at the University of Pennsylvania, he also studied singing in Philadelphia. After graduation he went to New York, where he was a student of Oscar Saenger. His début at the Hamburg Opera as the King in *Lohengrin*, in 1903, secured for him a five-year contract with that institution. His fine voice and impressive stage appearance made him an ideal interpreter of the great Wagnerian rôles, so that he was heard at Covent Garden and Bayreuth. In 1908 he became a member of the Metropolitan Opera Company.

HINCKLEY, Thomas (1618–1706). Governor of Plymouth Colony from 1681, except during the administration of Sir Edmund Andros, until 1692, when Plymouth was united with Massachusetts. Of English birth, he came to the New England Colonies in 1635 and began to be active in the affairs of Plymouth in 1639 and was successively deputy (1645), representative (1647), and magistrate (1658–80). In 1680 he was also Deputy Governor. Seven years before his appointment as Governor he held the office of commissioner on the central board of the Plymouth and Massachusetts Colonies and continued in that position until the end of his governorship and was afterward a councilor. Governor Hinckley collected several volumes of papers which are now in the possession of the Boston Public Library.

HINCKS, Edward (1792–1866). An Irish Orientalist, eldest son of Thomas Dix Hincks, the Presbyterian divine, and brother of Sir Francis Hincks, the Canadian statesman. Edward was born at Cork, and graduated at Trinity College, Dublin, in 1811. In 1825 he was appointed rector of Killyleagh, County Down, where, in spite of his seclusion, he undertook studies in hieroglyphics (1833) and wrote for the *Dublin University Magazine* and the *Journal of Sacred Literature*. Simultaneously with Rawlinson he discovered the syllabic character of the Assyrian cuneiform letters, and he had earlier written on the Egyptian hieroglyphics. He began an Assyrian grammar, but did not leave materials for its completion.

HINCKS, Sir Francis (1807–85). A Canadian statesman, born in Cork, Ireland, and educated at Fermoy and at the Royal Belfast Institution. Having received a business training, he emigrated to Upper Canada in 1832, and settling in Toronto became a wholesale merchant. His interest in politics led him to found and edit the *Examiner* (1838), a Liberal newspaper, in which he advocated responsible government. In 1841 he was elected a member of the Canada Legislative Assembly, and in 1842–43 was Inspector General (Minister of Finance) in the first Baldwin-Lafontaine administration. In 1844 he failed of reëlection, and went to Montreal, where he established the *Pilot* and for several years was its chief contributor. He continued to defend responsible government and demanded the abolition of the clergy reserves and seignorial tenures. (See Canada, *History*.) In the second Baldwin-Lafontaine administration (1848–51) Hincks was again Inspector General and had charge of the commercial and economic measures. He procured active governmental aid to railway building and started the movement for reciprocity in natural products with the United States—not realized until 1854. (See Reciprocity Treaty.) In 1849 he was a special envoy to England in regard to the Rebellion Losses agitation. In the Hincks-Morin administration (1851–54), of which he was joint Premier, Hincks's wide knowledge of trade and financial affairs was used to promote a commercial treaty with the United States and to develop mines and railways. In the latter part of his administration he was opposed by the advanced Liberals of Upper Canada for failure promptly to carry out their programme of secularizing the clergy reserves and for yielding to the Roman Catholic demand of separate schools. After his defeat he was made Governor of Barbados (1855–62) and of British Guiana (1862–69). He returned to Canada and in 1869–73 was Minister of Finance in the Coalition administration of Sir John A. Macdonald. He afterward removed to Montreal, where he edited the *Journal of Commerce*. In 1869 he was knighted. His principal publications are: *Canada: Its Financial Position and Resources* (1849); *Reply to the Speech of Joseph Howe on the Union of the North American Provinces* (1855); *Religious Endowments in Canada* (1869); *The Boundaries Formerly in Dispute between Great Britain and the United States* (1885); *Reminiscences of my Public Life* (1885), a work of permanent value on the political history of Canada in 1840–54. Consult S. B. Leacock, *Baldwin, Lafontaine, Hincks*, in the "Makers of Canada Series" (Toronto, 1907).

HINC'MAR (806–882). A celebrated churchman of the ninth century. He was born presumably in Toulouse, as he belonged to the family of the counts of that province. He was educated in the monastery of Saint-Denis, near Paris, and was intrusted with the framing and carrying out of a plan for the reformation of the monastery. In 845 he was elected Archbishop of Rheims. In this position he had to deal with the case of the alleged heretic Gottschalk (q.v.), whom he treated with great severity. The followers of his predecessor, Ebbo, who had been deposed, remained bitter enemies. In 862 he became involved in a controversy with Pope Nicholas I. Rothadius, Bishop of Soissons and Suffragan to Hincmar, deposed a priest of his diocese, who appealed to Hincmar, as Metropolitan, and was ordered by him to be restored to office. Rothadius, resisting this order and having been in consequence condemned and excommunicated by the Archbishop, appealed to the Pope, who ordered Hincmar to restore Rothadius, or to appear at Rome in person, or by his representative, to vindicate the sentence. Hincmar sent a legate to Rome, but refused to restore the deposed Bishop; whereupon Nicholas annulled the sentence and required that the cause should again be heard in Rome. Hincmar, after some demur, was forced to acquiesce. The cause of Rothadius was reëxamined, and he was acquitted and restored to his see. Under the successor of Nicholas, Adrian II, a question arose as to the succession to the sovereignty of

Lorraine on the death of King Lothaire, the Pope favoring the pretensions of the Emperor Louis II in opposition to those of Charles the Bald of France. To the mandate which Adrian addressed to the subjects of Charles and to the nobles of Lorraine, accompanied by a menace of the censures of the Church, Hincmar offered a firm and persistent opposition. He was equally firm in resisting the undue extension of the royal prerogative in ecclesiastical affairs. Hincmar died at Epernay, whither he had fled from the Normans, Dec. 21, 882. His works were collected by Sirmond (Paris, 1645), reprinted in Migne, *Patrol. Lat.*, cxxv–cxxvi. Many others of his works are still in manuscripts. For his life, consult: J. C. Prichard, *Life and Times of Hincmar* (Littlemore, 1849); C. N. D. Diez, *De Hincmari vita et ingenio* (Sens, 1859); W. F. Gess, *Merkwürdigkeiten aus dem Leben und den Schriften Hincmars* (Göttingen, 1860); Carl von Noorden, *Hinkmar, Erzbischof von Reims* (Bonn, 1863); Theodor Foerster, *Drei Erzbischöfe vor tausend Jahren* (Gütersloh, 1873); Auguste Vidieu, *Hincmar de Reims; étude sur le IXe siècle* (Paris, 1875); Max Sdralek, *Hincmars von Reims kanonistisches Gutachten über die Ehescheidung des Königs Lothars II.* (Freiburg-im-Breisgau, 1881); J. H. Schorörs, *Hinkmar, Erzbischof von Reims* (ib., 1884).

HIND, hīnd (AS., Icel. *hind*, OHG. *hinta*, Ger. *Hinde*, hind; probably connected with Goth. *hinþan*, to catch, related to AS. *huntian*, Eng. *hunt*, possibly connected with Gk. κεμάς, *kemas*, gazelle). The female of the red deer, a correlative of "stag" or "hart" (q.v.). In strict use, according to the ancient laws and customs of venery, it did not become the designation of a female red deer until the third year of its age. Latterly the word has become, outside of England, a synonym of "doe."

HIND. A fish. See GROUPER.

HIND, HENRY YOULE (1823–1908). A Canadian explorer and geologist, born in Nottingham, England. He was educated at Leipzig and at Cambridge and went to the United States in 1846 and in 1847 to Upper Canada. He was made mathematical master in the provincial normal school and in 1851 became professor of chemistry and geology in Trinity College, Toronto. In 1857 he was appointed geologist to the Red River exploring expedition, and in 1858 he was placed in charge of the expedition sent to explore the country between the Red and Saskatchewan rivers. His reports on these expeditions were published by the Canadian and British parliaments. In 1861 he made an exploratory survey in Labrador. He removed to New Brunswick in 1864, made a geological survey of that province, and later, having gone to Nova Scotia, was appointed professor of chemistry and natural history in King's College, Windsor. In 1876 he made a geological exploration of the northeastern part of Newfoundland and the Atlantic coast of Labrador. He prominently assisted in the scientific work of the Fisheries Commission which met in Halifax in 1877 under the provisions of the Treaty of Washington (q.v.). In 1860 he was elected a fellow of the Royal Geographical Society. He published the *Northwest Territory* (1859) and many other reports of his geological and exploring expeditions.

HIND, JOHN RUSSELL (1823–95). An English astronomer, born at Nottingham. When a mere boy, he devoted himself to astronomy and at the age of 17 he was given a position in the Royal Observatory at Greenwich. In 1844 he was appointed member of the commission sent to determine the exact longitude of Valentia. On his return he was appointed observer in Bishop's Observatory, Regent's Park, London. He calculated the orbits of a number of planets and comets, noted many new variable stars and nebulæ, and discovered 10 new planetoids (q.v.), viz., Iris and Flora in 1847; Victoria in 1850; Irene in 1851; Melpomene, Fortuna, Calliope, and Thalia, in 1852; Euterpe in 1853; and Urania in 1854. In 1851 Hind received from the Academy of Sciences in Paris the Lalande medal and was elected a corresponding member. In 1852 he received the gold medal of the Astronomical Society of London and obtained a pension of £200 a year from the British government. He was superintendent of the *Nautical Almanac* in 1857–91. His scientific papers have generally been published in the *Transactions of the Astronomical Society*, the *Comptes Rendus*, and the *Astronomische Nachrichten*. His principal popular works are: *The Solar System* (1846); *Astronomical Vocabulary* (1852); *The Comets* (1852); *Descriptive Treatise on Comets* (1857); *Introduction to Astronomy* (3d ed., 1871). He was president of the Royal Astronomical Society in 1880.

HIND AND THE PANTHER, THE. A satirical poem by John Dryden (1687). It is a defense of the Roman Catholic church in the form of an allegory, in which all characters are represented by animals. The Hind stands for the Roman, the Panther for the Anglican church.

HINDENBURG, hĭn'den-bŭrk, KARL FRIEDRICH (1741–1808). A German mathematician, born at Dresden. Educated at Leipzig, he became docent (1771) and professor of philosophy (1781) in the university there. In 1786 he became professor of physics. He edited the *Magazin für reine und angewandte Mathematik*, with Bernoulli (1786–88), and the *Archiv der reinen und angewandten Mathematik* (1794–99); but he is best known as the discoverer of combinatory analysis and as author of *Kombinatorisch-analytische Abhandlungen* (1796 and 1800).

HINDENBURG, PAUL VON BENECKENDORFF UND VON (1847–). A German soldier, born in Posen. He became a subaltern in 1866, served in the war against Austria, distinguishing himself at the battle of Königgratz, and participated during the Franco-Prussian War in the storming of St. Privat, near Metz, and in the battle of Sedan. After receiving a military education (1872–75) he served in various capacities with the general staff—in active service in the field and as head of a bureau of the War Department. He was promoted major general in 1900 and lieutenant general in 1903, was retired in 1911, but, when the great European War broke out, in 1914, was recalled and made general-oberst, with chief command of the campaign in East Prussia against Russia. At Tannenberg he won one of the greatest German victories in the campaign against Russia. In 1870 and again in 1914 he was decorated with the order of the Iron Cross, and in November of the latter year he was made field marshal. See WAR IN EUROPE.

HIN'DERSIN, GUSTAV EDUARD VON (1804–72). A Prussian soldier, born at Wernigerode. He joined the Prussian artillery in 1820, became

an officer in 1825, attended the Kriegsakademie at Berlin in 1830–37, and in 1841 was detailed for duty on the general staff, of the topographical section of which he was later director. As lieutenant general, he had charge of the artillery attack on Düppel during the war with Denmark in 1864 and for his services was ennobled. He was chief of artillery on the King's staff during the war with Austria in 1866 and during the Franco-Prussian War. His energy led to great improvement of the artillery efficiency, to the substitution of the rifled gun for the smoothbore, and to the organization of the artillery school.

HINDI. See HINDUSTANI LANGUAGE AND LITERATURE.

HINDLEY, hīnd'lī. An urban district in Lancashire, England, 3 miles southeast of Wigan. Coal mining and cotton manufactures are important industries. Its chief buildings are the free grammar school and the old parish church, which was desecrated by the Cavaliers during the Puritan Revolution. The municipality operates markets and remunerative gas and water works. Pop., 1901, 23,504; 1911, 24,100.

HINDMAN, hīnd'mən, THOMAS CARMICHAEL (1818–68). A Confederate officer in the American Civil War. He was born in Tennessee, was educated in the common schools, studied law, and removed to Mississippi to practice his profession. As a lieutenant in a Mississippi regiment, he took part in the Mexican War and was a Democratic member of Congress from 1858 to 1861. He was appointed to the command of a brigade in the Confederate army soon after the Civil War began and first served under Gen. Simon Buckner in Kentucky. At Memphis he was in command and was afterward defeated at the battles of Newtonia and Prairie Grove. Promoted to be a major general at the battle of Shiloh, he was transferred to Arkansas. After the close of the war he went to the city of Mexico, but finally returned and settled in Arkansas in 1867. The following year General Hindman was murdered by one of his former soldiers in revenge for some disciplinary act during the war.

HINDOOSTAN, hīn'dōō-stän'. See HINDUSTAN.

HINDU CHRONOLOGY. See VEDA.

HINDUISM. The national religion of India. The result of a compromise between Brahmanism (q.v.) and the religious ideas of the lower Aryan castes and the non-Aryan population of India, modern Hinduism is as diversified as there are degrees in this compromise. Standard Hinduism is characterized by professed reverence for the Veda and the traditions of the Brahmans, with the consequent acknowledgment of Brahman privileges; the observance of certain prescriptions concerning food, marriage, and burial; and the practice of a number of rites, sacraments, and forms of divine worship. But if any one of the traits alluded to in this formal definition be chosen as a test of Hinduism, its application would lead to impossible consequences. This holds true of even its most tenacious traits, such as the cremation of the dead, the respect for the cow, and the employment of Brahman ministration. Nor is Hinduism wholly coextensive with the caste system. (See CASTE.) This many-sided and elusive aspect of Hinduism is quite natural in view of its syncretism, which has incorporated animist, fetishist, and shamanist elements to a philosophy derived from Vedic and Sankhya (q.v.) sources and to Vedic worship has added sectarianism, mysticism and magic, theriolatry and phallicism, the cult of numerous local divinities, and reverence for holy men.

The movement has not always been from Brahmanism downward; local and primitive faiths and rites have imitated the appearance of Hinduism into which they were finally merged. Hinduism has thus come to comprise "entirely different sets of ideas, or, one may say, widely different conceptions of the world and life. At one end, at the lower end of the series, is Animism, an essentially materialistic theory of things which seeks by means of magic to ward off or to forestall physical disasters, which looks no further than the world of sense. . . . At the other end is Pantheism, combined with a system of transcendental metaphysics." (Risley.) The author just quoted has, in fact, epigrammatically defined Hinduism as "magic tempered by metaphysics." Related to this character of Hinduism is the importance it attaches to a sensuous symbolism, which, to a non-Hindu at least, frequently seems to obscure rather than bring out the underlying idea. This peculiarity explains the lapse of philosophical schools of religion into mere formalism, with its exaggerated emphasis of externals to the detriment of real religious feeling. On the other hand, what at first glance resembles idol worship may be a consciously symbolic act of reverence.

The Sanskrit word *dharma* (right, duty, law, usage, institution, conduct, morality, piety, religion) exactly indicates the scope of Hinduism. The terms "Brahmanism" and "Hinduism" are often interchangeable; usually, however, the former is restricted to the orthodox religion of the Brahmans, which is nearer Vedic belief than the newer and more popular forms of worship which constitute Hinduism proper.

According to the census of 1911, Hinduism is professed by 217,586,900 individuals out of a total Indian population of upward of 313,000,000. The religion next in numbers is Mohammedanism, which in India counts over 66,000,000 adherents. Buddhism claims 10,721,449 people, while upward of 10,000,000 are classed as animists. The non-orthodox sect of the Sikhs is represented by more than 3,000,000 individuals and Jainism by some 1,250,000. The immense preponderance of Hinduism is therefore obvious. Its numerical strength is also an index of the diversity of this religion which is "monotheistic in essence, multifarious and grotesque polytheism in semblance, with pantheism for a harmonizing principle." (Moore.) We are thus led to distinguish between a purely speculative and theological and a low sectarian aspect of this faith. True sectarianism is to a large extent subversive of orthodoxy. Frequently antagonistic to the Brahmans, the sectaries revere religious teachers (*gurus*) of their own and often set aside caste differences within their fold. The sects have special Puranas (see PURANA) and other religious and semireligious works, liturgies, formulas (*mantras*), and emblems to which they tenaciously cling, and which differentiate them from one another. A position apart is held by the numerous ascetics, religious mendicants, and Yogi jugglers, whose sectarianism is often nominal, and who may comprise several sects in the same order. A general sketch of the development of Hindu religion will be found under the heading INDIA, section *Religion*, while

under BRAHMANISM is treated the change of Vedic religion to Brahmanism and early Hinduism. (See INDIAN MYTHOLOGY.) The present article endeavors to touch on the philosophic aspects of Hinduism. The written sources of Hinduism are the epics of Mahabharata and Ramayana, and especially the Bhagavad-Gita and Harivansa portions of the former, the Puranas, and other sectarian writings, such as the *Bhakti Sūtras* of Sāndilya and Nārada, the philosophical writings of the founders of sects, their commentators and opponents, and numerous treatises of edification, stotras, or odes in praise of the divinity, etc.

Two doctrines lay from the time of the Upanishads (q.v.) at the basis of every Hindu speculative system, viz., the doctrine of an indefinite series of rebirths (*saṅsāra*, or transmigration), and that of the permanence of the effects of one's action (*Karma, adṛshta*), all Hindus agreeing that every action invariably brings about its reward or punishment in either this life or in some future existence, and that, conversely, the nature of one's existence, the lot of man, is rigorously determined by the merit or demerit incurred by previous actions. This is held to be possible because of the existence of a "subtle body" (*sūkshma śarīra*) which accompanies the soul in all its wanderings. Several corollaries of these doctrines are important from a religious point of view. Between the gods and men there is thus no difference of essence, but only of degree, because both gods and men are but steps in the saṅsāra. In consequence of this belief atheism does not in India possess the significance it has in the religious history of Europe. God, moreover, the highest good, came to be regarded as the ultimate and desirable goal of universal evolution. To reach him, to obtain deliverance (*mukti, moksha*) from the sluggard course of saṅsāra became the supreme task of theology, man's aim being to obtain at first a partial state of freedom (*jivanmukti*), which merges into perennial bliss when all the previous karma has been spent out. This conception is foreign to the Vedic age when the worshiper's sole concern was to demand of the gods certain material benefits in the return for the sacrifice. The Brahmanas may be said to countenance a "practical road" (*Karma-marga*) to salvation, a view which later received an elaborate treatment at the hands of the famous Kumārila (700 A.D.). Opposed to this is the Upanishad (q.v.) theory of saving knowledge (*jñānakaṇḍa*), which, elaborated in the Vedanta (q.v.) system of philosophy, is practically identical with esoteric Brahmanism. The chief theological contribution of Hinduism, on the other hand, is the doctrine that salvation is primarily dependent on *bhakti*, faith or devotion to one divinity.* It is therefore essentially theistic as against the pantheistic Vedantism. The opposition of the two is not, however, felt in religious practice and is diminished by the belief in the incarnations (*avatāras*) of Vishnu, which bridge the gulf between an immanent all-god and a personal deity. The personal pantheism of Krishnaism has been compared with the Christian doctrine of the Son's incarnation, but differs from it inasmuch as Christianism is not pantheistic. In Hinduism, on the other hand, "the immanence of God in the external world and in the heart of man is the cardinal doctrine." (Bhandarkar.) God is therefore both the material and the efficient cause of the world in the majority of Hindu systems. Nevertheless philosophic Sivaism, and some schools of Vishnuism, admit a dualism of matter and mind which entails a differentiation, in some respects at least, of God from the world.

The Bhakti doctrine is especially promulgated by the Vishnuite schools; but there also is a Siva-bhakti. Originally a religion of reform, like Jainism and Buddhism, and likewise directed against Brahmanism, the new faith appeared not much later than the two great heterodox religions as a monotheism preaching "the religion of a single-minded love and devotion to One," Ekāntika Dharma. In a sectarian form this monotheism was absorbed by the Vāsudeva worship of the Bhāgavata and Pancharātra sects and flourished among the Kshatriya tribe of the Sātvatas. The religion was well established in the fourth century B.C., a date which, according to Sir R. Bhandarkar, is the *terminus ad quem* of the Bhagavad-Gita, the Vishnuite Bible. This poem shows strong influence of Upanishad, Sankhya, and Yoga (qq.v.) ideas—a fact which must have increased its popularity. Successive identification of the Bhāgavata divinity with Purusha Nārāyaṇa, the primeval Man, with the Vedic Vishnu (q.v.), the cowherd boy-divinity Gopāla-Kṛshṇa of Gokula (see KRISHNA), and with the hero Rāma transformed the original monism into a number of related sects. Vishnu finally became an all-god, and his religion the sectarian aspect of Vedantic monism. Vedantic Sivaism, as Professor Hopkins has rightly observed, is, on the contrary, only nominal Sivaism, or, if true Sivaism, only nominally Vedantic.

The Vedantic philosophy received its definite formulation in the ninth century A.D., when Sankara, commenting on the Brahma Sūtra of Badarāyana, elaborated the doctrine of idealist singularism which declared the phenomenal world an illusion (*māyā*) due to "ignorance" conceived as an active principle. The only true reality is God, or absolute being, with whom the saved soul is identical. Sankara thus opposed a transcendent (*nirguṇa*) divinity, which is incogitable to the personal, "qualified" (*saguṇa*) Brahma of the Upanishads, and declared the latter to be a concession to the vulgar minds. To the enlightened practical worship has no importance. This doctrine soon found an echo among the enlightened Brahmans and was strengthened by the elaboration of a kindred psychology and cosmology. As it endangered practical religion, it also had many opponents. One of them, the Vishnuite Rāmānuja (born in 1016 A.D.), revived the old teaching of the Bhagavad-Gita, and its Sankhya principles. His system of "qualified monism" (*visishtādvaita*) teaches that God is, not pure being, as held Sankara, but a personality qualified by all the perfections, such as intelligence, joy, power, mercy, etc. The insensate world (*achit*) and the individual, atomic, souls which together constitute the *chit*, are both the body, or attribute (*prakṛti*) of the cosmic soul that controls the universe (Iśvara, identified with Nārāyaṇa). God appears in several modes, the highest being

* While Vedantin Brahmans restrict salvation to members of the Brahman class, the others having first to be born in this class before they may be saved, modern Hinduism promises salvation to all the people in its fold; even Sudras. Hinduism is to Vedic religion what the New Testament is to the Old, and some scholars, like Grierson, believe that its establishment was influenced by Christian ideas coming from the northwest.

Para and Viuha, and the next Vibhava, which comprises the 10 avatāras of Vishnu, and Antaryāmin, or inner soul, perceived by the Yogins; and in the idols. The practice of *bhakti*, which he conceived as identical with the *upāsana* (meditation) of the Upanishads, is not open to the Sudras, who know not the Vedas and the rites, but even they may attain salvation if they abandon the world and throw themselves on God's mercy (*prapatti*, surrender). The saved soul enjoys all the attributes of God save the creative. Rāmānuja has many followers in the south of India. His contemporary Nimbārka taught that the *chit* and *achit* constitute the Sakti, or divine capacity, being a development of his potentiality. Bhakti he conceived in an erotic sense (the term is applied in Hindu theosophy to the female generative principle). He adored the divine pair of Krishna and his mistress Rādhā and won many followers in Bengal. A more refined system was elaborated by Madhva-Anandatīrtha, an eclectic who denied God as a material cause of the universe (thirteenth century). His followers are recruited among the Brahmans.

Vedantic pseudo-Sivaism is typified in the Kashmir school (ninth to eleventh centuries A.D.), which held that the world is a reflection of Siva's splendor in himself. God is therefore the archetype of the world and the source of all true knowledge. These ideas were not destined to become popular. Popular Sivaism is, as a rule, associated with brutal and obscene rites and with degraded asceticism. This evil side of the faith was apparent from the beginning of the cult; Rudra-Siva being a terrible divinity, the lord of wild places, of cemeteries and forests and of the people who live in them, thieves and outcasts. The horrible sects of the Kāpālas and Kālāmukhas, who practiced human sacrifices, and the erratic (*antimargika*) school of Pāsupatas, who took refuge in the mystic and extravagant practices of the Yogi type, illustrate low Sivaism. From the philosophical point of view, however, the last-named school holds out, as does ordinary Sivaism (*Siddhāntadarśana, Saivadharśana*), the theory of a material or formative principle (prakṛti, Māyā) distinct from Siva but under his control. The Lingayats of Dekkan, an anti-Brahmanic sect which originated towards the middle of the eleventh century of our era, show Vishnuite influence. They hold that Siva, or Linga,* qualified by Sakti, is the efficient and material cause of the world, "the instructor and redeemer of mankind" (Bhandarkar), to whom the souls aspire by virtue of an innate bhakti. Devotion and renunciation to the world are necessary to salvation. The Vīrasaivas, or Lingayats, are recognized by the phallus, or *linga*, which they usually carry in a box suspended from their neck.

While Sivaism appealed to the enlightened few and to the rabble, Vishnuism is a middle-class religion divided into two main branches—a purer, or Ramaite, and a lower and less chaste Krishnaite. The cult of Rāma, the epic hero conceived as an incarnation of Krishna, and of his spouse Sītā, received a mighty impetus in the fourteenth century when Rāmānuja, preaching in the vernacular, called to the fold even the degraded classes. Although his disciples (Avadhūtas, the freed) threw off many sectarian practices, they are still true Hindus. They also show reverence for the monkey Hanuman, the mythical friend of Rāma. A number of modern reformers claiming fidelity to Ramananda's teaching, stripped his theology of all its sectarian characteristics until it became, under Moslem influence, a pure unitarianism. The most famous of these were Dādu, a contemporary of Akbar, the weaver* Kabīr (fifteenth century), and Nānak, the reputed founder of the Sikhs (q.v.). Rāma faith was professed by the poet† Tulsī Dāsa (1574–1623), who, although not a sect founder, wrote a Hindi Ramayana which may be called the New Testament of Vishnuism, both for its moral doctrines and also because Rāma is therein said to have sacrificed himself for the salvation of men. The two Marātha saints Nāmdev (end of fourteenth century) and Tukārām (born in 1607 A.D.) may be mentioned here. They, like Kabīr, denounced mere formalism and laid stress on moral purification as prerequisite to salvation. The erotic aspect of the Krishna-Rādhā cult is most noticeable among the followers of Vallabha (sixteenth century); they are wealthy middle-class men of Gujarat and Rajputana, who imitate their sporting divinity by leading an easy and care-free life. Less sensual is the sect inaugurated by Chaitanya of Bengal, a contemporary of Luther; it represents the mystical and emotional side of bhakti. Both sects show an exaggerated respect for their religious teachers (*gurus, gosains*).

We may reckon among the Sivaites the votaries of Ganeśa, whose cult has been contaminated by that of Vināyaka, the prince of evil spirits, the followers of Karttikeya, once numerous, and most of the Yogis. A peculiar position is held by the Sāktas, or worshipers of the female principle (*śakti*), personified in Siva's consort of many names, Mahādevī, Durgā, Kāli, Pārvatī, Kāralā, etc. The śakti cult has a bloody and a sensual form. (See THUG; TANTRA.) It is among the "left-hand" Sāktas, who form a secret association chiefly represented in East Bengal and Assam, that unspeakable orgies form a part of worship. Yet even these gross aberrations admit of a symbolic interpretation strengthened by a philosophic terminology. Yoga exercises of all kinds, mystic gestures (*mudrās*), cabalistic formulas (*mantras*), symbolic emblems, and the "five m's" (viz., *madya*, wine, *māñsa*, meat, *mātsya*, fish, *mudrā*, parched grain, and *maithuna*, union of the sexes) play an important rôle in Sākta worship, which is typically syncretistic inasmuch as it associates phallicism, magic, and shamanism with Vedic rites, fetishism, and the worship of mother divinities. It is pleasant to oppose to this degraded worship and its accompanying beliefs not only the pure unitarianism professed by the enlightened members of the Brahmo-Somaj (q.v.), the more national religion of the Arya Somaj, the philosophic Vedantins, and the nonsectarian worshipers of one god under the name of Rāma, Vithobā, etc., but also the uncultured adherents of both monotheism and polytheism found in Berar. Hinduism is thus seen to contain an

* Linga is the phallus; but the Sankhya school uses the term for the "subtle body" which is the unperishable substratum of psychic life. Among the more refined Lingayats God is identical with the ether linga, which is infinity.

* These later reformers are sometimes of low station. Senā was a barber.

† To Vishnuism belong the Sanskrit poet Jayadeva and the Tamil Tiruvalluva Nāyanār (author of the Kurral); while the Tamil saint Tirunāna Sambandha and the poet Manikka Vāśagar were Sivaites

infinity of potencies, good and bad. Contrasted with the Vedic religion, it shows a more advanced stage because it appeals to more classes of people than did Vedic worship, and because it no longer is content with formalist ritualism, but lays stress on love as a means of salvation. But although, under the influence of Mohammedanism and Christianity, it has cast off some of its specific Hindu garb, Hinduism still continues to be a nationalist and not a universal religion.

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HINDU KUSH, hĭn'dōō kōōsh, or INDIAN CAUCASUS. A range of mountains, forming the westward continuation of the Himalaya, being sometimes reckoned a part of that colossal range (Map: Afghanistan, N 5). It extends from the Upper Indus on the east to the Bamian Pass (beyond which the continuing range is generally designated Safed-Koh) on the west, stretching in latitude between 34° and 36° N. and in longitude between 68° and 74° 30′ E., with a length of about 500 miles. Nearly the whole of it is contained in Afghanistan. The Oxus, or Amu-Darya, has its source in its northern ridges, and many tributaries of the Indus flow down the south slope. For the first 100 miles west of the Pamirs it is flat-topped with lakes and no peaks and with passes ranging in altitude from 12,500 to 17,500 feet. Farther westward it becomes higher, and its plateau summit breaks up into peaks of which Tirach Mir, on the frontier of Chitral, is the loftiest (25,400 feet in altitude). In this part are many passes over which trails or roads are in use. The range, which consists mainly of granites and schists, was probably uplifted in Tertiary time.

HINDU MUSIC. According to the ancient Hindu belief all arts were bestowed upon man by various gods, and music was the gift of Brahma. The early history of music in India is so beset with fables and reaches back to such remote antiquity that it is impossible to trace its real origin. We have, however, unmistakable evidence that several of the hymns of the *Rig-Veda* (about 1500 B.C.) were intended to be sung to music. The hymns also mention flutes (*vāṇa*), cymbals (*karkari*), drums (*dundubhi*), and trumpets (*bakura*). Not only are the early accounts of the origin of music marked by an exuberance of the imagination, but the strictly scientific treatises on the subject of music are not free from this fault. The Hindu works on music are of uncertain date, but seem to be relatively late. Like much of Sanskrit literature, even when dealing with technical subjects, they are written in verse. They exist for the most part as yet only in manuscript. The most important are the *Saṁgītadarpaṇa* of Damodara, the *Saṁgītanārāyaṇa* by Narayana, the *Saṁgītaratnākara* of Sarngadeva (ed. by Telang. Poona, 1897), the *Rāgavibōdha* of Somanatha (ed. by Gharpure, Poona, 1895), the *Rāgamāta* of Kshemakara and many others of less value.

The oldest scale of the Hindus, the *Vēlāvali*, consists of only five tones, F, G, A, C, D, and is identical with that of the Chinese. In the course of time two tones were added, and A was taken as the starting point. Thus a scale identical with our A major was obtained. A scale was known as *Svaragrāma*, or *Saptaka*, and the different tones were designated by the syllables *Sa, Ri, Ga, Ma, Pa, Dhai, Ni*. Each of these syllables denoted not only the fundamental tone, but was applied equally to all its chromatic alterations. Within any scale three tones were designated by special names. These were the first, third, and fifth, known as *Aṁśa, Graha*, and *Nyāsa* respectively. Their function is stated in the *Saṁgītanārāyaṇa:* "The note Graha stands at the beginning and Nyāsa at the end of a song. Aṁśa is the leading note; it gives to the melody its particular character and is used the most frequently, and the other notes are subordinated to it as to a ruler." The seven tones of the scale were repeated three times in succession, and thus a compass of three *Aṣṭau*, or octaves, was obtained. The different tones were classified as major tones, minor tones, and semitones. Each major tone consisted of four quarter tones, each minor of three quarters, and each semitone of two quarters. These subdivisions were called *śrutis*, of which each octave had 22. Major tones were the first, fourth, and fifth, minor tones the second and sixth, semitones the third and seventh. The *Rāgavibōdha* admits the possibility of no less than 960 modes, but enumerates only 36. Even out of these only 23 are recognized as having practical value. These 36 modes were divided into 6 primary called *Rāgas*, and 30 secondary modes called *Rāginīs*. The number of Rāgas was determined by the number of seasons, which in India is six. An attempt was made to have each Rāga express, as closely as possible, the character of the season to which it corresponded. It also was improper to play a Rāga at any other season than the one of which it was the expression. Musical notation by means of a staff was unknown to the Hindus. The different tones were represented by their initial consonants with lines drawn above or below to indicate to which *Aṣṭau*, or octave, the particular tone belonged. Embellishments and marks of expression were represented quite definitely by means of small circles, ellipses, chains, curves, horizontal and perpendicular lines. The end of a phrase was indicated by a lotus flower.

Of the musical instruments the *vina* (q.v.) was the principal one and is still used to-day in India. The *magudi* was also a stringed instrument with four strings. Among the varied instruments the principal ones were the *basari*, a flute with seven holes, and the *śankha*, a kind of trumpet made from a sea shell. From the perfection of the vina it can easily be inferred that in the art of music India was far in advance of all other Asiatic countries of antiquity. In spite of the complicated theoretical system composers employed chiefly the *śrīrāga*, our modern A major. The minor mode occurs also, but very seldom. In the religious cult of the Hindus music was of primary importance. Music, both vocal and instrumental, was strictly regulated by laws. The former was called *Gaṇa*, the latter *Vādya*. Pantomimes were known as *Nṛtya;* and a combination of all was designated by the term *Saṁgīta*.

What strikes a student of the original Hindu melodies is the great discrepancy between musical theory and actual practice. Evidently the composers disregarded theoretical speculations and wrote according to the dictates of their ear; for all the melodies are found to be written exactly in our major or minor modes and can be harmonized accordingly without the least difficulty.

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HINDUSTAN, hĭn'dōō-stän', or **HINDOOSTAN.** The land of the Hindus. A portion of India situated north of the Vindhya Mountains in the valley of the Upper Ganges. The name has been used loosely as a designation of the Indian peninsula. See INDIA.

HINDUSTANI (hĭn'dōō-stä'nē) **LANGUAGE AND LITERATURE.** The *lingua franca* of northern India. This is in structure an Indian language, descended from a sister dialect of the ancient Sanskrit through mediæval Prakrit vernaculars. Hindustani (Mod. Pers. *Hindūstāni*, from *Hind*, India) is divided into nearly 60 subdialects, which in the eastern portion of its district are approximate Bengali and in the south and west closely resemble Marathi and Gujarati. The territory of Hindustani, which is the vernacular of nearly 100,000,000 people, covers some 248,000 square miles. The standard dialect is the Brāj Bhāsha, spoken in the districts of Delhi, Agra, and Mathura. Hindustani abounds in Turkish, Arabic, and Persian words, as well as in numerous borrowings from Dravidian and Kolarian dialects. In this form it is called Urdū, which in Turkish signifies 'camp.' This term is a relic of the Mohammedan invasions of the country around Delhi in the twelfth century, when conquerors and conquered sought to find a speech which they might each understand, and this speech became the official language of the Mogul administration, while a literary form of Urdu, used in poetry and rich in Persian elements, is known as *Rekhta*. During the nineteenth century the vocabulary of the language was purified to a great extent of the foreign element, and the usage of native words as far as possible has since been preferred. Hindustani without these non-Indian importations is called Hindi, or High Hindi.

In structure the language is analytic. In this it resembles the other modern Indian languages as well as Persian, and in many respects English. It forms cases, tenses, etc., by postpositions, periphrases, and the like. Thus, from *ghar*, 'house' (Sanskrit *gṛha*), is formed the genitive *ghar kā*, ablative *ghar sē*, agent case *ghar nē*, while the plural of the same cases is *gharōn kā, gharōn sē, gharōn nē*. The agent case is used for the subject of a transitive verb in a tense

derived from the past participle. There are two genders, two numbers, two voices, and nine tenses in common use, e.g., *main dekhtā*, 'I see,' *main dekhtā hūn*, 'I am seeing,' *main dekhūngā*, 'I am going to see,' *main nē dekhā hai*, 'I have seen' (lit. 'by me it has been seen'), and so forth. Hindi is written in the Devanagari alphabet, like Sanskrit and Marathi, while Urdu employs the Perso-Arabic script with three additional characters to represent specifically Indian sounds.

Hindustani literature is very abundant, although for the most part it rises little above mediocrity in character. It begins with the *Prithvirāj Rāsau*, by Chand Bardai (about 1200 A.D.), who related in his long poem the history of Prithviraja II, the last Hindu King of Delhi. Much of the literature consists of translations from the Sanskrit as well as from Persian and Arabic. Noteworthy specimens of this particular class of work are the *Rāmāyan* of Tulsīdās, begun 1575 A.D., and the *Bāgh o Bahār* (Garden and Spring), which Ammān of Delhi translated from the Persian collection of stories called the "History of the Four Dervishes," at the beginning of the nineteenth century (Eng. trans. by Eastwick, 1851). Religious poetry, often assuming an erotic form, history, and the drama also find their place in this literature, which is the most important in modern India.

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HINGE (ME. *henge*, from *hengen*, secondary form of *hangen*, to hang). A device for attaching a door, shutter, box lid, or other swinging member, to one side or edge of an opening. It consists usually of two *flaps* of metal connected by a *pin*, or pivot, passing through one or more eyes or perforated *knuckles* formed on one or both flaps. Any hinge intended to be attached to the edge of the door or lid is called a *butt;* the majority of hinges are of this kind. One from which the pin is removable is a *loose-pin* butt; one in which the pin is a part of one flap, the other having a single long knuckle, is called a *loose-joint* or *lift-off* hinge. Flap hinges and strap hinges are attached to the faces of the door and jamb, or of the lid and side of a box: the common "barn-door" hinge is of this sort. Double-acting hinges have two knuckles and three flaps, allowing a door to swing in both directions through the opening, as a pantry door. Brass, bronze, iron, and steel are the metals commonly used for hinges. In mediæval work the hinges, if of the strap type, were often very ornamental, covering a considerable space with their scrolls of wrought iron. Doors which swing on pivots, like many heavy iron and bronze doors and gates and like many ancient doors and shutters of wood and even of stone (see DOOR), are not properly said to be hinged, but pivoted.

HINGHAM, hĭng'am. A town in Plymouth Co., Mass., comprising the villages of West Hingham, South Hingham, and Hingham Centre, 17 miles by rail southeast of Boston, on Massachusetts Bay, and on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, F 3). It is purely residential and has Derby Academy, a public library, and an old meeting house which dates from 1681. The harbor here is of importance, the State having dredged, in 1911, an anchorage basin 6 feet deep and a channel 75 feet wide and 6 feet deep to connect this basin and the channel made by the Federal government, which the State widened from 50 to 75 feet. The government is administered by town meetings. Pop., 1900, 5059; 1910, 4965. Hingham was settled in 1633 and was known as Barecove until 1635, when it was incorporated under its present name. It was the home of Gen. Benjamin Lincoln, John A. Andrew, and John D. Long, and the birthplace of James Hall the eminent geologist. Consult Lincoln and others, *History of the Town of Hingham* (Cambridge, 1893), and L. C. Cornish, *Settlement of Hingham, Mass.* (Hingham, 1911).

HINK'SON, MRS. KATHARINE (maiden name TYNAN) (1861–). An Irish novelist and poet, born in Dublin. She was educated at the Dominican convent of St. Catharine of Siena at Drogheda, Ireland, and in 1893, having been married to H. A. Hinkson, she took up her residence in London. She is favorably known for her verse contained in *Louise de la Vallière and Other Poems* (1885); *Shamrocks* (1887); *Ballads and Lyrics* (1890); *Cuckoo Songs* (1894); *The Wind in the Trees* (1898); *Collected Poems* (1901). She also portrayed phases of Irish character in a series of pleasant novels, comprising chiefly: *A Cluster of Nuts* (1894), short tales; *The Way of a Maid* (1895); *O, What a Plague is Love* (1896); *The Handsome Brandons* (1898); *The Dear Irish Girl* and *She Walks in Beauty* (1899); *Three Fair Maids* and *A Daughter of the Fields* (1900); *The Honorable Molly* (1903); *A Book of Memory* (1906); *Peggy* (1909); *Freda* (1910); *Princess Katharine* (1911); *Honey, My Honey* (1912); *Irish Poems* (1913); *Rose of the Garden, The Romance of Lady Sarah Lennox: A Novel* (1913). Consult her *Twenty-five Years: Reminiscences* (New York, 1914). For an appreciative estimate of Mrs. Hinkson as a poet, consult *Treasury of Irish Poetry*, edited by Stopford A. Brooke and T. W. Rolleston (London, 1900), and William Archer, *Poets of the Younger Generation* (New York, 1902). Mrs. Hinkson was a conspicuous figure in the so-called Irish Literary Revival, a movement which was well under way in the nineties of the last century.

HINLICHE, ĕn-lē'chā, 'Southern People.' A pastoral tribe of Araucania, wandering over the southern pampas of Argentina. They live in portable tents of skins and subsist entirely upon meat derived from their herds of horses, cattle, and sheep. They are skillful artificers in leather and iron, while the women make rugs of ostrich skins and weave woolen blankets and ponchos of superior quality.

HINNA. See HENNA.

HIN'NOM, VALLEY OF. A ravine in or near Jerusalem (Map: Palestine, A 1). The precise location has not been determined. Scholars differ as to which of the three valleys, Kidron, Tyropœon, or Wady el Rababi, is likely to have been called the Valley of Hinnom. Jewish and Arab

tradition favor the first, which runs east of the temple elevation. A majority of recent investigators prefer the last, which is south of the present city. Much probability, however, seems to attach to the Tyropœon. In Enoch xxvi the ravine over which the author marvels is evidently the Valley of Hinnom, and it is unquestionably identical with the Tyropœon, lying between Mount Zion and the western hill. Consequently a writer familiar with Jerusalem and living towards the end of the second century B.C. located the Valley of Hinnom in the Tyropœon. The chief objections are that, if the city did not in preëxilic times extend beyond the Tyropœon, there ought to be some remains of walls there, and that, if the Tyropœon was within the city, the sacrifices of the first-born to Moloch would have been made in the immediate neighborhood of the Yahwe temple. But whatever the extent of the city, it is highly improbable that important sanctuaries were left unprotected outside the walls. That Solomon should build temples to Chemosh and Moloch, the gods of the conquered Moabitish and Ammonitish dependencies, was only natural (1 Kings xi. 7). These shrines would not be far from the royal sanctuary. When even kings like Ahaz and Manasseh offered their first-born, and questions such as those in Micah vi. 6–7 could be asked in Judah touching the expediency of making similar sacrifices to Yahwe, there is no reason to suppose that the inhabitants of Jerusalem objected to having offerings of the first-born made to Moloch near the Yahwe temple. A later addition to 1 Kings xi. 7, found in the Greek version, states that Solomon also built a temple to Ashtaroth. (See ASTARTE.) This is not improbable, but it may simply reflect the memory of the actual existence of such a sanctuary in the valley. The sites had probably been occupied long before Solomon by Canaanitish shrines. The name of the valley is quite obscure. Its full title seems to have been either "Valley of the Sons of Hinnom" or "Valley of the Son of Hinnom." The former is found in 2 Kings xxiii. 10 and often in the best manuscripts of the Greek version; the latter in Joshua xv. 8 and xviii. 16, where the abbreviated form "Valley of Hinnom" is also found, and in 2 Chron. xxviii. 3, xxxiii. 6; Jer. vii. 31–32, xix. 2–6, xxxiii. 35. Hinnom was regarded by the Greek translators as a proper name, and many modern authors take the same view. But as the name is changed in Jer. vii. 32, xix. 6, to "Valley of Slaughter," it probably originally suggested a pleasant meaning. It has been conjectured that the name of the divinity worshiped in the valley was *Ben Naaman* (pleasant son), which may have been a descriptive title of Tammuz (q.v.). Another explanation, necessitating no alteration of the consonantal text, is that *hinam* meant in this connection "sexual enjoyment," and that the participants in the licentious rites practiced at the shrines and in the groves of this valley were called "sons of joy." In the Babylonian Talmud (*Erubin*, 19 a) Hinnom is connected with the word *hinam* used in the sense of "levity, licentiousness." The meaning of the root is "to be jocund," and the word *hinnom* should probably be connected with it. At one of the sanctuaries in this valley children were passed through the altar fire to Moloch. It is not evident whether the phrase implies a burnt offering or an ordeal by fire. But Josiah defiled one of the chief sanctuaries, the Taphet, later pronounced Tophet to suggest *bosheth* (shame). What basis there is for the mediæval rabbinic statement that perpetual fires were kept up in this valley for consuming dead bodies of criminals and carcasses of animals, cannot be ascertained. If Tophet was at the southern end of the Tyropœon, near Siloam, this cremation of refuse would be outside the city limits. The apocalyptic expectation in the second century of a final battle between the nations and Israel outside of the holy city seems to have rested upon this feature of the surroundings. Here the enemy would be consumed, and the pious who should go up to the temple in Jerusalem on Sabbaths and at new moons would look with satisfaction upon the carcasses consumed by fire and worms (Isa. lxvi. 23–24). The same idea is found in Enoch xxvii. Gradually the term *Ge Hinnom*, or (Aramaized) *Gehenna*, came to be used, not of this valley in Jerusalem, but of the subterranean Tartarus to which it was the entrance: of the unseen place of final punishment of the impenitent; of the sudden destruction of both soul and body; or figuratively, of the inner condemnation of spiritual loss. On the geographical question, consult: Warren's article "Hinnom," in Hastings, *Dictionary of the Bible;* Conder's article "Jerusalem," in the *Encyclopædia Biblica;* G. A. Smith, *Historical Geography of the Holy Land* (7th ed., London, 1901). See GEHENNA; HELL; JUDGMENT, FINAL; ESCHATOLOGY.

HIN'NY (Lat. *hinna*, *hinnus*, Gk. *ἵννος*, or *ginnus*, Gk. *γίννος*, mule from a stallion and a she-ass). The hybrid produced between a horse and a female ass. It is smaller than a mule, but the body is more bulky in proportion to the legs, and its strength is inferior. It is less valuable than the mule, although more docile. The hinny is rare. It was described by some of the earlier naturalists as a hybrid between the ox and the ass. See MULE.

HINOYOSSA, hē'nō-yŏs'sȧ, ALEXANDER D'. The director of Nieuer Amstel, a Dutch colony established on the east bank of the Delaware in 1656, and afterward Governor of all the settlements on that river until the conquest of New Netherland by the English. Hinoyossa was born and died in Holland, and his activity in the Dutch settlements of America extended from 1656 to 1674. He came to New Amsterdam in 1656 as lieutenant in a small force of soldiers accompanying 150 Dutch emigrants and succeeded Jacob Aldrichs as director of Nieuer Amstel in 1659. His position was a trying one on account of the conflicts of authority which were continually disturbing the colony, especially in regard to taxation. Appeals to Holland were frequent, and Hinoyossa refused to recognize the authority of Director Stuyvesant, of New Amsterdam, who had the supervision of the commissioners composing the government of the colony. As an investment, the latter was not at first profitable, owing to sickness and dissension among its members; but Hinoyossa governed so vigorously and wisely that all attempts by the West India Company to secure control failed. Confident of his own ability and seeing the necessity of a single and undisputed authority, Hinoyossa went to Holland in 1663 to ask for the entire direction of all the Delaware settlements, which was finally given to him. Director Stuyvesant formally transferred his authority, and the Swedes, who had rival settlements there, after a fruitless effort to

resist the change, also became obedient and accepted Hinoyossa's control. On the English conquest of New Netherland Hinoyossa returned to Holland and became a soldier in the Republican army in the great war with Louis XIV. Consult J. R. Brodhead, *History of the State of New York* (2 vols., New York, 1871–74).

HINSCHIUS, hĭn'shī-ŭs, PAUL (1835–98). A German jurist, known especially as an authority on ecclesiastical law. He was born in Berlin and studied jurisprudence there and at Heidelberg. In 1859 he became a lecturer on law at the University of Berlin, served as professor of law at Halle in 1863, returned to Berlin in 1865, and in 1868 was appointed professor at the University of Kiel, which he represented in the Prussian House of Lords. In 1872 he became professor of ecclesiastical law at Berlin and subsequently took part in the Kulturkampf (q.v.). He served in the Reichstag in 1872–78 and 1881–82 and represented the University of Berlin in the Prussian Upper House after 1889. His fame rests mainly on the *Decretales Pseudo-Isidorianæ et Capitula Angilramni* (2 parts, 1863) and on the incomplete but especially important *Das Kirchenrecht der Katholiken und Protestanten in Deutschland* (6 vols., 1869–77).

HINSDALE, hĭnz'dāl, BURKE AARON (1837–1900). An American educator. He was born in Ohio and was educated at the Western Reserve Eclectic Institute (now Hiram College), where he was a pupil of James A. Garfield. In 1861 he entered the Campbellite ministry, preaching in Cleveland and other places, and in 1866 was chosen assistant editor of the *Christian Standard.* Three years later he became professor of history and English literature in Hiram College and from 1870 to 1882 was its president. After a few years' service as superintendent of schools at Cleveland, Ohio, he was appointed professor of the science and art of teaching in the University of Michigan in 1886. Among his publications are: *Genuineness and Authenticity of the Gospels* (1870); *The Republican Text-Book* (1880); *Garfield and Education* (1881); *The Old Northwest* (1888); *How to Study and Teach History* (1894); *Teaching the Language Arts* (1896); *Horace Mann and the Common-School Revival in the United States* (1898); *American Government, National and State* (4th ed., 1905). He also edited the *Life and Works of James A. Garfield* (2 vols., 1882–83).

HINTERLAND, hĭn'tĕr-länt (Ger., back territory). A term that came into general use at the time of the partition of East Africa between Germany and England in 1890. The doctrine of the hinterland is the claim of German diplomats that, when a power takes possession of a strip of seacoast, its rights extend inland indefinitely, or until its territory reaches the recognized boundary of some other power.

HIN'TON. A city and the county seat of Summers Co., W. Va., 97 miles southeast of Charleston, on the New River, and on the Chesapeake and Ohio Railroad (Map: West Virginia, D 4). It is a railroad division headquarters with repair shops, and has two hospitals, a high school, and a Carnegie library. Pop., 1900, 3763; 1910, 3656.

HINTON, ARTHUR (1869–). An English composer, born at Beckenham, Kent. He completed a three-year course at the Royal Academy of Music in London under Sauret (violin) and Davenport (composition) and was then appointed teacher of violin. Having held this position for three years, he went to Munich for a further course in composition under Rheinberger. Here his first symphony, in B flat, was produced under his own direction. After some time spent in Vienna and Rome he returned to London in 1896, where he filled various positions as conductor of theatre orchestras. In 1903 he married the pianist Katharine Goodson (q.v.). His works include two symphonies (the second in C minor); an orchestral fantasy, *The Triumph of Cæsar;* two scenes from *Endymion;* a violin sonata in B flat; a trio in D minor; a piano quintet in G minor; the opera *Tamara;* and the very successful children's operas *The Disagreeable Princess* and *St. Elizabeth's Rose.*

HINTON, JAMES (1822–75). An English surgeon and philosophical writer, born at Reading. He was educated at the hospital of St. Bartholomew and began the practice of surgery in London about 1850 as an ear specialist. Besides lecturing upon his chosen subject in Guy's Hospital, from 1862 to 1874, he published: *Man and his Dwelling-Place* (1859); *Life in Nature* (1862); *The Mystery of Pain* (1865). Two of his books upon similar subjects were issued posthumously. Ellice Hopkins edited his *Life and Letters* (1878).

HINZPETER, hĭnts'pā'tĕr, GEORG ERNST (1827–1907). A German educator, born at Bielefeld, where he taught after his university course at Halle and Berlin (1847–50). The Crown Prince's tutor, Hinzpeter became Privy Councilor and member of several governmental boards after Wilhelm II came to the throne. He strongly influenced the Emperor's educational policy and in 1890 was prominent in the Berlin Conference on Higher Education. He wrote *Kaiser Wilhelm II.* (9th ed., 1889). In 1908 the Emperor contributed towards the monument erected to Hinzpeter.

HIOGO, hyō'gō, or **FIOGO.** A part of the Japanese town of Kōbé (q.v.).

HIONG-NU, hyōng'nōō'. By this name (also spelt Hun-yü, Hien-yün, Küan, and Hiung-nu) the Chinese chroniclers designate a people of Turkish or Tatar race who, some two centuries B.C., founded a powerful kingdom in Central Asia, conquered Turkestan, and made inroads into China. The kingdom of the Hiong-nu lasted until the middle of the first century A.D., when it split into two sections, of which the northern soon disappeared from history. Early Chinese chronicles are filled with accounts of conflicts with this race. Some identify the Huns with the Hiong-nu. The Chinese account of this people was published (in translation) in the *Journal of the Anthropological Institute* (London, 1874). Many ethnologists see in the Hiong-nu the ancestors of the Turks. Consult Hirth, *The Ancient History of China* (New York, 1911).

HIOUEN-THSANG, hĕ-wĕn-tsäng', or **YUAN CHWANG.** A celebrated Chinese Buddhist traveler, who visited 110 places of India in the first half of the seventh century (629–645) and gave an account of the condition of Buddhism at that period in India. He was born in 600 in the Province of Honan. He was a precocious youth, loved learning, and was very fond of the Confucian work on Filial Piety. At the age of 20 he was ordained as a Buddhist monk and soon became famous for his learning and eloquence. His longing to visit the holy land of Buddhism set him on his travels. After an absence of 16 years he returned, bringing

with him 657 sacred Buddhist books and 150 relics of Buddha. He received a great ovation from Emperor, court, and people, and was held in the highest honor. As to the accounts of his travels, his interests being chiefly religious, he did not enter much into details concerning the social and political condition of India. His narrative, however, gives many curious facts which he observed and, possessing a high degree of trustworthiness, is one of the most important documents for the history of India at that time. Apparently he traveled alone or with a few occasional companions and wore the garb of a religious mendicant. It does not appear that the account of his travels was written by himself. The first of the two works relating to them is a biographical notice of him, in which his travels form a principal feature; it was composed by two of his pupils, Hoei-li and Yen-thsong. The latter bears the title of *Ta-thang-si-yu-ki*, or "Memoirs of the Countries of the West, published under the Thang," and was edited by Pien-ki. Both works have been translated by Julien in his *Histoire de la vie de Hiuen-Thsang* (1853) and his *Mémoires sur les contrées occidentales, par Hiuen-Thsang* (1857–58). Consult: *Buddhist Records of the Western World* (2 vols., Boston, 1885); Samuel Beal, *Life of Hiuen-Tsaing* (London, 1888); Thomas Watters, *On Yuan Chwang's Travels in India* (2 vols., ib., 1904–05); G. A. Grierson, "Yuan Chwang's Mo-la-p'o," in *Journal of the Royal Asiatic Society* (1906).

HIP JOINT. A ball-and-socket joint, formed by the reception of the globular head of the thigh bone (or femur) into the deep pit or cup in the *os innominatum*, which is known as the *acetabulum* (so called from its resemblance to the vinegar cups used by the Romans). If the variety of the movements of this joint—viz., flexion, extension, abduction, adduction, and rotation inward and outward—and at the same time its great strength are considered, it may well claim to be regarded as the most perfect joint in the whole body.

The ligaments are usually described as five in number: (1) the capsular; (2) the ilio-femoral; (3) the teres, or round; (4) the cotyloid; and (5) the transverse. The capsular ligament extends from the edge of the cup to the circumference of the neck upon which the ball is carried, inclosing the bony parts in a strong sheath. The ilio-femoral, or Y, ligament is merely an accessory band of fibres which give increased thickness to the capsular ligament in front, where strength is specially required. The great use of the capsular ligament is to limit the extension of the hip joint and thus to give steadiness to the erect posture. The only other ligament of importance is the teres, or round, ligament, which is in reality triangular rather than round and has its apex attached to the head of the thigh bone, while its base is connected with the cavity of the acetabulum. Its use is not very clearly known, but probably is to support and protect vessels giving blood supply to the head of the bone. It is sometimes absent in cases in which no special weakness of the joint was observed during life and is of by no means constant occurrence in mammals. The joint is much strengthened by a large number of surrounding muscles, some of which are of considerable power.

In such a joint as this, although the ligaments materially assist in preventing dislocation, it is obvious that the articular surfaces cannot, under ordinary circumstances, be kept in apposition by them, inasmuch as they must be loose in their whole circumference, to permit of the general movements of the joint. The experiments of Weber have shown that atmospheric pressure is the real power by which the head of the femur is retained in the acetabulum when the muscles are at rest. In spite of its anatomical reënforcements the hip joint is often dislocated. The head of the femur may be forced from its socket downward, forward, or backward, each position producing its characteristic symptoms and deformity.

Disease of the Hip Joint. Hip disease differs in so many points of importance from other joint diseases and is so serious an affection that it requires a special notice. Its connection with the scrofulous or strumous diathesis is more distinctly marked than that of most other joint diseases, and it almost always occurs before the age of puberty. It is essentially a tubercular inflammation of the hip joint. Its beginning may be often associated with some trivial occurrence, such as overexertion in a long walk, a sprain in jumping, or a fall.

In the early stage of the disease the whole of the structures of the joint are inflamed, and by proper treatment at this period the morbid action may be sometimes subdued without any worse consequences than a more or less rigid joint. Usually, however, abscesses form around the joint and often communicate with its interior; and the acetabulum, and the head and neck of the thigh bone, become disintegrated, softened, and roughened. In a still more advanced stage dislocation of the head of the thigh bone commonly occurs, either from the capsular ligaments becoming more or less destroyed, and the head of the bone being drawn out of its cavity by the action of the surrounding muscles, or from a fungous mass sprouting up from the bottom of the cavity and pushing the head of the bone before it. It is of extreme importance that the symptoms should be detected in an early stage of the disease, and surgical aid at once be sought.

As the disease advances, abscesses, as already mentioned, occur around the joint, which sometimes, from the tension they exert on the obturator nerve, occasion extreme pain in the inside of the thigh. True shortening of the limb now takes place, which at the same time becomes adducted and inverted. From this stage, if the general health is good, the patient may be so fortunate as to recover with an anchylosed (or immovable) hip joint; but occasionally a condition of exhaustion comes on, the tubercular process exhibits itself in the lungs and elsewhere, and death finally supervenes from the prolonged septic processes. The duration of the disease may vary from two or three months to 10 or more years. The essential factor in the treatment of these cases is complete immobilization of the joint for a protracted period by means of plaster splints or rigid metal braces. With this must be combined nourishing food, fresh air, and sunlight, with general exercise of the body as early as is practicable.

HIP'KINS, Alfred James (1826–1903). An English connoisseur of musical instruments, born at Westminster. Having entered in 1840 the piano firm of Broadwood and Sons, with which he remained till his death, he made himself master of all the details of technical con-

struction and also turned his attention to the history of the piano. This led him further to a study of all related keyboard instruments, and this, in turn, to the investigation of temperament and pitch. At the same time he made himself an excellent performer on the piano as well as on all the older instruments. Beginning with the Great Exhibition of 1851, he served as expert or juror in connection with almost every important exhibition held in England since then. He participated in the exhibitions in Vienna (1892) and Paris (1900). His principal writings are: *Old Keyboard Instruments* (1887); *Musical Instruments, Historical, Rare, and Unique* (1888); *A Description and History of the Pianoforte and Older Keyboard Stringed Instruments* (1896). Besides, he wrote all the articles relating to his subject for the ninth edition of the *Encyclopædia Britannica* and for Grove's *Dictionary of Music and Musicians.*

HIPPARCHUS, hĭp-pär'kŭs (Lat., from Gk. Ἵππαρχος) (flourished between 161 and 126 B.C.). A Greek astronomer and mathematician. He was born in Nicæa, Bithynia, but his astronomical work was done on the island of Rhodes and possibly also in Alexandria. Of his personal history nothing is known. He was the founder of genuinely scientific astronomy and also of a part of that science which lies on the borderland of astronomy and geometry, viz., trigonometry. In this field he computed a table of chords which, although lost, is known to us through the works of Theon of Alexandria (q.v.), who wrote about 365 A.D. It is probable, too, that this is the Hipparchus who wrote on combinatory analysis, and that the Arabs were correct in attributing to him a knowledge of the quadratic equation. Certain it is that Ptolemy was indebted to him for much of the *Almagest* (q.v.). According to Fabricius, Hipparchus wrote nine separate works; but of these only the *Commentaries on the Phænomena of Aratus and Eudoxus* has come down to us. The text of these *Commentaries* was edited by Manitius and published, with a German translation, at Leipzig in 1894. From the *Almagest* we learn that it was Hipparchus who first discovered the precession of the equinoxes, determined the place of the equinox among the stars, invented solar and lunar theories, invented the astrolabe (q.v.), determined longitude by means of lunar eclipses, and drew up a catalogue of 1080 stars, determining the longitude and latitude of each (this catalogue has been preserved in the *Almagest*). As Ptolemy was also an astronomer, there is some difficulty in allotting to each his meed of praise for the discoveries mentioned in the *Almagest*, which difficulty has given rise to some discussion. Consult: J. B. J. Delambre, *Histoire de l'astronomie ancienne* (Paris, 1817); Robert Grant, *History of Physical Astronomy* (London, 1852); Lewis, *Historical Survey of the Astronomy of the Ancients* (ib., 1862); Hugo Berger, *Die geographischen Fragmente des Hipparch* (Leipzig, 1870); Rudolf Wolf, *Geschichte der Astronomie* (Munich, 1877); Paul Tannery, *Recherches sur l'histoire de l'astronomie ancienne* (Paris, 1893).

HIPPARCHUS (c.555–514 B.C.). The son and one of the successors of Pisistratus (q.v.), tyrant of Athens. On the death of Pisistratus (527 B.C.) Hipparchus and his older brother, Hippias, kept the government of Athens in their hands. Hipparchus interested himself in art and literature, as his father had done. He was murdered by Harmodius and Aristogiton (q.v.), in 514, at the Panathenæa, probably in revenge for a personal insult, though the Greeks of the next century commonly considered the murderers as patriots and saviors of their country. See Hippias.

HIPPA'RION (Neo-Lat., from Gk. *ἱππάριον,* pony, dim. of *ἵππος, hippos,* horse). A fossil horse, somewhat smaller than the Asiatic ass, remains of which have been found in Upper Miocene rocks of North America and in the Pliocene deposits of North Africa, Asia, and Europe.

HIPPEASTRUM, or Lily of the Palace. See Plate of Amaryllidaceæ.

HIP'PEL, Theodor Gottlieb von (1741–96). A German humorist and satirist, born at Königsberg. After traveling in Russia he settled in his birthplace, first as tutor and then as zealous student of law, and in 1786 became Privy Councilor of War and president of the town. He was a strange man, full of inconsistencies. He published, all anonymously, *Ueber die Ehe* (1774, ed. by Brenning, 1872); *Ueber die bürgerliche Verbesserung der Weiber* (1792); *Lebensläufe nach aufsteigender Linie, nebst Beilagen A. B. C.* (1778–81, ed. by Oettingen, 1883), his most important work; and *Ueber weibliche Bildung* (1801). In these works he attempted to express and popularize the philosophy of Kant's *Kritik,* then unpublished. Of a more satiric and political nature are: *Zimmermann I. und Friedrich II., von Johann Heinrich Friedrich Quittenbaum Bildschnitzer in Hannover* (1790) and *Kreuz und Querzüge des Ritters A bis Z.* His other works include some hymns, the idyllic *Handzeichnungen nach der Natur* (1790); the drama *Der Mann nach der Uhr* (2d ed., 1771); and *Ueber das Königsberger Stapelrecht* (1791). His collected works were published at Berlin in 14 volumes (1827–38). Consult his autobiography (Gotha, 1801); M. von Hippel, *Die Geschichte der Familie von Hippel* (Leipzig, 1899); Johann Czerny, *Sterne, Hippel, und Jean Paul* (Berlin, 1904).

HIPPIAS, hĭp'ĭ-ăs (Lat., from Gk. Ἱππίας) (?–c.490 B.C.). A tyrant of Athens, son of Pisistratus (q.v.), upon whose death (527 B.C.) he assumed the government in conjunction with his brother Hipparchus (q.v.). According to Thucydides, the government of the brothers was conducted on the same principle as that of their father, and many distinguished poets, including Simonides of Ceos and Anacreon of Teos, lived at Athens under their patronage. After the assassination of Hipparchus, in 514 B.C., Hippias governed alone and avenged the death of his brother by imposing extraordinary taxes, selling offices, and putting to death all of whom he entertained the least suspicion. At length, however, his despotism was overthrown. The Delphic oracle was bribed to enjoin the Lacedæmonians to free Athens from the Pisistratidæ, and after one or two unsuccessful attempts the tyrant's old enemies, the Alcmæonidæ (q.v.), to whom Megacles belonged, supported by a Spartan force under Cleomenes, defeated Hippias in the field, captured his children, and compelled him and all his relatives to leave Attica (510 B.C.). As soon as they had departed, a decree was passed condemning the tyrant and his family to perpetual banishment, and a monument commemorative of their crimes and oppression was erected in the Acropolis. After spending some time at Sigeum, Hippias went to the court of Darius and

incited the first war of the Persians against the European Greeks. He accompanied the expedition sent under Datis and Artaphernes and persuaded the Persians to land at Marathon. It cannot be determined whether he was killed during the battle or whether he died at Lemnos on his return.

HIPPIAS OF E'LIS (c.460–? B.C.). A Greek mathematician, writer, diplomat, and philosopher. He was a teacher of renown, a man of great pretense, but a scholar of little originality. His teaching, for which his pupils were compelled to pay heavily, was directed to the practical end of success in a worldly way, to display, and to ability in public address. It is probable that he is the Hippias mentioned by Proclus (on the authority of Geminus) as the inventor of the quadratrix—a curve originally designed, it is thought, for dividing an arc in a given ratio, but which also lends itself readily to the quadrature of the circle. (See QUADRATURE.) This curve, however, usually bears the name of Dinostratus, since he studied it with so much care.

HIPPID'IUM. An extinct ancestor of the horse. See HORSE, FOSSIL.

HIP'PO (Lat., from Gk. Ἱππών, *Hippōn*), or HIPPO REGIUS. A Phœnician colony in north Africa, later a favorite residence of Masinissa, King of Numidia, of which the scanty ruins are yet to be seen near Bona (Bone), Algeria. Hippo was a flourishing trading city under the Roman rule and in later years the see of St. Augustine, who died here in 430 A.D., just before the destruction of the city by the Vandals.

HIP'POBOS'CIDÆ (Neo-Lat. nom. pl., from Gk. *ἱπποβοσκός, hippoboskos*, feeding horses, feeding on horses, from *ἵππος, hippos*, horse + *βόσκειν, boskein*, to feed). A strange and important family of dipterous insects which are parasitic upon birds and mammals and which are popularly known by the name of bird ticks. This is misleading, since they are not ticks, and are not confined to birds, although the adults live and move quickly about among the feathers and hair of birds and mammals. Unlike most other external parasites of the higher animals, many of them possess wings, although they are otherwise modified as the result of their parasitic life. Their development is very abnormal and differs from that of all other insects. The eggs hatch and the larvæ develop within the mother and are extruded only after they have become pupæ. *Hippobosca equina* is a winged species which occurs on the horse and is known in England as the forest fly. *Melophagus ovinus* is a wingless form and occurs on the sheep. One of the commonest of the North American species is *Olfersia americana*, which is found upon certain birds, like the horned owl, certain hawks, and the ruffed grouse. The species of the genus *Lipoptena* may, while still winged, live on birds, but afterward they lose their wings and are then found on mammals.

HIP'POCAM'PUS. See SEA HORSE.

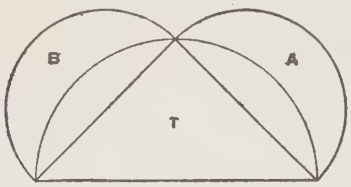
HIP'POCRAS (from Fr. *hippocras, hypocras*, from Lat. *Hippocrates*, Gk. Ἱπποκράτης, *Hippokratēs*, a famous Greek physician). An aromatic medicated cordial, formerly much used in Great Britain. It was made of spiced wine, mixed with sugar, lemon, aromatic tincture, or other ingredients.

HIPPOC'RATES (Lat., from Gk. Ἱπποκράτης, *Hippokratēs*) (c.460–357 B.C.). A Greek physician, the most celebrated of antiquity and justly called "the father of medicine." He was the son of Heraclides, also a physician, and belonged to the family of the Asclepiadæ, being either the nineteenth or seventeenth in descent from Æsculapius. His mother, Phænarete, was said to be descended from Hercules. He was born in the island of Cos. He is said to have been instructed in medicine by his father and by Herodicus, and in philosophy by Georgias of Leontini, the sophist, and Democritus of Abdera, whom he afterward cured of insanity. After spending some time in traveling through different parts of Greece, he settled and practiced his profession at Cos and finally died at Larissa in Thessaly. He is said to have passed the age of 100. We know little more of his personal history than that he was highly esteemed as a physician and an author, and that he raised the medical school of Cos to a very high reputation. His works were studied and quoted by Plato. Various stories are recorded of him by Greek writers, which are undoubtedly fabulous; and legends regarding him are found in the works of Arabic writers, who term him Bukrat, while the European story-tellers of the Middle Ages celebrate him under the name of Ypocras. The works bearing the name of Hippocrates, and termed the Hippocratic collection, are 72 in number and include many treatises by his sons Thessalus and Draco, by his son-in-law Polybus, and by others. The following are considered authentic: *Epidemics; Regimen in Acute Diseases; On Air, Water, and Places; On Wounds of the Head;* parts of the *Aphorisms* and parts of the *Prognostics;* the work on *Ancient Medicines; Joints; Fractures; The Use of the Lever; Law; Ulcers; Hæmorrhoids; The Sacred Disease; Fistulæ;* and *On the Duty of the Physician*, as well as the *Oath*. Hippocrates divides the causes of disease into two principal classes—the first consisting of the influence of seasons, climates, water, situation, etc., and the second of more personal causes, such as the food and exercise of the individual patient. His belief in the influence which different climates exert on the human constitution is very strongly expressed. He ascribes to this influence both the conformation of the body and the disposition of the mind and thus accounts for the difference between the Greek and the Asiatic. The four fluids, or humors, of the body (blood, phlegm, yellow bile, and black bile) were regarded by him as the primary seats of disease; health was the result of the due combination (or crasis) of these, and illness was the consequence of a disturbance of this crasis. When a disease was proceeding favorably, these humors underwent a certain change (or *coction*), which was the sign of returning health, as preparing the way for the expulsion of morbid matter, or *crisis*, these crises having a tendency to occur at definite periods, which were hence called "critical days." His treatment of diseases was cautious and what we now term expectant; it consisted chiefly in attention to diet and regimen. Thus, he was the inventor of the humoral pathology, so long in vogue in medical schools. He must be judged by the standards of his day. A most careful and keen observer and exact chronicler of symptoms, he was also the possessor of a remarkable mental equipment and a man of great nobility and morality. See HIPPOCRATIC OATH.

The works of Hippocrates were translated at an early period into Arabic. They were first printed in a Latin translation in 1525 at Rome,

Galen's commentaries on his works being of special value. The first Greek edition (the Aldine) appeared the following year at Venice; an edition by Mercurialis appeared in 1588, one by Fœsius in 1595, and one by Van der Linden (still much esteemed) in 1665. An edition under the editorship of Kuhn appeared in three volumes at Leipzig in 1825–27. The best French edition is that of Littré, in 10 volumes, the first of which appeared in 1839 and the last in 1861. An excellent English translation of *The Genuine Works of Hippocrates* was published in 1849 in two volumes by Dr. Adams.

HIPPOCRATES OF CHIOS, kī'ŏs (c.450 B.C.). A Greek geometer, possibly related to the family of the celebrated physician. His early life was devoted to maritime commerce, and the seizure of a vessel by the Athenian customs called him (c.430) to Athens to obtain redress. Failing in his mission, he betook himself to the study of philosophy and to teaching geometry. He wrote the first elementary textbook on geometry, and his name is often connected with the quadrature of certain figures which are com-



LUNES OF HIPPOCRATES.

monly called the lunes of Hippocrates. The theorem is not found in the works of Hippocrates; but Pardies, in his *Elemens de géométrie* (1671), assigns it to him, and most subsequent writers have done the same without stopping to confirm the statement. Simplicius quotes Eudemus as saying that Hippocrates first showed that similar segments of circles are proportioned to the squares of their bases, and the proposition regarding them can easily be deduced from it. In its simplest form the proposition asserts that if semicircles be described upon the three sides of an isosceles triangle, as shown in the accompanying figure, the area of the triangle equals the sum of the areas of the lunes—i.e., $T = A + B = 2A$. It is easily proved that $T = A + B$ even if the triangle is not isosceles. These propositions on the lunes are further interesting as being the oldest extant specimens of geometric proofs by reasoning.

Hippocrates attempted the problem of duplicating the cube and reduced it to that of finding two means between one line and another of double its length. He is also credited by Proclus with inventing the process of geometric reduction, consisting in passing from one proposition to another, which being mastered, the one proposed necessarily follows. Consult Paul Tannery, "Hippocrate de Chios et la quadrature des lunules," in the *Mémoires de Bordeaux* (Bordeaux, 1878).

HIP'POCRAT'IC OATH. An oath taken by young men in the early days on entering upon the practice of medicine. In ancient times the oath was ascribed to Hippocrates and is probably authentic. It runs as follows: "I swear by Apollo, the physician, by Æsculapius, by Hygieia, Panacea, and all the gods and goddesses, that according to my ability and judgment I will keep this oath and stipulation: to reckon him who teaches me this art equally dear with my parents; to share my substance with him and to relieve his necessities if required; to look upon his offspring upon the same footing as my own brothers; and to teach them this art if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and by every other mode of instruction I will impart a knowledge of this art to my own sons, to those of my teachers, and to disciples bound by a stipulation and oath, according to the law of medicine, but to no others. I will follow that system of regimen which, according to my best judgment, I consider best for my patients and abstain from whatever is injurious. I will give no deadly medicine to any one if asked nor suggest any such counsel. Furthermore, I will not give to a woman an instrument to procure abortion. With purity and holiness will I pass my life and practice my art. I will not cut a person who is suffering with stone, but will leave this to be done by those who are practitioners of such work. Into whatever houses I enter I will go for the advantage of the sick and will abstain from every voluntary act of mischief and corruption, and, further, from the seduction of females or males, bond or free. Whatever in connection with my professional practice, or not in connection with it, I may see or hear, I will not divulge, holding that all such things should be kept secret. While I continue to keep this oath inviolate, may it be granted to me to enjoy life and the practice of my art, respected always by all men; but should I break through and violate this oath, may the reverse be my lot." It is said that a similar oath was used in the Middle Ages, after the discontinuance of the use of the Hippocratic oath. Some medical colleges of to-day impose a simpler obligation in the form of an admonition and an affirmation, to which the graduating class assents.

HIPPOCRENE, hĭp'pō-krē'nē (Lat., from Gk. Ἱπποκρήνη, *Hippokrēnē*, horse spring, from ἵππος, *hippos*, horse + κρήνη, *krēnē*, spring). A fountain on Mount Helicon (q.v.), about 20 stadia above the Grove of the Muses, and, according to the mythical account, produced by a stroke from the hoof of the horse Pegasus (q.v.). It was sacred to the Muses. It is probably to be identified with the *Kryopēgadi* (cold spring), on the north side of the southeast (and highest) peak of Mount Helicon.

HIPPODAMIA, hĭp'pō-dā-mī'ā (Lat., from Gk. Ἱπποδάμεια). 1. Daughter of Œnomaus (q.v.), King of Pisa in Elis, and Sterope, one of the Pleiades. As an oracle had declared that Œnomaus should be killed by his son-in-law, the King required that each suitor should engage with him in a chariot race, from Pisa (Olympia) to the altar of Poseidon at Corinth. The suitor, with Hippodamia in his chariot, was allowed as a handicap so much time as Œnomaus needed for a sacrifice to Poseidon. As his horses were a gift of the god, the King always caught the luckless suitor, whom he slew in passing with his spear, until Pelops (q.v.) bribed Myrtilus, the King's charioteer, to weaken the linchpin, and Œnomaus was dragged to death by his own horses. After his victory Pelops threw Myrtilus into the sea and was cursed by the drowning man for his faithlessness. Hippodamia became the wife of Pelops and the mother of Atreus and Thyestes. She afterward induced them to murder their half brother, Chrysippus, and then

fled to Midea in Argolis, where she died. Her body was brought by Pelops to Olympia and interred in the sacred inclosure of the Altis, where she was worshiped in later times. The preparations for the chariot race formed the subject of the sculptures in the east pediment of the great temple at Olympia. (Consult Karl Baedeker, *Greece*, pp. 304–305, 4th Eng. ed., Leipzig, 1909.) Hippodamia appears not infrequently on vases. 2. The wife of Pirithous, at whose wedding occurred the conflict between the Centaurs and Lapithæ (q.v.).

HIPPODAMUS, hĭp-pŏd'ȧ-mŭs (Lat., from Gk. Ἱππόδαμος), OF MILETUS. A Greek architect of the fifth century B.C., famed as the first to lay out cities with broad, straight streets intersecting at right angles. At the invitation of Pericles he laid out the Piræus (q.v.). He went as architect with the colonists to Thurii (q.v.). In 408 B.C. he laid out the town of Rhodes. Consult F. J. Haverfield, *Ancient Town-Planning* (Oxford, 1913).

HIP'PO DI'ARRHY'TUS. See BIZERTA.

HIP'PODROME (Lat. *hippodromus*, from Gk. ἱππόδρομος, horse-race course, from ἵππος, *hippos*, horse + δρόμος, *dromos*, running, course, from δραμεῖν, *dramein*, to run). The Greek name for the place set apart for horse and chariot races. The dimensions seem to have varied at different places. Frequently the hippodrome was but a level space, fitted out at the actual time of the races with proper turning posts. The dimensions of the hippodrome at Olympia, which was larger and far more elaborate than the ordinary hippodrome, have recently come to light in a Greek manuscript found in the old Seraglio in Constantinople. The total circuit was 8 stadia (about 0.95 mile), but the length of the actual race course was only 6 stadia. The breadth was about 320 feet. It is also said that pairs of colts made three circuits, pairs of grown horses or four colts made eight rounds, and the four-horse chariots twelve. Riding races consisted of but one lap (6 stadia). From about 500 to 444 B.C. there was a mule chariot race at Olympia. As the figures given above make the four-horse chariot race cover about 8½ miles, some modern scholars believe that not the circuit, but merely the length of the hippodrome, is meant, and that therefore the length of the contests should be reduced one-half. A race of over 8 miles must have been a contest of endurance rather than of speed. At Olympia the starting was effected by means of the *aphesis*, a system of stalls arranged along the two sides of a triangle, the apex of which was to the right of the centre line, and apparently so arranged that the distances from the turning point to the angles at the base of the triangle were equal; a rope was stretched before each chariot. The start was effected by setting free the chariots on the extreme right and left, nearest the base of the triangle, and when they came abreast of the next two, by setting them free also, and so on till all were in motion. The total number of starters seems at times to have been very large, as Pindar speaks of 41 chariots as competing at the Pythian games, and Alcibiades alone sent seven chariots to Olympia; hence each side of the *aphesis* was 400 feet long. The *aphesis* does not seem to have been used elsewhere. The golden age of the hippodrome was during the Byzantine Empire. The blue and green factions in the hippodrome carried their animosity into all departments of the public service, and the Nika riots in Constantinople threatened to dethrone Justinian. The site of the great hippodrome at Constantinople is still called Atmeidan (the horse place) by the Turks, and the line of the central barrier is marked by the obelisk of Theodosius, the bronze serpents that supported the Platæan tripod, and the column erected by Constantine VII. Consult: G. H. A. Lehndorff, *Hippodromos* (Berlin, 1876); Ervinus Pollack, *Hippodromica* (Leipzig, 1890); William Smith, *A Dictionary of Greek and Roman Antiquities*, vol. i (3d ed., London, 1890); Wernicke and Schöne, in *Jahrbuch des archäologischen Instituts*, ix (Berlin, 1894) and xii (ib., 1897); the elaborate article by A. Martin, "Hippodromos," in Daremberg and Saglio, *Dictionnaire des antiquités* (Paris, 1897); E. N. Gardiner, *Greek Athletic Sports and Festivals* (London, 1910).

HIP'POGRIFF, or **HIP'POGRYPH** (from Fr. *hippogriffe*, Gk. ἵππος, *hippos*, horse + Lat. *gryphus*, griffin, from Gk. γρύψ, *gryps*, from γρυπός, *grypos*, hook-nosed). A fabulous animal, represented as a winged horse, with the head of a griffin, invented, probably in imitation of Pegasus, by the romancers of the Middle Ages for the purpose of transporting their heroes through the air.

HIPPOL'ITA. The Queen of the Amazons and the betrothed of Theseus, in Shakespeare's *Midsummer Night's Dream*.

HIPPOL'YTA. See AMAZONS; HERCULES.

HIPPOL'YTUS (Lat., from Gk. Ἱππόλυτος). In Greek legend, the son of Theseus (q.v.) and the Amazon Antiope, or Hippolyte, a mighty hunter and devoted servant of Artemis, but a despiser of Aphrodite, who wreaked a terrible vengeance on him. Brought up in Troezen, he was first seen by his stepmother Phædra when he was a young man. She fell in love with him and, when he repulsed her advances, committed suicide, leaving a letter to Theseus accusing Hippolytus of an attempt upon her virtue. (Cf. the similar stories told of BELLEROPHON and PELEUS.) Theseus cursed Hippolytus and drove him from home and besought his father, Poseidon, to avenge him. Poseidon sent a sea monster, who frightened the horses of Hippolytus, as he was driving along the shore near Troezen, so that they ran away and dragged him to his death. Hippolytus was worshiped at Troezen. One version of the Hippolytus story told how Artemis persuaded Asclepius to restore her favorite to life, and this led the Romans to identify him with the deity Virbius of Aricia. The story of Hippolytus is best known to us through the *Hippolytus* of Euripides (the extant *Hippolytus* is the later of two plays on the subject by Euripides), which has been imitated by Seneca in his *Hippolytus* and by Racine in his *Phèdre*. Consult: Euripides, *Hippolytos*, edited by Wilamowitz-Möllendorf (Berlin, 1891), and Harry (Boston, 1899); Kalkmann, *De Hippolytis Euripideis* (Bonn, 1882). On the numerous representations, especially on sarcophagi, consult: August Kalkmann, "Ueber Darstellungen der Hippolytos-Sage," in the *Archäologische Zeitung*, xli (Berlin, 1883); Karl Robert, *Antike Sarkophagreliefs*, ii (ib., 1902); J. E. Harry, Introduction to his edition, pp. xxxviii–xlv. For interpretation of the myth, consult Harry, pp. xxxiv–xxxvii.

HIPPOLYTUS. The name of several saints and martyrs of the early Church, of whom the most interesting flourished in the early part of the third century. Although a very prominent

man in his day, the known facts of his life are few. He was of Greek ancestry and possibly born in Rome, became a presbyter of Rome under Bishop Zephyrinus (199–217?), and attracted attention by his great learning. He headed a party in opposition to Zephyrinus and especially to his successor Calixtus, and was chosen by it their Bishop. But as his opposition was probably mostly personal and on questions of policy, when Urban I succeeded Calixtus, he was reconciled with the Roman church. However, in 235 he went into exile in Sardinia with Pontianus, Urban's successor, and died there. The bodies of both were brought back to Rome for burial. He is a saint in the Roman calendar, and his day is August 13. He was a voluminous author, but his works are now known only by fragments. Of these the most interesting is the so-called *Philosophoumena*, formerly attributed to Origen, but now thought to be the first book of a work by Hippolytus, *The Refutation of All the Heresies*. A manuscript giving books iv–x, previously unknown, was discovered at Mount Athos in 1842. In them Hippolytus gave details which threw new light upon his life. This manuscript was first printed in its entirety by Emmanuel Miller (Oxford, 1851), who, however, attributed it to Origen. Baron Bunsen was the first (1852) to assign it to Hippolytus. Hippolytus' works are given in Migne, *Patrol. Græca*, x, and much better by Bonwetsch and Archelis (Leipzig, 1897 et seq.); they are translated in *Ante-Nicene Fathers*, v. Consult: C. K. J. Bunsen, *Hippolytus and his Age* (London, 1852); Hans Achelis, "Hippolytstudien," in *Texte und Untersuchungen* (Leipzig, 1897); K. J. Neumann, *Hippolytus von Rom in seiner Stellung zu Staat und Welt* (ib., 1901); A. d'Ales, *La théologie de Saint Hippolyte* (Paris, 1906).

HIPPOLYTUS, Canons of. A book of ecclesiastical instructions, written in Greek, but now known in an Arabic version from a Coptic translation, which ascribes it to "Hippolytus, chief of the bishops of Rome." While this authorship is doubtful, the book probably belongs to the third century and may have taken its present form in Egypt. It is connected with a group of works whose nucleus is the *Egyptian Church Order*. This book exists in Coptic and Ethiopic and is expanded in the Syriac *Testament of the Lord* and in the *Apostolic Constitutions*, a compilation from about the end of the fourth century. The *Canons of Hippolytus* and the *Egyptian Church Order* are evidently related, but which is the basis of the other has been disputed. The growing opinion, however, is that the *Canons of Hippolytus* is the earlier collection. The importance of these works lies in their aid in reconstructing the life and order of the early Church. The *Canons* contain directions for the ordination of the orders of the clergy, for the admission of converts to the Church, for the Eucharist and its preceding fast, for the visitation of the sick, for worship in the church and in private, and for the life of the ordinary Christian and of the ascetic. They show the progress ritualism and asceticism had made in the Church, but also lay stress on moral life and personal religion. Consult: Achelis, in *Texte und Untersuchungen*, vol. vi (Leipzig, 1891); Funk, *Die apostolischen Constitutionen* (Rottenburg, 1891); Riedel, *Kirchenrechtsquelle des Patriarchats Alexandrien* (Leipzig, 1900); O'Leary, *The Apostolic Constitutions and Cognate Documents* (London, 1906).

HIPPOMANE, hĭp-pŏm′ȧ-nē. See Manchineel.

HIPPOM′EDON (Lat., from Gk. Ἱπποµέδων). In Greek mythology, the son of Aristomachus of Argos, and one of the seven leaders in the expedition against Thebes, in which he was killed by Ismarus. Consult Æschylus, *Seven against Thebes*, 475 ff. See Seven against Thebes.

HIPPOM′ENES (Lat., from Gk. Ἱπποµένης). The son of Magareus and descendant of Poseidon. He was the lover of the Bœotian damsel Atalanta. See Atalanta, 1.

HIPPO′NAX (Lat., from Gk. Ἱππῶναξ). A Greek poet of the sixth century B.C.; next to Archilochus and Simonides, the greatest iambic poet of Greece. Expelled from Ephesus about 542 B.C. by the tyrant Athenagoras, he took refuge in Clazomenæ. There his deformed figure and malicious disposition exposed him to the caricature of the Chian sculptors Bupalus (q.v.) and Athenis; but he avenged himself by issuing against them a series of such bitter satires that tradition says they hanged themselves. These are in thought and execution inferior to the similar works of his predecessor, Archilochus. His coarseness of thought and feeling, his rude vocabulary, his want of charm and taste, and his numerous allusions to matters of merely local interest make him a unique figure in Greek literature. He invented epic parody; the four opening lines of his parody on the *Iliad* have been preserved in *Athenæus* (p. 698 f.). He also invented the choliambic or Hipponactean measure, in which a trochee or spondee is substituted for the final iambus in an iambic trimeter. (See Versification, *Greek and Latin: Iambic Rhythms.*) The substitution of the trochee or spondee for the final iambus gives to the verse, at least at times, a limping or halting effect, which adds much to the force of verse scornful in itself. The fragments of the poems of Hipponax are edited by Bergk, *Poetæ Lyrici Græci*, vol. ii (Leipzig, 1914). Consult Christ-Schmid, *Geschichte der griesschen Litteratur* (2 vols., 5th ed., Munich, 1908–13).

HIPPOPH′AGY (from Gk. ἱποφάγος, *hippophagos*, horse eating, from ἵππος, *hippos*, horse + φαγεῖν, *phagein*, to eat). The eating of horseflesh. That semicivilized nations eat horseflesh is well known.

In 1855 and 1856 there was a good deal of discussion in Paris relative to the formal introduction of horseflesh into the meat markets, and some of the more enthusiastic advocates of the plan formed themselves into a society. French skill was exercised abundantly in disguising the somewhat coarse taste and odor of horseflesh.

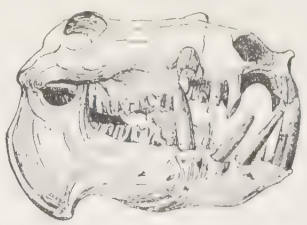
In 1866 there was official recognition of the introduction of this kind of food into the market under such restrictions as were deemed suitable. The prefect of the Seine issued an ordinance in June of that year, recognizing horseflesh as human food, establishing special slaughterhouses or abattoirs for slaying horses under specific regulations. The animals were to be killed by those specially appointed in presence of a veterinary inspector, who was also to stamp or seal every joint of meat after inspection. All restaurateurs who used horseflesh were to acquaint their customers with the fact. During the French International Exhibition of 1867 some of the humbler restaurants of Paris made great use of horseflesh; and during the siege of Paris, in 1870–71, horseflesh was extensively used as

food. At the present time the eating of horseflesh is not at all uncommon in European countries. It is very largely employed in the manufacture of sausages, and in Paris there are a considerable number of places where the meat of horses, mules, and donkeys is for sale. The objection to the use of good horseflesh for food is wholly sentimental, and its cheap price is of great advantage.

HIP'POPOT'AMUS (Lat., from Gk. *ἱπποπόταμος, hippopotamos,* river horse, from *ἵππος, hippos,* horse + *ποταμός, potamos,* river). A huge, thick-skinned, almost aquatic, kind of mammal of tropical Africa, two living genera and many fossil species of which constitute the family Hippopotamidæ. This family is closely allied to the swine, and it would be more nearly accurate to call them river hogs rather than river horses. They differ from the swine and peccaries, however, in having a broad rounded muzzle, with the nostril superior and no trace of a terminal disk (see SWINE); in having all the toes touch the ground and nearly equal in size; in the continual growth of the lower incisor teeth; and in other anatomical details. The family seems always to have been confined to the Old World; but remains of various species have been found in the Upper Tertiary rocks of Burma and Algeria, and others, nearer the modern type, in the Pliocene and later formations of India and of southern Europe. Within the historic period, at least, the hippopotami have been restricted to Africa —unless one may believe, from biblical references to the behemoth (q.v.), that it has inhabited Palestine since the origin of tradition— where it seems to have occupied all the larger lakes and rivers until locally exterminated by man. Anciently it possessed the whole Nile and was killed by the early Egyptians by means of harpoons; but for centuries none have been seen below the cataracts. When white settlements began at the Cape of Good Hope, "hippos" lived in the most southern of African rivers, but gradually disappeared, until now the upper Limpopo marks the southern boundary of their habitat. They are likely to die out of the East African rivers speedily, but the endless marshes of the upper Nile and its tributaries and the vast swamps and waterways of the Congo basin will preserve the animal indefinitely. These remarks refer to the familiar species (*Hippopotamus amphibius*), in addition to which a species, placed in a genus of its own (*Chœropsis*), small in size and more swinelike in appearance, is found in Liberia.

The Common Hippopotamus. This is, next to the elephant, the bulkiest of land mammals. Old males are from 12 to 14 or more feet long, stand nearly 4 feet high at the shoulder, and weigh about four tons. The body is elongated, barrel-shaped, and the belly nearly touches the ground, while the swollen, ugly head seems too heavy even for the massive neck, and the animals, when out of the water, usually rest the chin upon each other or some support. The body is carried upon short piglike legs, having four toes upon each foot, each covered with a round black hoof and resting flat upon the ground, but connected by webs. The skin is two inches thick in some places, is spongy, like that of a walrus, rough, warty and covered with a network of fine wrinkles, and it varies in color in the male from dark leather brown to bluish gray, more or less spotted. The females usually are of lighter tint, and both sexes are lighter on the belly. The skin is naked except for the bristles on the muzzle, and a few tufts of short hair upon the sides of the head and neck and on the ears and tail. It contains a great quantity of an oily substance which exudes from the pores; and under excitement this flows out copiously and is tinctured with blood, producing the "bloody sweat" for which this beast is famous. The tail is short and laterally compressed.

Habits and Food. The hippopotamus is most at home in the water, and aquatic vegetation is its natural fare. To this its organization has become particularly adapted. It swims well, makes long excursions, sometimes into open water, and even goes some distance out into the salt estuaries of rivers. It is able to dive quickly, but its ordinary method of submergence is quietly to sink to the bottom, where it is said that it may walk about, browsing, for several minutes. To this end not only its nostrils but its small ears are closed by sphincter muscles, keeping out the water; and its infolded lips prevent an inrush of water in feeding. The nostrils and eyes are so high that it need only expose an unnoticeable fraction of the face in order to breathe and look about, while its entire body is safely hidden beneath the surface. The peculiar dentition and digestive organs have reference to this manner of life and to a diet of coarse herbage. The enormous mouth, which may open to the extent of 4 feet, is furnished with numerous ivory-capped grinders, and with powerful rooting and biting teeth in front. The larger teeth are the tusks or canines, which are



SKULL AND TEETH OF HIPPOPOTAMUS.

curved backward and have their ends obliquely leveled off by mutual attrition. These tusks and the incisor teeth continue to grow during the life of the animal, and their points turn downward. In this respect these teeth differ from the pig's, which form roots.

The hippopotamus cuts grass or corn as if it were done with a scythe, or bites with its strong teeth a stem of considerable thickness neatly through; it also tears up the marsh growth by means of its great tusks. Its food consists chiefly of the plants which grow in shallow waters and about the margins of lakes and rivers; and probably it renders no unimportant service in preventing slow streams from being choked up by the luxuriance of tropical vegetation. It often, however, leaves the water, chiefly by night, to feed on the banks and makes inroads on cultivated fields, devouring and trampling the crops. As considerable quantities of such fare must be consumed in order to obtain sufficient nutrition, the hippopotamus possesses an enormous stomach, the axial length of which is 11 feet, while the greater curvature measures 15 feet. It fills nearly the entire length of the body and is divided into three distinct compartments, of which the third is cylindrical, with the pylorus almost in the pelvis. It is mainly

in this third compartment that assimilation occurs.

These beasts are gregarious; herds of 12 or 20 gather where food is plentiful, and they seem to remain in one locality all their lives unless much disturbed. During the day they lie hidden, usually asleep, on some marshy islet and betray their presence, if at all, by their snorting, coughing, or grunting, which in anger becomes a hoarse roar. It is at night that they are most active, feed most, and leave the water to graze on shore or invade neighboring fields of millet and the like. Their excursions sometimes extend 7 or 8 miles in a night, and regular paths are trodden through the waterside jungle, in which the negroes dig pits or arrange deadfalls for the capture of the animal. Usually only one offspring is born annually, after a gestation of seven and a half months. The mother takes it into the water immediately, but, as it is unable to swim, supports it upon her neck until it learns how to take care of itself; she also protects it most assiduously, not only from crocodiles and other enemies, but from the rage of the males, who will kill infants unless prevented. The young nurse under water and continue to grow for five years, after which they may live 25 or more years.

Though the brain of this animal is very small and its life a dull one, it is by no means stupid. It quickly learns, when much hunted, not to expose itself nor to indulge in a whalelike snort when it rises to breathe. Its scent apparently is very keen and its vigilance great. Captives learn the names and faces, voices and customs, of their keepers and exhibit much general intelligence. They are naturally very timid, yet curious, and subject to fits of panic or rage. Hence small boats are always endangered by going near them, and even large steamboats have been attacked. A wounded or enraged hippopotamus is regarded by sportsmen as perhaps the most dangerous beast to be encountered. Pure malice seems frequently to dictate their actions. The natives more often get them by strategy than by bold attack. The negroes eat the flesh and fat and make some use of the hide. By white men the animals are shot mainly for sport and near the coast for the sake of the hide, out of which coverings for handles (shrunk on), bull whips, and polishing wheels are made; also for the ivory of the great canine teeth, which sometimes exceed 30 inches in length; but this ivory is not so much valued now as it was early in the nineteenth century, when it was in demand for the making of artificial teeth.

The Pygmy or Liberian Hippopotamus. Concerning this small species not much is known. It appears to be restricted to the Guinea coast and to be much less aquatic than its large relative. It wanders and seeks its food in swampy woods, after the manner of a pig, but never gathers in herds. It is about 6 feet long, 2½ feet tall, and weighs from 400 to 600 pounds. In color it is bluish black along the back, paling gradually to greenish white on the ventral parts. The fact that it sometimes has only one pair of incisor teeth, instead of two, in the lower jaw, has led to its being placed in a separate genus (*Chœropsis*).

In 1912 three of these exceedingly rare animals were received alive at the New York Zoölogical Park, where in 1914 they were living in good health. For a full account of these, consult Hornaday and Schomburgk, *Zoölogical Society Bulletin* (New York, 1912), also G. Rensham, *Natural History Essays* (London, 1904).

Fossils. Remains of the hippopotamus have been found in the Pliocene and Pleistocene deposits of India, Burma, Algeria, and Europe. Hippopotami roamed in herds over England not very long before the period of the earliest human occupation, and the remains of individuals of all sizes have been found in the gravels near Cambridge. Remains of dwarf species, associated with those of dwarf elephants, are found in the cave and fissure deposits of the islands of Sicily and Malta. No remains of fossil hippopotami have yet been found in America.

Bibliography. Consult general works, especially Wright, *Standard Natural History*, vol. v (Boston, 1885); Oakley and Boyd-Dawkins in *Cassell's Natural History*, vol. ii (New York, 1884); also writings of African explorers and sportsmen, especially Livingstone, Gordon-Cumming, and Speke; also Georg Schweinfurth, *Heart of Africa* (London, 1873); Emil Holub, *Seven Years in South Africa* (ib., 1881); S. W. Baker, *Wild Beasts and their Ways* (ib., 1890); Richard Lydekker, *Game Animals of Africa* (ib., 1908); Roosevelt and Heller, *Life-Histories of African Game Animals* (New York, 1914).

See Plate of TAPIRS AND HIPPOPOTAMUS; and Colored Plate of PACHYDERMS.

HIP'PO RE'GIUS. See HIPPO.

HIPPOTH'OÖN (Lat., from Gk. Ἱπποθόων). The hero of the Attic tribe Hippothoöntis. He was the son of Poseidon and Alope, the daughter of Cercyon of Eleusis, and was exposed as a newborn infant, but was suckled by a mare and brought up by shepherds. When Theseus overcame and killed Cercyon, he transferred the government to Hippothoön.

HIPPU'RIC ACID (from Gk. ἵππος, *hippos*, horse + οὖρον, *ouron*, urine), $CH_2NH(C_6H_5CO)$-$COOH$. A compound of great interest, both to the chemist and to the physiologist. It derives its name from its having been first discovered in the urine of the horse, and that fluid, or the renal secretion of the cow, affords us the best and readiest means of obtaining it. The fresh urine is boiled with a slight excess of milk of lime and filtered; the filtrate is evaporated to a small volume, cooled, and acidified with hydrochloric acid, when hippuric acid separates out in the form of fine needle-like crystals. It may be purified by dissolving it in hot water, passing a stream of chlorine gas into the solution, and filtering hot. When obtained by a process of slow crystallization, the crystals of hippuric acid are moderately large, at first colorless, but subsequently becoming milk-white four-sided prisms, which are devoid of odor, but have a faintly bitter taste. They dissolve readily in boiling water and in spirit, but are only sparingly soluble in cold water and in ether. The melting point of the pure acid is 187.5° C. (369.5° F.). Its chemical name is benzoyl-aminoacetic acid, and it may be prepared artificially from benzoic acid, C_6H_5COOH, and glycine, CH_2NH_2COOH. When boiled with strong mineral acids, hippuric acid takes up water and splits up again into its chemical components, benzoic acid and glycine. It is a normal constituent of the urine of the horse, cow, sheep, goat, hare, elephant, etc., and most probably is to be found in the urine of all vegetable feeders. In normal human urine, if the food is an ordinary mixed diet it occurs in very small quantity, but is increased by an exclusively vegetable

diet and in the well-known disease diabetes. Although hippuric acid usually occurs in mere traces in human urine, we can artificially produce it at will in the body and cause it to be eliminated in comparatively large quantity. If we swallow benzoic acid, it seems to take up the elements of glycine in its passage through the system and thus to form hippuric acid, which appears abundantly in the urine. Hippuric acid is formed in the animal body not only from benzoic acid itself but from any substance that may be readily transformed into benzoic acid. Some such substances are contained in grass, hay, and in many berries, and are also found among the products of the putrefaction of proteids, especially those of vegetable origin. In carnivora the formation of hippuric acid has been shown to take place chiefly in the kidneys; in the herbivora, however, benzoic acid is largely transformed into hippuric acid even if the kidneys have been removed. In birds the ingestion of benzoic acid causes the formation, not of hippuric, but of œnanthylic acid. The hippuric acid which occurs in the animal organism exists in combination with bases, chiefly as hippurate of sodium and hippurate of calcium. The last-named salt can be obtained by the mere evaporation of the urine of the horse. As shown by Dehn in 1908, the presence of hippuric acid in urine may be demonstrated by adding enough of a solution of sodium hypobromite to color the urine yellow; if hippuric acid is present, a characteristic brownish-red precipitate is formed.

HIP'PURIT'IDÆ (Neo-Lat. nom. pl., from Gk. *ἵππουρις, hippouris*, horse-tailed, from *ἵππος, hippos*, horse + *οὐρά, oura*, tail). A family of pelecypods, representing the most extreme development of the highly aberrant branch of the Rudistæ. In this family, which is typically represented by the genus *Hippurites*, the lower valve has become a cylindroconic body, attached by the apex, of columnar appearance, through deep sutures representing the anal, branchial, and ligamentary inflections. The other valve is developed into a flat cover, bearing three long toothlike processes, which fit so closely into corresponding sockets of the lower shell that they are difficult to prepare. The living chamber of the animal is extremely small, since the lower valve is filled with a porcelaneous white inner layer that forms septa and interseptal spaces, as in a cephalopod. The shells of *Hippurites* reach a meter or more in length, and like the other Rudistæ they occur in vast numbers in the Middle and Upper Cretaceous beds of the Mediterranean countries and of western Asia and became extinct at the end of Cretaceous time. An American form is *Hippurites barretia*, which is found in the Cretaceous of Jamaica and Guatemala. See RUDISTÆ; PELECYPODA.

HIPURINA, ē-pōō'rē-nȧ'. A tribe of the middle Purus of western Brazil, one of the most warlike on the river, and estimated at perhaps 2500 souls. They live in long, low houses, built of converging poles, and use poisoned arrows with heads notched so as to break off in the wound. They wear only the breechcloth, but are clean and self-respecting.

HIRADO, hē-rä'dō (in old books FIRANDO). An island in the northwest of the entrance to the Bay of Omura, off the coast of Hizen, Japan, with a capital of the same name containing 10,600 inhabitants. It was made famous in the sixteenth century as the place of welcome to the Portuguese (the first foreigners to visit Japan), and later, in 1600, to the Dutch, and in 1609 to the English. From 1609 to 1611 the English, and from 1609 to 1640 the Dutch, had a trading station here, the latter in 1640 being transferred to the little artificial island of Deshima (q.v.) at Nagasaki. Consult *The Diary of Richard Cocks* (Hakluyt Society, London, 1883).

HI'RAM, or **HURAM** (perhaps an abbreviation of *Ahiram*, brother of the High One, or, Ahi is exalted). 1. King of Tyre. He is represented as David's friend and ally and assisted him in the building of his palace by contributions of timber and labor (2 Sam. v. 11; 1 Chron. xiv. 1). Upon Solomon's accession Hiram sent cedar and other timber and skilled workmen for the building of the temple, in return for which Solomon paid a yearly tribute (1 Kings v. 1–12). The two kings remained constant friends, and Hiram supplied Solomon with a navy (1 Kings ix. 26–28, x. 22). Hiram waged a successful war against Cyprus and fortified the island of Tyre. The question has been raised whether the same King of Tyre could have been the contemporary of both David and Solomon, both of whom had long reigns. If we assume, however, that David undertook his building operations during the latter part of his reign, there is no reasonable ground for doubt; though it is, of course, possible that for David's reign we should substitute the name of Abibaal, the father of Hiram. 2. According to 1 Kings vii. 13 et seq., a Tyrian artificer who was sent by Hiram, the King of Tyre, to assist in the building of Solomon's temple.

HIRAM COLLEGE. A coeducational institution of higher education at Hiram, Ohio, founded in 1850 as the Western Reserve Eclectic Institute, of which James A. Garfield was a student, teacher, and principal. It became a college in 1867 and had, in 1914, 242 students, of whom 233 were enrolled in the college proper, the preparatory school having been discontinued in 1911. The library contains about 13,000 volumes. The equipment includes women's dormitories, observatory and telescope, museum, gymnasium, athletic field, and laboratories. Besides dwellings, the college owns six buildings wholly devoted to college purposes. The endowment fund is about $300,000. The president in 1914 was Miner Lee Bates, A.M., Ph.D.

HIRE, E. and L. DE LA. See LA HIRE.

HIRE-PURCHASE AGREEMENT. A contract which combines the elements of hiring and of sale of a chattel. Its usual form is the hiring of a chattel to a would-be purchaser, the purchase price to be paid in fixed installments, the chattel continuing to be the property of the vendor until the last installment is paid. The real object of the transaction being the sale of the property, it is more frankly described by the title which it usually bears in the United States, of an installment sale; but the hiring provision, which preserves the title in the vendor, while at the same time giving the purchaser the possession and use of the property, is legally binding and is sustained by the courts. This feature of the agreement takes it out of the category of contracts of sale and exempts it from the operation of the Bills of Sale acts in England and the United States which require registration of such contracts. The form of a hire-purchase agreement is sometimes employed as a cover for a contract of sale or a loan on the security of chattels, and the court will look into the real nature of the transaction to de-

termine whether it is what it purports to be, viz., a real contract of hiring with an option of purchase, or a sale, mortgage, or pledge. Under the terms of the agreement the lender or vendor is generally permitted to retake the chattel on default of payment of an installment when it falls due, the payments previously made being retained by the lessor as compensation for the hire of the property. The hardships which often result from such default have led to attempts to avoid the forfeiture or to secure for the defaulting hirer a further period of redemption, but these efforts have met with no success. Where the agreement is found to be in reality a hire and purchase agreement and not a mortgage or pledge, it is invariably enforced in accordance with its terms. More difficult questions present themselves where the hire-purchase agreement contemplates the annexation of the chattels to the freehold of the hirer or purchaser, as where machinery is sold to a manufacturer, or plumbing to a builder for installation in a building under an agreement that the articles are to remain the property of the vendor until paid for. Such a transaction is more in the nature of a sale and purchase-money mortgage than of a hiring agreement, but it is nevertheless sustained by the courts in accordance with its terms. See BAILMENT; HIRING; SALE.

HIRING. A transaction whereby the owner of a chattel transfers its possession to another under an agreement by the latter, known as the hirer, to pay a specified sum for the use of the same, the goods to be returned to the owner or lender at a specified time or on demand. Hiring a chattel is a recognized form of bailment, vesting in the bailee, the hirer, the complete right of possession during the period of the bailment and imposing on him certain definite obligations as to the use of the property bailed and the degree of care to be exercised by him while it is under his control. His possession is exclusive during such period and may not be interfered with, either by the bailor or by any one else, without subjecting the wrongdoer, even if the owner, to an action of trespass or of trover at the instance of the bailee. In the meantime the owner, having parted with the possession and the right to the possession of the chattel, is deprived of the right to maintain any possessory action (replevin, trespass, or trover) against a third person who may interfere with, injure, or destroy the property, though he may, if the act of such wrongdoer results in permanent injury to the chattel, sue him in an action on the case for the injury to his so-called reversionary interest. As against the bailee, the owner can never maintain trespass, though for a wanton destruction, sale, or other act of conversion committed by the latter, which has the effect of terminating the bailment and thus of reviving the owner's right of possession, he may have an action of trover. Indeed, any unwarranted use or abuse of the property by the bailee gives the owner the immediate right to demand its return and, if the demand be refused, to vindicate his right by an action of trover.

The bailee is bound to exercise ordinary care, such as a prudent man exercises in the case of his own property, and at the end of the bailment to restore the property to the owner without unnecessary delay. He is not liable for ordinary wear and tear, nor for injury or destruction caused by inevitable accident or resulting from the wrongful acts of others which could not in the exercise of ordinary care have been prevented by him. If the article when returned is not in good condition, the law places in the bailee the duty of showing that its impairment of value was not due to his fault under the rule of liability above laid down. See BAILMENT; TRESPASS; TROVER.

HIRLAS (hêr'lâs) **HORN,** THE. A long, blue, silver-rimmed drinking horn, mentioned in a Welsh poem of the same name, written by Owain, Prince of Powys, in the twelfth century.

HIRN, ên, GUSTAVE ADOLPHE (1815–90). A French physicist, born at Logelbach, near Colmar. When he was 19, he entered his grandfather's cotton factory as dye chemist; afterward he acted as engineer (1842) and began his valuable researches on mechanics and especially on heat. He was made a member of the French Academy of Science in 1867, in 1880 founded a meteorological observatory near Colmar, and later devoted himself to astronomy. Hirn was educated in the shop, and his works are marked by much practical criticism of mere academic theory. They include: *Théorie mécanique de la chaleur* (3d ed., 1875–76); *Analyse de l'univers* (1869); *Mémoire sur les anneaux de Saturne* (1872); *Les pandynamomètres* (1876); *Etude sur une classe particulière de tourbillons* (1878); *Recherches expérimentales sur les relations entre la résistance de l'air et sa température* (1882); *La vie future et la science moderne* (1882); *Constitution de l'espace céleste* (1889).

HIRN, YEJÖ (1870–). A Finnish educator and writer on æsthetics. He was born in Villmanstrand and was educated at the University of Helsingfors, where he became professor of æsthetics and of modern literature in 1898. His works, of great importance for æsthetic theory and for their presentation of primitive art, include: *Forstudier till en Konstfilosofi* (1896); *Pueblo Folkens Konstlif* (1901); *The Origins of Art* (1900; in Swedish, 1902; in German, 1904); *Det heliga Skrinet* (1909; in English, *The Sacred Shrine*, 1912), a study of the art and poetry of the Catholic church; *Det estetiska Lifvet* (1913).

HIROSAKI, hē'rō-sä'kē. A town of Japan, situated in the northern part of Hondo, 22 miles by rail from Asmori (Map: Japan, G 3). It contains ruins of an old castle and a museum. The chief product is lacquered ware. Pop., 1898, 34,771; 1908, 37,487.

HIROSHIGE, hē'rō-shē'gĕ, ANDO (1797–1858). A Japanese landscape painter for color printing from wood blocks, of the *Ukiyoé* (Popular) school. He was born of a Samurai family in Yeddo (Tokyo), and when only 10 years old painted the procession of the embassy from the Riu-Kiu (Loo-choo) islands in such a lifelike manner and with such good colors as to attract attention. At 15 he sought instruction from Toyokuni, who had so many pupils that he refused him. But Toyohiro received him, and in recognition of this the pupil assumed the name of Hiroshige in place of his original name of Tokutaro. On his teacher's death, in 1828, he opened his own studio, but, on account of the popularity of Toyokuni's prints of actors and figure groups, had a hard struggle. His first great success was with pictures of the Tokaido, the wonderful highway between Yeddo and Kyoto. These and other landscapes by him were so much admired that soon many other artists forsook the figure school and imitated him. What brings Hiroshige close to us of the Occi-

dent is that his method of representation shows European influence, though his work remains always completely Japanese. He observes the rules of perspective to a certain extent, aspires to correct composition, with proper adjustment of foreground and background; and his designs have both inner unity and outer finality, as contrasted with those of the Chinese, which seem to float in the air. While his technique is of architectural precision, he always sees nature with his own eyes and renders with his brush the *mood* of a landscape seen in a certain light and from a certain point of view. In the Metropolitan Museum, New York, are important prints by Hiroshige from the Francis Lathrop and other collections. One of his pupils took the name of Hiroshige II, another, that of Hiroshige III. Consult: E. F. Fenollosa, *The Masters of Ukioye* (New York, 1896); Woldemar von Seidlitz, *History of Japanese Colour-Prints* (ib., 1910); Amsden-Happer, *The Heritage of Hiroshige* (San Francisco, 1912).

HIROSHIMA, hē'rō'shē-mȧ. The capital of the Japanese Province of Aki and of the Prefecture of Hiroshima, situated at the southwest end of Hondo, about 3 miles inland (Map: Japan, C 6). It lies in a beautiful region at the foot of a hill and contains a number of fine temples, a park, and tea houses. Opposite the city is situated the sacred island of Miyajima, or Itsukushima, with its celebrated Shinto temple. Commercially Hiroshima is considered the most important place west of Kobe and forms the centre of the trade in lacquered ware, bronze, and other objects of art. Pop., 1898, 122,306; 1908, 142,763.

HIRPINI, hēr-pī'nī (from Sabine *hirpus*, wolf). A people of ancient Italy, who inhabited the southern portion of Samnium. They have been considered by some authorities as merely a Samnite tribe. (See ITALIC LANGUAGES, *The Italic Dialects in Detail;* SAMNITES.) By others they are looked upon as an independent nation. The country they inhabited was the wild and mountainous district traversed by the Sabatus, the Calor, and the Tamarus, tributaries of the Vulturnus, and, on the east side of the Apennine ridge, by the upper course of the Aufidus. In the early history of Rome the Hirpini are found identifying themselves with their Samnite neighbors against the Romans. They seem to have been subdued in the early part of the third century B.C., as in 268 B.C. Beneventum (see BENEVENTO), the key of all their military positions, was colonized by Romans. In the Second Punic War, revolting from their conquerors, they joined the Carthaginian invaders, and, though they were unable to recapture their stronghold of Beneventum, they remained faithful to Hannibal till the defeat of Hasdrubal at the Metaurus restored the Empire of Italy to the Romans. In this year (207 B.C.) the Hirpini made peace with the Romans by betraying into their hands the garrisons of the Carthaginians. From this time till the outbreak of the Social War (q.v.), the Hirpini seem to have continued steadfast in their allegiance to Rome. On that occasion, however, they set the example of revolt and might have become formidable enemies had not the rapid successes of Sulla induced them to repair their error by a complete submission. At the close of this war the Hirpini obtained the franchise and do not again appear in history as an independent people. Consult R. S. Conway, *Italic Dialects* (Cambridge, 1897).

HIRSCH, hĕrsh, AUGUST (1817–94). A German physician, born at Danzig, where he practiced after studying at Berlin and Leipzig. In recognition of his studies on malarial fever and his work, *Handbuch der historisch-geographischen Pathologie* (2d ed., 1881–86), he was in 1863 made professor of the history of medicine at Berlin. In 1873 he was a member of the German Cholera Commission, studied the conditions of Posen and West Prussia, and published a valuable report (1874). He studied the plague in Astrakhan in 1879 and 1880 and in the latter year wrote a report to his government. His more important writings are: *Die Meningitis Cerebro-spinalis Epidemica* (1866); *Geschichte der Augenheilkunde* (1877); *Geschichte der medizinischen Wissenschaften in Deutschland* (1893); a revision of Hecker's collected writings, under the title *Die grossen Volkskrankheiten des Mittelalters* (1865). He edited *Biographisches Lexikon der hervorragenden Aerzte aller Zeiten und Völker* (1884–88) and, with Virchow, the *Jahresbericht über die Fortschritte und Leistungen der Medizin* (1866 et seq.).

HIRSCH, CARL (1858–). A German composer, born at Wemding, Bavaria. He began life as a school-teacher, but soon abandoned that career for music. He was church music director at Munich (1885–87); music director at Mannheim (1887–92), at Cologne (1892–93), at Elberfeld (1893–); and director of the Gesangschule, the Liedertafel, the Philharmonic concerts at Elberfeld. But it is as a composer that Hirsch is best known, his *a-cappella* male choruses, which are very numerous, and his cantatas being widely known and used. Of the latter *Die Krone im Rhein* and *Landsknechtsleben* are representative. His songs and ballads are scarcely inferior to his male choruses.

HIRSCH, EMIL GUSTAV (1852–). An American rabbi, born in Luxemburg, the son of a prominent Jewish theologian who in 1866 became minister of the Reformed Congregation in Philadelphia. He graduated at the University of Pennsylvania in 1872 and studied at Berlin in 1872–76. He was rabbi in Baltimore (1877) and in Louisville, Ky. (1878–80), but did his greatest work in Chicago, whither he went in 1880 as minister of the Sinai Congregation. He took some part in politics as a member of the Republican party, was president of the Chicago Public Library Board (1888–97), in 1892 became professor of rabbinical literature and philosophy in the University of Chicago, and in 1902 was Trumbull lecturer at Johns Hopkins. From 1880 to 1887 he edited the Milwaukee *Zeitgeist* and in 1894 undertook the editorial charge of the *Reform Advocate*. As a lecturer and writer, he is closely connected with advanced Judaism and with philanthropy. He translated and edited Dr. Einhorn's *Ritual for Jewish Reform Congregations*.

HIRSCH, JENNY (1829–1902). A German reformer and author, born at Zerbst, where she was a tutor for several years. She went to Berlin in 1860, wrote for the *Bazar*, under the pseudonym J. N. Heynrichs, until 1864, and about that time became interested in woman's rights and female education. A member of the Women's Congress of 1865 at Leipzig and for many years a leader in the Lette-Verein, she edited *Der Frauenanwalt* (1870–82) and, with Lina Morgenstern, *Deutsche Hausfrauenzeitung* (1887–92); with Mary Wall she wrote *Haus*

und Gesellschaft in England (1878); in 1881 published *Fürstin Frau Mutter*, and after it many other tales, artistically unimportant. Among them are the following titles: *Die Erben* (1889); *Der Amerikaner* (1894); *Vermisst* (1894); *Löwenfelde* (1896); *Der Amtmann von Rapshagen* (1890); *Schuldig* (1899); *Camilla Feinberg* (1901). Under the title *Hörigkeit der Frau* (3d ed., 1891), she translated into German Mill's *Subjection of Woman* and wrote a *Geschichte der 25 jährigen Wirksamkeit des Lette-Vereins* (1892).

HIRSCH, Joseph (1836–1901). A French engineer, of Jewish family, born at Lyons. Educated there, at the Ecole Polytechnique and the Ecole des Ponts et Chaussées, he worked on the canal at Sarrebourg (1866) and there invented the Mittersheim siphon for the automatic control of reservoirs. From 1876 to 1898 he was professor of steam machinery at the Ecole des Ponts et Chaussées, and from 1886 until his death at the Conservatoire des Arts et Métiers. He contributed to the *Annales* of the former school; as member of the juries of award at the expositions of 1878 and 1889 and as president of the jury of 1900, he wrote valuable reports and lectured on the machinery exhibited at these expositions; and was the author of many treatises on machinery, including *Théorie des machines aéro-thermiques* (1874–75). His contributions to Lechalas's *Encyclopédie* should also be mentioned, as well as his *Traductions de notes sur l'Amérique* (1875).

HIRSCH, Maurice, Baron de (Maurice de Hirsch de Gereuth) (1831–96). An Austrian Jewish financier and philanthropist. He inherited his father's wealth in 1869 and greatly increased his fortunes by his marriage to the daughter of the senior partner of the banking firm of Bischoffsheim and Goldsmid, Brussels, with whom he had become associated. He also made large sums by building railways in Rumania and Turkey, from which countries he obtained vast concessions, whose money value he doubled by fortunate speculations. His fortune was estimated at $200,000,000, and his income at from $15,000,000 to $20,000,000 a year. He gave to charity about $100,000,000 during his life, and the Baroness de Hirsch on her death, in 1899, bequeathed about $15,000,000 to charities. These benefactions were chiefly for the alleviation of the condition of the Jews. He gave not less than $50,000,000 to the Jewish Colonization Association, by which colonies were established in the Argentine Republic. He endowed the Galician schools with $5,000,000 and in 1888 offered $10,000,000 to the Russian government for schools, provided no distinctions of race or religion should be made in its distribution. His offer was declined. He gave $2,500,000 to establish a fund in New York for educating and Americanizing Russian and Rumanian Jews. The sum of $1,200,000 was added to this fund by the Baroness, who died in Paris, April 1, 1899.

HIRSCH, Max (1832–1905). A German political economist and politician, born at Halberstadt in Prussian Saxony. He studied political economy and jurisprudence at the universities of Tübingen, Heidelberg, and Berlin, and then traveled through France and north Africa. As the result of his observations during these travels, he published *Skizze der volkswirtschaftlichen Zustände in Algerien* (1857) and *Reise in das Innere von Algerien, durch die Kabylie und Sahara* (1862). In 1859 he established a publishing house in Berlin, but soon gave it up for political and club life. After a journey through England and Scotland (1867–68), he returned home to organize trades-unions among his countrymen. These soon spread all over Germany, and through them and their organ, *Der Gewerkverein*, he wielded great influence. He was several times a member of the Reichstag and was the leading spirit in a number of societies for the benefit of the laboring classes. His publications include *Was bezwecken die Gewerkvereine?* (15th ed., 1891) and *Das Invaliditäts- und Altersversicherungsgesetz* (3d ed., 1890).

HIRSCHBERG, hĕrsh'bĕrk. A manufacturing town in the Prussian Province of Silesia, situated at the foot of a mountain, 30 miles southwest of Liegnitz (Map: Germany, F 3). The town is ancient and still girt about by a double line of walls. Its large Protestant church, a Gothic edifice, is known for its excellent organ. Hirschberg has manufactures of linen, lace, yarn, cotton goods, Venetian blinds, strawboard, cement, porcelain, machinery, paper, metal, and tobacco. Much wine is made, and there is trade in grain, wine, cement, linen, and butter. The town was founded at the beginning of the eleventh century. Pop., 1900, 17,865; 1910, 20,564, mostly Protestants.

HIRSCHBERG, Julius (1843–). A German ophthalmologist. He was born in Potsdam and was educated at the University of Berlin, where he graduated as M.D. in 1886, became assistant to Von Graefe, lecturer (1869), and professor (1879). His works cover nearly every branch of ophthalmology, but are particularly valuable for the history of this branch of medicine. They include: *Markschwamm der Netzhaut* (1869); *Beiträge zur praktischen Augenheilkunde* (1876–78); *Der Elektromagnetismus in der Augenheilkunde* (2d ed., 1899); *Wörterbuch der Augenheilkunde* (1887); *Einführung in der Augenheilkunde* (1892–1901), a history of ophthalmology—in antiquity (1899), among the Arabs (1905), in the Middle Ages (1906), from the Renaissance to the eighteenth century (1908), in the eighteenth century (1909–11), in Germany in 1800–50 (1912), in France (1912); *Behandlung der Kurksichtigkeit* (1910, and in English). He also wrote sketches of travel—*Tunis* (1885), *Von New-York nach San Franzisco* (1888), *Aegypten* (1890), *Um die Erde* (1894), *Hellas-Fahrten* (1910).

HIRSCHFELD, Georg (1873–). A German novelist and dramatist. He was born in Berlin, left a Berlin Gymnasium at the age of 17 to go into business, but in 1893, under the patronage of Hauptmann and Wildenbruch, began his literary career and studied at the universities of Munich and Berlin. In Berlin he was as Hauptmann's pupil a member of the group that figured in the Freie Bühne movement, and his first novel, *Dämon Kleist* (1895), and his one-act play, *Zu Hause* (1896), were first printed in the *Freie Bühne*, an organ of the movement, and his most successful play, *Die Mütter* (1896), had a long run in 1895 at the Free Theatre of Berlin. At the Vienna Burg-Theater in 1898 appeared his *Agnes Jordan*, a play in five acts, which, with a fine disregard for unities, presents in each act a different period in a woman's life, and which more than most of his other work shows the influence of Ibsen. At Munich, where Hirschfeld definitely

settled in 1912, he was a member of the circle of Halbe and the Intimes-Theater. His works, besides those already mentioned, include the novels and romances *Die Bergsee* (1896), *Freundschaft* (1902), *Das grüne Band* (1905), *Das Mädchen von Lille* (1906), *Der Wirt von Veladuz* (1907), *Hans aus einer anderen Welt* (1909), *Die Nixe vom Güldensee* (1910), *Angst und Emma* (1911), *Der Kamf der weissen und der roten Rose* (1912), *Onkel und Tante Vantee* (1913), and *Pension Zweifel* (1913); and the plays *Pauline*, a "Berlin comedy" (1899), *Der junge Goldner* (1901), *Der Weg zum Licht* (1902), *Nebeneinander* (1904), and *Ueberwinder* (1913).

HIRSCHFELD, hĕrsh'fĕlt, GUSTAV (1847–95). A German archæologist, born at Pyritz in Pomerania. He was educated at Tübingen, Leipzig, and Berlin, and was sent by the Prussian Archæological Institute in 1870 to Greece, Italy, and Asia Minor. From 1875 to 1877 he had charge of the excavations at Olympia (q.v.) and in 1882 traveled again in Asia Minor. He was appointed professor of archæology at Königsberg in 1878. Besides many articles in the archæological journals, he wrote: *Tituli Statuariorum Sculptorumque Græcorum* (1871); *Athena und Marsyas* (1872); *Paphlagonische Felsengräber* (1885); *Berichte über alte Geographie* (1885); *Die Felsenreliefs in Kleinasien und das Volk der Hittiter* (1887); *Griechische Inschriften des Britischen Museums* (1893). He contributed also to the first two volumes of *Ausgrabungen zu Olympia* (1877–78). His *Aus dem Orient* was posthumously published (1897).

HIRSCHFELD, OTTO (1843–). An eminent German classical scholar and historian, born at Königsberg. After having taught at Göttingen, Prague, and Vienna, he was in 1885 appointed to the chair of ancient history in the University of Berlin. Of his historical writings the most important is his *Untersuchungen auf dem Gebiete der römischen Verwaltungsgeschichte* (1876; 2d ed., 1905). He rendered especial service to classical learning as editor of Latin inscriptions: *Inscriptiones Galliæ Narbonensis Latinæ* (1888); supplement to the *Corpus Inscriptionum Latinarum*, vol. iii (1893); *Inscriptiones Aquitaniæ et Lugdunensis* (1899); *Inscriptiones Belgicæ* (1904). In 1913 he collected his minor papers under the title *Kleine Schriften*. Consult the *Berliner philologische Wochenschrift*, vol. xxxiv, pp. 812–816 (1914).

HIRST, FRANCIS W(RIGLEY) (1873–). An English economist. He was educated at Clifton College and at Wadham College, Oxford, studied law, and in 1907 became editor of the *Economist*. He was prominent, especially in 1913, in the English movement for an international agreement for disarmament. He wrote: *Essays in Liberalism* (1897), with others; *Liberalism and the Empire* (1900), with others; the very valuable *Local Government in England* (1903), with Redlich; *Adam Smith* (1904); *Monopolies, Trusts, and Kartells* (1905); *The Arbiter in Council* (1906); *The Stock Exchange* (1911); *The Six Panics and Other Essays* (1913).

HIRT, hĕrt, HERMANN (1865–). A German philologist. He was born at Magdeburg, wrote on German metres (*Untersuchungen zur westgermanischen Verskunst*, 1889), edited Schopenhauer's *Parerga* (1890), and then, devoting himself to Indo-Germanic philology, made special studies on accent, writing *Der indogermanische Akzent* (1895) and *Der indogermanische Ablaut, vornehmlich in seinem Verhältnis zur Betonung* (1900). Hirt, who became professor at Leipzig, made valuable contributions to Brugmann and Streitberg's *Indogermanische Forschungen*, on the morphology of case endings. In 1902 he published *Handbuch der griechischen Laut- und Formenlehre* (2d rev. ed., 1912), and in 1905–06 *Die Indogermanen*, on the primitive culture of the Indo-Germanic peoples. He also edited Weigand's *Deutsches Wörterbuch* (5th ed., 1909–10).

HIRTH, hĕrt, FRIEDRICH (1845–). A German-American sinologue, born at Gräfentonna, Saxe-Gotha. He was educated at the universities of Leipzig, Berlin, and Greifswald (Ph.D., 1869) and from 1870 to 1897 was in the Chinese maritime customs service. He was consulted by Count von Bülow in 1900 on the question of the Boxer indemnity. In 1902 he was appointed to the professorship of Chinese in Columbia University (New York City). A collection of Chinese manuscripts and printed books made by him is in the Royal Library at Berlin, and another of porcelains of considerable historical importance in the Gotha Museum. As an investigator, he conducted researches in Chinese literature by imitation of the methods of classical philology. His chief publications include: *China and the Roman Orient: Researches into their Ancient and Mediæval Relations as Represented in Old Chinese Records* (1885); *Ancient Porcelain: A Study in Chinese Mediæval Industry and Trade* (1888); *Text-Book of Documentary Chinese* (2 vols., 1885–88); *Chinesische Studien*, vol. i (1890); *Ueber fremde Einflüsse in der chinesischen Kunst* (1896); *Scraps from a Collector's Note-book, Being Notes on Some Chinese Painters of the Present Dynasty, with Appendices on Some Old Masters and Art Historians* (1905); *The Ancient History of China* (1908); *Chau Ju-kua* (1911), with W. W. Rockhill; and many papers on subjects connected with Chinese literature. He contributed to the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

HIRTIUS, hĕr'shĭ-ŭs, AULUS (90–43 B.C.). A personal friend of Julius Cæsar, under whom he served in Gaul, and who in 46 B.C. nominated him as one of the 10 prætors. After the death of Cæsar he became consul, declared against Antony, and headed a reënforcement for Octavius. While leading an assault on Mutina (Modena), he was killed. It is said that he was the author of the eighth book of Cæsar's *Commentaries on the Gallic War*. See CÆSAR, GAIUS JULIUS; COMMENTARIES, CÆSAR'S; COMMENTARII. Consult Martin von Schanz, *Geschichte der römischen Litteratur*, § 122 (3d ed., Munich, 1909).

HIRUDO, hĭ-rōō'dō, HIRUDINEA. See LEECH.

HI'RUNDIN'IDÆ (Neo-Lat. nom. pl., from *hirundo*, swallow). The swallow family. See SWALLOW.

HIRZEL, hĕr'tsel, RUDOLF (1846–). A German classical scholar, son of Salomon Hirzel. He was educated at the universities of Heidelberg, Göttingen, and Berlin, and became professor of classical philology at Jena. He wrote: *Untersuchungen zu Ciceros philosophischen Schriften* (1871–83); *Der Dialog* (1895); *Der Eid* (1902); *Themis, Dike, und Verwandtes* (1907); *Plutarch* (1912).

HIRZEL, hĕr'tsel, SALOMON (1804–77). A German publisher and an authority on Goethe.

He was born in Zurich, was a member of the firm of Weidmann in Leipzig until 1853, and then with his brother-in-law, Karl Reimer, founded an independent publishing house, which brought out Freytag's works, Grimm's *Wörterbuch*, and the publications of the Saxon Royal Academy, the Jablonowski Association, and the Prussian archives. Hirzel made a valuable collection of Zwingliana, which he left to the University of Strassburg. His valuable library on Goethe was willed to Leipzig University. Hirzel wrote *Der junge Goethe, 1764–76* (with an introduction by Bernays, 1875) and *Verzeichnis einer Goethe-Bibliothek* (1874). Consult article by Alfred Dove in the *Allgemeine deutsche Biographie*, vol. xii (Leipzig, 1880).

HIS, hēs, Wilhelm (1831–1904). A German anatomist and physician. He was born in Basel, studied medicine there, in Berlin, Würzburg, and Vienna. He was professor at Basel (1857–72) and at Leipzig. His earlier researches were histological; afterward he devoted himself to anatomy and in a less degree to embryology. He edited with Braune the *Zeitschrift für Anatomie und Entwicklungsgeschichte* (1875–92) and in 1877 took charge of the anatomical department of the *Archiv für Anatomie und Physiologie*. Among his more important publications are: *Crania Helvetica* (1864), with Rütimeyer; *Unsere Körperform* (1875); *Anatomie menschlicher Embryonen* (1880–85); *Die anatomische Nomenklatur* (1895); *Die Entwickelung des menschlichen Gehirns während der erster Monate* (1904); and a reconstruction of the physiognomy of Bach after the discovery of his remains (1895), with Seffner.

HIS'COCK, Frank (1834–1914). An American lawyer and legislator, born at Pompey, N. Y. He was admitted to the bar in 1855, served as district attorney of Onondaga County in 1860–63, and was a member of the State Constitutional Convention in 1867. Elected to Congress as a Republican Representative in 1877, he won repute as a debater and leader. From 1887 to 1893 he was a member of the United States Senate, being chairman of the Appropriations Committee. After his retirement he became connected with a large law firm and director of several banks.

HISGEN, hĭz'gen, Thomas Louis (1858–). An American manufacturer and political reformer. He was born at Petersburg, Ind., and was educated in the public schools. With his father and brothers he erected at Albany, N. Y. (1898), one of the largest axle-grease factories in the world. A bitter competitive struggle followed the refusal to sell their plant to the Standard Oil Company and resulted in the formation of Hisgen Bros., and the Four Brothers Independent Oil Company, with T. L. Hisgen as president. He was Democratic and Independence League candidate for State Auditor of Massachusetts in 1906, Independence League candidate for Governor of Massachusetts in 1907, and candidate of the National Independence party for President of the United States in 1908. He became president of the Independent Petroleum Marketers Association of the United States.

HISHAM, hĕsh-ăm'. The name of several Ommiad rulers of Spain.—Hisham I was Emir of Cordova from 788 to 796. He was a vigorous ruler and put down revolts with a firm hand. He also was successful in some expeditions against the Franks. He is, however, remembered chiefly for his personal habits. In disguise he wandered incognito about the capital, succoring the poor and oppressed, caring for the sick, and inquiring into the administration of justice. His charity and justice endeared him to his subjects.—Hisham II, Ommiad Caliph of Cordova from 976 to about 1009, succeeded to the throne before he was 12. He had little ability and lived in seclusion, while his chief officer, Almanzor, made conquests from the Christians. Hisham was deposed and probably murdered.—With Hisham III, who was deposed in 1031, the Ommiad caliphate in Spain came to an end. Consult Stanley Lane-Poole, *The Moors in Spain* (New York, 1886; 7th ed., London, 1904).

HISPALENSIS, Johannes. See John of Seville.

HISPA'NIA. The name by which the Spanish Peninsula, including the modern Spain and Portugal, was known to the Romans. The Greeks called it Iberia. The Roman poets sometimes called it Hesperia (the western land). The earliest inhabitants of whom we have any knowledge were the Iberians (q.v.), a race apparently unconnected ethnically or linguistically with any other race of Europe, of which the modern representatives are the Basques of northern Spain. But in very early times hordes of Celts crossed the Pyrenees and occupied almost the whole peninsula, pushing back or assimilating the Iberians, whence the natives were generally called Celtiberians by the ancients. (See Celtiberi; Gaul; Spain, *History*.) The natural wealth of the country, especially its silver deposits, early attracted traders and colonists. About the middle of the fourth century B.C. the Greek colony of Emporiæ (Ampurias) was founded on the northeast coast. Phœnician traders early made the circuit of the coasts, and Gades (Cadiz) was one of their permanent trading stations. The Carthaginians, driven from Sicily, Corsica, and Sardinia by the Romans, determined to conquer Spain both as a source of wealth and as a base of operations against Italy. (See Hamilcar, 7; Hasdrubal, 2, 3; Hannibal.) Carthago Nova (see Cartagena) was their principal town, and they soon brought almost the entire country under their sway. From this city Hannibal set out to cross the Alps (218 B.C.); but his downfall at the end of the Second Punic War caused the loss of the country to the Carthaginians. The Romans now sought to subdue the country, but the task proved very difficult. (See Spain, *History*.) For a century or two the native tribes continued semi-independent, until the time of Augustus, who founded many colonies in Spain, through which the country was Romanized so completely that Spain contributed to the history of Latin literature such distinguished names as those of Seneca the rhetorician, Seneca the philosopher and writer of tragedies, Lucan, Quintilian, and Martial (the century in which these authors worked has been called the Spanish Period of Latin Literature). The peninsula was divided into three provinces: *Hispania Tarraconensis*, with its capital Tarraco (Tarragona) in the north and east; Bætica in the south; and Lusitania, corresponding nearly to the modern Portugal. Consult M. F. Hübner, *La Arqueología de España* (Barcelona, 1888), and E. S. Bouchier, *Spain under the Roman Empire* (Oxford, 1914).

HISPANIOLA, hĭs'păn-yō'lȧ. The Latinized name for Española, the island of Haiti (q.v.).

HISS, Philip Hanson (1868–1913). An

American bacteriologist. Born at Baltimore, Md., he graduated from Johns Hopkins University in 1891, and four years later from the College of Physicians and Surgeons (Columbia), where he was assistant bacteriologist (1895–99), instructor in hygiene and bacteriology (1899–1903), adjunct professor of bacteriology (1903–06), and professor thereafter until his death. He served also as assistant bacteriologist in the department of health of New York City in 1896–99. The results of his researches were presented to the Congress of Hygiene at Washington in 1912. He is coauthor with Hans Zinsser of *A Text-Book of Bacteriology* (1910).

HISSAR, hĭs-sär′. The capital of a district of the Delhi division, Punjab, British India, on the West Jumna Canal, 102 miles northwest of Delhi by rail (Map: India, C 3). It is the seat of a governmental cattle farm with 43,287 acres devoted to pasturage; trade is carried on in cotton and cayenne pepper, and there is a cotton gin and compress here. Hissar was founded in 1356 and has interesting archæological and historical remains. Pop., 1901, 17,647; 1911, 17,162.

HISSAR′LIK. See TROY.

HISTIÆA, hĭs′tĭ-ē′ȧ (Lat., from Gk. Ἱστιαία, *Histiaia,* dialect form of Ἑστία, *Hestia,* Lat. *Vesta*), or OREUS. An ancient and important city of Eubœa, on the north extremity of the island, in the District of Hellopia. It was probably founded by settlers from the Histiæotis, on the mainland, driven out by the advance of the Thessalians. In the period following the invasion of Xerxes it passed into the hands of the Athenian League, but in 446 B.C. joined the rest of Eubœa in a revolt. When the island was reduced by Pericles, the old inhabitants of the town were expelled, and Athenian colonists were settled in the neighboring village of Oreus, which soon developed into a flourishing city and gave the popular name to the colony, though officially it was still called Histiæa. At the end of the Peloponnesian War the descendants of the old inhabitants and other Eubœans replaced the expelled Athenians, and the city remained loyal to Sparta till after the battle of Leuctra, when it joined the second Athenian League. In the war between Philip of Macedon and the Athenians, Oreus was one of the centres of Macedonian intrigue, and in the confusion after Alexander's death, and later during the Roman wars, it was of considerable strategic importance. In 200 B.C. it was stormed by the Romans. After this it fell into decay.

HIS′TIÆ′US (Lat., from Gk. Ἱστιαῖος, *Histiaios*) (?–494 B.C.). A tyrant of Miletus (q.v.), who guarded the bridge of boats by which the Persians had crossed the Danube when Darius (q.v.) invaded Scythia (513 B.C.). He refused to follow Miltiades' suggestion to destroy the bridge and in consequence was rewarded by Darius with the rule of Mitylene and with a district in Thrace. Afterward, however, when his growing power was viewed with suspicion by the Persians, he was invited to the Persian court at Susa and was detained there for 13 years. Tired of this restraint, he secretly instigated, says Herodotus, the revolt of the Ionian Greeks (see IONIA), but was sent by Darius to suppress it, because Histiæus persuaded the King that he alone could crush the revolt. With his freedom thus recovered he openly made war against the Persians, but was defeated, and finally beheaded by Artaphernes. His head was sent to Darius, who received it with sorrow and buried it with honors. Herodotus' statement that Histiæus alone caused the Ionian revolt has been met by evidence that as early as 512 B.C. the Ionians had been preparing for the revolt. Consult Heinlein in *Klio* (1909).

HISTOGENESIS. See HISTOLOGY.

HISTOIRE COMIQUE DE FRANCION, ē′stwär′ kō′mēk′ de frän′syôn′ (Fr., Comic History of Francion). A romance by Charles Sorel de Sauvigny (1622), published under the pseudonym of Nicolas du Moulinet. The chief interest of the story is in the information which it supplies of contemporary customs and in the fact that it is one of the few realistic novels of the seventeenth century. It met with much success, but was always disavowed by its author.

HISTOL′OGY (from Gk. *ἱστός, histos,* web, from *ἱστάναι, histanai,* to stand + *-λογια, -logia,* account, from *λέγειν, legein,* to say). That branch of biological science which treats of the microscopical structure of living organisms, both animal and vegetable. The histology of plants belongs to the domain of botany, that of animals to the domain of human and comparative anatomy. Just as gross anatomy is subdivided into normal anatomy and pathological anatomy, so histology may be subdivided into normal histology and pathological histology. The term "histology" when unqualified is usually accepted as referring to normal histology.

History. Although the study of the microscopic structure of plants and animals may be traced to the times of Malpighi (1628–94), who discovered the blood corpuscles, Robert Hooke, who was the first (1667) to describe plant cells, and Leeuwenhoek (1632–1723), who with comparatively imperfect optical means practically laid the foundations of our knowledge of the minute structure of the tissues, no definite progress in histology as a science was made until the beginning of the nineteenth century, when the compound microscope began to assume its present improved form. The great work of Bichat, entitled *Anatomie générale appliqué à la physiologie et à la médecine* (1801), marked an epoch in the development of the science of histology. Although he apparently did little actual work with the microscope, he brought to bear upon the achievements of other investigators the power of his generalizing mind and was the first to classify tissues according to their structure. After Bichat came an epoch of histological research, during which the microscopic observations of Malpighi and Leeuwenhoek were extended in accordance with the general system of Bichat. The next great step forward was made by two botanists, Hugo von Mohl and Schleiden, who discovered the cellular basis of all plant structure. The discovery of the method of combining lenses so as to render them achromatic gave a new impulse to the study of histology, and a more perfect classification of the tissues of the body was the result, as it placed in the hands of Schwann an instrument which enabled him to demonstrate the law that all animal as well as plant tissues are composed of and develop from cells. Schleiden had already demonstrated this, which may be called the greatest discovery in histology, and therefore he and Schwann are often called the founders of the science of histogenesis, or the study of the origin of tissues, more recently pursued with great success by Reichert, Kölliker, Remak, and others. Then the microscopic

anatomy of diseased structures and their mode of development came to be investigated, and the science of pathological histology took its rise. Johannes Müller is regarded as the father of this branch of histology, as he indicated the general direction in which the investigation of diseased growths should be pursued. Afterward Virchow published his celebrated *Cellular Pathology*, and later the science was still further enriched by the labors of Billroth, Rindfleisch, Von Recklinghausen, Cohnheim, and others.

HISTOLOGY OF ANIMALS

Cells. The histological basis of the body structure is the cell. In general terms all tissues may be said to be composed of cells of one kind or another, and these cells are always combined with more or less intercellular substance. This intercellular substance may be very small in amount, as in the epithelial tissues, where it amounts to nothing more than a cementing material holding the cells together, or it may make up the greater part of the tissue, as in some forms of connective tissue. Cells differ in shape. They may be round, oval, cuboidal, spindle-shaped, or irregularly stellate. The intercellular substance differs greatly in structure, and it is upon the differences in density of the intercellular substance that the different degrees of hardness depend. Thus, in mucous tissue the intercellular substance is soft and gelatinous, in cartilage it is dense and firm, in bone it is infiltrated with lime salts and is extremely hard. It was at first believed that a cell was a little bag filled with fluid; hence its name. Most animal cells are, however, small masses of living matter, called protoplasm, having, as a rule, no cell wall. Cells may or may not have nuclei. It is probable that nonnucleated cells are incapable of performing certain of the higher functions of cells, e.g., that of reproduction.

All adult tissues and organs originate in the elementary layers of the embryo. What determines the lines of growth of these different cells, and why some develop to form one kind of tissue, others to form other kinds of tissues, is as yet beyond our knowledge. There are two modes of cell growth or reproduction—direct cell division and indirect cell division, or mitosis.

Tissues. The tissues of the body fall into four great groups: (1) epithelial tissue; (2) connective tissue; (3) muscular tissue; (4) nervous tissue. It is by combinations of these tissues that the different organs of the body are formed. The most widely distributed of the tissues is connective tissue, which in its various forms, as fibrous tissue, elastic tissue, cartilage, bone, etc., makes up the framework of the body. In combination with one or more of the other tissues it forms the various organs of the body, acting as their supporting framework. Thus, in the nervous system such organs as the brain and cord consist of nervous tissue held together and supported by the peculiar form of connective tissue known as neuroglia. A muscle consists of muscle tissue bound together by connective tissue; and the various glands of the body, such as the liver or pancreas, consist of a glandular epithelium peculiar to the particular organ held together by connective tissue. See CONNECTIVE TISSUE.

Consult Delafield and Prudden, *A Text Book of Pathology* (9th ed., New York, 1911). The histology of the different tissues and organs may be found described under such titles as CONNECTIVE TISSUE; MUSCLE; EPITHELIUM; NERVOUS SYSTEM; LIVER; KIDNEY; ETC. See also CELL; BLOOD.

HISTOLOGY OF PLANTS

Cells. Many plants consist of only a single cell; nevertheless such plants show almost infinite variety in form. The simplest are nearly spherical, but in the desmids and diatoms almost every conceivable shape is to be found, and a high degree of differentiation is attained. When cells divide in only one plane and do not separate after each division, a chain of cells results; when division takes place in two planes, a plate of cells is formed; divisions in three planes give rise to a body several cells in thickness. In the last case considerable differentiation is likely to follow; the cells on the outside become adapted to the work of protection and absorption, some of those on the inside perform the nutritive functions, and others are specially modified for conducting materials. Even in the algæ and fungi there is a division of labor—some cells being modified for the work of protection and absorption, others for conduction, still others for reproduction. In the liverworts and mosses the specialization is carried still further, but it is in the ferns and flowering plants that difference in structure and division of labor finds its highest expression. Such differentiation of cells in form and function gives rise to tissues.

Tissues. A tissue is a group of connected cells of like origin and structure. Tissues are therefore classified according to the form of their component cells, the thickness and chemical composition of the cell walls, the character of their contents, etc. All cells of a very young plant are alike in having thin walls, abundant protoplasm, minute vacuoles or none, and relatively large nuclei. Such cells constitute embryonic, formative, or meristematic tissue, which is found in the higher plants in three places: (1) at the tips of the shoots and roots, where it constitutes the "growing points," protected in the shoot by overarching leaves which form a bud, and in the root by the root cap; (2) one or more thin layers concentric with the stem, by which new layers of wood, cork, and bast are added to it internally; (3) where wounds are made, in which cases the meristem produces tissues that heal the wound.

In all the higher plants tissues are grouped in such a way as to form tissue systems. (See MORPHOLOGY IN PLANTS.) Those there described are reduced to three by some: viz., (1) the tegumentary (equivalent to the protective); (2) the vascular (equivalent to the conducting and in part the mechanical); (3) the fundamental, a sort of limbo to which are assigned all the tissues not included in the other two systems. Of all tissues it may be remarked that the cell walls are subject to thickening as they grow older. This thickening consists of material added to the surface of the primary wall. The successive additions are frequently unlike and in the mature wall are apt to be distinctly stratified. The thickening is seldom uniform. Sometimes minute regions escape thickening and remain as small pits in the added layers. These pits occur at points where the protoplasm of one cell has not been com-

pletely separated from that of the other by the formation of a partition wall, but remains connected there by many very slender strands. In other cases the thickening is absent from wider areas. This leaves broader and shallower pits, which are symmetrically or irregularly distributed and give the appearance of sculpturing of the wall (2, Fig. 1). When the thickening is restricted to spiral lines or rings, the thin walls seem to be merely supported by the thickened portions, as in spiral and annular vessels (1, 3, Fig. 1).

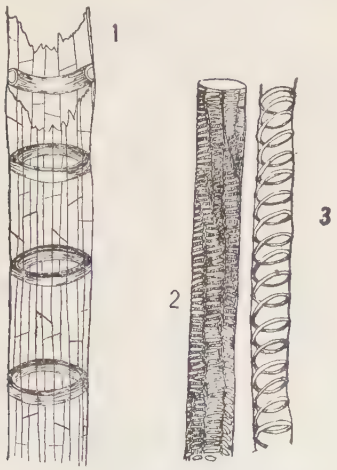


FIG. 1. TRACHEÆ.
1, annular; 2, pitted; 3, spiral.

Only the more important kinds of tissues are here described. 1. *Parenchyma.* Cells of very various form, but mostly nearly equal in the three dimensions, usually with a thin cellulose wall containing (so long as they are functional) living protoplasm, and almost invariably separating more or less from one another to form intercellular spaces. In elongated organs parenchyma cells are likely to become elongated. The parenchyma of the leaf and the cortex of the stem may develop into very irregular forms (Fig. 2). In water plants and others in which the parenchyma develops extensive intercellular spaces (aërenchyma) the cells may become branched, some even being regularly stellate (Fig. 3). Parenchyma cells sometimes have thick walls and thus form a transition to the sclerenchyma (see below), from which, however, they may be distinguished by the presence of living cell contents and sometimes reserve food. Such parenchyma occurs in the rhizome of many ferns. Parenchyma forms the chief nutritive and storage regions of all plants and is especially abundant in herbaceous plants. In fleshy leaves, fruits, stems, etc., the parenchyma is greatly developed at the expense of other sorts of tissue and is there used for storage of reserve food. The outer walls of parenchyma cells, which form the surface (i.e., the epidermis), undergo a peculiar change, being infiltrated with cutin, by which they are rendered almost impervious to water. Parenchyma cells of tabular form arise from the phellogen, which have all their walls cutinized. They constitute a tissue known as *cork* (Fig. 4).

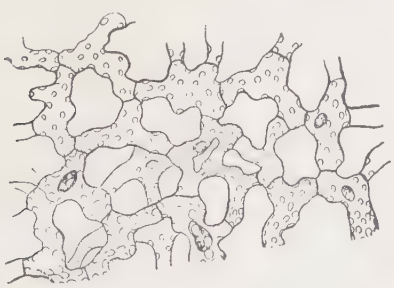


FIG. 2. IRREGULAR PARENCHYMA.
From a leaf, with only chloroplasts and nuclei shown.

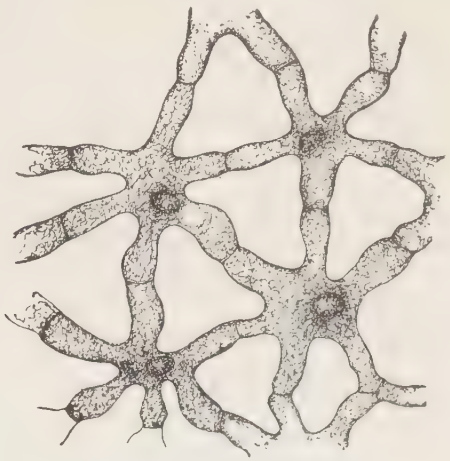


FIG. 3. STELLATE PARENCHYMA.
From stem of *Juncus*.

2. *Collenchyma* differs from parenchyma, of which it is hardly more than a variety, in the elongation of the cells, the absence of intercellular spaces, and the thickening of the angles of the cells where three or more walls join (Fig. 5). These thickened parts are more highly refractive than other parts of the wall and have a very peculiar bluish-white lustre. Collenchyma occurs only in elongated organs (stems, petioles, etc.), where it forms a strengthening tissue beneath the epidermis.

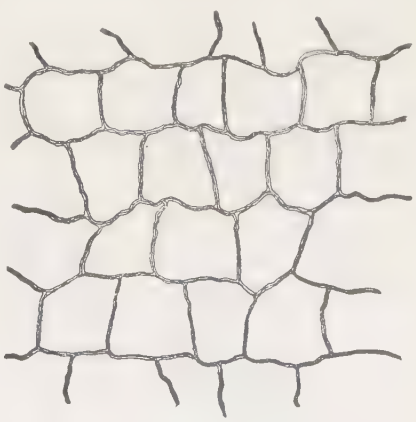


FIG. 4. CORK TISSUE.
Longitudinal section from bottle cork.

3. *Sclerenchyma* occurs in two forms, in one of which the cells have their three dimensions almost equal; in the other they are greatly elongated (Fig. 6). In both the wall is excessively thickened, sometimes so much so that the lumen is nearly obliterated. In all cases the protoplasm disappears at maturity, and the tissue is of use to the plant only by its mechanical strength. The short-celled sclerenchyma is common in the stone fruits (peach and cherry), in the shell of various nuts, in the gritty parts of the flesh of pears, quinces, etc., and in the hard portions of bark, many dry fruits, and seeds. Elongated sclerenchyma cells are most abundant in stems and leaves, in which they form continuous strands or bands, closely associated with the vascular bundles. They are often called bast fibres, but do not always belong to the bast or phloem bundles. The individual cells taper at each end, the ends of adjacent cells above and below overlap, and thus give to the strands great flexibility and a tensile strength which in many cases exceeds that of the best steel. The cells are relatively very long, 1 to 4 millimeters in jute, 10 millimeters or more in hemp, 20 to 40 millimeters in flax, and as much as 220 millimeters in ramie, with diameters from 0.01 to 0.4 millimeter. The strands of sclerenchyma fibres constitute the so-called fibres of commerce, the finer ones of which are used for textile fabrics and the coarser for cordage, etc.

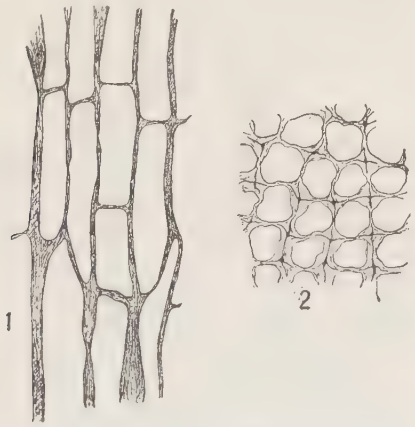


FIG. 5. COLLENCHYMA.
1, longitudinal section; 2, transverse section.

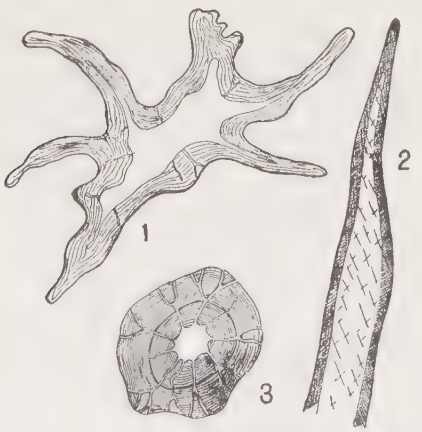


FIG. 6. SCLERENCHYMA.
1, irregular form (idioblast) from leaf of tea; 2, surface view of a fibre showing tapering end and oblique pits; 3, transverse section of a fibre showing concentric structure of wall with pore pits.

4. *Tracheæ* and *tracheids.* Tracheids are usually elongated cells, whose walls have become lignified (by which they are made very pervious to water) and thickened in spiral or annular lines or in reticulate patterns (Fig. 1). At maturity the protoplasm disappears, leaving only the cell wall of service to the plants. Tracheæ are similar to tracheids in the sculpturing of their walls, but instead of being single cells they are formed by the fusion of a row of cells lying originally end to end, the end walls being resorbed as the lateral walls thicken and the protoplasm disappears. At maturity the long empty tubes thus formed show little trace of the cells from which they originated. In angiosperms they constitute the greater part of the xylem bundles, changing to tracheids as the bundles grow smaller and come to an end (Fig. 7, *b*). But in gymnosperms (pines and their allies) tracheæ are formed only in the primary xylem, almost all the secondary xylem being tracheids with characteristic circular-bordered pits (Fig. 7, *a*). Tracheæ and tracheids are the most efficient tissues for the transport of water in the larger plants.

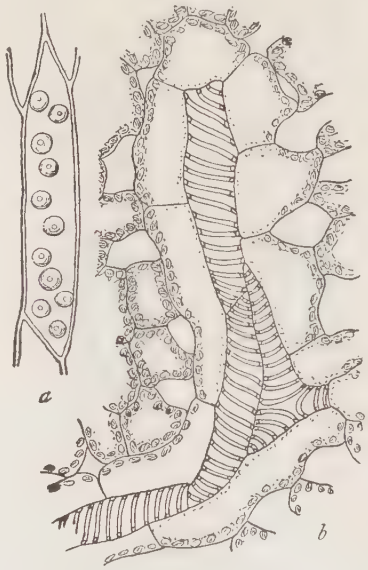


FIG. 7. TRACHEIDS.
a, from stem of pine; *b*, forming the termination of a xylem bundle in a leaf of *Impatiens parviflora*.

5. *Sieve tubes* are cell fusions formed by the partial resorption of the end walls of a row of young cells. The end partitions and sometimes the lateral walls which adjoin other sieve tubes become perforated, forming a so-called "sieve plate," through which the contents of the sieve tubes (a slimy mixture of soluble proteids, carbohydrates, and other foods) pass freely. Sieve tubes are found in the phloem bundles, in which they constitute the most efficient tissue for the transport of foods (Fig. 8). See SIEVE VESSELS.

6. *Latex tubes* are long, much-branched tubes,

with free or anastomosing branches, which contain the milky or colored sap in certain plants. There are two sorts, articulated and nonarticulated. A nonarticulated tube arises by early differentiation of certain cells in the embryo, which push their way among the other develop-

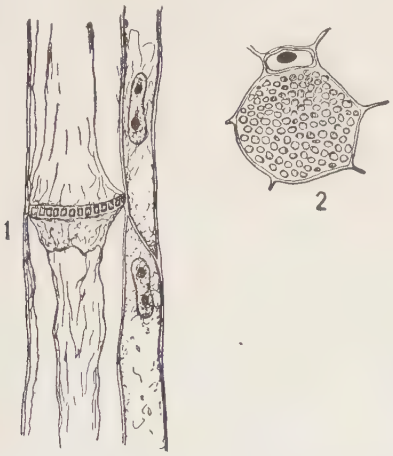


FIG. 8. SIEVE TUBE AND COMPANION CELL.

1, in longitudinal section; 2, in transverse section showing a sieve plate.

ing tissues by independent growth. The articulated tubes arise by the fusion of rather indefinite rows of cells, either longitudinal or transverse, which form a network of irregular tubes. Latex tubes are found in the phloem bundles, or just outside these bundles in the cortex of stems, and accompany them into the leaves, where they ramify widely. Their terminals come into close relation with the nutritive cells. (See Illustration under LATEX.) They seem to constitute a transportation system for foods. See GROWTH, IN PLANTS; ANATOMY OF PLANTS; CELL, IN PLANTS; ROOT; STEM; CONDUCTION; LATEX.

HISTOLOGICAL TECHNIQUE

The methods of histological observation were at first extremely crude, consisting merely in tearing apart the tissues and examining them under the microscope. Such handling, of course, largely destroyed the relations of the different elements of the tissues to one another. The cutting of thin sections of tissue with a razor was soon introduced, this being much facilitated by the previous hardening of the tissues in some suitable solution. Such sections were, however, difficult to study, owing to their transparency and the fact that the different tissue elements possess nearly the same index of refraction. The staining of sections was the next great improvement in technique. At first a single stain was used, the denser elements taking a darker shade than those of less dense structure. The discovery of what is known as differential staining, whereby the different tissue elements are stained different colors, and the introduction of an instrument for section cutting, known as the microtome (see further below), together with improvements in the microscope, have been the main factors in the recent rapid development of the art. At present the most commonly used technical procedure in the examination of tissues and organs is as follows:

The first step is *fixation*. By this is meant a rapid killing of the tissue in such a way as to allow it to retain as nearly as possible the same form and relation as does the living tissue. Among the more common fixatives may be mentioned alcohol of various strengths, formalin in from 5 to 20 per cent solutions, osmic acid, usually in 1 per cent solution, Müller's fluid (2.5 grams of potassium bichromate and 1 gram of sodium sulphate, dissolved in 100 cubic centimeters of water), Fleming's fluid (a mixture of osmic, chromic, and acetic acids in water), chromacetic acid (1 per cent solution in water), and corrosive sublimate in saturated aqueous solution. Many other fixatives are used for special purposes; thus, osmic acid is employed for the demonstration of fat and myelin. The small slices of tissue employed are allowed to remain from 12 to 48 hours in a large amount of fixative. Tissues which have been fixed by any other agent than alcohol are then subjected to prolonged washing with running water. The next step is *hardening*. Fixing solutions are also hardening agents if allowed to act sufficiently long. Many fixatives, however, have a detrimental effect upon the tissues if their action is too prolonged. It is, therefore, quite common to transfer the tissues after proper fixation to some new fluid for the purpose of hardening and preservation. The almost universal hardening and preserving agent is alcohol, but formalin, too, in from 5 to 10 per cent aqueous solution, is now extensively used. The first alcohol bath for plant tissues should be 35 per cent or weaker, while many animal tissues will stand 50 per cent. This should be followed consecutively by 50, 70, 90, and 97 per cent alcohol. For long preservation 80 per cent alcohol is the most satisfactory. Next in the process is *embedding*. By this is meant the impregnation of the tissues with a liquid which afterward hardens, thus holding the tissues in a firm mass, which can be easily cut. For this purpose paraffin and celloidin are most commonly used. In paraffin embedding the tissue is first immersed in any pure solvent of paraffin, then passed to a warm solution of paraffin in the solvent, and finally left in pure melted paraffin until thoroughly impregnated. In celloidin embedding the tissue is transferred from alcohol to a mixture of alcohol and ether and then placed in a solution of celloidin in a mixture of equal parts of alcohol and ether. After impregnation the paraffin is allowed to harden by cooling, or the celloidin to thicken by exposure to the air and consequent evaporation of the alcohol and ether, after which it is immersed in chloroform for hardening. The operator then proceeds to cut sections by means of the microtome. This instrument consists essentially of a knife carrier, which can be made to slide back and forth past a clamp to which the specimen is attached. The embedded specimen is fastened to a block, usually of wood, clamped in the microtome. The clamp is so arranged that the blocked specimen can be raised any desired fraction of a millimeter, thus bringing any thickness of it above the knife. In paraffin cutting the knife is kept dry; in celloidin section cutting it is kept flooded with alcohol. The sections are then stained for the purpose of bringing out sharply the different tissue elements. For staining the nuclei, carmine, hæmatoxylin, and various aniline dyes are commonly used. For demonstrating the other tissue ele-

ments other dyes may be used, eosin being much employed. The procedure in staining celloidin sections with hæmatoxylin and eosin is as follows: The sections are first allowed to remain for several minutes in an aqueous solution of hæmatoxylin; then they are thoroughly washed with 97 per cent alcohol and placed for several minutes in an alcoholic solution of eosin; they are then again washed in alcohol and cleared in oil of origanum or bergamot containing a little eosin. From the clearing bath the specimen is lifted to a glass slide, the excess of oil is removed by means of blotting paper, a drop of a solution of Canada balsam is placed upon the specimen, and the whole is covered with a thin glass, called the cover glass. By the drying and hardening of the balsam a permanent "mount" of the specimen is secured.

The above methods of procedure are illustrative of those applicable to general histological material. The examination of special tissues and organs requires the use of special methods of technique. This is especially true in regard to the nervous tissues, for the study of which some very elaborate methods have been devised, some of which will be found described in the article NERVOUS SYSTEM.

For histological methods as applied to plant tissues, consult C. J. Chamberlain, *Methods in Plant Histology* (2d ed., Chicago, 1905), and Eduard Strasburger, *Handbook of Practical Botany* (7th ed., New York, 1911); for methods in animal histology, consult A. B. Lee, *Microtomist's Vademecum* (6th ed., Philadelphia, 1905), and F. R. Bailey, *Text-Book of Histology* (4th ed., New York, 1913).

HISTO'NIUM. See FRENTANI; VASTO.

HISTORIA AUGUSTA. See AUGUSTAN HISTORY.

HISTOR'ICAL ASSOCIATION, AMERICAN. A society of historical students and writers, founded at Saratoga, N. Y., in September, 1884, at the suggestion of Herbert B. Adams, of Johns Hopkins University. Its original membership was 40, but within a year it had increased to 250, and in 1889 it received a definite standing and recognition by an Act of Congress incorporating it in the District of Columbia. The society has exerted wide influence in directing and stimulating historical research, and its publications and monographs have covered a broad field of historical study. The American Society of Church History, founded in March, 1888, became in 1896 the Church History Section of the American Historical Association, but regained its independence in 1904. Important committees of the society are the Historical Manuscripts Commission, which prepares valuable manuscripts for publication, and the Public Archives Commission, concerned in the preservation of public records. The society holds annual meetings, publishes an annual report through the Smithsonian Institution, and appoints a board of editors for the *American Historical Review*, published quarterly. The society has published five volumes of *Papers*, some 40 volumes of *Annual Reports*, a series of prize essays, two volumes on *The Study of History in Schools*, secondary and elementary, and a series of reprints of *Original Narratives of American History* in 20 volumes.

HISTOR'IC GEOLOGY. See GEOLOGY.

HIS'TORY (Lat. *historia*, Gk. ἱστορία, history, from ἵστωρ, *histōr*, learned, from εἰδέναι, *eidenai*, Skt. *vid*, OHG. *wizzan*, Ger. *wissen*, to know). A systematic narrative of past events, or, in the light of modern historical scholarship, the science of the progressive development of human society. The social and economic conditions of peoples, their racial affinities and physical environment, exercise determining influences upon their history and find expression in their thought, their art, and their politics. History deals with the social structure in its successive forms and recognizes as inseparable allies all sciences which contribute to a knowledge of man as a social being and in his relation with the physical world.

As a science, history is primarily inductive. It proceeds from a body of concrete facts, which critical study links together according to the sequences of time and causation. Afterward deductive processes may be used, but always sparingly and cautiously.

Historical method comprises four processes: the collation of facts; the arrangement of these facts according to the sequences of time and causation; criticism, by which the value of the facts is determined; and their interpretation in accordance with the results of arrangement and criticism. These processes are all simple; they are the ordinary processes of scientific research, but in carrying them out the human equation becomes so large an element of the problem as to make it essentially different from the problems of the physical world, and for this reason history can never be an exact science.

History depends upon human evidence, and its investigation must follow the laws governing the reception of human evidence. These are found to a considerable extent in the body of principles developed by jurisprudence for the reception of evidence in the courts. The historical material is contained in several categories: (*a*) Remains, such as buildings, walls, roads, statues, pictures, medals, coins, implements—whatever, indeed, man has made and used and which may thus throw light upon his civilization and his deeds. These may be studied directly, when accessible, or through the reproductions easily obtainable by means of modern processes.

(*b*) Documents. Under this head are included official and business papers and letters written with an immediate practical purpose.

(*c*) Literatures. This class includes a great body of material of the highest value—the writings through which are expressed the ideas of the peoples, their philosophy, poetry, science, and religion.

(*d*) Traditions. Much of this class is preserved in the literatures; much of it must be gathered from other sources.

(*e*) Laws. These, especially public law, are found in codes and treatises and are of great value in determining many questions.

(*f*) Contemporary writings with historical purpose—annals, chronicles, biographies. Under these heads can be classified the original material on which secondary historical work, the written history of a nation or an age, is based and by examination of which its accuracy must be tested.

This material may also be divided into two great classes of evidence—conscious and unconscious. It will be seen that some of this material must have been prepared consciously to influence the opinion of contemporary or succeeding generations. In this class are proclamations, statements, writings, narratives, told with intention concerning events within the narrator's own knowledge, or reported to him by others.

Such evidence must be taken with qualifications attaching to all ex parte testimony. On the other hand, the evidence may be given unconsciously, as in documents of record, writings or other remains, prepared with no other purpose beyond that of direct utility. A striking example of this class of evidence is found in the little cylinders and tablets of clay, preserving in the business records, impressed upon them in cuneiform characters, so much of the social history of the Babylonians of thousands of years before the Christian era. All these materials of human history must be subjected to searching inquiry as to their original purpose and the circumstances under which they were made. The development of history into scientific form has been the work of ages and owes its final impulse to the great improvements in methods in the physical sciences during the eighteenth and nineteenth centuries, although it developed along with the development of the human society whose life it records. The historical idea requires for its existence a background and a consciousness on the part of society of itself and of its continuity; of its relations to a past and a present. The growth of this social self-consciousness has been a matter of time. It is interesting to notice, on the other hand, how the study of their history has sometimes aroused in a people the consciousness of their own national life, which before was dormant. An example of this may be found in the Balkan states, which were roused not many years ago into determined revolt against Turkish rule by the teaching of their national history through the efforts of a few patriotic scholars.

The new outlook upon the natural world given by the physical sciences and the change in historical methods gave rise to a controversy in the last century, in which certain philosophical thinkers of the highest ability undertook to maintain that "human actions are governed by laws as fixed and regular as those which rule in the physical world." Auguste Comte, Henry Thomas Buckle, and Herbert Spencer are the distinguished sponsors of this theory. Buckle, in his *History of Civilization in England*, the first volume of which was published in 1857, elaborated this idea with a profundity of learning, but with much inconsistency of reasoning. Such literary historians as Charles Kingsley and James Anthony Froude entered the discussion on the other side, and John Stuart Mill, in his *System of Logic*, made a very sane and able contribution to it. The strongest and most extreme presentation of the opposite side of the controversy is, perhaps, that made by Froude in his lecture of 1864 on "The Science of History." He maintained with great eloquence that the determination of human movements upon any basis of scientific accuracy was impossible. This old controversy is closed now in the light of a better understanding of what the science and scientific method really are, but it is of interest historically as marking one stage in the development of the science of history.

The development of history down to the nineteenth century may be traced through the work of a very few writers and scholars. The first of all historians was the Greek Herodotus, who lived in the fifth century B.C. He was, however, only a narrative writer, recording with great accuracy those events which came within the scope of his personal knowledge, but mingling with his narratives much which came to him only by hearsay, and to which he applied no critical canons. Thucydides, the next of the great historians, is justly estimated as one of the greatest historians of all time. He recorded events with remarkable conciseness and first applied philosophical reasoning to the historical narrative. Among narrative historians the accomplished Xenophon deserves a place. Polybius, with a wider outlook, followed in the footsteps of Thucydides. Of the Romans, Cæsar, Livy, and Tacitus show a high development of the historical sense—the two former confining themselves to the narrative field, and the last claiming a place in the class of historians like Thucydides, who endeavored to find the meaning of history beneath the mere sequence of events. The historians of the later Roman Empire were for the most part apologists for or eulogists of the emperors who were their masters and establish no landmark of importance. During the Middle Ages there was no historical writing worthy of the name in Europe. The historical writing of the time is contained in the annals and chronicles preserved in the monasteries, which were very little more than diaries from day to day, kept without any discrimination by men whose outlook upon the world was of the narrowest. Einhard in the reign of Charlemagne, Otho of Freising in that of Frederick Barbarossa, and a few others, alone rise a little above the dead level, which offers material for historical research, but no true history. The awakening of a broader and more vigorous scholarship in the period of the Renaissance produced a new school of political and historical thinkers, who built upon the revived classical models. They are found in Italy, where Machiavelli and Guicciardini wrote historical works that are admirable in thought and style, and in France, Spain, and England, where the example of Italy was followed as in other fields of culture. In the eighteenth century the Englishman Gibbon, who devoted his life to his great work, *The Decline and Fall of the Roman Empire*, left one of the masterpieces of historical scholarship—a work that stands to-day as the most thorough and scholarly presentation of the history of the later Empire and of the Middle Ages. Voltaire, Hume, Montesquieu, and Robertson are brilliant names in the progress of historical thought of the same century. It remained, however, for the nineteenth century to develop history into a systematic science. With Niebuhr began a rational study of classical history, which has been carried on by Mommsen and Curtius for Roman and Greek history respectively. The greatest impulse, however, for the study came from the classrooms of Leopold von Ranke (1795–1886). Ranke grasped the fundamental idea of historical science with a rugged sincerity, both of theory and practice, and impressed his spirit upon a large body of enthusiastic students in Germany and America. Waitz, Droysen, Von Sybel, Von Holst, Treitschke, and others have followed with greater or less ability along the path over which he led the way. In France within the last half century historical work and instruction have developed with great rapidity, and Monod, Duruy, Henri Martin, Lavisse, Rambaud, and many others have exemplified the French genius for clear and scientific thinking and for condensed lucidity of statement. In less degree the other continental countries have contributed to the development of the science. In England, along with such brilliant literary historians as Macau-

lay, Kingsley, and Froude, we have a body of eminent scientific scholars, of whom Freeman, Green, Stubbs, Creighton, and Gardiner are distinguished representatives. In America, whose scholars have drawn largely from the German and French schools, there has also been a noticeable development in historical writing and in critical scholarship. Succeeding the earlier school, which included Bancroft, Prescott, and Motley, there has grown up in the United States a modern school, trained in the best university methods of research, and enrolling in different kinds of historical work hundreds of vigorous and enthusiastic scholars. Francis Parkman, Justin Winsor, and John Fiske left behind them a body of historical writings of a very high order. Henry Adams, James Schouler, Captain Mahan, John Bach McMaster, and James Ford Rhodes are contemporary American historians whose studies in the history of their own country are of permanent value, and many more names might be added. From the lecture rooms and seminaries of Europe and America a constant impulse to wise and thorough study and use of historical material goes forth from earnest and able teachers. Numerous periodicals are devoted to the advancement of historical research. Most noteworthy of these are the *Historische Zeitschrift* in Germany, the *Revue Historique* in France, the *English Historical Review* in England, and the *American Historical Review* in the United States.

It is the tendency of the modern school of historical students to rely more upon the thorough study of true sources of history, rejecting the myths, traditions, and second-hand accounts, which have so often formed much of the material of writers of so-called history. Collections of written sources form a very considerable part of the historical publications of to-day, and guides and commentaries to these collections of sources are constantly being issued to enable the student to find his way intelligently through the mass of material which the source collections present. In this direction Germany, under the leadership of Ranke, led the way. The massive and constantly growing collection of sources of German history, known as the *Monumenta Germaniæ Historica*, is in itself a monument of scholarship and research, and in France, England, and the United States similar collections have been published and are in process of publication from year to year. The well-known *Rolls Series* in England is nearly as notable a collection as the German *Monumenta*. Even in historical instruction in the schools, the simpler and more interesting sources have been put in available form for elementary students and are used with great success to enliven the historical narrative and to give an appreciation of the true nature of historical research. This tendency to explore the actual evidence critically has done much to clear history of the fables, myths, and traditions which made much of it unreliable and to render it real to the student. However, the mere application, no matter how arduous, of the scientific method to great masses of material is inadequate for writing history; but with this application the success of the writer will be in proportion to his own measure as a man, which will be reflected in his power to image the thoughts, feelings, beliefs, hopes, and pleasures of the people of the past. This is only another way of saying that history should partake of both science and literature.

Divisions of History. History is commonly divided chronologically into three great periods —Ancient, Mediæval, and Modern. While there is complete continuity in the course of history, each one of these periods has certain characteristics distinguishing it from the others and making it convenient to treat each as a unit. In the first period the beginning and growth and decline of the great civilizations of antiquity are comprised. Here are considered the old East, Egypt, Mesopotamia, and Syria, Greece, and Rome. In these remote ages were laid the foundations of civilization, the elements of which were handed on from the valleys of the Nile and Euphrates to the Greeks and Romans, who fashioned them into instruments available for later generations. The Roman Empire welded together all the diverse elements of the ancient world. Ancient history is usually regarded as ending when the irruption of the Germanic barbarians from northern and central Europe into the highly developed Roman civilization caused the downfall of the old Empire in the fifth century of our era and ushered in several centuries of confusion. The world that had been so thoroughly organized by the Roman was materially modified in its structure by the individualism for which the German stood, in contradistinction to the principle of Imperial unity emphasized in the Roman world. Out of this stormy mingling of conflicting ideas in the Middle Ages came modern Europe, which rests politically upon a combination of the German and Roman principles. The Middle Ages are regarded as closing about the end of the fifteenth century, when the fall of Constantinople had removed the last shadow of the old Roman world, when the discoveries of Columbus had immeasurably widened the European horizon, and the revolt was beginning against ecclesiastical imperialism. The national idea slowly took form out of the feudalism of the Middle Ages, and modern nations gradually arose, with the result of bringing into being a legal code for the regulation of international relations. The internal confusion of the Middle Ages had separated Europe from the rest of the world, but with the revival of learning and the interest in new things, known in history as the Renaissance, came a larger acquaintance with that older world of the East which, while less progressive, had its own civilization, institutions, and history. The conflict of the religions and civilizations of the East and West produced the Eastern Question, in which are contained so many of the most difficult problems of modern international politics. The opening of the New World in the period of discovery introduced a new factor of the greatest importance in the world's history—the future great power of the Western Hemisphere, which had as its heritage the civilization of Europe, but was unhampered by immemorial traditions and institutions and by conflicting national interests. The same pregnant era that saw these new elements thrown into the world's life saw also the renewal of the old conflict between the German idea of liberty and the Roman idea of unity in the Protestant revolt against the control of the Roman church. This conflict shaped much of the world's history for three centuries. The expansion of population in the older countries, the development of commerce, the increasing knowledge of the world, and the growing ambition of nations conscious of their own possibilities and increas-

ing rapidly in power and wealth, together with the religious persecutions generated by the Protestant revolution, brought about the opening and settlement of new and hitherto inaccessible regions, resulting in the widening of national interests, enormous increase in the power and resources of the great nations, and a development of national rivalries on a scale hitherto unknown. There has also come an insistence on the part of civilized peoples that barbarian races shall submit to civilization and not obstruct the progress of world development. History has until recently concerned itself almost exclusively with the Occidental nations, regarding the Orient only as it has come in contact with the West. Now, however, the histories of India, China, Japan, and all other peoples that have enjoyed organized life have assumed importance in view of their bearing upon the larger problems of the age. Such has been the movement of the great current of history which has expanded in volume with the expansion of the race. Within these wide boundaries the histories of different countries may be studied in detail; and the study of history may be still further specialized along the lines of social, economic, political, or constitutional fields, or in those of art, literature, or thought. These special fields become increasingly important as history grows in complexity, so that light is needed upon its phases in detail.

Bibliography. The true spirit of history is nowhere better expressed than in R. W. Emerson's essay on *History*. See also Frederic Harrison, *The Meaning of History* (London, 1894); Lord Acton's inaugural address as regius professor at Oxford (ib., 1895); C. W. Smith, *Lectures on the Study of History* (Oxford, 1865); G. S. Hall (ed.), *Methods of Teaching History* (Boston, 1883–85); E. A. Freeman, *Methods of Historical Study* (London, 1886); J. G. Droysen, *Grundriss der Historik* (Boston, 1893); J. A. Froude, *Short Studies on Great Subjects* (New York, 1893); Ernst Bernheim, *Lehrbuch der historischen Methode* (Leipzig, 1894); Langlois and Seignobos, *Introduction to the Study of History* (New York, 1898); William Stubbs, *Lectures on the Study of Mediæval and Modern History* (3d ed., Oxford, 1900); K. G. Lamprecht, *What is History?* (New York, 1905); J. F. Rhodes, *Historical Essays* (ib., 1909); W. E. H. Lecky, *Historical and Political Essays* (new ed., ib., 1910); J. H. Robinson, *The New History, Essays Illustrating the Modern Historical Outlook* (ib., 1912); G. M. Trevelyan, *Clio, A Muse and Other Essays* (London, 1913); John Morley, *Notes on Politics and History* (New York, 1914). The publications of the American Historical Association contain many papers relating to history in general in its different aspects.

HISTRIA. See ISTRIA.

HIS'TRIOMAS'TIX (Neo-Lat., from Lat. *histrio*, actor + Gk. *μάστιξ, mastix*, scourge). A comedy produced not later than 1599, of which John Marston was at least a collaborator, and printed in 1610.

HISTRIOMASTIX, THE PLAYER'S SCOURGE, or ACTOR'S TRAGÆDIE. A tract violently attacking the drama, by William Prynne, a Puritan, published in 1632.

HIT (Gk. Ἴς, *Is*). A town of Asiatic Turkey, situated among deserts and salt marshes on the right bank of the Euphrates, in the Vilayet of Bagdad, and 80 miles northwest of the city of that name (Map: Turkey in Asia, E 4). It is remarkable for the asphalt and naphtha pits in the neighborhood, from which asphalt is believed to have been obtained for the construction of the walls of Babylon. The chief products of the place are asphalt, naphtha, salt, lime, and gypsum. It has a shipyard and is the head of navigation of the Euphrates. Pop., about 5000.

HITA, ē'tȧ, GINES PÉREZ DE. See PÉREZ DE HITA, GINES.

HITCH. See KNOTTING AND SPLICING.

HITCH'COCK, ALBERT SPEAR (1865–). An American agrostologist. He was born at Owosso, Mich., and was educated at the Iowa State Agricultural College (B.S., 1884; M.S., 1886). He served as an instructor at the State University of Iowa in 1886–89, as an assistant at the Missouri Botanical Garden, St. Louis, in 1889–91, and as professor of botany at the Kansas Agricultural College from 1892 to 1901. He became assistant agrostologist in 1901 and agrostologist in 1905 of the United States Department of Agriculture. His investigations deal especially with the taxonomy of grasses. He was president of the Botanical Society of America in 1914.

HITCHCOCK, CHARLES HENRY (1836–1919). An American geologist, the son of Edward Hitchcock. He was born at Amherst, Mass. After graduating at Amherst College (1856), he was assistant to the Geological Survey of Vermont (1857–61); State geologist of Maine (1861–62) and of New Hampshire (1868–78). His three-volume report on his work in New Hampshire, containing a folio atlas of maps, profiles, and sections, is considered his most important publication. Incidental to the survey was the maintenance of a meteorological station throughout the year on the summit of Mount Washington, whence daily statements of the weather conditions were issued before the United States Signal Service had begun its weather predictions. From 1868 to 1908 he was professor of geology at Dartmouth College. He was vice president of the American Association for the Advancement of Science (1883), a member of the Imperial Geological Institution of Vienna, and one of the original and most active members of the Geological Society of America. He was the first to suggest the locality of the great terminal glacier in the United States. Besides some 150 papers chiefly on New England geology, he is author of *Elementary Geology* (1861), with Edward Hitchcock; *Mount Washington in Winter* (1871); *Hawaii and its Volcanoes* (1909; 2d ed., 1911).

HITCHCOCK, EDWARD (1793–1864). A scientist and educator who contributed greatly to the development and popularizing of geological science in America. He was born in Deerfield, Mass., where for a time he served as principal of the academy. From 1814 to 1818 he published the *Country Almanac* and in the latter year entered Yale Theological Seminary, from which he was graduated in 1820. After serving as pastor of the Congregational Church in Conway, Mass., he was appointed professor of chemistry and natural history in Amherst College. As president of that institution from 1845 to 1854, he improved its financial condition and greatly extended its usefulness. When he resigned the presidency, he retained the professorship of natural theology and geology, holding this office until his death. Throughout the latter part of his life he devoted much

time to geological research. In 1830 he was appointed State geologist of Massachusetts, and under his direction the first geological survey of any extensive area was completed. The results of this work were published by the State government in several voluminous reports. In 1836 he received the appointment of geologist of New York, but resigned the position. He served as geologist of Vermont from 1857 to 1861 and in 1850 was commissioned by the State of Massachusetts to examine the agricultural schools of Europe. He was one of the founders of the Massachusetts Agricultural College and of Mount Holyoke Seminary and was the first president of the American Geological Society. His extensive collection of fossil footprints of the Connecticut valley was presented to Amherst College. The most important of his works are: *Economic Geology* (1832); *Report on the Geology, Mineralogy, Botany, and Zoölogy of Massachusetts* (1833); *Elementary Geology* (1840); *Geology of Massachusetts* (1841); *History of a Zoölogical Temperance Convention in Central Africa* (1850); *Religious Lectures on Peculiar Phenomena of the Four Seasons* (1850); *Religion of Geology and its Connected Sciences* (1851); *Religious Truth, Illustrated from Science* (1857); *Ichnology of New England* (1858); *Report on the Geology of Vermont* (1861); *Reminiscences of Amherst College* (1863).

HITCHCOCK, Ethan Allen (1798–1870). An American soldier. He was a grandson of Ethan Allen, of Ticonderoga fame, was born at Vergennes, Vt., and graduated at West Point in 1817. After garrison service he was instructor in tactics at West Point (1824–27) and commandant there (1827–29). He served against the Indians in Florida in 1836 and 1840 and in the last campaign of the Mexican War. For his service in Mexico he was brevetted brigadier general (1847). He commanded the Pacific Division from 1851 to 1854 and in the next year resigned because of a quarrel with Jefferson Davis, then Secretary of War. At the outbreak of the Civil War he was appointed major general and served at first on special duty under the Secretary of War and later as commissioner of exchange. He was also confidential adviser to the President. Hitchcock was a scholar of great attainments and in expression of his peculiar philosophy wrote: *Remarks upon Alchemy and the Alchemists*, arguing that they were religious philosophers, and that truth was the philosopher's stone (1857); *Swedenborg, a Hermetic Philosopher* (1858); *Christ, the Spirit*, in which the Gospels are treated as symbolical writings of the Essenes, a Jewish secret society (1860); *Red Book of Appin, and Other Fairy Tales* (1863); *Remarks on the Sonnets of Shakespeare* (1865 and 1867); *Spenser's Colin Clout Explained* (1865); *Notes on the Vita Nuova of Dante* (1866), in all of which he gives hermetic explanations of the matter of these books.

HITCHCOCK, Ethan Allen (1835–1909). An American politician and cabinet officer, born in Mobile, Ala., and educated at New Haven, Conn. He was in business for a while in China and for several years in St. Louis. In 1897 he was sent as United States Minister to Russia and subsequently was made Ambassador upon a corresponding change in the Russian diplomatic service. In 1898, upon the retirement of Cornelius M. Bliss, he was appointed Secretary of the Interior, serving until 1907. During his term, and largely through his efforts, the gigantic system of public land frauds in the West was uncovered, and many of its participants were punished.—His brother Henry (1829–1902) was born near Mobile, Ala., and was one of the foremost lawyers and citizens of St. Louis.

HITCHCOCK, Frank Harris (1867–). An American cabinet officer, born at Amherst, Ohio. He graduated from Harvard University in 1891 and from the law department of Columbian (now George Washington) University in 1894. After practicing law and holding various less important posts in several government departments, he was First Assistant Postmaster-General from 1905 to 1908. In the latter year he managed William H. Taft's campaign for the presidential nomination, and as chairman of the Republican National Committee (1908–09) he also had charge of the campaign resulting in Taft's election. His administration of the postal system (Postmaster-General, 1909–13) resulted in a surplus of revenue over expenditures; the postal savings bank and parcel post were introduced during his term of office, and near the close of his administration he recommended government ownership of the telegraphs. He resumed the practice of law in New York City in 1913.

HITCHCOCK, Gilbert Monell (1859–). An American legislator. He was born at Omaha, Neb., where, after studying at Baden-Baden, Germany, and graduating from the University of Michigan Law School (1881), he practiced law. He founded the Omaha *Evening World* in 1885 and in 1889, having bought the *Morning Herald*, consolidated it with the *World* under the title of the *World-Herald*. He was a Democratic member of the Fifty-eighth (1903–05) and of the Sixtieth and Sixty-first congresses (1907–11), and he became United States Senator for Nebraska for the term 1911–17.

HITCHCOCK, Henry (1829–1902). An American lawyer, born at Spring Hill, Ala., and educated at the University of Nashville (A.B., 1846) and at Yale University (A.B., 1848). He studied law, taught in the Worcester (Mass.) High School in 1848–49, and was admitted to the bar at St. Louis, Mo., in 1851. During the Civil War he served in the Union army as assistant adjutant general, and was judge advocate on the staff of General Sherman. In 1867 he helped to organize the law department of Washington University (known as the St. Louis Law School), of which he was dean until 1881. He served also as professor in the school and continued his lectures after resigning the deanship. He was president of the St. Louis Bar Association (1880), of the Missouri State Bar Association (1892), and of the American Bar Association (1889).

HITCHCOCK, Roswell Dwight (1817–87). An American clergyman and educator, born in East Machias, Me. He graduated at Amherst College in 1836 and at Andover Theological Seminary in 1838. He preached a year in Waterville, Me., and in 1845 was installed over the First Congregational Church in Exeter, N. H. He resigned in 1852 to accept the professorship of revealed religion at Bowdoin College. Three years later he resigned at Bowdoin to become professor of Church history at Union Theological Seminary, of which he was elected

president in 1880. He was on the editorial staff of the *American Theological Review* for seven years, traveled in Egypt and Palestine, and was elected president of the Palestine Exploration Society in 1871 and vice president of the American Geological Society in 1880. He published: *The Life, Character, and Writings of Edward Robinson* (1863); *Complete Analysis of the Holy Bible* (1869); *Socialism* (1879); *Carmina Sanctorum*, with Dr. Zachary Eddy and Rev. Lewis W. Mudge (1885). A collection of sermons, *Eternal Atonement*, was published posthumously (1888).

HITCHIN, hĭch'ĭn. A market town in Hertfordshire, England, 14 miles northwest of Hertford, on the river Hiz (Map: England, F 5). It was the original seat of Girton College; it has a free school, founded 1622; and its fine old parish church of St. Mary contains an historical crypt, an excellent porch, interesting monuments, and an "Adoration of the Magi" by Rubens. The town hall and corn exchange are fine modern buildings. Hitchin has large breweries and a trade in corn, malt, and flour. Straw plaiting is carried on, and the cultivation of peppermint and of lavender for its perfumery dates from 1568. It is a large cattle market. Hitchin is recorded in the Domesday Book. It was given to Harold by Edward the Confessor and came into the possession of William the Conqueror. Pop., 1901, 10,072; 1911, 11,905.

HITOPADESA, hĕ-tō'pà-dā'shà (Skt., salutary instruction), or Book of Good Counsel. The name of a celebrated Sanskrit collection of fables, the contents of which have passed into almost all the civilized literatures of the world. The collection itself, in the form in which we possess it, is founded on older works of a kindred nature; and its preface expressly mentions "the *Panchatantra* and another work." For a convenient list of editions and translations and a sketch of the subject, consult C. R. Lanman, *Sanskrit Reader* (Boston, 1888), and Hertel, *Ueber Text und Verfasser des Hitopadesa* (Leipzig, 1897). Two good editions with English notes are published in India by Godabole and Parab (Bombay, 3d ed., 1890) and by Peterson (ib., 1895). See Panchatantra; Sanskrit Literature.

HITOTSUBASHI. See Kéiki.

HITTEREN, hĭt'ēr-en. An island off the west coast of Norway, situated at the entrance to the Trondhjem Fiord (Map: Norway, D 5). It covers an area of nearly 200 square miles (including some adjacent islets) and has a population of about 2500. It is covered with low but rugged hills, reaching 1000 feet, among which are numerous lakes and streams. The inhabitants are mostly engaged in fishing.

HIT'TITES (Heb. *Heth*, pl. *Hittim;* Bab. *Hatti;* Egypt. *H't'*). An ancient Asianic people whose home seems to have been in Cappadocia, but who not only made their power felt in all parts of Asia Minor but also established themselves in Syria and Mesopotamia. Until recent times they were known only through various allusions in the Bible. The eponymous ancestor of the people, Heth, appears in Gen. x. 15 as the son of Canaan, the brother of Sidon, the Amorite, etc., indicating that the Hittites belonged to the earlier population of Syria found by the invading Hebrews, and that they were regarded as akin to the Phœnicians and the Amorites. In the list of the peoples of Canaan the Hittites are regularly mentioned; the city of Luz is said to be in "the land of the Hittites" (Judg. i. 26); Abraham buys the Machpelah from Ephron the Hittite (Gen. xxiii. 3 ff.); Esau's wives Jehudith and Bashemath were Hittites (Gen. xxvi. 34); Ahimelek the Hittite is mentioned in 1 Sam. xxvi. 6; Uriah and probably his wife Bathsheba were Hittites (2 Sam. xi. 3 ff.); Solomon had commercial relations with the kings of the Hittites (1 Kings x. 29); there were Hittites among the foreign wives of Solomon (1 Kings xi. 1); the Aramæans besieging Samaria were afraid of the kings of the Hittites; in Ezekiel xvi. 3, 45, Jerusalem's mother is said to be a Hittite; and in Josh. i. 4 the promised land is designated as "the whole land of the Hittites." It has been questioned whether there could have been Hittites in Hebron or among the Edomitish clans, but in the light of recent discoveries there is no valid reason to doubt it.

The earliest datable reference to the Hittites in cuneiform literature comes from the Chronicles of Babylonian Kings, published by King in 1907, recording that in the time of Samsuditana (c.1932 B.C.) "the Hittites came to the land of Akkad." The dynasty was probably overthrown by the Hittites, under whose suzerainty the first kings of the next dynasty of Babylon seem to have ruled. (See Babylonia.) But several centuries before this time the earliest-known rulers in Assur, Uspia and Kakia, seem to have Hittite names, and the Assyrian invasion of Asia Minor of which the Cappadocian tablets give testimony is likely to have been a reaction against this early occupation of Assur by the Hittites in the third millennium B.C. (See Assyria.) Whether Hatti (the modern Boghaz-keui) was already at this time the capital of the Hittite power cannot yet be determined, but is altogether probable. It has been suggested that the advance of the Hittites from Asia Minor into Syria and Mesopotamia, where the State of Hani was founded by them on the middle Euphrates, was connected with the Hyksos invasion of Egypt, and that long before the eighteenth dynasty Palestine to its southern border was overrun with Hittites. This seems to be borne out by the traditions of the Hebrews. Statues of Marduk and Zarpanit were carried away to Hani probably in the days of Samsuditana; these were not brought back to Babylon until the time of Agum II Kakrime (c.1655–1625 B.C.). An oracle speaking of Marduk's deportation to the land of the Hittites probably refers to the same event. In 1470 and 1463 Thothmes III declared that he received tribute from the land of the greater Hatti. He seems to have taken the Hittite cities of Kadesh, Carchemish, and Nii. An Assyrian king sought the aid of Thothmes IV against the Hittite State of Marash, and in 1446 the Egyptian King fought against the Hittites. The Amarna letters (q.v.) show the growth of Hittite power in northern Syria. The Hittites were in alliance with the Kassites (q.v.) in Babylon, and Amoritish chiefs like Abdasirta and Aziru (see Amorites), while protesting fidelity to Egypt, were seeking the protection of the great King in Hatti. Subbiluliuma, the first of these monarchs known to us by name and possibly the founder of a new dynasty, sent a message to Amenhotep IV, probably to congratulate him on his accession to the throne (c.1389). The Mitannians (q.v.) in Mesopotamia and the Arzawi, probably in Armenia, who appear to have been Hittites in

the wider sense, maintained their independence, and the former were in alliance with Egypt. A complete list of the Hittite kings from about 1400 to 1250 has been obtained from the Babylonian Boghazkeui letters. Subbiluliuma was succeeded by Arandas, Mursil, Mutallu, Hattusil, Dudhalia, and Arnuanta. The greatest of these was Hattusil, the contemporary of Ramses II (1310–1244 B.C.). After the battle of Kadesh a treaty was concluded between them, and in 1290 an offensive and defensive alliance was established. Ramses II married Hattusil's daughter in 1277. Hattusil also made an alliance with Kadashman Turgu of Babylon and subsequently threatened to sever their relations if the son of this King was not given the crown. The good relations with Egypt seem to have continued after the death of Ramses II. But in the days of Ramses III the Hittites appear to have joined the confederacy of peoples that attacked Egypt, as the Egyptians declare that the Prince of the Hittites was captured in battle. Egypt was saved, but lost her influence in Syria; and the Hittite Empire came to its end through the invasion of new peoples into Asia Minor. For some time this Empire, which once, as the monuments show, held sway over the Troad, Lydia, and Cilicia, had evidently lost much of its power.

But strong Hittite city kingdoms still continued to exist for several centuries. Against these the Assyrians kept up a persistent warfare. Tiglath-pileser I made expeditions against the Hittites in Commagene (c.1120). Shalmaneser III (860–825 B.C.) fought against a confederacy of Syrian kings, led by Sangara of Carchemish, at the battle of Karkar in 854 B.C. The Chaldians (q.v.) also waged wars against Hittite kingdoms. Menuas made a raid against Surisilis and Tarchigamas in the territory of the Hittite ruler Sadahalis. In another expedition he defeated the King of Gupas; and his son Argistis I likewise fought with Hittite rulers. Tiglath-pileser IV (745–728 B.C.) put a stop to the expansion of Chaldian power in this direction. Pisiris of Carchemish paid tribute to Tiglath-pileser IV in 739, but the city was afterward independent. It was Sargon II (722–705 B.C.) who finally conquered this important Hittite stronghold in 717 B.C.

The Hittites evidently belonged to the stock that inhabited Asia Minor before the invasion of Aryo-European nations. They are represented on the monuments with receding foreheads, large noses, marked cheek bones, and protruding upper jaws. Characteristic of their dress are the high peaked caps, the tunics reaching to the knees, and the shoes with ends turned up. From the type of personal names it may be inferred that the Hittite language belonged to the same family as some other early Asianic tongues. Unfortunately it has not yet been possible to decipher the native inscriptions. Of these a considerable number is now known. They have been found at Ibreez, Giaur Kalessi, Boghazkeui, Eyuk, Mount Sipylos, the Pass of Karabel, Mazaka, and elsewhere in Asia Minor, at Hamath, Aleppo, Carchemish, Nineveh, and Babylon. The hieroglyphic writing runs boustrophedon, as the ox plows—one line from right to left, the next from left to right. This is indicated by the direction of the faces. But the value of the signs has not yet been ascertained. A bilingual inscription on the so-called Tarkondemos boss, in Babylonian cuneiform and Hittite, is probably of Mitannian origin, but has not furnished a sufficient clew. Among the many tablets discovered by Winckler at Boghazkeui in 1906 there were many in which the native language was written in cuneiform signs, while others were in Babylonian script and speech. The former may prove of great value to scholars; but they have not yet been published, and they are not so likely to throw light on the hieroglyphics as to give some knowledge of the language that will be available when the value of the signs shall have been correctly guessed. The attempts at decipherment by Wright, Conder, Sayce, Peiser, Jensen, Messerschmidt, and Gleye have not yet been crowned with success. In Syria the Hittites, like the Hebrews, probably adopted the language of Canaan, and later Aramaic. Among the Mitannians the Iranian element in the population seems to have affected to some extent their Hittite speech. As the system of hieroglyphics is entirely independent of the Cretan and the Egyptian as well as of the early Sumerian pictographs, so Hittite architecture and sculpture may have been more original creations than is generally supposed. The similarity to Sumero-Akkadian motives on the one hand and Egyptian on the other is obvious and has naturally led to the assumption of borrowing. A strong influence exerted by the great rival civilizations at various times is also intrinsically probable. But only a more extensive knowledge of the earliest phase of Hittite history than we now possess can settle such questions as whether the Assyrian temples were built on Hittite models, and how far the sculpture of the Amoritish dynasty in Babylon reflects Hittite influence. On some of the finest specimens of Hittite art, see EYUK.

The chief sources of our knowledge of Hittite religion are the treaty between Hattusil and Ramses II, of which an Egyptian copy has long been known, and a résumé in Babylonian language and script was found by Winckler in 1906; a treaty between Hattusil and a Mitannian ruler, also discovered at Boghazkeui; allusions in other texts; and pictorial representations. There were gods of earth and heaven; and each river, mountain, land, and city had its male or female sutekh, its genius loci. Foremost among the gods were Hatti, Teshub, Tarchu, Chipa, and apparently Sandan and Ma. Hatti is represented at Yazyly Kaya in such a manner as to leave no doubt that he is the same god as the Phrygian Attys; and it is not improbable that the two names are identical. Teshub was worshiped by a number of peoples who may have been connected in some way with the Hittites. Tarchu has been thought to be identical with Terah, represented as the father of Abraham. Chipa occurs in Mitannian names like those of the princesses Tadu Chipa and Gilu Chipa, and of the Governor of Jerusalem, Arta Chipa. Sandan seems to have been especially connected with Cilicia, and Ma was the great mother goddess. In the Mitannian treaty Babylonian gods are mentioned, but also Iranian, such as Varuna, Mithra, and the Nasatyas. Survivals of the ancient Hittite religions may be found in Strabo's description of Cappadocia (XII, ii, 3, 6, 7) and possibly in Lucian's *De Dea Syra*, as the worship at Hierapolis-Mabug is likely to have been a continuation of that carried on at Carchemish (q.v.) until the destruction of this city.

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HITTORF, hĭt'tôrf, Johann Wilhelm (1824–). A German physicist, born at Bonn. In 1852 he became professor of chemistry and physics at Münster, where he remained in active service for half a century. Hittorf's earliest important researches were in electrolysis, and he was able to extend Faraday's work, his method of determining the mobility of ions being of the greatest importance to physical chemistry. In addition to his work in electrolysis he made elaborate investigations of the various phenomena attending the passage of electricity through gases. In 1862, with Plücker, he discovered that different spectra could be obtained from the same substances under different conditions of temperature. Later (1869), in studying the passage of electricity through tubes containing a rarefied gas, he observed that by increasing the exhaustion of the tube the dark space between the negative pole and the negative glow became wider, and that when the discharge from the cathode struck against the glass considerable fluorescence was produced. Hittorf also ascertained that these rays could be deflected by a magnet and anticipated Crookes, who in 1878 published his famous researches with the vacuum or Crookes tubes and named the rays thus produced radiant matter. He investigated the allotropic occurrence of selenium and phosphorus, and in the case of the latter substance he was successful in producing a crystallized form, black in color and with a metallic lustre. He was a foreign associate of the Berlin Royal Academy of Sciences. Hittorf's many valuable papers on physics and chemistry are to be found for the most part in Poggendorff's and Wiedemann's *Annalen der Physik* (Leipzig, current). This paper "On the Migration of Ions during Electrolysis" is contained in *The Fundamental Laws of Electrolytic Conduction* (New York, 1899), translated from Poggendorff's *Annalen* and reprinted in German in *Ostwald's Klassiker*, No. 21 (Leipzig, 1891).

HITTORFF, ĕ'tôrf', Jacques Ignace (1793–1867). A French architect, born in Cologne. He went to Paris in 1810, studied architecture under Ch. Percier (q.v.), and between 1819 and 1825 traveled extensively in England and Germany and in Sicily, where he studied the Greek ruins with particular reference to their polychromy. On his return he was appointed architect to the King, and with the assistance of Lepère built in Paris the fine Neo-Greek church of St. Vincent de Paul, applying to it the results of his researches in Greek polychromy. The exterior color decorations and paintings, however, failed to resist the climate and were removed a few years later. He was the chief designer of the embellishments for the Place de la Concorde, including its two fine fountains, and for the Champs Elysées and other avenues and squares. In 1864 he was made general inspector of the Conseil des Bâtiments. He published *Architecture antique de la Sicile* (1826–30), *Architecture moderne de la Sicile* (1826–35), *Architecture polychrome chez les Grecs* (1851)—all of which are still highly valued.

HITZIG, hĭts'ĭk, Eduard (1838–1907). A German alienist, grandson of the biographer and criminologist Julius Eduard Hitzig. He was born in Berlin, studied medicine there and in Würzburg, and in 1875 became professor of psychiatry at Zurich. Four years afterward he became professor in Halle, where he established an independent clinic for nervous and mental disorders, the first in Prussia. Failing eyesight compelled him to give up his professorship in 1903. He wrote: *Physiologische und klinische Untersuchungen über das Gehirn* (1904), the result of long research on cerebral physiology and pathology, and especially on localization of the various functions; *Ueber traumatische Tabes* (1894); *Der Querulantenwahnsinn* (1895).

HITZIG, Ferdinand (1807–75). A German biblical scholar. He was born June 23, 1807, at Hauingen, Baden, and educated at Heidelberg, Halle, and Göttingen. In 1833 he was called to Zurich as professor of theology, with a special view to the exegesis of the Old Testament; but his lectures embraced also the New Testament and the languages of the East. In 1861 Hitzig returned to Heidelberg as professor. The first work which established his fame was his *Der Prophet Jesaia übersetzt und ausgelegt* (1833). Besides a translation of the Psalms, with a commentary (1835–36), he furnished for the *Exegetisches Handbuch zum alten Testament* the commentaries on the minor prophets (1838), on Jeremiah (1841), Ezekiel (1847), Ecclesiastes (1847), Daniel (1850), the Song of Solomon (1855), and Proverbs (1858), with a translation of all the prophetical books as a supplement (1854). He also published works on the New Testament and various archæological subjects, and *Geschichte des Volkes Israel* (1869–70). His work is important in the progress of modern biblical scholarship. He died at Heidelberg, Jan. 22, 1875. Consult T. K. Cheyne, *Founders of Old Testament Criticism* (London, 1893), and, for his biography, H. Steiner (Zurich, 1882).

HITZIG, Julius Eduard (1780–1849). A German criminal jurist and biographer. He was born in Berlin, studied law at Halle and Erlangen, and from 1799 to 1835 was connected more or less closely with the criminal courts of

Warsaw and Berlin. To this period belong the *Zeitschrift für die preussische Kriminalrechtspflege* (1825) and *Annalen für deutsche und ausländische Kriminalrechtspflege* (1828), both founded by him. At Warsaw he had been intimate with the poets Mnioch and Werner, and in Berlin he was even more prominent in literary circles as founder of the Mittwochsgesellschaft, a literary club. Hitzig was editor of the *Presszeitung* (1840–44) and author of biographies of Z. Werner (1823), of E. T. A. Hoffmann (1823; 3d ed., 1839), and, at his request, of Chamisso (1839–40). With Häring, in 1842, he began to publish *Der neue Pitaval;* in 1826 he had brought out *Gelehrtes Berlin im Jahre 1825.*

HIVE BEE. The honeybee. See BEE.

HIVES. A name popularly given to the eruption known as urticaria, or nettle rash (qq.v.). The eruption appears as white rounded elevations or long wheals, which turn red later, especially after scratching or rubbing, for the itching and burning are intense. Eating lobsters or crabs has caused hives in some people. Certain drugs, such as the balsams, often cause it. After unloading the bowels, local treatment with dilute acids or bichloride of mercury will give relief. Alkalies and salicylates, taken internally, cut an attack short. In Great Britain the term is loosely applied to laryngitis and croup. See HIVE SIRUP.

HIVE SIRUP, *Syrupus Scillæ compositus.* The compound sirup of squills, a plant growing on the northern coast of the Mediterranean Sea. The bulb is the officinal portion. It is generally dried for use, but is sometimes imported packed in sand in a partially undried state. The sirup is prepared usually by taking of squill a moderately coarse powder, senega a moderately fine powder, tartrate of antimony and potassium, sugar, diluted alcohol, and water. The whole is carefully mixed according to formulæ laid down in the Pharmacopœia. In its action it is an emetic and combines the virtues of senega, squill, and tartar emetic, of the last of which it contains but one grain to the fluid ounce. It is also diaphoretic, expectorant, and in large doses cathartic. It was originally devised for the treatment of spasmodic croup, which is loosely known as hives in Great Britain, whence comes its popular name. Great care must be taken, in employing it, not to allow its sedative operation to proceed too far. In overdoses it has been known to produce a fatal inflammation of the stomach and bowels, since tartar emetic is highly poisonous.

HI'VITES. One of the peoples mentioned in the lists of nations dispossessed by the Hebrews when they entered Palestine (Ex. iii. 8 et al.). In Gen. x. 17 they are placed among the sons of Canaan. They are especially connected with the Amorites and seem to have been a branch of this people. In Gen. xxxiv. 2 Shechem is a Hivite; in Gen. xlviii. 22 the city is inhabited by Amorites. Similarly the inhabitants of Gibeon are said to be Hivites in Josh. ix. 7; xi. 19, and Amorites in 2 Sam. xxi. 2. In Josh. xi. 3; Judg. iii. 3, Hivites appear in the Lebanon region. Consult Böhl, *Kanaanäer und Hebräer* (Leipzig, 1911).

HIZEN, hē'zĕn'. One of the nine provinces of the island of Kyushu, Japan, famous in history and for its kaolin and the production of porcelain. It is rich in tea, tobacco, vegetable wax, and coal, but not in cereals, though in quality its rice is reckoned the best. Its chief towns are Saga and Nagasaki (q.v.). Arita and Imari, both situated in this province, are famed for their ceramic ware. It was formerly divided among 10 daimyos (q.v.). It is now mostly within the Nagasaki-ken. Consult J. J. Rein, *Japan* (London, 1884), and for the ceramic industries of the province, Frank Brinkley, *Japan: Its History, Arts, and Literature* (8 vols., Boston, 1910).

HJÄRNE, yâr'nĕ, HARALD GABRIEL (1848–). A Swedish historian, born at Klastorp, Vestergötland. He was educated at Upsala, where he obtained his doctor's degree and became lecturer (1872) and professor (1889). He published numerous articles on history and several large works. His studies on the relations between Russia and Sweden are of particular importance. He wrote: *Polens nordiska politik närmast före kongressen i Stettin 1570* (1884); *De äldsta svensk-ryska legationsakterna* (1884); *Från Moskva till Petersburg* (1888–89); *Sveriges statsskick under reformationstiden 1520–1611* (1893); *Gustaf Adolf, protestantismens förkämpe* (1901; Ger. trans. in *Der Protestantismus am Ende des 19ten Jahrhunderts,* 1900–02); *Medeltidens statsskick* (1895); *Karl XII* (1902); *Blandade spörsmål* (1903). In 1902–08 he was a member (Liberal) of the Lower House of Parliament. He also wrote *Ostanifrån, minnen och utkust* (1905); *Svenskt och främmande* (1908); *Ur det förgångna* (1912); *Stat och kyrka* (1912). Consult A. Grape, *Bidrag till en Hjärne-Biografi,* by 27 authors (Stockholm, 1908).

HJELT, hyĕlt, EDVARD IMMANUEL (1855–). A Finnish chemist and educator, born in Wichtis, the son of a professor of medicine. He was educated at the University of Helsingfors, where he became lecturer in chemistry in 1880, was professor of chemistry in 1882–1907 and rector from 1899 to 1907, and then vice chancellor. In 1907–09 Hjelt was Vice President of the Senate of Finland. He was one of the revisers of Roscoe and Schorlemmer's *Treatise on Chemistry,* and wrote, besides many technical papers, biographical studies of great chemists, especially Berzelius. *Principles of General Organic Chemistry,* an English version from Hjelt's German book, appeared in 1890.

HJORT, hĭôrt, JOHAN (1869–). A Norwegian zoölogist, oceanographer, and fisheries expert. He was born in Christiania and there studied medicine and zoölogy and became (1892) conservator of the zoötomical museum and (1893) government representative at the salt-water fisheries. After taking his doctor's degree at Munich, he was appointed, in 1906, fisheries director for Norway. The government furnished him with a staff of scientists and with the *S. S. Michael Sars;* in this vessel in 1910 he headed, with Sir John Murray, an expedition to Africa and America. Afterward he published, with Murray, *The Depths of the Ocean* (1912), and *Report on the Scientific Results of the Michael Sars North Atlantic Deep Sea Expedition, 1910* (1914). As member for Norway of the International Council for the Study of the Sea, he did much pioneer work. He wrote *Report on Norwegian Fishery and Marine Investigations* (vol. i, Christiania, 1900; vol. ii, Bergen, 1909); *Report on International Herring-Investigations in 1910* (Copenhagen, 1911), with E. Lea, and many other books and articles. In 1914 he visited Canada, upon the invitation of the government, to investigate the Canadian fish and fisheries.

HLADÍK, klä'dēk, VÁCLAV (1868–). A Czech writer, born in Prague and educated at Ceskoslov and Prague. He repeatedly visited France and England and was strongly influenced by the French Naturalist school. Hladík occupies a prominent place in Czech journalism, having been editor of the *Národní Politiký* and *Lumír*. Many of his writings were first published in periodicals and then collected in book form. They include: *Z lepši společnosti* (1892), sketches from the life of Prague; *Z pražskeho ouzduši* (1894); *O Současne Francü* (1909), a book of observations on French life; novels, *Trest* (1901), *Vaseň a sílža* (1902), *Valentinory ženy;* and dramas, *Novy Zivot* (1896), *Závrat* (1902), etc. He is the chief representative of French literary ideals in modern Czech literature.

HOADLY, hōd'lī, BENJAMIN (1676–1761). A Church of England prelate. He was born at Westerham, Kent, Nov. 14, 1676. He graduated B.A. at Cambridge, 1696, became preacher in London in 1701, Bishop of Bangor in 1715, of Hereford in 1721, of Salisbury in 1723, and of Winchester in 1734. He attracted attention by controversies with the Nonconformists and with the High Church party of the Church of England. His principles were developed in his *Essay on the Origin of Civil Government* (1709). The accession of George I in 1714 brought Hoadly's views into favor with the court, and he received advancement. In 1717 the so-called Bangorian Controversy arose. It began by Hoadly's publication of a pamphlet, and of a sermon on the text, "My kingdom is not of this world." He maintained that Christ had left behind Him no such authority as that claimed by churches, and that this was the best way of answering the pretensions of the Church of Rome. These views gave great offense both to High Church and Dissenters. He was attacked from all quarters, and the controversy raged for three years. He died at Chelsea, London, April 17, 1761. His works were published with a life by his son, John Hoadly (London, 1773). Consult Leslie Stephen, *History of English Thought in the Eighteenth Century* (3d ed., New York, 1902).

HOADLY, hōd'lī, GEORGE (1826–1902). An American lawyer, and Governor of Ohio, born in New Haven, Conn. He was educated in the public schools of Cleveland, whither his father had moved in 1830. He graduated from Western Reserve College, then at Hudson, Ohio, in 1844, studied at Harvard Law School, was admitted to the bar in 1847, and two years later became a partner in the law firm of Chase and Bull at Cincinnati, in which Salmon P. Chase was the senior member. In 1851 he was chosen by the Legislature judge of the Superior Court of Cincinnati, in 1855 became city solicitor, and in 1859, upon the reorganization of the new Superior Court, was elected judge and was reelected in 1864. He refused a seat on the supreme bench offered him by Governor Chase. Originally a Democrat, he took a prominent part in the "Barnburner" movement, was a War Democrat, and finally during the war allied himself with the Republican party. He resigned from the bench in 1866 to resume his law practice. In 1872 he was active in the Liberal Republican revolt, but dissatisfaction with the nomination of Greeley caused him to remain in the party. In 1876, however, he allied himself with the Democratic party on the tariff issue and was one of the counsel for Tilden before the Electoral Commission and argued the cases of Florida and Oregon. In 1883 he was the party's candidate for Governor of Ohio, being elected over Joseph B. Foraker by 12,000. Two years later he was in turn defeated by Foraker for reëlection to the same office. During 20 years of this period he was a professor in the Cincinnati Law School. From 1887 until his death he practiced law in New York City.

HOANG-HO, HUANG-HO, HWANG-HO, hwäng'hō', or YELLOW RIVER. Next to the Yang-tse-kiang, the largest river of China (Map: China, J 3). Its sources are two mountain torrents on the Odontala Plain, altitude 14,000 feet, south of the Burhan Bota Mountains in Tibet, only a short distance north of the upper course of the Yang-tse-kiang. Its course is exceptionally tortuous. After flowing eastward to near the boundary of Tibet, it changes its direction first to the northwest and then to the northeast, in which latter direction it flows through the Chinese Province of Kansu. Leaving the Province of Kansu, it crosses the Great Wall into Mongolia. There it flows at first northeast and then east as far as the western boundary of the Chinese Province of Shansi, where it turns sharply to the south, and, passing the Great Wall again, flows between the provinces of Shensi and Shansi, forming their boundary line. At about lat. 35° N. it turns sharply east, which direction it maintains as far as the city of Kaifeng, in the Province of Honan. From that point it flows in a northeastern direction until it falls into the Gulf of Pechili about lat. 38° N. Its total length is probably over 2700 miles, and its basin is estimated at 400,000 square miles. The chief tributaries of the Hoang-ho are the Tao-ho from the south, the Wei-ho from the west, and the Tatung-ho from the north. The Hoang-ho is navigable for small vessels for a short distance from its mouth and in some parts of its middle course. The course of the river has changed repeatedly, and the present mouth was that of the Tatsin until 1853. Prior to that time the course of the river below Kaifeng was southeasterly, and its mouth in the Province of Kiangsu in about lat. 34° N. The sediment which is transported in large quantities by the Hoang-ho raises its bed, thereby causing inundations. These have been so frequent and so disastrous that the river has come to be known as "China's sorrow." Chinese history is filled with the vagaries of the Hoang-ho, disastrous changes in the channel having occurred in 1194, 1209, 1324, and 1853. In 1898, because of a destructive flood, silt and sand were deposited over an area of about 200 square miles, at a depth of from 2 to 10 feet, amounting in all to 16,000,000 cubic feet. The distress caused by this calamity was one of the causes of the Boxer Rebellion. It is estimated that the river will not keep to part of its present bed more than 15 years, as the flood level is now from 15 to 20 feet above the level of the plains below the city of Tungahsien. From time immemorial a vast system of dams and dikes has been maintained to keep the river in check. The river causes an annual expense and loss of about $3,750,000 to the government and the provinces.

HOAR, hōr, EBENEZER ROCKWOOD (1816–95). An American jurist. He was born at Concord, Mass., the son of Samuel Hoar, graduated from Harvard College in 1835 and from Harvard Law School in 1839, and was admitted to the bar in 1840. He was a judge of the Court of Common Pleas from 1849 to 1855 and of the State

Supreme Court from 1859 to 1869. In 1869–70 he was Attorney-General of the United States in President Grant's cabinet. His zeal for civil-service reform aroused the hostility of "machine" politicians, and not only cost him his portfolio, but was responsible for the Senate's failure to confirm his nomination as associate justice of the Supreme Court. He was a member of the Joint High Commission that framed the Treaty of Washington in 1871 and was a Republican member of Congress in 1873–75. From 1878 to 1887 he was president of the board of overseers of Harvard University.

HOAR, George Frisbie (1826–1904). An American legislator, born at Concord, Mass., Aug. 29, 1826. He graduated at Harvard in 1846, studied law in Harvard Law School, and in 1849 opened an office in Worcester. He was an ardent member of the Free Soil party and later of the Republican party, almost from the time of its organization, and in 1852 he was elected one of its representatives in the Massachusetts Legislature. Though his ambition at this time was for a legal rather than a political career, he was induced to accept other nominations, which resulted in his serving in both branches of the State Legislature and in the United States House of Representatives, of which he was a member from 1869 until 1877, when he was chosen Senator by his State. During his last year in the House he was a member of the Electoral Commission (q.v.), chosen in 1877, which decided that Hayes had been elected President over Tilden. He presided over the Republican National Convention of 1880, which nominated Garfield and thus ended the bitter contest between Grant and Blaine. He was always a consistent opponent of "imperialism" from the days when he aided Sumner in his opposition to the annexation of Santo Domingo; and though he supported President McKinley for reëlection, he strongly opposed his policy in the Philippines, which he considered subversive of American ideals. During his service in the House Mr. Hoar was one of the managers of the Belknap impeachment trial, and after his election to the Senate he was chairman of the committees on the judiciary and on privileges and elections, and a member of the committees on engineering bills, civil service and retrenchment, library claims, Nicaragua claims, and rules, as well as chairman of the select committees on woman suffrage and relations with Canada. He served as regent of the Smithsonian Institution (1880), president of the American Antiquarian Society, president of the American Historical Association (1895), president of the board of trustees of Clark University (1900), and trustee of the Peabody Fund. He died in Worcester, Sept. 30, 1904. Consult his *Autobiography of Seventy Years* (2 vols., New York, 1903) and F. C. Lowell, "George Frisbie Hoar," in *Sons of the Puritans* (Boston, 1908).

HOAR, Samuel (1778–1856). An American lawyer and legislator. He was born at Lincoln, Mass., graduated at Harvard in 1802, was admitted to the bar in 1805, and soon became a prominent lawyer. He was a State Senator in 1825 and again in 1833 and was a Whig member of Congress from 1835 to 1837. In 1844 he was sent by the Massachusetts Legislature to South Carolina to test before the courts the constitutionality of certain laws of that State authorizing the imprisonment of free negroes coming into it. He was, however, not allowed to plead, but was forcibly expelled from Charleston by the public authorities, the South Carolina Legislature by special act authorizing the expulsion.

HOARE, Sir Richard Colt (1758–1838). An English antiquary, born at Stourhead in Wiltshire. At 25 he married Lord Lyttelton's eldest daughter and after her death, two years later, traveled extensively over Europe. He wrote journals concerned with his tours in Ireland (1807) and in Italy (1819); a translation of Giraldus Cambrensis (1808); a topographical catalogue of the British Isles (1815); and, most important among his works, an *Ancient History of North and South Wiltshire* (1812–21), succeeded by an incomplete *History of Modern Wiltshire,* dealing with the southern section only (1822–44).

HOAR FROST. See Frost.

HOAR'HOUND. See Horehound.

HOARSE'NESS. See Throat, Affections of.

HOATZIN, hō-ăt'sĭn (South American name), or Hanna. A bird (*Opisthocomus cristatus*) of Guiana and Brazil, possessing many conflicting characteristics of structure, so that its place in classification has been greatly in dispute. Some writers have regarded it as nearly related to the plantain eaters; others, to the curassows. Most recent writers have placed it with or very near the Gallinæ, but generally as a separate order, the Opisthocomiformes. It has the general shape of a curassow, but in size is much smaller, is olive color varied with white above and deep bay below, and has a long pendent crest of loose yellow feathers. The tail is long and

THE HOATZIN.

broadly tipped with yellow. It lives in bands in the forest, frequents the borders of streams, feeds upon leaves and fruits, rarely leaving the lower trees and bushes, flying weakly, and uttering a "sharp grating hiss" as a call note. It feeds largely on a species of arum, which at times gives its flesh and whole body a vile musky odor, so that it is known in British Guiana as "stink bird." On the Amazon it is called *cigano,* or "gypsy." Its nest is rudely built of sticks on some low bush, and the eggs, three or four in number, are whitish with reddish-brown blotches. The character and actions of the young are, however, the most remarkable thing about this extraordinary bird. They are hatched naked and possess at birth well-developed claws on both the index (forefinger) and pollex (thumb) digits of the fore limb. Soon after hatching the nestlings begin to crawl about by hooking these claws about twigs or any object accessible and

so use their wings precisely as feet, holding on also by the bill. This is an interesting reminder of the condition of the wing in the most ancient of birds (see ARCHÆOPTERYX), which used its anterior digits in much the same way. The young hoatzin, however, sheds its claws after a few days. Consult: Alfred Newton, *Dictionary*

YOUNG HOATZIN.
Showing handlike use of immature wings.

of Birds (New York, 1896); C. W. Beebe, "Ecology of the Hoatzin," *Zoologica*, i (ib., 1909); M. B. and C. W. Beebe, *Our Search for a Wilderness* (ib., 1910).

HO'BAN, JAMES. An American architect, born in Ireland, c.1755. After some years' residence in Charleston, S. C., he went to Washington when that city was first laid out and worked there for the government for the greater part of his life (1792–?1817). He is chiefly known as the architect of the White House, which he also rebuilt after its burning by the British in 1814. He was in charge also of the building of the Capitol under Thornton.

HO'BART. The capital of Tasmania, situated on the river Derwent, 12 miles from its entrance into Storm Bay, on the south coast of the island (Map: Tasmania, D 3). Besides the government official buildings, Hobart has a college, a technical school, two cathedrals, hospitals, a free library, museum, and art gallery. Its naturally excellent harbor and quay with three patent slips accommodate ships of the largest size. It has considerable manufactures, a large export and import trade, railway communication with Launceston, and steamship communication with Sydney, Melbourne, New Zealand, and London. It is the seat of a United States consul and the see of Anglican and Roman Catholic bishops. With Mount Wellington as a picturesque background and with street railroads, fine parks and drives, Hobart is a favorite summer resort for Australians. The mean temperature for the year is 52.3°, being 42.1° in winter and 63.1° in summer. Pop., 1911, 27,526; with suburbs, 39,937. Hobart was founded in 1804 and became a city in 1857. In 1881 its name was changed from Hobart Town to the present form.

HOBART. A city and the county seat of Kiowa Co., Okla., 55 miles west of Anadarko, on the Little and Big Elk rivers, and on the Chicago, Rock Island, and Pacific and the St. Louis and San Francisco railroads (Map: Oklahoma, C 3). It is situated in an agricultural region; carries on a trade in alfalfa, hay, grain, poultry, live stock, and dairy products; and has cotton-seed-oil and alfalfa mills and a cotton compress. There is a Carnegie library. The water works are owned by the municipality. Hobart was opened by the government to white settlers in 1901. Pop., 1900, 3136; 1910, 3845.

HOBART, GARRET AUGUSTUS (1844–99). An American lawyer and politician, Vice President of the United States. He was born at Long Branch, N. J., graduated at Rutgers College in 1863, was admitted to the bar six years later, and practiced his profession with success at Paterson, N. J., where he made his home until death. He was city solicitor there in 1871, was a member of the State Assembly from 1873 to 1875, and of the State Senate from 1877 to 1883, presiding over both of those bodies. He was nominated to the United States Senate in 1884, but failed of election. He was four times successively delegate at large from New Jersey to the Republican National Convention and, having been nominated at St. Louis in 1896 for Vice President on the ticket with William McKinley, was elected. To a greater extent, perhaps, than any of his predecessors in the vice presidency, he made that office one of real influence and power. He was the intimate friend and counselor of President McKinley and exercised a strong influence on the conduct of public affairs. He defeated the move to give the Filipinos independence. He was interested in many banking and other business corporations, conducted many successful receiverships, and accumulated a large fortune. He died before the expiration of his term of office, on Nov. 21, 1899.

HOBART, JOHN HENRY (1775–1830). A Protestant Episcopal bishop of New York. He was born in Philadelphia, Pa., graduated at Princeton in 1793, and was tutor from 1795 to 1798, when he took orders. His first charges were in Philadelphia, New Brunswick, N. J., and Hempstead, L. I. He was appointed curate of Trinity Church, New York (1800); was ordained priest (1801); and after serving in various capacities was appointed (1816) rector of Trinity and Bishop of the diocese. In 1821 he was appointed professor of pastoral theology and oratory in the General Theological Seminary, which he helped to found. He spent the years 1824–25 in Europe, studying social, moral, and religious conditions. He died at Auburn, N. Y. His writings, which went through many editions, include: *Festivals and Fasts* (1804); *Clergyman's Companion* (1805); *Controversial Essays* (1806); *Apology for Apostolic Order* (1807); *The Christian's Manual* (1814); *A Comparison of the United States with England* (1826). He also edited D'Oyley and Mant's *Family Bible* (2 vols., 1818–20). Consult: W. Berrian, "Memoir," attached to the *Posthumous Works of Bishop Hobart* (New York, 1833); McVickar, *The Early and Professional Years of Bishop Hobart* (Oxford, 1838); *Correspondence of John Henry Hobart*, vols. i–v (New York, 1911–12).

HOBART, JOHN HENRY (1817–89). An American Protestant Episcopal clergyman and author, the youngest son of Bishop John Henry Hobart. He was born in New York City, graduated at Columbia College, and was ordained in

1841. After having a charge at Baltimore he was assistant in Trinity Church in New York City for 15 years and afterward became rector of Trinity Church, Fishkill, N. Y. He published: *Instruction and Encouragement for Lent* (1859); *Mediævalism* (1877); *Church Reform in Mexico* (1877).

HOBART COLLEGE. An institution for higher education, founded at Geneva, N. Y., under Episcopal auspices. It was projected in 1812 and named after Bishop Hobart, through whose efforts it was organized. A provisional charter was secured in 1822 and a full charter in 1825, under the title of Geneva College. In 1852 the name was changed to Hobart Free College and in 1860 to Hobart College. The college offers academic courses leading to the degrees of Bachelor of Arts and of Science. William Smith College was opened in 1908 for the separate instruction of women. The work of the two colleges is carried on independently by a common faculty, upon whose recommendation the corporation of Hobart College grants to the students of both institutions the same degrees. In 1914 it had 72 students in William Smith College and 102 in Hobart, 23 instructors, 53,000 volumes in the library, total property valued at $1,265,955, including grounds, buildings, and other equipment worth $507,480, and an annual income of $82,322. The president in 1914 was Lyman P. Powell.

HOBART-HAMPDEN, Augustus Charles (commonly known as Hobart Pasha, pȧ-shä′) (1822–86). An English admiral in the Turkish service. He entered the British navy in 1835, distinguished himself in the Crimean War, and in 1863 was promoted to the rank of captain, but shortly after this he retired. During the American Civil War he was a blockade runner and had many narrow escapes. In 1867 Hobart entered the Turkish service as naval adviser to the Sultan. His first service was in suppressing the Cretan rebellion, for which he was promoted an admiral with the title of Pasha. He reorganized the Turkish fleet, which he commanded on the Black Sea against Russia, in the War of 1877–78, and in 1881 was appointed marshal of the Empire. Although his name was twice struck from the British navy list for operating against powers friendly to Great Britain in disregard of the Foreign Enlistment Act, he was finally restored in 1885 with the rank of vice admiral. His book, *Sketches of my Life* (1887), published posthumously, is a mixture of fact and fiction.

HOBBEMA, hôb′bȧ-mä, Meindert (1638–1709). One of the greatest Dutch landscape painters. He was born at Amsterdam in 1638, the date being verified by the statement in the record of his marriage there, Oct. 2, 1668, that he was 30 years old at that time. This marriage with the cook of Lambert Reynst, burgomaster of Amsterdam, put an end to his artistic career. For, through the influence of another maidservant in the burgomaster's household, he was appointed wine gauger to the city and ceased painting. He lived at Amsterdam and was a pupil and friend of Jacob van Ruysdael. They often worked together, painting the same scene side by side. As such well-known contemporaries as Berchen, Vandevelde, and Lingelbach are said to have painted the figures in his landscapes, it seems likely that he was appreciated by the artists of his day. Nevertheless, he died at Amsterdam in poverty, Dec. 14, 1709.

Hobbema and Ruysdael are the greatest landscape painters of the Dutch school; their art marks its consummation. Some of their works are difficult to distinguish; but Ruysdael is usually considered the greater because he is much more versatile. Hobbema, e.g., never painted rocky gorges, torrents, stormy autumn scenes, rough seas, coast scenes, panoramas, but preferred the gentler aspects of nature, such as quiet woodland scenes, pools of water with subtle sunlight effects, romantic water mills and streams. His pictures are rich in warm and golden tones, and his color, when it has not darkened, has a transparent quality, with brilliant effects reflected in sky and water. His technique is bold in touch, but careful in finish of detail, which occasionally becomes excessive. No one has better portrayed the magical effects of sunlight and atmosphere. It was not until the eighteenth century that his merit was appreciated. The English were the first to recognize it, and therefore far the greater number of his best works were in the private collections of England, from which they have been largely bought by American collectors. Hobbema also exercised great influence upon the English landscape painters of the latter eighteenth century, especially upon Old Crome. The rarity of his paintings has made them much sought after, and their high value has caused forgeries of signatures and dates.

Of all public collections the National Gallery, London, is richest in works of Hobbema, possessing nine, including the "Avenue, Middelharnis" and the "Ruins of Brederode Castle." Amsterdam has six, including the famous "Water Mill"; Glasgow and Brussels, each four; Paris, Dresden, and Frankfort, each three; and Berlin two. Hobbema is especially well represented in the great American private collections. Thus, the Widener collection, Philadelphia, has four fine examples; the Frick collection, New York, three; the J. Pierpont Morgan collection three, two of which, the so-called Holford and Trevor landscapes, are on loan in the Metropolitan Museum, New York; and J. G. Johnson, Philadelphia, has four.

Bibliography. The best list of Hobbema's works is in Hofstede de Groot, *Catalogue of Dutch Painters*, vol. iv (London, 1912), with admirable brief biography. See also the scholarly treatise of Wilhelm Bode, *Great Masters of Dutch and Flemish Painting* (ib., 1909). Of a more popular character are F. E. Michel, *Hobbema et les paysagistes de son temps en Holland* (Paris, 1890), and Frank Cundall, *The Landscape and Pastoral Painters of Holland* (London, 1891).

HOBBES, hŏbz, John Oliver (Pearl Richards Craigie) (1867–1906). An English novelist, born in Boston, Mass. Her father removed to England while she was very young, and she was educated there by private tutors and later in Paris and at University College, London. She was married in 1887 to Reginald W. Craigie, but secured a divorce in 1895. She wrote the novels: *Some Emotions and a Moral* (1891); *A Study in Temptations* (1893); *The Gods, Some Mortals, and Lord Wickenham* (1895); *A Bundle of Life* (1894); *Robert Orange* (1900); *The Serious Wooing* (1901); *Love and the Soul Hunters* (1902); *The Vineyard* (1904); *Flute of Pan* (1905); *The Dream and the Business* (1906), posthumous; and the plays: *Journeys End in Lovers' Meeting* (1894), for Miss Ellen Terry; *The Ambassador* (1898); *A Repentance* (1899).

HOBBEMA

"THE AVENUE OF MIDDLEHARNIS," FROM THE PAINTING IN THE NATIONAL GALLERY, LONDON

A selection from her writings, *Life and To-Morrow* (New York, 1907), was made by T. Proctor. Her style is cynical, brilliant, and epigrammatic, especially in dialogue. Consult J. M. Richards, *Life of John Oliver Hobbes Told in her Correspondence with Numerous Friends* (ib., 1911).

HOBBES, THOMAS (1588–1679). An English philosopher and political theorist. He was born at Malmesbury on April 5, 1588, the son of a clergyman. At the age of 15 he went to Oxford and studied the usual course of Aristotelian logic and physics. At the age of 20, having taken his degree and quitted Oxford, he was recommended to Lord Cavendish, afterward Earl of Devonshire, as tutor to his eldest son. Thus began an intimate connection with that great family which lasted through his long life.

In 1610 he went abroad with his pupil and made the tour of France and Italy. After his return he still continued to live with the Earl of Devonshire's family, and his residence in London afforded him opportunities of becoming acquainted with Bacon, Ben Jonson, and the other distinguished men of the time. Meantime he was occupied with classical, political, and philosophical studies, and prepared for publication his first work, a translation of Thucydides, which came out in 1628. His interest in Thucydides was largely political. For many years he still derived his income from tutorial work, but gave his leisure to study. The political disturbances of the time made him desirous of political stability and order, which he believed could be obtained only by unquestioning recognition of the absolute power of the sovereign. This power, according to Hobbes, is neither original nor divine, but was delegated by the subjects in a compact which created the state and gave rise to all moral and political obligation. Primitive man did not live in any social or political organization. Every one was at first bent on securing his own selfish ends, but came to see that the warfare which inevitably resulted from the clash of unregulated interests was suicidal. A contract was made whereby this war of each against all—*bellum omnium contra omnes*—was brought to a close, a civil government established, and loyalty pledged to the sovereign power thus constituted. Whatever laws this power lays down are the measure of right and wrong. Thus, instead of recognizing "the divine right" of kings, Hobbes derived their sovereignty from the original contract; and although he vigorously maintained the supreme authority of the crown, the fact that this authority is of human origin logically involved the possibility of revoking it. So that, in spite of Hobbes's strong defense of royal sovereignty, his views were unwelcome to those in authority. These views were published in various works: *De Cive* (1642); *Humane Nature* (1650); *De Corpore Politico* (1650); *Leviathan, or the Matter, Form, and Power of a Commonwealth* (1651).

After the meeting of the Long Parliament in 1640 Hobbes had returned to Paris, from his dread of the civil troubles. In 1647 he was appointed mathematical tutor to the Prince of Wales, afterward Charles II; but the character of his writings, especially after the publication of the *Leviathan*, so offended the Royalist clergy, in common with all other sects, that Charles was induced to part with him, and he took alarm for his personal safety and abruptly fled in 1651 to Paris; but after a short stay there, knowing that he had caused much irritation in France by his bitter attacks on the papacy, he returned to England, where he was allowed to live quietly. Very different was his position after the Restoration; for although Charles granted him a pension of £100 a year, the dislike to his views was so general that they were condemned by the House of Commons in 1666, and he was in danger of still severer measures. His connection with the Earl of Devonshire, with whom he lived in the latter part of his life, was no doubt a powerful protection to him. His old age was fruitful in additions to his writings and was marked by some sharp controversies. His last works were a translation of Homer and a history of the civil wars. He died on Dec. 4, 1679.

All his Latin works were collected and published by himself (Amsterdam, 1668) and by Molesworth (5 vols., London, 1839–45). His English works were edited by Molesworth (11 vols., including index, London, 1839–45). F. Tönnies edited and published *Behemoth, or the Long Parliament* (London, 1889). The Cambridge University Press publishes a convenient edition of the *Leviathan*. Woodbridge has edited a selection from Hobbes's writings (Minneapolis, 1903).

In philosophy and psychology Hobbes was a sensationalist and, at least at times, a materialist. All change for him is motion; hence sensuous perception is motion, and pleasure is also motion. Just why motion should appear in the form of consciousness is an inexplicable mystery. Sense impressions, in their combinations and transformations, give rise to memory and thought. This takes place according to definite laws. The order of succession of memory ideas is that of the original sense impressions, while the impressions originally in combination tend to reappear in the same combination; this fact he called the law of contiguity. Indeed, Hobbes is commonly regarded as the "father of associational psychology." Hobbes's ethics was hedonistic. It is man's desire for pleasure that made him in the first instance establish civil authority, but it is the supremacy of that authority which makes it binding now. Consult: Tönnies, "Anmerkungen über die Philosophie des Hobbes," four articles in *Vierteljahrsschrift für wissenschaftliche Philosophie* (Leipzig, 1879–81); Robertson, *Hobbes* (Edinburgh, 1886); Wille, *Der Phänomenalismus des Thomas Hobbes* (Kiel, 1888); Lewis, *Ueber den Individualismus bei Hobbes* (Halle, 1892); Lyon, *La philosophie de Hobbes* (Paris, 1893); F. J. Tönnies, *Hobbes Leben und Lehre* (Stuttgart, 1896); E. H. Sneath, *Ethics of Hobbes* (Boston, 1898); William Graham, *English Political Philosophy from Hobbes to Maine* (New York, 1900); Leslie Stephen, *Hobbes* (ib., 1904); A. E. Taylor, *Thomas Hobbes* (ib., 1909).

HOBBS, WILLIAM HERBERT (1864–). An American geologist. Born at Worcester, Mass., he graduated from Worcester Polytechnic Institute in 1883; and he studied also at Johns Hopkins University (Ph.D., 1888), and at the University of Heidelberg (1888–89). At the University of Wisconsin he was curator of the geological museum (1889–90), assistant professor of mineralogy and metallurgy (1890–99), and professor of mineralogy and petrology (1899–1906), and at the University of Michigan professor of geology and director of the geological laboratory after 1906. From 1886 to 1906 he served with the United States Geological Survey. His

publications include: *Earthquakes* (1907; Ger. trans., 1910); *Characteristics of Existing Glaciers* (1911); *Earth Features and their Meaning* (1912). In 1909 he became editor of the *Journal of Geology*.

HOB'BY (OF. *hobe*, from *hober*, to move, from ODutch *hobben*, to toss, *hoppen*, to hop, AS. *hoppian*, Ger. *hopfen*, to hop). A small European falcon (*Falco subbuteo*), formerly trained in falconry to fly at pigeons and partridges. The nearest North American species is the pigeon hawk.

HOB'HOUSE, ARTHUR, first BARON (1819–1904). An English judge, born at Hadspen, Somerset. He was early educated at Eton and graduated from Balliol College, Oxford, in 1840. In 1845 he was called to the bar at Lincoln's Inn, acquired a large chancery practice, became a queen's counsel in 1862, but retired from practice in 1866. In that year he accepted the post of charity commissioner. From 1872 to 1877 he was legal counsel on the staff of the Governor-General of India, and from 1881 to 1901 he served on the judicial committee of the Privy Council. Hobhouse was made a peer in 1885. Active in the work of the Municipal Reform League, he became one of the first aldermen under the newly created London County Council in 1888. He did much to promote desirable legal reforms. Some of his addresses on property were published under the title *The Dead Hand* (1880).

HOBHOUSE, JOHN CAM. See BROUGHTON, BARON.

HOBHOUSE, L(EONARD) T(RELAWNEY) (1864–). An English philosopher, son of the Archdeacon of Bodmin. Educated at Oxford, he became fellow of Merton in 1887 and assistant tutor of Corpus Christi in 1890 and fellow in 1894. He was on the editorial staff of the *Manchester Guardian* in 1897–1902, and, after being secretary of the Free Trade Union, on the staff of the *Tribune* in 1906–07. In 1907 he became professor of sociology in London University. His earlier theory of mechanical causation he gradually gave up for a theistic and teleological one. He wrote: *The Labor Movement* (1893; 3d ed., 1912); *The Theory of Knowledge* (1896); *Mind in Evolution* (1901); *Democracy and Reaction* (1904); an elaborate work on *Morals in Evolution* (1906); a sketch of *Liberalism* (1911); *Social Evolution and Political Theory* (1911), Columbia University lectures on the Julius Beer foundation; *Development and Purpose* (1913). He edited the University of London *Monographs on Sociology*.

HOB'KIRK'S HILL, BATTLE OF. A battle fought at Hobkirk's Hill, about 2 miles north of Camden, S. C., on April 25, 1781, during the American Revolution, between an American force of about 950, under General Greene, and an English and Loyalist force about equal in number, under Lord Rawdon. The latter, leaving his strong position at Camden, fell upon the Americans unprepared, and after some stubborn fighting Greene's favorite regiment, the First Maryland, was stricken with panic. The victory gave no strategic advantage to Rawdon, who on May 10 evacuated Camden and retreated towards Charleston. The loss of the Americans in killed, wounded, and missing was 271; that of the English and Tories, 258. This engagement is also known as the second battle of Camden. Consult Carrington, *Battles of the American Revolution* (6th ed., New York, 1904), and Edward McCrady, *The History of South Carolina in the Revolution* (2 vols., ib., 1901–02).

HO'BOKEN. A city in Hudson Co., N. J., on the Hudson River, opposite New York, with which it is connected by ferry and tube, and adjoining Jersey City. It is the terminus of the Hamburg-America, North German Lloyd, Holland-American, and Scandinavian-American steamship lines, and of the Delaware, Lackawanna, and Western, the Lehigh Valley, and the West Shore railroads (Map: New York City, Borough of Manhattan, B 17). It lies at the base of the Palisades, the principal streets running north and south, parallel to the river. In the eastern section rises a hill. The site of Stevens Institute of Technology (q.v.) is fronted by Hudson Park. In the latter is a soldiers' monument; and in Church Square Park are situated the public library and a firemen's monument. St. Mary's Hospital is a noteworthy structure. Hoboken is a great shipping place for coal. The most important manufactures comprise foundry and machine-shop products, marine engines, technical instruments, cork products, motor fire engines, castings, elevators, inks, metal tubes, chemicals, waterproofed fabrics, lead pencils, leather goods, silk, wall paper, and caskets. The government is administered by a mayor, elected every two years, who appoints school, health, fire, and library commissioners, and, with the consent of the council, assessors and police commissioners, of which board he is the president. The council is unicameral and elects the city clerk and assistants and inspectors. The municipal income and expenditures amounted in 1912 to $4,249,000 and $3,930,000 respectively, the main items of expense being $129,000 for the fire department, $153,000 for the police department, $225,000 for operation of the water works, and $428,000 for schools. Pop., 1900, 59,364; 1910, 70,324; 1914 (U. S. est.), 74,994; 1920, 68,166.

The land on which Hoboken stands was part of the patroonship granted to Michael Pauw in 1630 and was then called Hobocan Hackingh (the land of the tobacco pipe), in allusion to the fact that Indians carved pipes from a kind of stone found here. A house was built about 1640 by Arendt Teunisson Van Putten, and a straggling settlement grew up; but the present city really dates from 1804, when John Stevens, "the founder of Hoboken," bought the land and laid out a town. During the first quarter of the nineteenth century the Elysian Fields in Hoboken were the favorite pleasure resort for New Yorkers and became noted as the meeting place of Federalist politicians. Hoboken was incorporated as a town in 1849, its population then being about 2000, and in 1855, with a population of about 6700, it was chartered as a city. In 1900 a fire at the wharves of the North German Lloyd Steamship Company caused the loss of about 300 lives and destroyed property, including three steamers, valued at $5,000,000. Hoboken is associated with the early development of steam navigation and steam railroads in this country. The modern type of ferry slip, built of piling, was invented by Colonel Stevens and first used here, as was the steam-propelled ferryboat, invented by the same man in 1811. Consult Winfield, *History of the County of Hudson* (New York, 1874).

HOBRECHT. See OBRECHT.

HOB'SON, JOHN ATKINSON (1858–). An English economist, born at Derby. He was

educated at Lincoln College, Oxford, from 1880 to 1887 was classical master in schools at Faversham (Kent) and Exeter, and from 1887 to 1897 was lecturer in English literature and economics for the University Extension Delegacy and the London Society for the Extension of University Teaching. From the time of the appearance of his *Problems of Poverty* (1891, No. 2 in the "Social Questions of To-Day Series") he became known as one of the more prominent British economists of the recent school and a very effective writer. His other publications include: *The Physiology of Industry: Being an Exposure of Certain Fallacies in Existing Theories of Economics* (1889), with A. F. Mummery; *The Evolution of Modern Capitalism* (1894); *Coöperative Labour upon the Land, and Other Papers* (1895); *The Problem of the Unemployed: An Enquiry and an Economic Policy* (1896); *John Ruskin, Social Reformer* (1898); *The War in South Africa: Its Causes and Effects* (1900); *The Economics of Distribution* (1900); *Capitalism and Imperialism in South Africa* (1900); *The Psychology of Jingoism* (1901); *The Social Problem; Life and Work* (1901); *Imperialism* (1902); *International Trade* (1904); *Canada To-Day* (1906); *The Industrial System* (1909); *The Science of Wealth* (1911); *The Economic Interpretation of Investment* (1911); *Gold, Prices, and Wages* (1913).

HOBSON, Joseph (1833–1917). A Canadian civil engineer. He was born in the township of Guelph, Ontario, and was educated at the local schools. He studied surveying and engineering and entered the service of the Grand Trunk Railway as an assistant engineer on construction west of Toronto. He afterward became assistant engineer on various railway lines in Nova Scotia, Ontario, and Michigan; was resident engineer of the International Bridge, Buffalo (1870–73); was appointed chief engineer of the Great Western Railway (1875); and from 1896 until 1907, when he retired, he was chief engineer of the Grand Trunk Railway system. In 1890–91 he built the St. Clair Tunnel, Ontario, and in 1897 had entire charge of the reconstruction of the Victoria Jubilee Bridge, Montreal.

HOBSON, Richmond Pearson (1870–). An American naval constructor, born in Greensboro, Ala. He entered the Southern University in 1882, but three years afterward accepted an appointment to the United States Naval Academy, where he graduated in 1889, and then took a postgraduate course at the Ecole Nationale Supérieure des Mines and the Ecole d'Application du Génie Maritime in Paris. He served on various naval stations and at the New York and the Newport News navy yards, and in 1897 he was ordered to Annapolis to organize a postgraduate course for those officers who intended to enter the construction corps. During the war with Spain he was present at the bombardment of Matanzas and took part in the expedition against San Juan de Puerto Rico; but his great achievement was the sinking of the collier *Merrimac* in the entrance to Santiago harbor before daylight, on June 3, 1898, in order to "bottle up" Cervera's fleet. He did not succeed in accomplishing the desired result, as the gear of the stern anchors was shot away and the current swung the ship parallel to the channel instead of across it; but the daring of the exploit made popular heroes of all concerned in it. After the war he raised and refitted several of the Spanish warships which had been sunk in Cuban and Philippine waters. He resigned from the navy in 1903 and entered political life. In 1906 he was elected to Congress, and until 1915 he represented a district of his native State in that body. Among his publications are *The Disappearing Gun Afloat* and *The Sinking of the Merrimac*.

HOC'CLEVE, or **OCCLEVE,** Thomas (?1370–?1450). An English poet. Concerning his life very little is known. For 24 years he was clerk in the Privy Seal Office, London. His principal work, *De Regimine Principum* (Concerning the Duties of Kings), mainly a digest of a Latin treatise under the same title by Ægidius Colonna, consists of 5488 lines in Chaucer's seven-line stanza. In the prologue, which comprises about a third of the work, Hoccleve mentions some incidents of his life. He says he was poor and his pension not paid and laments the death of Chaucer, who is called the "floure of eloquence." The rest of the long poem is devoted mainly to moral reflections on the manners of the time. On the margin of one of the manuscripts Hoccleve drew in colors the well-known portrait of Chaucer, his "maister dere." Hoccleve also wrote several other poems, among which is the beautiful orison to the Virgin, beginning "Mother of God and Virgin undefouled." This last poem has been attributed to Chaucer. Consult *Works*, ed. F. J. Furnivall for the Early English Text Society (London, 1892–97).

HOC'CO (native name in Guiana). A native name applied by Buffon to curassows in general, but apparently applicable and now restricted especially to the Mexican species (*Crax alector*), also called royal pheasant by the Mexicans. Consult Sumichrast, "Native Birds . . . of Vera Cruz," in *Memoirs of the Boston Society of Natural History*, vol. i, part iv (Boston, 1869). See Curassow.

HOCHBERG, hŏg'bĕrk, Bolko, Count von (1843–). A German patron of music and dramatic composer, whose earlier music appeared under the pseudonym "J. H. Franz." He was born at Castle Fürstenstein in Silesia, studied law at Bonn and Berlin, and soon gave up the diplomatic service to devote himself to music. Hochberg founded in 1870 the Silesian musical festivals, to the success of which he greatly contributed. From 1886 to 1903 he was general superintendent of the Court Theatre of Berlin. Besides symphonies, songs, and string quartets, he composed *Claudine von Villabella* (1864) and *Die Falkensteiner* (1876), entirely rewritten and produced as *Der Wärwolf* (1881).

HOCHE, ôsh, Lazare (1768–97). A general of the French Revolution. He was born June 25, 1768, at Montreuil, near Versailles. In 1784 he entered the National Guard, but joined the regular army at Paris in 1792 as a sergeant of grenadiers. Owing to his military experience and soldierly qualities, he rapidly obtained promotion. In 1793, after distinguishing himself under Le Veneur, he was made adjutant general of the Army of the North. Some hasty words, caused by the arrest of his chief, Le Veneur, brought about Hoche's arrest; but he was acquitted by the revolutionary tribunal at Douai and restored to his command and aided Souham in the defense of Dunkirk. Having succeeded in repulsing the Duke of York, Hoche was made a general of division and given the command of the French forces on the Moselle and in spite

of the numerical superiority of the enemy succeeded in driving the Austrians out of Alsace after defeating them at Weissenburg (Dec. 26, 1793). His important services were requited, however, by suspicion and arrest, and had it not been for the downfall of Robespierre Hoche would probably have perished on the guillotine. He was next intrusted with the task of suppressing the Royalist revolt in La Vendée and at the head of an army of 100,000 men succeeded in pacifying the country in less than a year (1794–95). His great victory in this campaign was over the *émigrés* at Quiberon. In December, 1796, he commanded the army destined for the invasion of Ireland; but adverse conditions of wind and weather scattered his ships and made the expedition a failure, though a part of the fleet succeeded in reaching the Irish coast. Hoche was then made commander of the Army of the Sambre and Meuse and in the spring of 1797 won several victories over the Austrians. The preliminaries of Leoben put an end to his activity, and on Sept. 19, 1797, he died very suddenly at his camp at Wetzlar, though not by poison, as some have supposed. There are numerous biographies of Hoche, the best being: Claude Desprez, *Lazare Hoche, d'après sa correspondance* (Paris, 1858); H. de Font-Réaulx, *Le général Hoche* (ib., 1890); A. Griffiths, *French Revolutionary Generals* (London, 1891); Albert Sorel, *Bonaparte et Hoche* (Paris, 1896).

HOCHKIRCH, hōg'kĕrK, or **HOCHKIRCHEN.** A village in the District of Bautzen in Saxony. It was the scene of a battle between the Austrians and Prussians (Oct. 14, 1758) during the Seven Years' War. Frederick the Great of Prussia, with an army 30,000 to 40,000 strong, having taken up an almost untenable position at Hochkirch, was surprised in the nighttime, under cover of a thick fog, by Marshal Daun, with 65,000 Austrians, and compelled to retire to the heights of Drehsa. Here he was again attacked by the Duke of Arenberg and after a conflict of five hours' duration again retired. He lost 9000 men killed and wounded and 100 guns. He himself and almost all his generals were wounded. The Austrians lost 6000 men. On May 21, 1813, a battle took place here between the French and the allies, which was won by the former. See BAUTZEN.

HÖCHST, hēKst. A town in the Prussian Province of Hesse-Nassau, at the confluence of the Nidda and the Main, 7½ miles northwest of Frankfort. Höchst has one of the largest paint and dye factories in Germany, employing about 4300 men. There are also large porcelain works, established in 1740, and manufactures of iron and brass ware, lighting fixtures, crackers, biscuits, tobacco, gas and water mains, machinery, oilcloth, gelatin, and furniture. Höchst was made a city in 1400. Pop., 1890, 8455; 1900, 14,121; 1910, 17,240.

HÖCHSTÄDT, hēK'shtĕt. See BLENHEIM.

HOCHSTETTER, hōg'shtĕt-ĕr, FERDINAND VON (1829–84). An Austrian geologist, born at Esslingen, Württemberg, and educated at Tübingen, where he received the traveling scholarship in geology. He was a member of the *Novara* expedition (1857–59) and made a special study of the geology of New Zealand and the gold fields of Australia, the results of which were published in the account of the expedition and in a small work on New Zealand. After his return to Europe he was appointed a professor at the Vienna Imperial Polytechnic Institute and afterward director of the Imperial Museum of Natural History (1876). He wrote an authoritative work on the geology of Turkey and the Ural region and published, together with Hann and Pokodny, the *Allgemeine Erdkunde.*

HOCK, HOUGH, hŏk (AS. *hōh,* OHG. *hahsa,* Ger. *Hechse,* hock; ultimately connected with Lat. *coxa,* thigh, Skt. *kaksa,* armpit). The joint between the stifle and the fetlock in a horse's hind leg. *Hock joint,* the hinge formed by tibia and astragalus.

HOCK'DAY (from AS. *hēah,* high + *dæg,* day). The second Tuesday after Easter; formerly a popular festival in England observed as late as the seventeenth century. Hockday and Michaelmas (q.v.) were the rent days in rural England. Hocktide or Hockdays included Hock Tuesday and the day before. The origin of the festival is uncertain.

HÖCKERT, hēk'ĕrt, JOHAN FREDRIK (1826–66). A Swedish genre and historical painter, born at Jönköping. He studied at the Stockholm Academy under Boklund, with whom he was in Munich (1846–49); visited Lapland with the botanist Andersson (1849); went to Paris (1851) and allied himself with Max Hess; traveled through Holland, Belgium, and England (1857) and, in 1861, through Spain, Italy, and north Africa. He was a member and a professor of the Stockholm Academy. Among his works are: "Christina Ordering the Execution of Monaldeschi" (1853); "The Rescue of Gustavus Vasa" (1858); the uncompleted canvas "Burning of the Palace in Stockholm, 1697"; "Service in a Lapland Chapel," at Lille; "Interior of a Hut in Lapland" (1858), in the Stockholm Museum; and the "Rättvik Maiden," at Göteborg. He has been called the Swedish Delacroix and ranks high as a colorist.

HOCK'ET (OF. *hoquet, hocquet, houquet,* hiccough; so called from the broken effect). A musical trick much used by composers during the twelfth and thirteenth centuries. In a composition for two or three voices one voice suddenly, and at irregular intervals, interrupted the other voices. The passages where such interruptions occurred were called hocket.

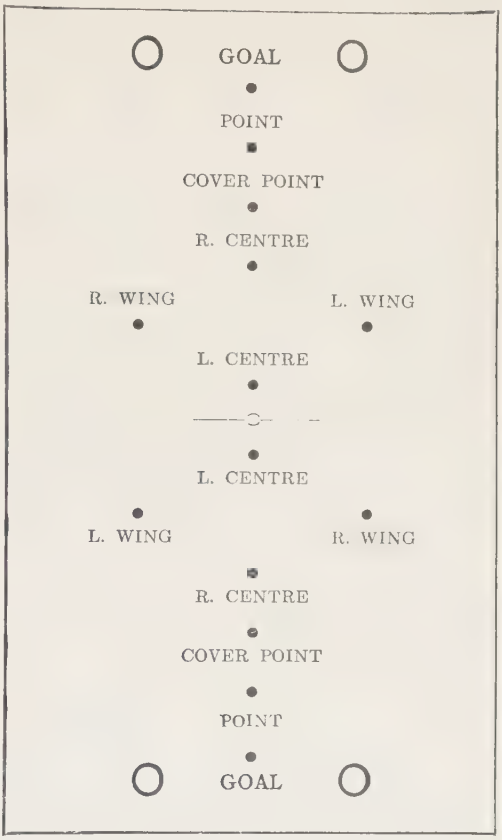
HOCK'EY (also *hawkey, hookey,* apparently from *hook,* in allusion to the hooked club with which the game is played. Murray's *New English Dictionary* (1901) cites OF. *hoquet,* shepherd's staff, crook, but adds that the "connecting links are wanting"). An outdoor game played on a ground 100 yards long and not less than 55 nor more than 60 yards wide, by two teams of 11 players each, armed with sticks curved at the end, with which each team attempts to drive a ball into the goal of the other. The game is probably as old as any involving a ball. In the Copenhagen National Museum is an altar pot, made about the year 1300, on which are two figures of men with curved sticks, apparently playing some such game, and there appears in a Galway statute of 1527 a prohibition of "the horlinge of the litill balle with hockie stickes or staves," while Cowper in 1785 mentioned a game called "hockey" played by the boys at Olney. Not until 1876 was any code of rules formulated for the game. Ten years later the English Hockey Association was organized, and since then the popularity of the game in the British Isles has steadily increased, while it has also been taken up in the various British colonies and in Bel-

gium, Denmark, Holland, France, and Germany, with the result that in 1907 the International Hockey Board was formed to provide for international contests.

A hockey team usually consists of five forwards, three half backs, two backs, and a goal keeper, though this formation is not compulsory. The game is divided into two halves of 35 minutes each (unless another time is agreed upon), the teams changing sides at the end of each half. In the centre of each goal line is the goal, consisting of two posts, 4 yards apart, joined at their tops by a horizontal crossbar 7 feet from the ground. Nets are attached to the posts, crossbars, and ground beyond the goals. In front of each goal is drawn a white line 4 yards long, parallel to and 15 yards from the goal line. This line is continued each way to meet the goal line by quarter circles which have the goal posts as centres. The space within these lines is called the striking circle. The ball is either a leather cricket ball painted white or is made of white leather. The stick may have a flat surface on its left-hand side only, must not have any sharp edges, must pass through a two-inch ring, and must not weigh more than 28 ounces. The play is begun by two opposing players "bullying" the ball in the centre of the ground; i.e., each player must strike the ground on his own side of the ball and his opponent's stick over the ball three times, after which either player may strike the ball. A goal is counted when the ball has passed entirely over the goal line under the bar, the ball while within the striking circle having been hit or glanced off the stick of an attacker. While in play, the ball may be caught, but must immediately be dropped to the ground; or it may be stopped, but it may not be picked up or in any other way moved except with the stick.

Ice Hockey. The old winter game of hockey, or shinny, is the basis of the modern game of ice hockey, but the modern game is more scientific than its English and Scottish predecessors. The old game was played on more or less frozen ground, and the players cared more about action than rules, and in the beginning no restrictions existed as to the number on each side, the shape or proportion of the sticks, the size or material of the ball, the size of the playing space, or even the manner of making a goal. The organization of this crude game into the present scientific, exciting, and dangerous contest, played entirely on skates, began in 1881 with the McGill College and Victoria Hockey teams in Montreal, Canada, where the game, as a purely winter sport, has something of the popularity of baseball in the United States. The first series of challenge games between Canadian teams was played in 1884, and in 1887 the Amateur Hockey Association of Canada was formed. The game was soon taken up by players in the United States, where the American Amateur Hockey League was formed in 1896. This organization adopted a regular constitution and a set of rules which govern most amateur contests. Practically all of the larger northern universities and colleges in the United States now have hockey teams, and an intercollegiate schedule is played off each season. These American college and the athletic club teams have developed many fine players; but the most skillful teams are those of Canada, and notably the Wanderers, of Montreal, the Quebecs, and the Ottawas. Since 1895 the most important Canadian trophy for hockey has been the Stanley Cup.

The rules of the American Amateur Hockey League provide that the game shall be played on a rink at least 112 feet long by 58 feet wide,



POSITIONS OF A HOCKEY TEAM.

by teams of not more than seven players each, whose positions are shown on the accompanying diagram. The sticks must not be more than 3 inches wide at any point, nor more than 13 inches long on the blade, and must be made entirely of wood, though tape binding is permitted. Players must not wear skates that are pointed or sharpened so as to be unnecessarily dangerous. For the ball, used in English hockey, is substituted a puck, which must be made of vulcanized rubber 1 inch thick; it must be 3 inches in diameter and must weigh not less than $7\frac{6}{16}$ nor more than $7\frac{9}{16}$ ounces. The game is divided into two halves of 20 minutes each, with an intermission of 10 minutes. A goal is scored when the puck passes between the goal posts. The goals are placed midway on each goal line; each consists of a goal net supported by two upright posts, 4 feet high, placed 6 feet apart, and at least 10 and not more than 15 feet from the edge of the ice. Consult Arthur Farrel, *How to Play Hockey* (Spalding's Athletic Library, New York, issued annually).

HOCK'ING. A river in Ohio, rising near Lancaster, Fairfield Co. (Map: Ohio, F 7). It flows southeast and empties into the Ohio River below Parkersburg, W. Va., after a course of 80 miles. Boat navigation is possible for about 70

miles and can be continued through the Hocking Canal, which passes along its shore.

HOCKING, Joseph (1860–). An English Wesleyan clergyman and novelist, brother of Silas K. Hocking, born at St. Stephen's, Cornwall. He graduated in 1881 from Crescent Park College, Victoria Park, where he was a prizeman, and also from Owens College, Manchester, in the same year. The year 1878 he spent as a land surveyor. He entered the ministry of the Wesleyan Methodist church in 1884 and in 1887 traveled extensively in Egypt, Palestine, Syria, Greece, and Turkey. He wrote more than 20 novels, beginning with *Jabez Easterbrook* (1891), some of the later of which deal with the conflict between Protestants and Roman Catholics—*The Sword of the Lord* (1909) is a story of the time of Luther.

HOCKING, Silas Kitto (1850–). An English novelist, brother of Joseph Hocking, born at St. Stephen's, Cornwall. He entered the Wesleyan ministry, but resigned in 1896. His novels, which have a strong flavor of Methodism, were immensely popular, and their total sales ran over 1,000,000 copies. The critics pass these stories by, but admiring readers are legion. Among Hocking's uncounted novels may be mentioned: *Alec Green* (1878); *Sea Waif* (1882); *Real Grit* (1887); *God's Outcast* (1898), which has as its appealing hero a Methodist minister who married the wrong woman; *Israel Pendray* (1899), notable for its account of Wesley's preaching in Cornwall; *Mistress Nancy Molesworth* (1899), a story of eighteenth-century Cornwall; *Who Shall Judge?* (1910); *The Third Man* (1911); *Quenchless Fire* (1912); *Woman's Love* (1913); *In Self-Defense* (1914).

HOCK'TIDE. See Hockday.

HODEIDA, hō-dĕ'ī-dȧ. An important fortified seaport of Yemen, Arabia, situated on the coast of the Red Sea, about 100 miles north of Mocha (Map: Turkey in Asia, E 8). Its roadstead is somewhat obstructed by coral reefs, but it is nevertheless the chief centre of the Arabian coffee trade. Hodeida is the chief landing place for Mecca pilgrims from Africa. It has steamer connection with Aden, Suez, and Nassawa. Pop. (est.), 40,000.

HODELL, hō'dĕl, Frans Oscar Leonard (1840–90). A Swedish dramatist and poet, born at Stockholm. He was in early life an actor, then editor (1870) and proprietor of the *Söndagsnisse*, a humorous journal. He was the author and adapter of a large number of plays, such as the popular *Andersson, Petersson, och Lundström* (1866), and wrote also some verses and ballads, under the title *Visor och kupletter* (1873).

HODGE. 1. In *Gammer Gurton's Needle*, the husband of Gammer Gurton, whose breeches she was mending when the needle was lost. 2. The conventional class name for the English farmer or countryman.

HODGE, Archibald Alexander (1823–86). An American Presbyterian theologian, the son of Charles Hodge. He was born at Princeton, N. J., graduated at Princeton in 1841, and was an assistant professor there from 1844 to 1846. In 1847 he graduated at the Princeton Theological Seminary and for three years was missionary at Allahabad, India, under the auspices of the American Presbyterian Missionary Society. After 1851 he held pastorates in Maryland, Virginia, and Pennsylvania, and in 1864 was called to a church in Allegheny, Pa., where until 1877 he was also professor of didactic theology in the Western Theological Seminary. In 1878 he succeeded to the chair of didactic, exegetical, and polemic theology at Princeton, made vacant by the death of his father, to whom he had been appointed assistant professor the year before. He was a trustee of Princeton College and edited for a period the *Presbyterian Review*. He published several theological and other works, including: *Outlines of Theology* (1860; new ed., 1879); *The Atonement* (1868; new ed., 1886); *Life of Charles Hodge, Professor in the Theological Seminary, Princeton* (1880); *Manual of Forms, Conformed to the Doctrine and Discipline of the Presbyterian Church* (1883); *Popular Lectures on Theological Themes* (1887).

HODGE, Charles (1797–1878). An American Presbyterian theologian and historian, of Scotch-Irish descent. He was born in Philadelphia, graduated at Princeton in 1815, and at the theological seminary there in 1819, became assistant professor in his alma mater the following year, and with the exception of an interval of two years (1826–27) in Europe, studying at the universities of Paris, Halle, and Berlin, was connected with its faculty until his death. From 1822 he was professor of Oriental and biblical literature and from 1840 professor of didactic and exegetical theology, polemic theology being added in 1852. In 1872 the semicentennial anniversary of his professional life was commemorated at Princeton by the foundation of the Charles Hodge professorship, with an endowment of $50,000. He was also the recipient of a gift of $15,000. In 1846 he was moderator of the Presbyterian General Assembly and in 1858 was one of the revisers of the *Book of Discipline*. He was editor of the *Biblical Repertory*, which he founded in 1825, expanding the title four years later to the *Biblical Repertory and Princeton Review*. He retired from the editorship in 1871. His chief work, *Systematic Theology* (3 vols., 1871–72), is still considered one of the best interpretations of the Calvinistic doctrine. Other important works are a *Constitutional History of the Presbyterian Church in the United States* (2 vols., 1840–41), *The Way of Life* (1842), and *What is Darwinism?* (1874). He also published several commentaries. Consult *The Semi-Centennial Commemoration of the Professorship of Charles Hodge, D D., LL.D., September 24, 1872* (Philadelphia, 1872) and A. A. Hodge, *Life of Charles Hodge, Professor in the Theological Seminary, Princeton* (New York, 1880).

HODGE, Frederick Webb (1864–). An American ethnologist, long connected with the Smithsonian Institution. He was born at Plymouth, England, but came to America in 1871 and was educated in the public schools and in Columbian (now George Washington) University. In 1886 he was made secretary of the Hemenway archæological expedition and in this position he traveled through Arizona and New Mexico until 1889, when he joined the Bureau of Ethnology of the Smithsonian Institution. His work here was the preparation of a *Cyclopedia of Indian Tribes*. In 1895, 1897, and 1899 he explored New Mexico and Arizona again, and on the second trip he scaled the Enchanted Mesa. In 1901 he became executive officer of the Smithsonian Institution. In 1910 he became ethnologist in charge of the Bureau of Ethnology, the *Handbook* of which (2 parts, 1907–10) he prepared. His more important

works are: *List of Publications of the Bureau of Ethnology,* written while he was librarian of that department (1894); *The First Discovered City of Cibola* (1895); a pamphlet on *Coronado's Route from Culiacan to Quivira* (1899); and his contributions to the *American Anthropologist,* of which he was managing editor from 1899 to 1910 and again after 1912. He also edited Curtis's *North American Indian; Narratives of Cabeza de Vaca and Coronado* (1907); *Handbook of Indians of Canada* (1913).

HODGE, Hugh Lenox (1796–1873). An American physician, born in Philadelphia, the brother of Charles Hodge. He graduated at Princeton in 1814, studied medicine, and began to practice in 1820. During the cholera epidemic of 1838 he successfully employed a system of treatment largely based on observations made during a two years' residence in India. In 1835 he was appointed professor of obstetrics in the University of Pennsylvania and retained his connection there until 1863. He was the author of *Diseases Peculiar to Women* (1859), *Principles and Practice of Obstetrics* (1864), and *Fœticide* (1869).

HODGES, hŏj'ĕz, George (1856–1919). An American Protestant Episcopal theologian, born at Rome, N. Y., and educated at Hamilton College (A.B., 1877; A.M., 1882; LL.D., 1912). He was assistant in 1881–89 and rector in 1889–94 of Calvary Church, Pittsburgh, Pa., and thereafter was dean of the Episcopal Theological School at Cambridge, Mass. He is author of *The Episcopal Church* (1889); *Christianity between Sundays* (1892; 1914); *The Heresy of Cain* (1894; 1914); *The Battles of Peace* (1897; 1914); *William Penn* (1900); *The Human Nature of the Saints* (1904); *Three Hundred Years of the Episcopal Church in America* (1906); *The Administration of an Institutional Church* (1906); *The Year of Grace* (2 vols., 1906; 2d ed., 1914); *Apprenticeship of Washington* (1909); *The Training of Children in Religion* (1910; 1912); *Everyman's Religion* (1911; 1913); *Saints and Heroes* (2 vols., 1911–12); *Classbook of Old Testament History* (1913).

HODGES, John Sebastian Bach (1830–1915). An American Protestant Episcopal clergyman, born in Bristol, England (son of Dr. Edward H. Hodges, organist of Trinity Church, New York City). He came to this country in 1845 and graduated at Columbia College in 1850 and at the General Theological Seminary, New York, in 1854. After ministerial service in the West and at Newark, N. J. (1860–70), he was rector of St. Paul's Church, Baltimore, from 1870 until his retirement in 1906. His musical compositions, which include chants, anthems, and hymn tunes, are widely known. His chief work is the *Book of Common Praise* (1886), compiled as a companion to the *Book of Common Prayer.*

HODGES, Nathaniel Dana Carlile (1852–). An American librarian, born at Salem, Mass. He graduated from Harvard University in 1874 and studied at the University of Heidelberg (1874–75). He taught physics at Cambridge, Mass. (1876–77) and at Harvard (1877–81), was assistant editor and editor of *Science* (1883–94), and served as assistant at the Astor Library, New York (1895–97), and at the Harvard University Library (1897–1900). In 1900 he became librarian of the Public Library of Cincinnati. He was president of the American Library Association in 1909–10.

HODGINS, hŏj'ĭnz, John George (1821–1912). A Canadian educator and author. He was born in Dublin, Ireland, but went to Canada with his parents in 1833. He was educated at Upper Canada College, at Victoria University, Cobourg, and, in law, at Toronto University. After holding various posts, he was deputy superintendent of education (1855–76) under Egerton Ryerson (q.v.), after whose retirement in 1876 he was deputy minister of education for the province until 1890. He was then made librarian and historiographer of the Education Department, and in 1904–12 was historiographer solely. An early investigation made by him of the Irish educational system resulted in improvements to the schools of Upper Canada, and in 1871 his report upon technical schools in the United States led in part to the establishment of the School of Practical Science, now a department of Toronto University. In 1885 he was honorary secretary to the International Congress of Educators at the New Orleans Exposition. For 30 years editor of the *Upper Canada Journal of Education,* he was one of the pioneers in Canadian schoolbook literature, especially in the department of geography, and throughout his career was an important figure in the educational activities of Ontario. In 1861 he was elected a fellow of the Royal Geographical Society; in 1879 he received the French decoration of the Palm Leaf; during the governorship of the Marquis of Lansdowne he was awarded the Confederation medal for services as a public officer and man of letters; and in 1903 he was given the decoration of the Imperial Service Order. He published: *A Geography and History of British America* (1857); *History of Canada* (1860); *School Law Lectures* (1878); *Legislation and History of Separate Schools in Upper Canada* (1897); *Popular Education in England* (1899); *School Room Decoration* (1900); *The Establishment of Schools and Colleges in Ontario, 1791–1910* (1910); *Documentary History of Education in Upper Canada* (28 vols., 1910–13), a work of permanent historical value.

HODGKIN, hŏj'kĭn, Thomas (1831–1913). An English banker and historian. He was born at Tottenham, studied at the Friends' Grove House School there, and graduated at University College, London. He studied law, but poor health forbade him to practice; so he busied himself at banking and built up a large firm, Hodgkin, Barnett, & Co. In 1874 he gave himself up to literary work. He wrote: *Italy and her Invaders* (8 vols., 1880–99); *Letters of Cassiodorus* (1886); *The Dynasty of Theodosius* (1889); *Theodoric the Goth* (1891); *George Fox* (1896); *Life of Charles the Great* (1897); *Ernst Curtius* (1905); *Political History of England from the Earliest Times to the Norman Conquest* (1906); *The Trial of our Faith* (1911).

HODGKIN'S DISEASE (Lymphadenoma, Pseudoleucæmia). A form of anæmia, attended by swelling of the lymphatic glands and spleen. The cervical glands are the first to enlarge, followed by the axillary, and then the inguinal lymph nodes. The exciting cause is not known, but the disease has been attributed to decayed teeth and nasal suppuration, chronic tonsillar infection, and other inflammations; but the etiology is as obscure now as it was when Hodgkin described the affection in 1832. In the early stages there is only a slight

anæmia. Later there is a great increase in the number of white blood cells (leucocytosis), the polymorphonuclear leucocytes alone being increased. The disease is most common between the ages of 15 and 35. Recovery is rare, death taking place usually in the third year of the disease. Excision of the cervical glands is advised in the beginning, when only these are involved. Later, operation is of no benefit. Iron, arsenic, cod-liver oil, phosphorus, and bone marrow are given with great benefit in many cases. The X-ray is credited with some cures. See ANÆMIA.

HODGKINSON, hŏj'kĭn-son, EATON (1789–1861). An English civil engineer, born at Anderton, Cheshire. After a rather desultory schooling in which he displayed an aptitude for mathematics, he undertook a course of scientific investigation that soon won him distinction. His first important work was on strains and the strength of materials, on which subject he read a paper before the Literary and Philosophical Society of Manchester in 1822. In 1828 and in 1830, respectively, he gave to the same society the results of his researches on the forms of the catenary in suspension bridges and on the strength and best forms of iron beams. In 1847 he was appointed professor of the mechanical principles of engineering at University College, London. From 1847 to 1849 he was one of the royal commissioners engaged in inquiring into the application of iron in railroad structures. From 1848 to 1850 he was president of the Manchester Literary and Philosophical Society. He was a member of the Geological Society, of the Royal Irish Academy, and an honorary member of the Institute of Civil Engineers. He made investigations as to the temperature of the earth in deep mines which were of especial interest. His experiments on the strength of materials, and especially his determination of the "neutral line" in the section of fracture, with the resultant designs for beams, mark an important step in the science of modern engineering. He published *Researches on the Strength and Other Properties of Cast Iron* (1846). Consult the "Life of Eaton Hodgkinson," in the *Memoirs of the Manchester Literary and Philosophical Society,* No. ii (3d series, Manchester, 1862).

HODG'SON, BRIAN HOUGHTON (1800–94). An English Orientalist and zoölogist, born at Lower Beeches and educated at Haileybury. He entered the English civil service at Calcutta in 1818 and remained in it until 1843, when he was removed, apparently without cause, by Lord Ellenborough. Hodgson then lived for a few months in Europe, but soon returned to India and lived practically alone at Darjeeling (1845–58), where he made important additions to the classified fauna of India. Besides his zoölogical specimens he made valuable collections of Indian manuscripts and of ethnological material. These collections he distributed generously among European museums, giving especially to the British Museum. His written studies were on the ancient texts of India, especially the literature of Buddhism, on the modern vernacular and the subject of "national education," on the ethnology of the hill tribes, on Hindu law and practice, especially in Nepal, and on zoology. Among his works, besides scores of articles in reviews and governmental bulletins, may be mentioned: *Literature and Religion of the Buddhists of the North* (1841); *Letters on National Education for the People of India* (last ed., 1847); *Aborigines of India* (1847); *Essays on the Language, Literature, and Religion of Nepal and Tibet* (1874); *Miscellaneous Essays Relating to Indian Subjects* (1880). Consult W. W. Hunter, *Life of Brian Houghton Hodgson* (London, 1896).

HODGSON, JOHN EVAN (1831–95). An English historical and genre painter. He was born in London, spent his youth in Russia, and entered the schools of the Royal Academy in 1855. He became A.R.A. in 1873, R.A. in 1879, and in 1879 librarian and professor of painting. At first he painted domestic and historical pictures, but in 1868 a visit to Tunis and Tangiers interested him in Arab life, to which he chiefly confined himself thereafter. Among his earlier pictures are: "Arrest of a Poacher," "Canvassing for a Vote," "First Sight of the Armada," "Queen Elizabeth at Purfleet." His later works include: "An Arab Story-Teller," "A Tunisian Birdseller," "An Arab Patriarch," "Army Reorganization in Morocco." All of his pictures, Oriental as well as English, possess charm, sentiment, and often humor, but are tame in conception and sober in color. He wrote *The Royal Academy and its Members, 1768–1830* (1905), with F. A. Eaton.

HODGSON, SHADWORTH HOLLOWAY (1832–1912). An English metaphysician, born in Boston, Lincolnshire, and educated at Rugby and Oxford. In 1880 he became president of the Aristotelian Society for the systematic study of philosophy, was frequently reëlected, and in his addresses to the society and its proceedings gave much of his best work. Besides these, various contributions to *Mind,* and the miscellaneous works, *The Principles of Reform in Suffrage* (1866) and *Outcast Essays and Verse Translations* (1881), mention should be made of the preliminary studies entitled *Time and Space* (1865); *The Theory of Practice* (1870); *The Philosophy of Reflection* (1878); and of the summing up of his metaphysic, *The Metaphysic of Experience* (1898), the most forcible and valuable of his works, in which he claims that "metaphysic like pure mathematic is fontal and preinductive," and as a phenomenist takes a strong stand against transcendental realities.

HÓDMEZÖ-VÁSÁRHELY, hôd'mĕ-zĕ-vä'-shär-hĕly'. A city in the County of Csongrád, Hungary, on Hód (Moon) Lake, 16 miles northeast of Szegedin (Map: Austria-Hungary, G 3). Among its principal buildings are the town hall, hospitals, and a Gymnasium. The city owns 383 square miles of the surrounding territory and so has risen into prominence as an agricultural and trading centre. In the neighborhood are raised cattle and the cultivation of the vine and tobacco is extensively engaged in. The industrial establishments include breweries and an oil factory. The town is protected from overflow of the Tisza by a large dike. Pop., 1900, 60,883; 1910, 62,394, mostly Magyars.

HOD'OGRAPH (from Gk. ὁδός, *hodos,* way + γράφειν, *graphein,* to write). A velocity curve, representing the acceleration of a given motion. In Fig. 1, V_1, V_2, V_3 .... represent the velocities of a point P, which moves along the curve C, at the various positions P_1, P_2, P_3 .... In Fig. 2, OV_1, OV_2, OV_3 .... are drawn parallel and equal to V_1, V_2, V_3 .... The curve H, formed by joining the points V_1, V_2, V_3, is called the hodograph of the motion of P. If V describes the curve H, while P describes the curve C, then the velocity

of V at any point, laid off on the tangent of the curve H at that point, represents the acceleration of the point P both in magnitude and

FIG. 1.

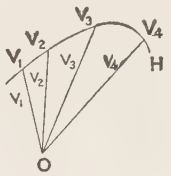


FIG. 2.

direction. Thus, the velocity of the hodograph is the acceleration of the original motion.

HOD'SON, WILLIAM STEPHEN RAIKES (1821–58). An English soldier, born at Maisemore Court, near Gloucester, and educated at Rugby and at Trinity College, Cambridge (B.A., 1844). In 1845 he joined the army in India and participated in the Sikh War. Two years afterward he had command of native troops and distinguished himself during the mutiny as leader of the irregular cavalry called Hodson's Horse. In 1849, when the Punjab was annexed to the British Empire, he was stationed at Umritsur as assistant commissioner; but he resigned in 1852 to reënter active duty in the army. He was killed at Lucknow. Consult: *Hodson of Hodson's Horse, or Twelve Years of a Soldier's Life in India,* being extracts from Hodson's letters, edited by his brother G. H. Hodson (London, 1889); L. J. Trotter, *Life of Hodson of Hodson's Horse* (Edinburgh, 1910).

HO'DY, HUMPHREY (1659–1707). A Church of England divine. He was born at Odcombe, Somersetshire, Jan. 1, 1659, graduated B.A. at Oxford in 1679, became fellow of Wadham College there in 1685, and in 1697–98 regius professor of Greek. He died near Bath, Jan. 20, 1707. He participated on the government side in the controversy over the bishops and their followers who refused to accept William and Mary as their legal sovereigns—the so-called Nonjurors; and also in that about the rights and powers of convocation, contributing the valuable *History of English Councils and Convocations and of the Clergy's Sitting in Parliament* (London, 1701). But his lasting reputation rests upon his work on the Hebrew text, the Septuagint, and Vulgate version of the Bible, *De Bibliorum Textibus Originalibus* (1705). His life, written largely by himself, appears in Jebb's edition of his *De Græcis Illustribus* (London, 1742).

HOE (from OF. *houe,* hoe, from OHG. *houwa,* Ger. *Haue,* hoe, from OHG. *houwan,* Ger. *hauen,* AS. *hēawan,* Eng. *hew*). An agricultural implement, used for stirring the soil, drawing up earth to plants, thinning plants in drills, clearing the ground of weeds, etc. There are two classes of hoes—*draw hoes* and *thrust hoes.* In the former the blade is almost at right angles to the handle; in the latter, almost in the same plane with it. The thrust hoe, or Dutch hoe, is chiefly used for killing weeds and for stirring ground to a very slight depth. The draw hoe is much used in gardening and is in some countries very extensively used in place of the spade in agriculture. Hoes intended for tilling the ground, instead of the plow and spade, and for grubbing, are much larger and heavier than those ordinarily used, are raised much higher, and brought down to the ground with greater force, somewhat like the pickaxe. Hoes for stirring very stiff soils are sometimes made with prongs instead of a blade.

HOE. The name of a family prominently identified with the manufacture and improvement of the printing press in America.—ROBERT (1784–1833) was born in Leicestershire, England. He was indented to a joiner, in 1802 emigrated to the United States, worked for a time as a master carpenter, and subsequently was an associate of his brothers-in-law, Peter and Matthew Smith, in the business of carpentry and in the manufacture of a hand printing press invented by the former. In 1823 he became sole proprietor of the business, retiring in 1832. A skillful mechanic, he constructed and introduced the original Hoe press and was, it is thought, the earliest American machinist to utilize steam as a motive power in his plant.—RICHARD MARCH (1812–86), son of the foregoing. He began the practical study of printing-press manufacture in 1827 and soon became a partner of the Hoe firm. He devised numerous ingenious improvements in the presses and also produced a fine quality of steel saw. In 1841 he, in connection with his brothers, Peter Smith Hoe and Robert Hoe, took over the entire direction of the business. The first form of rotary press, called the type revolving printing press and widely known as Hoe's lightning press, was brought out by him in 1846 and forthwith was very extensively adopted for newspaper work. (See PRINTING.) Afterward he invented the web perfecting press, which superseded his former invention and prints upon both sides of the sheet and includes complicated apparatus for cutting and folding. (See PRINTING.) Constant improvements were made by him in the output of his works.—ROBERT (1839–1909), a son of Robert Hoe, 2d, succeeded to the headship of the firm, which continued its preëminence among printing-press makers. He was one of the organizers and first president of the Grolier Club, the well-known New York organization for the promotion of bookmaking as an art. He was an extensive collector of rare books and manuscripts as well as of silver, miniatures, and other art objects, his collections at the time of his death being valued at several million dollars. The catalogues of his library were unique and valuable from both a typographical and a bibliographical standpoint. He edited Maberly's *Print Collector* (1880), and was the author of *A Short History of the Printing Press* (New York, 1902) and *Bookbinding as a Fine Art* (Grolier Club, ib., 1886). Consult a brief and fragmentary biographical sketch by Gilliss in the *New York Genealogical and Biographical Record,* vol. xli (ib., 1910).

HOEBER, hō'bĕr, ARTHUR (1854–1915). An American landscape painter, born in New York City. He studied at the Art Students' League, New York, under Beckwith, and at the Ecole des Beaux-Arts, Paris, under Gérôme. In 1882 he exhibited at the Salon his "Sur la Grande Route" and in 1885 "Le Pain Quotidien." His paintings are to be found in most American exhibitions. He was art critic of the New York *Times* for three years, associate editor of the *Illustrated American* for one year, and later became art critic of the New York *Globe and Commercial Advertiser.* He also became known

as a lecturer on art. He was elected an Associate National Academician. He published *The Treasures of the Metropolitan Museum of Art* (1892) and *Painting in the Nineteenth Century in France, Belgium, Spain, and Italy.*

HOECKE, VAN DEN, vän den hụk′e. A family of Flemish painters.—JAN (1611–51), a portrait and figure painter, was a pupil of his father, Caspar, and of Rubens. After studying also in Italy and executing commissions for the Emperor of Austria, he settled in 1647 in Antwerp, as court painter to the Archduke Leopold Wilhelm. With that prince's collection a number of his best works came into the possession of the Vienna Gallery; others are at Antwerp. His portraits resemble Van Dyck's rather than those of Rubens.—His brother ROBRECHT (1622–48), also a pupil of his father, was an architect as well as painter. As controller of the fortifications of Flanders, he painted many views of camps, battles, and cities, very detailed in execution and pleasing in color. His work also is well represented in the Vienna Gallery.

HOEFNAGEL, hōōf′nä′gel, JORIS (1545–1610). A Flemish illuminator and miniature painter, born at Antwerp. He was a pupil of Jan Bol at Mechlin and for some time was at the court of Bavaria. He then went to Prague and finally to Vienna. His masterpiece is in the museum there, a Roman missal done for the Archduke Ferdinand. It is elaborately ornamented, and he worked on it for eight years (1582–90). Another fine work of Hoefnagel's is a miniature view of Seville (1573), in the Brussels Museum.—His son JAKOB (1575–1629), a miniature painter and engraver, was court painter to the Emperor Rudolph II.

HÖEGH-GULDBERG, hēg-gụld′bĕrg, OVE. See GULDBERG, OVE HÖEGH.

HOENSBROECH, hōns′brōg, PAUL, COUNT (1852–). A German theologian, born at Castle Haag in the Province of Gelderland. When nine years old, he entered the Jesuit school in Feldkirch. Afterward he attended the Jesuit college at Stonyhurst, England, where he studied philosophy for a year, and then he studied law at the universities of Bonn, Würzburg, and Göttingen. In 1876 he set out on his travels through France, Portugal, Spain, northern Africa, and Italy, and in 1878 entered the Society of Jesus. In 1903 he was a candidate for the Reichstag, but was defeated by his Social-Democratic opponent. While a member of the Society, he wrote *Der Kirchenstaat in seiner dogmatischen und historischen Bedeutung* (1899) and *Christ und Widerchrist: Ein Beitrag zur Verteidigung der Gottheit Christi und zur Charakteristik des Unglaubens in der protestantischen Theologie* (1892). In 1893 he left the Jesuit Order and published a work entitled *Mein Austritt aus dem Jesuitenorden* (1893), which led to a bitter attack upon him by the Ultramontane press. Two years later he joined the Evangelical church. His later writings include: *Moderner Jesuitismus* (1893); *Der konfessionelle Friede und die deutschen Jesuiten der Gegenwart* (1896); *Das Papsttum in seiner socialkulturellen Wirksamkeit* (vol. i, 3d ed., 1901; vol. ii, 1902).

HOERNES, hēr′nĕs, MORITZ (1852–). An Austrian ethnologist, born in Vienna and educated at the universities of Vienna and Berlin. He saw military service in the occupation of Bosnia in 1878 and in 1879–80 led a scientific expedition through Bosnia and Herzegovina. He was for several years custodian of the Vienna Natural History Museum. Hoernes edited the *Wissenschaftliche Mitteilungen aus Bosnien und der Herzegowina* (1893 et seq.) and wrote: *Altertümer der Herzegowina und Bosniens* (1881); *Dinarische Wanderungen* (1888); *Urgeschichte des Menschen* (1891); *Urgeschichte der Menschheit* (1895; 2d ed., 1897); *Natur- und Urgeschichte des Menschen* (1909); *Kultur der Urzeit* (1912).

HOERNLE, hĕrn′le, AUGUSTUS RUDOLF FREDERIC (1841–). An English Orientalist and prominent authority on Indian antiquities and languages. He was born at Agra, British India; was educated at Esslingen, Stuttgart, Basel, London, and Tübingen; became a missionary of the English church at Mirat in 1865; and taught for four years at the Jay Narain's College in Benares. He entered the governmental educational service in 1881, after several years as principal of the mission college at Calcutta, and until 1899, when he retired and returned to England, was principal of the Calcutta Madrasah. He edited: *Chanḍa's Grammar of the Ancient Prākrit* (1880), *The Prithirāj Rāsan* (1886), *The Bower Manuscript . . . with English Translation* (1893), and *The Uvāsagadasão with Abhayadeva's Commentary* (1888–90); translated *The Suśrutasamhitā, or the Hindu System of Medicine* (1897 et seq.); and wrote, among other linguistic works of considerable importance, *A Comparative Grammar of the Gaudian Languages* (1880) and, with Grierson, the incomplete *Comparative Dictionary of the Bihārī Language* (1885 et seq.). In 1907 he published the first part of *Studies in the Medicine of Ancient India,* dealing with osteology. With H. Stark he wrote *A History of India* (4th ed., 1909).

HOETZENDORF, hĕts′en-dōrf, FRANZ, BARON CONRAD VON (1852–). An Austrian general, born at Penzing, the son of a colonel. He had a military education, became a lieutenant before he was 19, served as an officer of the general staff in Bosnia and Herzegovina in 1878–79 and against the South Dalmatian insurrection in 1882, taught tactics in the Austrian military academy at Vienna in 1888, and rose rapidly in rank. In 1906–11 and again after December, 1912, he was chief of the general staff, his resignation for the interval (when he was army inspector) being due to the opposition of the Archduke Francis Ferdinand. (See WAR IN EUROPE for his part in the military operations of 1914–15.) He wrote several books on tactics and infantry formations.

HOEVELL, hōō′vel, WALTER ROBERT VAN, BARON (1812–79). A Dutch author and colonial statesman, born at Deventer. He studied theology at Groningen and in 1836 went to Bavaria, where in the following year he founded the *Tijdschrift van Nederlandsch-Indië.* For the emancipation of the slaves and for the spread of Christianity in the Dutch Indies Van Hoevell accomplished much, especially by his writings. He also edited and translated various Malaysian poems, among which *Sjair Bidasari* (1843) deserves mention. But his greatest work was in colonial politics. From 1849 to 1854 he published *Reis over Java, Madura en Bali,* which joined a keen criticism of governmental methods of the time with a brilliant description of East Indian scenery and life. Returning to Holland in 1848, he was elected to the House of Deputies, where for 13 years he was leader of the

Liberal Colonial party. His parliamentary speeches delivered during this period (published 1862–66) are models. Van Hoevell was named Councilor of State in 1862. His sketches, *Uit het Indische leven* (1860; 2d ed., 1865), met with immense success and in 1868 were published in German.

HOEVEN, hōō′ven (HOOF′EN), JAN VAN DER (1801–68). A distinguished Dutch naturalist. He was born in Rotterdam, studied medicine and natural history at Leyden and Paris, became professor of zoölogy at Leyden in 1826, and held this position until his death. His most important work is his *Handbook der Dierkunde* (3 vols., 2d ed., 1846–55). An English translation, by Professor Clark of Cambridge, under the title *Handbook of Zoölogy*, was issued, with important additions by both the author and the editor, in 1856–58.—His elder brother, CORNELIS PRUYS (1792–1871), was professor of medicine in the University of Leyden and author of several important works, including: *De Historia Medicinæ* (1842); *De Historia Medicamentorum* (1847); *Etudes de la vie humaine* (1857).

HOF, hôf. A town of Bavaria, situated on the Saale, in Upper Franconia, 32 miles northeast of Bayreuth (Map: Germany, D 3). It has an attractive thirteenth-century church, recently restored, with fine glass windows, and an old Gothic Rathaus. There are a Gymnasium, opened in 1546, a city museum, and a hospital dating from 1260. The numerous textile manufacturing establishments produce chiefly cotton and woolen goods; but there are also manufactured machinery, iron and steel ware, dyes, carpets, celluloid, building stone, chemicals, vinegar, pottery, and leather. There is some trade in grain. The town has electric lights, water works, and canal communication. It was founded about the end of the eleventh century, as Regnitzhof. It was almost destroyed by fire in 1823. Pop., 1900, 32,781; 1910, 41,126, mostly Protestants.

HOFDIJK, hôf′dĭk, WILLEM JACOBSZOON (1816–88). A Dutch poet and author, born at Alkmaar. His first work, a romantic poem, *Rosamunde* (1839), attracted the attention of Van Lennep, who obtained for him a clerk's position in the government offices at Alkmaar. Afterward he taught Dutch history and literature in the Gymnasium at Amsterdam. His works, which are in verse and prose, include the studies in Dutch history, *Geschiedenis der nederlandsche Letterkunde* (1853; 7th ed., 1886), *Historische Landschappen* (1856), *Geschiedenis des nederlandschen Volks* (1865–72), *Willem Frederik Hendrik, Prins der Nederlanden* (1880); and the poems, *De Bruidsdans* (1842), *De Jonker van Brederode* (1849), and *Kennemerland, Balladen* (1850–52). He also wrote some poetical dramas, without much success. Consult Jan ten Brink for biography (Amsterdam, 1885), and C. J. B. Van der Duys, *W. J. Hofdijk in zijn leven en werken* (Edam, 1890).

HOFER, hō′fĕr, ANDREAS (1767–1810). A patriot leader of Tirol. He was born at Sankt Leonhard in the valley of Passeier, Nov. 22, 1767. His father was landlord of the inn Am Sand, and the son carried on the business, becoming known as the Sandwirt. In 1796 Hofer led a body of sharpshooters against the French on Lake Garda. He became a captain of the militia and in 1805 fought against Ney in the valley of Passeier, and after Tirol had been abandoned to France by the Peace of Pressburg he was chosen as one of the secret deputation which was sent to Vienna to represent to the Archduke John the sufferings of the people and their wish to be reunited to Austria. But Austria was powerless, and in virtue of Napoleon's decree Tirol was made part of Bavaria. The patriots, however, did not lose heart, and, at the desire of the Archduke, Baron von Hormayr prepared for them a plan of insurrection. The rising took place in 1809, on the renewal of war between Napoleon and Austria. On April 11 Hofer defeated the Bavarian allies of France at Sterzing, and, after they had rallied during the early part of May, he beat them again in the neighborhood of Innsbruck, forcing them to evacuate Tirol. Napoleon, however, dispatched three armies to subdue the rebellious peasantry, who had been abandoned by the Austrians by the armistice of Znaim (July 12, 1809). At first Hofer concealed himself in the valley of Passeier, but later speedily renewed the defense of Tirol, and defeated the combined French and Bavarian forces under Lefebvre at Berg Isel (Aug. 13, 1809), driving them from the country. For two months Tirol was free, and Hofer acted as head of the government, but the Treaty of Schönbrunn (Oct. 14, 1809) resulted in a fresh invasion. The French and Bavarians poured into the country, and after an heroic struggle Hofer was obliged to take refuge in the mountains. Two months later (Jan. 28, 1810) he was betrayed into the hands of the French, conveyed to Mantua, and there shot, by order of Napoleon, after a summary trial. His family were indemnified for the loss of their property by the Emperor of Austria in 1818, and his son was ennobled. Hofer has been made the hero of tragedies by Auerbach and Immermann, and there are numerous patriotic songs about him in Tirol. Consult: J. F. Hormayr, *Das Land Tyrol und der Tyrolerkrieg von 1809* (Leipzig, 1845); K. F. Heigel, *Andreas Hofer* (Munich, 1874); Josef Egger, *Geschichte Tyrols* (Innsbruck, 1870–80); Cölest. Stampfer, *Sandwirt Andreas Hofer* (Freiburg, 1891).

HÖFER, hē′fĕr, EDMUND (1819–82). A German novelist. He was born at Greifswald, was educated there, and in the universities of Heidelberg and Berlin. His first stories appeared in 1845, and from that time onward he wrote many novels marked by excellence of characterization and descriptions of north German landscapes. Later he wrote much, but not so well. Among his works may be mentioned: *Schwanwiek* (1856); *Bewegtes Leben* (1856); *Norien: Erinnerungen einer alten Frau* (1858); *Die Honoratiorentochter* (1861); *Altermann Ryke* (1864); *Ein Findling* (1868); *Der Junker* (1878); *In der letzten Stunde* (1881). His selected works appeared in 14 volumes (1882 et seq.). Consult W. Raade's "Biographische Skizze," in *Ueber Land und Meer*, vol. xx, no. 27 (Stuttgart, 1868).

HOFF, hôf, JAKOBUS HENDRIKUS VAN 'T. See VAN 'T HOFF.

HÖFFDING, hēvdĭng, HARALD (1843–). A Danish philosopher, born and educated in Copenhagen. He was a school-teacher between 1861 and 1871, in the latter year became instructor, and in 1883 professor, in the University of Copenhagen. He received honorary degrees from several European universities, among them Oxford (1904) and Cambridge (1909).

Early influenced by Kierkegaard, he held to a distinction between knowledge and belief; but later he became a positivist, though to the views of that school he applied the methods of critical philosophy and the results of psychological study. In ethics he is a utilitarian of a moderate type. His principal works are: *Den engelske Filosofi i vor Tid* (1874); *Etik* (1887; 3d ed., 1905; Ger. trans., Leipzig, 1888); *Psychologi i Omrids paa Grundlag of Erfaring* (1882; 5th ed., 1905; trans. into many languages); *Formal Logik til Brug ved Forelæsninger* (1889; 5th ed., 1907); *Psykologiske Undersögelser* (1889); *Kontinuiteten i Kants filosofiske Udviklingsgang* (1893); *Den nyere Filosofis Historie* (2 vols., 1894–95; Ger. trans., 1907; Eng. trans., 1912); *Rousseau und seine Philosophie* (1901); *Det psykologiske Grundlag for logiske Domme* (1899); *Religionsfilosofi* (1901; 2d ed., 1906; Eng. trans., 1906); *Mindre Arbejder* (2 vols., 1899–1905); *Problems of Philosophy* (1905); *Den menneskelige Tanke dens Former og dens Opgaver* (1910); *Modern Philosophers* (Eng. trans., New York, 1914). His textbooks in philosophy are widely used. Consult: C. N. Starcke and G. Saxild in *Tilskueren* (March, 1903); G. Brandes, *Samlede Skrifter*, xv (1905); A. Ipsen, *Literære Portræter* (1906).

HOFF'MAN, Charles Fenno (1806–84). An American poet and novelist, born in New York City. In early youth he had his leg crushed and amputated, but was not deterred thereby from athletics and an open-air life. He attended, but did not graduate from, Columbia College, was admitted to the bar at 21, and practiced three years, after which he devoted himself to literature. In 1833 he established the *Knickerbocker Magazine*, but soon gave it up and became editor of the *American Monthly*, which he conducted for several years. Afterward he edited for short periods the *Mirror* and the *Literary World*. His first book was *A Winter in the West* (1835), which was followed by *Wild Scenes in Forest and Prairie* (1837)—both based upon actual experiences in search of health. He now wrote a few novels, the most important being *Greyslaer* (1840), founded upon the murder of Colonel Sharpe by Beauchamp—a theme which a little later attracted Simms (q.v.). But his fame rested chiefly upon his poems, first collected in *The Vigil of Faith* (1842), and especially his songs, which were once deservedly popular. Among them may be named "Rosalie Clare" and "Monterey." A complete edition of his poems appeared in 1874. In 1849 he became insane and for the remainder of his life was confined in an asylum.

HOFFMAN, David (1784–1854). An American lawyer and author. He was professor of law in the University of Maryland from 1817 to 1836, traveled much abroad, and received honorary degrees from Oxford and Göttingen. Among his publications are: *A Course of Legal Study* (1817); *Legal Outlines* (1836); *Miscellaneous Thoughts on Men, Manners, and Things*, by "Anthony Grumbler" (1837); *Chronicles Selected from the Originals of Cartaphilus, the Wandering Jew* (1853), a work designed to present through the legend of the Wandering Jew a history of government and religion since the time of Christ.

HOFFMAN, Eugene Augustus (1829–1902). An American Protestant Episcopal clergyman, born in New York City and educated at Rutgers and Harvard colleges and at the General Theological Seminary. He was rector successively of Christ Church, Elizabeth, N. J.; St. Mary's Church, Burlington, N. J.; Grace Church, Brooklyn Heights; and St. Mark's Church, Philadelphia. In 1879 he was appointed dean of the General Theological Seminary, New York, and in connection with his family heavily endowed that institution. He wrote *Free Churches* (1858) and *The Eucharistic Week* (1859 and 1893). Consult T. M. Riley, *Memorial Biography of E. A. Hoffman* (New York, 1904).

HOFFMAN, Frederick Ludwig (1865–). An American statistician, born at Varel, Germany. In 1894 he became statistician of the Prudential Insurance Company of America, and in 1911 he was president of the American Statistical Association. His publications include: *Sanitary Conditions of the Tenements of Trinity Church, New York* (1895); *Tornadoes and Tornado Insurance* (1896); *The Race Traits and Tendencies of the American Negro* (1896); *History of the Prudential Insurance Company of America* (1900); *Fatal Accidents in Coal Mining* (1910); *Insurance Science and Economics* (1911); *Fifty Years of Life Insurance Progress* (1911); *Statistical Experience Data of the Johns Hopkins Hospital* (1913); *Menace of Cancer* (1913).

HOFFMAN, Richard (1831–1909). An American pianist, composer, and teacher. He was born in Manchester, Lancashire, England, but after his sixteenth year resided in New York City. His earliest instruction was received from his father and subsequently from Meyer, Pleyel, Moscheles, Rubinstein, Thalberg, Döhler, and Liszt. Within a year of his arrival in America he made a tour of the country and later accompanied Jenny Lind on her tours. He was an exceedingly popular concert pianist and played with Gottschalk and afterward with Von Bülow (New York, 1875). He settled down to teaching and became one of the most important factors in American musical life. His compositions consist of pianoforte music, part songs, ballads, anthems, and Church music generally.

HOFFMAN, Walter James (1846–99). An American ethnologist. He was born at Weidasville, Pa., studied medicine at Jefferson College, Philadelphia, and practiced it in Reading, Pa., till 1870, when he went to the Franco-Prussian War as a surgeon with the German army. On his return he took a similar position with the United States troops and thus obtained opportunities for natural-history researches in Arizona, Nevada, and Dakota. In 1877 Hoffman was attached to the Geological Survey and two years afterward became assistant in the Bureau of Ethnology at its formation.

HOFFMAN, or, The Revenge for a Father. A tragedy by Henry Chettle, performed in 1602.

HOFFMANN, hôf'mân, August Heinrich, called Hoffmann von Fallersleben, fôn fäl'ĕrslā'ben (1798–1874). A German poet, philologist, and literary historian, born at Fallersleben. He was educated at Göttingen and Bonn and from 1823 to 1838 was librarian at the University of Breslau, where he was also professor of the German language from 1830 till his dismissal (1842) for his *Unpolitische Lieder* (1841–42). He was restored to his rights as a Prussian citizen in 1848, having passed the intervening years in wanderings till 1845, when he settled in Mecklenburg. He married in 1849 and afterward lived

at Bingerbrück, Neuwied, and Weimar, where he was an editor of the *Weimarisches Jahrbuch*. From 1860 till his death he was librarian of the Duke of Ratibor at Korvei. Popular at first as a liberal political poet, he is cherished still for the ease, simplicity, and grace of songs of common life (for many of which he also composed melodies), sometimes of patriotic appeal, as the popular "Deutschland, Deutschland, über alles." Hoffmann was a diligent student and editor of early German classics (*Reineke Vos*, *Monumenta Elnonensia*, *Theophilus*), made valuable contributions to philology, now mostly of antiquarian interest, and to literary history. In 1868–70 Hoffmann published *Mein Leben*, an autobiography in six volumes. His complete works were issued by Gerstenberg in eight volumes (1890–93). His *Briefe an Ferdinand Wolf* were published in 1874. Consult: *Life* by J. M. Wagner (Vienna, 1869); Kreyenberg in *Preussiche Jahrbücher* (Berlin, 1891); H. Gerstenberg, *Henriette von Schwechenberg und H. von Fallersleben* (ib., 1903).

HOFFMANN, Ernst Theodor Amadeus (originally Wilhelm) (1776–1822). An eccentric but brilliant German romantic novelist of cosmopolitan reputation and influence, born at Königsberg. His foremost characteristic is his wayward yet keen fancy, suggesting at once Hawthorne and Poe. He dealt by preference with the grotesque, startling, and marvelous, until towards the close of his life morbidity verged on madness. After a joyless childhood he prepared carefully for the law, although he wished to become a composer, lost his position in Posen because of some witty caricatures, and suffered from penury and dissipation. He eked out a living by scene and portrait painting and musical composition and criticism in Posen, Warsaw, Bamberg, Leipzig, Dresden, and Berlin, where in 1816 he became councilor of the Court of Appeals. He was a brilliant lawyer. For short intervals he was manager and musical director also. His first book was a collection of musical criticisms with illustrations, *Phantasiestücke in Callots Manier* (1814–15), in which appear the stories *Ritter Gluck*, *Don Juan*, and *Das Märchen vom Goldenen Topf*. In 1816 appeared the novel *Die Elixire des Teufels*, which, with the unfinished novel *Lebensansichten des Katers Murr* (1820–22), is the most famous of his works. Other noteworthy volumes are *Die Serapionsbrüder* (1819–21), containing many stories, and *Nachtstücke* (1817). All are alike characterized by a lyric swing and an erratic imagination that is mentally disquieting and yet blended with shrewd satire, wit, and even wisdom. He died of disease induced by dissipation, his mind at times clear, and clinging tenaciously to a life that ebbed away inch by inch. Hoffmann's *Works* are in 15 volumes (2d rev. ed., 1905). A complete edition of his musical compositions was issued by E. Istel (1906). Of the more popular, there are many editions. The *Elixire des Teufels* has been translated into English (1824), also *Der goldene Topf* (The Golden Pot), one of the *Phantasiestücke*, by Carlyle in his *German Romance* (Edinburgh, 1827), with a biographical sketch. Other translations are by Gillies (London, 1826), Bealby (New York, 1885), and Ewing (London, 1886). Consult: Z. Funck, *Erinnerungen* (Leipzig, 1836); Hitzig, *Hoffmanns Leben und Nachlass* (Stuttgart, 1839); Hans Wolzogen, *E. T. A. Hoffmann u. R. Wagner* (Berlin, 1906); Arthur Sakheim, *E. T. A. Hoffmann: Studien zu seiner Persönlichkeit und seinen Werken* (Leipzig, 1908).

HOFFMANN, Friedrich (1660–1742). A German physician, one of the most celebrated of the eighteenth century. He was born at Halle and received his medical degree in 1681 at Jena. He then studied chemistry at Erfurt under Kaspar Cramer, practiced at Minden and Halberstadt with great success, and was professor of medicine in the University of Halle from 1693 to 1742. In 1708 he became physician to the King of Prussia at Berlin and subsequently enjoyed a European reputation second only to that of Boerhaave. His name is perpetuated in the title "Hoffmann's anodyne." (See Ether.) His greatest work was *Medicina Rationalis Systematica* (1718–40); *Opera Omnia Physico-Medica denuo Revisa, Correcta et Aucta* (1740) and *Medicini Consultatoria* (1721–39) were also celebrated, together with the *Opuscula*, published after his death and reprinted at Venice in 17 volumes in 1745 and subsequently at Naples.

HOFFMANN, Gustav (known as Graben-Hoffman) (1820–1900). A German composer, born at Bnin, near Posen. He was the pupil of Stümer in Berlin, and afterwards of Hauptmann at Leipzig in singing, and acquired a reputation in barytone parts in concert and oratorio. He taught vocal music and composed nearly a hundred books of songs and choral music, besides publishing several textbooks on voice training. His best-known song is "Funfmalhunderttausend Teufel." In 1885 he settled at Potsdam, where he founded a singing school for women.

HOFFMANN, Hans (1848–1909). A German novelist, born in Stettin. He studied philology at the universities of Bonn, Berlin, and Halle, and made a long visit to Italy and Greece. For some time he was a Gymnasium teacher. He is one of the most gifted of the modern German novelists and unites with an uncommon talent for vivid descriptions of landscapes a poetical and delightful humor. He died while secretary of the Schiller Foundation in Weimar. Among his works are: *Der Hexenprediger* (1883), his best work; *Iwan der Schreckliche und sein Hund* (1889); *Von Frühling zu Frühling* (1889, 1898); *Tante Fritzchen* (1899); *Geschichten aus Hinterpommern* (1891); *Irrende Mutterliebe* (1900); *Der eiserne Rittmeister* (1900); *Das Gymnasium zu Stolpenburg* (1900); *Von Haff zu Haff* (1903); and the lyrics *Vom Lebenswege* (Leipzig, 1893). Consult Otto Ladendorf, *Hans Hoffmann* (Berlin, 1908).

HOFFMANN, or **HOFFMANN-DONNER,** dŏn'ĕr, Heinrich (1809–94). A German humorous poet, born in Frankfort-on-the-Main. At his marriage he added his wife's name (Donner) to his own. He studied medicine at the universities of Heidelberg, Halle, and Paris, then became a teacher of anatomy in the Senckenberg Institution in Frankfort-on-the-Main, and from 1851 till 1889 was directing physician of the municipal insane asylum. He wrote on medical subjects, but is far better known through his children's books, which he illustrated himself. The most famous of these, *Struwwelpeter* (1845: 250th ed., 1903), has been widely translated. A parody of this famous work by E. V. Lucas in 1914 was one of the most agreeable books produced by the war in Europe. He also published *König Nussknacker* and a volume of poems, *Auf heitern Pfaden* (1873).

HOFFMANN, JOHANN JOSEPH (1805–78). A German Oriental scholar. He was born at Würzburg, where he was educated. He became an actor in 1825, but in 1830 his attention was diverted to Oriental philology by Philipp Franz von Siebold (q.v.). He completed his studies under a Chinese instructor, became Japanese translator for the Dutch Colonial Minister, and later was made professor of Chinese and Japanese at the University of Leyden. He published a Japanese grammar in both Dutch and English in 1867 and republished it in German and English in 1876. He is author also of *Japanische Studien* (1878).

HOFFMANNITES. See FRIENDS OF THE TEMPLE.

HOFFORY, hŏ'fŏ-rē (JOHN PETER), JULIUS (1855–97). A Danish-German philologist, phonetician, and Germanic scholar, born at Aarhus, Denmark. He was educated at Copenhagen, Berlin, and Strassburg. In 1883 he was made professor of Norse philology and phonetics at the University of Berlin. In 1889 his health broke down, and in 1893 he had to enter a sanitarium near Berlin, where he died in 1897. He wrote: *Eddastudien* (1889); "Phonetische Streitfragen," in the *Zeitschrift für vergleichende Sprachforschung*, vol. xxiii, and *Professor Sievers und die Principien der Sprachphysiologie* (1884), both attacks on Sievers. He edited and translated into German some of Holberg's comedies under the title of *Dänische Schaubühne* (1885–87), and translated other Danish writings in *Nordische Bibliothek* (1889–91). He did much towards the introduction of Ibsen into Germany. Consult Henning, *Acta Germanica* (Berlin, 1898), and R. M. Meyer, *Goethe-Jahrbuch*, No. 19 (Frankfort-on-the-Main, 1898).

HOFHUF, hô-fōōf'. See EL-HOFUF.

HÖFLER, hĕf'lĕr, KARL ADOLF KONSTANTIN VON (1811–97). A German historian. He was born at Memmingen and studied at the universities of Munich and Göttingen. For two years (1834–36) he was in Rome and Florence, making historical researches. When he returned to Munich, he directed the *Münchener Zeitung*, the official journal of Bavaria. Three years afterward he was made a professor at the university there. He became involved in the political troubles of Bavaria, and the publication of his *Konkordat und Konstitutionseid der Katholiken in Bayern* (1847), together with his active part in the agitation against Lola Montez, lost him his Munich chair; but, after being archivist at Bamberg for a time, he was made professor of history in the University of Prague (1851). In the controversy between the Czechs and the Germans Höfler sided conspicuously with the Germans, and in 1872 he was called into the Austrian House of Peers. His numerous historical publications include: *Die deutschen Päpste* (1839); *Lehrbuch der allgemeinen Geschichte* (1850-56); *Papst Adrian VI.* (1880); *Monumenta Hispanica* (1881–82); *Die Aera der Bastarden am Schlusse des Mittelalters* (1891).

HOFMANN, hŏf'mân, AUGUST WILHELM VON (1818–92). A distinguished German chemist, born at Giessen. After obtaining the degree of Ph.D., he became assistant to Liebig in the Giessen laboratory, and in 1845 became a docent in chemistry in the University of Bonn. In the same year the Royal College of Chemistry was established in London, and Hofmann was recommended by Liebig as highly qualified for the post of director of the new institution. This college, which subsequently became part of the Royal School of Mines, owes much of its high reputation to Hofmann's activity. On the promotion of Thomas Graham from the post of chemist to the mint to the office of master of that institution, Hofmann was appointed his successor. In 1861 he was elected president of the London Chemical Society. In 1865 Hofmann accepted the chair of chemistry in the University of Berlin and in 1868 founded the German Chemical Society. He was ennobled in 1888. He served as judge at several industrial expositions, of which he published admirable accounts, and was a member of many scientific bodies at home and abroad.

The results of his brilliant researches have formed entire departments in organic chemistry and have had an important influence on the development of chemical theory. He investigated the organic bases obtained from coal tar and discovered a new and important class of compounds (the amines, q.v.) which are derived from ammonia by the substitution of organic radicals for hydrogen atoms. One of his best-known contributions was a method (known as *Hofmann's reaction*) for the transformation of acid amides into amines by the action of bromine and caustic potash. Among his most important discoveries are that of aniline among the products of destructive distillation of bituminous coal and the discovery of methods for the artificial preparation of beautiful coloring substances from aniline. He obtained the colorless base known as *rosaniline* and its colored salts, such as *fuchsin, dahlia* (*Hofmann's violet*), etc. These discoveries have contributed greatly to the development of the color industry and have practically revolutionized the art of dyeing. Among his contributions to physical chemistry may be mentioned his method of determining the vapor densities of chemical substances for the purpose of obtaining their molecular weights, and a method of demonstrating the dissociation of gases, such as carbonic-acid gas and water vapor, by the action of electric sparks. Hofmann was a brilliant teacher, and his *Introduction to Modern Chemistry* (1865, and several later editions) brought about important reforms in the methods of teaching chemistry. He also wrote: *A Handbook of Organic Analysis* (1853); *The Life Work of Liebig in Experimental and Philosophic Chemistry* (1876); *Zur Erinnerung an vorangegangene Freunde* (1889); etc. Consult Volhard and Fischer, *August Wilhelm von Hofmann: Ein Lebensbild, im Auftrage der deutschen chemischen Gesellschaft* (Berlin, 1902).

HOFMANN, FRANZ ADOLF (1843–). A German hygienist. He was born in Munich, studied medicine there, and was assistant in the physiological institute of the university until 1872, when he went to Leipzig as head of the university laboratory of pathological chemistry. Six years afterward Hofmann was appointed professor of experimental hygiene and director of the hygienic institute at Leipzig, and he continued to hold his chair after resigning from administrative work. An editor of the *Archiv für Hygiene*, he contributed to that journal, to the *Zeitschrift für Biologie*, and to the *Vierteljahrschrift für öffentliche Gesundheitspflege*, on pathological chemistry, on the properties of subterraneous waters, and on disinfection, refrigeration, and the preservation of foods, especially meats.

HOFMANN, Heinrich (1824–1902). A German historical painter, born in Darmstadt. He was a pupil of Theodor Hildebrandt and Schadow at Düsseldorf and of the Antwerp Academy. After visiting Italy in 1854–58, where he came under the influence of Cornelius, and practicing in different German cities, he settled in 1862 at Dresden, where he became professor at the academy. Although his subjects are drawn from the entire domain of literature and mythology, his extensively engraved scenes from the life of Christ are most widely known. Among these are: "Christ Taken Prisoner" (1858, Darmstadt); "The Adulteress before Christ" (1868, Dresden); "Christ's Sermon on Lake Gennesaret" (1875, Berlin); "Christ in the Temple" (1882, Dresden). In 1878–79 he decorated the ceiling of the vestibule in the Dresden Theatre with "Apotheosis of the Heroes of the Greek Drama." Hofmann's pictures are not distinguished by any unusual technical qualities, but owe their popularity entirely to his illustrative talent and ideal conceptions of biblical events.

HOFMANN, Johann Christian Konrad von (1810–77). A German Lutheran theologian and historian, born in Nuremberg. He studied history and theology at the universities of Erlangen and Berlin and in 1833 was appointed a teacher in the Gymnasium at Erlangen. Two years later he became a privatdocent in the theological faculty of the university and in 1841 professor extraordinarius. The next year he accepted a call as full professor to Rostock, but in 1845 returned to Erlangen. In 1857 he was ennobled. He was the head of the so-called Erlangen school, which developed the theological ideas of Bengel, and in the end conformed in all essential respects with the doctrines of the Lutheran church. As a member of the Second Chamber of the Bavarian Legislature, he labored for the union of Germany and was, despite his clerical conservatism, a member of the Liberal party. His writings include: *Lehrbuch der Weltgeschichte* (2d ed., 1843); *Weissagung und Erfüllung im alten und neuen Testament* (2d ed., 3 vols., 1857–60); *Die heilige Schrift neuen Testaments, zusammenhängend untersucht* (1862–86, the latter part edited by Vlock); *Der Schriftbeweis* (2d ed., 1857–60). Consult Grau, *Johann Christian Konrad von Hofmann: Erinnerungen* (Gütersloh, 1879).

HOFMANN, Josef (1877–). A celebrated Polish concert pianist, born in Cracow, Galicia. His father was a leading musician of Warsaw, in which city he held the position of professor of harmony and composition at the conservatory and also the directorship of the opera. Josef studied with his father until he was 15 years of age, after which he spent two years with Rubinstein. As a child, he was one of the most remarkable musical prodigies ever known; at the age of six years he had made his public début, and by the time he was nine had toured continental Europe and Great Britain, and in 1887–88 he visited America. On the conclusion of the last-named tour he went into retirement for further study and preparation and in 1894 made his reappearance at Dresden and subsequently toured every civilized country. On his reappearance in New York in 1901 he showed a vastly improved technique and great interpretative ability. Among his contemporaries no pianist was his superior. He is equally at home in the interpretation of all schools of music—classic, romantic, or modern. Although he never taught music, he published two little books, *Piano Playing* and *Piano Questions Answered*, the principal merit of which is their eminent practicability. He composed several attractive numbers for the piano and also five concertos.

HOFMANN, Konrad (1819–90). A German philologist, born near Bemberg. He studied medicine at Munich and Erlangen and philology at Munich, Leipzig, Berlin, and Paris. In 1852 he was put in charge of the materials gathered by Schmeller among the manuscripts in the library of Munich. In the following year he succeeded Schmeller as professor of Germanic philology, assuming in 1869 also the chair of Romance philology. Most of his writings were for journals, especially the publications of the Munich Academy, *Romanische Forschungen*, and Pfeiffer's *Germania*. His other works are editions of the *Hildebrandlied* (1850), with Vollmar; *Amis et Amiles, Jourdain de Blaivies* (last ed., 1882); *Primavera y Flor de Romances* (1856), with Wolf; *Karls des grossen Pilgerfahrt* (1866); *Joufrois* (1880); Lutwin's *Adam und Eva* (1881), with Meyer; *Chanson de Roland* (not published); and the critical works *Ueber die Gründung der Wissenschaft altdeutscher Sprache und Litteratur* (1857) and *Zur Textkritik der Nibelungen* (1872).

HOFMANN, Melchior (c.1498–c.1544). A German Anabaptist, born at Hall in Swabia. He was a furrier at Livland, but under the influence of Luther became a lay preacher and in 1524 visited Sweden. From this country, however, he was expelled, and he was also driven from Dorpat in the same year. But Frederick I of Denmark appointed him to preach at Kiel. For a short period he enjoyed the favor of Luther, whom he visited at Wittenberg; but in 1529, because of his view of the Eucharist, he was attacked by Luther and his adherents. He preached at Strassburg and afterward in East Friesland. Upon his return to Strassburg in 1533 his Anabaptist doctrines had become so pronounced that he was placed in prison, and there he died.

HOFMANNSTHAL, hōf'mäns-täl, Hugo von (1874–). An Austrian poet. He was born of wealthy parents in Vienna and studied law, then literature and the languages, at the university of that city; but he early turned his attention entirely to literary work. His first venture, written under the pseudonym of Theophil Morren, when he was 18, a short lyric-dramatic study called *Gestern* (1892; 2d ed., 1904), he has hardly surpassed. His brief drama *Der Tod des Tizian* (1901; 4th ed., 1908) was successful and remains one of his best works. After the appearance of the plays *Theater in Versen* (containing *Die Frau im Fenster, Die Hochzeit der Sobeide, Der Abenteurer und die Sängerin*, 1899), *Der Tor und der Tod* (1900), *Der Kaiser und die Hexe* (1900), *Das Bergwerk zu Falun* (1900), and *Das kleine Welttheater, oder die Glücklichen, ein Puppenspiel* (1903), Hofmannsthal tried something more serious in his imitations of Greek tragedy, *Elektra* (1903), *Œdipus und die Sphinx* (1906), *Alcestis* (1911), and in his *Das gerettete Venedig, nach Thomas Otway* (1904), with promising but not permanent success. He has a flowing, graceful style, which, however, soon palls with its sweetness, and his characters almost never approach real life. In this he is true to his stated principle,

that art and life lie far apart. His gift is lyric rather than dramatic. Among his other works may be mentioned: *Ausgewählte Gedichte* (1903; 2d ed., 1904); *Das Märchen der 267. Nacht, und andere Erzählungen* (1904); *Viktor Hugo* (1904); *Vorspiele* (1908); *Prosaische Schriften* (1907); *Der Rosenkavalier* (1911), the libretto of a popular opera, which, with music by R. Strauss, had its first New York performance in 1913; *Jedermann, ein altes Spiel erneuert* (1912); *Ariadne auf Naxos* (1912). Consult: Sulger-Gebing, *H. von Hofmannsthal* (Leipzig, 1905); Borchhardt, *Rilke und Hofmannsthal* (ib., 1905); Köllmann, *H. von H.* (ib., 1907); Hladny, *Hofmannsthals Griechenstücke* (Vienna, 1910).

HOFMANNSWALDAU, hôf'måns-väl'dou, Christian Hofmann von (1617–79). A German poet, born in Breslau; the chief representative of the so-called second Silesian school. He studied law at Leyden and then traveled through the Netherlands, England, France, and Italy. On his return, and before he had reached the required age, he was made a member of the Breslau city council. His poetry was greatly influenced by the Italians Guarini and Marino and departed more and more from the somewhat insipid and tasteless style of the previously authoritative Martin Opitz (q.v.). Witty and endowed with considerable literary skill, he was much admired; his love lyrics were often imitated, and many editions of them were published. His style is pompous, bombastic, and highly artificial. Although of clean reputation himself, his poems cannot boast of that virtue. Selections from his poems are given in vol. xxxvi of Kürschner's *Deutsche Nationalliteratur.* Consult: Josef Ettlinger, *Christian Hofmann von Hofmannswaldau* (Halle, 1891); Brossmann, *Hofmann von Hofmannswaldau* (Leipzig, 1900); P. Hintringer, *Sprach- und textgeschichtliche Studien zu H. von H.* (Breslau, 1908).

HOFMEISTER, hôf'mī-stẽr, Franz (1850–). A German chemist, born at Prague, Bohemia, and educated at the universities of Prague, Leipzig, and Strassburg. At Prague he became an assistant in medical chemistry in 1872, lecturer in 1879, and professor of pharmacology in 1883. In 1896 he became director of the physiological-chemistry department at Strassburg. His investigations deal with action of salt in the body, assimilation of nourishment, metabolic assimilation of tissues, supply and use of albumen in organisms, and other problems in physiological chemistry. He published *Leitfaden für den praktisch-chemischen Unterricht der Mediziner* (3d ed., 1908).

HOFMEISTER, Wilhelm (1824–77). A German botanist, born at Leipzig. He has the reputation of being the father of modern morphology, i.e., the morphology of life histories and phylogeny. He was by profession a druggist and entirely self-trained in botany, having no university connection until long after his most famous contributions had appeared. His work was done during a period of revolution and foundation laying in every department of botany, and as a consequence he lived in the midst of violent opposition on the part of the established order. When 25 years old (1849), he published one of his two greatest works, *Die Entstehung des Embryo der Phanerogamen,* which corrected a remarkable misapprehension concerning the embryo of seed plants. In 1851 appeared his most famous work, under the title *Vergleichende Untersuchungen höherer Kryptogamen und der Koniferen,* an English translation of which, by Frederick Curry, was published in 1862 by the Royal Society. This, his epoch-making contribution, bridged the great gulf which was thought to separate cryptogams and phanerogams. The methods he had used in studying embryo formation in seed plants were applied to the embryology of Bryophytes and Pteridophytes, and in the course of this investigation he brought out with remarkable clearness, and for the first time, what is now called alternation of generations (q.v.). The estimate of this work given by Sachs is as follows: "These results were magnificent beyond all that has been achieved before or since in the domain of descriptive botany. The many valuable details are lost in the splendor of the total result." The idea of what is meant by the development of a plant was suddenly and completely changed. The intimate connection of all groups, from liverworts to angiosperms, was seen in all of its relations with a distinctness never before attained. When Darwin's theory of natural selection was given to the world, eight years after Hofmeister's investigations, the relations of affinity between the great divisions of plants were so well established and so evident that the theory of descent had only to accept what Hofmeister's morphology had actually brought to view. All of these results were obtained before he achieved his first university position, which was the professorship of botany at Heidelberg (1863–72). Later (1872–77) he was professor of botany at Tübingen. After he entered upon his career as a teacher, his work seems to have deteriorated; at least his investigations dealt with subjects of minor importance.

HOFMEYR, hôf'mī'ẽr, Jan Hendrik (1845–1909). A South African politician, born at Cape Town, South Africa, and educated at the South African College. He edited the journals *Volksvriend, Zuid Afrikaan,* and *Zuid Afrikaansche Tijdschrift;* organized the Boeren Vereeniging (Farmers' Association) in 1878; and when the Afrikander Bond was formed in 1882 he gained control of it and amalgamated the two societies, thereby becoming the leader of the Dutch residents of Cape Colony. From 1879 to 1895 he was a member of the Cape Parliament, and in 1882 he served in Scanlon's ministry. At the first colonial conference in London, in 1887, he proposed an Imperial customs federation. Two years later he was a member of the South African customs conference, and in 1890 he negotiated the Swaziland Convention. He brought about the conference between Lord Milner and President Kruger at Bloemfontein, and later he personally visited that city and Pretoria in his efforts to prevent war between England and the Transvaal. After the war he favored conciliation and was one of the delegates sent to London in 1909 to make final arrangements for the South African union. Consult the *Life* by J. H. Hofmeyr (London, 1914).

HOFSTEDE DE GROOT, hôf'stå-de de grōt, Petrus (1802–86). A Dutch theologian and reformer, born at Leer in East Friesland, Prussia. In 1826 he became pastor at Ulrum and in 1829 professor of theology in Groningen. He was the head of the so-called Groningen school, the members of which style themselves the Evan-

STANDARD BREEDS OF HOGS

1

2

3

4

5

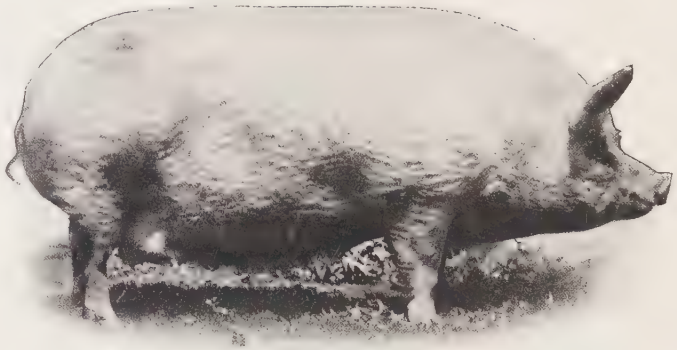
1. A TRIO OF DUROC SOWS

2. BERKSHIRE SOW
4. HAMPSHIRE BOAR

3 MULEFOOT SOW
5 ESSEX SOW

STANDARD BREEDS OF HOGS

1



2

3

4

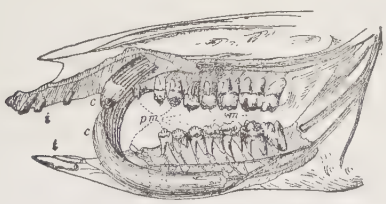
1. YORKSHIRE BOAR
3. POLAND-CHINA BOAR

2. CHESHIRE SOW
4. CHESTER WHITE SOW

gelicals and form a middle Church party between the moderns and the orthodox, although they lean more towards the latter. The party organ was the *Waarheid en Liefde*, of which Hofstede was an editor. His writings include: *Opvoeding der Menschheid* (2d ed., 1855); *Institutio Theologiæ Naturalis* (4th ed., 1861); *Die Groninger Theologen* (1854); *Over de evangelisch-catholieke godgeleerdheid als de godgeleerdheid der toekomst* (1856); *Die moderne Theologie in den Niederlanden* (1870). Consult Heerspink, *Dr. Petrus Hofstedes leven en werken* (Groningen, 1897).

HOFUF. See El-Hofuf.

HOG, The Domestic (probably from *hog, hag,* to cut, Icel. *hoggva,* Swed. *hugga,* AS. *hēawan,* OHG. *houwan,* Ger. *hauen,* to hew; connected with OChurch Slav. *kovati,* Lith. *káuti,* to strike, to forge; referring ordinarily to a castrated boar). All the known breeds of domestic swine (see Swine, for the general natural history of the race) may be divided into two groups—the European hog (*Sus scrofa*), which is sprung from and resembles the wild boar; and the Asiatic pigs, regarded as descended



DENTITION OF THE WILD BOAR.

Right upper and lower jaws, with their teeth and their nerves, exposed from the inside: *i, i,* incisors; *c, c,* canines (tusks); *pm,* premolars; *m,* molars.

from the Indian wild boar (*Sus cristatus*). The common hog (*Sus scrofa*) appears to be a native of most parts of Europe and Asia, and domesticated swine were found by the first navigators in many islands of the southern seas. Although the use of its flesh was prohibited to the Jews, and the prohibition has been adopted in the Mohammedan law, it constitutes a large part of the food of many nations. The fecundity of the hog is great; with proper treatment it will produce two litters annually, generally of four to eight pigs each, although sometimes there are as many as 14 in a litter. The period of gestation is usually 16 weeks. Great quantities of the flesh and fat are consumed in various forms as pork, fresh or salted, bacon, ham, and lard. Hog skin is made into leather, which is highly esteemed. The bristles are much used for brush making.

Breeds. Numerous breeds of the domestic hog have resulted from selection and crossing and from conditions of environment favorable to improvement. Apparently there were two original or native breeds in Great Britain—the old English hog and a breed found in the Highlands of Scotland. From these our modern improved breeds have been developed by crossing the native breeds with foreign hogs, principally the Chinese and Neapolitans. The modern white breeds, with fine bone, thin skin, short legs, and tendency to fatten at an early age, take these qualities from the Chinese hog; while the black breeds, of which the Essex is a type, get their qualities from the Neapolitan stock.

The *Yorkshire* is the principal of the English white breeds and is divided into three subvarieties—the Large Whites, or Large Yorkshires, the Middle Whites, and the Small Whites, or Small Yorkshires, which are considered the smallest and finest of the white breeds. They mature early and fatten quickly. The Large Whites are characterized by immense size, although the best are rather fine-boned and not coarse. The Yorkshires are very popular in England, and white swine generally are preferred in that country. It is said that from this source came the American breed of Chester Whites, which was originated in Chester Co., Pa. Pigs of this breed are among the largest, and individuals have attained a weight of 1300 pounds.

The *Berkshires* are popular and widely disseminated. This breed is of English origin and takes its name from the county whence it came. It is of large size, black in color with white on the face and occasional splashes elsewhere, and fattens readily at any age. Great improvement has been made in its size and symmetry in recent years. The quality of the pork is unexcelled.

The *Poland-Chinas* divide honors with the Berkshires in the great pork-producing sections of the United States. This is also a black breed and is a purely American one, originating in Ohio. It is not generally believed that any Polish cross was ever introduced in its development, in spite of its name. As now bred, the Poland-Chinas are similar to the Berkshires, but show rather more white in their markings. They are among the largest of hogs, but have been much improved in fineness of bone, early maturity, and tendency to fatten at an early age.

The *Duroc-Jerseys* are the result of uniting several families of red pigs which were bred in New York and New Jersey. Though the color is red, the shades vary considerably. The body, as a whole, resembles the Poland-China. The breed has become very popular in recent years. The *Cheshires* are a medium-sized white breed which originated in New York. Though possessed of many good qualities, it has not been popular in the West. The *Thin Rind,* or *Hampshire,* is a good bacon pig of American origin. The color is black with a white band about the body. The *Tamworth* is a large, coarse, "leggy" hog, of a dark chestnut color, more or less spotted with black. This animal has been widely exploited as a bacon hog. It originated in England, but is popular in America. The *Victorias* are a white breed of medium size, not widely raised in the United States; and the *Essex* is a black English breed, classed among the smaller breeds. It has not become popular in the United States. The *Small Black,* or *Suffolk,* originated in England from a cross between the Essex and the Neapolitan. The *Large Black* is a new English breed. The *Lincolnshire Curly Coated* is a native of eastern England. A few have been brought to the United States.

Care and Treatment. Although hogs are raised to some extent in all parts of the United States, the great pork-producing section is in the Mississippi valley, where corn is abundant and cheap. The northern part of this valley is said to be the greatest hog-raising section in the world. The hogs are commonly pastured during the earlier stages of growth. Frequently a herd of swine are put with steers which are being fed whole corn, and the hogs feed upon the corn voided in the manure. Alfalfa pasturage is used for hogs in some sections. In the

South cowpeas, peanuts, chufas, and a variety of other crops are grown for hog pasture. Corn is the great hog feed of the Middle West; sometimes it is ground, but it is largely fed on the ear. As corn contains only a small percentage of ash, the hogs fed upon it exclusively become weak-boned and can hardly walk about. This is corrected by giving wood ashes, which they eat greedily. Skim milk and buttermilk from creameries constitute excellent food for pigs of all ages; and if corn meal is added, a pork of the finest quality is obtained. The large, overfattened hog, weighing 400 or 500 pounds, has given way to a quickly maturing hog of from 200 to 300 pounds. This animal is produced more economically and is preferred by the packing houses. The gains in proportion to the food eaten diminish as the animal grows, and experiments have shown that it is most profitable to market the hogs when they have reached 200 or 250 pounds. Packers prefer a hog weighing about 250 pounds. See PORK; SWINE.

The number of hogs on farms in the United States increased from 1890 to 1911, when the total was 65,620,000, valued at $615,170,000; but decreased in subsequent years, being in 1914 58,933,000 valued at $612,950,000.

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HOG (so called as resembling in outline the back of a hog). This nautical term implies the opposite of *sag*. A ship is *hogged* when through weakness her ends droop in such a manner as to cause her keel to curve upward amidships. In lightly built or shallow vessels a tendency to hog is prevented by a truss frame arranged to support the ends and called the hog-frame. Most wood-built and many iron paddle-wheel river steamers have such frames rising well above the hull and sometimes above the deck houses. Instead of a framework extending from end to end, it may be located only amidships, and the strain transmitted to it by *hogchains* extending to the ends. In deep-draft vessels, the side plating and fore-and-aft bulkheads act as girders to prevent hogging or sagging; the plating of the decks (especially of the upper deck) and bottom serves as ties to hold the framing in shape.

HOGAN, hō'gạn. A cone-shaped earth-covered house used by the Navaho (q.v.).

HOGAN, hō'gạn, JOHN SHERIDAN (c.1815–c.61). A Canadian journalist and legislator. Born near Dublin, Ireland, in early youth he came to Toronto, Upper Canada. For a few years he practiced law in Hamilton. In 1841 he came into wide notoriety on account of his arrest at Rochester, N. Y., on a charge of having been concerned in the destruction of the *Caroline*, an American steamer that was set on fire and sent over Niagara Falls during the rebellion of 1837–38. He was set at liberty and returned to Hamilton. Later he established at Toronto the *United Empire*, a weekly newspaper, and also became the parliamentary correspondent for several journals. About 1850 he contributed a number of vigorous articles on Canadian politics to *Blackwood's Magazine*. In 1855 his essay on *Canada and her Resources* was awarded the first prize of the Paris Exhibition Committee, and in 1857 he was elected a Liberal member of the Canada Legislative Assembly, and gave promise of a distinguished parliamentary career. While in Toronto in 1859, he suddenly disappeared, and it was not known until two years later, when his body was found, that he had been murdered.

HOG APE. The mandrill. See BABOON.

HOG APPLE. See PODOPHYLLUM.

HOGARTH, hō'gärth, DAVID GEORGE (1862–). An English archæologist, born at Barton-on-Humber. He was educated at Winchester and at Magdalen College, Oxford, and was tutor of Magdalen in 1886–93 and afterward fellow. He traveled in Asia Minor in 1887, 1890, 1891, and 1894, and carried on excavations at Paphos (1888), Dêr-el-Bahari (1894), Alexandria (1895), Fayûm (1896), Naukratis (1899, 1903), Cnosus and the Dictæan Cave (1900), Zakro (1901), the Artemisium in Ephesus (1904–05), Assiut (1906–07), and Jerablus (1911)—largely for the British Museum. In 1897–1900 he was director of the British School at Athens, and in 1909 he became keeper of the Ashmolean Museum, Oxford. He wrote: *Devia Cypria* (1890); *A Wandering Scholar in the Levant* (1896); *Philip and Alexander of Macedon* (1897); *The Nearer East* (1902); *The Penetration of Arabia* (1904); *Excavations at Ephesus: The Archaic Artemisia* (1908), with others; *Ionia and the East* (1909); *Accidents of an Antiquary's Life* (1910).

HOGARTH, WILLIAM (1697–1764). An English painter and engraver. He was born in London, Nov. 10, 1697. His father was an unsuccessful schoolmaster, who was also a hack writer and corrector for the press. At the age of 17 Hogarth was apprenticed to a silversmith, for whom he made designs for plate which are now much prized by collectors. In 1718 he entered business on his own account, and, besides engraving arms and shop bills, he began to design copper plates for the booksellers. During the years 1721–26 he designed a number of engravings, the most important of which were "Masquerades and Operas" (1724), which struck the keynote of his future satire, and his illustrations to Butler's *Hudibras*, which brought him into public notice. At first Hogarth's ambition was to be a line engraver; but about 1724 he began to attend the private art school of Sir James Thornhill, in St. Martin's Lane, with a view to painting. In 1728–29 he painted a series of small conversation pieces, groups of family portraits connected by some common interest or occupation, besides others of a political and social character. Between 1727 and 1732 he engraved a large number of frontispieces for well-known books. In 1729 he ran away with his former master's daughter, Jane Thornhill, who made him an excellent wife.

Soon after his marriage he began the first of the series of paintings, "The Harlot's Progress," reproduced also as engravings, which made him famous. It represented in six plates the story of a country girl who came innocent to town to seek a situation. The original paintings, except one, are lost, but the plates are well known. The shameless piracy of these plates resulted in

WILLIAM HOGARTH
"AFTER THE MARRIAGE" (FROM "MARRIAGE À LA MODE")
FROM THE ORIGINAL IN THE NATIONAL GALLERY, LONDON

the Parliamentary Act of 1735 vesting in artists the exclusive rights to their designs. In the same year appeared "A Rake's Progress," eight plates, representing the career of a profligate young man of means, who ends in the madhouse, the original paintings for which are in the Soane Museum, London. The third and most famous series, the "Marriage à la Mode," was not completed till 1745. It represents in six plates the story of a fashionable marriage between the son of an impoverished lord and the daughter of a wealthy city alderman. The original paintings are in the National Gallery and are Hogarth's greatest work. Another prominent series was "Industry and Idleness" (12 sheets, 1747), executed as engravings only. They represent the respective careers of an idle and an industrious apprentice and were intended for the working class. Besides these he executed briefer series and many single plates.

Hogarth's art was essentially of a literary character, and he has well been called the Molière of painting. His constant endeavor was to point out the vices and follies of society with the strict moral purpose of reforming. His great importance in the development of art lies in the fact that he was the first to turn his back on traditional practices and to go directly to nature for the figures he painted. He is free from all foreign and ancient influence. In his portraits he is a technician of high order. His pictures are strongly and broadly painted and excel equally in drawing and in color. His paintings are better than his engravings, which are hastily executed and lack finish, although they are always spirited and intelligible.

He succeeded especially well in his portraits, one of the best of which is of himself with his dog Trump (1745), in the National Gallery. This collection contains also portraits of his sister, Mary Hogarth (1746), Lavinia Fenton as Polly Peachum, David Garrick as Richard III, the Earl of Feversham, and the inimitable "Shrimp Girl." The Metropolitan Museum, New York, possesses the portrait of Peg Woffington. Among his other paintings of a didactic character, painted for engraving, were "Southwark Fair" (1733), "Midnight Modern Conversation" (1734), the "Distressed Poet" (1735), the "Enraged Musician" (1741), "March to Finchley," and the "Election"—the two latter in the Soane Museum. He also attempted a few historical pictures on a large scale, but not with equal success.

Hogarth took a prominent part in the art controversies of his day, being the uncompromising foe of the imitation of the old masters—the "black masters" as he called them because of their darkened colors. In 1753 he published his *Analysis of Beauty* (reprinted at Pittsfield, Mass., 1909), setting forth his views on art; it was not a success and brought ridicule upon him. After the death of his father-in-law, in 1734, Hogarth converted his art school into a sort of life class, in which 30 or 40 artists drew after the nude. In 1757 he was appointed sergeant painter of all his Majesty's works, succeeding his brother-in-law, John Thornhill. His last days were marred by the ill success of his "Sigismunda Weeping over the Heart of her Husband," the harsh criticism of which was especially painful to Hogarth, as Sigismunda bore the features of his wife. An ill-advised effort in behalf of Lord Bute's ministry in 1762 brought down upon him the terrible satire of Wilkes and Churchill, until then his intimate friends. Though much grieved, Hogarth retaliated by two prints—a hideous portrait of Wilkes with a satyr's leer and squint, and "The Bruiser, C. Churchill." He died at London, Oct. 25, 1764.

Bibliography. Among the commentaries to Hogarth's engravings are: Trusler, *Hogarth Moralized* (London, 1768); Horace Walpole, *Anecdotes of Painting*, vol. iv (ib., 1771); Samuel Ireland, *Hogarth Illustrated* (ib., 1791–98) and *Graphic Illustrations of Hogarth* (ib., 1794–99); G. C. Lichtenberg, *Ausführliche Erklärung der Hogarthschen Kupferstiche* (Göttingen, 1794); Nichols and Steevens, *Genuine Works of Hogarth* (London, 1808–17); Clerk, *Works of Hogarth* (ib., 1806). Hogarth's engravings are easily accessible in Hind's *Great Engravers Series* (ib., 1913). Among the numerous editions of his *Works* are those of Nichols (ib., 1820–22), of Monkhouse and Dobson (ib., 1872), and of Ireland and Nichols (ib., 1883). By far the best monograph on Hogarth is the folio by Austin Dobson (ib., 1902), with introduction by Sir Walter Armstrong, and admirable half-tone illustrations. Others are by Nichols (ib., 1785), G. A. H. Sala (ib., 1866), and Austin Dobson (New York, 1908); Benoit, in *Les grands artistes* (Paris, n. d.); Meier-Gräfe (Munich, 1910); Edward Garnett (New York, 1910); C. L. Hind (ib., 1910); and the excellent brief folios by Hutton in *Kunst der Gegenwart* (Berlin, 1908).

HOG CHOLERA, SWINE FEVER, or SCHWEINEPEST. An acute, subacute, or chronic contagious disease of hogs, caused primarily by a filterable virus and accompanied by a very high death rate. In the course of the disease inflammatory and necrotic processes develop, produced either by *Bacillus suipestifer* when the lesions occur in the intestinal canal and in the abdominal lymph glands, or by the *Bacillus suisepticus* when the lesions are manifested in the lungs. The term has been used to cover at least two diseases—true hog cholera and swine plague (q.v.).

The chief symptoms of hog cholera are a rise in body temperature, loss of appetite, a discharge from the eyes, watery at first but later yellowish and viscid, a purplish coloration of the skin, giving rise to a common name, blue sickness, occurring especially on the ears, chest, and abdomen, the underside of the neck, and on the inside of the thighs. Constipation is an early symptom, but diarrhœa soon sets in and persists until the death of the animal. The excrement is dark-colored and possesses a fetid odor. The body temperature may rise from one to three degrees above the normal, but the elevation of temperature is frequently absent. The animals are dull and indifferent to surroundings, lie down a great part of the time, and hide their heads under straw or litter, often have a dry cough, and sometimes squeal from intestinal pain. As the disease progresses, they become gaunt with arching backs. Acute cases may last from two to five days; chronic ones, a month. The characteristic pathological changes are enlargement of the spleen and a hemorrhagic condition of the large intestines and lymphatic glands. In chronic cases ulcers are formed in the large intestines, or the whole wall may become effused with blood.

Hog cholera and swine plague (*Schweineseuche*) have been frequently confounded, but

in typical cases they may be distinguished by clinical symptoms and post-mortem lesions. In most outbreaks of contagious hog diseases, hog cholera and swine plague occur in combination in the same animal. In general, however, the seat of infection in hog cholera is in the intestines; that of swine plague is in the lungs and secondarily in the intestines. A reddening of the skin is an indication of hog cholera, while coughing is more pronounced in cases of swine plague. For a reliable differential diagnosis of the two diseases it is necessary to make pure cultures of the microörganisms that are concerned.

No satisfactory medicinal treatment has been devised for hog cholera. Recognized tonics which assist in keeping hogs in good physical condition may render them less susceptible to disease. A mixture containing sodium salts, sulphur, sulphide of antimony, and wood charcoal has proved as effective as any remedy.

The investigations carried on by agents of the United States Department of Agriculture which led to the discovery that this disease is caused primarily by a filterable virus were followed by experiments which have resulted in the production of an immune serum that is being successfully used in immunizing hogs against the disease. This immune serum is produced by the repeated injection of blood from a hog sick of hog cholera into vigorous immune hogs. Two methods of immunizing hogs against the disease are now practiced. The first, which confers a passive immunity, consists in the injection of the immune serum into the hog. While protecting against the disease for but a few weeks, it gives the grower sufficient time to fatten and market his drove after the disease appears. The second, known as the serum simultaneous method, which confers an active immunity, consists in the injection of the immune serum on one side of the body and a small amount of blood taken from a hog sick of hog cholera on the other side. This simultaneous method confers upon the injected pig a permanent and lasting immunity.

It has been found practically impossible to disinfect hog pens and yards after an outbreak of hog cholera. Infected pens should be burned, and the surrounding ground should be cultivated to some crop for at least a year before again using as a hog yard. Pens should be kept as clean as possible and treated from time to time with lime and whitewash. By observing these precautions, preventing infection of the water supply, and quarantining imported hogs before allowing them to run with the herd, the liability to infection from hog cholera will be much reduced. Consult Hutyra and Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol. i (Chicago, 1912), and publications of the United States Bureau of Animal Industry and of the Department of Agriculture.

HOG DEER. The "para," or smallest of the East Indian rusine deer (*Cervus porcinus*), which takes its name from its habit of darting through the tall grass like a startled boar. It stands only 2 feet high at the withers. Its legs are comparatively short, and its antlers, having given off a brow tine, are nearly straight to the small terminal fork and are mounted upon remarkably high pedicels. The general color is rufous brown, paler in summer and somewhat spotted. This deer ranges through northern India and down the coasts of Assam and Burma. It is very numerous, not gregarious, and forms a favorite object of jungle sport, sometimes by spearing.

HOGE, hōg, Moses Drury (1819–99). An American Presbyterian minister. He was born in Hampden-Sidney, Va., was educated there, and was made assistant in a Richmond church in 1844. When a second Presbyterian church grew out of the first, Dr. Hoge became its pastor (1845–85), and during the Civil War he succeeded in securing from the British and Foreign Bible Society a very large number of volumes for the use of Confederate soldiers. He was joint editor of the *Central Presbyterian* (1862–67). A volume entitled *Perfection of Beauty and Other Sermons* was published in 1904.

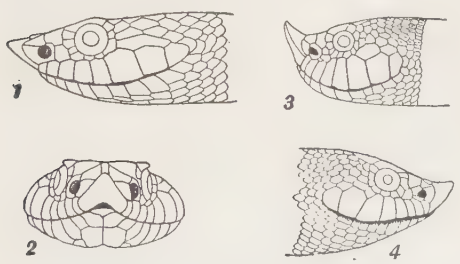
HOG'FISH', or Hog'mol'ly. A local name for the log perch (q.v.).

HOGG, hōg, James (1770–1835). A Scottish poet, known as the Ettrick Shepherd, born in the parish of Ettrick, Selkirkshire, in 1770. His father was a poor farmer. The boy's education was slight, for he was taken from school to herd ewes. But from his mother he learned many folk tales of giants, fairies, and brownies. Beginning to make songs for lasses to sing in chorus, he next wrote them out with great labor. His first poem was published anonymously in 1800. Going to Edinburgh, in 1801, to sell his employer's sheep, he wrote out from memory a collection of his songs and published them roughly as *Scottish Pastorals, Poems, Songs, etc.* The next year he made the acquaintance of Scott, who was visiting the Ettrick Forest in search of material for the *Minstrelsy of the Scottish Border.* Several ballads which Hogg and his mother furnished Scott appeared in the third volume of the *Minstrelsy* (1803). In 1807 Hogg published *The Mountain Bard,* original ballads suggested by Scott. With the proceeds of this volume and a treatise on sheep, amounting to £300, Hogg took a farm, which proved a disastrous venture. In 1810 he went to Edinburgh and began as professional author with the *Forest Minstrel,* published in the last-named year. Three years later appeared his most imaginative poem, *The Queen's Wake.* By this time he was becoming acquainted, directly or through correspondence, with some of the most eminent men of letters, who admired him greatly. He married in 1820 and retired to the farm of Eltrive Lake in the valley of the Yarrow. In 1834 appeared his *Domestic Manners and Private Life of Sir Walter Scott.* He died Nov. 21, 1835, and was buried in the Ettrick churchyard. In 1860 a monument was erected to his memory, overlooking St. Mary's Lake. Hogg was immortalized as the Ettrick Shepherd by Wilson in the *Noctes Ambrosianæ.* Among his poems not cited above are *The Pilgrims of the Sun* (1815), *The Poetic Mirror* (1816), and *Songs* (1829). These and other poems place Hogg among the greatest of the peasant poets of Scotland. Well known are such songs as "When the Kye Comes Hame" and "Flora Macdonald's Farewell." Hogg also wrote many tales of uneven quality. The most remarkable is entitled *Confessions of a Fanatic* (1824). Interesting, too, is the volume called *Winter Evening Tales* (1820), depicting the manners of the border. Consult: *Works,* edited with memoirs by T. Thomson (London, 1865); "Poems," selected, in *Canterbury Poets* (ib., 1886); *Me-*

morials of J. Hogg, by his daughter, Mrs. Garden (ib., 1887).

HOGG, THOMAS JEFFERSON (1792–1862). An English biographer. He was born at Norton, Durham. In 1811 he was expelled from University College, Oxford, with Shelley for suspected complicity in bringing out *The Necessity for Atheism*. He became a conveyancer at York, studied law, was admitted to the bar in 1817, and became a revising barrister in 1833. He resumed his intimate relations with Shelley in 1814, published his reminiscences of the poet in 1832 in the *New Monthly Magazine*, and in 1844 received a £2000 bequest under Shelley's will. Supplied with the documents, he began in 1855 to write Shelley's biography, of which he produced the first two volumes in 1858 (republished in 1906). The work was so unsatisfactory that members of Shelley's family obliged Hogg to discontinue the task he had started. Consult Richard Garnett, in *Dictionary of National Biography*, vol. xxvii (London, 1891).

HOG'NOSE. A harmless American serpent, remarkable for its blunt snout and curious manners. Three species form the colubrine genus *Heterodon*, all confined to North America, exclusive of the Pacific coast and Mexico. The best-known species (*Heterodon platyrhinus*) is one of our most common and widespread snakes. It is usually about 2, but may be 3, feet long and is normally reddish brown above, heavily blotched or obscurely barred with a darker tint, and underneath is greenish white. Great variety in color and markings exists, however, and many seem sooty black or dark slate all over. It is



HEADS OF HOGNOSE SNAKES.

1, *Heterodon platyrhinus*. 2, face of same. 3, *Heterodon nasicus*. 4, *Heterodon simus*.

always to be recognized by its piglike snout and its extraordinary behavior when disturbed. It is timid, and will hide or escape when possible; but if surprised or cornered it will throw itself into vigorous contortions and perhaps soon tumble over on its back as if dead, or, more probably, it will inflate its long lung until its body swells up like a sausage, and at the same time extend its anterior ribs until its neck is surprisingly broad and flat, and then, opening wide its great mouth, will blow and hiss loudly. This alarming menace is meant to terrify its foes and has led to the popular names of "blowing viper," "spreading adder," etc., and to the general belief that it must be very poisonous. Its blotched back, easily mistaken by the unobserving for that of a copperhead, adds to its evil reputation. Nevertheless, this snake is entirely harmless, and when handled is found to be so gentle that it can hardly be forced to bite.

It feeds on mice, frogs, insects, birds' eggs, and so on, all obtained on the ground, for it is unable to climb trees. It lays a number of eggs, about an inch in length, in loose soil, into which it burrows for this purpose. The eggs are covered with a tough parchment-like coat and probably hatch in a few days. There seems to be no precise time of laying; young have been reported from May until September. The young just issued from the egg will go through their contortions and hissing when molested, as do the adults. Much interesting information as to their breeding and other habits, collected by Abbott, Hay, and others, will be found summarized in Cope, *Crocodilians, Lizards, and Snakes*, published by the Smithsonian Institution (Washington, 1900).

The Southern States have a second species (*Heterodon simus*), and Texas and the Mexican border a third (*Heterodon nasicus*), in which the point of the snout is longer and more upturned than in the Northern forms. See Plate of SNAKES, AMERICAN HARMLESS.

HOG PLUM, SPANISH PLUM, and BRAZILIAN PLUM. Names given in the West Indies and other tropical countries to the fruit of certain species of *Spondias*, a genus which belongs to the family Anacardiaceæ. The species are trees and shrubs, with pinnate leaves, with terminal leaflets, and flowers in racemes or panicles. Some of them produce very pleasant fruits, among which may be mentioned *Spondias purpurea* and *Spondias lutea*, which are generally called hog plum in the West Indies, because the fruits are a common food of hogs. *Spondias purpurea* has fruit about an inch in length, ovate or oblong, purple or variegated with yellow; yellow pulp with a peculiar but agreeable acid and aromatic taste. The fruit of *Spondias tuberosa*, called imbuzeiro in the north of Brazil, is about twice the size of a large gooseberry, oblong, yellowish, with a leathery skin and sweetish-acid pulp. The tree is remarkable for the numerous round black swellings, about 18 inches in diameter, which it produces on its widely spreading roots, and which are very cellular and full of water. They are evidently intended for the wants of the tree in the dry season and are often dug out by travelers for the sake of the water, of which each full-grown knot yields about a pint. An important species is the ti or Tahiti apple (*Spondias dulcis*), a very fine fruit of the South Sea Islands. This tree often attains a height of 50 to 60 feet and, according to Seeman, is laden with fruits averaging a pound each.

HOG RAT. See HUTIA.

HOGS'HEAD. An old English measure of capacity. For wine, it was equivalent to 63 gallons or 52½ imperial gallons; for ale, 48 gallons; and for beer, 54 gallons. In the United States it is still used as a measure for liquids, equivalent to two barrels, or 63 gallons, each of 231 cubic inches. Section 3339 Revised Statutes, in referring to standard barrels of fermented liquids, says, "more than one barrel, and not more than sixty-three gallons, shall be accounted two barrels, or a hogshead." When used for tobacco, the hogshead varies by custom rather than by statute, in different States ranging from about 750 to 1200 pounds; it is usual, however, to mark the actual net weight of the contents on the hogshead.

HOGUE, ōg, or **HOUGUE,** o͞og, LA. A roadstead near the northeast extremity of the peninsula of Cotentin, Normandy, a few miles south of Barfleur. It gives its name to the naval

battle of May 29 (old style May 19), 1692, when the combined English and Dutch fleets, under Admiral Russell, defeated the French fleet commanded by Tourville. The name of La Hogue is often confounded with La Hague, the name of the cape at the northwest extremity of Cotentin.

HOH. See QUILLAYUTE.

HOHENBERG, hō′*e*n-bĕrk, SOPHIE, DUCHESS OF (1868–1914). The morganatic wife of Francis Ferdinand, Archduke of Austria (q.v.), with whom she was assassinated at Serajevo, Bosnia, in June, 1914. She was born at Stuttgart, Württemberg, and before her marriage to the Archduke in 1900 was known as the Countess Chotek. She was the mother of Princess Sophie (born 1901), and of Princes Maximilien Charles (born 1902) and Ernest (born 1904); but her children were excluded from succession to the Austro-Hungarian throne by the laws of the Empire.

HOHENHEIM, hō′*e*n-hīm, PHILIPPUS, A. P. VON. See PARACELSUS.

HOHENLINDEN, hō′*e*n-lĭn′d*e*n (Ger., tall lindens). A village in Upper Bavaria, 19 miles east of Munich, celebrated for the victory gained there by the French, under Moreau, over the Austrians under Archduke John, Dec. 3, 1800. Moreau's army was posted on the plateau between the Isar and the Inn and barred the way to Munich, which was the Archduke's objective point. In three columns the Austrians advanced to the attack through forest and ravines in a blinding snowstorm. Moreau contented himself with holding them in check until Richepanse, whom he had sent around the enemy's flank, reached the Austrian rear. Then he hurled Ney against their front. Richepanse delivered his attack from the rear, and the Austrian army was destroyed between the two French forces. The Austrians lost 20,000 men (including 10,000 prisoners) and 100 guns, while Moreau's loss amounted to only 5000. The battle hastened the conclusion of peace at Lunéville, Feb. 9, 1801.

HOHENLOHE, hō′*e*n-lō′*e*. Formerly an earldom, later a principality, in Franconia, Germany. It lost its sovereignty and was divided in 1806, the main portion being assigned to Württemberg and a part to Bavaria.

HOHENLOHE. A princely family of Germany, claiming descent from Eberhard, one of the early dukes of Franconia. The family first appears in history in the early part of the twelfth century in possession of the castle of Holloch, near Uffenheim. The first Count we hear of is Heinrich, who lived in the twelfth century. He left two sons, Konrad and Gottfried, who followed the fortunes of the Hohenstaufen and founded respectively the lines of Hohenlohe-Brauneck and Hohenlohe-Holloch. The former became subdivided into the Haltenbergstetten and Brauneck branches, both of which were extinct in 1390; the latter into the Weikersheim and Uffenheim, or Speckfeld, branches, of which the latter became extinct in 1412. In 1551 a new division in the Weikersheim line gave rise to the branches of Hohenlohe-Neuenstein and Hohenlohe-Waldenburg, which still continue. In the Reformation the Neuenstein branch became Protestant, while the Waldenburg counts remained Catholic. Princely rank was conferred upon the latter branch in 1744 and on the former in 1764. Of the Neuenstein branch there were two lines—Oehringen, extinct in 1805 (see MEDIATE), and Langenburg, the latter being further subdivided into the Hohenlohe-Ingelfingen (Oehringen after 1805) and Hohenlohe-Kirchberg (extinct in 1861). The Waldenburg branch formed two lines—Bartenstein, with the cadet branch of Jagstberg, and Schillingsfürst, to which was added the Duchy of Ratibor. Among the prominent members of the Hohenlohe family are:

FRIEDRICH LUDWIG, PRINCE OF HOHENLOHE-INGELFINGEN (1746–1818). A Prussian general. He distinguished himself at the storming of Weissenburg (1793) and won the battle of Kaiserslautern (Sept. 20, 1794). After the defeat of Jena, in which he shared, he succeeded the Duke of Brunswick in command and capitulated at Prenzlau with 17,000 men (Oct. 28, 1806). For this he was severely censured and forced to retire from further participation in the campaign.—KRAFT KARL AUGUST EDUARD FRIEDRICH, PRINCE OF HOHENLOHE-INGELFINGEN (1827–92). A Prussian general of artillery. He received a thorough training for the artillery service and was placed in several positions of responsibility. He served with distinction through the Crimean War. In 1866 he held an important command at Sadowa, and in 1870 he commanded the artillery of the Guards in all its engagements, including Saint-Privat and Sedan. He was chief of artillery at the siege of Paris. He was made a lieutenant general in 1873, adjutant general in 1875, general of infantry in 1883, and general of artillery in 1889. He died in Dresden, Jan. 16, 1892. He was the author of several works on military science: *Militärische Briefe* (1887–90); *Strategische Briefe* (1887); *Die Feldartillerie in ihrer Unterstellung unter die Generalkommandos* (1889); *Ideen über Befestigungen* (1888); also, *Gespräche über Reiterei* (1887).—CHLODWIG KARL VICTOR, PRINCE OF HOHENLOHE-SCHILLINGSFÜRST, DUKE OF RATIBOR AND KORVEI (1819–1901). Chancellor of the German Empire from 1894 to 1900. He was born March 31, 1819, at Rotenburg-an-der-Fulda. His mother was a princess of Hohenlohe-Langenburg. He studied political science and jurisprudence at Heidelberg, Göttingen, and Bonn. Before he came to his title of Duke of Ratibor and of Korvei, in 1845, he held offices in connection with the law courts at Ehrenbreitstein and Potsdam. In the Bavarian Diet he opposed the Ultramontane policy, and in 1866 he strove to bring over Bavaria to the side of Prussia. At the close of the year he became Bavarian Minister of Foreign Affairs and President of the Ministerial Council, holding office till March, 1870. It is now that his importance in history begins. His efforts in behalf of a united Germany long met with fierce opposition, but he saw clearly the triumph of the cause for which he had worked, and entered the First German Reichstag as a member of the *Reichspartei*. In 1874 he was appointed German Ambassador to Paris, and in 1878 he was the third German Plenipotentiary at the Congress of Berlin. In 1885 he became Governor of Alsace-Lorraine, in which position he displayed conspicuous tact. On the resignation of Count Caprivi, in 1894, Prince Hohenlohe was created Imperial Chancellor. This office he resigned in 1900, being succeeded by Count von Bülow. During his long career in German politics Prince Hohenlohe did much to promote German unity. He had to face the hostility of the anti-Unionists in Bavaria and was one of Bismarck's chief

supporters in that statesman's Imperial policy. As Chancellor, he promoted the colonial policy and favored the creation of a powerful navy. He was a favorite with William II up to the time of his resignation, in October, 1900. It was said that the cause of his resigning the chancellorship was dissatisfaction with the Emperor's aggressive policy, especially in so far as it related to China. He died at Ragatz, Switzerland, July 6, 1901. Consult his *Denkwürdigkeiten* (Stuttgart, 1906; Eng. trans., New York, 1906), which caused an international sensation on their appearance. They supersede all his biographies.—GUSTAV ADOLF (1823–96), PRINCE OF HOHENLOHE-SCHILLINGSFÜRST. A brother of the Chancellor. He took holy orders in 1849 and became in 1857 Bishop of Edessa in partibus and almoner to Pius IX. He was made Cardinal in 1866, and endeavored to prevent the Kulturkampf (q.v.). He was sent to Rome in 1872 as Ambassador to the Holy See, but his appointment was rejected by Pius IX. He returned to Rome in 1876 and subsequently gained the favor of Leo XIII. From 1879 to 1884 he was Bishop of Albano and became subsequently archpriest of Santa Maria Maggiore in Rome. He died in Rome, Oct. 30, 1896.—HERMANN, PRINCE OF HOHENLOHE-LANGENBURG (1832–1913). He entered the Württemberg army, was in the Austrian service from 1854 to 1860, and was a general in the army of Baden from 1862 to 1871. After 1860 he was a member of the Upper Chamber of Württemberg, but was represented by his son after 1895; Vice President in 1893. He was a member of the Imperial Reichstag from 1871 to 1880 and acted with the *Reichspartei.* (See POLITICAL PARTIES, *Germany.*) From 1894 to 1907 he was Governor of Alsace-Lorraine. He was the founder and president (1887–94) of the Deutsche Kolonialgesellschaft. He held the military rank of general of cavalry in the Prussian army.—ERNST, PRINCE OF HOHENLOHE-LANGENBURG (1863–), son of the preceding, was born at Langenburg and studied at the universities of Bonn, Tübingen, and Leipzig. In 1889 he entered the army as a lieutenant colonel. From 1900 to 1905 he was Regent of Saxe-Coburg-Gotha. He was a member of the Upper Chamber of Württemberg after 1895 and of the German Reichstag (1907–11; second Vice President, 1909–10).

HOHENSTAUFEN, hō'en-stou'fen. A princely house of Swabia in Germany, which held possession of the German Imperial throne from 1138 to 1254, except for a few years in the early thirteenth century. The family traced its descent from Frederick of Büren, who lived in the second half of the eleventh century, and whose son, Frederick of Staufen, built the castle from which the family derived its name, some vestiges of which are still to be seen on the summit of the Hohenstaufen, close to the town of Göppingen, Württemberg. The son, Frederick of Staufen, was a faithful partisan of the Emperor Henry IV and in return received Henry's daughter and the Duchy of Swabia in 1079. Duke Frederick, at his death in 1105, left two sons—Frederick II the One-Eyed and Conrad; the former was immediately confirmed in the possession of Swabia by Henry V, and in 1112 the latter received the Duchy of Franconia. Upon the death of Henry V in 1125 his family estates fell to the house of Hohenstaufen. It seemed, too, as if the Imperial dignity would be conferred upon Frederick on account of his talents and popularity; but Lothair of Saxony, his rival and enemy, was elected as Henry V's successor. On Lothair's accession he demanded the Imperial possessions held by the house of Hohenstaufen, and a war ensued between him and the Hohenstaufen princes, in which Lothair was supported by the house of Welf (Guelph). In the course of this struggle Conrad was crowned King of Italy in 1128; but the two brothers were forced to make peace with Lothair in 1135 and afterward lent him their support. After Lothair's death Conrad was elected King of Germany, in 1138, as Conrad III (q.v.). Under Conrad III the house of Hohenstaufen waged war against the house of Guelph, which for a brief time was weakened by the loss of Bavaria.

On Conrad's death, in 1152, his nephew, Frederick I Barbarossa, became Emperor. As he was the offspring of a Hohenstaufen father and a Guelph mother, it was hoped that the struggle between the two houses might be ended by his accession. But the defiant attitude of Henry the Lion, Duke of Saxony and Bavaria, the powerful representative of the Guelph family, caused the conflict to break out afresh in 1180. Henry the Lion was conquered and deprived of most of his possessions. Frederick went on the Third Crusade, but died in 1190, before reaching Jerusalem. His son, Henry VI, succeeded to the throne without opposition. By a marriage with the heiress of Sicily and by conquest he added southern Italy and Sicily to the Empire. He exercised the most far-reaching power of all the Hohenstaufens and dreamed of a world-wide empire. Richard the Lion-Hearted of England was obliged to become his vassal in order to be freed from captivity. Some of the Christian rulers in the East had sought protection from Henry, and he sent an army to the Holy Land, "the German Crusade" (see CRUSADE) to establish his own supremacy. His plans were frustrated by his early death, in 1197. His son, Frederick II, had already been crowned King of Germany, but as he was only a child of three his rights were passed over. The Guelphs chose Otho of Brunswick, son of Henry the Lion, and the choice of the partisans of the Hohenstaufen fell upon Philip of Swabia, uncle of Frederick II. Civil war followed, the contest terminating with the assassination of Philip in 1208 by Otho of Wittelsbach. For a time Otho of Brunswick (Otho IV) was recognized as ruler; then his opponents rallied about Frederick II, who in the meantime had been ruling his Kingdom of Sicily, which he had inherited from his mother. Frederick was crowned and by 1215 was recognized by all except a few obstinate partisans of Otho IV. He ruled over Germany, Italy, and Sicily, and also became King of Jerusalem. His reign was spent to a great extent in a struggle with the papacy. The partisans of the Hohenstaufen in Italy and the opponents of the Imperial power, in general the supporters of the papacy, were known respectively as Ghibellines and Guelphs. (See GUELPHS AND GHIBELLINES.) After Frederick's death, in 1250, the inveterate animosity of the Guelphs followed his son, Conrad IV, who abandoned Germany for his hereditary Italian possessions and died in 1254. After Conrad's death his half brother, Manfred, fought for the Hohenstaufen interests until he was defeated and killed at the battle of Benevento, in 1266, against Charles of Anjou, who at the invitation of the Pope had undertaken

the conquest of the Two Sicilies. Manfred's sons were kept in prison until his death. His daughter married Peter III of Aragon, who later avenged the destruction of the Hohenstaufen by expelling their foes from the Kingdom of Sicily. Conrad's young son, Conradin, in an attempt to reconquer the Two Sicilies, was taken captive by Charles of Anjou at the battle of Tagliacozzo and executed at Naples on Oct. 29, 1268. Enzio, an illegitimate son of Frederick II, who had been made King of Sardinia, died in prison four years later. Thus all of the male descendants of Frederick II perished. The emperors of this family rank among the ablest rulers of Germany and hold the first place in popular German tradition to-day, just as they held the first place in the affections of the people during their lifetime. They appear in general as men possessed of great virtues and of great faults and impressive by reason of both. Frederick Barbarossa, according to the legend, which was originally told of Frederick II, is not dead, but asleep, and will wake to help his people in time of need. Frederick II is one of the most remarkable figures of the Middle Ages in his character as ruler, knight, scholar, and freethinker. Consult Friedrich von Raumer, *Geschichte der Hohenstaufen* (5th ed., 6 vols., Leipzig, 1878), and Jastrow and Winter, *Deutsche Geschichte im Zeitalter der Hohenstaufen* (2 vols., Berlin, 1893–1901). See also articles on the individual emperors.

HOHENSTEIN, hō'*e*n-shtīn, COUNT. See THUN UND HOHENSTEIN.

HOHENSTEIN-ERNSTTHAL, ĕrnst'täl. A manufacturing town in the Kingdom of Saxony, 12 miles northeast of Zwickau. It produces chiefly textiles and knit goods, gloves, machinery; in the neighborhood are mines of sulphur, copper, arsenic, and gold. Hohenstein and Ernstthal, formerly two cities, were incorporated together in 1898. Pop., 1900, 13,397; 1910, 15,776.

HOHENWART, hō'*e*n-värt, KARL, COUNT (1824–99). An Austrian statesman, leader of the Federalist party. In 1868 he became Governor of Upper Austria and three years afterward succeeded Potocki as President of the Ministry. In his cabinet he held the portfolio of the Interior. His Federalist policy met with such opposition on the part of the Hungarian Ministry and the German Liberals that he was forced to resign after holding office for less than a month. He was elected to the Lower House in 1873 and became a leader of the Right Centre, which had a coalition majority under Taafe's ministry (1879–91). In 1885 Hohenwart was appointed president of the Supreme Court of Accounts, and in 1891 he formed the Hohenwart Club, a strongly conservative body consisting of German Conservatives, Slovenes, Croatians, and Rumans, as well as the great landed proprietors of Bohemia. But this party broke in 1895, through the defection of the German members, and in 1897, on the appointment of its leader to the Upper House, it disintegrated entirely.

HOHENZOLLERN, hō'*e*n-tsōl'ĕrn. A province of Prussia, consisting of a narrow strip of land entirely surrounded by Württemberg and Baden, and covering, together with its nine exclaves, an area of about 440 square miles (Map: Germany, C 4). Previous to 1850 it was divided into two parts, Hohenzollern-Sigmaringen and Hohenzollern-Hechingen, but they were united to form the Government of Sigmaringen. It extends from the Neckar in the northwest to the vicinity of Lake Constance and is divided by the Rauhe Alb, which rises in places to 3000 feet. The Danube crosses the province in the south, the Neckar in the north. The mountain valleys are productive and yield grain, fruit, hops, etc. The Alb chain yields some iron, gypsum, coal, and peat, and in other mountains some deposits of rock salt are found. Mineral springs abound. Some manufacturing is done in the way of cotton spinning and the production of iron; but the chief industries are agriculture and cattle raising. Since 1873 it has had a Landtag sitting at Sigmaringen. It sends one deputy to the Reichstag. Pop., 1900, 66,783; 1910, 71,011. The inhabitants are nearly all Roman Catholics, and the province forms a dependency of the Archbishop of Freiburg. On a steep eminence near Hechingen stands the magnificent castle of Hohenzollern, erected in the second half of the nineteenth century, in the style of the fourteenth century, on the ruins of the mediæval stronghold, the cradle of the reigning Hohenzollern dynasty of Prussia.

HOHENZOLLERN. The family name of the royal house of Prussia, in which has been vested also, since Jan. 18, 1871, the dignity of German Emperor. The name is derived from the ancestral Castle Zollern, or Hohenzollern, in Swabia. The origin of the house is involved in obscurity, and the story of its descent from Count Thassilo, a Swabian noble of the time of Charles the Great, is a fiction of the sixteenth century. The family name occurs as early as the eleventh century in the persons of Burchard and Wezel of Zolorin, who were killed in 1061; but whether there is any relationship between these and the succeeding Hohenzollern family is a matter of doubt. The house of Hohenzollern occupied a prominent position among the petty princely families of Swabia as early as the first half of the twelfth century, and at the close of that century (1192) we find Count Frederick of Zolorin invested with the Burgraviate of Nuremberg, an Imperial office, which descended to his posterity. His sons, Frederick and Conrad, divided the possessions of the house in 1227, founding the Swabian and Franconian lines respectively. From the close of the sixteenth century the elder, or Swabian, branch of the house of Hohenzollern existed in the two lines of Hohenzollern-Hechingen and Hohenzollern-Sigmaringen. In 1695 a pact of inheritance was made between these branches and that of Brandenburg (see below). In 1821 a new covenant was drawn up and confirmed by the King of Prussia, as head of the Hohenzollern family, by which it was provided that in case of failure of male issue in either line possession should pass to the other and on the extinction of both lines should vest in the royal family of Prussia. But before the prospect of extinction presented itself the princes of Hohenzollern-Hechingen and Hohenzollern-Sigmaringen, after the commotions of the revolutionary year 1848, decided to abdicate in favor of the King of Prussia. The act of renunciation took place at the close of 1849, and Frederick William IV took possession of the two principalities in the following year, the two princes being given annual pensions. Leopold of Hohenzollern, the prince who was offered the crown of Spain in 1870, an offer which was the immediate cause of the Franco-Prussian War, was the eldest son of the last ruler of Hohenzollern-Sigmaringen. The second son, Charles,

became Prince and King of Rumania, and died in 1914.

The great destiny of the family was reserved for the cadet branch, the Franconian line. They attached themselves to the Hohenstaufen until that great house became extinct, when they gave their support to Rudolph of Hapsburg. During the civil war which followed the double election of 1314 they sided with Louis of Bavaria against the house of Austria, but subsequently they became once more faithful supporters of the Hapsburgs. Acquisitiveness and a capacity to hold what was once obtained and to administer it with thrift seem to have characterized to a greater or less degree all the Franconian Hohenzollern princes. From the founder of the line, Conrad III (died 1261), there was a steady gain in territory and influence under Frederick III (1261–97), Frederick IV (1297–1332), John II (1332–57), and Frederick V (1357–98). The possessions of the house, in which was vested the Burgraviate of Nuremberg, were constituted into the two margraviates of Bayreuth (originally Culmbach) and Anspach. The sons of Frederick V, John III and Frederick VI, possessed respectively Bayreuth and Anspach, the latter inheriting his brother's possessions in 1420. Frederick VI in 1411 received the Margraviate of Brandenburg as a pledge for a loan to the Emperor Sigismund, and in 1415 it was granted to him as an hereditary possession, together with the dignity of Elector. This was the foundation of the real greatness of the house of Hohenzollern.

The Elector Albert Achilles of Brandenburg by the so-called *Dispositio Achillea* of 1473 decreed that the Franconian margraviates (Anspach and Bayreuth) should be separated from Brandenburg and ruled as secundogenitures. The last Margrave of Bayreuth died in 1769, when the state was united with Anspach. In 1791 the Margrave of Anspach and Bayreuth sold his principalities to Prussia, which, however, retained them only a few years.

The electors of Brandenburg were as follows:

Frederick I (the Frederick VI mentioned above)	(1415–1440)
Frederick II	(1440–1470)
Albert Achilles	(1470–1486)
John Cicero	(1486–1499)
Joachim I Nestor	(1499–1535)
Joachim II Hector	(1535–1571)
John George	(1571–1598)
Joachim Frederick	(1598–1608)
John Sigismund	(1608–1619)
George William	(1619–1640)
Frederick William, the Great Elector	(1640–1688)
Frederick III	(1688–1713), after 1701, King Frederick I of Prussia

The Hohenzollern kings of Prussia since Frederick I have been as follows:

Frederick William I	(1713–1740)
Frederick II the Great	(1740–1786)
Frederick William II	(1786–1797)
Frederick William III	(1797–1840)
Frederick William IV	(1840–1861)
William I	(1861–1888), after 1871, German Emperor
Frederick III	(1888)
William II	(1888–)

The history of the Hohenzollern family from the fifteenth century is that of BRANDENBURG, PRUSSIA, and GERMANY. Consult: Stillfried-Alcantara and Kugler, *Die Hohenzollern und das deutsche Vaterland* (Munich, 1881), a well-ordered account, dedicated to Emperor William I and presumably having a semiofficial standing; Albert Waddington, *L'Acquisition de la couronne royale de Prusse par les Hohenzollern* (Paris, 1888), a valuable study of Hohenzollern history in the seventeenth and eighteenth centuries, with many documents; Paul Seidel, *Hohenzollern-Jahrbuch, Forschungen zur Geschichte der Hohenzollern in Brandenburg-Preussen* (Leipzig, 1897–1914); Linau, *Hohenzollern* (Berlin, 1905); Herbert Tuttle, *History of Prussia* (4 vols., Boston, 1884–96), one of the best products of American historical scholarship, cut short at 1757 by the death of the author.

HOHLFELD, hōl'fĕld, ALEXANDER RUDOLF (1865–). An American Germanic scholar, born at Dresden, Germany. He received his Ph.D. from the University of Leipzig in 1888 and studied at Paris in 1889. At Vanderbilt University he was instructor in French (1889–90), adjunct professor of Romance languages (1890–92), professor of Germanic languages (1892–1901), and dean of the academic department (1900–01). In 1901 he became professor of German at the University of Wisconsin, and in 1913 he was president of the Modern Language Association of America. He is author of *Die altenglischen Mysterienspiele* (1888) and *The Teaching of the History of a Foreign Literature* (1905), was editor in chief of a *Deutsches Liederbuch für amerikanische Studenten* (1906), and contributed to American and German periodicals.

HÖHNEL, hĕ'nel, LUDWIG VON (1857–). An Austrian explorer, born at Pressburg and educated at the Naval Academy of Fiume. In 1886 he accompanied Count Teleki in the journey from Zanzibar, on which Lakes Rudolph and Stephanie were discovered, and a large area, before unknown, carefully plotted on Höhnel's maps. The expeditions proved the connection between the Abyssinian plateau and the Rand. Lieutenant Höhnel described the results of his journey in his book *Zum Rudolfsee und Stefaniesee* (1892). In 1892–93 he explored with an American traveler, William Astor Chanler (q.v.), the country between the rivers Tana and Juba in Central Africa. Consult W. A. Chanler, *Through Jungle and Desert* (New York, 1896).

HÖHSCHEID, hĕ'shīt. A town of the Prussian Rhine Province, situated on the Wupper, 17 miles east-southeast of Düsseldorf. It has extensive manufactures of steel products, machinery, pocketbooks, and corsets. Pop., 1900, 14,172; 1910, 16,088.

HOIHOW, hoi'hou'. The seaport of Kiungchow (q.v.).

HOININGEN, hoi'nĭng-*en*, BARON VON. See HUENE, KARL.

HOJÉDA, ō-hā'dȧ, ALONSO DE. See OJÉDA.

HŌJŌ, hō'jō. The name of five towns in Japan, from one of which, in Idzu (q.v.), arose the celebrated family of regents known as the Hōjō, which during the era of the puppet Shoguns at Kamakura (1219–1333 A.D.) ruled the Empire. During their régime Buddhism developed rapidly, and the Mongol invaders under Kublai Khan were driven off and their armada destroyed. The Hōjō were overthrown by one Nitta Yoshisada in 1333. Consult: Adams, *History of Japan*, vol. i (London, 1884); Frank Brinkley, *Japan: Its History, Arts, and Literature* (Boston, 1901–02); W. E. Griffis, *The Mikado's Empire* (11th ed., New York, 1906).

HOKIONG. See FUKIEN.

HOKITIKA, hō'kĕ-tē'kȧ. The capital of

Westland County, on the northwest coast of South Island, New Zealand (Map: New Zealand, S. I., C 3), 24 miles southwest of Greymouth. It has rail connections and thriving agricultural industries, while gold mining, formerly of great importance, is carried on. Pop., 1901, 1951; 1911, 2291.

HOKKAIDO, hŏk′kī′dō. See YEZO.

HOKOW, hō′kou′. The name of a number of towns in China, the most important of which are the following: 1. A town in the Province of Kiangsi, on the right bank of the Poyang-hu Lake, opposite Kiukiang (Map: China, L 6). It has an extensive trade in black tea. Pop. (est.), 300,000. 2. A treaty port in the northern part of the Province of Yunnan, on the left bank of the Red River, nearly opposite Laokai in Tongking, with which it is connected by a suspension bridge, completed in 1900. It has about 4000 inhabitants and was opened for foreign trade, as the first subport of entry for the Mengtsz District, in accordance with the supplementary convention between China and France of June 20, 1895. The trade is not large. 3. A small town in the northern part of the Province of Shansi, at the confluence of the Hei-shui and the Hoang-ho. It lies near the beginning of the highway to Peking and has important soda works.

HOKUSAI, hōk′o͞o-sī (1760–1849). A noted Japanese artist. He was born at Honjō in Yeddo (now Tokyo), son of an artisan named Nakashima Ise, a maker of metal mirrors in the employ of the Shogun of the time. Little is known of his life beyond what he himself tells in the prefaces to his numerous works. At 13 he left home and apprenticed himself to an engraver. Five years afterward he gave up engraving to study with Shunsho, the most noted designer of the time, but was expelled in 1786 for persistently indulging in a style that was displeasing to his master. He tried to make a living by illustrating comic books, but, not meeting with success, he became a peddler, continuing to draw and paint as he had opportunity. In order to attract attention and raise money he in 1804 exhibited his dexterity by painting in public a colored figure of a Buddhist saint on a sheet of paper 18 yards long and 11 yards wide, using brooms for brushes and buckets to hold his liquid India ink. Three years later he became associated with Bakin, the novelist, and collaborated with him in illustrating a work translated from the Chinese by Bakin and containing 108 portraits of Chinese heroes. This appeared in 1828. His connection with Bakin lasted only four years, and he was again adrift. His public career really did not begin until 1810, when he became an industrial artist and a teacher of drawing. Pupils flocked to him in numbers so great that he could not supply them with original drawings of his own as models, so he began wood engraving in order to furnish the needed number. In this way his *Mangwa*, or album of 'Ten Thousand Sketches,' took form, and his fame spread as volume after volume and edition after edition appeared. The later volumes of this series appeared in 1836, a year after his *Fugakŭ Hyakŭkei*, or *Huji Hyakke* (A Hundred Views of Fujisan). His industry was great, and his works numerous. Thirty thousand drawings of his have been counted up, yet he was always in poverty. He died April 13 (some say May 10), 1849, at Asakusa, a district of Yeddo. Money for his funeral was provided by his pupils and admirers.

Hokusai was a man of the people to the end. He never rose above his class and never made any attempt to do so. His talent lay in producing *Ukiyo-ye* (pictures of this passing world), free from the conventionalities of his predecessors and his contemporaries. His influence on modern art has been very great. His whole life was spent in perfecting himself; yet when he came to die his last words were "If Heaven would only grant me ten more years!" and a moment later, "If Heaven had only granted me five years more, I could have been a thorough artist." His signatures were numerous. In 1798 he appears under the name of Sori, and in 1800 he called himself simply Hokusai (North Studio). A favorite signature was Hokusai Gwa-kyo Rōjin (Hokusai, the old man crazy about drawing). His latest name was Manji (the Swastika), and the inscription over his grave is the one he preferred—Manji Gwa-kyo Rōjin. A full list of his works (with a bibliography) is in Anderson's *Descriptive and Historical Catalogue of Chinese and Japanese Art* (London, 1886).

Bibliography. *Fugi Hiakki* (A Hundred Views of Fujisan, London, 1880); Anderson, *History of Japanese Art* (ib., 1886); E. F. Fenollosa, *Hokusai and his School* (Boston, 1893); *Hokusai*, a paper read by John La Farge before the Century Club (New York, 1897); E. F. Holmes, *Hokusai* (London, 1899). Consult also Frank Brinkley, *Japan: Its History, Arts, and Literature* (Boston, 1901–02). See Cut in JAPANESE ART.

HOL, RICHARD (1825–1904). A widely known Dutch pianist, organist, and composer, born at Amsterdam. A brilliant exponent of the modern Romantic German school, he received many decorations and foreign orders for his services to the cause of music. He was director of the Amstels Männerchor (1856), director of the Society for the Promotion of Music (1857), city musical director of Utrecht (1862), cathedral organist (1869), director of the School of Music (1875). Hol was perhaps better known in America as a composer of part songs for male or female voices. His compositions include an oratorio, two operas, four symphonies, masses, songs, chamber music, orchestral music, etc. His male choral works are standard with the leading men's choruses.

HOL'ABIRD, SAMUEL BECKLEY (1826–1907). An American soldier, born in Canaan, Conn. He graduated at West Point in 1849, served with the Army of the Potomac (1861–62), and became brigadier and quartermaster-general (1883), as well as translator for the army. His chief translation was General Jomini's *Treatise on the Grand Military Operations of Frederick the Great* (1865).

HOL'ADIN. An extract of the pancreas, the entire gland being used. Holadin possesses the property of digesting starch and proteids and splitting up fats in the same way as the pancreatic juice. It is given in capsule form and is useful in some cases of indigestion.

HOLARC'TIC REGION (from Gk. ὅλος, *holos*, entire + ἀρκτικός, *arktikos*, northern, from ἄρκτος, *arktos*, bear). A division in zoögeography, defined in two senses: 1. *Arctogæa.*—In the larger sense the term is used unhappily as a synonym for "Arctogæa." (See DISTRIBUTION OF ANIMALS; NOTOGÆA.) This "region" em-

braces all of the Northern Hemisphere except the hot coast regions of Central America, all of Africa and Madagascar, and an indefinite extent of the Malayan and Polynesian islands, where its boundaries vary in different classes of animals; in other words, it is a combination of the Nearctic, Palearctic, Paleotropical, and Oriental regions of Sclater and Wallace, as opposed to the combined Neotropical and Australasian regions (Notogæa). The fundamental difference between Arctogæa and Notogæa reaches back to an early geological period, while many of the present distinctions between their subdivisions disappear when traced back to the Tertiary, when the distribution of animal life was very different from now. It is this broad historical view, rather than the modern aspect, which has led naturalists to the generalizations of Arctogæa and Notogæa. Limiting the comparison to vertebrate animals, the characteristics of Arctogæa are in outline as follows: Among fishes, the perches, carps, salmons, and sturgeons are present as whole tribes, together with many lesser groups, especially of freshwater or coast fishes, while the lungfishes are conspicuous absentees. In the class Amphibia the line is drawn at the frog family, Cystignathidæ, which is entirely Arctogæan. Gadow also points out the predominance of Arcifera, which constitute nine-tenths of the anurous population and are hardly represented in Notogæa. Of turtles, the presence of Trionychoidea and the absence of Chelydidæ are distinctive. Of lizards, exclusively Arctogæal groups are the Lacertidæ, Zomoridæ, Gerrhosauridæ, and Anniellidæ. Among the snakes, the viper family is entirely Arctogæal, and the crotaline tribe mainly so. Lesser exclusive groups are the Uropeltidæ, Xenopeltidæ, and many genera. Ornithological distinctions may be most easily sketched by saying that Arctogæa possesses no emus or cassowaries, no mound birds, birds of paradise, lyre birds, cockatoos, tinamous, curassows, hoatzins, toucans, cotingas, or many others, although it is rich in game birds, finches, woodpeckers, wood warblers, and the like. But perhaps the most striking difference is the presence of the large Arctic tribe of auks and the like and the absence of penguins. Among mammals, also, the most notable feature is the entire absence of edentates, of monotremes, of marsupials (except one opossum), of cebine monkeys, and of marmosets. The northern region, however, has the lemurs, the insectivores except the West Indian Solenodon, the elephants, rhinoceroses, hyraces, horses, deer, giraffes, bovines, hyenas, hares, and a variety of other important families; it is, in fact, as Beddard points out, the headquarters of all the Eutheria except edentates and marsupials.

2. *Holarctic, or Periarctic, Province.*—In a more restricted and perhaps more usual sense the term "holarctic" in zoögeography denotes a circumpolar district formed by the union of the Palearctic and Nearctic provinces of Sclater and Wallace, elsewhere described. It was long ago felt that the faunal characteristics of North America and the northern part of the Old World were not sufficiently distinct to justify their separation into two provinces. Their union under one name was first made by A. Heilprin, who proposed "Triarctic" as the new designation. For this A. Newton suggested the substitution of "Holarctic," which Heilprin at once adopted. More recently Gadow has used "Periarctic" as a synonym, on the ground that it is more precise. Its faunal characteristics are those sketched in the first paragraph, with the omission of such forms as are exclusively Ethiopian (Africa, south of the Sahara) or Oriental (the Asiatic coast and islands south of the Himalayan watershed). The faunal agreement between North America and the northern part of the Old World is greater than any differences. There are few families not represented in both, and the distinctive animals are mainly local genera or species, while a great many apparently identical forms occur on both continents, having a circumpolar distribution due either to their powers of travel or to ancient land connections. Consult: Angelo Heilprin, *Geographical and Geological Distribution of Animals* (New York, 1887); Alfred Newton, *Dictionary of Birds* (ib., 1896); J. G. Bartholomew, *Atlas of Zoögeography* (London, 1911), and the authorities referred to under Distribution of Animals. See also Nearctic Region; Palearctic Region.

HOLBACH, ôl'bäG, Paul 'Henri Thyry d', Baron (1723–89). A French philosopher of the eighteenth century and one of the Encyclopædists. (See Encyclopédie.) He was born of wealthy parents at Heidelsheim in the Palatinate in 1723. At an early age he went to Paris, where he continued to reside during the remainder of his life. His personal popularity and his generous hospitality drew to his house the most eminent thinkers and writers of the day, such as Condorcet, Diderot, Duclos, Helvétius, Raynal, Rousseau, Buffon. The witty Abbé Galiani called Holbach the *maître d'hôtel* of philosophy. Here speculation, it is said, was carried to such daring lengths that Buffon, D'Alembert, and Rousseau were compelled to withdraw from the circle. Holbach was the zealous champion of naturalism and contended not only against Christianity but against all positive religion. His principal work, the *Système de la nature* (published anonymously in 1770), has been called the "Bible of Naturalism." In this work the author endeavors to expound the principles of morality upon a sensualistic, materialistic, deterministic, egoistic, and atheistic basis. For him God is only an ideal being, created by kings and priests. The work is in no sense original, but gives voice to the materialism of the French *philosophes* of the eighteenth century, which is nowhere more openly advocated than in the writings of Holbach. In 1774 he published *Système Social* (London) and in 1776 *Ethocratic; ou le gouvernement fondé sur la morale* (Amsterdam). He was a man of good heart and of most unselfish benevolence. When the Jesuits fell into disgrace during the reign of Louis XV, Holbach, though he hated their system and had written against them in the days of their prosperity, made his house an asylum for his old foes when the clouds gathered around them. Many anonymous works besides the *Système* have been attributed to Holbach.

Bibliography. J. P. Damiron, *Mémoires pour servir à l'histoire de la philosophie au XVIIIe siècle* (Paris, 1858); Avezac-Lavigne, *Diderot et la société du baron d'Holbach* (ib., 1875); John Morley, "Three Works of the Eighteenth Century, I: Holbach's System of Nature," in *Fortnightly Review* (London, 1877); id., *Diderot and the Encyclopædists* (ib., 1878; 2d ed., 1886); E. V. Hall (under pseudonym of S. G.

Tallentyn), *The Friends of Voltaire* (New York, 1907), and the histories of modern philosophy.

HOLBEIN, hōl'bīn, HANS, THE ELDER (c.1460–1524). A noted German painter of the Swabian school. The little known of his life is derived from the tax and court records of Augsburg, where he was born, the son of the tanner Michael Holbein, and where he resided at intervals for many years, alternately prosperous and in want. He is mentioned as a citizen of Ulm in 1499 and two years later was active in Frankfort. In 1502 he was again in Augsburg, where in 1506–08 he executed commissions for the cathedral, the records of which show him in dire financial straits. In 1517 he was sued for debt by his brother, and the same year he visited Frankfort. After 1516 he lived at a short distance from Augsburg and in 1517 wandered off to paint an altarpiece for the priory of St. Antony at Issenheim. Here he probably died c.1524, when he is mentioned as deceased in the records of the Augsburg guild.

With whom the elder Holbein studied is not known. That he worked in the studio of Martin Schongauer at Colmar is a surmise suggested by a certain resemblance of style, especially in the types of his heads. Undoubtedly Holbein formed his style on the models of the early Flemish school and subsequently modified it by yielding to local tradition and Italian influences. In his early pictures slender figures, mild and regular features, staidness of attitude, and a clear transparency of tone unrelieved by depth of shadow are the prevailing characteristics. To this class belong the Weingartner altar (1493), treating the "Life of the Virgin" in four separate panels, now in the cathedral of Augsburg; the altar of St. Afra, representing the death of that saint; and "Death" and "Coronation of the Virgin"—the first and last in the archiepiscopal palace at Eichstätt, the other in the Museum of Basel; and a large "Death of the Virgin," in private possession, Paris. Of a similar stamp are four altar panels (1493), representing "Joachim's Sacrifice," "Birth and Presentation of Mary," and "Presentation of Christ," in the cathedral of Augsburg. Somewhat less marked is the Flemish origin of the master's manner in the large altarpiece (1499) with the "Basilica of Santa Maria Maggiore" in the centre, "Coronation of the Virgin" above it, the "Nativity" and "Martyrdom of St. Dorothea" in the wings, complete in the Gallery at Augsburg. From the same period date the small Madonna in the Germanic Museum, Nuremberg, the 12 passion scenes in the Gallery at Donaueschingen, and the "Ecce Homo" in the Gallery of Strassburg. In Frankfort he painted for the Dominicans a composite altarpiece (1501), comprising the "Last Supper," "Entry of Christ into Jerusalem," "Expulsion of the Jews from the Temple," etc., and "Seven Scenes from the Passion"—all now in the Städel Institute. In 1502 he painted the large altarpiece for the monastery of Raisheim near Donaueschingen, of which 16 are in the Old Pinakothek, Munich, and three at Augsburg. The outer, painted by his assistants, represented scenes from the "Passion of Christ"; the far better inner panels, by the painter himself, scenes from the "Life of Mary." To this period belong other works in the Augsburg Museum, at Nuremberg, Basel, Schleissheim, and elsewhere. Of the same period are the "Crucifixion," "Descent from the Cross," "Entombment," and "Transfiguration," also "Sixteen Scenes from the Life of Mary"—all parts of a large altarpiece in the Old Pinakothek at Munich. A marked progress in the master's manner is to be noticed in the "Basilica of St. Paul" (1504), with scenes from the life of that saint, in its more ideal conception, correct drawing, and delicate execution, and of traditional interest as containing the portraits of the artist and his two sons, Ambrosius and Hans. The influence of the Italian Renaissance is still more apparent in the greater expressiveness and beauty of color displayed in the four panels of the "St. Catharine Altar" (1512)—this and the preceding also in the Augsburg Gallery; but his maturest work is the "Altar of St. Sebastian" (1515–16), in the Pinakothek at Munich. The central panel, representing the martyrdom of the Saint, is a composition full of dramatic power, far transcending his previous efforts; the wings, two delightful female saints. His last important work was probably the "Fountain of Life" (1519), in the National Museum at Lisbon. Holbein the Elder also excelled as a portrait painter, and his rare gift for characterization is apparent especially in the numerous head studies, mostly in silver point, distributed in various collections, among which those in Berlin, Copenhagen, and Basel are the richest. Very interesting examples are those of the painter himself (Chantilly), of his brother Sigismund Holbein (Berlin), and his sons Ambrosius and Hans (ib.). The museum at Basel also possesses a number of sketches for his religious paintings. Mention should be made also of his designs for stained glasses, after which two fine windows survive in the cathedral of Eichstätt, and of his designs for copper engravings, carried out by Israll of Meckenen.

His brother SIGISMUND (?–1540) first appears on the rate books of Augsburg in 1504 and in 1519 removed to Bern, where he died, making his nephew, Hans the Younger, his heir. There is very little doubt that he assisted the elder master in several of his most important works, although no single picture can be traced to him directly.—AMBROSIUS (c.1494–c.1519), son and pupil of Hans the Elder, was born in Augsburg and with his brother, Hans the Younger, was sent to Basel about 1515, when both were engaged chiefly in designing title-pages, initials, and other illustrations for books. The art of Ambrosius shows the influence of his father's teaching and his younger brother's example, without attaining the latter's excellence. In 1517 he was admitted into the guild Zum Himmel and acquired the freedom of the city in the year following, but all trace of him is lost after 1519. The museum at Basel preserves, besides many drawings, three authenticated paintings by him, "Christ Crowned with Thorns" and two "Bust Portraits of Boys," besides which the portrait of the goldsmith Georg Schweiger, of Augsburg, may also be attributed to him with tolerable certainty. Other portraits are in the museums of Darmstadt and St. Petersburg and in the Ambras collection, Vienna. A portrait of a young man (1518) is in the Hermitage at St. Petersburg.

Bibliography. Waltmann, *Holbein und seine Zeit* (Leipzig, 1873–76); A. B. Chamberlain, *Hans Holbein* (New York, 1905); K. E. Werner, *Die Linear perspektive auf dem Gemälden Hans Holbein des älteren* (Göttingen, 1912).

The best monograph on Holbein the Elder is by Glaser (Leipzig, 1908); an earlier work is by Stödtner (Berlin, 1896). Consult also the prin-

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"THE MADONNA OF THE BURGOMASTER MEYER," FROM THE PAINTING IN THE DARMSTADT GALLERY

cipal works cited on Hans Holbein the Younger. For Ambrosius Holbein, see the monograph by Hess (Strassburg, 1911).

HOLBEIN, HANS, THE YOUNGER (1497–1543). A German painter and designer, one of the chief masters of the German Renaissance. He was a son of Hans Holbein the Elder and was born at Augsburg, where he studied with his father and with Hans Burgkmair. Two of the works which may have been painted in his father's workshop survive: a "Madonna" (1514), in the Museum of Basel, and "Christ Bearing the Cross," in the Gallery at Karlsruhe. Both resemble the work of his father, to whom the latter picture has also been ascribed. In 1514 the family left Augsburg, and early in 1515 we find Holbein at Basel, where he and his elder brother Ambrosius had probably come to make illustrations for books; Basel was then an important centre of the book trade. Here Hans was introduced into the classic world, especially through his association with Beatus Rhenanus, corrector for the printer Froben. This influence is revealed in the table plate in the Museum of Zurich, which he painted for the family Baer, with scenes of hunting, fishing, and knightly tourneys, and in his 83 pen drawings for Erasmus' *Praise of Folly*, which are in the Museum of Basel. These drawings are a curious mixture of the coarse style of the fifteenth century and the more refined manner of the sixteenth. They show a great master at the beginning of his powers. The Museum of Basel contains two characteristic works of 1516: a sign for a schoolmaster, on which are painted two school scenes, and the double portrait of Burgomaster Jakob Meyer and his second wife; "Adam and Eve" of 1517, besides undated heads of the Virgin and St. John, and five Passion scenes of the same period.

In 1517 he went to Lucerne to decorate the façade and interior of the house of Jakob Hertenstein. Excepting a fragment in the Museum of Lucerne, these paintings have perished; but the original pen design in the Museum of Basel shows that the façade was decorated with classical subjects, completely in the style of the sixteenth century, and that he was influenced by the study of Mantegna's prints. At this time (1517) he painted the remarkable portrait of Benedikt von Hertenstein, now in the Metropolitan Museum, New York, and probably other members of that family. In 1518 he probably traveled in Lombardy, visiting Milan. The influence of the Lombard school may be seen in Holbein's modeling and chiaroscuro after 1518, in such works as his "Last Supper" (Basel Museum), which closely resembles Leonardo's masterpiece at Milan.

In 1519 Holbein entered the painters' guild of Basel, and in the following year he became a citizen. During the next few years he decorated the façades of a number of houses at Basel, chief among which was the Haus zum Tanz, of which the original pen design is in the museum, with architectural decorations and a representation of peasants dancing. He also began his extensive decorations of the council chamber, with antique historical subjects representing civic virtue and justice and with allegorical figures. On the organ doors of the minster of Basel he painted, in brown monochrome, grandiose figures of saints and angels singing. Among his panel pictures is an altarpiece of "Passion Scenes," of great dramatic power and fine effects of light and shade, and the "Dead Body of Christ" (1521), of striking, almost repulsive realism—all in the Museum of Basel. Among other works of this period is the "Madonna with Saints Ursus and Martin" (1522), in the Museum of Solothurn.

Holbein's best-known altarpiece is the "Madonna of Burgomaster Meyer," painted in 1525 or 1526, which holds the same rank in German painting as the "Sistine Madonna" in Italian. The original is in the Gallery of Darmstadt, the Dresden example having been proved to be an excellent copy by a Netherlander of the seventeenth century. Especially fine, in this picture, are the portraits of the kneeling burgomaster and his family, and the nude figure of his youngest son—a cherub worthy of Correggio.

His portraits of this period include the refined face of Bonifazius Amerbach (1519), the first great German art collector; three likenesses of Erasmus, who was then a resident of Basel—two in profile, at Basel and in the Louvre, and a larger three-quarter view in Longford Castle; the portrait of an unknown young woman, probably Holbein's wife, in the Museum of The Hague; his own portrait in colored chalk at Basel; and two allegorical representations of the courtesan Dorothea Offenburg in the Basel Museum (1526), as "Lais of Corinth" and as "Venus" with Cupid.

At the same time Holbein was occupied with other forms of design. Among his drawings of the period are two admirable youths—one a pencil, supposed to represent Holbein himself, the other a chalk drawing in the Museum of Basel. One of his favorite subjects was the contemporary German "Lanzknechte" (soldiers), in various actions and attitudes. To the same period belong his drawings of female costumes, then current in Basel, which may have been designs for actual use. His designs for glass painting in the Basel Museum include 10 wash drawings of "Passion Scenes," the equals of the painted series mentioned above, Madonnas and other biblical subjects, and coats of arms—all in beautiful Renaissance framing. As a designer for woodcuts, Holbein is second only to Dürer. He left over 300 blocks, the best of which were cut by Hans Lützelburger. His illustrated Luther's Bible, and his "Historiarum Veteris Instrumenti Icones" (Pictures from the Old Testament), 91 plates, were first published together at Lyons in 1538. Best known of all is his "Dance of Death," 58 plates in all, replete with humor and satire upon the ecclesiastical and social conditions of the day. It was published in book form at Lyons in 1538 and has been often republished; a good modern edition is that of Lippmann (Berlin, 1878).

The advent of the Reformation and the consequent disturbances in Basel were the chief cause of Holbein's journey to England in 1526. Equipped with recommendations from his friend Erasmus, he found a ready welcome in the house of Sir Thomas More at Southwark. His activity during his stay there, which lasted two years, may best be studied in the fine series of chalk drawings at Windsor Castle (published in London, 1884). In 1527 he painted Sir Thomas More, now in possession of Henry Huth, London; Sir Henry Guildford, in Windsor Castle; and Archbishop Warham, of Canterbury, in Lambeth Palace (replica in the Louvre), the best of all—a wonderful piece of realism and strength. Among his portraits of 1528 are those of Nicholas Kratzer, the King's astrologer, in the Louvre, and of Thomas Godsalve and his son John, at

Dresden. His famous picture of More and his family is lost, but the studies for the heads are at Windsor, and the pen sketch which he brought back for Erasmus is still at Basel. Among undated portraits of his first English period are those of Sir Henry Wyatt (Louvre), and several of Sir Bryan Tuke, of which the best-known version is at Munich.

On his return to Basel in 1529 he purchased a house. But during his stay the storm of iconoclasm broke over the city, and the demand for religious pictures ceased. Holbein, indeed, finished his frescoes in the council chamber, adding two large subjects from the Old Testament, "Samuel Reproving Saul" and "Rehoboam's Pride." Both paintings are lost, but the sketches in the Museum of Basel, masterly in composition and dramatic action, show Holbein as a great historical painter. In 1529 he painted one of the finest and certainly the most pathetic of all of his portraits, that of his wife with her two children (Basel Museum); two portraits of Erasmus (Parma and Basel); and one of Melanchthon (Hanover). Notwithstanding the efforts of the burgomaster and council of Basel to retain him, he returned in 1532 to England.

On his arrival at London he resided with the German merchants of the Steelyard, with whom he found occupation. In 1532 and in the following years he painted a number of portraits of these merchants, of which examples survive at Vienna, Windsor, Munich, Brunswick, and Petworth. The most remarkable of these fine portraits is perhaps that of George Gysse (1532), in the Museum of Berlin, noted for its easy pose, wonderful treatment of light and shade, and exquisite balance of detail and general effect. On the occasion of Anne Boleyn's coronation he designed for the German merchants an allegorical pageant of Parnassus; he decorated their guildhall with two large paintings, of which there are sketches in the Louvre, "Triumph of Riches" and "Triumph of Poverty." It is not known when he first entered Henry VIII's service, but in 1536 we find him mentioned as the King's painter. In that year he painted the portrait of the Queen, Jane Seymour (Hofmuseum, Vienna), in the following year the King (Earl Spencer, Althorp), and afterward (1538–39) their son Edward, Prince of Wales (Hanover). In 1537 he was sent to Brussels to paint the portrait (now in the National Gallery, London) of Christina of Denmark, Duchess of Milan, whom the King thought of marrying, and in 1539 to portray Anne of Cleves, whose portrait (now in the Louvre) had much to do with the King's marrying her. The same year he again portrayed the King (National Gallery, Rome) and in 1540–41 the Queen, Catharine Howard. His chief work for Henry VIII was a group painted on the wall of the Privy Chamber at Whitehall, in 1537, representing the King with his father and mother and Jane Seymour. This painting was destroyed in the fire of 1698, but the cartoon of the King is at Hardwick Hall, and there are several copies of the portrait, the best known of which is at Windsor Castle. The King also commissioned him to design various decorations, especially in the goldsmith's art, in which he acquitted himself with great taste and ability, as is evident from the original designs in the British Museum and elsewhere. In 1538 he visited Basel, where he was banqueted by the council, and he promised to return after two years, which promise, however, he did not keep.

His principal portraits, executed during his last stay in England, besides those mentioned above, are: "The Ambassadors" (1533), in the National Gallery; Robert Cheeseman (1533), the King's falconer, at The Hague; Thomas Cromwell, at Tittenhanger; John Reskitamer, at Hampton Court; Hans of Antwerp, in the Windsor and Salting collection, London; the French Ambassador, Sieur de Morette, at Dresden, a magnificent achievement; Thomas Howard, Duke of Norfolk, at Windsor; Lady Rich (c.1536) and Margaret Wyatt, Lady Lee (c.1539), in the Altman collection, Metropolitan Museum, New York; two unknown men (1541), at Berlin and Vienna, and an unknown woman, at Vienna; Dr. John Chambers, the King's physician, at Vienna; Sir William Butts and Lady Butts, in the Gardner collection, Boston; the Artist (1543), Uffizi; and Simon George, at Frankfort.

Another important part of his activity at the English court was the painting of miniatures, in which art he achieved an unsurpassed mastery. Within the narrow bounds of the miniature he achieved unusual largeness of expression; and his light, delicate touch, thinness of color, and subtle modeling are particularly adapted to this technique. Authentic miniatures by him are very rare. The J. P. Morgan collection (Metropolitan Museum, New York) is richest with eight authentic examples, including two of Henry VIII, Sir Thomas More, and Mrs. Pemberton; five are in the royal collection at Windsor Castle; and others are in the Royal collection of The Hague, in Florence, in Munich, in the Wallace collection and the South Kensington Museum, London. He also designed a number of important wood engravings, including the title-page of Coverdale's Bible, illustrations of Cranmer's catechism, and "King Henry in Council," the title-page of Hall's *Chronicle*.

Holbein died of the pestilence in London in the autumn of 1543. He is chiefly known as a portrait painter; but his religious pictures, and especially his mural decorations, show that, had the opportunity presented itself, he might have been one of the greatest historical painters of all times. In England he was compelled by the taste of his noble patrons to adopt an archaic style, with emphasis on detail and neglect of light and shadow, his predilection; but these restrictions did not prevent his development into one of the world's greatest portraitists. The most striking quality of his portraits is their absolute truthfulness. "He is the one painter whom one can never suspect of flattery . . . whose entire veracity is unquestionable." They are rendered with an objectivity and absence of sentiment attained among the old masters only by Velazquez. They charm also by an impeccable draftsmanship, "with an accuracy unknown before or since." This phase of his activity may best be studied in his inimitable drawings, preserved more especially at Windsor and Basel. Designed as rapid preliminary sketches for his portraits, they cause even greater pleasure by reason of their greater freedom and directness. The composition of both his drawings and portraits is of the very first rank. In color his handling is "tight," and he prefers smooth enamel-like surfaces, but with complete mastery of values, consummate treatment of light and shadow, great purity of individual color, in bright as well as grave harmonies. Dürer was a greater genius, a greater thinker, a

greater engraver; but Holbein was the greatest *painter* Germany has ever produced.

Bibliography. A complete bibliography of Holbein up to 1900 was published in *Schweizerisches Künsterlewicon,* vol. i (Fraufeld, 1900). The most important monographs are the folios of Mantz (Paris, 1879), Davies (London, 1903), and A. B. Chamberlain (2 vols., New York, 1913). Of very great value are the researches of Paul Ganz, published in various German and Swiss periodicals and in works cited below. Of earlier monographs, those of Wornum (London, 1867) and Woltmann (Leipzig, 1874–76; Eng. trans., London, 1872) are best; popular biographies are those of Knackfuss (Bielefeld, 1897) and Gauthiez (Paris, 1908). The most complete edition of his drawings is in course of publication by Ganz (Berlin, 1911 et seq.); those at Windsor were published by Holmes with Hanfstängel's reproductions (n. d.). A convenient selection is that of Baldry (London and New York, 1904). For other designs, consult Hiis-Heusler, *Dessins d'ornements de Hans Holbein,* fol. (Paris, 1886); Goethe, *Holbeins Totentanz* (Strassburg, 1897). For his engravings, see Hind, in the *Great Engravers Series* (London, 1912); for miniatures, Williamson, *History of Portrait Miniatures,* vol. i (ib., 1904). A delightful appreciation of Holbein is by the painter Kenyon Cox in his *Painters and Sculptors* (2d series, New York, 1907).

HOLBERG, hôl'bĕrg, Ludvig, Baron (1684–1754). A Norwegian-Danish poet, novelist, dramatist, and historian, born at Bergen, Norway. He is called the "father of Danish comedy." Left an orphan in childhood, he proved an eager student in spite of poverty and discouragements and supported himself precariously as tutor for some years, in the course of which he visited Holland, Germany, and England, and studied for two years at Oxford. He lectured in the University at Copenhagen, where his scholarship was recognized, though not remunerated. Some historical studies in manuscript attracted the attention of King Frederick IV, and Holberg received a traveling scholarship that took him through a great part of Europe, largely on foot. He returned to Denmark in 1716 and in 1718 published *An Introduction to Natural and Popular Law,* which brought him a professorship in the University of Copenhagen and a modest competence. Thus eased, his genius welled up in the seriocomic epic *Peder Paars* (1719), a brilliant satire on contemporary manners, followed by five others, hardly less successful. In 1721 he was made director of the first Danish theatre in Copenhagen, for which he wrote during 1722 five classic comedies and in 1723 10 others. His best comedy, *Henrik and Pernille,* belongs to 1724. The theatre failed, and Holberg closed his dramatic career by publishing his collected comedies in 1731. Adapting himself to a change in the national spirit, he turned to history, philosophy, and satire, writing much that is now forgotten, and also the famous satire, *Subterranean Journey of Niels Klim* (*Nicolai Klimii Iter Subterraneum,* 1741), which was thrice translated from Latin into Danish, 10 times into German, three times into Swedish, English, and Dutch, twice into French and Russian, and once into Hungarian. He published also five volumes of *Letters* (1748–54). He shares with Voltaire the preëminence in European literature in his generation. He made Danish a literary language and won for it aristocratic recognition. His influence has endured for two centuries. Editions of his works are countless; the best edition of the *Comedies* is by Lichtenberg (Copenhagen, 4th ed., 1893; illustrated jubilee ed., 1883–88). The Holberg Society, founded at Copenhagen in 1842, oversaw (1848–54) a critical edition of Holberg's comedies in eight volumes. There are biographies by Prutz (Stuttgart, 1857), Smith (Copenhagen, 1858), and Horn (ib., 1884). Consult also: Legrelle, *Holberg considéré comme imitateur de Molière* (Paris, 1864); O. Skavlan, *Holberg som Komedieforfatter* (Christiania, 1872); Georg Brandes, *Holberg und seine Zeitgenossen* (Berlin, 1884); *Holbergliteratur i det Deichmanske Bibliothek* (Christiania, 1906).

HOLBORN, hō'bŭrn. A district and street in London. The name is derived from Old or Hole Bourne, the former name for a part of the Fleet, which ran through a valley. The depression is now crossed by the famous Holborn Viaduct, an iron structure 27 yards wide and 657 long, built in 1869 to facilitate communication by avoiding the ascent of Holborn Hill. Criminals formerly passed through Holborn on their way to execution and according to an old custom received a nosegay at St. Sepulchre's Church, near Newgate Prison, from which the thoroughfare leads west to New Oxford Street. On Holborn are Barnard's, Furnivall's, and Staple Inn, and near it are Ely Chapel, Gray's Inn, and Lincoln's Inn. Milton at one time lived on the western portion of the street, called High Holborn. A number of picturesque old houses stand on this street, which survived the Great Fire.

HOL'BROOK. A town in Norfolk Co., Mass., 14 miles south of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 4). It contains a public library, and has extensive manufactures of boots and shoes. Holbrook has became a popular residential suburb of Brockton and Boston. It was first incorporated on Feb. 29, 1872. Pop., 1900, 2229; 1910, 2816.

HOLBROOK, John Edwards (1794–1871). An American physician and naturalist, born in Beaufort, S. C. He graduated at Brown in 1815 and in medicine at the Pennsylvania University three years later, studied afterward in Europe, and began practice in Charleston in 1822. In 1824 he was made professor of anatomy in the South Carolina College. This position he retained for more than 30 years. While there, he began work on *The Ichthyology of the South,* which was not finished. Part of it, however, was published in 1854 as *The Ichthyology of South Carolina.* His previous work upon *American Herpetology* (5 vols., 1842) was highly commended by Agassiz and others.

HOLBROOKE, Josef (1878–). An English composer, born at Croydon. He studied at the Royal Academy of Music in London under Westlake (piano) and F. Corder (composition), graduating in 1898. Thereafter he devoted his entire time to composition. His music is extremely modern, finding its inspiration chiefly in tragic, frequently in fantastic subjects. The chamber-music works, of which he wrote a considerable number, are the least satisfactory, because the themes generally are of a character that calls for orchestral treatment. His talent shows itself most advantageously when employing the orchestra for its expression. But here also one encounters many strange and even bizarre effects in harmonization and instrumentation.

His compositions for orchestra are an overture, *The New Renaissance;* the symphonic poems: *The Raven, Ode to Victory, The Skeleton in Armor, Ulalume, Queen Mab, The Mask of the Red Death, Apollo and the Seaman.* A choral work with orchestra, *The Bells,* gave rise to much discussion after its first performance at the Leeds Festival of 1907; while his opera *The Children of Don,* produced by Hammerstein at the London Opera House in 1912, proved a puzzle to many serious musicians. A sequel to this opera, *Dylan,* was produced at Drury Lane in 1914. An earlier opera, *Pierrot and Pierrette,* was given in 1909.

HOL'BROOK'IA (named in honor of the American naturalist J. E. Holbrook). A genus of iguanid lizards of the southwestern United States and northern Mexico, especially characteristic of the Rio Grande valley. The half-dozen species are of moderate size, with short legs,

HOLBROOKIA MACULATA.
a, underside of head; *b*, profile.

squat depressed bodies, covered with minute scales, and long tails. The general color is gray, and all are blotched, spotted, and barred (on the tail) with darker tints, but the colors are highly variable; hence they are popularly known as spotted lizards. They prefer rocky ground and run swiftly with their tails curved over their backs. They subsist mainly on insects, worms, and the like, but also take vegetable food. They make interesting pets. When placed in a fly trap, they pick out the very large, black, and bright-colored flies before eating the house flies. See IGUANA.

HOLCOMBE, hōl'kŭm, CHESTER (1844–1912). An American author and diplomat, born at Winfield, N. Y. After graduating from Union College in 1861, he went to China, where he was interpreter and Secretary to the United States Legation at Peking in 1871–85 and acting Minister in 1875–76, 1878–79, and 1881–82. He assisted the United States government in making treaties with China in 1880 and with Korea in 1882. In 1896 he prepared the Chinese and English documents for the government loan of $100,000,000, and later he drew up in both languages plans for the construction of 3000 miles of Chinese railroads. He was a lecturer of the Lowell Institute, Boston, in 1902. His writings in Chinese include *Mental Arithmetic* (1873), *Life of Christ* (1875), and a translation of the American Declaration of Independence; in English, *Travels in Western China* (1875), *The Practical Effect of Confucianism upon the Chinese Nation* (1882), *Catalogue and Handbook of Antique Chinese Porcelains* (1890), *The Real Chinaman* (1895), *The Real Chinese Question* (1900), *China's Past and Future* (1904).

HOLCROFT, hōl'krōft, THOMAS (1745–1809). An English dramatist and novelist, born in London. The son of a shoemaker, he learned his father's trade; later he was a stable boy, a tutor, an actor, journalist, printer, and lastly a playwright. In 1783 he was correspondent in Paris for the *Morning Herald.* In 1784 he translated the *Mariage de Figaro* from memory and produced it at Covent Garden, himself playing the leading rôle. He wrote 30 plays, the best and most successful of which is *The Road to Ruin* (1792), still occasionally acted. During the French Revolution he became a member of the Society for Constitutional Information, and was indicted (1794) for high treason, imprisoned, and finally discharged without trial. He was a man of great industry. He learned French, German, and Italian, and translated many works, including Goethe's *Hermann und Dorothea* (1801), Lavater's *Physiognomische Fragmente* (1793), and some of the works of Frederick the Great. He was also the author of four novels and numerous poems—*Alwyn* (1780), notable among the former, and *Human Happiness* (1783) among the latter. His *Memoirs,* written by himself or compiled from his diary and other papers, by William Hazlitt, were published after his death (3 vols., 1816).

HOL'CUS. See SOFT GRASS. .

HOLD (older form *hole,* from Dutch *hol,* hole, hold; connected with AS., OHG. *helan,* Ger. *hehlen,* Lat. *celare,* Gk. καλύπτειν, *kalyptein,* to hide, OIr. *celim,* I hide; confused in popular etymology with *hold,* to contain). That portion of the interior of the ship which is below the upper deck. This part of a ship may be divided into several parts, as the *forepeak,* the *forehold,* the *main hold,* the *after hold,* the *engine* and *boiler rooms, coal bunkers, storerooms,* etc. To *stow* a hold is to put things in it and arrange them properly; to *break out* a hold is to remove the contents of it.

HOLD. In music, a sign placed above (𝄐) or below (𝄐) a note or rest to indicate that its time value is increased. The length of a hold is governed by the rhythm of the music and is left to the performer's discretion. See GENERAL PAUSE.

HOLDEFLEISS, hōl'de-flīs, FRIEDRICH WILHELM (1846–). A German agricultural chemist. He was born at Bennstedt and studied at Halle, where for several years he acted as assistant in the Agricultural Experiment Station and in the Agricultural Institute of the university. In 1878 he was appointed director of the agricultural station of the Central Silesian Agricultural Society at Breslau. In 1881 he became professor extraordinary and in 1882 ordinary professor of agricultural chemistry in the Agricultural Institute of the University of Breslau. After filling this position with distinction for 10 years, he was appointed director of the Institute. During his incumbency he was actively engaged in the preparation of numerous works dealing with his specialty. Among these may be mentioned: *Untersuchungen über den Stallmist* (Breslau, 1889); *Das Knochenmehl* (Berlin, 1890); *Die Rinderzucht Schlesiens* (Breslau, 1896); *Schatzkästlein des praktischen Landwirts* (Berlin, 1896).

HOLDEN, hōl'den, EDWARD SINGLETON (1846–1914). An American educator and astronomer. He was born in St. Louis, Mo., and was educated at Washington University and at West Point, where he graduated in 1870. He occupied successively the positions of professor of mathematics, United States navy (1873–81), director of the Washburn Observatory, Madison, Wis. (1881–85), president of the University of California (1885–

88), and (1888–98) director of the Lick Observatory, Cal., where his most important work was done. Most of the buildings and instruments of this institution were designed and built under his direction. In 1901 he was appointed librarian of the United States Military Academy. He was a member of the National Academy of Sciences and of various foreign learned bodies, including the Royal Astronomical Society, London. Besides editing various publications, he wrote: *Bastion System of Fortification* (1872); *Life of Sir William Herschel* (1881); *Mountain Observatories* (1896); *Elementary Astronomy* (1899); *Essays in Astronomy* (1900); *The Sciences* (1903); *Galileo* (1905).

HOLDEN, Hubert Ashton (1822–96). An English classical scholar. He studied at King Edward's College, Birmingham, and graduated from Trinity College, Cambridge, in 1845, was tutor and lecturer at Trinity in 1848–53, vice principal of Cheltenham College in 1853–58, and head master of Queen Elizabeth's School, Ipswich, in 1858–83, and in 1890 became a fellow at the University of London. His best-known texts are *Foliorum Silvula* (4 parts, 1852; part i, 18th ed., 1910); *Foliorum Centuriæ* (1852; 12th ed., 1901); *Folia Silvulæ* (2 vols., 1865–70). He also edited Cicero's *De Officiis* (1869; 6th ed., 1886) and *Pro Publio Sestio* (1883; 3d ed., 1889); Xenophon's *Hieron* (1883; 3d ed., 1888) and *Œconomicus* (1884; 4th ed., 1889); and various other texts.

HOLDEN, Sir Isaac (1807–97). A British inventor, who produced lucifer matches and improved wool-carding machinery. He was born in Hurlet, Renfrewshire, of English parents, and from being a drawboy to hand weavers, he went into a Paisley cotton mill, educating himself meanwhile till he was able to teach school. In the course of experimenting for a chemistry class he discovered the efficiency of sulphur as a medium between the explosive matter and the wood for matches (1829); but, as he took out no patent, others reaped the benefit of his invention. He was next bookkeeper, then manager, then owner of a wool-combing mill, and made such important improvements in its machinery that he became a wealthy manufacturer. He was elected to Parliament in 1865 and was knighted in 1893.

HOLDER, hōl'dēr, Alfred (Theophil) (1840–). A German philologist. He was born in Vienna, the son of a portrait painter, was educated at Heidelberg and Bonn, taught in the Rastatt Lyceum and in a private secondary school at Ryswick, and in 1867 entered the Karlsruhe Hofbibliothek, of which he became librarian in 1870 and the manuscripts of which he described in volumes published from 1895 to 1914. His other publications are in widely different fields, including *Altceltischer Sprachschatz* (1896–1914, particularly important for Gaulish), and editions of Horace (1864–70), with Keller—still the best critical text; of Waltharius (1874), with Scheffel; of Tacitus' *Germania* (1878); of the Lex Salica (1879–80); of Cæsar's *Bellum Gallicum* (1882); of Saxo Grammaticus (1886), the only recent complete edition; of Herodotus (1886–88); of Avienus (1887); of Porphyrio's scholia on Horace (1894); of Cæsar's *Civil War* (1898); etc.

HOLDER, Charles Frederick (1851–1915). An American naturalist. Born in Lynn, Mass., of Quaker parents, he was sent to the Friends' School in Providence, R. I., afterward to a seminary near Boston, thence to the United States Naval Academy at Annapolis, but followed his natural bent towards science and became assistant curator of zoölogy in the American Museum of Natural History, New York City (1871–75). He spent some time collecting specimens for the Aquarium at New York City and was lecturer in the city schools as well as a writer upon scientific subjects for young people. He removed to California and was made trustee and professor of zoölogy in Throop University. His publications include: *Marvels of Animal Life* (1880); *Elements of Zoölogy* (1885); *Living Lights* (1887); *The Ivory King* (1886); *A Frozen Dragon* (1888); *A Strange Company* (1889); *Around Pasadena* (1889); *The Pasadena Highlands* (1889); *Santa Catalina Island: Its Sports* (1889); *Louis Agassiz: His Life* (1892); *Charles Darwin's Life and Work* (1893); *The Treasure Divers* (1898); *Stories of Animal Life* (1900); *Half Hours with Nature* (5 vols., 1901); *The Boy Anglers* (1904); *Half Hours with the Lower Animals* (1905); *Life in the Open* (1906); *Log of a Sea Angler* (1906); *Big Game at Sea* (1908); *The Marooners* (1909); *The Channel Islands* (1910); *Distinguished American Scientists* (1911); *Game Fishes of the World* (1913); *The Ocean* (1914); *Angling Adventures around the World* (1914).

HÖLDER, hēl'dēr, Eduard Otto (1847–1911). A German jurist, especially versed in Roman law. Born at Stuttgart, he studied at Tübingen and became professor at Zurich (1872), Greifswald (1874), Erlangen (1880), and professor of Roman law at Leipzig (1893). His works include: *Institutionen des römischen Rechtes* (3d ed., 1893); *Zum allgemeinen Teil des Entwurfs eines deutschen bürgerlichen Gesetzbuchs* (1888); *Pandekten* (1886–91); *Ueber objektives und subjektives Recht* (1893); *Die Stellung des römischen Erben* (1895); *Natürliche und juristische Personen* (1905). With Schollmeyer and others, he undertook the preparation of the *Kommentar zum deutschen bürgerlichen Gesetzbuch* (1900).

HÖLDERLIN, hēl'dēr-lēn, Johann Christian Friedrich (1770–1843). A German poet, born at Lauffen and educated at Tübingen, where he knew Hegel and Schelling. He was an ardent admirer of Schiller, who secured him a tutorship in the house of his friend, Charlotte von Kalb (1793–94). Then he became tutor in a banker's family at Frankfort, where the mother of his young charges, Frau Gontard, inspired him with a Platonic passion, which led him to celebrate her under the name of Diotima in his *Hyperion.* But from this time on his mind began to fail, and, save for intervals of sanity, he never recovered. His style was classic; his thought, in his best work, deep and full. He wrote: *Hyperion, oder der Eremit in Griechenland,* a novel in epistolary form, but really a prose poem (1797–99); an incomplete drama, *Empedokles;* translations from Sophocles' *Œdipus* and *Antigone* (1804); and the *Lyrische Gedichte,* his best work, mostly elegiac in tone, edited by Uhland and Schwab (4th ed., 1878; in 1899, by Linke). A complete edition of his works, with his letters and biography by Schwab, appeared at Stuttgart (1846). Consult Scherer, *F. Hölderlin Vorträge* (Leipzig, 1874); Müller-Rastatt. *Hölderlin, sein Leben und sein Dichten* (Bremen, 1894); Milbrandt, *Friedrich Hölderlin* (Berlin,

1896); Klein-Hattingen, *Das Liebesleben Hölderlins, Lenaus, Heines* (ib., 1900); Lange, *Hölderlin, eine Pathographie* (Stuttgart, 1909).

HOLDERNESS, hōl'dēr-nĕs, Sir Thomas William (1849–). An English administrator in India. He was educated at Cheltenham and at University College, Oxford, entered the Indian Civil Service in 1872, was member of the Famine Commission of 1897, acted as Secretary in the Revenue and Agricultural Department in 1898–1901, was Secretary of the Revenue Statistics and Commerce Department of the India Office from 1901 to 1912, and in 1912 became permanent Undersecretary of State in the India Office. In 1907 he was made Knight Commander of the Star of India. He revised Strachey's *India* (1911) and wrote *Narrative of the Indian Famine* (1896–97) and a brief *Peoples and Problems of India* (1912).

HOLDICH, hōl'dĭch, Sir Thomas Hungerford (1843–). An English explorer, born in Dingley, Northampton. He was educated at Woolwich, entered the Royal Engineers, served in the Afghan War in 1878–80 and on frontier expeditions, and in 1884–86 made important additions to our knowledge of Afghan Turkestan when he was on the Afghan Boundary Commission. From 1892 to 1898 he was superintendent of the Indian frontiers survey. In 1899 he was appointed one of three British commissioners on the disputed Patagonian boundary of Chile and Argentina and in 1902 personally surveyed the country, furnishing the data on which the "King's award" was made, and published *The Countries of the King's Award* (1904). He was knighted in 1897. He wrote: *The Indian Borderland* (1901); *India* (1904); *Tibet the Mysterious* (1906); *The Gates of India* (1910).

HOLD'ING (Lat. *tenementum*, a tenement, something held, from *tenere*, to hold). In the feudal law of land tenure, an estate in land held of a superior lord in fee. The term is seldom found in English law except in its Latin form, *tenementum*, which has in English taken on the form of *tenement*. It appears, however, in abbreviated form in the familiar expression "freehold" (*liberum tenementum*). The word has survived in Scots law in its original sense. See also Estate; Fee; Freehold; Tenement; Tenure.

HOLDREGE, hōl'drēj. A city and the county seat of Phelps Co., Neb., 151 miles west of Lincoln, on the Chicago, Burlington, and Quincy Railroad (Map: Nebraska, E 4). It has a Carnegie library and a fine courthouse. It is a grain centre and distributing point for an agricultural and cattle-raising region. Settled in 1883, it is governed by a mayor, elected annually, and a city council. The water works are owned by the city. Pop., 1900, 3007; 1910, 3030.

HOLE, William (1846–). A British painter and etcher, born at Salisbury, England. After serving an apprenticeship as civil engineer, he studied in the school of the Royal Scottish Academy, of which he was elected associate in 1878. He stands highest as etcher, his plates after Millet, Constable, and Velazquez possessing remarkable interpretative merit. His principal paintings are: "End of the '45" (1879); "Prince Charlie's Parliament" (1882); "The Night's Catch" (1883); "The Fill of the Boats" (1885); "The Canterbury Pilgrims" (1889); "The Ascension" (1906). There are mural paintings by him in Edinburgh—in St. James's Church (1896), the National Portrait Gallery of Scotland (1900), the Municipal Buildings (1903).

HOLGUIN, ôl-gēn'. A city of Cuba, in the Province of Santiago de Cuba, and capital of the department of the same name, about 25 miles by rail from Gibara, its port (Map: Cuba, J 6). It has a number of fine buildings. It exports tobacco, timber, corn, and cattle. It was founded in 1720 and received the title of city in 1751.. Pop., 1907, 7592.

HOL'IBUT. See Halibut.

HOL'IDAY (AS. *hālig dag*, holy day). A day set apart as a religious anniversary, or for the purpose of commemorating some extraordinary event, or of honoring the memory of a distinguished person, or for some reason of public policy. As a rule, holidays are occasions for rejoicing. People are expected to observe them "with the voice of joy and praise." (Ps. xlii. 4.) At times, however, they are accompanied by fasts rather than feasts. Of this character are days of humiliation and prayer, such as Fast Day, formerly observed in Massachusetts and other New England States, and days appointed from time to time by proclamation of governmental or ecclesiastical authorities.

During the Middle Ages holidays became so numerous, in many parts of Europe, as to interfere seriously with industrial pursuits. One of the most important results of the religious reformation of the sixteenth century was the abolition of excessive holidays with its consequent increase in the volume of secular labor. A *legal holiday* is one set apart, either by common or by statute law, as a day of rest, or of cessation in whole or in part from ordinary business activities. Sunday is the only common-law holiday in the United States, although in England Good Friday has been recognized as such for centuries. Legal holidays are of two kinds—general or public, and special or limited. On a public holiday, such as Sunday or the Fourth of July, public offices are closed, and persons under contract to render services cannot lawfully be required to work. In England, and in many of the United States, persons are prohibited from carrying on business or making contracts on Sunday, though there is no general rule prohibiting voluntary labor on other public holidays. (See Sunday.) On special or limited holidays, such as some of the bank holidays (q.v.), exemption from labor and from the performance of contracts generally is confined to a particular class of employees or to a designated section of the community, as public officials and employees, bank clerks, etc. As a general rule, negotiable paper falling due on a public or general holiday is not payable until the following day.

There are no national holidays in the United States, although Congress has at various times designated special holidays. Sundays, certain fast days, as Mardi-Gras (Shrove Tuesday) in Alabama, Florida, and Louisiana, and Saturdays after twelve o'clock noon are now legal holidays in all States and Territories where they are so designated by act of legislature. When holidays occur on Sunday, the following day is usually observed. The principal legal holidays in all of the States are as follows: January 1, New Year's Day (except in Arkansas and Mississippi); February 22, Washington's Birthday; May 30, Decoration, or Memorial,

Day (except in Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas); July 4, Independence Day; September, first Monday, Labor Day; November, Election Day, first Tuesday (or Tuesday after the first Monday) in all States holding election, also other days on which elections are held in various States; November, Thanksgiving Day, usually the last Thursday; and December 25, Christmas Day.

In addition to the foregoing the following holidays are commonly observed: January 19, Robert E. Lee's Birthday, in Alabama, Arkansas, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Virginia; February 12, Lincoln's Birthday, in California, Colorado, Connecticut, Delaware, Illinois, Iowa, Indiana, Kansas, Michigan, Minnesota, Montana, Nevada, New Jersey, New York, North Dakota, Oregon, Pennsylvania, South Dakota, Utah, Washington, West Virginia, and Wyoming; variable in date, Good Friday, in Alabama, Connecticut, Delaware, Florida, Louisiana, Maryland, Minnesota, New Jersey, Pennsylvania, Porto Rico, and Tennessee; April 19, Patriots' Day (anniversary of the battle of Lexington), in Maine and Massachusetts; Confederate Memorial Day, April 26, in Alabama, Florida, Georgia, and Mississippi; May 10, in North Carolina and South Carolina; second Friday in May, in Tennessee; June 3, Jefferson Davis's Birthday, in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, South Carolina, Texas, and Virginia; October 12, Columbus Day, in Alabama, Arkansas, California, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, Vermont, and Washington.

Also the following special holidays are observed only in the State or Territory mentioned: January 8, anniversary of the battle of New Orleans, in Louisiana; February 12, Georgia Day; March 2, anniversary of Texan Independence, in Texas; March 22, Emancipation Day, in Porto Rico; April 12, Halifax Independence Resolutions, in North Carolina; April 13, Thomas Jefferson's Birthday, in Alabama; April 21, anniversary of the battle of San Jacinto, in Texas; May 20, anniversary of the signing of the Mecklenburg Declaration of Independence, in North Carolina; June 11, Kamehameha Day, in Hawaii; June 15, Pioneer Day, in Idaho; July 10, Admission Day, in Wyoming; July 24, Pioneers' Day, in Utah; July 25, landing of United States troops, in Porto Rico; August 1, Colorado Day; August 16, Bennington Battle Day, in Vermont; September, third Saturday, Regatta Day, in Hawaii; September 9, Admission Day, in California; October 18, Alaska Day; October 31, Admission Day, in Nevada; November 1, All Saints' Day, in Louisiana; November, first Friday, Pioneer Day, in Montana.

Arbor Day and Flag Day (June 14) are frequently celebrated, and in certain cities special days are more or less observed; as, March 4, Inauguration Day, in Washington, D. C.; September 12, Defenders' Day, anniversary of the battle of North Point, in Baltimore, Md.; November 25, Evacuation Day, in New York. Thanksgiving Day, although designated as a holiday by a proclamation by the President of the United States, is a legal holiday only in the District of Columbia and the Territories. The governors of the States usually designate the same day as the President for Thanksgiving Day, but not always.

In England certain Church festivals, known as "red letter" days (so called because they are printed in red letters in the calendar), are still observed as holidays. They include January 6, Twelfth Day (the evening preceding is Twelfth Night); February 2, Candlemas; February 14, Old Candlemas (St. Valentine's Day); March 25 (formerly April 6), Lady Day; June 24 (formerly July 7), Midsummer Day, or St. John's Day; July 15, St. Swithin's Day; August 1, Lammas Day; September 29, Michaelmas; November 1, Allhallowmas, or All Saints' Day (the evening preceding is Allhalloween); November 2, All Souls' Day; November 11, Martinmas (formerly November 23); and December 28, Childermas. Bank holidays (q.v.) in Great Britain are days designated by act of Parliament on which banks may suspend business.

Bibliography. "Origin of Holidays," *Popular Science Monthly*, vol. xxxiv (New York, 1889); "American Holidays," in *Saturday Review* (London, 1886); "Bank Holidays," in *Journal of the Institute of Bankers* (ib., 1901); "What Should our National Holidays Commemorate?" in *Massachusetts Historical Society* (2d series, Boston, 1902); R. M. McCurdy, *Bibliography of Articles Relating to Holidays* (ib., 1905); Hutton Webster, *Rest Days: A Sociological Study* (Nebraska University Studies, vol. xi, Lincoln, 1911).

HOLINESS, Entire. See Higher Life.

HOLINSHED, or **HOLLINGSHEAD,** hŏl'ĭnz-hĕd, Raphael (?–1580). An English chronicler. Little is known of his life save that he was of a Cheshire family, probably the son of Ralph Holinshed, of Cophurst, in the township of Sutton Downes. He is celebrated as the author of a history of England, Scotland, and Ireland, which the Elizabethan dramatists drew upon for material in the construction of their historical plays. The work had been started originally by Wolfe, who, however, died in 1573 before its completion. Thereupon Holinshed undertook the work, and in 1577 appeared *Raphael Hollingeshed's Cronycle*, in two folio volumes. Holinshed had been assisted by William Harrison, who wrote the historical descriptions of England and Scotland, and by Richard Stanihurst, who contributed a part of the history of Ireland. All copies of the work were printed by Henry Bynneman. The publishers were George Bishop, John Harrison, and Luke Harrison. A second edition appeared in 1587, after Holinshed's death. This edition was chiefly revised by John Hooker, Abraham Fleming, and Francis Thynne, and contained some passages disagreeable to Elizabeth, who immediately ordered them cut out. A modern edition in six volumes was published in London (1807–08), with the "disagreeable passages" restored. But, after all, Holinshed's *Chronicle*, though popular in its day, would be seldom recalled to-day were it not for Shakespeare's indebtedness to it. From it the data for most of the great historical plays were probably derived; and in *Macbeth*, *Lear*, and *Cymbeline* most of the borrowed action and dialogue can be illustrated by excerpts from Holinshed. Consult: Cooper, *Athenæ Cantabrigienses* (Cam-

bridge, England, 1858); W. G. Boswell-Stone, *Shakespere's Holinshed* (New York, 1907); C. F. Fiske, *A Study of a Feature of Sixteenth Century Conventionalism as it Reveals itself in Holinshed's Chronicle* (Bloomington, Ill., 1910).

HOLKAR, hōl'kär. The name of a powerful Mahratta family, later adopted as a title by the rulers of Indore, one of the native states of Central India. The founder of the family was Malhār Rao Holkar, who was born in the Deccan in 1694 and, having gained by his valor the favor of the Peshwa (q.v.), obtained from him the western half of Malwa, with Indore for his capital. In 1761 he joined the great league of the princes of Hindustan, formed to bar the progress of Ahmed Shah Durrani, and was present at the battle of Panipat, Jan. 6, 1761; but as he fled shortly after the battle began, he was suspected of treason. Holkar was the only Mahratta chief of note who escaped the slaughter. He died in 1766 and was succeeded by his grandson, Māle Rao, who died the following year. The government then passed to Ahalyā Bai, the mother of Māle Rao, who resigned the military power to Tukoji Rao Holkar. On his death, in 1797, his natural son, Jaswant Rao Holkar, a man able, brave, and unscrupulous, seized Indore, but was driven out by Sindia (q.v.). Such, however, was Holkar's reputation for energy and ability that part of the victorious army deserted to him, with whose aid he obtained a signal victory over Sindia and the Peshwa (October, 1802). After fighting a long time against the British with varying success, he was compelled to conclude peace. He died insane Oct. 20, 1811. His son, Malhar Rao Holkar II, a minor, succeeded, and in 1817 declared war against the British, but his army was totally routed at Mahedpore, December 21; whereupon he sent offers of peace, which were accepted, and an English residency was established at Indore in January, 1818. He died in 1833. Mārtand Rao Holkar, Harī Rao Holkar, and Khande Rao Holkar successively ruled after him. The last of these died without heirs in 1843, and the East India Company assumed the right of nominating Tukoji Rao Holkar, who did not belong to the Holkar family. He was educated under the auspices of the British government and displayed great ability and always remained on the most friendly terms with the British. In 1886 he was succeeded by his oldest son, Sivaji Rao Holkar (died 1908), who ruled until 1903, when he abdicated in favor of his 12-year-old son, Tukoji Rao Holkar, who succeeded with full ruling powers in November, 1911. Consult: J. G. Duff, *A History of the Mahrattas* (3 vols., London, 1826); M. G. Ranade, *Rise of the Maratha Power* (Bombay, 1900); *The Imperial Gazetteer of India* (Oxford, 1907–09).

HOLKAR'S DOMINIONS. See INDORE.

HOLL, hōl, FRANK (1845–88). An English portrait and genre painter. He was born in London, the son and grandson of engravers whose profession he at first intended to follow. He entered the Royal Academy schools in 1860, won numerous medals, and was made A.R.A. in 1878 and R.A. in 1883. In 1868 he won the traveling scholarship with "The Lord Gave, and the Lord Hath Taken Away," which, because of its grim pathos and high technical qualities, made his reputation. The blackness of its coloration is perhaps due to his training as an engraver. Among other works exhibited at the Royal Academy were: "No Tidings from the Sea" (1871), painted for Queen Victoria; "I Am the Resurrection and the Life" (1872); "Deserted" (1874); "Her First-Born" (1876); "Committed for Trial" (1878); "The Gifts of the Fairies" (1879); "Ordered to the Front" (1880). His portrait of Samuel Cousins, the mezzotint engraver (1878), was hailed as a masterpiece, and immediately Holl was overwhelmed with commissions, the execution of which broke down a constitution never strong. Among the 200 portraits he painted are those of Lord Roberts (1882), for Queen Victoria; the Prince of Wales, Lord Dufferin, the Duke of Cleveland (1885); Lord Overstone, Mr. Bright, Mr. Gladstone, Mr. Chamberlain, and Earl Spencer. Holl's earlier pictures owed part of their striking success to the sombre and melodramatic sentimentality of the stories they told; but his methods as a portrait painter are less open to criticism. Though he sometimes failed to catch a likeness, his work is at best full of strength and decision and ranks him among the foremost men of the English school.

HOLL, KARL (1866–). A German Protestant theologian and Church historian, born and educated in Tübingen. He was licensed in theology in 1890, became an assistant in the Berlin Academy of Sciences in 1894, and lecturer in the University of Berlin in 1896. In 1900 he was made professor at Tübingen and in 1906 professor at Berlin. Among his publications are: *Sacra Parallela des Johannes Damaszenus* (1896); *Enthusiasmus und Bussgewalt beim griechischen Mönchtum* (1898); *Amphilochius von Ikonium* (1904); *Die geistliche Uebungen des Ignatius von Loyola* (1905); *Die Rechtfertigungslehre im Lichte der Geschichte des Protestantismus* (1907); *Der Modernismus* (1908); *Calvin* (1909); *Thomas Chalmers und der Anfang der kirchlichsozialen Bewegung* (1913).

HOLLAND, hōl'and. A mediæval county, whose territories now form the provinces of North and South Holland (qq.v.), in the Kingdom of the Netherlands (Map: Netherlands, C 2). The hereditary counts of Holland, whose dominions were included within the limits of the Holy Roman Empire, appear in history as early as the tenth century, but the title Count of Holland was not used until the following century, and the counts owed their importance to the victory won from the Duke of Lorraine in 1018. During the eleventh and twelfth centuries the Dirks and Florises, as all the counts were named, gradually increased their lands and powers. Count William II was elected Roman Emperor in 1247 in opposition to Frederick II. He contested the Imperial crown with Conrad IV, Frederick's successor, and on the death of Conrad in 1254 was recognized by many German princes. He was drowned by breaking through ice while on an expedition against the Frisians in 1256. In 1299 the last lineal descendant of Dirk I died, and Holland passed to the counts of Hainault. Soon after, Zeeland was permanently united with Holland. In 1417 the Countess Jacqueline succeeded to the rule at the age of 17; her husband, the heir to the Kingdom of France, had died only a few months before. From that time she was in constant trouble and was betrayed by husbands and relatives until finally her fourth husband, to whom she seems to have been

strongly attached, was taken prisoner, and in 1433 she made over Hainault, Holland, and Zeeland to Philip the Good of Burgundy, who succeeded in 1436, after her death. Holland shared the fortunes of the united Netherlands and was one of the provinces which achieved their liberation from Spain and constituted themselves into the Dutch Republic. Consult P. J. Blōk, *History of the People of the Netherlands* (5 vols., New York, 1898, 1912), and Poullet, *Histoire politique nationale; origines, développements, et transformations des institutions, etc.* (2d ed., 2 vols., Louvain, 1882–92). See BURGUNDY; NETHERLANDS.

HOLLAND. A city in Ottawa Co., Mich., at the head of Black Lake, which affords a good harbor, having regular steamboat lines to Chicago, and 26 miles southwest of Grand Rapids, on the Pere Marquette Railroad (Map: Michigan, C 6). It is the seat of Hope College, opened in 1865, and of the Western Theological Seminary, both under the control of the Reformed church in America, and has a public library, fine school buildings and city hall, and Jenison and Centennial parks. There are several summer resorts on the shore of Black Lake that enjoy considerable popularity. Holland carries on an extensive grain trade and is a manufacturing centre of importance, its industrial establishments including flour and planing mills, machine shop, tanneries, furniture factories, a beet-sugar factory, a large pickling plant, and manufactories of wood-working machinery, pianos, rusks, and electric and steam launches. The water works and electric-light plant are owned by the municipality. Founded in 1847 by Dutch settlers, Holland was chartered as a city in 1867. Its inhabitants are still largely of Dutch descent. On Oct. 9, 1871, almost the entire city was destroyed by fire, more than 300 buildings being burned down. Pop., 1900, 7790; 1910, 10,490; 1914 (U. S. est.), 11,639; 1920, 12,166.

HOLLAND. A variety of unbleached linen cloth used largely for window shades, being either dyed or coated with a colored dressing. The name is derived from the fact that it was first manufactured in Holland. See LINEN.

HOLLAND, CHARLES (1733–69). An English actor. He was born at Chiswick and in 1755 made his début in *Oroonoko* at Drury Lane, where he played until his death. He was the first to play Florizel in Garrick's alteration of Shakespeare's *The Winter's Tale*. He also appeared in Mrs. Sheridan's *Discovery* (1763), in Garrick and Coleman's *Clandestine Marriage* (1766), in Kendrick's *Widowed Wife* (1767), in Murphy's *Zenobia* (1769), and in Mrs. Griffith's *School for Rakes* (1769). In his final season he played the rôle of Richard III in Garrick's *Jubilee* pageant (1769) and that of Timur in Dow's *Zingis* (1769).

HOLLAND, EDMUND MILTON (1848–1913). An American comedian, born in New York City, the son of George Holland, who was also a well-known actor. He appeared upon the stage in childhood, but his regular professional career began in 1866 at Barnum's Museum. The next year, under the name of Mr. E. Milton, he became a member of Wallack's company, with which he played successfully in *The Road to Ruin*, *Caste*, and other pieces till 1880. After an interval, during which he made a tour in England, he was engaged in 1882 at the Madison Square Theatre. Among his characters in the years that followed were Pittacus Green in *Hazel Kirke*, Old Rogers in *Esmeralda*, Captain Redwood in *Jim the Penman*, Lot Burden in *Saints and Sinners*, and Colonel Carter in *Colonel Carter of Cartersville*, the last named at Palmer's Theatre. Beginning in 1895, he and his brother Joseph starred for about two years in *A Social Highwayman* and other plays. In 1901–02 he played the title rôle in *Eben Holden*, and from 1903 to 1906 he played Captain Bedford in *Raffles*. In 1909 he joined the New Theatre Company, of which he remained a member till 1911, playing, among other parts, Sir Oliver Surface in *The School for Scandal*, Canon Bonington in *Don*, Mr. Elkin in *The Thunderbolt*, Gaffer Tyl in *The Blue Bird*, and Baron Von Haugh in *Old Heidelberg*. He appeared as Metz in *Years of Discretion* at the Belasco Theatre in 1912. Consult McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896), and L. C. Strang, *Famous Actors of the Day in America* (Boston, 1900).

HOLLAND, SIR HENRY (1788–1873). An English physician, natural philosopher, and author, born at Knutsford, England. He was educated at London and Edinburgh, receiving his medical degree at the University of Edinburgh in 1811. He traveled extensively, practiced medicine from 1815 till his death, was elected fellow of the Royal College of Physicians in 1828, physician in ordinary to the Prince Consort in 1840 and in 1852 to Queen Victoria, was made Baronet in 1853, and was very prominent medically, socially, and in literary circles. He was the author of *Medical Notes and Reflections* (1840); *Chapters on Mental Physiology* (1852); *Essays on Scientific Subjects* (1862); *Recollections of a Past Life* (1871).

HOLLAND, HENRY FOX, first BARON (1705–74). An English politician, the younger son of Sir Stephen Fox, born in Chiswick. He was educated at Eton and at Christ Church, Oxford, and, after a reckless early life, during which time he spent the greater part of his fortune, he entered politics. He was returned to Parliament as a Whig for the borough of Hindon in Wiltshire in 1735, and from 1741 to 1761 he sat for Windsor. In 1737 he was appointed surveyor-general of works by Walpole. After his chief's fall he was Lord of the Treasury (1743) and Secretary of State for War and member of the Privy Council (1746). In 1755 he was bribed by a seat in the cabinet to back George II's measures and quickly became leader of the House. But in 1756 he resigned, and a year later he entered upon the lucrative office of Paymaster-General. Grenville's resignation in 1762 made him again leader of the House of Commons. The task of getting the Peace of Paris approved he accomplished by corruption and browbeating (1763), and for his reward was made Baron Holland, a title which carried with it a seat in the House of Lords. By 1765 he had become so unpopular that he was forced to resign the paymaster-generalship. The Court of Exchequer brought proceedings against him, and the Mayor of London (1769) spoke of him in a petition to George III as "the public defaulter of millions," but he had served the King so well that all attacks were unsuccessful even when he was out of favor at court. Consult T. W. Riker, *Henry Fox, First Lord Holland* (Oxford, 1911).

HOLLAND, HENRY RICH, first EARL OF (1590–1649). An English nobleman, educated

at Emmanuel College, Cambridge, and created Earl in 1610. For Charles, Prince of Wales, he conducted the marriage negotiations with Henrietta Maria in 1624. He became constable of Windsor and high steward to the Queen in 1629, groom of the stole in 1636, and general of the horse in 1639. During Charles's troubles with Parliament Holland three times supported the Parliamentarians, only to desert their cause each time for that of the King. In 1647 he led a force of 600 men in behalf of the royal cause, but was defeated, was captured at St. Neots, and imprisoned at Warwick Castle. He was tried and sentenced to death by the courts and was executed together with Capel and Hamilton, March 9, 1649.

HOLLAND, Henry Richard Vassall Fox, third Baron (1773–1840). An English politician, only son of Stephen, second Lord Holland, and nephew of Charles James Fox. He was born at Winterslow House, Wiltshire, and was educated at Eton, at Christ Church, Oxford (M.A., 1792), and by extensive travels on the Continent. He entered the House of Lords in 1796 and won especial fame by his protests, later collected by Moylan, *The Opinions of Lord Holland, 1797–1840* (1841). He was soon recognized as a power in the Whig party and fought against suspension of the Habeas Corpus Act, against the union with Ireland, and for the repeal of the Test and Corporation Acts. He was a commissioner (1806) to negotiate a treaty with America. When his uncle died, he was a member of the Privy Council and was a member of the cabinet of 1806 as Lord Privy Seal. When his party was restored to power in 1830, he became Chancellor of the Duchy of Lancaster, and except for two short intervals he held this post until his death. He is perhaps most widely known as the host of Holland House and the centre with Lady Holland of the brilliant company that gathered there. Besides his *History of the Whig Party during my Time,* edited by his son (1852), he wrote *Some Account of the Life and Writings of Lope Felix de Vega Carpio* (1806) and *Inquiry into the State of the Nation, at the Commencement of the Present Administration* (3d ed., 1806). His *Foreign Reminiscences* (1850) gives vivid pictures of his times. His *Further Memoirs of the Whig Party* (1807–21) was published in 1905.

HOLLAND, Henry Scott (1847–1918). An English preacher and theologian, born at Ledbury in Herefordshire. He was educated at Eton and at Balliol College, Oxford, was made canon (1884) and precentor (1886) of St. Paul's Cathedral, London; and in 1910 he became regius professor of divinity at Oxford and canon of Christ Church. His publications include several volumes of sermons, such as *Logic and Life* (1882); also *Personal Studies* (1905); *Vital Values* (1906); *Fibres of Faith* (1910); *Unity in Diversity* (1914).

HOLLAND, John Philip (1844–1914). An American inventor. He was born at Liscannor, County Clare, Ireland, and was educated at the Christian Brothers' school, Limerick. For 15 years he was a school teacher, including, after removal to America, five years at Paterson, N. J. His interest in Irish independence led him to investigate means of breaking up England's sea power, and for this purpose he directed his attention to the construction of submarine torpedo boats. He laid his first plans for a submarine before the United States Navy Department in 1875, and two years later constructed his first vessel of the sort, a clumsy wooden affair. In 1893 he received his first contract from the United States government, but because of others' interference the boat when constructed was practically a failure. Joining the Crescent Shipyards at Elizabeth, N. J., he built, according to his own plans, the submarine *Holland,* which was successfully tried in 1898 and then purchased by the United States. See Torpedo Boat, Submarine. Holland died in poverty.

HOLLAND, Josiah Gilbert (1819–81). An American journalist and author, born at Belchertown, Mass., July 24, 1819. He graduated at Berkshire Medical College, Pittsfield, Mass., in 1844, practiced medicine three years, was made school superintendent at Vicksburg, Miss., became assistant editor of the Springfield *Republican* (1849–66), and made that journal attain great influence in New England. Here he published his *History of Western Massachusetts* (1855) and during these years gained distinction as a popular lecturer. On his return from two years in Europe (1868–70) he founded *Scribner's Monthly,* which absorbed successively *Hours at Home, Putnam's Magazine,* and *Old and New,* and, under changed ownership, is the present *Century Magazine.* Of this he remained editor till his death in New York, Oct. 12, 1881. Of his many volumes of fiction and verse, the earlier were published under the assumed name of Timothy Titcomb. The more noteworthy of the novels are: *The Bay Path* (1857); *Miss Gilbert's Career* (1860); *Arthur Bonnicastle* (1873); *The Story of Seven Oaks* (1875); *Nicholas Minturn* (1877). Of the poems the most popular are: *Bittersweet* (1858); *Kathrina* (1867); *Garnered Sheaves* (1873). Noteworthy also are: *Letters to Young People* (1858); *Letters to the Joneses* (1863); *Plain Talk on Familiar Subjects* (1865); *Life of Lincoln* (1865); *The Mistress of the Manse* (1874). A collected edition of his works (16 vols., New York) appeared in 1897–1911. His prose and verse are alike clean in diction and thought, pure and sweet in feeling, earnest in moral tone, and appeal to a wide circle of readers. For his life, consult H. M. Plunkett, *J. G. Holland* (New York, 1894).

HOLLAND, North. See North Holland.

HOLLAND, Philemon (1552–1637). A native of Chelmsford, England, called by his contemporaries "the translator general of his age." He was educated at Trinity College, of which he became a fellow. On being appointed to the rectorship of the free grammar school of Coventry he began a long series of translations from the classics. He also found time to carry on practice as a physician. By distribution of his time he reconciled his three professions of schoolmaster, doctor, and translator, fulfilling the functions of all three till his eightieth year. His chief translations are those of Livy (entire), Pliny's *Natural History,* Plutarch's *Morals,* Suetonius, Ammianus Marcellinus, and the *Cyropædia* of Xenophon. He also did good service to literature by his edition and translation of Camden's *Britannica,* to which he made some valuable additions.

HOLLAND, Thomas Erskine (1835–). An English authority on international law. He was born at Brighton, studied there and at Balliol and Magdalen colleges, Oxford, where he won

high honors, and entered law practice in 1863. In 1874 Holland became Vinerian reader in English law at Oxford and immediately afterward was appointed Chicele professor of international law and diplomacy, which post he held until 1910. Holland was given the degree of D.C.L. by Oxford and that of LL.D. by Bologna, Glasgow, Brussels, and Dublin, and received numerous other honors. In 1913 he was president of the Institute of International Law. His best-known work, *Elements of Jurisprudence* (1880; 11th ed., 1910), is a standard in England and America. He also wrote: *The Institutes of Justinian* (1873–81); *The European Concert in the Eastern Question* (1885); *Studies in International Law* (1898); *Neutral Duties in a Maritime War as Illustrated by Recent Events* (1905); *The Laws of War on Land* (1908); *Proposed Changes in the Law of Prize* (1911).

HOLLAND, William J(acob) (1848–). An American zoölogist and paleontologist, born at Bethany, Jamaica, West Indies. He graduated from the Moravian College and Theological Seminary at Bethlehem, Pa., in 1867, from Amherst College in 1869, and from Princeton Theological Seminary in 1874. He was principal of high schools in Massachusetts (1869–71), was ordained to the Moravian ministry in 1872, held pastorates at Philadelphia (1872–74) and at Pittsburgh, Pa. (1874–91), and was chancellor of the Western University of Pennsylvania (now the University of Pittsburgh) from 1891 to 1901. In 1898 he became director of the Carnegie Institute at Pittsburgh, where he had been professor and lecturer since 1892. In 1907–09 he served as president of the American Association of Museums. His publications include *The Butterfly Book* (1898), *The Moth Book* (1903), *To the River Platte and Back* (1913), and papers on the Tertiary fauna and Jurassic dinosaurs.

HOLLAND, William of. See William of Holland.

HOLLÄNDER, Bernard (1864–). An English physician. He was born in Vienna, went to London in 1883, became a British subject, studied medicine at King's College Hospital and on the Continent, and practiced in London. His particular interest in abnormal psychology led him to study cerebral localization and to attempt a modern scientific phrenology. He wrote: *The Mental Functions of the Brain* (1901); *Scientific Phrenology* (1902); *Crime and Responsibility* (1907); *Psycho-Therapeutics of Insanity* (1908); *The Unknown Life and Works of Dr. Francis Joseph Gall* (1909); *Eugenics and Marriage* (1912); *The Insanity of Genius* (1913).

HOLLÄNDER, Gustav (1855–1915). A German violinist and teacher, born at Leobschütz (Upper Silesia). He received his first instruction from his father, a physician and most enthusiastic music lover, and even as a child played in public. In 1867–69 he studied under David at the Leipzig Conservatory, from 1869 to 1874 under Joachim at the Hochschule in Berlin and at the same time composition under Kiel. Immediately upon the completion of his studies he joined the orchestra of the Royal Opera in Berlin and was appointed teacher of violin in Kullak's academy. In 1881 he was called to Cologne as concert master of the Gürzenich Orchestra and professor at the conservatory. A few years later he also succeeded Japha as first violin of the famous Professoren Streichquartett. In 1895 he went again to Berlin to assume the directorship of the Stern Conservatory. He made many successful concert tours of Germany, Austria, Holland, and Belgium. In the field of composition he confined himself to works for his own instrument.

HOL'LANDER, Jacob Harry (1871–). An American economist, born in Baltimore. He graduated from Johns Hopkins University in 1891. He was appointed secretary to the Bimetallic Commission of 1897; in 1900 the Secretary of War made him special commissioner on the revision of law in Porto Rico, and a few months afterward he was named Treasurer of the island by President McKinley. At Johns Hopkins he served as associate professor of finance until 1900, and as associate professor of political economy from 1901 to 1904, when he was appointed professor. In 1908 he was special commissioner to Santo Domingo to investigate the public debt, and after 1908 he was financial adviser of that Republic. His publications include: *The Cincinnati Southern Railway: A Study in Municipal Activity* (1894); *The Financial History of Baltimore* (1899); *Studies in State Taxation* (1900); *Report on the Debt of Santo Domingo* (1906); *David Ricardo: A Centenary Estimate* (1910). He edited the *Letters of David Ricardo to J. R. McCulloch* (1895) and to *Hutches Trower* (1899).

HOLLAND (hŏl'ənd) **HOUSE.** A London mansion of Tudor architecture, on a hill near Kensington Gardens, built in 1607 for Sir Walter Cope. Its name is derived from an early owner, Henry Rich, Earl of Holland. The house is famous for its associations with the names of those who have occupied it. After Lord Holland's execution it passed into the hands of the Parliamentary generals Fairfax and Lambert, but was later restored to Lady Holland. Addison lived in it from 1716 to his death in 1719. Henry Fox, father of Charles James Fox, purchased it in 1762, and it is still in the possession of his line. Among its other inmates have been Cromwell, Ireton, William Penn, William III and Mary, Moore, and Macaulay.

HOLLAND PURCHASE. See New York.

HOLLAND SOCIETY. A genealogical society, founded in New York City on April 6, 1885. Its objects are to collect information respecting the early history and settlement of New Amsterdam by the Dutch and to discover and preserve all existing documents, mementos, etc., relating to their genealogy and history, as well as to publish material for a memorial history of the Dutch in America, in which shall be particularly set forth the part belonging to that element in the growth and development of American character, institutions, and progress. The society admits to membership descendants, in the male line only, of Dutchmen, or of persons entitled to the privileges of Dutch citizenship in Dutch settlements in America, prior to the year 1675. The badge is a facsimile of the famous Beggars medal of 1566. The society has marked various historical localities in New York City by inscribed plates and publishes a yearbook containing historical and genealogical information. Its membership in 1914 was 1000, with a waiting list, being limited to that number.

HOLLAR, hŏl'lär, Wenceslaus (in Bohe-

mian, Vaclav Holar) (1607–77). A celebrated Bohemian etcher. He was born at Prague, June 13, 1607, the son of a lawyer, and received a good education. When quite young, he took up the study of drawing, modeling his work especially on that of Dürer. He was only 18 when he published his first works, consisting of the "Virgin" (after Dürer), the "Ecce Homo," and some other subjects. Leaving Prague, he began a wandering life through Germany, taking views of the chief towns and of the most striking scenery of the Danube, Rhine, and other streams. He lived two years at Frankfort, where he worked under Matthew Marian, a pupil of Rubens and Van Dyck, and afterward in Strassburg and Cologne. At Cologne in 1635 he fell in with the Earl of Arundel, the English Ambassador to the German Emperor, who attached him to his service. Soon after reaching England with his patron he was appointed to instruct the Prince of Wales in drawing and in 1640 published his *Ornatus Muliebris Anglicanus*, a description of the customs of the contemporary Englishwomen, followed in 1643 by *Theatrum Mulierum*, a similar production for the women of the remaining parts of Europe. During the Civil War he enlisted as a Royalist and took part, with other artists, in the defense of Basing House. In 1645 he joined Lord Arundel at Antwerp. He was simple and honest in money matters, and nearly always the victim of unscrupulous dealers. After Arundel's death he became very poor. He worked by time, fixing his tariff at fourpence an hour, which he marked by a sandglass. During this period, however, he produced his best work. He returned to England in 1652 and worked with the same unflagging industry and with no more profitable result. His plates in Dugdale's *Monasticon* and *History of St. Paul's* and in other works attest his diligence. After the Restoration he was made designer to the King, and in 1669 he was commissioned by Charles II to take plans and perspective drawings of Tangier and its fortifications, in payment for which work he received a very paltry sum. In 1673 he traveled through northern England, etching the principal cities there. He died in great poverty in London, Jan. 19, 1677.

He left some 2750 plates on a great variety of subjects. They include views of cities, such as Strassburg, Frankfort, Cologne, Greenwich, Oxford, Lincoln, York, Albury, Windsor, Tangier, etc.; architectural drawings, for example of Antwerp Cathedral, St. George's Chapel (Windsor), tomb of Edward IV (Windsor); and other subjects: "Trial of Archbishop Laud," "Coronation of Charles II," "Engagement with the Algerian Pirates," the "Four Seasons." His portraits were especially after Holbein and Van Dyck. Among the best known are those of Charles I and his Queen after the latter, and his original engravings of the Duke of York (afterward James II), Oliver Cromwell, Hobbes, and Lady Venetia Digby. While most of his work was original, he executed with equal facility engravings after the old masters. Some of the best known are an "Ecce Homo," after Titian; "Esther before Ahasuerus," after Veronese; "Cupid Riding a Lion," after Giulio Romano; and especially a beautiful goblet after Mantegna's pen drawing. There are almost complete collections of his works in the British Museum and in the library of Windsor Castle.

Hollar's work unites, in a remarkable fashion, accuracy and the pictorial quality. He is known chiefly as a topographical and architectural engraver, and even into such subjects he knows how to introduce poetry and romance. His portraits are admirable, his landscapes dainty and free. Catalogues of Hollar's plates were edited by Vertue (London, 1759) and by Parthey (Berlin, 1853; supplement, 1858; additions by Borowsky, Prague, 1898). The former contains valuable biographical notices; the latter is an excellent and exhaustive treatise.

HOLLAZ, hō'läts, David (1648–1713). A German dogmatic theologian, born at Wulkow in Pomerania. He studied at Erfurt and Wittenberg, became preacher at Pützerlin in 1670, assistant rector at Stargard in 1681, and afterward was situated at Kolberg and at Jakobshagen. His great work, *Examen Theologicum Acroamaticum Universam Theologiam Theticopolemicam Complectens* (1707), passed through many editions and surpassed preceding works in clearness and simplicity rather than scientific knowledge. It may be considered the best expression of Lutheran orthodoxy of the period. He is not to be confused with David Hollaz, his grandson, who preached at Günthersberg and was the author of *Beschreibung der Wiedergeburt* (1737), *Anweisung zum Gebet* (1747), *Evangelische Gnadenordnung* (1751), and *Pilgerstrasse nach Zion* (1771).

HOLLEBEN, hōl'lā'ben, Theodor von (1838–1913). A German diplomat. He was born in Stettin and was educated at Berlin, Heidelberg, and Göttingen. After serving in the Franco-Prussian War he left the Hussars for the diplomatic service in 1872. He was Minister to Argentina (1875–85); Envoy to Japan (1885–91), to Washington (1892–93), to Stuttgart (1893–97), and then again to Washington, where he received the rank of Ambassador (1897). After the failure of the German effort to induce President Roosevelt to act as arbitrator in the Venezuelan dispute, Von Holleben resigned (1903), his health having failed.

HOLLES, hōl'iz, *or* hōlz, Denzil, Lord (1599–1680). An English statesman, born at Haughton, Nottinghamshire, Oct. 31, 1599. He was a member of Parliament for St. Michael, Cornwall, in 1624, for Dorchester in 1628, and in 1629 was one of two members who forced the Speaker to keep his seat when he strove to obey Charles I by adjourning the House before it could pass certain acts upon taxation and religion obnoxious to the King. Holles was fined and imprisoned in the Tower for nearly a year. He again represented Dorchester in Parliament in 1640. Two years afterward he was one of the famous five members whom King Charles tried unsuccessfully to arrest, and while the civil war was in progress held Bristol for the Parliament and raised a regiment of foot that made its mark at Edgehill and Brentford. But, his war spirit having abated, he was one of the commissioners appointed to treat with the King both at Oxford and at Newport. When he proposed the disbandment of the army in 1647, its leaders accused him of high treason, and he was once again obliged to seek an asylum on the Continent and remained in France until the close of the Protectorate. He was one of those who conferred with Monk regarding the proposed Restoration and again took his seat in Parliament in February, 1660. He was ever watchful that Charles II did not encroach upon the public liberties, dearer to him than the

King who had made him a peer (1661) and in whose Privy Council he sat (1679), and he exercised his great influence towards the disbanding of the army, lest the restored monarch should attempt to use it for his own purposes. Lord Holles was one of the commissioners of the Treaty of Breda (1667). He wrote: *The Grand Question Concerning the Judicature of the House of Peers* (1669); *The Case Stated Concerning the Judicature of the House of Peers in the Point of Appeals* (1675); *The Case Stated of the Jurisdiction of the House of Lords in the Point of Impositions* (1676); *Considerations Touching that Question whether the Prelates have the Right to Sit among the Lords and Vote with them in Parliament in Capital Cases* (1682).

HOL'LEY, ALEXANDER LYMAN (1832–82). An American metallurgist and mechanical engineer, born at Lakeville, Conn., where his father, Alexander H. Holley, later Governor of the State, had a cutlery factory, in which the boy became an adept as a machinist. He took a scientific course at Brown University (1850–53). In 1854 he became editor and partner with Zerah Colburn of the *Railroad Advocate*. Four years later he and Colburn wrote *The Permanent Way and Coal-Burning Locomotive Boilers of European Railways*, which did much to reform American railroad management. He was an editor of the New York *Times* and of Webster's *Dictionary*, traveled in Europe in 1862, and wrote a *Treatise on Ordnance and Armor* (1864). In 1863 he went to England, purchased the Bessemer patents, and in 1865 started the Bessemer plant at Troy, which, later, he greatly improved. (See IRON AND STEEL, *Bessemer Process.*) He was closely connected with the building of many large steel works. He was trustee of the Rensselaer Polytechnic Institute (1865–82) and in 1875 became president of the Institute of Mining Engineers and a member of the government board for testing structural materials.

HOLLEY, MARIETTA (1850–). An American author, born near Adams, Jefferson Co., N. Y. She began by writing poetry for the country press at the age of 16. Her prose contributions to periodicals giving the amusing adventures of "Samantha," and the sayings and doings of "Josiah Allen's Wife," proved very popular. Her books include: *Samantha at the Centennial* (1877); *My Wayward Pardner* (1880); *Miss Richard's Boy* (1883); *Samantha at Saratoga* (1887); *Samantha amongst the Colored Folks* (1892); *Samantha in Europe* (1895); *Around the World with Josiah Allen's Wife* (1899); *Samantha at the St. Louis Exposition* (1904); *Samantha on the Woman Question* (1913); *Josiah Allen on the Woman Question* (1914).

HOLLEY, MYRON (1779–1841). An American reformer and editor, born in Salisbury, Conn. A graduate of Williams College, he began the practice of law in 1802, but left it for a bookselling business in Canandaigua, N. Y., and was a leading promoter of the Erie Canal. Afterward he was prominent in the Antimasonic and the antislavery movements. He was editor first of the *Countryman* (1831–34), then of the Hartford *Free Elector* and of the Rochester *Freeman*.

HOL'LICK, CHARLES ARTHUR (1857–). An American geologist, born on Staten Island, N. Y. He graduated from the Columbia School of Mines in 1879 and as Ph.D. from Columbian (now George Washington) University in 1897. He served as president of the Port Richmond (N. Y.) boulevard commission (1896), and of the Richmond County (N. Y.) park commmission (1897–1904), and as member of the New York City Board of Education (1907–10), from 1891 to 1900 taught geology at Columbia University, and thereafter was curator of the department of fossil botany of the New York Botanical Garden. In 1881 he joined the United States Geological Survey, of which he became geologist. His writings deal with the fossil botany and geology of the eastern United States. He became a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA.

HOL'LIDAYSBURG. A borough and the county seat of Blair Co., Pa., on the Juniata River, 7 miles south of Altoona, on branches of the Pennsylvania Railroad (Map: Pennsylvania, E 6). Coal, iron ore, ganister, and limestone are found in the vicinity; and the borough has foundries and machine shops, a silk mill, car works and classification yards. The borough owns its water works. On the outskirts of Hollidaysburg are the Ant Hill Woods, famous for their colony of ants. Pop., 1900, 2998; 1910, 3734.

HOL'LINS, ALFRED (1865–). An English musician, born at Hull. He was blind from his birth and at nine years of age entered the Wilberforce Institution for the Blind at York, where he remained three years, studying music under William Barnby. In 1878 he entered the Royal Normal College for the Blind at Upper Norwood, making the piano his chief study, his teacher being Fritz Hartvigson. Through the kindness of the principal of the institution he secured organ lessons from E. J. Hopkins, who took a special interest in him, and who helped him considerably in the mastery of orchestration, which was later a conspicuous feature of his compositions. At the age of 16 he had given recitals before the courts of England and Germany and was a special favorite with Queen Victoria and the Empress Frederick of Germany. In furtherance of his equipment as a pianist he studied piano with Von Bülow in Berlin and in 1887 became a pupil at the Raff Conservatory, studying in addition under Max Schwartz. He visited America twice—in 1886 as a member of Dr. Campbell's party and in 1888 as a concert organist. His most important engagement was as organist of United Free St. George's Church, Edinburgh. His organ compositions are universally known and are very popular in the United States. The following are among his better-known works: two concert overtures (in C major and C minor); andante in D; grand *chœur* in G minor; two preludes; intermezzo in D flat; and a nocturne in B flat.

HOLLINS, GEORGE NICHOLS (1799–1878). An American naval officer. A native of Baltimore, Md., he was midshipman at the age of 15, and, being aboard a frigate taken by the English, he was held a prisoner by them till the end of the War of 1812. Ten years later he had exchanged the naval for the merchant service, and by 1844 was captain of an armed vessel which he subsequently employed to enforce the rights of Americans living in Nicaragua, thereby causing international complications with Great Britain. This was in 1855. At the outbreak of the Civil War he sided with the Confederates

and as a commodore in their navy rendered important service.

HOL'LIS, Henry French (1869–). An American legislator. He was born in Concord, N. H., and graduated from Harvard University in 1892. In the following year he took up the practice of law at Concord. He became a member of the Democratic State Central Committee in 1900 and was Democratic candidate for Congress in 1900 and for Governor in 1902 and 1904. He was elected United States Senator from New Hampshire for the term 1913–19.

HOLLIS, Ira Nelson (1856–). An American marine engineer and educator, born at Mooresville, Ind. He graduated from the United States Naval Academy in 1878, rose to the rank of assistant engineer in the United States navy in 1888, but resigned in 1893. Thereafter until 1913 he was professor of engineering at Harvard University, and in the latter year he became president of Worcester Polytechnic Institute. He received the honorary degrees of A.M. from Harvard in 1899, L.H.D. from Union College in 1899, and Sc.D from the University of Pittsburgh in 1912. Besides contributions to engineering magazines, he is author of *War College Lectures on Naval Ships* (1892) and a history of *The Frigate Constitution* (1900).

HOL'LISTER. A town and the county seat of San Benito Co., Cal., 94 miles southeast of San Francisco, on the Southern Pacific Railroad (Map: California, D 6). It is the centre of farming, fruit-growing, dairying, and stock-raising interests. The town has a hospital and a Carnegie library. Quicksilver is found in the vicinity. Pop., 1900, 1315; 1910, 2308.

HOLLISTER, Gideon Hiram (1817–81). An American author, born in Washington, Conn. After graduating at Yale (1840), he studied and practiced law in Litchfield, with digressions to other towns in Connecticut and with a year in Haiti as United States Minister (1868–69). In 1880 he was sent to Congress. His literary work consists of an historical novel, *Mount Hope* (1851), *History of Connecticut* (2 vols., 1854), *Thomas à Becket: A Tragedy, and Other Poems* (1866), and *Kinley Hollow* (1882), published posthumously.

HOLLMANN, hŏl'mȧn, Friedrich (1842–1913). A German admiral, born in Berlin. He entered the Prussian navy in 1857, served in the Asiatic expedition of 1859–62, commanded a gunboat in 1864, and, after service on schoolship and at the Kiel Naval Academy, fought at the battle of Grille in the Franco-Prussian War. His advance was rapid; in 1889 he arranged the trip of the German Emperor and Empress to Greece and Turkey; and in the following year he was made Secretary of State for the Navy—a post which he held until June, 1897, when he resigned because of his inability to pass the naval budget. He had been promoted to admiral in 1896. Since 1904 he had been a member of the Prussian House of Lords.

HOLLMANN, Josef (1852–). A Dutch violoncellist, born at Maestricht. After having been prepared in his native town by Keller, he entered the Brussels Conservatory, where he studied the cello with Servais and composition with Fétis. Although he left the institution as winner of the first prize, he went to Paris for further study under Jacquard and Savart. His first tour of Scandinavia established his reputation, which grew steadily on his subsequent tours of Germany, the Netherlands, France, and England. Twice he visited the United States, in 1892 and 1906, both times with most gratifying results. His playing is characterized by a fiery energy artistically restrained, and an extremely beautiful tone of great power and mellowness. He published a number of compositions for his instrument.

HOL'LOWAY, Josephus Flavius (1825–96). An American mechanical engineer, born at Uniontown, Ohio. From 1865 to 1872 he was superintendent and engineer and thereafter, until 1886, president of the Cuyahoga (Ohio) Steam Furnace Company, manufacturers of locomotive and marine engines. He then became consulting engineer of the H. R. Worthington firm of New York City, and in 1895 took up the same duties with the Snow Steam Pump Works of Buffalo. He patented several improvements in marine engines and in pumping machinery. In 1885 he served as president of the American Society of Mechanical Engineers.

HOL'LOWAY, Laura Carter (afterward Mrs. Langford) (1848–). An American author, twice married, whose maiden name was Carter. She was born in Nashville, Tenn., and was educated at the Female Academy there. For 12 years she was associate editor of the Brooklyn *Daily Eagle*. She was president of the Seidl Musical Society in Brooklyn and a collaborator with Anton Seidl himself in the musical work for the *Standard Dictionary*. She published: *Ladies of the White House* (1870); *An Hour with Charlotte Brontë* (1883); *The Mothers of Great Men and Women* (1884); *Chinese Gordon* (1885); *Adelaide Neilson: A Biography* (1885); *The Buddhist Diet Book* (1887); *Atma Fairy Stories* (1903).

HOLLOWAY COLLEGE, The Royal. An institution founded in 1883 at Mount Lee, Egham, Surrey, England, by Thomas Holloway, for the purpose of supplying higher education to women, particularly of the middle class. The building is very handsome, in the French Renaissance style, and was opened by Queen Victoria in 1886. Seventeen governors look after the management. Accommodation is provided for some 200 students, who are prepared for the examinations of the University of London in the faculties of arts and science.

HOL'LOW WARE. There are two classes of iron goods so called, viz., cast-iron hollow ware and wrought-iron hollow ware. Both kinds include cooking and other vessels for domestic use, which have in large part displaced earthenware, and comprise also some other articles, such as coffee mills, which are molded and finished in a similar way. Wrought-iron hollow ware is largely made by the process of stamping (see Dies and Die Sinking), though it may be forged, drawn, or planed. Hollow ware is finished in three ways; some of it is enameled, some tinned, and some of it is left black, or untinned. See Enamel.

HOLLS, hŏlz, George Frederick William (1857–1903). An American lawyer. He was born at Zelienople, Pa., graduated at Columbia (1878) and at Columbia Law School (1880), and gained a large German-American practice in New York City. He was a Republican delegate at large to the State Constitutional Convention in 1894 and was commissioner on government of cities of the third class (1895). During the Spanish-American War he did much in Germany to better feeling towards the United States and

in the following year was appointed secretary and counsel of the American delegation to the Peace Conference at The Hague. In the treaty there concluded Holls wrote the article "Special Mediation." He wrote: *Franz Lieber* (1884, in German); *Sancta Sophia and Troitza* (1888), a sketch of travel in Russia and the East; *Compulsory Voting* (1891); *The Peace Conference at The Hague and its Bearings on International Law and Polity* (1900).

HOL'LY (older *hollen*, from AS. *holen;* connected with Ir. *cuilenn*, Gael. *cuilioun*, Welsh, *celyn*, holly, and also with OHG. *hulis, huls*, Ger. *Hülse*, holly, Skt. *śala*, staff), *Ilex*. A genus of trees and shrubs of the family Aquifoliaceæ, chiefly natives of temperate climates, with evergreen, leathery, shining, and generally spinous leaves. The common holly (*Ilex aquifolium*), the only European species, and a native also of some parts of Asia, is a well-known ornament of parks and shrubberies in Great Britain, where it sometimes attains a height of 50 feet upon suitably light soils. Numerous varieties of holly are in cultivation, which exhibit great diversity in the leaves. The flowers of the holly are whitish, axillary, nearly umbellate; the fruit small, scarlet, rarely yellow or white. Medicinal properties are attributed to the leaves, berries, and roots. Birdlime is made from the inner bark. The wood is almost as white as ivory, very hard and fine-grained, and is used by cabinetmakers, turners, musical-instrument makers, etc., and sometimes for wood engraving. The holly is often planted for hedges, since it bears clipping well. The name "holly" is said to be derived from the use of the branches and berries to decorate churches at Christmas, from which the tree was called holy tree. Numerous species of holly are found in North America, most of them in swampy situations; in South America, Nepal, Japan, and other parts of the world. Some of these have been introduced as ornamental trees and shrubs. Maté (q.v.), or Paraguay tea, is the leaf of a South American

HOLLY (*Ilex aquifolium*).

species of holly (*Ilex paraguensis*). In the United States there are a dozen species of *Ilex*, the finest of which, American holly (*Ilex opaca*), is a small tree, 20 to 40 feet tall, extensively used as a Christmas decoration, though the leaves are less glossy and the berries not so bright a red as the European species. *Ilex vomitoria* is a shrub which occurs from Virginia southward. Its leaves are used for tea, and it furnished the "black drink" of the North Carolina Indians.

HOL'LYHOCK (ME. *holihoc*, holy hock, from *holi*, AS. *hālig*, holy + *hoc*, AS. *hoc*, leaf), *Althæa rosea*. A plant of the family Malvaceæ, native of India and south of Europe, etc., and common in gardens throughout the world. It

HOLLYHOCK (*Althæa rosea*).

has a tall, straight, hairy, unbranched stem, 4 to 15 feet tall; heart-shaped, crenate, wrinkled, five to seven angled leaves, which diminish upward into bracts; and large axillary flowers, almost without stalks, which on the upper part of the stem form a spike; the petals are hairy at their bases. Its flowers vary much in color, and double and semidouble varieties are common. It is an ornamental autumnal flower, which continues till frost. It is propagated either by seed or cuttings.

The plant is frequently attacked by a fungus, a rust, *Puccinia malvacearum*, which has greatly reduced its culture in many parts of the United States and Europe. Its presence may be first noticed in May or June by small yellow spots on the leaves and stems. Soon the leaves become dry and dead, as though scorched by fire. Any standard fungicide applied frequently from early spring until flowering time will keep the disease in check. Washing the leaves with a solution of two tablespoonfuls of potassium permanganate in a quart of water is a common remedy employed in Europe. The hollyhock is sometimes attacked by blight (*Colletotrichum malvarum*), and a leaf-spot disease (*Cercospora althæina*), both of which may be prevented by the use of some good fungicide (q.v.).

HOL'LY SPRINGS. A city and the county seat of Marshall Co., Miss., 45 miles southeast of Memphis, Tenn., on the Kansas City, Memphis, and Birmingham, and the Illinois Central railroads (Map: Mississippi, F 1). It has a public library, Rust University for negroes (Methodist Episcopal), opened in 1868, the Mississippi Synodical College for young ladies, the Holly Springs Normal Institute, and the experiment station of the Mississippi Agricultural and Mechanical College. The city is situated in a fertile stock-raising and dairying region and is principally engaged in the cotton trade and has a cotton compress and gin, a cottonseed-oil mill, bottling works, an ice factory, stone-jug fac-

tories, etc. Holly Springs is governed under a charter of 1896, which provides for a mayor, elected biennially, and a city council. The water works and electric-light plant are owned and operated by the municipality. In December, 1862, during the Civil War, General Grant established here a depot of supplies, protected by a small garrison under Col. R. C. Murphy, preparatory to moving forward against Vicksburg. On December 20 the Confederate General Van Dorn by a rapid movement captured the post, taking about 1500 prisoners, and destroyed supplies valued by Grant at $400,000. This, together with a raid by Forrest into Tennessee, forced Grant to abandon for a time his forward movement. Pop., 1890, 2246; 1900, 2815; 1910, 2192.

HOLM, hôlm, Gustav Frederik (1849–). A Danish naval officer and Arctic explorer, born at Copenhagen. He was made commander in the navy in 1899, was chief of the hydrographic bureau from 1899 to 1909, and became director of pilots in 1912. A member of the Royal Greenland Commission after 1896, he became distinguished for his explorations, which greatly enlarged our knowledge, especially of the east coast of Greenland and of its natives. Among many explorations he investigated archæologically the Norse ruins of the Julianehaab district. From 1883 to 1885 he explored, with Garde (q.v.), the east coast of Christian IX Land, as far as 66° 8′ N. Holm discovered 11 hitherto unknown Eskimo communities, numbering 431 inhabitants, and five great ice fiords. As a result, Denmark established a missionary station and commercial post at Angmagsalik, 65° 37′ N., thus saving from annihilation the slowly vanishing natives of that coast. For his explorations he received gold medals from the Société de Géographie, Paris (1891), and the Danish Geographical Society (1895), and the Danish Order of Merit (1909). He wrote, with Garde, *Den danske Konebaads-Expedition til Grønlands Ostkyst 1883–85* (1887) and *Om de geografiske Forhold i dansk Ostgrönland* (1889). Consult *Meddelelser om Grönland,* ii, vi, ix, x, xvi (Copenhagen, 1879).

HOLM, hôlm, Peter Edward (1833–). A Danish historian, born at Copenhagen. He studied philology at the University of Copenhagen and, after receiving his doctor's degree there, became lecturer in 1865 and from 1868 to 1899 was professor of history. In 1875 he published *Danmark-Norges udenrigske Historie 1791–1807* in two volumes. He planned to write the history of Denmark and Norway from 1720 to 1814 and published as introduction *Danmark-Norges indre Historie, 1660–1720* (2 vols., 1885–86), and up to 1914 seven volumes had appeared of his *Danmark-Norges Historie fra den store nordiske Krigs Afslutning til Rigernes Adskillelse.* This work is monumental in Danish historical writing. Holm's great historical learning and broad culture, his practical administrative knowledge, his good sense and calm estimation of persons and actions, and his strict impartiality to both kingdoms fitted him eminently to be the historian of the period he treats. His *Danmarks Riges Historie* (1903) is an abbreviation of his history of the period 1699–1814. Holm was elected an officer or member of many scientific societies.

HOLM, hōm, Saxe. The nom de plume signed to a series of short stories, first published in *Scribner's Monthly Magazine* and then in a volume (New York, 1873; 2d series, 1878). They have been attributed to Mrs. H. M. F. Jackson (at the time of publication, Mrs. Helen Hunt).

HOLM, hôlm (Herman) Theodor (1854–). An American botanist. He was born at Copenhagen, Denmark, and graduated from the University of Copenhagen in 1880. He was botanist and zoölogist of the Danish North Pole Expedition in 1882–83 and made explorations in west Greenland for his government in 1884–86. In 1893, after five years of residence in the United States, he became an American citizen. He served as assistant botanist of the United States National Museum in 1888–93 and of the United States Department of Agriculture in 1893–96, and in 1896–99 he made investigations of the high Alpine flora of Colorado. He is author of several papers on Arctic plants and on the anatomy and morphology of phanerogams. In 1902 he received an honorary Ph.D. from the Catholic University of America.

HOLMAN, hōl'mən, Joseph George (1764–1817). An English actor and dramatist. Educated in London and at Oxford, he made his début, when 20 years of age, as Romeo at Covent Garden, and continued to present Shakespearean and other rôles there till the end of the eighteenth century. In 1806 he played in Dublin and then at the Haymarket, London. He went in 1812 to America, where he had the support of his daughter in performances at New York City and Philadelphia. He was successful as a writer of comedies and comic operas, such as *Abroad and at Home* (1796), *Red Cross Knights* (1799), *Votary of Wealth* (1799), and *What a Blunder* (1800).

HOLMAN, Silas Whitcomb (1856–1900). An American physicist, born at Harvard, Mass. He graduated at Massachusetts Institute of Technology in 1876, was appointed an instructor in that institution in 1881, assistant professor in 1882, associate professor in 1885, and professor in 1893. In 1897 ill health and failing eyesight compelled him to retire with the title of professor emeritus. He was particularly interested in the methods of laboratory instruction and published investigations on *The Effect of Temperature on the Viscosity of Air* (1876) and on *The Viscosity of Gases;* and other works, including *Physical Laboratory Notes* (1885–95), *Computation Rules and Logarithms* (1896), and *Matter, Energy, Force, and Work* (1898).

HOLMAN, William Steele (1822–97). An American jurist and politician. He was born in Dearborn Co., Ind., and was educated at Franklin College, became a judge of probate at the age of 21, was elected district attorney of his county in 1846, and in 1851 was sent to the Legislature. With the exception of eight years he was a Democratic Representative in Congress from 1859 till his death, in 1897, and from his opposition to extravagant appropriations was known as "the great objector" and "the watchdog of the Treasury."

HOLMBOE, hôlm'bō, Christopher Andreas (1796–1882). A Norwegian philologist and numismatist, brother of Bernt Michael Holmboe (1795–1850), the mathematician. He was born at Vang, studied at Christiania, and made a specialty of Oriental languages, especially Persian, under De Sacy in Paris (1821–22). In 1822 he became lecturer in Oriental languages at Christiania, and in 1825 professor. Besides being a pioneer in philology, he took an active interest in education. He founded the *Norske Universitets og Skole-Annaler* (1834–40). His more im-

portant works are: *De Re Prisca Monetaria Norvegiæ* (1841); *Sanskrit og Oldnorsk* (1846); *Det Oldnorske Verbum* (1848); *Det Norske Sprogs väsentligste Ordforraad, sammenlignet med Sanskrit* (1852); *Norsk og Keltisk* (1854); *Bibelsk Real-Ordbok* (1868).

HOLMBY (hōm'bĭ) **HOUSE.** A mansion near Northampton, England, erected by Sir Christopher Hatton during the reign of Elizabeth and later purchased by James I. It was here that Charles I was imprisoned by the Parliamentary commissioners from the time he was surrendered by the Scots until removed to Newmarket by Cornet Joyce (February–June, 1647). Five years thereafter the house was dismantled. See Gardiner, *History of the Great Civil War,* vol. iii (new ed., London, 1893).

HOLMES, hōmz, ABIEL (1763–1837). An American Congregational clergyman and historian, born at Woodstock, Conn. He graduated at Yale in 1783 and for a time was a tutor and a student of theology there. His first pastorate was at Midway, Ga., in a district settled largely by New Englanders. There he remained from 1785 till 1791. In 1792 he accepted a call to the First Congregational Church of Cambridge, Mass., where he continued during the next 40 years. His first wife was a daughter of President Stiles, of Yale College; his second was the daughter of Oliver Wendell and became the mother of Oliver Wendell Holmes (q.v.). His publications include: *A Life of President Stiles* (1798); *Annals of America* (1805; new ed., 1829, bringing the narrative down to 1826)—his best-known work, characterized by the minutest accuracy and still standard for the period covered; *Historical Sketch of the English Translation of the Bible* (1815); and a number of sermons, addresses, and memoirs.

HOLMÈS, ō'mĕs', AUGUSTA MARY ANNE (1847–1903). A French composer, born in Paris of English-Irish parents. Her father was Capt. Dalkeith Holmes, of the British army, and her mother was a member of an old Hampshire (England) family. She studied under Lambert, Klosé, and César Franck, and, although a brilliant pianist (in her childhood regarded as a prodigy), she attained distinction entirely through her compositions. In 1879 she won the third prize with her *Lutèce,* in an open competition instituted by the city of Paris. Her other important compositions are a psalm, *In exitu* (1873); the operas *Héro et Léandre* (1874) and *La montagne noire* (1895); an *Andante pastoral* (1877); the symphonies *Les Argonautes* (1880), *Irlande* (1882), and *Pologne* (1883); and over 100 songs, besides other orchestral works. Two more operas, *Astarte* and *Lancelot du Lac,* she left in manuscript. Consult P. Barillon-Bauché, *Augusta Holmès et la femme compositeur* (Paris, 1913).

HOLMES, hōmz, E(LIAS) BURTON (1870–). An American traveler and lecturer. He was born in Chicago, where he was educated at the Allen Academy and at the Harvard School, and where he began his lecture work in 1890. With the exception of Australia, New Zealand, and South Africa, he traveled in nearly every country in the world in gathering material for his lectures; these he delivered in all the leading American cities and in several foreign countries. He is author of *The Burton Holmes Travelogues* (12 vols., 1908).

HOLMES, GEORGE FREDERICK (1820–97). An American educator. He was born in British Guiana, was educated at Durham University, England, came to America in 1838, and taught in Virginia, South Carolina, and Georgia. He was for a time one of the editors of the *Southern Quarterly Review* and in 1846 became first president of the University of Mississippi. From 1847 to 1857 he was professor of history, political economy, and international law in William and Mary College. From that time until his death he was professor of history and literature in the University of Virginia. He prepared a series of textbooks for the use of schools in the Southern States, in which the sentiments and selections were made with reference to the justification of slavery.

HOLMES, JOHN HAYNES (1879–). An American Unitarian clergyman, born in Philadelphia. He graduated from Harvard University in 1902 and from Harvard Divinity School in 1904. He then became minister of the Third Religious Society (Unitarian) of Dorchester, Mass., and in 1907 he succeeded Minot J. Savage as pastor of the church of the Messiah, New York City. From 1908 to 1911, as president of the Unitarian Fellowship for Social Justice, he was especially active in urging reforms. He became associate editor of *Unity,* Chicago, and of the *Unitarian Advance,* New York; and is author of *The Revolutionary Function of the Modern Church* (1912) and *Marriage and Divorce* (1913).

HOLMES, JOSEPH AUSTIN (1859–1915). An American geologist, born at Laurens, S. C. In 1881 he graduated from Cornell University. From 1881 to 1891 he was professor of geology and natural history at the University of North Carolina, where he afterward served as lecturer. He was State geologist of North Carolina from 1891 to 1904; had charge of the United States Geological Survey laboratories for testing fuels and structural materials at St. Louis, Mo., in 1904–07 and at Pittsburgh, Pa., after 1908; investigated mine accidents in 1907–10 for the government; and when the Bureau of Mines was organized under the Department of the Interior (1910), he became its director. In 1904 he was chief of the department of mines and metallurgy at the St. Louis Exposition, and he wrote on mining technology, on mine explosions, and on more efficient and safe methods of mining.

HOLMES, MARY JANE (c.1839–1907). An American novelist. Her maiden name was Hawes, and she was born in Brookfield, Mass., but moved at her marriage to Versailles, Ky., and afterward to Brockport, N. Y. She was at first a district school-teacher, and the didactic tendency is perceptible throughout her works, which were favorites of the young person of a past generation and, indeed, are still current. Her first novel, *Tempest and Sunshine* (1854), a picture of Southern society, was followed by a book almost every year, and the total circulation of her many volumes has exceeded two millions. Mrs. Holmes was a novelist of domestic life, free from sensationalism, and, in the moral tone of her stories, quite unobjectionable.

HOLMES, NATHANIEL (1815–1901). An American jurist and author, born in Peterboro, N. H. He graduated at Harvard, began legal practice in 1839 at St. Louis, and was judge of the Missouri Supreme Court from 1865 to 1868. From that time until 1872 he was Royall professor of law at Harvard. In *The Authorship of Shakespeare* (1866; enlarged ed., 1886) he credits Francis Bacon with the dramas, and

he published also *Realistic Idealism in Philosophy Itself* (2 vols., 1888) and an *Historical Address* (1890).

HOLMES, Oliver Wendell (1809–94). An American man of letters, born at Cambridge, Mass., Aug. 29, 1809, son of the Rev. Abiel Holmes (q.v.), a minister of Calvinistic orthodoxy, who withstood the Unitarianism which was then gaining ground, and to which his son was later to give his adherence. Holmes was sent to Phillips Academy, Andover, Mass., for his preliminary education, and graduated from Harvard College in 1829. He at once entered the Law School of that institution, but, finding the law uncongenial, he gave it up for medicine. While a law student, he wrote and published in the Boston *Advertiser*, in 1830, his well-known and stirring verses, "Old Ironsides," which were an effective and popular protest against the proposed breaking up of the famous frigate *Constitution*. After three years in Harvard Medical School, Holmes in 1833 sailed for Europe, where he studied two years, chiefly in Paris, and on his return began the practice of medicine in Boston in 1836. The same year witnessed the publication of his first volume of poems. In 1838 he was appointed to the professorship of anatomy at Dartmouth College, a post which he held for two years. Thenceforth he passed his life almost wholly in Boston, with which city his name became very intimately associated. On June 15, 1840, he married Miss Amelia Lee Jackson, of Boston. His only important contribution to medical science was made in 1843, when he published his essay on the *Contagiousness of Puerperal Fever*, though he wrote numerous other scientific papers. From 1847 to 1882 he was Parkman professor of anatomy and physiology in Harvard Medical School. He was, however, not really eminent in his profession. His literary gift was marked, and he was less renowned in Boston as a practitioner than as a writer of very facile, witty verse, collections of which appeared from time to time until *Before the Curfew*, the last of them, was published in 1888.

Until 1857, however, his reputation was almost wholly local. The establishment in that year of the *Atlantic Monthly*, under the editorship of Lowell, brought him a national and almost world-wide vogue through the serial publication in that magazine of *The Autocrat of the Breakfast Table*, which appeared in book form in 1858. These delightfully egotistical talks, full of brilliant wit and buoyant seriousness, essentially of New England and Boston, had had their origin in two forgotten essays by Holmes in the *New England Magazine* in 1833. The success of *The Autocrat* was remarkable, and Holmes has been likened to almost every famous essayist from Montaigne to Lamb. Among orthodox Calvinists of the day the sketches met with disfavor, since the ideas and the manner were those of an essential rationalist. They were followed in the next year by a series scarcely less delightful, *The Professor at the Breakfast Table* (pub. 1860 in book form), and after a lapse of more than a decade, in 1871–72, by the third and last volume of the series, *The Poet at the Breakfast Table*. *The Autocrat*, however, is the best, most original, and most popular of the works of Holmes, who is often called the "Autocrat."

In 1861 Holmes published his first novel, *Elsie Venner*. Though rather formless and uneven in quality and inartistic in method, it is interesting and full of power. More commonplace in idea than *Elsie Venner*, but equally interesting in its delineation, often rather contemptuous, of New England character, was *The Guardian Angel* (1867). In the interval between these two novels appeared *Songs in Many Keys* (1861) and *Humorous Poems* (1865) and a volume of prose, *Soundings from the Atlantic* (1863). His remaining literary work contained nothing very new or striking. The chief titles are: *Mechanism in Thought and Morals* (1871); *Songs of Many Seasons* (1874); *John Lothrop Motley* (1878), a memoir; *The School-Boy* (1878); *The Iron Gate, and Other Poems* (1880); *Pages from an Old Volume of Life* (1883); *Medical Essays* (1883); *Ralph Waldo Emerson* (1884), a life; *A Mortal Antipathy* (1885), his last novel, inferior to the two former; *The New Portfolio* (1885–86), in the *Atlantic; Our Hundred Days in Europe* (1887), an account of a voyage taken with his wife and daughter; *Before the Curfew, and Other Poems* (1888); and *Over the Tea-Cups* (1890); in the vein of *The Autocrat*. His death occurred in his eighty-sixth year, in Boston, Oct. 7, 1894.

Dr. Holmes was slight in stature and fastidious as to his personal appearance. In temper he was humane and kindly, particularly gracious to his numerous correspondents when confident of their sincerity, and genial in all his writing. His social accomplishments were unusual; he is said to have been the best talker in Boston. His style, at its best, is the style of spoken discourse—light, intimate, and winning, but not flippant. His verse, which is mainly of an occasional character, such as poems read at reunions of his college class or scattered throughout the pages of *The Autocrat*, is, like that prose work, sparkling with wit, or a graceful compound of gravity and humor. He is a prince among writers of *vers de société*. Among the best known of his poems are "Old Ironsides," "The Chambered Nautilus," "The Last Leaf," "Dorothy Q.," "The Voiceless," "The Deacon's Masterpiece; or, the Wonderful One-Hoss Shay."

Bibliography. Consult J. T. Morse, *Life and Letters of Holmes*, vols. xiv and xv of the *Collected Works;* T. W. Higginson, *Old Cambridge* (1899); Howells, *My Literary Friends and Acquaintance* (1899); S. M. Crothers, *O. W. Holmes* (1909). The standard edition of his works is the Riverside, in 15 volumes (Boston, 1892). A complete edition of his works in 14 volumes was published in New York (1913).

HOLMES, Oliver Wendell, Jr. (1841–). An American jurist, son of Dr. O. W. Holmes. He was born in Boston, was educated at Harvard, served in the Civil War and was three times wounded—at Ball's Bluff, at Antietam, and at Fredericksburg. He practiced law in Boston, edited the *American Law Review* (1870–73), became professor of law at Harvard in 1882, and in the same year was appointed a member of the Massachusetts Supreme Court, of which he became Chief Justice in 1899. In 1902 he was named to succeed Justice Gray in the United States Supreme Court, where his profound legal learning, his sound judgment and humor, and his gifts of literary expression have given him a position of great influence. Holmes edited the twelfth edition of Kent's *Commentaries* and published his own Lowell Institute lectures, *The Common Law* (Boston,

1881), a notable contribution to our legal history. He has also published a volume of *Speeches* (Boston, 1913).

HOLMES, Sherlock. See Doyle, Sir Arthur Conan.

HOLMES, Theophilus Hunter (1804–80). An American soldier, prominent on the Confederate side in the Civil War. He was born in Sampson Co., N. C., graduated at West Point in 1829, served in the Florida War and the War with Mexico, and at the outbreak of the Civil War was acting as superintendent of the general recruiting service, with the rank of major. In April, 1861, he resigned his commission in the United States army and for a time was engaged in organizing the State troops of North Carolina. He became a brigadier general in the Confederate service soon after the secession of his State, commanded the Confederates in the engagement at Aquia Creek, was promoted to be major general, and from September, 1862, to March, 1863, was in command of the Trans-Mississippi Department, attaining the rank of lieutenant general. On July 3, 1863, he made an unsuccessful attack on Helena, Ark. In 1864 his health failed, and he was assigned to command the reserve forces in North Carolina. After the war he retired to his farm near Fayetteville, N. C.

HOLMES, T(homas) Rice (Edward) (1855–). A British historian, born in County Westmeath, Ireland. He was educated at Christ Church, Oxford, and became a schoolmaster, teaching in St. Paul's School from 1886 to 1909 and then receiving a civil-list pension. He wrote an excellent *History of the Indian Mutiny* (1883; 5th ed., 1898) and *Four Famous Soldiers* (1889), but is even better known for his studies of Julius Cæsar's campaigns in Gaul and Britain—*Cæsar's Conquest of Gaul* (1899; 2d ed., 1911), *Ancient Britain and the Invasions of Julius Cæsar* (1907), and an English version of Cæsar's *Commentaries on the Gallic War* (1908). Parts of the works on Cæsar's campaigns in Gaul and Britain were translated into German as *Cäsars Feldzüge in Gallien und Britannien*, by W. Schott and Felix Rosenberg (Leipzig, 1913). Holmes also edited, with Introduction and Notes, Cæsar's *Commentarii de Bello Gallico* (Oxford, 1914).

HOLMES, William Henry (1846–). An American anthropologist and archæologist. He was born near Cadiz, Ohio, and after graduating at the McNeely Normal College (1870) was assistant on the United States Geological Survey (1872–80). During that period he accompanied Dr. F. V. Hayden's explorations in the Rocky Mountain region and superintended the survey of the San Juan territory until the reorganization of the survey (1880), when he was appointed geologist in charge of the department of illustrations. He had charge of the archæological explorations of the Bureau of Ethnology in 1889–93, in 1894–98 was professor of archæologic geology at the University of Chicago, from 1898 to 1902 and again after 1910 was curator of the United States National Museum, and was chief of the Bureau of American Ethnology from 1902 to 1909. He was president of the American Anthropological Association, and of the National Society of Fine Arts in 1909. In 1905 he became a member of the National Academy of Sciences. He edited geological publications, including Hayden's *Atlas of Colorado* and the eleventh and twelfth reports of the Geological Survey, and published: *Archæological Studies among the Ancient Cities of Mexico* (1895); *Stone Implements of the Potomac-Chesapeake Tidewater Province* (1897); and papers on aboriginal American art.

HOLMGREN, hōlm'grān, Alarik Frithiof (1831–97). A Swedish physiologist, born in Vestra Ny Socken, Ostergötland, and educated at the University of Upsala, at the University of Berlin under Du Bois-Reymond and Helmholtz, and under Brücke and Ludwig in Vienna. In 1864 he became professor of physiology at Upsala, the first chair in that subject in Sweden, and soon afterward founded a physiological laboratory. His medical studies were mostly in the field of ophthalmology, and he was an authority on color blindness; his works on this subject, "Om den medfödda färgblindhetens diagnostik och teori," in *Nordisk medicinsk Arkiv* (1874), and *Om färgblindheten i dess förhållande till järnvägstrafiken och sjöväsenet* (1877), have been translated into many languages. Holmgren was a firm believer in the hygienic value of Swedish gymnastics. He edited the *Skandinavisches Archiv für Physiologie* (1889 to his death, 7 vols.).—His wife, Ann Margreta Tersmeden (1850–), a strong advocate of education, wrote, under the pseudonym Märta Bolle, the novels *Fru Stråhle* (1894) and *När Riddar Alf suckar* (2 vols., 1896).—His brother, August Emil Algot Holmgren (1829–88), was a naturalist of much ability. He wrote: *Ichneumonologia Suecica* (1864); *Handbok i Zoologi* (1865–71); *Om Småfoglarne* (1869); *Om skadeinsekter inomhus* (1879), besides other works on entomology and ornithology.

HOLMIA, hōl'mĭ-ȧ. A characteristic genus of trilobites found in the Lower Cambrian rocks. It possesses a cephalon very much like *Olenellus*, but 16 free thoracic segments and a telson that is composed of a small plate without apparent segmental divisions, while the pleura of the thorax end in rounded spines. It occurs in Scandinavia and America.

HOLOCAINE, hōl'ō-kā'ĭn. A drug used as a local anæsthetic, especially in operations upon the eye. It is slightly more irritating than cocaine, but has germicidal properties. It has a greater effect on inflamed tissues than cocaine and does not produce dilatation of the pupil. The drug has been employed successfully in suppurative conditions of the cornea.

HOL'OCEPH'ALI (Neo-Lat. nom. pl., from Gk. ὅλος, *holos*, entire + κεφαλή, *kephalē*, head). A subclass of cartilaginous fishes, including the single living family Chimæridæ. The number of living genera is small, but in the remote past they were a dominant group, numerous in species. See Chimæra.

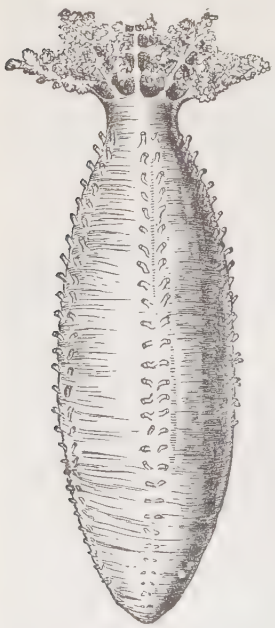
HOL'OGRAPH (Lat. *holographus*, from Gk. ὁλόγραφος, written entirely by the author's hand, from ὅλος, *holos*, entire + γράφειν, *graphein*, to write). A deed or writing wholly in the handwriting of the maker or author. In those countries which derive their legal systems mainly from the civil, or Roman, law, a holographic writing is deemed to prove itself; i.e., proof of the handwriting of the person whose instrument it purports to be is in itself sufficient to authenticate the document, without formal attestation by subscribing witnesses, notarial seals, and the like. This is true of Scotland, Quebec, and Louisiana, as well as of most continental states. In the common-law system, however, of England

and America no superior validity attaches to holographic writings, and they require the same formal attestation and the same proof of validity as other writings. See EVIDENCE; HANDWRITING, and the authorities there cited.

HOLOPTYCHIUS, hŏl'ŏp-tĭk'ĭ-ŭs (Neo-Lat., from Gk. ὅλος, *holos*, entire + πτυχή, *ptychē*, πτύξ, *ptyx*, fold). A genus of fossil ganoid fish of the order Crossopterygii, remains of which are found commonly in the Catskill sandstones of North America and in the Old Red Sandstone of the British Devonian system. Some of the species were 30 inches long, with rounded tapering bodies and heterocercal tails. There are two dorsal fins, a pair of long, stout, pointed pectoral fins, and short pelvic and anal fins. The body was covered with large, rounded (cycloid) scales, the surfaces of which are marked by prominent ridges of ganoin, a structureless enamel. These scales, of gray or bluish-white color and 1 to 3 inches in diameter, are very abundant in some parts of the Catskill formation in New York and Pennsylvania. See CATSKILL FORMATION; DEVONIAN SYSTEM; GANOIDEI; FOSSIL.

HOLOSTEI, hŏl-ŏs'tē-ī (Neo-Lat. nom. pl., from Gk. ὅλος, *holos*, entire + ὀστέον, *osteon*, bone). A group of bony ganoids, embracing the garpikes and bowfins. See GAR; BOWFIN.

HOL'OTHU'RIAN (from Lat. *holothurium*, Gk. ὁλοθούριον, water polyp; probably from ὅλος, *holos*, entire + θούριος, *thourios*, θοῦρος, *thouros*, impetuous). An echinoderm of the class Holothuroidea, easily recognized by the soft body, generally wormlike form, and circle of tentacles about the mouth. The madreporic plate is internal. Sea cucumber, sea squirt, and sea slug are some of the popular names of these animals, whose dried bodies form the Oriental trepang (q.v.). The class have not the covering of calcareous plates characteristic of the more typical Echinodermata, but a tough, leathery, muscular integument, in some genera strengthened by minute or rather large calcareous plates or hooks, very irritable and capable of great distention and contraction. Some of them are almost globose, some truly wormlike; but the same individual is often capable of extending itself to several times the length which it has in a state of repose. In locomotion the body is extended and contracted as in the annelids, and in the apodous forms this is the only means of locomotion, except such aid as is given by the tentacles. In the pedate forms the principal organs of locomotion, as in starfishes and sea urchins, are the ambulacral feet, of which there are sometimes five double rows, while sometimes they are distributed over the whole surface of the body; but some of the species have the feet developed only on the ventral side, and the body then presents an upper and an under surface. When the feet are furnished with suckers and are very extensible, they are called pedicels; but when they end in a blunt point and their function seems to be chiefly respiratory, or to serve as organs of touch, they are called papillæ. Sometimes all the feet are pedicels; sometimes there are pedicels on the ventral side and papillæ on the dorsal; rarely all the feet are papillæ. In two families the feet are completely wanting.



THE COMMON NORTH ATLANTIC HOLOTHURIAN.
(*Pentacta frondosa.*)

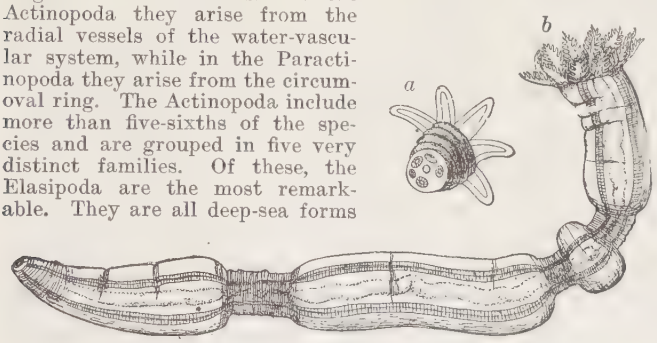
The radiate structure is apparent at the mouth, which is surrounded with tentacles, in number frequently a multiple of five, exhibiting considerable variety of form and capable of being more or less retracted. These tentacles vary in number from 8 to 30, but 10, 12, 15, and 20 are the usual numbers. They are very rarely short, simple, and unbranched; generally they are provided with branches, which may be arranged along the sides, clustered at the top, or irregularly scattered. The tentacles are very sensitive and are the most important sense organs of the animal; upon them are occasionally found special sense cups, supposed to be olfactory, or there may be at the base pigment eyes or positional organs. The nervous system is perfectly radiate in structure and very simple in organization. The mouth opens into an alimentary canal, usually much longer than the body and therefore more or less looped or coiled. An œsophagus, stomach, intestine, and cloaca can usually be distinguished. Arising from the cloaca, there are often two irregularly branched organs, known as the respiratory trees. These are hollow, very thin-walled, and capable of containing a great deal of water, which they receive through the anus. They are excretory and perhaps respiratory in function. In many species there arise from the wall of the cloaca, and extend into the body cavity of the animal, numerous glandular tubules, known as Cuvier's organs. These can be ejected from the anus as long, sticky threads, and thus seem to be protective. The blood system is well developed in most holothurians, especially along the intestine. In those forms which have a respiratory tree one branch of it is often closely bound up with a network of blood vessels, arising from the principal vessel on the intestine. The sexes are generally separate, hermaphrodite forms being quite unusual; but there is no external difference between male and female, save in a very few forms. The eggs are generally thrown out into the water, where they are fertilized; but several viviparous forms are known, in which the eggs fall into the body cavity of the mother, and the young develop there. In such cases the development is direct, but in species whose eggs develop in the water the young assume a peculiar larval form, known as the *auricularia*, from which the adults develop by a more or less complicated metamorphosis. Several cases are known of female holothurians which brood their eggs and care for the young.

The holothurians are capable of the most extraordinary regeneration of parts, even of the most important organs. In direct relation with this is their curious and noteworthy habit of evisceration. Many species when alarmed or irritated expel from the anal opening (or less

commonly the mouth) the viscera, either wholly or in part. They thus lose their entire digestive, reproductive, respiratory, and excretory systems and a large part of the blood system; but if not disturbed further, they will in the course of a few weeks replace all they lost with an entirely new set.

Holothurians are found in all seas, but particularly abound in the West Indies and between Asia and Australia. The largest American species is *Holothuria floridana*, which abounds just below low-water mark on the Florida reefs. Another large one, *Cucumaria frondosa*, inhabiting the North Atlantic and probably circumpolar, is about a foot in length and is yellowish brown. Many of the tropical species exhibit attractive colors and are among the creatures which make the bottom of the sea, particularly among coral reefs and islands, extraordinarily interesting.

The holothurians (Holothuroidea) are classified in two orders according to the point of origin of the tentacles. In the Actinopoda they arise from the radial vessels of the water-vascular system, while in the Paractinopoda they arise from the circumoval ring. The Actinopoda include more than five-sixths of the species and are grouped in five very distinct families. Of these, the Elasipoda are the most remarkable. They are all deep-sea forms and occur in all parts of the world. Many of them assume the most grotesque shapes, and some reach a large size. The Paractinopoda are all footless forms, of a single family. The best-known genus is *Synapta* containing more than 50 species, found in all parts of the world. Over 600 species of holothurians are known, varying in size from those ½ inch long up to certain tropical species 2 or even 3 feet in length. The colors vary from white, or almost transparent, to jet black; but as a rule the colors are more or less in correspondence with the bottom on which the animal lives. They chiefly feed on Foraminifera. Their movements are generally very sluggish, and they seem to have few enemies. All are harmless; but the only ones of any use to man are the larger forms, from which bêche de mer, or trepang, a great delicacy with the Chinese, is prepared.



SYNAPTA.
a, free-swimming young; *b*, adult synapta.

Consult: Lampert, *Die Seewalzen* (Wiesbaden, 1885); Ludwig, "Die Seewalzen," in Bronn, *Klassen und Ordnungen des Tierreichs: Echinodermen*, vol. i (Berlin, 1889–92), a standard work on holothurians; one of the best works in English is Théel, "Report on the Holothuroidea," in *Challenger Reports: Zoölogy*, vol. iv, part xiii, and vol. xiv, part xxxix (London, 1882 and 1886); Bather and others, "Echinoderma," in Lankester's *Treatise on Zoölogy* (ib., 1900).

HOL'OTHUROI'DEA. A class of echinoderms. See ECHINODERMATA; HOLOTHURIAN.

HOLROYD, hōl'roid, SIR CHARLES (1861–). An English painter and etcher, born at Leeds. He studied under Legros (q.v.) at the Slade School, University College, London, and for two years in Italy. On his return he was Legros's assistant for four years. He was the first keeper of the National Gallery of British Art (Tate Gallery) and in 1906 became director of the National Gallery. He was knighted in 1903. His best-known etchings are the "Monte Olivetto" series, the "Icarus" series, and the "Eve" series. He frequently exhibited at the Royal Academy, the Royal Institute of Painters in Water Colors, and the Royal Society of Painter Etchers. His book on *Michel Angelo* (London, 1903) is a scholarly production.

HOLST, hōlst, HANS PETER (1811–93). A Danish poet and novelist, born of humble parents at Copenhagen. From 1875 until his death he was dramaturgist for the Royal Theatre, Copenhagen. His first work to attract attention was a memorial poem on the death of Frederick VI (1839). This was followed by *Ude og Hjemme*, prose and verse (1843), and *Den lille Hornblæser* (1849; 9th ed., 1902), a collection of patriotic poems. He also wrote a number of plays, vaudevilles, and novels, and translated *Much Adó about Nothing* (1880). His *Udvalgte Skrifter*, in 6 vols., appeared in 1887–88. Consult T. Anentzen, *Danske Digtere i det 19 Aarhundrede* (Copenhagen, 1864).

HOLST, hōlst, HERMANN EDUARD VON (1841–1904). A German American historian and educator, born at Fellin in Livonia, of German parentage. He studied at Dorpat from 1860 to 1863 and at Heidelberg from 1863 to 1865 and became a tutor at St. Petersburg in 1866, but was excluded from the Russian dominions in the following year for publishing a pamphlet of which the Russian government disapproved, and emigrated to America. Settling in New York, he was an assistant editor of Schem's *Deutsch-amerikanisches Konversations-Lexikon*. He returned to Germany, was professor of history in the University of Strassburg from 1872 to 1874 and in the University of Freiburg from 1874 to 1892, visited America in 1878–79 and in 1884 served for a number of years in the Baden Diet, for the last two sessions as vice president, and in 1892 became head of the department of history in the newly founded University of Chicago. In 1900 ill health compelled his retirement, and he returned to his home in Freiburg. Von Holst's works are almost altogether on American topics. The chief defect in Von Holst's studies in American history is found in the fact that he regards the slavery question as dominant to the exclusion of all others. His *Verfassung und Demokratie der Vereinigten Staaten von Amerika* (5 vols., 1873–91; Eng. trans. by Lalor and Mason, *The Constitutional and Political History of the United States*, 8 vols., 1877–92) is his best-known work and contains a remarkably able presentation of the Federalist and antislavery view of American political history. More than half of it is devoted to the decade 1850–60. Among his other publications are: *Das Staatsrecht der Vereinigten Staaten von Amerika* (1885; Eng. trans., *The Constitutional Law of the United States of America*, 1887); *John C. Calhoun*, in the "American Statesmen Series" (1882); *John*

Brown (1888); *The French Revolution Tested by Mirabeau's Career* (1894). Consult Hart, "Hermann von Holst," in the *Political Science Quarterly*, vol. v (New York, 1890), and the *Nation*, vol. lxxviii (ib., 1904).

HOLSTEIN, hōl'stīn. Formerly a duchy belonging to Denmark, and at the same time a member of the Holy Roman Empire and of the Germanic Confederation (Map: Germany, C 1). In 1864, after Schleswig and Holstein had been wrested from Denmark, Holstein was placed in the care of Austria (Germany taking Schleswig). It was ceded in 1866 to Prussia at the end of the Austrian War and now forms the southern part of the Province of Schleswig-Holstein (q.v.).

HOLSTEIN, or HOLSTEIN-FRIESIAN. A breed of dairy cattle. See CATTLE.

HOLSTEIN, FRIEDRICH VON (1837–1909). A German diplomat and statesman, born in Schwedt. Entering the diplomatic service, he held minor appointments at St. Petersburg, Rio de Janeiro, London, Washington, Florence, and Paris until 1876, when he was recalled to Germany to take charge of the political department of the Foreign Office. When Bismarck was dismissed in 1890, Holstein was retained by Count Caprivi in the Foreign Office, where his influence practically shaped the German foreign policy. He was largely responsible for the German seizure of Kiaochau (q.v.), China. The Emperor William II's visit to Tangier was the result of his advice; but the later proceedings in the Morocco crisis did not meet with his approval, and the disregard of his protests led to his retirement in 1906. Von Holstein was little heard of by the general public, but his influence in international affairs was very great.

HOLSTEIN-GOTTORP, gŏt'tôrp. See OLDENBURG, HOUSE OF.

HOLSTON (hōl'stŭn) **RIVER.** One of the two rivers, the French Broad (q.v.) being the other, which unite 4½ miles east of Knoxville, Tenn., to form the Tennessee River. It is formed by the junction of its North and South forks, about 1 mile below Kingsport, Sullivan Co., Tenn. From this point it flows in a generally southwesterly direction, its course to its confluence with the French Broad measuring 141½ miles. During rain tides it is navigable for about 50 miles for light-draft vessels. The fall of the river from its forks to its mouth is about 361 feet.

HOLT, HAMILTON (1872–). An American editor. He was born in Brooklyn, N. Y., graduated from Yale University in 1894, and studied at Columbia University in 1894–97. He was managing editor of the *Independent* from 1897 to 1913, for some months was editor and owner, and in 1914 became editor alone. In 1912 he lectured at the School of Journalism, Columbia University. Widely known as a lecturer on international peace, as an advocate of simplified spelling, as a reformer of municipal government, and as a worker for improved social and labor conditions, he was chosen a trustee of the American College for Girls at Constantinople, and a member of the executive committee of the International Conciliation Society. While visiting Japan in 1912, he was decorated by the Mikado with the order (third class) of the Sacred Treasure. He is author of *Undistinguished Americans* (1906) and *Commercialism and Journalism* (1909).

HOLT, HENRY (1840–). An American author and publisher, born in Baltimore, Md. He graduated from Yale University in 1862 and from Columbia Law School in 1864 and received the honorary degree of LL.D. from the University of Vermont in 1901. Associated with G. P. Putnam in the publishing business beginning in 1863, in 1873 he became president of Henry Holt and Company, publishers in New York City. At various times he lectured at Yale, Columbia, and the University of Vermont. He served as a member of the first executive committee of the Simplified Spelling Board, and as first chairman of the New York University Settlement Society. In 1913 he founded and undertook the editorship of the *Unpopular Review*, a quarterly magazine of high literary quality, containing contributions of a serious nature and in lighter vein by temporarily anonymous writers. He is author of: *Calmire—Man and Nature* (1892; 6th ed., 1906); *Talks on Civics* (1901); *Sturmsee—Man and Man* (1905; 3d ed., 1906); *On the Civic Relations* (1907); *On the Cosmic Relations* (1914).

HOLT, SIR JOHN (1642–1710). An English jurist, born at Thame, Oxfordshire, Dec. 30, 1642. After receiving his education at Oriel College, Oxford, he was called to the bar (1663) from Gray's Inn. He soon displayed a decided talent for law and became an able advocate, well versed in the constitutional law of England. In 1685–86 he was Recorder of London and about this time was appointed sergeant at law and king's sergeant. He fell into disfavor with King James II because of a decision favoring liberal government; but the ability which he displayed in the Convention Parliament raised him so high in the estimation of the Prince of Orange that, upon the accession of the latter to the English throne, Holt was made Lord Chief Justice of the King's Bench. As a judge, he was noted for the fairness and even kindness with which he treated accused persons and for his opposition to prosecutions for witchcraft. He was also opposed to standing armies and to the use of military power for the preservation of domestic peace. In 1694 he stoutly maintained his prerogative when assailed by the House of Lords, and seven years later he was equally firm in a clash with the House of Commons. He died in London, March 5, 1710. Consult: *Report of all the Cases Determined by Sir John Holt, Kt., from 1688 to 1710, etc.* (in the Savoy, 1738); *Report of Cases Argued, etc., in B[anco] R[eginæ] in the Time of Queen Anne* (ib., 1737); Foss, *Judges of England: with Sketches of their Lives, etc.* (London, 1848–64); Burnet, *History of my own Time* (6 vols., London, 1838).

HOLT, JOSEPH (1807–94). An American jurist, born in Breckinridge Co., Ky., and educated at St. Joseph's College and Centre College in the same State. He studied law; practiced in Elizabethtown, then in Louisville; lived for a time after 1835 in Mississippi, where he contested several suits with Sergeant S. Prentiss, among them the case as to the ownership of some public land, claimed by the heirs of Newit Vick, for whom Prentiss was counsel. He attracted attention as politician and orator by his defense of R. M. Johnson in the Democratic National Convention in this same year (1835). He was a strong supporter of Buchanan in 1856 and was appointed by him Commissioner of Patents in the following year. In 1859 he became Postmaster-General and in 1860 succeeded

Floyd as Secretary of War. A Douglas Democrat before the war, he heartily supported the Union and in 1862 became Judge Advocate and two years later Judge-Advocate-General. As head of the department of military justice, he conducted the trial of Fitz John Porter and that of Lincoln's assassins. He was brevetted major general in 1865 and retired 10 years later.

HOLT, L(UTHER) EMMETT (1855–). An American physician. He was born at Webster, N. Y., and graduated from the University of Rochester in 1875 and from the College of Physicians and Surgeons (Columbia) in 1880. He was professor of the diseases of children at the New York Polyclinic from 1890 to 1901 and thereafter at the College of Physicians and Surgeons. He became also attending physician to the Babies Hospital and the New York Foundling Hospital, and a member of the board of directors, and secretary, of the Rockefeller Institute for Medical Research. Besides special articles on the diseases of children, he is author of *The Care and Feeding of Children* (1894; 7th ed., rev., 1914) and *Diseases of Infancy and Childhood* (1896; 6th ed., rev., 1911).

HOLTEI, hōl'tī, KARL VON (1798–1880). A German poet, dramatist, and novelist, born in Breslau. He took part in the campaign of 1815, studied law, and then, at the age of 21, went on the stage. In 1821 he married an actress, Luise Rogée, and after acting as secretary and dramaturgist to the Breslau Theatre for two years went to Berlin with his wife (engaged at the Court Theatre there) and wrote the very successful plays, *Die Wiener in Berlin* and *Die Berliner in Wien.* Soon after his first wife died (1825), he married Julie Holzbecher (1809–39), a clever comedienne. In 1833 he returned to the stage and toured with his wife, writing for this purpose *Lorbeerbaum und Bettelstab* and *Shakespeare in der Heimat* (1840). He died at Breslau in the cloister of the Brothers of Charity. The best of his productions is his *Schlesische Gedichte* (22d ed., 1905), lyrics in the Silesian dialect. Holtei's collected plays are contained in the *Theater* (1867). Besides his plays, operettas, and lyrics, Holtei wrote many novels, among which mention should be made of *Die Vagabunden* (4 vols., 8th ed., 1894), *Christian Lammfell* (5 vols., 4th ed., 1878), *Noblesse oblige* (2d ed., 1862), and others collected in *Erzählende Schriften* (1861–66); and sketches and criticisms. Consult: the excellent autobiographical work *Vierzig Jahre* (8 vols., Berlin, 1843–50); Kurnik, *Karl von Holtei, ein Lebensbild* (Breslau, 1880); Otto Storch, *Karl von Holtei* (Waldenburg, 1898); P. Lindau, *Holteis Romane* (Berlin, 1904).

HOLTHAUSEN, hōlt'hou'zen, FERDINAND (KARL WENNEMAR) (1860–). A German philologist, born in Soest, Westphalia. He was educated at Leipzig, Heidelberg, Jena, and Berlin; became lecturer at Heidelberg in 1885 and at Göttingen in 1887; was made professor at Giessen in 1892; taught Germanics in Gothenburg, Sweden, in 1893–1900; and then became professor of English philology at Kiel, where he edited the *Kieler Studien zur englischen Philologie.* He edited many Old English and Middle English texts, *Havelok* (1901; 2d ed., 1910), *Beowulf* (1905; 3d ed., 1912), Cynewulf's *Elene* (1905; 2d ed., 1910), etc., and published *Studien zur Thidrekssaga* (1884), *Soester Mundart* (1886), *Altisländisches Elementarbuch* (1895), *Altisländisches Lesebuch* (1896), *Altsächsisches Elementarbuch* (1899), and a revised edition of Grein's *Sprachschatz* (1912 et seq.).

HOLTON, hōl'tŭn. A city and the county seat of Jackson Co., Kans., 30 miles north of Topeka, on the Union Pacific, the Chicago, Rock Island, and Pacific, and the Missouri Pacific railroads (Map: Kansas, G 4). It is the commercial centre for a stock-raising and farming region and has a rat-trap factory, bottling works, quilting factory, and fruit nursery. Campbell College was established here in 1882. Settled in 1859, Holton was incorporated in 1870 and adopted the commission form of government in 1912. The city owns its water works and electric-light plant. Pop., 1900, 3082; 1910, 2842.

HOLTON, LUTHER HAMILTON (1817–80). A Canadian statesman. He was born in South Leeds, Ontario, and when nine years old was taken by his parents to Montreal. There he became a clerk (1830), and later a partner, in the city's leading forwarding house. After 1846, when the repeal of the Corn Laws (q.v.) deprived the British American colonies of preferential treatment, Holton was one of the prominent signers of the manifesto of 1849, which favored annexation to the United States. He was an advanced free trader and one of the founders of Le Partie Rouge (see POLITICAL PARTIES, *Canada*). In 1854–57 he represented the city of Montreal in the Canada Legislative Assembly, and in 1862–63 he was a member of the Canada Legislative Council (at that time elective) for the Victoria Division. For part of 1863 he was Commissioner of Public Works in the short-lived Brown-Dorion administration and in 1863–64 Minister of Finance in the Macdonald-Dorion cabinet. He opposed Canadian confederation and the coalition cabinet organized to facilitate it (see BROWN, GEORGE). Elected in 1867 to the first Dominion Parliament, he remained a member of that body until his death.

HÖLTY, hēl'tē, LUDWIG HEINRICH CHRISTOPH (1748–76). A popular German poet, born at Mariensee, the son of a country parson. He studied theology at Göttingen (1769), fell in there with Bürger, Voss, and the Stolbergs, and assisted in founding the patriotic poetic league of the *Hainbund.* He was naturally sentimental and dwelt, though not morbidly, on death, nature, and solitude, showing the influence of Rousseau and especially of the *Night Thoughts* of Young. Occasionally there is also a joyous or even a playful strain, but it is with harmonious melancholy that he is associated in the popular mind. In some of his odes he surpassed his teacher, Klopstock (q.v.). A few of his poems are known wherever German is sung. Hölty's *Works* were collected in 1789; his complete works appeared in 1882. There is a life by Ruete (Guben, 1883), and biographies in the critical editions by Voss (Hamburg, 1835), Voigt (Hanover, 1858), and Halm (Leipzig, 1870).

HOLTZ, hōlts, WILHELM (1836–). A German physicist. He was born at Saatel, near Barth, in Pomerania, and studied physics and other sciences at Berlin, Dijon, and Edinburgh. He invented the electrical machine which bears his name (see ELECTRICAL MACHINE) in 1865 and engaged in many researches, particularly in electricity; but his health forced him to give up scientific investigations for a number of years. In 1877 he became assistant in the

physical laboratory of Greifswald, where in 1881 he was made privatdocent and three years later professor. He is the author of many papers on electricity published in the scientific journals and of two volumes on lightning protection, *Ueber Theorie, Anlage und Prüfung der Blitzableiter* (1878) and *Ueber die Zunahme der Blitzgefahr und ihre vermuthlichen Ursachen* (1880).

HOLTZENDORFF, hôlts'en-dôrf, Franz von (1829–89). A German jurist. He was born in Vietmannsdorf, Prussia; studied law at Berlin, Heidelberg, and Bonn; became professor of jurisprudence at Berlin in 1860 and held the same professorship at Munich from 1873 until his death. He strove especially to correct the criminal law, to abolish the death penalty, and to improve the condition of penal institutions. He was interested and active in the Protestant Union, in the Berlin People's Kitchens, and in the reform of female labor, and he was considered an authority on international law. Among his works are: *Französische Rechtszustände* (1859); *Die Reform der Staatsanwaltschaft in Deutschland* (1864); *Die Prinzipien der Politik* (2d ed., 1879); *Wesen und Wert der öffentlichen Meinung* (2d ed., 1880); *Das Verbrechen des Mordes und die Todesstrafe* (1874). He edited *Allgemeine deutsche Strafrechtszeitung* (1861–74), the *Encyklopädie der Rechtswissenschaft* (1880–90), a series of manuals on German law (1871–89), and, with Virchow, the *Sammlung gemeinverständlicher wissenschaftlicher Vorträge* (1866 et seq.). Consult Stoerk, *Franz von Holtzendorff* (Hamburg, 1889).

HOLTZENDORFF, Henning von (1853–). A German naval officer, born in Berlin. He entered the marine in 1869 and served through the different grades. In 1895–96 he commanded the cruiser *Prinzess Wilhelm* in the Far East, where he was again stationed in 1899–1901 in command of the *Kurfürst Friedrich Wilhelm.* Returning to Germany, he became chief inspector of docks at Danzig in 1901, was promoted second admiral in 1902, rear admiral in 1904, vice admiral in 1907, and admiral in 1910, and was chief of the first squadron of the sea fleet in 1906 and of the entire fleet in 1910. He retired from active service early in 1913 and in June of that year became a member of the House of Lords.

HOLTZ MACHINE. See Electrical Machine.

HOLTZMANN, hôlts'mân, Adolf (1810–70). A German philologist, born at Karlsruhe. He studied theology at Berlin and Halle and was for a short time vicar at Kandern. In 1832 he renewed his studies at Munich under Franck and later at Paris under Burnouf and made a specialty of old Germanic dialects and Sanskrit. His works are of unequal value. In 1852 he was made professor of German and Sanskrit at Heidelberg, where he died. His works are: in Indian philology, *Ueber den griechischen Ursprung des indischen Tierkreises* (1841) and the translations *Ramajana* (last ed., 1843), *Indische Sagen* (1845–47); in Germanics, *Kelten und Germanen* (1855), an attempt to identify the two peoples; *Untersuchungen über das Nibelungenlied* (1854) and *Das Nibelungenlied* (1857), both attacking Lachmann's theory of the composite authorship of the poem and renewing the question, Holtzmann's view being that such epics as the *Nibelungenlied* and the *Ilias* were not synthetic products but remnants of greater and more complete works; the much more important grammatical works, the edition of Isidorus (1836), *Ueber den Umlaut* (1843), *Ueber den Ablaut* (1844), *Altdeutsche Grammatik* (uncompleted, 1870–75); and the posthumous works, *Germanische Altertümer mit Text, Uebersetzung und Erklärung von Tacitus Germania* (1873) and *Deutsche Mythologie* (1874). Consult necrologies in *Germania,* vol. xvi (Vienna, 1871), and *Zeitschrift für deutsche Philologie,* vol. iii (Halle, 1871).

HOLTZMANN, Heinrich Julius (1832–1910). A German Protestant theologian, born at Karlsruhe. Educated at Berlin, he was appointed professor of theology at Heidelberg in 1865 and at Strassburg in 1874. He became especially known for his exegetical and critical works on the New Testament. These include: *Die synoptischen Evangelien, ihr Ursprung und geschichtlicher Charakter* (1863); *Kritik der Epheser- und Kolosserbriefe* (1872); *Die Pastoralbriefe* (1880); *Lexikon für Theologie und Kirchenwesen* (1882; 3d ed., 1895), with Zöpffel; *Lehrbuch der historischkritischen Einleitung in das neue Testament* (1885; 3d ed., 1892); *Handkommentar zum neuen Testament* (1889–90; later editions), with Lipsius, Schmiedel, and Von Soden; *Lehrbuch der neutestamentlichen Theologie* (2 vols., 1897); *Die Entstehung des neuen Testaments* (1904); *Das messianische Bewusstsein Jesu* (1907).

HOLTZMANN, Oskar (1859–). A German New Testament critic, born in Stuttgart, where his father was director of the Royal Polytechnic. He was educated at the universities of Strassburg, Göttingen, and Giessen and in the theological seminary at Friedberg; preached for a year and taught in secondary schools and in 1890 became professor of New Testament exegesis at the University of Giessen. He taught in the Giessen Gymnasium also. Probably his most important work is the valuable *Neutestamentliche Zeitgeschichte* (2d ed., 1906). He published, besides, *Das Johannesevangelium untersucht und erklärt* (1887); *Das Ende des jüdischen Staatslebens und die Entstehung des Christentums* (1888); *Christbild der Geschichte und Christbild der Dogmatik* (1890); *Jesus Christus und das Gemeinschaftsleben des Menschen* (1893); *Leben Jesu* (1901; Eng. trans., 1904); *Jüdische Schriftgelehrsamkeit zur Zeit Jesu* (1901); *Das Messiasbewusstsein Jesu* (1902); *War Jesus Ekstatiker?* (1903); *Das christliche Gottesglaube* (1905); *Christus* (1907); and, with Beer, the text, with translation and commentary, of the Mishna (1912 et seq.).

HOLUB, hô'lup, Emil (1847–1902). An African explorer, born at Holitz in Bohemia. He studied medicine and natural science at the University of Prague and then, in 1872, went to South Africa. He lived for a time in the diamond fields as a surgeon, but early in 1873 made a journey through the southern Bantu countries and in the fall a second to the Transvaal and the lands to the north. In 1875 he succeeded in reaching the Zambezi and the Victoria Falls and brought back with him a rich natural science and ethnological collection, which he divided among various European institutions. In 1883, accompanied by his wife, he started from Cape Town with the intention of traversing the entire length of the African continent to Egypt. He had accomplished scarcely one-third of the journey, however, when

he was attacked by hostile tribesmen on the Kafue, a northern tributary of the Zambezi, and only after a desperate struggle was he able to win his way back to civilization. Fortunately he was able to save the large collection which he had gathered, and this, after it had been exhibited in Vienna and Prague, he divided among a number of museums. He died from the effects of malaria acquired during his explorations. His publications include: *The Victoria Falls* (1879); *Sieben Jahre in Südafrika* (1880–81; trans. by Ellen E. Frewer as *Seven Years in South Africa*, 2d ed., 1881); *Von der Kapstadt ins Land der Maschukulumbe* (2 vols., 1888–90).

HOLY ALLIANCE. A league formed after the fall of Napoleon, at the instance of Alexander I of Russia, by the sovereigns of Russia, Austria, and Prussia, nominally to regulate the relations of the states of Christendom by the principles of Christian charity. As it formed itself in the mind of Alexander it was the scheme of a pietistic idealist, but it was utilized by Metternich as an instrument of his reactionary policy. The document was drawn up by Alexander and was signed by the three rulers at Paris in September, 1815. In addition to the original signatories, Naples, Sardinia, France, and Spain acceded to the treaty, and it received the commendation, though not the signature, of the Prince Regent of Great Britain. It was formally made public in the Frankfort *Journal*, Feb. 2, 1816. Metternich, who privately sneered at the treaty, used it as the basis for the conferences of Troppau and Laybach and the congresses of Karlsbad and Verona, which were intended to unite the Powers in support of absolutism everywhere. It was in the name of the Holy Alliance that Austria, in 1821, crushed the revolutions in Naples and Piedmont and that France, in 1823, restored absolutism in Spain. Apart from this use of it, as one writer has said, "no one of the princes who adhered to the Holy Alliance, with the single exception of Alexander himself, ever took it seriously." Meaningless in itself, it soon ceased to have any importance, especially when both France and England refused to give it any support.

The text of the covenant is as follows:

"In the name of the Most Holy and Indivisible Trinity: Holy Alliance of Sovereigns of Austria, Prussia, and Russia. Their Majesties the Emperor of Austria, the King of Prussia, and the Emperor of Russia, having . . . acquired the intimate conviction of the necessity of settling the steps to be observed by the Powers, in their reciprocal relations, upon the sublime truths which the Holy Religion of Our Saviour teaches: They solemnly declare that the present Act has no other object than to publish, in the face of the whole world, their fixed resolution, both in the administration of their respective States, and in their political relations with every other government, to take for their sole guide the precepts of that Holy Religion, namely, the precepts of Justice, Christian Charity, and Peace. . . . *Art. I.* . . . The three contracting Monarchs will remain united by the bonds of a true and indissoluble fraternity, and, considering each other as fellow countrymen, they will, on all occasions and in all places, lend each other aid and assistance; and, regarding themselves toward their subjects and armies as fathers of families, they will lead them, in the same spirit of fraternity with which they are animated, to protect Religion, Peace, and Justice. *Art. II.* In consequence, the sole principle of action, whether between the said Governments or between their Subjects, shall be that of doing each other reciprocal service, and . . . to consider themselves all as members of one and the same Christian nation; the three allied Princes looking on themselves as merely delegated by Providence to govern three branches of the One family, namely, Austria, Prussia, and Russia, thus confessing that the Christian world, of which they and their people form a part, has in reality no other Sovereign than Him to whom alone power really belongs. . . . *Art. III.* All the Powers who shall choose solemnly to avow the sacred principles which have dictated the present Act . . . will be received with equal ardor and affection into this Holy Alliance. Done in triplicate and signed at Paris, the year of grace 1815, 14/26th September."

Perhaps the most noteworthy development from the Holy Alliance came from the attempt to extend its operation to the New World by the coercion of Spain's revolted colonies. George Canning (q.v.), on behalf of England, opposed this at the Congress of Verona, and the threatened invasion of American autonomy, together with the proposed colonization of the Pacific coast of North America by Russia, the leader in the Alliance, brought from the government of the United States the famous declaration of American policy known as the Monroe Doctrine (q.v.). For accounts of the Holy Alliance and its bearing upon contemporaneous history, consult the histories of the time and the biographies of leading persons connected with it. For its bearing on American history, the John Quincy Adams *Memoirs* are a veritable storehouse of material.

HOLY BROTHERHOOD. See HERMANDAD.

HOLY CITY. The common designation among different peoples and religious sects for the city regarded as the chief place of their religion. The term is most often understood as applying to Rome, but has been used also of Jerusalem, Allahabad, Benares, Mecca, Medina, Moscow, Kiev, and Cuzco.

HOLY COAT. A relic preserved with the greatest reverence in the cathedral of Treves (q.v.). It is alleged to be the seamless robe, or upper garment, of Jesus Christ (John xix. 23) and to have been discovered in the fourth century by the Empress Helena, in her memorable visit to Palestine (see HELENA, SAINT) and by her deposited at Treves. The earliest definite documentary evidence, supported, however, by still earlier incidental testimony, dates from the eleventh century. The holy coat of Treves was solemnly exhibited to the public gaze in 1196 and again in 1512, when Luther wrote against it and Leo X appointed it to be exhibited every seven years. The Reformation and wars prevented the regular observance of this religious festival; but it was celebrated in 1810 and was attended by a concourse of no fewer than 227,000 persons and in 1844 and 1891 by still greater crowds, while miraculous cures were confidently asserted to be performed by the precious relic. The exhibition of the holy coat in 1844 led to the secession of the "German Catholics" from the Catholic church. The seamless coat of Jesus is also said to be preserved in the church at Argenteuil, near Versailles, but this claim is not considered well founded. The legend here is that

it was given by Charlemagne to the monastery located there, his daughter Theodrada being abbess. Consult: Joseph Hommer, *Geschichte des heiligen Rockes unseres Heilandes* (Bonn, 1844); Gildemeister and Sybel, *Der heilige Rock zu Trier und die zwanzig andern heiligen ungenähten Röcke* (3d ed., Düsseldorf, 1845); Beissel, *Geschichte des heiligen Rockes* (Treves, 1889); R. F. Clarke, *Pilgrimage to the Holy Coat of Treves* (London, 1892); E. A. Plater, *The Holy Coat of Treves* (ib., 1891).

HOLY COMMUNION. See LORD'S SUPPER.

HOLY CROSS, COLLEGE OF THE. A Roman Catholic institution of higher education, founded at Worcester, Mass., in 1843, by Rt. Rev. Benedict Joseph Fenwick, second Bishop of Boston. Holy Cross is the oldest Catholic college in New England. In its establishment Bishop Fenwick was aided by Rev. James Fitton, who had as early as 1838 established the Seminary of Mount St. James. This institution, with its 60 acres of land, Father Fitton presented to the Bishop in 1842, upon which site the college was built. The first college building was completed in 1844. On July 14, 1852, a fire destroyed the whole of the central building of the college; but in the following year the college, enlarged and remodeled, was again ready to receive students. Although, as noted above, instruction was carried on in the college beginning in 1843, it was not incorporated until 1865. A petition for a charter was presented to the Legislature of the State in 1849, but this was refused. From 1849 to 1852 and from 1858 to 1865 Georgetown College conferred the degrees on all the students who graduated from Holy Cross. The college buildings are situated on one of the highest of the eminences surrounding the city of Worcester. The old buildings have been enlarged and improved in many ways, and extensive new constructions and improvements have been made in recent years. Among the newer and larger buildings are the O'Kane Building, an extension of the first main building, which contains the gymnasium, reception halls, laboratories, and classrooms; Alumni Hall, opened in 1905; and Beaven Hall, opened in 1913. The system of education at the university is the one in use in all colleges of the Society of Jesus. The natural sciences and modern languages are by no means excluded, but the ancient languages and their literature are still retained as prescribed courses and, with mathematics and philosophy, form the chief studies. The college provides a number of scholarships for deserving students. The total enrollment in 1913–14 was 551, of whom 532 were in the college proper and 19 in the preparatory department. The degrees conferred are M.A., B.A., and Ph.B. The faculty numbered, in 1914, 46. The library contains about 40,000 volumes. The productive funds amount to about $60,000, and the total annual income to about $240,000. The president in 1914 was Rev. Joseph N. Dinand, S.J.

HOLY CROSS, CONGREGATION OF THE. An institute formed in France in 1836 by uniting the Brothers of St. Joseph, founded at Ruillé in 1820, and the Auxiliary Priests of Le Mans, founded in 1835. The members teach and do missionary work. It had much success in France, where its schools and houses were suppressed by the Law of Associations (1901) and the members left for India, Canada, and the United States. It was introduced into the United States in September, 1841, by Father Edward Sorin, who located in the wilderness near South Bend, Ind. This foundation has since developed into the important University of Notre Dame. There are colleges also in Washington, D. C., Oregon, Wisconsin, Ohio, Louisiana, and Texas, and many parish foundations and secondary schools. At Notre Dame the *Ave Maria*, a well-known Catholic weekly, is published. The university also awards every year on Mid Lent Sunday the Lætare medal, an adoption of the old papal idea of the Golden Rose, to some distinguished American lay Catholic. It is, since the exile of the Congregation from France, the residence of the Father General. The congregation has 3 provinces, 60 houses, and 650 members. Four Sisters followed Father Sorin to South Bend in 1843. There St. Mary's College for Women at Notre Dame is now one of the most flourishing institutions in the West. There are more than 1000 Sisters working in the archdioceses of Baltimore, Chicago, New York, and San Francisco, where they conduct 1 college, 2 normal schools, 16 boarding schools, 40 academies and parish schools, 6 hospitals, and 4 asylums. Their greatest development was under Mother Angela (Eliza Gillespie, James G. Blaine's aunt), 1853–87. During the Civil War Mother Gillespie and 70 sisters took charge of six military hospitals in the Southwest. Consult F. J. Poirier, *Le Père Lefebvre et l'Acadie* (Montreal, 1898), and Moreau, *Basil Antoine Moreau et ses œuvres* (Paris, 1900).

HOLY CROSS, ORDER OF THE. The name of several monastic or semimonastic orders. The origin of the first community bearing this name is lost in obscurity; but leaving aside legendary accounts, we find the order definitely established in Italy as early as the accession of Pope Alexander III (1150). The mother house was at Bologna, and the work of the members was largely the care of the sick. They were confirmed by Urban III in 1187 and spread until they had 200 convents in all parts of Italy; the order declined later, so that Pius V was obliged to reform it in 1568, and Alexander VII to suppress it in 1656.

More important is the congregation of canons regular who were known in England as Crutched, or Crossed, Friars. This order was founded by Theodore de Celles at Huy, near Liége, Sept. 14, 1211, and confirmed by Innocent III five years later; it followed the rule of St. Augustine, assimilated in many particulars to that of the Dominicans. It spread rapidly throughout the Netherlands, France, Germany, having 90 convents, and several in England—in London (1298), Oxford (1349), Colchester, Honiton, and other places. The order was reformed from within in 1410. At the present day, while still faithful to its original spirit, it has very few houses, the principal ones being two in Holland (St. Agatha, the mother house, and Uden in North Brabant) and three in Belgium. In 1857 an attempt was made to start a branch at Bay Settlement, Wisconsin, but it failed because of local obstacles not surmountable. Consult Hermans, *Annales Canonicorum Regularium Sancti Augustini, Ordinis Sanctæ Crucis* (3 vols., Bois-le-Duc, 1858).

The knightly order bearing this name is of some importance in the history of Bohemia. It is distinguished by a red six-pointed star in addition to the cross worn on the habit and was originally an outgrowth of the Hospitaler

MOUNTAIN OF THE HOLY CROSS

brotherhood attached, in the first half of the twelfth century, to the hospital of the Poor Clares in Prague. In 1238 Gregory IX constituted it a definite order, under the rule of St. Augustine. It spread throughout Bohemia and other lands now included in Austria-Hungary and was one of the strongest bulwarks of the Church against the sectarian movements of the fifteenth and sixteenth centuries. At the siege of Eger in the Thirty Years' War it verified its knightly title by fighting at the head of the people. Its hospital at Prague was always open to new allies, and sheltered the first Jesuits in Bohemia in 1555, the Capuchins in 1599, and the Trinitarians in 1704. From 1561 to 1694 the order practically supported the archbishops of Prague, who had been deprived of their possessions in the wars of religion, making them grand masters during their incumbency of the see. The order now has less than 100 members; its library consists of 50,000 volumes, including many incunabula, and manuscripts of great value for Bohemian history. Consult Jacksche, *Der ritterliche Orden der Kreuzherren mit dem rothem Stern* (Vienna, 1882).

A Protestant Episcopal order of the same name was founded in 1881. Both priests and laymen are eligible, and its chief work is the carrying on of missions, conferences, and retreats. It conducts St. Andrews School for mountain boys at Sewanee, Tenn., and the Kent School for boys at Kent, Conn.

HOLY CROSS MISSION. A Catholic mission on the north bank of the Yukon River, Alaska, opposite the native village of Koserefsky. The centre of industrial and religious instruction for 400 natives, the mission has greatly benefited the community, especially as to agriculture and stock raising. The adjacent village of Koserefsky, with a population of 287 in 1910, has a government school, with an average attendance of 100, the largest native school in Alaska.

HOLY CROSS MOUNTAIN. A celebrated peak of the Rocky Mountains in Colorado, situated in Eagle County, in the central part of the State, 15 miles northwest of Leadville (Map: Colorado, C 2). Its height is 14,170 feet. It derives its name from two snow-filled ravines, which cross each other at right angles and present from a distance the appearance of a white cross.

HOLY DYING, Rule and Exercises of. A devotional manual, by Jeremy Taylor, published in 1651. It was soon extensively used, reached a twenty-first edition in 1710, has been frequently republished, and may be said, with its equally popular companion tractate, *Rule and Exercises of Holy Living* (1650), to offer a summary of the duties and devotions necessary to a Christian life.

HOLY FAMILY. The name given in art to representations of the Virgin and the Infant Saviour and their relatives, St. Joseph or St. Elizabeth and the infant John. The earliest such composition is that in the Catacomb of St. Calixtus in Rome, with the prophet Isaiah. The Virgin is represented sitting on a seat, which soon became a throne, the traditional attitude up to the Renaissance. The Byzantine school, as early as the sixth century, invented the type in which the Child is seated directly in the centre of the Virgin's lap and is blessing, both figures gazing straight forward. Some of these early pictures were regarded as painted by St. Luke and endowed with miraculous powers. Such are a number in the churches of Rome (e.g., at San Sisto, Santa Maria Maggiore, etc.) and Venice (e.g., that of St. Mark, brought from St. Sophia in 1204). Later, this school added attendant angels, who sometimes, as in the school of Crete, bore the emblems of the Passion, the sight of which affrights the Child. The arrangement in which the angels are throne-bearing and adoring figures, in rhythmic arrangement on either side of an immense throne, was developed very beautifully by Cimabue and Duccio in their famous pictures at Florence and Siena. It was quite late in the Middle Ages when other figures were brought into the composition. These were, especially, St. Anna, the mother of the Virgin (sometimes holding the Virgin in her lap), St Joseph, and, as playmates to the Infant Christ, the infant John the Baptist (usually in goatskin and bearing a cross), or St. Catharine (with whom Christ is being sometimes mystically married). Even the early legendary history of the infancy of Christ has been drawn upon for such scenes as the Twelve Apostles playing with the Infant Christ as boys—a scene peculiar to German art. Of all subjects of Christian art that of the Madonna and Child, comparatively unknown before the thirteenth century, came into overwhelming prominence, becoming the favorite theme of the Italian painters of the Renaissance. One of its variants at that time was the adoring Virgin on her knees before the Infant, a favorite subject with Filippo Lippi. The Holy Family represents a more intimate aspect of the subject, some phase of family life; it must include St. Joseph, St. Elizabeth, and the infant John—to be distinguished from the Madonna (q.v.) proper, as well as from the more elaborate scenes in which the Virgin and Child, similarly portrayed, are accompanied by several large figures, saints and fathers of the Church, which are not mere accessories of the sacred group; this is usually termed a *Sacra* (or *Santa*) *Conversazione*, and was a popular scene, especially with the Umbrian, Venetian, and northern schools of the fifteenth and sixteenth centuries. Among the distinguished painters who have treated the Holy Family, which was especially popular in the sixteenth century, the first place belongs to Raphael, who often repeated it, and in the example formerly in the Canigiani collection, now at Munich, created the most typical example. Others among the Italians were Bartolommeo, Correggio, Giulio Romano, Leonardo, Michelangelo. It was a favorite subject with Dürer, especially in his "Life of the Virgin"; with Gerard David and Rubens among the Flemings; Murillo among Spaniards; and Knaus (Metropolitan Museum) among modern Germans. Consult the bibliography of Madonna, and, for the location of the paintings cited, the articles on the painters mentioned. See Plates of Correggio; Engraving; Ghirlandaio; Holbein; Raphael; Robbia; Sarto.

HOLY GHOST, or Holy Spirit. In orthodox theology, the third person of the Trinity (q.v.), "proceeding from the Father and the Son," yet of one substance, majesty, and glory with the Father and the Son, very and eternal God. In early Hebrew thought the Spirit of God was God working in man on special occasions with particular results. It might bring evil as well as good. Both Saul's insanity (1 Sam. xvi. 19) and the work of a prophet (Ezek. ii. 2) might be ascribed to God's Spirit. Later, when noth-

ing evil was ascribed to God, His Spirit of course did only good. In the writings after the exile the term was also used for God working in nature (Job. xxvi. 13), but this usage did not pass into the New Testament period. By that time the term Holy Spirit was limited to the working of God upon the lives of men. There had long been the conception that when the Messiah came the Spirit would be given more freely (Joel ii. 28, 29), and the early Christians, who believed that Jesus was the Messiah, were ready to ascribe the divine guidance of their lives to the Spirit, as the abundant use of the term in the Acts and Paul's letters shows. Paul enlarged the term to mean, not merely the guidance of God in particular events, but the divine basis of the entire Christian life. The term, in its stage of biblical development, expresses the belief that the whole religious life originates from and is guided by God's Spirit acting directly on man's spirit. The proof of this action of God's Spirit lay (1) in the feeling of the man subject to it, (2) in its result, as furthering the recognized plan of God in human life and society.

The history of this term in theology is closely linked with that of Christology. In the Apostolic fathers, God, Christ, and the Spirit are sometimes distinguished, and sometimes the Spirit is made identical with the preëxistent Christ. As Greek thought came in, the Spirit and the Logos are often identified (Justin Martyr). The doctrine of the personality of the Spirit followed that of the personality of Christ. Arius held that the Holy Spirit was the first created nature produced by the Son. The clause in the Apostle's Creed, "I believe in the Holy Ghost," probably meant not the personality, but the work of the Spirit—that God's Spirit is active in man. The Constantinople Creed (381), called the Nicene Creed in the Western churches, first expresses the claim of the Spirit to worship. The "procession" (q.v.) of the Spirit became later one of the chief differences between the Eastern and the Western churches. The "filioque" (q.v.) clause was inserted in the creed by the third Council of Toledo (589). The orthodox belief regarding the Spirit has been that He is God, but distinct from Father and Son, in the same way as the Son is from the Father; that His function is to carry on the work of God in the hearts of men, by regeneration and sanctification. The doctrine of the Spirit has never been so actively discussed as that of Christ, but it is sometimes held that the Holy Spirit is, in the Bible, merely a name for God acting in the hearts of men, and that the idea of a separate personality is an inference from the person of Christ.

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HOLY GHOST, Order of the (Fr. *L'Ordre du Saint-Esprit*). The name of an order of knighthood founded in 1578 by Henry III, King of France, because on Pentecost, 1573, he had been elected King of Poland and on Pentecost, 1574, had succeeded to the French throne. Its purpose was to relieve the poor and infirm and to take care of foundlings. The grand master of the order was always to be the King of France. The insignia were a green cross with eight points, on the obverse of which was a dove turned downward, on the reverse the representation of the archangel Michael; the chain, after Henry IV, bore the lilies of France and the monogram "H." There were 100 knights, without counting foreigners. The order was definitely dissolved on Feb. 10, 1831, by Louis Philippe.

HOLY GHOST, Procession of the. See Procession of the Holy Ghost.

HOLY GHOST FLOWER, or Dove Flower. See Holy Spirit Plant.

HOLY GRAIL. See Grail, Holy.

HOLY GRASS (*Hierochloë odorata*). A grass about a foot high, with a brownish glossy lax panicle. It is found in the north of Europe and throughout North America. It has a sweet smell, like that of sweet vernal grass; and in Iceland, where it is plentiful, it is used for scenting apartments and clothes. In some countries it is strewn on the floors of the places of worship on festival days, whence its name. Its stems are used by North American Indians to weave into their baskets, mats, etc. It is of little value for forage, as stock seem to dislike it. This grass is known by many other names, as vanilla grass, Seneca grass, sweet-scented grass, etc.

HOLY GROTTO. The traditional scene of the Annunciation at Nazareth. Over the grotto stands a monastery, occupying the site of the Santa Casa, the house in which Mary was born, and which was carried by a miracle to Loreto. The grotto is marble-lined and is lighted by nine silver lamps. It is 20 feet square and 10 feet deep.

HOLYHEAD, hŏl'ī-hĕd. A seaport of Anglesey, North Wales, situated on Holy Island, 24½ miles west-northwest of Bangor (Map: England, B 3). It is the terminus of the London and Northwestern Railway, and a port for the mail steamers to Dublin, 60 miles distant. It has a celebrated breakwater, 7860 feet long, which forms a government harbor of refuge of 400 acres. It has three lighthouses. Coasting trade, shipbuilding, and rope making are carried on; and there is also some fishing. The town possesses assembly rooms and baths and a picturesque old embattled church. Interesting Roman and early English remains exist in the neighborhood. The United States is represented by a consular agent. Pop., 1901, 10,089; 1911, 10,636.

HOLYHEAD ISLAND. A small island of North Wales, west of the island of Anglesey, forming part of the county of that name (Map: Wales, B 3). Its area is about 6000 acres. Pop., 1901, 11,414; 1911, 11,131.

HOLY INNOCENTS' DAY. See Childermas.

HOLY ISLAND, or Lindisfarne, lĭn'dĭs-färn. A small island belonging to Northumberland, England, in lat. 55° 40′ N., long. 1° 47′ W., 10 miles southeast of Berwick-on-Tweed and 2

miles east of the mainland (Map: England, E 1). Area, 1051 acres. It is about 4 miles long and 2 miles broad and is connected with the mainland at low water. The north part is barren and uninhabited, but the south is very fertile. Rabbits, fish, and oysters are exported. On the south coast is the village of Holy Island, much resorted to by summer visitors. On the island are several ruins, the chief of which are the extensive and sombre-looking remains of the famous Abbey of Lindisfarne, originally a Saxon edifice, founded in 635 by St. Aidan, the disciple of St. Columba. There is also an ancient castle, now fortified. Holy Island flourished under St. Cuthbert, who died here in 687. In 793 the abbey was destroyed by the Danes. Consult R. Hegge (ed.), *Legend of St. Cuthbert with the Antiquities of the Church of Durham* (London, 1663), and Wilson, *Lindisfarne Churches* (1870). Pop., 1901, 405; 1911, 359.

HOLY LANCE. See LANCE, THE HOLY.

HOLY LAND. See PALESTINE.

HOLY LEAGUE. The name given to a number of political alliances in Europe. Of these the principal were the leagues formed (1) in 1511, by the Pope, Spain, and Venice against France; (2) in 1527, by the Pope, Francis I, and Henry VIII against the Emperor Charles V; (3) in 1538, by Charles V and the Catholic princes of Germany against the Schmalkaldic League; (4) in 1571, by the Pope, Spain, and Venice against the Turks; (5) most important of all, the one formed in 1576 by the Guises, the Pope, Spain, and the Parlement of Paris against the Huguenots; (6) in 1609 a Holy League (known as the Catholic League) organized by the Catholic states of Germany, with Bavaria at its head, in opposition to the Protestant Union.

HOLY MAID OF KENT. See BARTON, ELIZABETH.

HOLY MOTHER OF THE RUSSIANS. An epithet originally given to Moscow, the former capital of Russia, by the masses of that nation and still preserved among the peasantry.

HOLYOAKE, hōl'yōk, GEORGE JACOB (1817–1906). An English writer, lecturer, and reformer, particularly identified with the "coöperative movement." He was born in Birmingham, England, was educated at the Mechanics' Institute there, taught mathematics for a time, and while still young became widely known as a radical in politics and religion, attracting attention in particular by his advocacy of the theories of Robert Owen (q.v.). He early became especially interested in the theory and practice of coöperation, was active in the movement for the organization of the so-called Rochdale Pioneers in 1843, and subsequently was largely engaged as a lecturer and writer in the interests of coöperation. In 1842 he was imprisoned for six months for blasphemy, his being the last conviction on that charge in England. Soon afterward he devised a moral system, known as secularism (q.v.), which he advocated in public speeches and in the press. For a time he was president of the London Secular Society, the central organization of secularism. He was instrumental in securing the repeal of the so-called "tax upon knowledge" in 1854. He edited at various times the *New Moral World*, the *Reasoner* (from 1846 to 1866), and the *Cause of the People*, in which he contended vigorously for his views; and published numerous books, including: *History of the Rochdale Pioneers* (1857; 10th ed., enlarged, 1893); *The History of Coöperation in England* (rev. ed., 2 vols., 1906); *Life of Joseph Rayner Stephens, Preacher and Political Orator* (1881); *Self Help One Hundred Years Ago* (1890); *The Coöperative Movement To-Day* (1891); *Sixty Years of an Agitator's Life* (1892), an interesting though somewhat rambling autobiography; *Nature and Origin of Secularism, Showing that where Free Thought Commonly Ends Secularism Begins* (1896); *Jubilee History of the Leeds Coöperative Society* (1897); *Bygones Worth Remembering* (1906).

HOLYOKE, hōl'yōk. A city in Hampden Co., Mass., on the Connecticut River, 8 miles north of Springfield, on the Boston and Maine and the New York, New Haven, and Hartford railroads (Map: Massachusetts, B 4). It was originally a part of West Springfield and was incorporated as the Third Parish in 1786, though it was commonly called Ireland Parish, from the fact that several Irish families were the first settlers. In 1850 Holyoke was set off from West Springfield and incorporated as a separate town, and in 1873 it was chartered as a city. Its importance as a manufacturing centre dates from 1847, when the Hadley Falls Company began to develop the great natural water power. The river here falls 60 feet and is crossed by a granite dam 1000 feet long and 32 feet high, affording a maximum capacity of 40,000 horse power, the most valuable power in New England. For many years it has been noted for its paper mills. It now has also extensive manufactures of cottons, woolens, thread, silk, alpaca, belting, bricks, screws, wires, machinery, envelopes, and school supplies. It is an important centre for hydraulic engineering, for testing water wheels, etc. It has a public library, a tuberculosis hospital, a city hospital, and the House of Providence Hospital. The Holyoke Scientific Society has done valuable work in American archæology and has fine collections of Indian antiquities. In the vicinity are many places of scenic interest, notably Mount Tom (1215 feet), ascended by an electric railway from Holyoke, and Mount Holyoke (955 feet). Holyoke is governed under a revised charter of 1896, by a mayor, elected annually, and a city council, two-thirds of whose members are elected at large for two years, the remainder by wards for one year. The subordinate offices are filled as follows: appointed by the mayor—board of public works, fire commissioners, board of health, city marshal and assistants, city solicitor, and inspector of milk; appointed by the mayor with the consent of the council—sealer of weights and measures and inspectors of animals and provisions; elected by the council—water commissioners, city physician, poor overseers, city auditor, and city messengers. The annual income and expenditures of the city in 1912 amounted to $3,095,000 and $3,106,000 respectively, the main items of expense being $79,000 for the police department, including amounts for police courts, jails, etc.; $126,000 for the fire department, and $290,000 for schools. The city owns and operates its water works and its gas and electric-light plants. Pop., 1870, 10,773; 1880, 21,915; 1890, 35,637; 1900, 45,712; 1910, 57,730; 1914 (U. S. est.), 62,852; 1920, 60,203. See MOUNT HOLYOKE COLLEGE.

HOLYOKE, MOUNT. A steep ridge of greenstone in Massachusetts, near the east bank of the Connecticut River and about 6 miles due north of Holyoke. It rises 955 feet above sea level (Map: Massachusetts, B 3). A carriage

road winds upward to the point where a mountain railway carries passengers for 600 feet up a precipitous incline to a hotel built on the summit in 1821. The view here obtained of the Connecticut River and valley has long been famous as one of the finest in New England.

HOLY ORTHODOX CATHOLIC AND APOSTOLIC CHURCH. The official name of the Eastern church. See GREEK CHURCH.

HOLY PHIAL, BARONS OF THE (Fr. *Sainte Ampoule*). Sometimes described as an order of knighthood which formerly existed in France. They were four persons, prominent for rank, family, and fortune in the Province of Champagne. At the coronation of the French kings they were delivered to the dean, priors, and chapter of Rheims, as hostages for the return of the holy phial in which the coronation oil was kept. The phial, according to legend, was brought from heaven by the Holy Ghost in the form of a dove and put into the hands of St. Remigius at the coronation of Clovis (q.v.). The holy phial preserved at Rheims was broken by Ruhl, a member of the Convention, in 1793. The badge of the barons was a cross of gold enameled white, cantoned with four fleurs-de-lis, and on the cross a dove descending with a phial in its beak and a right hand receiving it. An interesting account of the coronation of Louis XIII and of these barons is given in Favine's *Theater of Honour* (London, 1623).

HOLY ROMAN EMPIRE. The name now given to the Empire erected by Charles the Great (q.v.), King of the Franks, in western Europe, usually dated from his coronation, at Rome, by Pope Leo III in 800; or, more technically, to this Empire as revived in 962 by Otho the Great (q.v.). In theory the Holy Roman Empire was a continuation of the Western Empire, which was overrun by the barbarians in 476. When Charles the Great was crowned Emperor by Leo III, he thought of himself as the successor of Augustus, Trajan, and Marcus Aurelius, and styled himself Augustus. This theory prevailed throughout the Middle Ages. Louis the Pious, Lothaire I, Louis II, Charles the Bald, and Charles the Fat were crowned as Roman emperors. After the deposition of the latter (887), which was followed by the disruption of the great Frankish Empire, the Imperial title was still held by a few princes, as Arnulf, King of Germany, and Berenger I, King of Italy. In 962 Otho the Great, after wresting the royal crown of Italy from a descendant of Charles the Great, had himself crowned Emperor of the Romans by Pope John XII and inaugurated the Roman Empire of the German nation. From that time the King of Germany was usually Emperor. The Empire consisted of Italy and the lands whose rulers recognized the overlordship of the German monarch; but theoretically the Emperor was the ruler of all Christians in western Europe, and some emperors, as, e.g., Henry VI, dreamed even of a world-wide empire. At different periods the rulers of Hungary, Poland, Denmark, Jerusalem, and Cyprus were to a greater or less extent vassals of the Roman Emperor. Until the reign of Frederick Barbarossa the name had been merely Roman Empire; Frederick added the designation Holy, either to vindicate its sacred character against the exclusive pretensions of the Church or else to describe its chief function as the protection of that Church. By the close of the thirteenth century the authority of the German emperors in Italy was reduced to a mere shadow. At the close of the fifteenth century the Swiss cut loose completely from the Empire. In the Netherlands the Imperial authority had come to an end long before their connection with the Empire was declared to be severed in an article of the Peace of Westphalia (1648).

The early German kings were elected by the chief men of the nation with the assent of the other freemen. Gradually the chief nobles secured almost entire control of the elections, but there was no fixed mode of procedure. At the election of Lothair in 1125, e.g., a committee consisting of 10 from each duchy was chosen to select an emperor. In the thirteenth century—by a process of evolution, which it is not possible to trace here—the number of electors had been fixed at seven, but there was a dispute as to who were included in the seven. This was settled in 1356 by the Golden Bull of Charles IV, which determined that the electoral college should be composed of the archbishops of Mainz, Treves, and Cologne, the King of Bohemia, the Count Palatine of the Rhine, the Duke of Saxony, and the Margrave of Brandenburg. The Golden Bull also declared that the electoral votes were attached to the office, not to the persons, and descended in the case of the lay principalities by right of primogeniture. This continued to be the constitution of the electoral college until 1623, when Ferdinand II arbitrarily transferred the vote belonging to the Count Palatine to Maximilian of Bavaria. At the Peace of Westphalia (1648) an eighth electorate was created for the Palatinate. In 1692 the ninth electorate, that of Hanover, was instituted. The Imperial elections were held at Frankfort-on-the-Main and the coronation city was Aix-la-Chapelle. The Emperor at some time during his reign went to Rome to receive the Imperial crown at the hands of the Pope. The last ceremony of this kind took place in 1530, when Charles V was crowned at Bologna by Pope Clement VII. The successor elect to the Emperor of the Romans was styled King of the Romans.

During the so-called Interregnum following on the death of the last Hohenstaufen Emperor there was a double election (1257), both Richard of Cornwall and Alfonso X of Castile being made Emperor, one receiving four votes and the other three. Their election may be taken to illustrate the theory held by some at the time, that a man of any nationality might be chosen to the Empire; but their total failure to obtain anything but the mere Imperial title proved that, as a matter of fact, the sovereignty of the Holy Roman Empire could be held only by a Germanic prince. After 1438 all the emperors but two belonged to the house of Hapsburg.

Charles the Great and his immediate successors followed the old German custom of calling together at frequent intervals the nobles and freemen for consultation about the public welfare. As feudalism developed, these assemblies ceased, and the Emperor called together only such of his vassals as he chose. Their meetings were called Imperial diets (*Reichstage*). In the thirteenth century the cities became very influential, and consequently their representatives were summoned to the diets. As the power of the emperors declined, the diets took a more prominent part in the administration of the Empire. Their functions were judicial as well as administrative. In the fourteenth century it came to be fixed that the Diet consisted of the three classes—electors, princes, and representa-

tives of the cities. The lesser nobility had no voice in the Diet. But the power of the Diet was slight, because it was concerned only with Imperial matters, and the Empire had ceased to be of real importance as a factor in European politics. This was clearly shown in 1495, when Maximilian I attempted to unite the Imperial estates against the French invasion of Italy. The Diet which he summoned did nothing to check the French, but with the Emperor's consent created the Imperial Chamber (q.v.), a supreme tribunal for the preservation of peace within the Empire. It consisted of a president and 16 members, who could not be removed from office. It held its sessions at Frankfort, Speyer, and other cities until 1689; in 1693 it was established permanently at Wetzlar. Gradually the Imperial Chamber became an important factor in the maintenance of peace within the Empire. The Emperor was jealous of it, as he had no control over it. Consequently he attempted to transfer some of its authority to the Aulic Council (q.v.) —a somewhat similar body for Austria, which was under his control. During the first half of the sixteenth century the Aulic Council interfered in the affairs of Italy, the Netherlands, and other portions of the Empire. After that time, however, it was again restricted to Austrian interests alone.

The Empire came to an end in 1806, when Francis II resigned the Imperial crown after having assumed (1804) the title of Emperor of Austria. After the time of the Hohenstaufen, whose dynasty came to an end in 1254, the Empire rapidly sank in importance and owed any real authority which it possessed to the strength of the ruler who was Emperor. Still the possession of the title gave some additional prestige. By the Peace of Westphalia (1648) the bonds which held the Empire together were greatly loosened, the right being accorded to the individual states to enter into foreign alliances. In the eighteenth century Voltaire said of the Holy Roman Empire that it was neither holy, nor Roman, nor an empire. During its earlier existence, however, it was a very important factor in the history of Europe. Consult: Karl Biedermann, *Deutschland in achtzehnten Jahrhundert* (3 vols., Leipzig, 1867–80); Shailer Mathews, *Select Mediæval Documents and Other Material Illustrating the History of the Church and Empire, 754–1254 A.D.* (2d ed., New York, 1900); W. F. Butler, *Lombard Communes* (ib., 1906); William Stubbs, *Germany in the Middle Ages* (ib., 1908); James Bryce, *The Holy Roman Empire* (ib., 1909); Herbert Fisher, *The Mediæval Empire* (2 vols., ib., 1909); Karl Hampe, *Deutsche Kaisergeschichte in der zeit Salier und Staufer* (2d ed., Leipzig, 1912). See GERMANY; ITALY; and the articles on the individual emperors, with the books cited.

HOLYROOD (hōl'ī-rōōd) **PALACE.** The former residence of the Scottish kings in Edinburgh. It was rebuilt between 1671 and 1679 by King Charles II of England from the designs of Sir William Bruce of Kinross, after the destruction by fire in 1650 of the prior palace built by James IV. It occupies the site of the famous Augustinian Abbey of the Holy Rood erected by King David I in 1128, at the place where, according to a fabulous story, he was miraculously saved from the attack of a hunted stag by the interposition of the lost holy cross or rood which fell from the stag's antlers into the King's hands, and at the sight of which the animal turned and fled. The black rood of Scotland, as it was called, was brought to Scotland by St. Margaret about the year 1070 and became one of the kingdom's heirlooms. It is known to have fallen into the hands of the English at the battle of Neville's Cross in 1346, but its disappearance in course of time gave currency to the above fable. The sole remains of the abbey are the ruins of the church, which anciently was a safe refuge for criminals and remained so for debtors until the abolition of imprisonment for debt in 1880. Holyrood is interesting as the scene of many historical events, including the term of Queen Mary's residence and of Rizzio's murder in 1566. It is the occasional residence of the British sovereigns and since the death of Queen Victoria has undergone thorough renovation. Consult: Charles Mackie, *Original Historical Description of the Monastery, Chapel Royal, and Palace of Holyrood House* (9th ed., Edinburgh, 1832); Daniel Wilson, *Memorials of Edinburgh* (ib., 1848); J. H. Burton, *The History of Scotland* (ib., 1870); F. W. Watkeys, *Old Edinburgh* (New York, 1913).

HOLY SEPULCHRE. The place where Jesus was entombed. According to the New Testament data the sites of the crucifixion and burial of Jesus were not far apart (John xix. 41), outside Jerusalem (Heb. xiii. 12), and near a road (Mark xv. 29; Matt. xxvii. 39). The tomb itself was in a garden (John xix. 41) and apparently on a slope. The place of crucifixion was called Golgotha (Mark xv. 22; Matt. xxvii. 33; John xix. 17), an Aramaic word meaning 'skull.' Calvary is but the anglicized form of the Latin *calvaria*, skull. There is no evidence for supposing that the locality was sufficiently elevated to be called a hill or mount. The Gospels imply that the site was well known when they were written, but the references are not full enough to make a modern identification easy or certain.

The traditional site of both Golgotha and the tomb of Jesus is that now covered by the church of the Holy Sepulchre, 400 to 500 yards west of the northern part of the Haram esh-Sherif, or temple area, and well within the modern city of Jerusalem. Here Constantine the Great built a beautiful church on the spot then supposed to be the place of the Resurrection. This identification was not seriously disputed until Jonas Korte, in 1741, claimed that, being within the city walls, it could not be correct. Korte supposed that the modern north wall was in existence at the time of the crucifixion, but in fact it was built later. In 1841 Edward Robinson, in his *Biblical Researches*, disputed the correctness of the traditional site, on the supposition that the second wall of Josephus—which was the outer wall in Christ's day—passed to the north of it, and in that case the traditional site must have been within the city. Since Robinson, this has been considered by many to be the chief and fatal obstacle to the view that the modern church actually covers the spot where Jesus was buried. But the excavations and measurements of Conrad Schick (1888 and later) strongly support the view that the wall in Christ's day lay south and east of the disputed site, which therefore was outside the city and may well have been the scene of the crucifixion and burial. Of other proposed sites, two—both outside the modern city, near the Damascus Gate—have received strong support. The question is still unsettled, but the drift of competent opinion is towards

provisional acceptance of the traditional view until more decisive evidence compels its rejection.

A few years after the crucifixion the northern area of Jerusalem was inclosed by a third wall, as it was becoming thickly settled. There is no reason to suppose that the early Christians forgot where the crucifixion and burial had occurred, though there is no probability that they venerated the place as holy. In the Jewish war with Rome (66–70) this part of the city was occupied by the Roman army preparatory to the assault on the second wall. From its capture by Titus (70) to the rebellion of Bar-Cochba (132–135), the city was practically in ruins, though not entirely desolate. After suppressing this rebellion Hadrian rebuilt Jerusalem as a heathen city, calling it Ælia Capitolina and absolutely forbidding Jews to enter it. On the site of the temple a shrine to Jupiter was built, and on that of the supposed tomb of Jesus a temple to Venus was erected (by Hadrian or one of the later emperors). Incidentally this may be evidence that even then Christian tradition pointed out that spot as worthy of veneration. In the third century the holy places of the city and vicinity began to attract pilgrims from various parts of the Empire, though there is no evidence that any visited this particular spot. In the fourth century the pilgrimages became more popular, and when through Constantine I the Empire became nominally Christian, it was but natural that the Emperor, urged on, doubtless, by his mother, determined to rescue the holy sepulchre from oblivion and disgrace. What guided Constantine in selecting this spot was, without doubt, the tradition already current. On removing the accumulated rubbish the workmen came upon a rock tomb. So astonishing was this coincidence that it was counted as simply miraculous that the precious grave, so long hidden away, should at last have come to light. Legends soon began to multiply—e.g., that Helena, Constantine's mother, miraculously discovered the true cross near by, of which Eusebius, the contemporary and well-informed witness, says nothing. (See Cross, Invention of the.) Constantine now built here a magnificent church. Over the grave was erected a beautiful gilded dome open to the sky, supported by columns and surrounded by a wall, the inside diameter being about 65 feet. From the rotunda eastward extended the basilica, 250 feet in length, with its nave and two aisles, the nave ending in a semicircular choir. Still farther to the east, connected with the basilica by three gateways, was the atrium, surrounded with colonnades and containing basins for the customary ablutions. From the atrium three gates led out into the propylæum, which connected the whole edifice with the market street to the east. The entire length of the church or cathedral so constructed was about 475 feet. It was due, doubtless, to the necessities of the situation that the propylæum and atrium were to the east rather than, as usual, west of the basilica. In the south aisle a knob of the native rock, with a cleft in it (the grave of Adam, according to legend), rose a few feet above the level of the floor, inclosed within a silver fence. This was supposed to be the rock in which the cross was set,—i.e., Golgotha proper. In 336 A.D., 10 years after its foundation, Constantine's church was dedicated by the Synod of Tyre. For nearly 300 years the edifice remained intact, famed for its beauty, one of the chief attractions for the numerous pilgrims constantly visiting Jerusalem. During this period legends grew apace, and numerous miraculous events were associated with the locality. In 614 the church was destroyed, at least partially, by the Persians under Chosroes II. Steps were taken at once by Modestus, acting Bishop of Jerusalem, to rebuild the edifice, and after 10 years' labor (616–26) the work was completed. The new buildings were not of the same plan or dimensions or beauty as their predecessor. The rotunda was rebuilt as a separate church—of the Resurrection—and on the site of the large basilica of Constantine a smaller one, the Martyrium, over the place where the cross was said to have been found, was erected. Southeast of the rotunda a new church in honor of the Virgin was built, while over Golgotha, now outside of the basilica, a chapel was placed. These edifices remained, with occasional damage and consequent repairs, until their destruction by Hakim, Caliph of Egypt, in 1010. With the assistance of the Byzantine Emperor they were restored in 1048, with some changes of plan. In 1140 the Crusaders began a general rebuilding of all the edifices on a larger scale. The new church was dedicated July 15, 1149, but not completed until 1168. The church of the Crusaders was destroyed in 1244, but again rebuilt (c.1300). Extensive alterations and improvements took place in 1555 and 1719. In 1808 the rotunda was burned and much other damage done to the western buildings. The restoration, the work of the Greeks and Armenians, was completed in 1810. Since that time, with the exception of the renewal of the dome in 1868 by Napoleon III and Alexander II of Russia, the buildings have undergone no serious alteration.

For plan of the present buildings, with extended descriptions, consult Baedeker's *Palestine and Syria* (New York, 1912); for the plan and extent of the buildings of Constantine, consult Carl Mommert, *Die heilige Grabeskirche zu Jerusalem in ihrem ursprünglichen Zustande* (Leipzig, 1898), or the *Survey of Jerusalem*, published by the Ordnance Survey; for the best bibliography, Hermann Guthe's article in the Hauck-Herzog *Realencyklopädie* (Leipzig, 1899). Consult also C. W. Wilson, *Golgotha and the Holy Sepulchre* (London, 1906), and G. A. Smith, *Jerusalem*, vol. i, pp. 247 ff. (New York, 1908).

HOLY SEPULCHRE, Knights of the. An order of knighthood instituted (1496), probably by Pope Alexander VI, for the guardianship of the Holy Sepulchre and the relief and protection of pilgrims. The Pope was originally the grand master, but he subsequently ceded his rights to the Guardian Father of the Holy Sepulchre at Jerusalem. The knights were held to strict rules of honor, faith, and purity, but in return they had the most unusual and extraordinary privileges conferred on them. They were exempt from taxation, could marry, as an organization could possess property, could legitimatize bastards, and could cut down and bury the bodies of criminals who had been hanged. After a temporary union with the Hospitalers, the order was reconstructed in 1814, both in France and in Poland, and is still in existence, its members being chosen by the Guardian of the Holy Sepulchre out of noble and devout pilgrims. The badge of the order consists of a Jerusalem cross of red enamel, with four smaller Latin crosses between its arms, surmounted by a crown and held by a black ribbon. The collar is made up of small crosses like the badge.

HOLY SPIRIT. See Holy Ghost.

HOLY SPIRIT PLANT, or Dove Plant. A name given to a species of orchid, *Peristeria elata*, found in Central America, especially in the vicinity of Panama. It is an epiphytic orchid, with large striated green pseudobulbs, which bear three to five lanceolate leaves, often a yard long and 6 inches across. The flower stem springs from the base of the pseudobulbs and is 4 to 6 feet high, a third of its height bearing creamy-white, fragrant flowers, an inch or more in diameter, the inner part of which is often tinged with crimson or other shades of red. The name is derived from the shape of the united column of style and stamens. This column resembles a conventional dove hovering with expanded wings in the vase formed by the petals. It is used in religious festivals in Central America as symbolical of the Holy Spirit; hence its name "el espíritu santo." See Orchid.

HOLY STONE. A miraculous rock at Ardmore, Ireland, which is said to have floated from Rome with robes, a bell, and a lighted taper for St. Patrick.

HO'LYSTONE. A piece of soft stone, usually sandstone, used in scrubbing decks. To holystone a deck is to scrub it, using holystones. Holystones are smooth on one side at least and have a small depression on the other to receive the end of a handle or stick by which they are pushed back and forth. To increase the scrubbing power of the stones, the decks are wetted and sand is sprinkled over them prior to holystoning. The derivation of the term is supposed to be from the fact that holystoning used chiefly to be done on Saturday as a preparation for Sunday inspection, church, etc.

HOLY THURSDAY. See Ascension Day; Holy Week; Maundy Thursday.

HOLY WAR. See Amphictyonic Council; Sacred Wars.

HOLY WAR, The. 1. The first of Thomas Fuller's historical writings (1639). It is a history of the Crusades and was very popular up to the time of the Restoration. 2. A religious allegory, explained on the title-pages as "made by Shaddai upon Diabolus," by John Bunyan (1682).

HOLY WATER (Lat. *aqua benedicta*). Water blessed by a priest for religious uses and employed in the Roman Catholic and Oriental churches. In most ancient religions the use of lustral or purifying water not only formed part of the public worship, but also entered largely into the personal acts of sanctification prescribed to individuals. The Jewish law contained many provisions to the same effect; and Christ, by establishing baptism with water as the necessary form of initiation into the religion instituted by Him, gave His sanction to the use. The usage of sprinkling the hands and face with water before entering the sanctuary, which was prescribed in the Jewish law, was retained, or at least very early adopted, in the Christian Church. It is expressly mentioned by Tertullian in the end of the second century. Water was used for the exorcism of evil spirits. St. Jerome mentions the blessing of water, and the Apostolic Constitutions contain a formula for the purpose. That now given in the Roman missal and ritual has been preserved unaltered from the sacramentary of St. Gregory. It includes an exorcism (q.v.) and the admixture of salt which has been blessed. The water so prepared is sprinkled by the priest on the congregation before high mass (this rite being called the *Asperges*, from the first word of the anthem which is sung during its progress), and is publicly employed as part of the rites for funerals and for the blessing of various objects and persons; that used in the consecration (q.v.) is prepared in a special manner. The ordinary holy water is also used privately by devout Roman Catholics on entering and leaving the church and at other times. It is considered by them as included among sacramentals (q.v.). The original idea of purification became, early in the history of religion, symbolic of spiritual cleansing; but Christian devotion assigned another potency to blessed water accompanied by special invocation, that of casting out evil spirits. Although it is difficult to fix the precise time, it cannot be doubted that the practice of mingling salt with the water is of very ancient origin, perhaps with the idea of adding to the magical power of the water.

HOLY WATER VASE, or Stoup. A receptacle, known in France as *bénitier*, for holy water, placed at the entrance of Roman Catholic churches, so that those who come in or go out may dip their fingers in it and cross themselves. It is frequently in the form of a shell and usually attached to the wall. The kind of vessel known as *pila* in Italy stands on a base of its own. The artists of the Italian Renaissance produced exquisite examples of both types, especially of the *pila*, as in Siena Cathedral. The two holy water stoups in St. Peter's at Rome are huge marble shells, held each by a colossal infant figure.

HOLY WEEK. The week immediately preceding Easter and especially consecrated to the commemoration of the passion of Christ. The observance of the week can be traced back at least to the fourth century. In the Roman Catholic church the special characteristics of the celebration of the Holy Week are increased solemnity and gloom, penitential rigor, and mourning. If any of the ordinary Church festivals fall therein, it is transferred till after Easter. All instrumental music is suspended in the churches, the altars are stripped of their ornaments, the pictures and statues are veiled from public sight; manual labor, although it is no longer entirely prohibited, is by many persons voluntarily suspended; the rigor of fasting is redoubled, and almsdeeds and other works of mercy sedulously enjoined and practiced. All Church services of the week, moreover, breathe the spirit of mourning, some of them being specially devoted to the commemoration of particular scenes in the passion.

Palm Sunday (q.v.) commemorates the triumphal entry of Christ into Jerusalem and is observed by the blessing of palm branches, which are carried in the procession as they were by the people of Jerusalem on that day. Spy Wednesday is the old English name for the day which commemorates the betrayal of Christ by Judas. Holy Thursday (also called Maundy Thursday, q.v.) is the commemoration of the Last Supper and the institution of the Eucharist. With this in mind, white vestments are worn at the mass (only one mass is celebrated on this day), after which the altars are solemnly stripped and washed by the clergy. (See also Foot Washing.) The matins of the last three days, generally sung on the preceding evening (see Tenebræ), constitute an impressive service. On Good Friday the mass is not celebrated, the day being the commemoration of the one sacrifice of the great High Priest; but a special service is held,

called the "mass of the presanctified," including the communion of the priest from the host reserved from the previous day on the "altar of repose," but without the prayer of consecration or the words of institution. (For the ceremony of the "adoration of the cross," see CROSS.) Holy Saturday was in the earliest times set aside for the solemn administration of baptism and orders; the present services of the day begin to partake of the gladness of Easter (q.v.). In the Anglican communion the observance of the week in a similar spirit is prescribed, and the Scripture selections all have a bearing upon the events commemorated. Good Friday is a legal holiday in England and Ireland. The observance of Holy Week is largely increasing, even among the nonliturgical denominations throughout the English-speaking world. For old English customs, consult Chambers, *The Book of Days*, March 20–28 (London, n. d.). For the Catholic ritual, consult Thurston, *Lent and Holy Week* (ib., 1904); Duchesne, *Christian Worship* (ib., 1906); Hellner, *Heortology* (ib., 1908).

HOLYWELL, hŏl'ĭ-wel. A market town and parliamentary borough in Flintshire, North Wales, 4½ miles northwest of Flint (Map: England, C 3). It has limestone quarries, coal, lead, copper, and zinc mines, and numerous establishments for smelting, manufacturing shot, zinc, brass, leather, flannel, cement, cottons, galloons, paper, and beer. Holywell owes its origin to the renowned well of St. Winifred, which is said to be the most copious spring in Britain, giving forth at the rate of 21 gallons a minute. Its waters were believed to be efficacious in curing diseases and are still resorted to by Roman Catholic pilgrims. The well is covered by a fine Perpendicular chapel attributed to Margaret, mother of Henry VII. In the vicinity are remains of the old Saxon abbey of Basingwerk, and in the town is St. Buenos College for Roman Catholic priests. Pop., 1901, 2652; 1911, 2549.

HOLYWOOD, JOHN OF. See SACROBOSCO.

HOLZ, hôlts, ARNO (1863–). A German poet and critic, born at Rastenburg. In 1882 he published a volume of poems, *Klinginsherz*, which won the Augsburg Schiller prize. In *Deutsche Weisen* (1884), written with Jerschke, and in the *Buch der Zeit* (1885 and 1892), his extremely modern tendency appears, and the attention to details and the attempt at photographic realism (under the influence of Zola) are carried even further in *Neue Gleise* (1892), in which he collaborated with Johannes Schlaf. His realistic theory is further illustrated in the plays *Socialaristokraten* (1896) and *Die Blechschmiede* (1902) and is defended in *Die Kunst, ihr Wesen und ihre Gesetze* (1891 et seq.) and *Revolution der Lyrik* (1899). His latest work comprises *Lieder auf einer alten Laute* (1903) and *Dafnis* (1904) and, with Jerschke, the drama *Traumulus* (1904; 10th ed., 1905); *Frei!* (1905), comedy; *Sonnenfinsternis* (1908), tragedy; *Büxl* (1911), comedy, in collaboration with Jerschke; *Ignorabimus* (1913), tragedy. Consult: F. Servaes, *Präludien* (Berlin, 1899); Karl Strobel, *A. Holz und die jüngstdeutsche Bewegung* (ib., 1902); R. Ress, *A. Holz* (ib., 1913).

HOLZSCHUH, hôlts'shōō, DIETRICH. A German pretender, also called TILE KOLUP. He laid claim to the throne as Frederick II, who died in 1250. In Cologne (1284) his claim was ridiculed; he was ducked in a sewer and driven from the city. At Neuss he fared better, because he was looked upon as a powerful magician. In 1285 he went to Wetzlar and there held court; but on the approach of Rudolf he was turned over to the King and was burned as a heretic (1285). Consult Meyer, *Tile Kolup* (Wetzlar, 1868), and Petri, "Der falsche Friedrich," in vol. ii of *Zeitschrift des bergeschen Geschichtsvereins* (Bonn, 1864).

HOMAGE, hŏm'ăj (from OF. *homage, hommage*, Fr. *hommage*, Prov. *homenatge, homenage*, from ML. *hominaticum*, homage, from Lat. *homo*, man). In the feudal system, the ceremony whereby a tenant in chivalry or by knight's service completed his investiture and thus became entitled to the lands of which he was enfeoffed by his lord, or which fell to him by inheritance. The form was ordinary as follows: The vassal knelt before his lord, placed his hands between his lord's hands, and declared himself the lord's vassal for his fief. The lord then gave him a kiss and raised him from his knees. Homage and fealty (q.v.) were usually parts of the same ceremony, but were not synonymous. Homage was always due to the immediate lord of whom the land was held. It consisted in an oath of allegiance wherein the vassal declared himself the lord's man (*homo*) and devoted himself to the lord's service "of life and limb and earthly obedience." It differed from fealty in that it was exacted only of military tenants, while fealty was due from socage tenants as well, and in the further fact that fealty was accounted a service, or obligation, by which the tenant held his land (a tenant was sometimes said to hold by fealty in lieu of all other services), whereas homage was not a specified service to be rendered by the tenant for his land, but an incident of the more honorable tenure of knight's service. However, there was probably little difference in the form of oath required in the two cases. With the other incidents peculiar to military tenure, homage was abolished by statute in 1660 (12 Car. II, c. 24), but fealty survived as a feature of socage tenure, though it has fallen into disuse.

In modern English law the term "homage" is still employed to denote the oath of allegiance taken by the nobility on the coronation of a new sovereign as well as the oath taken by a newly appointed bishop or archbishop. Consult Luchaire, *Manuel des institutions françaises* (Paris, 1892). See FEUDALISM.

HOMAGE ANCESTRAL. An ancient form of English land tenure of a privileged character. It was a form of the tenure of free and common socage (q.v.) and existed "where time out of mind a man and his ancestors had held by homage" only, in lieu of all other services. The alienation of an estate held by homage ancestral converted it into an ordinary socage tenure by homage and freed it from the peculiar privileges which attached to it by virtue of its ancestral character.

HOM'ALONO'TUS (Neo-Lat., from Gk. ὁμαλός, *homalos*, level + νῶτον, *nōton*, back). A genus of fossil trilobites of large size, found in the Silurian and Devonian rocks and characterized by the absence of trilobation of the thoracic segments. See TRILOBITA.

HOM'ALOP'SIDÆ. See HERPETON.

HOMAT'ROPINE (from Gk. ὁμός, *homos*, same + Eng. *atropine*, from Neo-Lat. *atropina*, from *Atropa*, deadly nightshade, from Gk. Ἄτροπος, *Atropos*, name of one of the Fates, the inflexible, from *a*, *a*, not + τρόπος, *tropos*, a turning, from τρέπειν, *trepein*, to turn). A by-product in the manufacture of atropine, used

chiefly for paralyzing the accommodation and dilating the pupil for purposes of examination. For this purpose the hydrobromate, which is freely soluble in water, is employed. Its action is similar to that of atropine, but less powerful and of shorter duration. The dilatation of the pupil passes off in from 24 to 36 hours, while that resulting from atropine lasts several days. Homatropine is often combined with cocaine when used for dilating the pupils. For internal use it is inferior to atropine.

HOMBERG, hŏm'bĕrk, Wilhelm (1652–1715). A Dutch naturalist and chemist, born at Batavia, Java. He studied law at Jena and Leipzig, and, having graduated in medicine at Wittenberg, practiced at Paris in 1682–85 and after 1691 and at Rome in 1685–90. He is remembered chiefly for his discovery of boracic acid in 1702, but he made several other important contributions to chemistry and physics.

HOMBURG. See Hesse-Homburg.

HOMBURG, Prince of. See Frederick II.

HOMBURG VOR DER HÖHE, hŏm'bŭrk fôr dĕr hē'e. A fashionable watering place, largely frequented by English, in the Prussian Province of Hesse-Nassau, situated at the foot of the Taunus Mountains, 11 miles northwest of Frankfort (Map: Germany, C 3). Towering above the older section of the town is an old castle which formerly belonged to the landgraves of Hesse-Homburg and is now used by the Prussian royal family. The new town was founded by the Landgrave Frederick II. The landgraves resided here from 1680 to 1866. The old Kurhaus contains a museum of antiquities. The splendid gambling resort here was closed in 1872. The chief of the eight mineral springs is the Elisabeth-Brunnen, the water of which is very rich in salts and is extensively exported. Other springs are rich in iron, and the waters of several are used only for bathing. The annual number of guests exceeds 14,000. Homburg has manufactures of machinery, soap, leather, hats, noodles, iron, castings, paper boxes, vinegar, mustard, and white lead. Pop., 1900, 9635; 1910, 14,344. The environs are delightful. The remains of extensive Roman intrenchments are to be seen in the vicinity.

HOME, Daniel Dunglas (1833–86). A Scottish spiritualist medium, born near Edinburgh. He was descended on his mother's side from a Highland family noted for its gift of "second sight." When a child, he was brought to the United States, and before he was 20 he was widely known as a medium. On the testimony of William Cullen Bryant, Professor Wells of Harvard, and other well-known men, it is recorded that knocking on the walls, the sliding about of the furniture, and the "levitation" of the medium himself in the air occurred without the slightest recourse to trickery so far as they could observe. When he returned to England in 1856, his séances were attended by many prominent people, including Robert Browning and his wife. Mrs. Browning is said to have believed in spiritualism, but her husband disbelieved, and was inspired to write *Mr. Sludge, the Medium.* In 1856 Home became a Catholic while at Rome, but in 1864 was expelled from the city as a sorcerer. Dr. Robert Chambers and Dr. Lockhart Robertson were among his converts, and a number of scientists were convinced of the genuineness of his powers, including Sir William Crookes, who published an account of the experiments made with him, entitled *Researches in the Phenomena of Spiritualism* (1874). In 1866 Home became secretary of the Spiritual Athenæum for the propagation of spiritualism. He instituted a vigorous campaign against professional mediums and scrupulously abstained from taking money at his séances. He published *Incidents in my Life* (2 vols., 1863–72) and *Lights and Shadows of Spiritualism* (1877). Consult Madame Home, *D. D. Home: His Life and Mission* (London, 1888) and *The Gift of D. D. Home* (ib., 1890).

HOME, Sir Everard (1756–1832). An English surgeon, born at Hull, the son of an army surgeon. He studied at Westminster School and in 1773 resigned a scholarship in Trinity College, Cambridge, to study under John Hunter (q.v.), who married Home's sister. Home was long connected with the College of Surgeons, was chosen its professor of anatomy and surgery in 1804, member of its court of examiners in 1809, master in 1813, and its first president in 1821. He was censured bitterly for burning Hunter's valuable manuscripts, of which he was custodian, and for using them in his work on *Comparative Anatomy* (1814–23), which gains what value it has from the source employed. Among Home's other writings are: *The Properties of Pus,* which won a gold medal from the Lyceum Medicum Londinense (1788); a biographical notice of Hunter, prefixed to Hunter, *On Blood, Inflammation, and Gunshot Wounds* (1794); *Practical Observations on the Treatment of Strictures in the Urethra and Œsophagus* (1795); *Observations on the Treatment of Ulcers on the Legs* (2d ed., 1801); *Practical Observations on the Diseases of the Prostate Gland* (1811–18); *On the Formation of Tumors* (1830).

HOME, Henry, Lord Kames (1696–1782). A Scottish judge and author, born at Kames. He entered the bar in 1724, was raised to the bench in 1752, with the title of Lord Kames, and was made one of the lords of judiciary in 1763. As a coarse but able judge, he is mentioned by Scott in *Redgauntlet* (chap. i). In 1728 he published *Remarkable Decisions of the Court of Session from 1716 to 1728.* The materials for this work were in 1741 embodied in his *Dictionary of the Decisions of the Court of Session* during its whole history. He is best known, however, by *Essays on the Principles of Morality and Natural Religion* (1751), containing a solution of the question of human freedom, which brought on him the suspicion of infidelity; *Introduction to the Art of Thinking* (1761); and, above all, the celebrated *Elements of Criticism* (1762), the work on which his fame now chiefly rests. In 1774 appeared his *Sketches of the History of Man.* While thus occupied with judicial and literary labors, he took a very active interest in agriculture, writing a useful tract entitled *The Gentleman Farmer: Being an Attempt to Improve Agriculture by Subjecting it to the Test of Rational Principles* (1776). His last work, *Loose Thoughts on Education* (1781), was written in his eighty-fifth year. Consult Lord Woodhouselee (A. F. Tytler), *Memoirs of the Life and Writings of Home* (Edinburgh, 1807).

HOME, John (1722–1808). A Scottish dramatist, born at Leith. He was educated at the University of Edinburgh and prepared for the Church. During the uprising of 1745 he fought as volunteer on the Hanoverian side. In 1747 he became minister of Athelstaneford in East

Lothian, where he wrote his famous tragedy of *Douglas*. Performed at Edinburgh in 1756 and at London in 1757, it was received with enthusiasm. For his plot Home used the popular Scottish ballad of *Childe Maurice* and in a less degree Shakespeare's *Othello*. The play, though turgid in diction, has great merits. It was the best English tragedy since Otway. The clergy of the Scottish Kirk, opposed to the theatre on principle, were scandalized by the production. After a bitter controversy Home resigned his charge (1757). He became secretary to Lord Bute, tutor to the Prince of Wales (afterward George III), and received liberal pensions. In 1770 he married and returned to East Lothian and after a time settled in Edinburgh. Besides *Douglas*, Home wrote other plays, which either failed or met with moderate success. Among them are: *Agis* (produced 1758 at Drury Lane); *Aquileia* (1760); *Fatal Discovery* (1769); *Alonzo* (1773); *Alfred* (1778). He also wrote a *History of the Rebellion of 1745* (1802). Consult: *Works*, with memoir by Henry Mackenzie (Edinburgh, 1822); Wilson, *Poets and Poetry of Scotland* (London, 1875); Francis Espinasse, in *Dictionary of National Biography*, vol. xxvii (ib., 1891).

HOME, Sir Patrick. See Hume, Sir Patrick.

HOME AS FOUND. A novel by J. Fenimore Cooper (1838). It is a sequel to *Homeward Bound*.

HOME ECONOMICS treats of the materials used in the home and of its economic and social interests and activities, all considered in their practical and also in their scientific aspects. Its content has been drawn from many sources, including experience and the results of research in various fields of knowledge. As a subject of study, it has only recently been systematically formulated, and its terminology is therefore not entirely uniform. It has been called home science, domestic science, household economics, household science, household arts, and domestic economy. There is a tendency at present, however, to use these various terms to designate special branches of the subject and to use "home economics" to cover the whole field. In support of this usage it is said that the word "home" has immaterial as well as material implications, while the kindred words have not, and that it may stand not only for the household and the roof which shelters it, but also for the centring points of the affections; and, further, that economics (*οἶκος*, the house or household, *νόμος*, law) of the old Greek writers carries not only its modern meaning, but also its original significance, viz., the art of wise and systematic household management.

Home economics, like agriculture and engineering, is a complex. Grouped about it and only imperfectly marked off from it are history, economics, sociology, æsthetics, mathematics, physics, hygiene, chemistry, physiology, biology, and other subjects. From all of these it draws information for the solutions of its own problems, which in general concern four main topics —food, clothing, shelter, and home management. In one form or another its problems have engaged thought and labor since home life first developed from the barbarism which preceded it. Even their formulation dates far back, for Xenophon's *Œconomicus* deals didactically with the management of a farm and household. As a subject for formal instruction, however, home economics is of much more recent origin. Records, though imperfect, show that it had its beginning in the Western Hemisphere in the middle of the seventeenth century, when the nuns in Quebec gave instruction in needlework, knitting, and household tasks to groups of girls. Regular class instruction in cooking seems to have been given in Edinburgh as early as 1835. For a long time formal instruction was confined to cooking, sewing, and housekeeping. These became a part of public-school instruction in the United States as early as 1876, being introduced first in the Eastern States. The work in colleges, on the other hand, had its origin in western United States, where the influence of State universities and agricultural colleges was pronounced.

State institutions in Iowa, Kansas, and Illinois were the pioneers in college work in home economics. Some confusion exists as to dates, but Iowa seems to have been (in 1869) first in the field with domestic-science instruction, which was, however, not permanent. The early seventies witnessed a new beginning there, destined to lead to uninterrupted development, and also the beginnings of work in Kansas and Illinois. In these and other Western institutions home economics proved itself to be mentally nutritive and not simply a form of vocational training, as some of its opponents had maintained. With the realization of its educational possibilities when rightly combined and correlated with other work, came the recognition in other localities of its great educational importance, and many women's colleges and coeducational institutions throughout the United States have opened their doors to it. Many other colleges which do not offer instruction specifically designated as home economics offer courses in hygiene, sanitation, food chemistry, and other subjects which are foundational to a well-rounded course in home economics, but which were not formerly a part of higher education of women.

Interest in the teaching of home economics has grown very rapidly during the last 25 years. It is now taught in 140 or more colleges and universities, in many normal and high schools in the United States, as well as in technical, vocational, and trade schools. A similar development may be noted in Canada. In Great Britain and on the Continent it forms a part of the general plan of education. Up to the present the work has been confined chiefly to secondary and technical schools and extension education. However, interest in the subject in its relation to higher education is increasing.

Courses of instruction in home economics may be cultural, technical, or vocational; elementary, secondary, or advanced. Advanced cultural courses deal chiefly with historical, economical, and sociological data, and with the sciences that are applied in household processes and problems. Technical courses lay special stress upon the problems of household management in order to develop special proficiency in the profession of teaching home economics or in managing homes or institutions. Vocational or trade courses deal chiefly with the manufacturing processes carried on in the home. Elementary courses usually take the form of manual training and are designed to have general educational value and also to be useful in a practical way to pupils who must leave school early.

Original investigation in connection with the

teaching of home economics has so far been concerned chiefly with the functions and uses of food, with hygiene, and with economics. The hygienic and economic problems which clothing and shelter present have been little investigated, but even in these matters the value of careful laboratory research is coming to be recognized.

Though late in its development in pedagogical form, home economics, like other branches of education, has its general and specific literature, its textbook and periodical literature, in addition to its empirical knowledge gained in the past and handed on from generation to generation. It has also its associations and gatherings for counsel and progress. An International Bureau has been established in Fribourg, Switzerland, to collect the literature of the subject and to serve as a clearing house for information. See ADULTERATION; COOKERY; FOOD; FOOD PRESERVATION; FISH AS FOOD; FIRELESS COOKER; FRUIT; MEAT; MILK; PORK; VEGETABLES; and similar topics. See also MANAGEMENT, HOME AND INSTITUTION; TEXTILES AND CLOTHING; COSTUME; DRESS; EMBROIDERY; FASHION; GLOVE; JEWELRY; LACE; SHOES; ETC. See SHELTER AND HOUSING; ARCHITECTURE; BUILDING; FURNITURE; HEATING AND VENTILATION; PLUMBING.

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HOMEL, hō'mĕl. A town of Russia. See GOMEL.

HO'MER. A city and the parish seat of Claiborne Parish, La., 45 miles (direct) east by north of Shreveport, on the Louisiana and Northwest Railroad (Map: Louisiana, C 1). It is the commercial centre for a productive cotton-growing district. The water works and electric-light plant are owned by the city. Pop., 1890, 1132; 1900, 1157; 1910, 1855.

HOMER. A village in Cortland Co., N. Y., 34 miles south of Syracuse, on the Delaware, Lackawanna, and Western Railroad (Map: New York, D 5). It is in a fertile farming and dairying region, has a canning factory, and manufactures shirts, carriages, fishing lines, and sleighs. The village contains Homer Academy, the county home for aged women, and a public library. The water works are municipally owned. Pop., 1900, 2381; 1910, 2695.

HOMER (Lat. *Homerus*, from Gk. *Ὅμηρος*). The less critical of the ancients attributed to Homer, who was to them a real person, many minor poems, as the *Hymns*, the *Margites* (q.v.), the late *Batrachomyomachia* (q.v.), and many of the lost so-called Cyclic Epics, dealing with the early legends. (See CYCLIC POETS.) To the more thoughtful, however, he was the author of the *Iliad* and the *Odyssey* only. The skeptical "separators" (chorizontes) denied him the *Odyssey*. To us he is the unknown poet who chiefly shaped the *Iliad* and possibly also the *Odyssey*. His date is placed by Herodotus about 850 B.C.; by the moderns, anywhere from 900 to 1100 B.C. At any rate, his is the first name in European literature. The *Iliad*, in 24 books, deals with an episode in the legendary siege of Troy (q.v.), or Ilium, a real town of which Schliemann (q.v.) excavated the remains at Hissarlik, a hillock in northwestern Asia Minor. This siege, in one view, is an idealization of the prolonged struggles of Achæan and Æolian invaders from Greece with the old (Phrygian?) possessors of the soil; in another view it represents the struggle between the Greeks and the inhabitants of the Troad for mastery of the Hellespont, and consequent control of trade with the Black Sea. (For this view, consult Leaf, *Troy: A Study in Homeric Geography*, London, 1912.) In the legend the war is undertaken to recover the beautiful Helen (q.v.), wife of King Menelaus of Sparta, who had eloped with Paris (q.v.), son of King Priam of Troy. In the tenth year of the war Achilles (q.v.), the Achæan (Thessalian) hero, quarrels with the Greek commander in chief, Agamemnon, King of Mycenæ, about a captive girl, Briseïs, and sulks in his tent, to the great loss of the Greeks, until he is aroused by the death of his dearest friend, Patroclus. Then he hurls himself into the battle and slays the slayer, Hector, the chief bulwark of Troy, with whose solemn burial the poem concludes.

The *Odyssey* relates, likewise in 24 books, the surprising experiences of Odysseus (see ULYSSES) as, after the 10 years' siege of Troy, he wandered for 10 years more, ever yearning to see the rocky isle of Ithaca, his home. (See ITHAKI.) Underplots describe the life of his faithful wife, Penelope, persecuted by the importunate wooing of rude suitors, and the adventures of his son, Telemachus, who in the tenth year goes forth in search of his father. In the end Odysseus returns, joins Telemachus, slays the suitors, and is at last recognized by Penelope. A literature does not thus begin with two long artistic and skillfully constructed epics. (See GREEK LITERATURE, I, *The Age of Epic Poetry*.) We must assume behind the *Iliad* shorter epic ballads such as the bard Phemius in the *Odyssey* (book i) chants to the suitors, and Demodocus recites at the Phæacian court (*Odyssey*, book viii), hymns to the gods, and songs of the "glory of men," such as Achilles, idle in his tent, sings to the music of a lyre won from the spoils of a captive town (*Iliad*, ix). The systematic mythology of the poems, the number of clearly defined personalities which they present, the profusion of detail about things and persons and places, their literary art, poetical diction, and mastery of the hexameter—all these things presuppose a long historical and literary development. But of this we know nothing except by analogy and inference from the poems themselves. The manifestly spurious ancient "lives" of Homer are clearly in many cases fashioned from minor poems attributed to "Homer." Homer, they tell us, was born of the nymph Critheïs and the river Meles (at Smyrna) and hence was called Melesigenes. The name Homer was variously

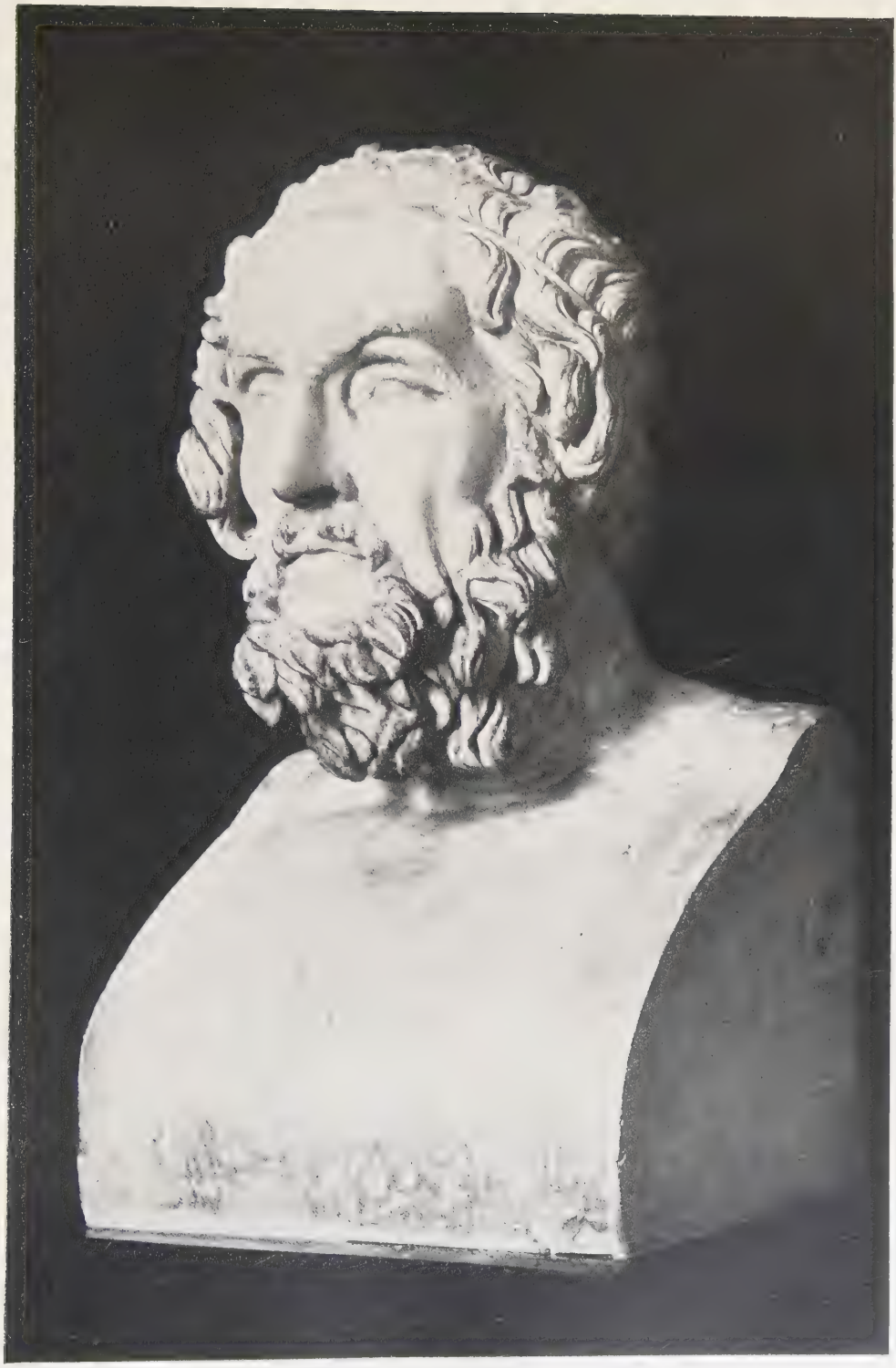
derived from the Greek word for hostage, because, said the story, he was a hostage in youth, or from a dialectic word for blind, because he lost his sight. Homer, the "lives" continue, wandered from city to city of Asia Minor, earning his bread by reciting his poetry or by "teaching," and immortalized by name in his poems many of those who treated him kindly. Some poems he actually gave to others who won fame by them—to Stasinus of Cyprus, e.g., he gave as his daughter's dowry the *Cypria* (q.v.), one of the so-called Cyclic Epics, of which only a few fragments remain. He died, as an oracle had foretold, through chagrin at his inability to read the riddle of the fishermen: "What we caught we left, what we caught not we bring," which referred not to fishes but to an animal more "familiar to man." After his death,

> "Seven cities claimed the mighty Homer dead,
> Where living Homer begged his daily bread."

All this and much more is fable. Modern scholars ask, rather: What is the origin of epic poetry in Greece? Can we detect in the *Iliad* traces of the ballads or shorter lays out of which we may conceive it to have been composed? Can we break up the *Iliad* into two chief groups of lays—the wrath of Achilles proper, and the general picture of the siege of Troy, by which this original framework was enlarged? What features of style, language, and manners, if any, mark the *Odyssey* as later than the *Iliad?* What parts of the *Iliad* most resemble the *Odyssey* in these features? Can we dissect the *Odyssey* into a "return of Odysseus" and a "Telemachiad"? Was the "story of Achilles" originally composed in Thessaly in the Æolic dialect, then transferred to the scene of the struggles of early Greek colonists in northwestern Asia Minor, and finally Ionicized, enlarged, embellished, and chanted by minstrels in the halls of Ionian nobles and merchant princes on the Lydian coast? Does the *Odyssey* reflect the travelers' tales brought back to Ionian seaports by the first navigators of the Euxine and the Mediterranean? What is the precise relation of the life depicted by Homer to the traditional legend of early Greek history on the one hand, and on the other to the apparently similar civilization revealed at Troy, Mycenæ, and Tiryns by the spade of Schliemann (q.v.), and conjecturally carried back to the third millennium B.C. by recent discoveries in Crete? See ARCHÆOLOGY, II, *Minoan, or Ægean, Period.*

These questions are debated by specialists, but with little unanimity of result. Meanwhile the *Iliad* and the *Odyssey* abide. They may be studied: (1) as a picture of early Greek life; (2) as literature; (3) in their historic influence.

Homer is the most objective of poets. In him mind has not yet been turned back upon itself. It is a mirror of the world. If the heroes dine, the ox is consecrated to the gods, slain, cut up, roasted, carved, and served up in our presence. We assist at all the details of the hero's toilet or of his arming for battle. Homer does not enumerate the parts of a ship or a bed; but he shows us Odysseus building the craft that is to bear him away from the isle of Calypso, or the bed whose secret reveals his identity to Penelope. We watch every step in the launching of the vessel that bears Chryseïs back to her father. We are not merely told that the ox sacrificed by Nestor has gold-tipped horns; we see the goldsmith come with the tools of his craft to lay on the gold. In consequence, we know the life of the Homeric man more intimately than that of any other primitive people—than that of the Hebrews or of our own Teutonic ancestors. This lore has been collected in three huge double volumes of Homeric "Realien," or real things, by the German scholar Buchholz (*Die homerische Realien,* 3 vols., Leipzig, 1871–73; 2d ed., 1887), and every history of Greece contains its chapter on early Greek life, religion, government, and manners, drawn from the same source. And this wealth of concrete detail is a striking, if not the chief, literary quality of Homeric poetry. Homer does not "beat in the void his luminous wings in vain." He does not analyze and refine. He is not dominated by any one great unifying religious or patriotic idea, as is Vergil or Dante or Milton. He does not delay to moralize or reflect except in brief pregnant sentences. He flows on and on in a broad, pellucid stream of narrative, description, and, above all, action. "The multitude of things in Homer is wonderful," says Hazlitt—"the splendor, the truth, the power, the variety." The great gods of Homer—Zeus, Apollo, Athena, Hera, Poseidon—have remained for 3000 years as ideal types for all subsequent poetry and sculpture. His personages—Achilles, Hector, Nestor, Odysseus, Helen, Andromache, Penelope, Nausicaa—live for the imagination to-day as no others save those of Shakespeare's greatest tragedies. The berserker battle rage and impassioned eloquence of Achilles still stir the sluggish blood like wine. The great pathetic or dramatic episodes—the parting of Hector and Andromache, the death of Sarpedon, the horses of Achilles mourning for Patroclus, Hecuba baring her bosom to her son from the walls of Troy, the dirges for Hector—are still the despair of imitators. The *Odyssey* is yet the most interesting storybook in the world. In short, the Homeric poems are still, as Matthew Arnold said, "the most important poetical monument existing." The most distinctive literary quality of that poetry is due to its intermediate position between the literary epic, as *Paradise Lost,* and the supposedly spontaneous popular epic, as the *Edda,* the *Kalewala,* or the *Chanson de Roland.* It has all the simple, childlike charm of the one, all the lucidity, architectonic order, and noble diction of the other. The primitive feelings still preserve their freshness and force, but they appeal to us through the medium of a noble and dignified art. But though an artist, and perhaps a conscious artist, the Homeric poet is not, like his successors, Apollonius of Rhodes, Vergil, Tasso, Milton, conscious of an inimitable model, of a long line of predecessors, and of a code of critic-formed rules. Matthew Arnold's four canons of Homeric style are well known: Homer, he says, is rapid, plain, and direct in syntax and words, plain and direct in matter and ideas, and yet withal eminently noble—a master of the grand style in simplicity. There is space only to mention some minor traits: (1) the stereotyped epithets, "cloud-compelling Zeus," the "wine-dark" or "unharvested" sea, the "rosy-fingered dawn," "the swift-footed Achilles," the "red-cheeked ships"; (2) the peculiar Homeric simile which, suggested by one point of resemblance, is continued for the sake of the picture into details where the likeness between the things compared ceases. It is cleverly imitated by Matthew Arnold in



HOMER

FROM AN ANTIQUE BUST IN THE LOUVRE, PARIS

Sohrab and Rustum. There are nearly 200 such similes in the *Iliad*, many of them containing precious detail about Homeric life. Those drawn from lions and the chase are particularly vigorous. To the Greek Homer was Bible, Shakespeare, Milton, and Domesday Book in one. Later forms of poetry were looked upon as evolutions or borrowings from Homer. He was the foundation of education, and many cultivated Greeks knew the *Iliad* by heart. Even in the prime of the Attic drama professional rhapsodists recited the *Iliad* and the *Odyssey* to enthusiastic audiences of thousands. Ethical reflection took its first texts from Homer and was largely occupied in the criticism of the conduct and character of his personages. Purer religious ideas presented themselves in the form of a censure by Plato and Xenophanes of Homeric anthropomorphism, and the allegorical interpretation of literature was invented as a reconciliation. The beginnings of literary and linguistic criticism among the Greek sophists attached themselves to Homeric problems. Lexicography probably originated in books of Homeric glosses. The conception of text criticism arose in the effort to establish a sound Homeric text. And the critical science of the great Alexandrian scholars, Zenodotus, Aristophanes of Byzantium, and Aristarchus, had its origin and achieved its greatest triumphs in the study of Homer.

It is in the modern world that the famous Homeric Question begins (if we ignore slight anticipations by Bentley and Vico), with F. A. Wolf's Latin *Prolegomena ad Homerum*, published in 1795. This was partly called forth by the recent publication of the Venetian scholia, which revealed how much the true text had been debated by the critics of antiquity. Wolf also collected stray notices in ancient authors to the effect that Solon or Hipparchus required the rhapsodists to recite Homer in due succession or from prompting, and that Pisistratus first reduced the scattered poems of Homer into one body. He inferred that the *Iliad* and the *Odyssey* were not originally composed as we have them, but were put together out of preëxisting materials. He confirmed this view by the argument (now refuted by facts) that writing was unknown, or at least rare, in early Greece, and that a long epic could not have been composed without writing. Since Wolf's time Lachmann, Hermann, Nitzsch, Grote, Christ, Leaf, and a host of others have elaborated theories of the composition of the *Iliad*. The debate between the partisans of lays stitched together and an original framework expanded and interpolated often degenerated into a logomachy. The tendency now is towards the second hypothesis. Proof is in the nature of things unattainable. For the present status of the question and bibliographical information concerning studies of the question, reference may be made to Scott, review of Rothe, "Die Ilias als Dichtung," in *The Classical Weekly*, iv (1911), and review of Rothe, "Die Odysee als Dichtung und ihr Verhältnis zur Ilias," ib., viii (1914), and Shewan, "Recent Homeric Literature," in *Classical Philology*, vii (1912). These two writers, in these and other papers in recent volumes of *Classical Philology*, the *Classical Quarterly*, the *Classical Weekly*, and the *American Journal of Philology*, argue strongly for the unity of the *Iliad* and the *Odyssey* as the work of a single period, even of a single author. On the other side consult Prentice, a review of Drerup, "Das fünfte Buch der Ilias: Grundlagen einer homerischen Kritik," in *American Journal of Philology*, xxxiv (1913). Meanwhile Chadwick, *The Heroic Age* (Cambridge, 1912), comparing Greek and Teutonic epics and examining the antecedents and environments of the heroic age in Greece about 1000 B.C., and the sources of Teutonic poetry in the third to the sixth centuries A.D., holds that similar conditions produced, with no suspicion of imitation, strikingly similar results. He believes that the Homeric poems reflect the age of the kings as epics based on the court poems of the heroic age itself.

The imitation of Homer through Vergil by Tasso, Camões, and Milton is too large a theme for our space. The critics of the seventeenth and eighteenth centuries elaborated rules for the correct epic which have been entertainingly parodied by Macaulay in his prophetic account of the "Wellingtoniad." Pope's translation (about 1720) long remained a classic and the model of poetical diction. It of course failed to satisfy the taste of the romantic revival at the end of the century or to meet the demands of the new scholarship born about the same time in Germany. Many attempts have been made to supersede it in popular favor; but, despite its artificial rhetoric, it still remains for the majority of English-speaking readers the one poetical translation of Homer. The early versions of Hobbes and Ogilby are of interest only to professional students of literature. Chapman is praised on the faith of Keats's noble sonnet and because of occasional spirited passages and exquisite lines. But the rugged rhythms, the obscurity of the syntax, the fantastic Elizabethan conceits, and the long uninspired tracts of doggerel make him intolerable in continuous perusal. Cowper, in his blank-verse version, aimed at uniting Miltonic stateliness with fidelity to Homeric simplicity, but succeeded only in being pompous and dull. Since the publication of Matthew Arnold's classic lectures *On Translating Homer*, we have had, among others, the estimable blank-verse translations of Lord Derby and of Bryant, and Way's spirited rendering in rhymed anapæstic hexameter. No definitive translation of Homer is possible, for every generation must reinterpret him in order to blend Homeric sentiment with its own in the measure demanded by its taste. Of late the majority of readers prefer the literal prose versions in the slightly archaic and consciously simple English of Lang, Leaf, and Myers (*Iliad*), and Butcher and Lang (*Odyssey*).

Bibliography. The needs of the English student will be best met by Seymour, *Introduction to the Language and Verse of Homer* (Boston, 1889); Monro, *A Grammar of the Homeric Dialect* (2d ed., Oxford, 1891); Jebb, *Introduction to Homer* (Boston, 1893); Lang, *Homer and the Epic* (London, 1893). Full bibliographies may be found in the discussions of Homer in the various histories of Greek literature, especially in Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (5th ed., Munich, 1908). Consult also the article "Homeros," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913). A suggestive paper on the world's study of Homer is that by Smyth, "Epic Poetry," in *Greek Literature* (New York, 1912).

Good text editions are those of Dindorf-

Hentze, Cauer, Van Leeuwen, Monro, and Allen. A good annotated (English) edition of the *Iliad* is that of Leaf (2 vols., 2d ed., London, 1900–02), and of the *Odyssey* that of Hayman (ib., 1882) and that of Merry, Riddell, and Monro (2 vols., Oxford, 1886–1901). An excellent annotated edition in German is that by Ameis-Hentze (Leipzig; undergoing revision again in 1914). The fullest Homeric lexicon is the *Lexicon Homericum* of Ebeling (Leipzig, 1885), or in English the Homeric Dictionary, by Autenrieth-Keep (New York, 1891). For the general study of Homeric antiquities, consult: Buchholz, *Homerische Realien* (3 vols., 2d ed., Leipzig, 1887); Helbig, *Das homerische Epos aus den Denkmälern erläutert* (2d ed., ib., 1887); Anderson-Engelmann, *Pictorial Atlas to Homer* (New York, 1892); Reichel, *Ueber homerische Waffen* (Vienna, 1894); Keller, *Homeric Society* (London, 1902); Bérard, *Les Phéniciens et l'Odyssée* (Paris, 1902–03); Browne, *Handbook of Homeric Study* (London, 1905); Seymour, *Life in the Homeric Age* (New York, 1907); Robert, "Topographische Probleme der Ilias," in *Hermes*, xlii (1907). See EPIC POETRY; GREEK LITERATURE; and the articles on the various authors and scholars, ancient and modern, mentioned in the article above.

HOMER, APOTHEOSIS OF. 1. A celebrated relief containing many figures, now in the British Museum. It was found in the Appian Way in the seventeenth century and probably dates from the first century A.D. 2. A large picture by Ingres (q.v.), now in the Louvre.

HOMER, LOUISE (c.1872–). An American dramatic contralto, born in Pittsburgh, Pa. Her maiden name was Louise Dilworth Beatty. She began her musical studies in Philadelphia. In 1894 she was studying singing with Wm. L. Whitney in Boston, and harmony with Sidney Homer, whom she married the following year. After two more years of study with Madame Koenig at Paris she made her début at Vichy as Leonora in *La Favorita* (1898). In the spring of 1899 she appeared at Covent Garden and in the fall at La Monnaie in Brussels. Her success at the Metropolitan Opera House of New York during her first season in 1900 was so emphatic and lasting that she continued thereafter to be a regular member of the company. With a voice of great compass, remarkably even in the different registers, she combines a fiery temperament and more than ordinary histrionic ability.

HOMER, SIDNEY (1864–). An American composer, born in Boston. He received his first musical instruction from G. W. Chadwick in Boston. Then he spent five years studying in Europe, three years being devoted to the study of composition under Rheinberger at the Königliche Musikschule in Munich. From 1888 to 1896 he lived in Boston as a private teacher of harmony and counterpoint. There Louise Beatty (subsequently famous as Louise Homer, q.v.) became his pupil and in 1895 his wife. He also gave lecture recitals on symphonies and the music dramas of Wagner. As a composer, he is known only for his songs; although he wrote some works in the larger forms, he did not publish them.

HOMER, WINSLOW (1836–1910). An American genre and marine painter, one of the foremost and the most typical of his school. He was born at Boston, Feb. 24, 1836, but passed his boyhood at Cambridge, Mass., then a small town, where his passion for outdoor life had full scope. At 19 he entered a lithographer's shop and after two years set up for himself in Boston, designing illustrations for *Ballou's Monthly* and for Harper and Brothers, who offered him a salaried position, which was declined. In 1859 he removed to New York, and, while supporting himself by illustrating, he attended the night class of the National Academy of Design under Cummings. From Frédéric Rondel, a French painter usually reputed his master, he had just four lessons. On the outbreak of the Civil War, in 1861, he went to the front as a special war correspondent and artist for *Harper's Weekly*. His election as associate (1864) and member (1865) of the National Academy came during the period of his earliest oil paintings of war and camp subjects, such as "Rations" (1863), "The Bright Side" (1865), and, most celebrated of all, "Prisoners from the Front" (1865). In 1867 he made his first trip to Europe, exhibiting the two last-named pictures with much success at Paris, Brussels, and Antwerp. Ten months spent in Paris were without influence upon his art, and on his return to New York he continued to illustrate for the Harpers until 1875. He painted a number of genre subjects, chiefly of New England village life and of negro life and character, studied during a sojourn at Petersburg, Va. These two groups include: "New England Country School"; "Snapping the Whip"; "The Two Guides," an Adirondack subject; "A Visit from the Old Mistress" (1876), now in the National Gallery, Washington; "The Campfire."

His interest, however, turned more to subjects relating to the sea. In 1880 he painted at Gloucester, Mass., and in 1881–82 at Tynemouth on the east coast of England, depicting the life of the fisher folk in a series of remarkable aquarelles and several oil paintings, such as "Mending the Nets," "Watching the Tempest," and "A Voice from the Cliffs." In 1884 he settled permanently at Prout's Neck, near Scarborough, Me., entering upon his great career as the painter of the ocean and the fisher folk. His incomparable series of paintings began with "The Life Line" (1884), Elkins collection, Philadelphia; this was followed by "The Fog Warning" (1885), Boston Art Museum; "Lost on the Grand Banks"; "Undertow" (1886), "Eight Bells," "The West Wind," "A Summer Night," Luxembourg Museum, Paris; the "Northeaster" and "Cannon Rock," both (1895) in the Metropolitan Museum, New York; "The Fox Hunt," Pennsylvania Academy, Philadelphia; "High Cliff, Coast of Maine" (1894), National Gallery, Washington; "Lookout—All's Well," Boston Art Museum; "The Maine Coast" (1895), Metropolitan Museum; and "On a Lee Shore" (1900), Providence—the two last often considered his masterpieces. His solitary life in Maine was enlivened by constant association with his brothers, varied by winter journeys to Florida, the Bahamas, and Cuba, resulting in a brilliant series of water colors, some of which are in the Brooklyn Museum; by trips to the Adirondacks and the Province of Quebec, the waters and fishes of which he has studied in marvelous manner. His numerous aquarelles are scattered throughout public museums (New York, Boston, Brooklyn, Worcester, etc.) and private collections. He received gold medals at the World's Fair, Chicago (1892), at Pittsburgh (1896), Philadelphia, and the Paris Exposition (1900), and was

a member of the American Academy of Arts and Letters.

Winslow Homer is the most typically national of all American painters. Self-taught in his technique, marked by the complete absence of foreign influence, he is no less national in his subjects and his powerful and direct presentation. The chief characteristic of his art is its absolute verity, its uncompromising presentation of nature. His color is strong and sure, sometimes harsh, but always true, especially in the values. But his pictures lack tone (except in so far as nature provides it), and therefore lack the decorative quality. Both draftsmanship and composition are excellent. In water color his technique is a marvel of boldness and facility.

Bibliography. The chief monograph on Winslow Homer is by W. H. Downes (Boston, 1911). Other descriptions of his life and work are by M. Van Rensselaer, *Six Portraits* (New York, 1889); C. H. Caffin, *American Masters of Painting* (ib., 1902); Samuel Isham, *History of American Painting* (ib., 1905); Mechlin, in *International Studio* (ib., 1908).

HOMERIDES, hō-mĕr'ĭ-dēz, or **HOMERIDÆ** (Lat., from Gk. *'Ομηρίδης, Homēridēs,* descendant of Homer, from *"Ομηρος, Homēros,* Homer). The name of a family or clan in the island of Chios, often mentioned; Strabo says that they claimed descent from Homer, and that they were adduced by the Chians to prove that Homer himself was a Chian. The name Homeridæ, however, is used by Pindar and by others frequently to mean persons who recite the Homeric poems, i.e., rhapsodists (q.v.), and it is in this sense that the name is commonly used. The Homeridæ of Chios have played a large part in the theories of some scholars as to the transmission of the Homeric poems; but there is no evidence that they were a guild of poets or even of rhapsodists. Consult Christ-Schmid, *Geschichte der griechischen Litteratur,* vol. i, pp. 35, 70 (5th ed., Munich, 1908).

HOMEROCENTONES, hō-mē'rō-sĕn-tō'nēz. See Eudocia; Centones Homerici.

HOMER PIGEON. See Pigeon.

HOME RULE. A term in British politics, designating the particular movement, begun in 1870, to secure for Ireland a local legislature and thus recognize and satisfy the persistent sentiment of Irish nationality. The question of Home Rule, ignored by Pitt in the Act of Union of 1800, was revived by O'Connell's agitation for repeal. With the failure in 1848 of that movement, hostility to British rule passed from the field of constitutional exertion to that of violence and revolution. But neither the doctrinaire fiasco of 1848 nor the plots of the Fenians brought any realization of the national aspirations. After 20 troubled years of conspiracy and secret crime the concession by Gladstone of Church disestablishment and land reform called the thoughts and hopes of the Irish people once more to constitutional activity. In 1870, a year after the Act of Disestablishment was passed, and while Gladstone's first Land Bill was still under discussion in Parliament, the first step was taken in the movement for Home Rule.

On May 19 in that year there assembled at the Bilton Hotel, Dublin, a number of Irishmen of the better class, representing all shades of political and religious belief. The dominant element was Protestant and Conservative. Discontented with the concessions made by Gladstone's government, they were ready to consider some plan for taking out of British hands the control of Irish affairs. After free discussion it was resolved "that the true remedy for the evils of Ireland is the establishment of an Irish Parliament, with full control over our domestic affairs." In accordance with this opinion a permanent organization was soon afterward effected, under the name of "The Home Government Association of Ireland." Its declaration of principles announced as its only object the obtaining of a distinct Parliament for Ireland, to regulate her internal affairs, while leaving to the Imperial Parliament all questions affecting the colonies, foreign relations, and the stability and defense of the Empire. With this declaration the movement for Home Rule was formally inaugurated.

The history of the Home Rule movement from 1870 to the present time may be divided into five periods: first, the leadership of Isaac Butt (1870–79); second, the merging of Home Rule into the land agitation (1879–86); third, the adoption of the principles by the Gladstonian Liberals (1886–93); fourth, the Conservative policy of "killing Home Rule by kindness"; fifth, the passage of the Government of Ireland Bill by the Asquith ministry in 1914.

First Period. This was the time of development and definition. From the outset the Home Rule idea was favorably received among the better classes of the Irish people, though ancient religious antipathies often blocked the way. Among the lower classes—those particularly in which Fenianism had found its chief support—the new form of constitutional agitation was slow to inspire confidence. Under the direction of Isaac Butt, however, who had made himself popular by his legal services in behalf of arrested Fenians, considerable progress was made, and at by-elections several Home Rulers, including Butt himself, were elected to Parliament. In the fall of 1873 the Home Government Association was replaced by the Irish Home Rule League, a new and more comprehensive organization, whose skillful management secured the return of 60 Home Rulers in the general election of 1874. For the next five years, under the leadership of Isaac Butt, they acted as a distinct party when Home Rule or Irish interests were at stake, but on other questions followed their individual preferences. In fact, during this period, outside of Ireland, there was very little interest in the subject, and English Liberal and English Conservative alike had voted against Butt's annual motion for an Irish Parliament. But an awakening was to come, when Parnell, who entered the Commons in 1875, began to advocate his policy of "obstruction," applying it—aided by a little group of followers—to all questions alike, whether Irish, English, or Imperial. In this course he was opposed by Butt and the majority of the party at that time; but through this policy Parnell succeeded in arousing the English people to a discussion of the subject and in winning, partly perhaps by means of the hatred he excited towards himself on the part of the old British parties, the enthusiastic support of Irishmen to a degree which Butt's milder course had never done.

Second Period. Butt died in the spring of 1879. The Home Rule party chose as his successor William Shaw, whose methods it was known would be those of Butt. But Parnell

was the rising man in Irish circles. In this same year, by throwing himself heart and soul into the land agitation and assuming the presidency of the Land League, he became the idol of the Irish masses. During the four succeeding years Home Rule was entirely overshadowed by the great agrarian issue. The general elections of 1880 showed an increase of the Home Rule delegation in Parliament from 60 to 68. But the extreme views of Parnell and his followers on the land question tended to alienate the moderate element in the party, already disgusted with his parliamentary tactics. During the desperate struggle made by the Parnellites against the Coercion Bill in January, 1881, Shaw and his followers formally withdrew from the Home Rule party in Parliament. This action was significant of a great change in the character of the party outside of Parliament. By connecting Home Rule with the land question Parnell drew to his support a great following, which Butt had never won; but he lost the Conservative and aristocratic element, which had practically inaugurated the movement. A Catholic peasantry instead of a Protestant middle class became the chief support of the party. With this absorption of the larger element one end was achieved which has been a source of about equal glory and reproach to Parnell—the physical-force faction, hitherto apathetic, was drawn into the constitutional agitation. The Irish National League, organized Oct. 17, 1882, was the formal expression of the Parnellite policy. Its programme combined essentially the principles of the Home Rule League and those of the recently suppressed Land League. In the elections of 1885 the success of Parnellism was demonstrated. The Nationalists returned 86 members to the House of Commons and secured the balance of power between the Liberals (333) and the Conservatives (251). Of the 103 members from Ireland, 85 were followers of Parnell.

Third Period. With an absolute Liberal majority in Parliament, so skillful a leader as Gladstone had found it almost impossible to transact business in the face of Nationalist obstruction. Now that Parnell held the balance of power and could displace ministries at will, the conduct of the government on any principle known to British practice seemed hopeless. On Jan. 27, 1886, the Nationalists aided the Liberals to overthrow Lord Salisbury's government, just as in the preceding year they had joined the Conservatives against Mr. Gladstone. The Conservatives now made advances looking to an understanding between the Nationalists and themselves, but without results. On the other hand, Gladstone, after careful consideration and consultation, decided to accept Home Rule as a Liberal principle; so on the 6th of April he brought in his famous Home Rule Bill. In it was embodied the long-sought provision for a distinct legislative body for Ireland, with powers extending to all subjects except those specifically reserved to the Parliament at Westminster. At the same time a sweeping measure for land purchase was announced, with the declaration that the two should be inseparable, together forming a complete scheme for the settlement of the Irish question. Parnell, with certain qualifications, accepted the bill on the part of the Irish Nationalists, and his party threw themselves heartily into alliance with the followers of Gladstone. The question of Home Rule now became one for the people of Great Britain to settle. With the adoption of the Irish demand by Gladstone, a great section of the Liberals declined to follow their old leader. Protesting against anything which looked like a step towards separation of the two islands, they took the name of Liberal Unionists and ultimately entered into alliance with the Conservatives. Gladstone's bill was defeated on the second reading by 343 to 313, 93 Liberals voting in the negative. Upon the appeal to the constituencies the adversaries of Home Rule gained a majority of 113 over the combined Gladstonians and Nationalists. Lord Salisbury assumed power with a policy of coercion, with possibly some eventual measure of concession in reference to local government in Ireland. Home Rule remained the most prominent issue throughout the four succeeding years, the Gladstonians expressing confidence in the ultimate support of a British majority, a belief which the by-elections seemed to justify, as the Liberals gained 16 seats in 99 contests. In the winter of 1890–91 a divorce case in which Parnell was corespondent brought much odium upon him and raised the question of his retirement from the leadership of his party. Gladstone announced that he could not hope to hold the Liberals to the Nationalist alliance unless Parnell resigned. The latter rejected all suggestions of his own withdrawal and by his course alienated a large section of his parliamentary followers. The result was a schism in the Irish Nationalist party, which made the future success of the Home Rule movement exceedingly doubtful. The death of Parnell, in October, 1891, only served for the moment to intensify the animosity of the Parnellite faction towards the majority of the Home Rulers, who accepted the leadership of Justin McCarthy (q.v.). The elections of July, 1892, resulted in a Liberal majority in the House of Commons of 40, so that Gladstone again became Premier, and in March, 1893, introduced a bill granting Home Rule to Ireland. It provided for an Irish legislative body of two houses, the members of the Upper House to be chosen by electors having a property qualification, and for complete self-government in local matters. The difficult question of Ireland's representation in the Imperial Parliament was first decided in favor of the "in-and-out" plan—Irish members voting on some questions, not on others—but later in favor of a reduction of its membership in the House of Commons from 103 to 80, with the same rights as other members. The bill passed the Commons September 1 (301 to 267), but was overwhelmingly defeated in the Lords, receiving only 41 votes out of a total of 450. Gladstone resigned in March, 1894, and Lord Rosebery assumed the premiership, professing adherence to Home Rule, but doing nothing for it during his ministry, which came to an end in June, 1895.

Fourth Period. This period opened with the Conservatives in power, the Home Rulers split into cliques and factions, and the Liberals demoralized and lukewarm towards the cause of the Irish Nationalists. The Conservatives, believing that Irish discontent had its source in economic conditions, in poverty and want, passed, under the cry of "killing Home Rule by kindness," a land act which simplified the rent problem, provided for land purchase, tended to bring a peasant proprietor class into being, and in general ameliorated economic conditions. In

1898 a Local Government Bill was introduced, and became a law in 1899, which placed county and municipal governments in the hands of the people, with provisions for an almost universal suffrage. Owing in part to improved conditions, in part to these reforms, public agitation had almost ceased, and it seemed as if "Balfourian amelioration" was on the point of success, when the Boer War broke out. Under the impulse of this war the warring Irish factions came together, accepted John E. Redmond as a common leader, revived their demand for an Irish Parliament, and in the election of 1900 chose 81 members to the House of Commons to press their cause. The benevolent attitude of the Unionist ministry was further exemplified in the important Land Act of 1903. (See IRISH LAND LAWS.) In 1904–05 much discussion in Parliament was aroused by a scheme for the gradual establishment of self-government propounded by the Irish Reform Association under the name of Devolution. It was assailed by the Protestant minority as being equivalent to Home Rule. The accession of a Liberal ministry under Sir Henry Campbell-Bannerman, December, 1905, was regarded as distinctly favorable to the Irish cause, inasmuch as the Premier and a number of leading members of the cabinet were avowed supporters of Home Rule. It was understood, however, that the government would not permit a sudden disruption of the union, though acquiescing in a policy of "Home Rule by installments." The Liberal-Unionist party attempted to make Home Rule an issue in the general election of 1906, but without success. In that election the Nationalists returned 83 members to Parliament.

Fifth Period. The defeat of the Unionists in the general elections of 1906 marks the beginning of a new era of Liberal government and reform. The following year Mr. Birrell's proposed Irish Councils Bill, giving considerable latitude to the Home Rulers, was denounced and rejected at a national convention in Dublin and was therefore withdrawn. The general elections of 1910 placed the Liberal and Unionist parties in positions of almost exact equality in the House of Commons, while the Nationalists held the balance of power and controlled the fortunes of Mr. Asquith's government. Conscious of power and supported by the Labor party in the House of Commons, the Irish members insisted that Home Rule be given precedence over all other measures. While speculation was rife as to the government's Home Rule plans, agitators in Ulster were not idle, for the Unionists of that province, led by Sir Edward Carson, appointed a committee to draw up a provisional government for Ulster, which should come into operation if the Home Rule measure was passed.

On April 11, 1912, Mr. Asquith introduced the Government of Ireland Bill. While asserting the supreme authority of the Imperial Parliament, it provides for a bicameral Irish Parliament—the Senate of 40 members nominated in the first instance by Great Britain and succeeded, as their terms expire, by appointees of the Irish Executive; and the House of Commons, 164 in number, to be elected by the Irish constituencies. The executive authority is vested in the King, represented by the Lord Lieutenant and an Irish ministry named by Parliament. The Irish Parliament is empowered to make all laws for Ireland, but certain classes of legislation are removed from its jurisdiction, such as peace, war, treaties, army, navy, militia, trade navigation, coast defenses, coinage, stamps, weights, measures, copyright, religion, and Freemasonry. The Irish constabulary are to remain under Imperial control for six years after the passage of the act. The following services would likewise be excluded for the present; the land-purchase tax, old-age pensions, national insurance, postal savings banks, and the service of public loans before the passage of the act. In the Imperial Parliament Ireland is to have 42 members, which number, in view of the divided authority, fiscal, legislative, and executive, set up by the bill, might be sufficient to guard her own reserved interests. While in the committee stage, the bill was so amended as to permit the principle of proportional representation—all constituencies electing three or more members to the Irish House of Commons and the entire Irish Senate after five years to be chosen by this method. The bill passed its third reading in the House of Commons on Jan. 16, 1913. On January 30 it was rejected by the Lords by a vote of 326 to 69. Following the rejection of Sir Edward Carson's amendment, excluding Ulster from the provisions of the Home Rule Bill, the Ulster Volunteers proceeded to add to their numbers and equipment, aided by Unionists from Great Britain. Realizing that Home Rule must come, the Belfast Trade Unions and other representative bodies protest that they are not in favor of exclusion. They maintain that the real source of hostility to Home Rule is not fear of religious persecution but the financial arrangements of the proposed law. The financial margin allowed is too small to enable the Irish Parliament to effect the many reforms required without taxing heavily either the land or commercial business; and as agriculture will be in control, they believe the onus will fall on the commercial interests of Ulster. The industrial workers of Belfast likewise fear they will be at the mercy of a parliament which will have no interest at all in maintaining a high level of labor conditions, for the Irish Parliament will be dominated, not by representatives of the agricultural laborers, but of the tenant farmers, who, so far as they are interested in employment at all, are interested as employers and pay the lowest wages in the United Kingdom.

The bill reintroduced in the summer session passed its third reading in the Commons, July 17, 1913. After considerable discussion and debate it passed the House of Commons for the third and last time on May 25, 1914. Radically modified it passed its third reading in the House of Lords on July 15. Five days later the Commons took up the measure as amended for extended consideration. No amicable adjustment of the situation seemed possible. A conference of the leaders of both parties, called by the King, failed to accomplish anything. The National Volunteers (a semi-military organization of Irish Catholics) were recognized by the Irish party. A mob attacked some British soldiers in July, 1914, and the entire population of England and Ireland were aroused to a fever pitch. Premier Asquith decided to postpone consideration of the Home Rule Bill until the excitement and passion had abated.

The outbreak of the Great War in 1914 completely overshadowed the Irish question and

for the time being the agitation ceased. The Home Rule Bill received the royal assent in September, 1914, and at the same time a Suspensory Act was passed which provided that it was to be suspended until the expiration of 12 months from the date of passing, i.e., until Sept. 18, 1915, or "until such later date (not being later than the end of the present war) as may be fixed by His Majesty by Order in Council." The cabinet took advantage of this latter provision and published an Order in Council on Sept. 14, 1915. This provided that "No steps shall be taken to put the Government of Ireland Act, 1914, into operation until the expiration of 18 months from the passing of that Act unless the present war has previously ended, nor if at the expiration of those 18 months the present war has not ended until such later date, not being later than the end of the present war, as may hereafter be fixed by Order in Council."

At the close of the war a new Home Rule Bill was introduced and passed by the Lloyd George government (Nov. 12, 1920). It proved satisfactory to neither group in Ireland and was superseded by the so-called Irish treaty which was adopted as a result of the Whitehall Conference held in October, 1921. See IRELAND, *History*.

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HOME'SICKNESS. See NOSTALGIA.

HOME'STEAD (*home*, AS. *hām*, Goth. *haims*, OHG. *heim*, Ger. *Heim;* connected with Lith. *kemas*, Gk. *κώμη*, *kōmē*, village, Skt. *kṣēma*, abode, from *ksi*, to dwell + *stead*, AS. *stede*, Goth. *staþs*, OHG. *stat*, Ger. *Statt*, place; ultimately connected with Eng. *stand*). In law, an estate in land, used as a home by the tenant or owner thereof, and to a greater or less extent protected by law from the claims of creditors. This right of exemption of the "homesteader," as he is termed, is a modern privilege created by statute and was unknown to the common law. It does not exist in England, but is peculiar to the United States, where it is everywhere recognized, excepting in Rhode Island, Pennsylvania, Delaware, Maryland, and the District of Columbia. It does not constitute a distinct form of estate in land, but belongs to the class of exemptions from the claims of creditors, which, originating in the common law, has been greatly extended by the humane policy of American law. See EXEMPTION; HOMESTEAD LAWS.

HOMESTEAD. A borough in Allegheny Co., Pa., on the Monongahela River, 7 miles southeast of Pittsburgh, on the Pittsburgh and Lake Erie, the Bessemer and Lake Erie, the Pennsylvania, and the Union railroads (Map: Pennsylvania, B 6). It has one of the largest steel plants in the United States, employing about 7000 men and producing both structural steel and nickel-steel armor plate, and a machine factory. There is a Carnegie library. Settled in 1871, Homestead was incorporated in 1880, the date of the charter now in operation, which provides for a mayor, elected every three years, and a unicameral council, in whose power rests the appointment of chief of police, street commissioner, and water-works engineer. The water works are owned and operated by the borough. In 1892 Homestead was the scene of a notable strike, which was attended by such rioting as necessitated the interference of State troops. Pop., 1900, 12,554; 1910, 18,713; 1914 (U. S. est.), 21,256; 1920, 20,452.

HOMESTEAD LAWS. Homestead laws in the United States are of two classes—those enacted by Congress and those enacted by State legislatures. The primary object of the first class is to enable citizens without capital to acquire homes. The main object of the second class is to secure homes, once acquired, against the claims of creditors. Legislation of the first class has done much to stimulate the settlement and improvement of wild, unoccupied land. That of the second class has saved countless families from pauperism.

The Federal homestead laws begin with the Act of 1862, now a part of the United States Revised Statutes (§§ 2289–2317). Their policy is to give portions of the public lands to those who will settle, cultivate, and make permanent homes upon them. Any person who is the head of a family, or who is 21 years of age and is a citizen of the United States, or who has filed his declaration of intention to become such, may acquire a tract of unappropriated public land, not exceeding 160 acres, on condition of settlement, cultivation, and continuous occupancy as a home by him for the period of five years, and of the payment of certain moderate fees. It is expressly declared that no lands acquired under this statute shall in any event become liable to the satisfaction of any debt contracted prior to the issuing of the patent therefor by the government to the settler. This provision was inserted for the purpose of protecting debtors and of inducing them to settle upon the public domain. Its constitutionality was questioned, but was sustained by the courts. It would be difficult to point to any enactment of Congress more wise in conception, more just in policy, and more beneficial in its results than this homestead statute and its amendments. Under their provisions more than 85,000,000 acres of unoccupied public lands have been transferred by the United States to homestead settlers.

The term "original entry" refers to the proceeding by which a person enters a tract of land as his homestead. Its important features are the filing of an affidavit, prescribed by statute, with the register of the land office in which the applicant is about to make the entry, and the

payment of a fee of five dollars if his entry is for not more than 80 acres, or of 10 dollars if it is for more than that quantity. The "final entry" refers to the proceedings connected with the issue of a certificate of title or patent by the United States to the person making the original entry, or to his widow, heirs, or devisees. Ordinarily the patent does not issue until the expiration of five years from the date of the original entry, and then only upon furnishing the evidence required by statute of the actual occupancy of the land and its cultivation by the claimant during that period. Provision is made, however, for shortening this term by "commuting," i.e., paying the minimum government price for the land. Upon such payment the homesteader may obtain a patent at any time. It is also provided that the term which a homestead settler served in the United States army, navy, or marine corps, "during the Rebellion," or in "the Spanish War," or "in suppressing the insurrection in the Philippines," may be deducted from the five years required to perfect his title and to receive a patent for his original entry.

State homestead laws are, as has been said above, in their objects and tenor quite different from those of the Federal government. Their aim, it has been judicially declared, "is to provide a place for the family and its surviving members, where they may reside and enjoy the comforts of a home, freed from any anxiety that it may be taken from them against their will, either by reason of their own necessity or improvidence or from the importunity of their creditors." This policy of protecting citizens and their families from the miseries and demoralizing influences of destitution, of fostering the disposition to improve and to take pride in a permanent homestead, has commended itself to both legislators and judges. The former have enacted laws providing for large exemptions to the homesteader, while the latter have, with few exceptions, construed such laws very liberally in his favor. In most of the States the benefits of this legislation are confined to families, although in a few Commonwealths they are extended to any resident, whether he has a family dependent upon him or not.

State legislation provides three distinct ways in which a homestead may be secured to the family against the debts of its owner. The first method is by a prescribed form of public notice properly executed and recorded. It must contain a statement of the facts showing that the person making it is the head of a family; a statement that such person resides on the land and claims it as a homestead; a description of the land, and an estimate of its actual cash value. The second method is by actual occupancy and use. The third method is by a proceeding in a court of justice. Its principal characteristics are an application to a designated court, a notice to creditors, and a judicial decree setting apart certain property as a homestead.

It is not to be understood that homestead property is exempted from every sort of claim against its owner. As a rule, it is subject to debts contracted before the homestead was duly recorded or set apart as such; to the liens of mortgages and judgments which were on the property when it was set apart; to claims for unpaid purchase money for the property, as well as for such improvements to the property as entitle the creditor to a mechanic's lien (q.v.) thereon; and to taxes and assessments for public improvements.

The amount of land which may be exempted under homestead laws varies in the different States. In some the limits are those of acreage, in others those of cash value. The former range ordinarily from 40 to 160 acres; the latter from $500 to $5000. Consult Thompson, *Homesteads and Exemptions* (San Francisco, 1886), and Waples, *Treatise on Homesteads and Exemptions* (Chicago, 1893).

HOME, SWEET HOME. A popular song by John Howard Payne, in his opera, *Clari, or the Maid of Milan,* first produced in 1823. The music of the song is by the composer of the opera, Sir Henry Bishop, who is said to have adapted it from an old Sicilian air.

HOME'WARD BOUND. A novel by J. Fenimore Cooper (1838).

HOMICIDAL (hŏm'ĭ-sīd'*a*l) **MANIA.** A popular term for the impulse to take life in one mentally disordered. In manic-depressive insanity, in general paresis, in paranoia, and other insane conditions, the homicidal impulse is not infrequent. Indeed, in normal mental action the desire to kill is not infrequently present, but is controlled. In the various stages of some insanities this control is either diminished, or through hallucinations or delusions the motive is stronger and uncontrollable, and murder results. It is impossible to determine beforehand whether an insane person will or will not take another's life. Often such an act is apparently the first symptom of the insanity. The obvious lesson is that the slightest symptoms of disturbed mental action should be carefully noted and proper precautions taken to prevent accidents. This caution is particularly pertinent in the case of puerperal women in whose family there has been any taint of insanity.

HOMICIDE, hŏm'ĭ-sīd (OF., Fr. *homicide,* from Lat. *homicidium,* manslaughter, from *homo,* man + *cædere,* to kill). The killing of one human being by the act, procurement, or neglect of another. In primitive communities the killing of another does not subject the slayer to criminal prosecution by the state. The act is thought of, not as an offense against the common weal, but simply as a wrong to the slain man's kindred—a wrong which they are at liberty to redress by vengeance upon the slayer or his kindred. But this policy leads to the perpetuation of blood feuds and to great waste of human life. Accordingly, at a very early time, the practice is introduced of buying off the injured kindred, or appeasing the feud by a money payment. Then a scale of compensation is fixed either by custom or by legislation, graduated generally by the rank of the person slain. In Anglo-Saxon law this is known as *wergild* (a man's price). At first the acceptance of such compensation is left to the choice of the injured kindred. They may take it and stay the feud, or they may reject it and enforce their right of private vengeance. But as the state grows more powerful, and the death of its citizens is felt to be a harm to the common weal, public authority compels the injured kindred to accept the compensation and not to pursue the feud. Then comes the final stage of legal development, in which the unlawful taking of human life is considered as primarily a wrong to the state, a public offense which cannot be

compounded by private bargain. See AVENGER OF BLOOD; BLOOD FEUD; BLOOD MONEY; ASYLUM; WERGILD; ETC.

As appears from the definition given above, homicide is a generic term, comprehending not only the crimes of murder and manslaughter (qq.v.), but also the taking of a human life under circumstances justifying the act or in a sense excusing its commission. Killing under such circumstances, not amounting to murder or manslaughter, is described as justifiable or excusable homicide. While the distinction between these has in law been wholly done away with, the early common law made an important distinction between excusable and justifiable homicide. The slayer in the latter case was not liable to any punishment, while in the former he was. In other words, homicide, if not committed under circumstances justifying the act, was, however excusable on moral grounds, still a criminal offense. Just how far it subjected the slayer to criminal punishment is, however, uncertain. Lord Coke declares that it rendered him liable to death, but Blackstone and Stephen insist that his liability did not extend beyond the forfeiture of goods. At present neither excusable homicide nor justifiable homicide is punishable at all, but the two terms are still retained in use in England and in many of the United States as marking a convenient distinction between two distinct classes of innocent, or noncriminal, killing. At common law excusable homicide was of two kinds—killing by accident or misfortune, and killing in self-defense. Justifiable homicide was of three kinds—killing by a public officer in conformity to a judicial sentence; killing by an officer or his assistant when necessary to overcome unlawful resistance to legal process, or to the performance of a legal duty, including killing by military forces in time of war or riot; and killing to prevent the commission of an atrocious crime of violence. While the common-law definition of these forms of homicide has been more or less modified by statute, it remains substantially the same, both in England and the United States.

Even unintentional homicide is not excusable unless it is committed without legal fault on the part of the slayer. The killing may not have been premeditated or intended—it may have been accidental—yet if it resulted from the slayer's unlawful conduct, as in connection with the commission of burglary or robbery, it is not a case of excusable homicide, but of manslaughter or murder, as the case may be. So, too, homicide is justifiable only when it is inflicted in strict accordance with lawful authority. A sheriff who inflicts the death penalty upon a convict in a manner not authorized by the judicial sentence which he undertakes to execute does a criminal, not a justifiable, act. An officer cannot justify the unnecessary killing of even the worst malefactor that is resisting arrest. Nor is a person at liberty to take the life of a brutal assailant unless he can show that he had reasonable ground to believe that the assailant was about to commit a felony or do some great personal injury to the slayer or to some member of his family or other person in his presence, and that there was imminent danger of the assailant's accomplishing his design.

Consult: Stephen, *History of the Criminal Law of England* (London, 1883); Clark and Marshall, *Law of Crimes* (2d ed., St. Paul, 1905); F. Wharton, *Laws of Homicide* (3d ed., Chicago, 1907); and the authorities referred to under CRIMINAL LAW.

HOMILDON, hŏm'ĭl-don, or **HUMBLEDON** (hŭm'b'l-don) **HILL.** An elevation near Wooler, in Northumberland, England, not far from the Scottish border, noted as the scene of a battle in which the English, under the Earl of Northumberland and his son, Harry Hotspur, overthrew a Scottish army under the command of Sir Murdoch Stewart and the Earl of Douglas, Sept. 14, 1402. The victory at Homildon Hill was soon followed by the rebellion of the Earl of Northumberland and his son. See HENRY IV.

HOM'ILET'ICS (from Gk. ὁμιλητικός, *homilētikos*, relating to conversation, from ὁμιλία, *homilia*, conversation, from ὁμιλεῖν, *homilein*, to converse, from ὅμιλος, *homilos*, assembly, from ὁμός, *homos*, similar + ἴλη, *ilē*, εἴλη, *eilē*, company, from εἴλειν, *eilein*, to crowd together). As the term is now used, the science of sermon writing. In early Christian times discourses were less formal than they became later (see HOMILY) and so were properly called homilies. The earliest Christian writer on homiletics is St. Augustine, whose book *De Doctrina Christiana* is in some sense an adaptation of profane rhetoric to sacred uses. Rabanus Maurus and Isidore of Seville also incidentally treat the subject; but the nearest approach to a systematic treatment in mediæval literature is to be found in Hunibert, *De Eruditione Concionatorum.* St. Carlo Borromeo's *Instructiones Pastorum* was a part of his general scheme for the improvement of clerical education; and in the ecclesiastical course, as well of Catholics as of Protestants, homiletics occupies an important place. Books on homiletics have been written by Bautain, Broadus, Claude, Dabney, Hoppin, Kidder, Phelps, Shedd, Storrs, Vinet, and many others. An important series of volumes have resulted from the Lyman Beecher lectureship (at Yale) on preaching, among the writers being Henry Ward Beecher (1871), Phillips Brooks (1876), Washington Gladden (1886, 1902), G. A. Smith (1898), Lyman Abbott (1904), J. H. Jowett (1912), C. S. Horne (1914).

HOMILIA'RIUM (ML., from Lat. *homilia*, Gk. ὁμιλία, *homilia*, conversation, homily). A collection of homilies for the use of the clergy, either to read to their congregations or for their own edification. The use of homilies of others dates as early as the sixth century, and in the eighth century collections were in use. The homilies of Leo I were used at an early time. Collections were made in the eighth and ninth centuries by Alanus, Abbot of Farfa, Smaragdus, Abbot of St. Michaels, Haymo, Bishop of Halberstadt, Rabanus Maurus, and Eric of Auxerre. The homilies of the Venerable Bede were in familiar use among the clergy in all parts of the West, and we find in the letters of the early mediæval time traces of an interchange of sermons, original or otherwise, between bishops and clergy, even in distant countries. Alcuin made an homiliarium, which, strangely enough, considering its author, passed out of mind and was only discovered in 1892. What since the fifteenth century has been called his is really a revision of that by Warnefried mentioned below. One of the many reformatory measures of Charlemagne was a compilation of homilies under the title of Homiliarium, which was made under his direction by the deacon,

Paul Warnefried, a monk of Monte Cassino and one of his chaplains. It was compiled in the end of the eighth century and contains homilies for all the Sundays and festivals of the year. It is the most famous of these collections. Maximus of Turin (fifth century, homilies in Migne, *Patrol. Lat.*, lvii) is more drawn upon than any other author, but Bede comes next, and then Leo the Great, Gregory the Great, Augustine, and others. The language was, of course, Latin. Many synods directed the clergy to translate these sermons for their flocks, and the collection continued in use for this purpose down to the sixteenth century. It was printed at Speyer in 1482 and again at Cologne in 1557 and is reprinted in Migne, *Patrol. Lat.*, xcv. Alfred the Great translated the homilies of Bede into Anglo-Saxon, and Ælfric added many others. A collection of English homilies turned into verse, that they might be more readily remembered by the people, appears to have been composed about the middle of the thirteenth century. This collection, affording a metrical sermon for every Sunday and festival day in the year, exists in manuscript; and a portion of it was edited with introduction and notes by John Small, librarian to the University of Edinburgh (*English Metrical Homilies*, Edinburgh, 1862). When the Reformation was introduced into England, the unfitness of the clergy to preach was so keenly felt that a book of homilies was prepared and sent forth by authority of Edward VI (1547), and again under Elizabeth (1563) a second book, and the reading of these homilies was enjoined. The two books were reprinted at Oxford, 1859. See HOMILY; HOMILIES OF THE CHURCH OF ENGLAND.

HOMILIES (hŏm′ĭ-lĭz) **OF THE CHURCH OF ENGLAND.** A collection of sermons, the first part of which was published in 1547, the first year of the reign of Edward VI, to be read in the churches, partly in order to supply the defect of sermons, but partly also to secure uniformity of doctrine and to guard against the heterodoxies, old and new, which threatened the unconsolidated Church. The second part was published in 1563, at the same time with the Articles, under Elizabeth. The titles are 21 in number. The homilies are not now read in churches; but they are frequently appealed to in controversies as to the doctrine of the Anglican church on the points of which they treat. The precise degree of authority due to them is matter of doubt. Consult Griffiths, *Homilies Appointed to be Read in Churches* (Oxford, 1896).

HOM′ILY. In ecclesiastical usage, a discourse held in the church and addressed by the minister to the congregation. The practice of explaining in a popular form the lessons of Scripture read in the synagogues had prevailed among the Jews and appears to have been adopted in the Christian churches from the earliest times. The discourses employed for this purpose were of the most simple character; but with the exception of one ascribed to Hippolytus (q.v.), we have no sample of this form of composition earlier than the homilies of Origen in the third century. Taking these as a type, the early Christian homily may be described as a popular exposition of a portion of Scripture, accompanied by moral reflections and exhortations. It differs from the sermon (Gk. λόγος, Lat. *oratio*), whose form was influenced by the rhetoric of the schools, in eschewing all oratorical display and in following the order of the scriptural text or narrative instead of being thrown into the form of a rhetorical discourse or a didactic essay. The schools of Alexandria and Antioch appear to have been the great centres of this class of sacred literature, and in the early centuries and mediæval times many preachers continued to use the homiletic form; and even in the modern Church many have regarded it as the best medium of scriptural instruction. See HOMILIARIUM; HOMILETICS; HOMILIES OF THE CHURCH OF ENGLAND.

HOMINE REPLEGIANDO, hŏm′ĭ-nē rē-plē′-jĭ-ăn′dō (ML., for replevying a man). The title of an old writ in English law, meaning 'to bail a man out of prison.' It was an ancient form of the writ of habeas corpus, by the later form of which, as now employed, it has been superseded in England and generally in the United States. In a few of the American States, however, the older writ has recently been revived in an amended form, as being better adapted to the purpose of securing the release of a prisoner on bail than the more usual writ of habeas corpus (q.v.).

HOMING (hōm′ĭng) **PIGEON,** or HOMER. The name among fanciers for that breed of domestic pigeon, also called "carrier," used in carrying messages and in long-distance races. The name refers to its proclivity for returning to its home with the utmost possible speed and directness when liberated at a distance. See PIGEON.

HOMIN′IDÆ (Neo-Lat. nom. pl., from Lat. *homo*, man). The family to which man belongs, and which, together with the various families of monkeys, baboons, and apes, forms part of the order Primates. Among the characters which distinguish the Hominidæ are: (1) the posture is completely erect; (2) the anterior appendages are provided with hands, the posterior with feet; (3) the feet have the inner digit greatly enlarged and nonopposable, forming a great toe; (4) the body is sparsely haired, except on the top of the head; (5) the lower jaw has a prominent ridge, the chin; (6) the facial angle exceeds 60°; (7) the brain is more than double the size of that of apes, and the cranial capacity three times as much; (8) the teeth stand in an uninterrupted series without a space in front of the upper incisors; (9) man has the power of speech. In his general organization man is so closely related to the higher apes that it is difficult to draw a hard and fast line between the Hominidæ and the lower groups. (See *Anthropoid Apes*, under APE.) In the zoölogical classification living races are considered as *Homo sapiens*. Various specific names have been proposed for extinct types of man, as *H. primigenius*, *H. heidelbergensis*, *H. aurignacensis hauseri*, *H. mousterensis hauseri*, *H. eoanthropus dawsoni*. A complete scheme of classification will be found under MAN, SCIENCE OF.

HOMMEL, hŏm′mel, FRITZ (1854–). A German Orientalist, born at Ansbach. He was educated at Leipzig and in 1877 became connected with the library of Munich and was made docent of the university, in which he was appointed professor of Semitic languages in 1885. His principal writings, aside from contributions to Oriental journals, are: *Die Namen der Säugethiere bei den südsemitischen Völkern* (1879); *Zwei Jagdinschriften Asurbanipals* (1879); *Die semitischen Völker und Sprachen* (1883); *Geschichte Babyloniens und Assyriens* (1885); *Der babylo-*

nische Ursprung der ägyptischen Kultur (1892); *Aufsätze und Abhandlungen arabistisch-semitologischen Inhalts*, vols. i–iii (1892–1901); *Südarabische Chrestomathie* (1893); *Die altisraelitische Ueberlieferung in inschriftlicher Beleuchtung* (1897); *Sumerische Lesestücke* (last ed., 1899); *Der Gestirndienst der alten Araber* (1900); *Die altorientalischen Denkmäler und das Alte Testament* (2d ed., 1903); *Grundriss der Geographie und Geschichte des alten Orients* (1st part, 1904); *Geschichte des alten Morgenlandes* (2d ed., 1908).

HOMME QUI RIT, L', lŏm' kē' rē' (Fr., The Man who Laughs). A romance by Victor Hugo (1869), the story of a boy whose face has been mutilated so that he always has the appearance of laughing.

HOMO. See HOMINIDÆ.

HO'MOCŒ'LA. See HETEROCŒLA.

HO'MŒOP'ATHY (from Gk. *ὁμοιοπάθεια, homoiopatheia*, similarity of feeling, from *ὁμοιοπαθής, homoiopathēs*, subject to like feeling, from *ὅμοιος, homoios*, similar + *πάθος, pathos*, feeling). A distinctive system of medicine elaborated by Samuel Hahnemann (q.v.) upon the suggestions of a number of predecessors and published in 1796. His chief dicta enunciated at that time were as follows:

"Every powerful medicinal substance produces in the human body a peculiar kind of disease; the more powerful the medicine, the more peculiar, marked, and violent the disease." "We should imitate nature, which sometimes cures a chronic disease by superadding another, and employ, in the disease we wish to cure, that medicine which is able to produce another very similar artificial disease, and the former will be cured, *similia similibus*." He was brought to this conclusion through observing the toxic effects of drugs, as recorded in the various works on materia medica, which he was translating from English into German, and by experiments made upon himself and others in corroboration. It is not claimed that Hahnemann first noted similarity of drug action and diseased condition, for many times in previous medical history had isolated instances been noticed; but he was the first to urge a general application of his principles and to state the propositions upon which was based the new treatment. In 1806, in a treatise entitled *The Medicine of Experience*, he indicated the name by which the new system of treatment should be known, and thenceforward "homœopathy" designated the science and art, as did "homœopathic" the practitioner.

In 1810 he published the *Organon of Rational Medicine*, which became and remains the embodiment of the fundamental methods of homœopathy. These fundamentals may be stated briefly thus:

1. Proving of medicines upon the healthy.
2. Selection and administration of medicines according to the law of similars.
3. The single remedy.
4. The minimum dose.

A medicine is "proved," according to the homœopathic method, as follows: A fluid extract or a tincture of a drug is selected for proving. Of this medicinal preparation a dose of one drop, two drops, or five drops is given to a healthy person at certain intervals, during which the person notes his symptoms. Gradually increasing doses are administered until the experimenter is satisfied and a set of tables of symptoms, believed to be caused by the drug in the healthy person, has been compiled. These tables of symptoms are then compared with symptoms noted in various diseases. Upon discovering that a disease presents a similar set of symptoms to those noted by the healthy person as caused by the test drug, the homœopathist argues that this drug will be the remedy for this disease. His method of reasoning is that if a drug produces certain symptoms in health it will cure a disease which causes similar symptoms. Upon this basis lies the fundamental "law of similars," generally stated in Latin, *similia similibus curantur*.

In the way just described Hahnemann proved upon himself and others more than 90 drugs. Societies were formed for the purpose; and since his death many medicinal substances have been tested to learn toxic, pathogenic, and curative power, if any. Thus, each drug had its pathogenesis, or "picture," and the one corresponding to the totality of diseased symptoms as elicited from the patient by the physician, if administered, would, according to the homœopathic claim, result in a cure. No two drugs having precisely the same picture and no two patients the like totality of symptoms, he therefore individualized his cases and declared that a single remedy should be given. Later in life he modified this to some extent and, recognizing the *genus epidemicus*, prescribed without seeing the patients, as in the cholera epidemic of 1831.

When he began prescribing according to his law, he gave massive doses; but, believing that the human system when diseased is much more sensitive than in health, he gradually lessened the quantity. Then it was that he wrote the *Spirit of the Homœopathic Doctrine*, in which he argued the morbific cause of disease and the dynamization of remedies. In regard to disease, Hahnemann recognized the *morbific cause*, which, acting upon the *morbid properties* in the tissues, developed *disease*. Therefore, he argued, disease is a morbid property developed into an active pathological state by the influence of a corresponding morbific force. Likewise regarding drugs, his idea was that the drug forces are cosmic principles or agents of the same order as the disease-developing forces; the germinal principles inherent in the plant correspond with the morbid properties in the tissues, and drugs correspond with the fully developed disease. He believed that the morbific cause is in closer affinity with the drug than with the tissues of the organism, and this union secures the restoration of the organism to a state of physiological harmony. He said, "As the human organism, even in health, is more readily influenced by drugs than by natural morbific agents, this influence is felt in the highest degree by an organism which is properly predisposed by disease, provided the artificial drug disease is homœopathic to the natural malady. Hence the smallest dose of the remedial agent is sufficient for a cure, for the spiritual power of the medicine does not in this instance accomplish its object by means of quantity, but by potentiality and quality; a larger dose might be injurious for this reason, that a larger dose does not only not overcome the morbid affection more certainly than the smallest possible dose of the homœopathically administered agent, but likewise imposes a complex medicinal disease, which is always a malady, though it runs its course in a shorter time." Herein lie the doctrines of small doses and "medicinal aggravations." From this mode of

accounting for a cure in accordance with the law of similars, there naturally followed the "potentization" of drugs, according to Hahnemann.

The attenuation was accomplished in the following manner: If the drug was a vegetable substance, a strong tincture was made and called mother tincture. Of this, two drops were taken, added to 98 drops of alcohol, and agitated. This was marked "first dilution." Two drops of this with 98 drops of alcohol constituted the second dilution, the third in a similar manner, and so on. This constituted what was known as the centesimal scale. Some preferred adding one drop of tincture to nine drops of alcohol, the label being first decimal, second, third, etc., according to the number of attenuations desired. Insoluble substances were triturated with sugar of milk in the proportion of one grain of the drug to 99 of sugar, or 9, as the physician deemed best. When the fifth trituration was reached, the substance, now claimed to be soluble, was dissolved in distilled water, and the further process carried on with alcohol as in the case of tinctures.

Hahnemann writes, quoting from the first American edition of the *Organon of Medicine* (Philadelphia, 1836): "Diseases are *dynamic* [spiritual] aberrations, which our *spiritual* existence undergoes in its mode of feeling and acting—that is to say, *immaterial* changes in the state of health" (p. 19). "A homœopathic dose, however, can scarcely ever be made so small as not to amend and, indeed, perfectly cure" (p. 157). "It will stand good as a homœopathic rule of cure, refutable by no experience whatever, that the *best dose* of the rightly selected medicine is ever the *smallest*" (p. 187). When describing the preparation of "potences" of fluid dilutions, the author says: "These manipulations are to be conducted thus" (by adding 2 drops of a preceding "potence" to 98 drops of alcohol and shaking twice) "from the first up to the thirtieth or decillionth development of power, which is the one in most general use" (p. 200). The effect of shaking, on homœopathic medicines, "is so energetic that latterly I have been forced by experience to reduce the number of shakes to two, of which I formerly prescribed ten to each dilution" (p. 205). "The best mode of administration is to make use of small globules of sugar, the size of a mustard seed; one of these globules having imbibed the medicine, and being introduced into the vehicle, forms a dose containing about the three-hundredth part of a drop; for three hundred of such globules will imbibe one drop of alcohol." "By placing one of these on the tongue, and not drinking anything after it, the dose is considerably diminished. But if the patient is very sensitive, and it is necessary to employ the smallest dose possible, and attain at the same time the most speedy results, it will be sufficient to let him smell once" (p. 207).

The directions for smelling a "remedy" are as follows: "The patient should hold the phial containing the globule under one nostril, when one momentary inhalation of the air in the phial is to be made; and if the dose is intended to be stronger, the same operation may be repeated with the other nostril" (p. 191). Hahnemann considered mesmerism a homœopathic remedy. He says: "This curative power, of whose efficacy none but madmen can entertain a doubt, which through the powerful will of a well-intentioned individual influences the body of the patient by the touch, acts homœopathically, by exciting symptoms analogous to those of the malady" (p. 210).

In 1813 an epidemic of typhus fever occurred in Leipzig, during which it is said that 73 patients were allotted to Hahnemann for treatment. Of these it is claimed that but one died. Many of his claims were denied, and many of his ideas were ridiculed. As a result of the opposition of the apothecaries' guild, he was forbidden to prepare his own medicines for pay. In spite of all opposition he and his pupils continued their practice and gave the remedies gratuitously when they were not allowed to take pay. Finally opposition and social ostracism so discouraged Hahnemann that he left Leipzig in 1820 for Rothen, where, under the patronage of the Duke of Anhalt, he had a certain vogue. Up to this time homœopathy was centred in the person and teachings of Hahnemann; but now that he was absent, his pupils, already having become doctors of medicine, began, in 1821, the publication of the first homœopathic journal, the *Archive of the Homœopathic Method of Curing*. This publication was continued until 1843. The growth of homœopathy in Germany has ever been slow. In Austria homœopathy was first officially known in 1819, in which year the Emperor Francis I decreed that the method should be forbidden. Afterward it was tacitly permitted, and the decree was revoked in 1837. Since 1846 there has been no governmental interference with individual preference. Homœopathy was introduced into Russia in 1823. There, as elsewhere, its pioneers were laymen, and its growth has been slow. It was introduced into Great Britain in 1827 by Quin, a physician. Shortly after, the medical opposition was so great as to prevent those who desired to practice it from obtaining a decree entitling them to register as physicians. At present there are no restrictions placed upon any person desiring to practice this system, but there are no legally incorporated schools for instruction. In France homœopathy was first systematically tried in the year 1830. It steadily grew in favor until 1835, when Hahnemann, settling in Paris, gave the cause a powerful impetus. He grouped around him a large number of able men, and until his death in 1843 Paris was the Mecca of homœopathy.

The laws of France, as of most countries in Europe, discriminate against homœopathy, and no place of public preferment or emolument is allowed its adherents. As a rule, homœopathic medical colleges are not legalized in European countries.

In the United States and in other young countries homœopathy has been most active. Dr. Hans B. Gram, a native of Boston, educated at Copenhagen, first began the practice of homœopathy in New York City. The novel method was adopted by many, and many became earnest advocates of the system. Later, and about the same time, there came into notice men and women, generally and very largely of the laity, who, without knowledge of disease or of science, began to report cures with the aid of homœopathic "remedies." Domestic practice was so easy by means of a cabinet of phials filled with globules and a book giving complete instruction for the use of homœopathic medicines as adapted to any symptoms, without the need of a diagnosis of disease, that the new cult grew rapidly. Soon there came from over the sea men who had learned the science and art from Hahnemann and his associates, and, as a help to the more perfect

understanding of this way, the first homœopathic college was established at Allentown, Pa., in the year 1835. While the converts to homœopathy have never been subjected to positive repressive legislation, yet they have been buffeted by the same storm of opposition as greeted their brethren in other lands. In order that the cause might be strengthened and physicians record progress, the publication of the *American Journal of Homœopathy* was begun in 1835. The American Institute of Homœopathy, the oldest national medical association in the country, was organized in 1844, though there were already societies in the States of Pennsylvania, New York, and Massachusetts. The existence of most of the local societies is mainly due to the suggestion and fostering care of the American Institute, to which they annually report.

In 1914 there were in the United States about 15,000 homœopathic physicians, and 10 medical colleges in which homœopathic therapeutics were taught. These schools had an attendance of 794 students and graduated 154. Considering its age, homœopathy is especially rich in theoretical and practical literature. The most exhaustive work on any division of the subject is the *Encyclopædia of Materia Medica*, by the late Prof. T. F. Allen, M.D., of New York City. Every department of medicine has been treated by homœopathic authors. Perhaps the chief factor in the spread of homœopathy in the United States, especially in the newer portions of the West, is the equality of all schools of medicine and all qualified practitioners before the law. For many years homœopathists in America taught only therapeutics and practice, and as a result all the earlier, and for many years most of the well-equipped, native American physicians were graduates of the regular school. Finally homœopathic medical schools were established, in which all the branches of medicine were taught, and the inexplicable terms "homœopathic surgeon" and "homœopathic obstetrician" came into use. The influence of the school has been waning for some years. In 1883 the *Hahnemannian Monthly* said: "A few years ago the editors of the *New York Medical Times* dropped from the title of their journal the distinctive word 'Homœopathic'; now they boldly urge the renunciation of the word as applied to our school of medicine. If we are emancipated from the thraldom of sect, we shall not only save our school from imminent dissolution, but shall also become an integral part of the medical profession of the day, honored as true, broad, liberal, progressive physicians. But if we cling to a name which by no means represents the catholicity and spirit of the new school, we are doomed to annihilation."

In the large cities of the Eastern States great numbers of graduates of homœopathic medical schools have taken courses of study in postgraduate departments of regular medical colleges, and afterward, while retaining the term "homœopathic," practice medicine principally according to the regular principles, using "old-school" drugs in "old-school" dosage. The number of exclusively homœopathic physicians is much less now than it was 25 years ago.

Whether due to its influence or not, since the advent of homœopathy the repulsiveness in taste and appearance as well as the size of the dose of old-school remedies have been greatly modified; and in a vast number of cases suggestion and encouragement, together perhaps with placebos, have taken the place of active medicinal treatment, and natural recuperative power has worked the cure. It is certainly true that the two schools have drawn nearer to each other, and each one has adopted something of the materia medica of the other. Few and rare today are the practitioners who adhere to the higher potencies of Hahnemann.

The terms "allopathy" and "allopathic" came into use after the invention of the words "homœopathy" and "homœopathic" and were used by the adherents of the new school in designating the old school and its practitioners, through a mistaken idea. The terms are etymologically incorrect. Consult W. H. King (ed.), *History of Homœopathy and its Institutions in America* (4 vols., New York, 1905), and S. C. F. Hahnemann, *Organon of the Rational Art of Healing* (ib., 1913). See the article HAHNEMANN.

HOMŒOPATHY, AMERICAN INSTITUTE OF. The oldest national medical organization in the United States, its first session having been held in New York City on April 10, 1844. Its objects are the reformation and augmentation of the Materia Medica and the furthering of the principles of homœopathy. It had (1914) 3048 members, representing every State in the Union, besides Canada, divided into bureaus on various lines of medicine and surgery, and meets annually in the large cities of the country. The institute publishes annual volumes of "Transactions," including reports and original papers. President (1914), Byron E. Miller, M.D., Portland, Oreg.

HO'MOGENE'ITY, LAW OF. The product of two homogeneous integral functions of the mth and the nth degree respectively is a homogeneous, integral function of the $(m + n)$th degree. The value of this principle in checking the process of multiplication of homogeneous functions is evident. The notion of homogeneity may be extended to irrational and fractional functions. In this case the degree is determined by introducing a factor k into each variable and observing the degree of the factor k in the resulting function.

HOM'OGRAPHS. See HOMONYMS.

HOMOIOUSION, hō'moi-o͞o'sī-on. See HOMOOUSION.

HOMOL'OGA'TION (from ML. *homologare*, to homologate, from Gk. ὁμολογεῖν, *homologein*, to agree, from ὁμόλογος, *homologos*, agreeing, from ὁμός, *homos*, same + λόγος, *logos*, word, from λέγειν, *legein*, to say). In the civil law, the judicial confirmation of an award, or of an accounting, or any other administrative or judicial proceeding, which was taken or performed without competent authority, or whose authority is in doubt. In Scots law the term denotes any act or course of conduct which confirms an act which would otherwise be invalid. Thus, an informal deed, though ineffectual in itself, may yet, if acted on by one or both parties, be set up and enforced against the party. In this sense, then, homologation is the equivalent of a form of estoppel (q.v.) in English and American law. To constitute homologation a clear knowledge of what the party is doing is necessary.

HOMOL'OGOUS SERIES. See HYDROCARBONS.

HOMOL'OGY (from Gk. ὁμολογία, *homologia*, conformity, from ὁμόλογος, *homologos*, harmonizing, from ὁμός, *homos*, same + -λογία, *-logia*, account, from λέγειν, *legein*, to say). 1. In biology, a term used to indicate structural corre-

spondence based on blood relationship, as opposed to analogy, which is applied to functional resemblance, such as that between the wings of a bird and those of a butterfly. Different sorts of homology have been recognized. There is the homology of the different parts of the body; viz., serial homology, as of the front and hind paired fins of fishes, or the arms and legs of man; antimeric homology, as of the petals of a flower or the right and left sides of the body. There is homology of corresponding organs in different individuals. This is most certain in individuals of the same species, somewhat less certain between genera and families, often doubtful between orders and classes, usually speculative between phyla. The criteria of homology are: (*a*) The criterion of connections. A part having similar relations in two species and making similar connections is homologous in the two cases. (*b*) The criterion of structure. Homologous parts have a fundamental similarity of structure. (*c*) The criterion of development. Homologous organs arise from the same germ layer in corresponding parts of the body and develop in the same fashion. Despite these clear-cut criteria, homologies are practically often very difficult of determination, particularly beyond the limits of a class.

2. In geometry, figures which are in perspective are often spoken of as homologous, because the centre and axis of perspective introduced by Poncelet were called by Chasles centre and axis of homology. (See PERSPECTIVE; CENTRE; AXIS.) The term "homologous" is also used in the sense of "corresponding." Thus, corresponding sides or angles of similar polygons are said to be homologous.

HOM'ONYMS (Fr. *homonyme*, Lat. *homonymus*, from Gk. *ὁμώνυμος*, *homōnymos*, having the same name, from *ὁμός*, *homos*, same + *ὄνομα*, *onoma*, name). Words that agree in form, but differ in origin and meaning. A familiar example of this class of words is *sound*, which in its different meanings goes back to the Latin *sonus*, Scandinavian *sund*, and Anglo-Saxon *gesund* and *sundian;* or the verb *bear* and the noun *bear*. Many homonyms are often distinguished by the accent, as *absent*, the adjective, and *absent*, the verb. Strictly speaking, these are not homonyms, but homographs, since the exact correspondence is confined to the spelling. A third term is also used—"homophones," words that agree in the sound, but not necessarily in the spelling. Thus *write*, *wright*, and *rite*, or *meet*, *meat*, and *mete*, are homophones.

HOMOOUSION, hō'mō-o͞o'sĭ-on (Gk. *ὁμοούσιον*, *homoousion*, consubstantial, from *ὁμός*, *homos*, same + *οὐσία*, *ousia*, essence). A term of Greek theology, employed against the Arians at the Council of Nicæa (325 A.D.), to denote that in the doctrine of the Trinity the Son is "of the same essence [or substance] with the Father." According to the received text of what we call the Nicene Creed, the article in question reads: "And [I believe] in one Lord Jesus Christ . . . being of one substance with the Father." The word *homoousion* is much older than the Council of Nicæa. Not to speak of its employment by Gnostics, like Basilides, it is found in the writings of Irenæus, in the latter half of the second century, and not infrequently in the third century. It was rejected by a synod held in Antioch, against Paul of Samosata (268 or 269), where it seems to have borne a meaning somewhat different from that which was applied to it by Athanasius. In the fourth century the word aroused a long and bitter controversy. The Athanasian party defended it; the Arians attacked it on every side. In the progress of the struggle various alternatives were proposed. Some extreme Arians wished to substitute *heteroousion* (of a different substance) for *homoousion*, thus affirming the direct opposite of what the orthodox party insisted upon. Others, less radical and largely indifferent to the real issue involved, suggested the colorless term *homoion* (similar), meaning simply the Son "is like" the Father. The greater part were willing to go so far as to use the word *homoiousion* (i.e., the Son is "of a like essence, or substance," with the Father). This use of *homoiousion* gave rise to the epigram that the quarrel was over a diphthong; but the serious theological problem was whether the Church worshiped one divine being in two persons, or two divine beings, God and Christ. After nearly 60 years of theological warfare the Church, at the Council of Constantinople (381), reaffirmed its allegiance to the *homoousion* doctrine and now applied it not simply to the Son, but also to the Holy Ghost, thus completing the dogma of the Trinity, which has ever since remained the orthodox faith of Christendom.

Consult: I. A. Dorner, *Doctrine of the Person of Christ* (Edinburgh, 1861–63); K. J. Hefele, *History of the Christian Councils from the Original Documents*, translated from the German and edited by W. R. Clark (ib., 1871); J. H. Newman, *The Arians of the Fourth Century* (5th ed., London, 1888); Athanasius, *Select Works*, translation in the *Nicene and Post-Nicene Fathers*, 2d series, edited by Schaff and Wace, vol. iv (New York, 1892); Dubose, *The Ecumenical Councils* (2d ed., ib., 1897); Adolf Harnack, *History of Dogma*, vol. iv (Boston, 1898); J. F. Bethune-Baker, *Meaning of Homoousios in the Constantinopolitan Creed* (New York, 1908). See ARIUS; ATHANASIUS; CHRISTOLOGY; NICENE CREED.

HOM'OPHONES. See HOMONYMS; HOMOPHONY.

HOMOPH'ONY (Gk. *ὁμόφωνος*, *homophōnos*, having the same sound, from *ὁμός*, *homos*, same + *φωνή*, *phōnē*, sound). The style of modern music where one voice or melody predominates. The other voices are not independent, but serve chiefly to furnish the harmonic basis for the leading voice. Thus it is directly opposed to the older polyphony (q.v.), where all voices were independent and of equal importance. See ANTIPHONY; MONODY.

HOMOP'LASY (from Gk. *ὁμός*, *homos*, same + *πλάσις*, *plasis*, molding, from *πλάσσειν*, *plassein*, to mold). A term proposed by Lankester to express, as he says, "the parallelism of genetically distinct organs." Its meaning by some is expressed by the word "convergence," now in frequent use. It is due to the action of similar or identical habits or environment on a part or parts of an animal or on the entire animal. Lankester's definition is: "When identical or nearly similar forces, or environments, act on two or more parts of an organism which are exactly or nearly alike, the resulting *modifications* of the various parts will be exactly or nearly alike." Lankester illustrates homoplasy by the case of the remarkable coincidence in the pteropod mollusks and cephalopod mollusks of appendages around or near the mouth provided with suckers. Osborn asserts that homoplasy

has been confused with "parallelism" and "convergence," which may affect absolutely non-homologous structures. *Homoplasy*, he says, should be confined to structures in which there is an element of homology. *Convergence* may be restricted to cases of "parallelism" between animals of entirely unrelated groups or classes, like the following: marsupial mice, and other animals of that group exactly resemble placental mice, etc.; whales resemble fishes owing to their similar adaptation to the water. Many cases of so-called mimicry (q.v.) appear to be instances of convergence. Legless lizards may be mistaken for snakes. There are multitudes of such examples, and the resemblance or parallelism is so exact as to have often misled well-trained zoölogists.

HOMOP'TERA (from Gk. *ὁμός, homos*, same + *πτερόν, pteron*, wing). A suborder of the Hemiptera, including insects with wings (when present) of uniform thickness throughout. It contains some of the most destructive of insects and others that are the most beneficial. It includes the cicadas, lantern flies, spittle insects, leaf hoppers and tree hoppers, plant lice, scale insects, and others. A few of the scale insects furnish materials that are useful to man, such as cochineal lac and wax. A famous scale insect is the "San José" scale, and the mealy bugs of greenhouses are well-known representatives of this group. See HEMIPTERA; BUG; COCHINEAL; APHID; CICADA; FROTH FLY; SCALE INSECT.

HOMOS'PORY (from Gk. *ὁμός, homos*, same + *σπόρος, sporos*, seed—lit., spores similar). A word generally used only in connection with such plants as have a distinct alternation of generations (q.v.). The sexless generation (sporophyte) in the alternating series produces spores, which in turn produce the sexual generation (gametophyte). Among the liverworts and mosses (Bryophytes), and in most of the ferns and their allies (Pteridophytes), these spores are all alike in appearance and power, each in germination producing a gametophyte which bears both male and female organs. The term contrasts with "heterospory" (q.v.), a condition in which the sporophyte produces two kinds of spores, unlike in size and power, the larger of which produce female gametophytes, the smaller male gametophytes. All the seed plants (Spermatophytes) are heterosporous, as well as the water ferns, quillworts, and little club mosses among the Pteridophytes. Isospory is the same as homospory.

HOM'OTAXY, or **HOM'OTAX'IS** (from Gk. *ὁμός, homos*, same + *τάξις, taxis*, arrangement, from *τάσσειν, tassein*, to arrange). A geological term which signifies a similarity in the succession of strata in different regions as shown by the included life forms.

HOMS, hŏms, or **HEMS,** hĕms (Lat. *Emesa*). A city of Syria, situated near the right bank of the Orontes, 1660 feet above sea level, 36 miles south of Hamah by rail (Map: Turkey in Asia, C 3). A branch railroad line to Tripoli on the coast was opened by a French company in 1911. The old town, built chiefly of black basalt, has crowded houses and narrow streets and is surrounded by old half-ruined walls and commanded by a ruined citadel. Although there are now no ancient buildings, numerous fragments of columns with Greek inscriptions, and the foundations of ancient baths with specimens of mosaic pavements, remain. The town has considerable trade in silk, cotton, oil, and gold ware, and has also some manufactures. Pop. (est.), 60,000, including about 16,000 Christians. Homs (ancient Emesa) was celebrated chiefly for its splendid temple of Baal, the god of the sun, one of the priests of which, Elagabalus, or Heliogabalus, was raised to the Imperial throne of Rome. Under the walls of Emesa Zenobia was defeated by the Emperor Aurelian in 272 A.D. The city was taken by the Saracens in 636, when its old Semitic name, Hems, was revived. In 1099 the Crusaders rode through its opened gates. Here the Egyptian army, under Ibrahim Pasha, defeated the Turks in July, 1832.

HOMURAI, hō'mōō-rī. See HORNBILL.

HONAN, hō'nän' (Chin., south of the river). One of the 18 provinces of China proper, bounded on the north by the provinces of Shansi and Chili, on the east by Shantung, Kiangsu, and Anhui, on the south by Hupeh, and on the west by Shensi (Map: China, K 5). It lies between lat. 32° and 37° N. and long. 110° and 116° E.; area, 67,954 square miles. The eastern part is comparatively level and belongs to the Great Plain, while in the western section spurs of the Fu-niu Range of mountains with a southeast trend are found. Its principal river is the Hoang-ho, which traverses the northern part from west to east. The soil is fertile and, in addition to the usual cereals, produces cotton, hemp, indigo, and tobacco. Patches of the remarkable formation called loess (q.v.) by Richthofen and "lake loam" or terrace deposit by Pumpelly are found in both the northern and southern parts. Honan is rich in minerals, iron, lead, tin, copper, etc., and has enormous deposits of anthracite and bituminous coal, which is mined only by native methods. It has been recently proposed to develop the mines by modern methods. The capital, Kaifeng (or Kaifung), is situated 11 miles south of the Hoang-ho and near the point where in 1853 the river burst its banks and took a new course to the northeast through Shantung to the Gulf of Pechili, instead of southeast through Kiangsu to the Yellow Sea, as formerly. Kaifeng is a station on the new *Lu-Han* or Hankow-Peking Railway. It is noted for its ancient colony of Jews, who built a synagogue there as early as 1183. (See KAIFENG.) Colonel Manifold (1905) reported that the Chinese of this province wished railroads and had other progressive ideas. Pop. (Chinese est.), in 1910, Minchengpu, census, 22,375,000. Construction on the Kaifeng-Honan Railway began in 1905, and the road was opened to traffic in 1908. It is 140 miles long and forms a junction at Chenchow with the Peking-Hankow Railway. It is in a prosperous condition, and several extensions are planned. As Honan is a rich province without navigable rivers, its prosperity will largely develop with advancing railway construction.

HONDA, ōn'dȧ. A city of Colombia, situated on the Magdalena, in a mountainous region, 55 miles northwest of Bogotá. The town has a very hot climate, as the surrounding mountains shut off the cool winds. It is important as the head of navigation, and the transit point of the trade for Bogotá, as well as the depot for the tobacco and quinine from the Ambalema District. Pop., 1912, 8225. Honda received its town charter in 1643. In 1805 it was destroyed by an earthquake.

HONDA, hŏn'dȧ, YOITSU (1848–1912). A Japanese Methodist Episcopal bishop and educator. The son of a chief of the Samurai class in his

province, he was born at Hirosaki on the island of Hondo. When a student in Yokohama, he was converted to Christianity, and in 1872 he was baptized and became a charter member of the first Protestant church organized in Japan. For some time he was a member of the local assembly of his province. In 1878 he was ordained a local elder of the Methodist Episcopal church—the first minister of the denomination in his country. After going to the United States to attend Drew Theological Seminary in 1889 and 1890, he returned to be president of the Aoyama Gakuin, or Anglo-Japanese College of the Methodist Episcopal church. In this position he remained until the Methodist church of Japan was organized in 1907, when he was elected its first Bishop. An ardent Y. M. C. A. worker, he twice represented his country in World's Student Federation conferences in Europe; in 1910 he was again in America, as fraternal delegate to the general conferences of the Methodist Episcopal Church South and of the Methodist Church of Canada. In the same year he was a member of the World's Sunday School Convention at Washington, D. C., and of the World Missionary Convention at Edinburgh. For many years the Christians of Japan selected him as their representative on all important public occasions.

HONDECOETER, hŏn′de-kōō′tēr, MELCHIOR D' (1636–95). A Dutch animal painter. His grandfather, GILLIS (died 1627), was a landscape painter at Amsterdam, and his father, GISBERT D'HONDECOETER (died 1653), painted animals. Melchior was born at Utrecht and studied under his father and his uncle, Jan Weenix (q.v.). From 1659 to 1663 he lived at The Hague and after that at Amsterdam, where he received the freedom of the city in 1688 and resided until his death, April 3, 1695. He stood in high favor with the Dutch magnates, and while at The Hague was employed by William III, afterward King of England, to paint his menagerie. His grandfather had made a considerable name in that form of art. Hondecoeter painted every kind of animal; but his favorite subjects were cocks, hens, ducks, and peacocks, which he delineated with wonderful correctness and truth. He depicts, with great charm, motifs like the maternity of the hen, and he even lends beauty to subjects like "cockfights" and "Ducks in a Pond." No one has excelled or even equaled him in painting the feathered tribe. The landscapes which he introduced as backgrounds to his pictures are equally true to nature and finished with a delicate lightness and transparency of touch that harmonize admirably with the subject of the piece. The museums of France, Germany, and Austria and the private and public collections of England have fine examples of his work, but his masterpieces are at Amsterdam and The Hague. His most celebrated work is "La plume flottante" (Floating Plumage) in the Museum of Amsterdam, representing a pond full of waterfowl.

HONDO, hŏn′dō, or **HON-SHU,** hŏn′shyōō′ (Chino-Jap., chief island). The name of the chief island of the Empire of Japan, often, but incorrectly, called Nippon or Nihon. Nippon is not the name of any one island, but of the entire Japanese Empire. The application of the erroneous name Nippon to the chief island originated with Kaempfer (q.v.), the Jesuits who wrote previously to him knowing Japanese geography too well to use the misleading term. Of late years the Japanese, studying geography in the Western fashion, and seeing the necessity of a name for their chief island, have called it Hondo. Hondo lies between lat. 24° 14′ and 41° 33′ N. and long. 130° 44′ and 142° 14′ E. and has an area (with its isles) officially computed in 1894 at 87,482 square miles, with a population (1908) of 37,414,281. It comprises the circuits of Tokaido, Kinai, Tosando, Hokurikudo, Sanindo, Sanyodo, and one province of Nankaido (the other four provinces of this circuit forming the island of Shikoku). For administrative purposes Hondo is divided into 34 fu and ken (or prefectures), 429 districts, 41 large cities, 930 towns, and 9219 villages. Of its taxable area in acres, 5,521,175 are in rice fields, 3,874,410 in arable land, 758,320 in building lots, and 14,697,336 in forest, 2,234,766 various, besides 501,188 acres of untaxed land. Its shape is a crescent, with horns towards Asia. A remarkable difference in climate is noted between the eastern and the western halves of Hondo—the former, under the influence of the Kuro-Shiwo, or gulf stream of the Pacific, being mild and warm; the latter, receiving the cold winds and under the influence of cold currents, having a more severe climate. The promontories of Hondo are now dotted with well-equipped lighthouses, and the island is well supplied with railways and telegraphs.

HONDURAS, hŏn-dōō′rȧs, *Sp. pron.* ŏn-dōō′-rȧs. A republic of Central America, bounded by the Caribbean Sea on the north and northeast, Nicaragua on the southeast, Salvador and the Pacific Ocean on the southwest, and Guatemala on the west (Map: Central America, D 3). Area, estimated at about 44,274 square miles. It is a mountainous country, a plateau in the interior, with low coast lands. The only plains of important extent are along the coasts of both oceans and on the lower courses of a few rivers. The widening of river valleys in the interior results in small plains, many of them at a considerable elevation. The mountains occupy a proportionately larger area than in neighboring Guatemala, but the ranges are inferior in extent and height, though some peaks rise to about 8000 feet. Volcanoes have recently played a smaller rôle than in any other country of Central America, though there are a number of extinct volcanoes, one of which formed the island of Sacategrande in the Gulf of Fonseca. In the west half of Honduras young eruptive rocks cover as large an area as all the other geological formations together, while in the east half very little of the surface is formed of volcanic outpourings of recent geological times, though the older eruptive rocks are largely represented, particularly in the north. The coasts have a long Atlantic and a small Pacific frontage. The Atlantic ports are Trujillo, Ceiba, and Puerto Cortés. Amapala has one of the best natural harbors on the Pacific coast. The water parting between the Atlantic and Pacific rivers is far to the south, so that most of the drainage is to the Atlantic Ocean. Some of the Atlantic rivers are navigable, among them being the Coco or Segovia (known also as the Wanks), which forms part of the boundary with Nicaragua.

In the interior the climate is healthful and on the whole temperate. The coast lands, owing to their small elevation, have a much higher temperature. Honduras is swept by the trade winds and receives an enormous quantity of rain. The tropical vegetation is very luxuriant. The broad Atlantic coastal lowlands, however, re-

ceive much less rainfall than the mountain regions of the interior, where most of the water vapor brought by the east winds is condensed. The result is that though the eastern lowlands are covered with vast forests of mahogany, cedars, and other cabinet woods, in which also sarsaparilla and other medicinal plants abound, vegetation in the east is not so luxuriant as in the higher regions inland, where there are boundless forests of pines and other conifers so dense that one may travel for days without being able to see more than 100 yards in any direction. The dry season prevails from November to May, the Pacific coast being the drier. The Atlantic coast is not healthful for the white race, and its products are mainly those of the forest and tropical fruits. The interior, from 1500 to 7000 feet, produces tropical products in the lower zone, coffee in the middle zone, and the products of temperate climates in the upper belt. Numerous relics of a former civilization are found in some districts, most of them being the ruins of temples and other religious edifices.

For fauna, see NEOTROPICAL REGION.

Mineral Resources. The country is richer in minerals than any other Central American state excepting Nicaragua. They include gold, silver, copper, zinc, iron, lignite, etc. Lack of capital and energy, however, has prevented large development. The mining activities are practically confined to the washing of gold from the rivers and the production of some silver in the southern part of the country, these metals being the largest exports.

Agriculture. The soil is very rich, but, in spite of its unusual fitness for agriculture, Honduras is the most backward state of Central America. The natural conditions are conducive to the cultivation of almost all the products of Central America, but the sparsity of population as well as the lack of transportation facilities stand in the way of agricultural development. More attention is paid to stock raising and to the cultivation of bananas and other fruits in the Atlantic coastal region than to any other branch of farming. Steamers carry a large quantity of bananas and coconuts to the United States. Tobacco, sugar, maize (the chief food staple), coffee, rice, etc., are all grown in quantities sufficient to supply the local demand, and considerable coffee is sold abroad. The almost prohibitive export duties have brought about a considerable increase in the live stock of the country. The exports of live cattle, however, as well as of hides, are not unimportant. Sheep, goats, and swine are few in number.

Transportation. With regard to transportation facilities the situation in Honduras is worse than in any other of the Central American states, although the natural obstacles in the way of a railway line from coast to coast are less than in most of the other states. The construction of a narrow-gauge line from Puerto Cortés on the Atlantic to the Gulf of Fonseca on the Pacific was begun in 1868 by an English company, which had secured from the government a land grant of 10 square miles per mile of road constructed, and extensive mining and lumbering privileges. Bonds to the amount of $30,000,000 were issued and sold; but the work was discontinued after about 60 miles, or one-fourth of the road, had been constructed. Since then all efforts to resume construction have been unsuccessful, and the part completed, between Puerto Cortés and La Pimenta, has been operated with varying success by several companies. A mule train is three weeks on the road between Puerto Cortés on the Atlantic and the Pacific port of Amapala, a journey that would take less than a day by rail. There are a number of other short railways, bringing the total mileage of the Republic to about 150. A number of concessions have been granted in order to improve the means of communication. There are a number of tolerable wagon roads, and a macadamized road connects Tegucigalpa with the port of San Lorenzo; but most of the traffic is still carried by mules. The telegraph lines of the country had 3812 miles of wire in 1912.

Commerce. The commerce of Honduras is less than that of any other Central American state, this being due largely to the general backwardness of the country. The imports in 1912 were $4,317,314, of which 67 per cent came from the United States and lesser amounts from Great Britain, Germany, and France, in the order named. The exports in 1912 amounted to $3,080,128, of which 88 per cent went to the United States and small amounts to other Central American states, Germany, and Great Britain, in the order named. The chief articles of import are foodstuffs, cotton manufactures, iron and steel manufactures, and chemicals. The largest single item of export is bananas, and then follow, in the order given, gold and silver cyanides and ores, coconuts, cattle, hides and skins, coined silver, coffee, rubber, tobacco, sarsaparilla, and cabinet woods.

Government. The constitution of Honduras, as promulgated in 1904, provides for a republican form of government. The executive power is vested in the President, elected by popular vote for a term of six years. The Chamber of Deputies, which is intrusted with the exercise of the legislative power, is composed of deputies elected directly for four years, at the rate of one deputy for every 10,000 inhabitants. The President is assisted in his duties by a cabinet of ministers. For administrative purposes the Republic is divided into 17 departments and one territory, administered by governors appointed by the President. The administration of justice is in the hands of a supreme court, situated at the capital, and a number of minor tribunals and justices of the peace. Municipal affairs are controlled by councils, elected by a direct vote of the people. The capital is Tegucigalpa.

Finance. The chief sources of revenue are customs duties and the spirits, powder, and tobacco monopolies. The revenue for 1913–14 was estimated at 4,824,000 pesos, and the expenditure at the same amount, of which about one-third was spent by the Department of War. The finances of the country are in a deplorable condition, owing to the expenditures incurred during the war with Salvador and Guatemala and to the continuous civil strife as well as to general mismanagement. Thus, the external debt of the country amounted on Jan. 1, 1914, to £5,398,570, while the arrears of interest at the same period amounted to £18,295,399, bringing up the foreign indebtedness of the country to £23,693,969. The internal debt amounted in 1912 to 6,625,206 pesos silver.

Defense. Military service is obligatory upon every able-bodied citizen between the ages of 18 and 40. The standing army, in 1910, had about 2000 men, and the reserve numbered 54,000 officers and men.

Population. The population of Honduras was

566,017 (official estimate) in 1911, exclusive of (uncivilized) Indians. Most of the population are called aboriginal Indians. The number of persons of pure European descent is very small. Religious freedom is provided for by the constitution, and no religion is officially recognized by the state. The prevailing religion is Roman Catholic, but there are also a number of Protestant churches. Education is supported by the state to a considerable degree, but the facilities are far from adequate. In 1911–12 there were 890 primary schools, with 35,703 pupils. At Tegucigalpa there is a university with faculties of medicine, science, law, and political science; at Comayagua there is a school of jurisprudence. There are four high schools, a normal school, and a school of arts and crafts, situated at Tegucigalpa, besides departmental colleges that receive subventions from the government. There are also normal and high schools at Juticalpa, Santa Rosa, and Santa Barbara. There is an agricultural school at Danli and a school for the manufacture of cigars and cigarettes at Tegucigalpa. As regards penal and charitable institutions, there are a penitentiary and general hospital at Tegucigalpa, also a hospital at Amapala.

History. The coast of Honduras was discovered by Columbus in 1502. The first settlement was made in 1524 by Cristóbal de Olid, a lieutenant of Cortés, sent to take possession of the country in the name of his commander. Olid founded the town of Triunfo de la Cruz and set up an independent government. Cortés set out in person to bring Olid to terms, and after a tedious march of six months over the mountains and rivers of Mexico and Central America, he reached the little colony in the spring of 1525. There he reënforced the colonists and founded the town of Natividad de Nuestra Señora, on Caballos Bay, returning to Mexico in 1526. A royal governor was appointed to rule the province. The mines of Honduras were valuable, but under Spanish government the colony developed slowly. In 1539 the province was made an audiencia of the Captaincy General of Guatemala. The laws enacted for the protection of the natives were systematically disregarded. In 1821 Honduras revolted from Spain and was annexed to the Mexican Empire. In 1823 it joined the federation of Central American states which was formed in October of that year and lasted until 1839, when it was finally dissolved. In 1849–51 Honduras formed a union with Salvador and Nicaragua, which ended in 1863 in war between the contracting parties. Between 1856 and 1860 the usual course of internal dissension was interrupted by the filibustering exploits of William Walker (q.v.). In 1871 war broke out between Honduras and Salvador and Guatemala, and after peace was declared, in 1874, a revolution in the interests of the ex-President, Medina, took place. Other states interfered, and the Guatemalan candidate, Soto, acted at first as provisional President and was elected to that office in April, 1877. In 1880 the national capital was removed from Comayagua to Tegucigalpa, and Soto was reëlected President. In 1899 General Sierra was chosen President for the term ending in 1903. He was succeeded by Gen. Manuel Bonilla. In July, 1906, there was a sharp five days' war between Honduras and Salvador on one side and Guatemala on the other. (See GUATEMALA.) In 1910 there was a revolt under General Valladares, who seized Amapala. The next year ex-President Bonilla led a revolt, and the United States intervened to secure an adjustment of the difficulties. President Miguel R. Dávila resigned, and General Bonilla was elected for another term, assuming office Feb. 1, 1912. Disturbed conditions continued, and in 1913 United States marines were landed to protect American property. President Bonilla died on March 31, 1913, and was succeeded by the Vice President, Francisco Bertrand.

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HONDURAS, BAY OF. An inlet of the Caribbean Sea, between British Honduras, Guatemala, and Honduras. It forms several inlets, receives Belize and Motagua rivers, and contains the island of Turneffe and the Bay Islands, off the coast of Honduras.

HONDURAS, BRITISH. See BRITISH HONDURAS.

HONE, PHILIP (1780–1851). An American merchant and politician, born in New York City, where, with his brother, he built up a profitable business as an auctioneer. In 1816 he established the first savings bank in New York, was mayor of the city in 1826, and founded the Mercantile Library Association. He had been a Federalist, joined in the formation of the Whig party, and, it is said, gave it that name. He was prominent in national politics, opposed Jackson, and later condemned abolition. He wrote a diary for the years 1828 to 1851, which, edited in part by Tuckerman (1889), gives valuable impressions of life in New York and of the early days of the Whig party.

HONE, WILLIAM (1780–1842). An English author and bookseller, born at Bath. He was brought up in the strictest piety, even learning to read and write from the Bible. When 10 years old, he was apprenticed to a London attorney, but afterward set up as bookseller. He gained a contemporary notoriety by his satires on the government, which were illustrated by Cruikshank. For his parodies on the Prayer Book in his *Political Litany* (1817) he was prosecuted, but acquitted. His *Political House that Jack Built* (1819) ran through 54 editions.

Withdrawing from politics, he produced works of more permanent value, as: *Ancient Mysteries* (1823); a new edition of Strutt's *Sports and Pastimes* (1830); *Every Day Book* (1826–27); *Table Talk* (1827–28); *The Year Book* (1832); and many cheap and popular reprints. During his last years he frequently preached. He died at Tottenham. Some of the most characteristic of Hone's works have been reprinted by W. Tegg: *Every Day Book, Table Talk,* and *Year Book* (1873); and *The Three Trials,* an account of his prosecution by the government (1876). Consult *Early Life and Conversion of William Hone, by Himself,* edited by his son (London, 1841).

HONES (AS. *hān,* Icel. *hein,* stone; ultimately connected with Lat. *cuneus,* Gk. *κώνος, kōnos,* wedge, Skt. *śāna,* whetstone, from *śā, śi,* to sharpen), or WHETSTONES. A particular class of stones used for the purpose of sharpening edge tools, such as razors, knives, scythes, etc. They are usually cut into pieces of convenient size according to their intended uses. The finest kind of hones are those called oilstones; these are hard, compact, and so very siliceous that they readily wear down the hardest steel; they are varieties of slate, derived from the argillaceous schists of the Paleozoic period. These stones are found in Turkey, Bohemia, Persia, in the Harz Mountains, in Styria, in the United States, Spain, Peru, and in Siberia. In Great Britain several localities yield hone stones of excellent quality, and none better than the celebrated Water-of-Ayr stone, which is much used for polishing copper plates as well as for hones. The hones used for sharpening scythes, etc., are usually made of coarse-grained sandstone. One of the best American stones for hones comes from Arkansas. In addition, there are artificial stones formed from abrasive materials, which possess advantages for certain purposes. See ABRASIVES.

HONES'DALE. A borough and the county seat of Wayne Co., Pa., on the Lackawaxen River, 44 miles by rail northeast of Scranton, on the Delaware and Hudson and the Erie railroads (Map: Pennsylvania, L 3). It has several public parks. Honesdale has extensive cut-glass manufactories. It manufactures also boots and shoes, silk and woolen goods, axes, foundry products, elevators, flour, paints, concrete blocks, etc. Pop., 1900, 2864; 1910, 2945.

HON'EST GEORGE. A nickname given to George Monck, first Lord Albemarle.

HONEST MAN'S FORTUNE, THE. A play by Fletcher and Massinger and possibly others, performed in 1613 and printed in 1747.

HONEST MAN'S REVENGE, THE. See ATHEIST'S TRAGEDY, THE.

HONEST WHORE, THE. A play in two parts by Dekker, and perhaps Middleton, the first part of which was published in 1604. The earliest extant edition of the second part was not printed until 1630.

HONEY (AS. *hunig,* OHG. *honag, honang,* Ger. *Honig,* of uncertain origin). A thick, sweet liquid, of more or less pronounced flavor, produced by bees of various kinds and by other insects. The neuter or working bees gather the nectar from the nectaries of flowers (and other sweet substances if flowers are lacking), extracting it by means of the proboscis and passing it into the crop or honey bag. The bee disgorges the honey into the cells of the comb. Apparently the sweet substance undergoes some change in the honey bag, as honey differs in flavor from the nectar of the flowers from which it is gathered. The consistency of honey varies with age and is influenced by its source, that from some flowers being much thicker than that from others. The flavor also varies with the source from which it is gathered—that from clover, sweet clover, basswood, or linden flowers, e.g., being very agreeable; that from buckwheat is darker colored and less liked by some. Age also affects the flavor. Some honey which at first has a weedy taste loses this on keeping.

Honey has, on an average, the following percentage composition: carbohydrates, 81.2; water, 18.2; protein, 0.4; and ash, 0.2. The carbohydrates are made up of dextrose and lævulose in about equal proportion. Honey sometimes contains a little wax and some aromatic bodies, which give it flavor. The best and newest honey is clear and contained in a white comb. Older honey is of a yellowish tone and sometimes darker. On standing, dextrose sometimes crystallizes out from liquid honey and renders it opaque or often thick. The composition of honey varies somewhat according to the food of the bees, their age, season, etc. It is a favorite article of diet, owing to its sweet taste and agreeable flavor. The actual food value depends upon the sugars (carbohydrates) present. Like all other carbohydrate foods, it is a source of energy. Honey has a fairly high fuel value, on an average—1520 calories per pound. It is, however, generally eaten for its flavor rather than for its true food value. To the ancients, who were unacquainted with sugar, it was very important, being used in ways as sugar is now. Taken in moderate quantity, honey is wholesome and laxative. Persons suffering from digestive disorders often find that it aggravates their symptoms, and there are persons in health who, owing to some idiosyncrasy, cannot eat honey without distress. Its therapeutic action is probably not very great, but it is frequently employed in mixtures prescribed for allaying coughs and in various agreeable cooling drinks used in febrile and inflammatory affections. It finds many uses in cookery, particularly in making cakes and confectionery. Some sorts, as certain German Christmas cakes and honey cakes, are very popular. It should be mentioned that honey occasionally possesses poisonous properties, due to the flowers from which it was gathered. The poisonous honey of Trebizond is gathered from *Azalea pontica.* In America poisoning has occurred from eating honey gathered from laurel *(Kalmia latifolia* and *Kalmia angustifolia).* Many other instances of poison honey are on record.

Honey is marketed in the comb and also extracted from it. The latter, sometimes called "strained" honey, was formerly often adulterated with commercial glucose. Since pure-food legislation was enacted, both national and State adulteration of honey has become uncommon in the United States. See also BEE.

HONEY BADGER. See BADGER.

HONEY BEAR (so called from its fondness for honey). The sloth bear of India (*Melursus labiatus*). One of the native names is aswail. See BEAR.

HONEY BEE. See BEE; BEE KEEPING.

HONEY BERRY. See MELICOCCA.

HONEY BUZZARD, or PERN. A large hawk of the genus *Pernis,* peculiar in having the lores closely covered with feathers, which over-

lap one another like scales. The food of honey buzzards consists, not of honey, but chiefly of bees, wasps, and their young, in quest of which these birds dig up the ground to get at the nests of the insects. They feed also partly on other insects and less frequently on lizards, small birds, and the like. The several species are natives of the Old World.

HON'EYCOMB' (AS. *hunigcamb*, from *hunig*, honey + *camb*, connected with *comb*, OHG. *kamb*, *champ*, Ger. *Kamm*, comb, Gk. *γόμφος*, *gomphos*, OChurch Slav. *zambŭ*, Skt. *jambhya*, tooth). 1. See BEE; HONEY. 2. In a gun, a *pitting* of the exposed surfaces of the bore due to the corroding or rusting action of the residuum from smokeless powder. It results in inaccuracy and finally in unserviceability unless great care is taken to clean the gun after each day's use. The word is sometimes used for what is more properly called *erosion*, which is the mechanical removal of the superheated exposed surface of the bore effected by the frictional action of the gases of explosion under enormous pressure and with great velocities. No permanent cure for *erosion* has been devised. The modern gun on this account has a very limited life unless relined with a new bore, a remedy sometimes resorted to.

HONEY CREEPER. A bird of the family Cœrebidæ, a passerine family of tropical and subtropical America, especially abundant in the West Indies. They are small birds, 4 or 5 inches in length, but usually of very handsome plumage. The colors are frequently brilliant, blue being especially common. The bill is very slender, sharp, and often decurved, and the tongue is deeply bifid and penicillate. The honey creepers are very closely allied to the American warblers, of the family Mniotiltidæ, so common throughout the United States. About 40 species are known, one of which, the banana quit, has occasionally strayed to Florida. They probe the corollas of flowers for the minute insects contained therein, possibly also eating honey, and often hover before them like humming birds, which some of them hardly exceed in size or fall below in brilliance. Consult Gosse, *Birds of Jamaica* (London, 1847), and *A Naturalist's Sojourn in Jamaica* (ib., 1851).

HON'EYDEW'. A term applied to the sweetish secretion which under certain conditions drips from the leaves of some trees. It is a form of "bleeding" which appears only when an abundant supply of atmospheric moisture (reducing evaporation) and a high temperature permit the development of a considerable sap pressure in the live cells. Some kinds of manna are the dried honeydew or the saccharine exudations of certain plants. Very generally this exudation, as it dries, coats the surface of leaves and branches with a clammy film, to which everything brought by the atmosphere adheres, thus closing the pores of the plant and impairing its health.

The name "honeydew" is often applied to a saccharine secretion of certain insects, notably the plant lice, the flea lice (Psyllidæ), certain scale insects and white flies (Aleyrodidæ), and certain leaf hoppers or tree hoppers. Of the latter, *Proconia* (*Oncometopia*) *undata* secretes the most abundant supply and is the cause of the phenomenon often described as "weeping trees." The honeydew secreted by all of these insects is frequently very abundant, giving the foliage and bark of trees a glistening appearance and frequently attracting swarms of bees, ants, wasps, and other honey-loving insects. Sometimes, when very abundant, as when sugar cane is attacked by leaf hoppers, bees collect the honey dew to such an extent as to impair the quality of the honey. Honeydew affords a welcome nidus for the spores of certain of the smut fungi, and an affected tree is likely soon to become black with smut. Thus, an olive orchard in California or southern Europe, the leaves of which turn black, will almost always be found to be infested with a scale insect (*Lecanium oleæ*) which secretes a quantity of honeydew. Orange and lemon plantations sometimes suffer great injury from the abundance of honeydew. See APHID.

HONEY EATER, or HONEY SUCKER. A name sometimes given to some of the Oriental sunbirds (q.v.), but also the common name of a large family of birds nearly allied to these and peculiar to Australia and the islands of that part of the world. This family, Meliphagidæ, of the order Passeres, has a long curved sharp bill (see Plate of CREEPERS), not so slender as in humming birds and sunbirds; the tongue terminates in a pencil of delicate filaments, the better to adapt it for sucking honey from flowers or juices from fruits. These are a part of the food of the honey eaters, but they also devour insects in great numbers. They are birds of elegant form and generally of gay plumage. Most of them have a long and broad tail. They are vivacious and active and keep up a continual chattering. Over 200 species of this family are known, arranged in about 25 genera. Examples are elsewhere described under BELL BIRD; BLOOD-BIRD; PARSON BIRD; ETC. Cf. FLOWER PECKERS and see POLLINATION.

HONEY GUIDE, INDICATOR, or MOROC. The popular name of a family of birds ranked in the vicinity of the barbet (q.v.) and the woodpecker (q.v.), but differing from these families in characters which show a slight approach to cuckoos, and also, in some respects, to creepers. About a dozen species are known, mostly natives of Africa, and found in almost all parts of it; but one species occurs in India, one in Malacca, and one in Borneo. They have acquired their name from guiding men to honey, a curious instinct prompting them to flutter near the traveler with frequent repetitions of a cry which resembles the syllable *cherr;* and it is said that if followed they almost always lead to a place where a bees' nest may be found. This story has been denounced as fabulous, but reliable observers vouch for its truthfulness. The birds are very fond of honey and always reap a harvest after man has once opened up a bee tree and taken what honey he wants. It is said that the Kaffirs never fail to leave a generous meal for the bird which has guided them to the tree. The honey guides are small birds of dull plumage and rather stout bill. They generally build pensile nests and lay white eggs; but some species are said to lay their eggs in the nests of other birds, as the European cuckoo and the cowbird do. See Plate of TROGON; HOOPOE, ETC.

HONEY LOCUST, *Gleditsia triacanthos*, also known as sweet locust and black locust, and in Great Britain as three-thorned acacia. A lofty and beautiful tree of the family Leguminosæ, a native of the rich valleys from Ontario through the basin of the Mississippi. It is not found wild on the Atlantic coast of North America, although often planted in parks and in the

vicinity of habitations. The flowers are small, greenish, and in spikes. The leaves are twice pinnate, without terminal leaflets, and derive a peculiar gracefulness from the numerous small, light-green, shining leaflets. The tree is furnished with numerous sharp triple spines. The pods are long, flat, pendulous, often twisted; the seeds large, brown, and enveloped in a pulp, which, when the pod is ripe, is very sweet. Sugar has been made from it, and when fermented it yields an intoxicating beverage, formerly in use among the American Indians. The honey locust attains a height of 70 or 80 feet. The wood resembles that of the American locust tree (see ACACIA), but is more coarse-grained. A variety is common in which the trees are nearly without thorns. The honey locust is valuable for windbreaks, hedges, and other plantations. A second species, *Gleditsia aquatica*, called water locust, is found from Kentucky and Missouri to the Gulf region and along the Atlantic from South Carolina to Florida. A third species, *Gleditsia texana*, is a large tree in Texas, where it attains a height of more than 100 feet. See MESQUITE TREE.

HONEY-MAKING ANT. Any of several species of ants of the genus *Myrmecocystus*, inhabiting Colorado, Arizona, New Mexico, and Mexico. Like other ants, they live in colonies, in subterranean nests, the entrance to which is in a small raised mound. The honey is obtained at night from small galls on oak leaves by foraging workers which come home considerably distended with honey. With the honey they feed the other workers and the young in the hill, and what is left over is communicated to a number of ants which simply serve as living receptacles. These live honey bags cling to the roof of the nest chamber and move very little, and in time their abdomens become enormously distended. According to McCook, these living storehouses merely retain the honey until it is needed by the colony during the winter, when it is given out from the surcharged crops to feed the colony. Ants with similar habits, but of the genera *Melophorus* and *Camponotus*, have been described from Australia, and still another genus (*Plagiolepsis*) has more recently been discovered in South Africa. In Mexico these ants are eaten by the natives. Consult: McCook, *The Honey Ants of the Garden of the Gods, etc.* (Philadelphia, 1881); Comstock, in *Standard Natural History*, vol. ii (Boston, 1884); Sharp, in *Cambridge Natural History*, vol. vi (New York and London, 1900); Wheeler, *Ants* (New York, 1910). See ANT.

HON'EYMOON', THE. A comedy in five acts, by John Tobin. It was produced after the author's death in 1805.

HONEY MOTH. See BEE.

HONEY POD. See MESQUITE TREE.

HONEY STONE. See MELILITE.

HONEY SUCKER. A bird of the family Meliphagidæ, or some related form, as the diamond bird; an indefinite term for a somewhat indeterminate assemblage of Oriental and Australian birds. See BELL BIRD; HONEY EATER; MOHO.

HON'EYSUCK'LE (AS. *hunisuce, hunisuge*, from *hunig*, honey + *sūcan, sūgan*, OHG. *sūger*, Ger. *saugen*, Lat. *sugere*, to suck), *Lonicera*. A genus of plants of the family Caprifoliaceæ. The species number 100 or more, all of which are indigenous in the Northern Hemisphere. They are shrubs, often twining, and have the flowers either in whorls or in pairs. The calyx is short and five-toothed; the corolla, tubular-funnel-shaped, five-cleft, generally two-lipped; the fruit a three-celled and many-seeded berry. About half the species of *Lonicera*, as well as many hybrids, are in cultivation. The common honeysuckle, or woodbine, of England (*Lonicera periclymenum*) is very abundant in woods and thickets in most parts of Great Britain. On account of its beautiful cream-colored flowers and their delightful fragrance the honeysuckle is often planted in shrubberies. It is said to be the "twisted eglantine" of Milton. Very similar to this is the perfoliate honeysuckle (*Lonicera caprifolium*), with whorls of paler flowers, and remarkable for having the upper leaves united so that an opposite pair form one leaf, through the middle of which the stem passes. This peculiarity is confined to the flower-bearing shoots and does not occur in the young runners; it is also most perfect near the flower. This species is a native of the south of Europe and much planted, as, although less fragrant than the common honeysuckle, it flowers earlier. There are numerous other species, natives of Europe, Siberia, and North America. The fly honeysuckle (*Lonicera xylosteum*) is an erect shrub, a native of Europe and Asia, common in shrubberies. Its branches are not infrequently used in some parts of Europe for tubes of tobacco pipes, and it is said to make good hedges in dry soils. The trumpet honeysuckle (*Lonicera sempervirens*), a twining green shrub, called in America the coral honeysuckle, is a native of the southern United States, often planted on account of its beautiful scented flowers, red on the outside and scarlet within. The Japanese honeysuckle (*Lonicera japonica*) has become established in the eastern part of the United States, having escaped from cultivation. The berries of the honeysuckle are nauseous. The name "honeysuckle" is also given to shrubs very different from this genus, but of which the flowers abound in honey, as to species of *Banksia* in Australia, *Diervilla, Aquilegia*, etc., in the United States. *Rhododendron viscosum* is called swamp honeysuckle in North America.

HONEYSUCKLE ORNAMENT. See ANTHEMION.

HONEYSUCKLE TREE. See BANKSIA.

HONFLEUR, ôn'flĕr'. A seaport town in the Department of Calvados, France, on the southern shore of the estuary of the Seine, 7 miles from Havre, which lies on the opposite shore (Map: France, N., F 3). It has a fifteenth-century chapel, which contains J. Jordaens's famous painting, "Jesus in the Garden of Gethsemane." The town lost much of its former commercial importance, owing to the silting of its harbor and the proximity of Havre; but since 1860 a floating basin and other harbor improvements have been installed and have revived its waning commerce. There are thriving fishing industries and a considerable trade in cattle, butter, eggs, poultry, and grain is carried on. Considerable manufactures of rope, leather, metal goods, and chemicals have grown up. The United States is represented by a consular agent. Pop., 1901, 9610; 1911, 9298. Honfleur, founded in the eleventh century, was of considerable strategical importance during the wars between France and England.

HONG-KIANG, hông'-kyäng', or WEST RIVER. See SI-KIANG.

HONGKONG, hŏng'kŏng' (Chin., Fair Har-

bor). An island belonging to Great Britain, lying off the southeast coast of China, from which it is separated by a narrow channel (one-fourth mile at its narrowest), known as Ly-e-Mun (or Carpfish Pass), at the mouth of the Chu-kiang (or Pearl) River (Map: China, K 7). It is 91 miles southeast of Canton and 40 miles east of Macao. Consisting of a range of granitic hills, it has little level land, its coast line is very irregular, and its shores are steep and precipitous, but broken in many places, especially on the south coast, by deep inlets, the chief of which are Ty- (or Tai-) tam and Shek-pai Wan. It is about 10 miles long from east to west and nearly 4 miles in average breadth. Area, about 32 square miles. The highest of six mountain peaks is Victoria Peak, with an elevation above sea level of 1825 feet.

Geologically Hongkong is entirely of igneous origin, its prevailing rock being a gray, rapidly disintegrating syenite, upheaved and penetrated by porphyritic rocks and basaltic trap. The climate of the island is very trying to foreigners. The temperature seldom exceeds 93° F.; the minimum summer temperature is 75° F.; but the rainfall in certain seasons is sometimes excessive, which makes the humidity very high. The driest month is December, and winter generally is the most delightful part of the year. The sanitary arrangements are good, but the Chinese quarter is sometimes visited by epidemics.

Notwithstanding the rocky character of the island and its generally barren appearance, Hongkong possesses a rich and varied flora. Bentham, in his *Flora Hongkongensis* (London, 1861), enumerates 1056 species of flowering plants and ferns, divided into 591 genera and 125 orders. The fauna of the island includes a few species of kingfisher, some singing birds and rock pigeons; several varieties of snakes and lizards are found, and scorpions and centipedes abound. Insect life is more plentiful and includes the mosquito and a flying cockroach from 1 inch to 1½ or 2 inches long. Ants, both white and red, are abundant and destructive.

The census of May, 1911, gave the population of the British colony of Hongkong (i.e., including the New Territories, on the mainland) as 456,739, of which 12,075 were non-Chinese and 444,664 Chinese. The Chinese boat population numbered 54,083. The city of Victoria, capital of the colony, had 7825 non-Chinese and 216,022 Chinese residents. The Peak population, on the high hill rising above Victoria, numbered 723 and 1749 respectively. The inhabitants of the New Territories (Kowloon Extension), on the mainland, were reported at 90,594 Chinese. Of the islands around Hongkong under British jurisdiction, Lantao had 7940, Chengchow 2734, and Lamma 1134 Chinese inhabitants, mainly agriculturists and fishermen. A considerable number of Chinese come and go to and from Hongkong; in 1912 this emigration numbered 122,657, and the immigration 163,248. In the same year 4461 Chinese left Hongkong for the United States, and 6757 returned.

The harbor of Hongkong, characterized by H. B. Morse as "one of the few harbors in the world which may be called perfect," has an area of 10 square miles. The only danger lies in occasional typhoons, which were destructive in 1906 and 1908. Extensive reclamation has been undertaken, consisting up to 1903 of 65 acres at a cost of $3,362,325 (Hongkong currency). On this reclaimed ground stand some of the finest buildings of the colony. The numerous dock accommodations are excellent, safe, and well sheltered. A new dock was added in 1908, the largest in the Empire outside of England, with a length of 787 feet, a width of 77½ feet at the bottom, 88 feet wide at the top, and a depth of 31 feet at low-water spring tides. It can be filled in 45 minutes and pumped out in 2 hours, 40 minutes. It is built of cement concrete lined with granite, on solid rock bottom, and can be enlarged.

Hongkong was declared a free port in 1842 and has remained one ever since, except for a tax on opium and intoxicating liquor. It is the distributing port of the world for south China, as Shanghai is for the north. The colony publishes no statistics of trade or reëxports, excepting shipping. In 1912 there were 488,649 vessels, of 36,735,149 tons, which entered the harbor and cleared; foreign ocean-going vessels showed an increase over 1911 of 187, of 674,680 tons. British ships and commerce led among the nations, with Japan second and Germany third. Exports from the United Kingdom to Hongkong in 1913 totaled £4,358,902, and imports £676,293. Exports of the United States to Hongkong were, in the fiscal year 1914, $10,696,214, and imports therefrom $3,085,840. The exports from the United States to Hongkong include flour, mineral oil, and cotton goods. Hongkong's exports consist mainly of rice, tea, tin, silk, cassia, sugar, preserved ginger, drugs, and feathers, and imports of cotton yarn and goods, kerosene, machinery, coal, flour, woolens, cutlery, ginseng, tobacco, and opium. For trade purposes the Mexican and Hongkong dollar are legal tender. In 1912 the Hongkong dollar was equal to 2 shillings.

There is little agriculture done in the colony. The Chinese ply such industries as fishing, boat making, glass blowing, opium boiling, the manufacture of soap, dyes, and tooth powder, wood and ivory carving, goldbeating, and the production of gold, silver, copper, iron, and sandalwood wares. Hongkong is a flourishing industrial centre. There are three large sugar refineries, a brewery, ice, match, soap, lard, rope, and cigar factories, flour mills, cement works, gas and electric companies, engineering works, cotton spinning and paper mills, etc.; also the manufacture of drainpipes, tiles, blackwood furniture, bamboo and rattan ware. Granite quarrying is an important industry, and large quantities of dressed stone are exported. The prosperity of the colony is best shown by the prices demanded and received for choice harbor fronts, which bring twice the prices of similar locations in Brooklyn or Jersey City.

The average strength of the military force is 4500, of the navy 2500 men. In addition there is a Volunteer Reserve Association of British residents over 25 years of age. Regiments stationed at Hongkong consist mainly of Indian (Sikh) troops, although from time to time famous regiments of the British army are in garrison. The harbor is well fortified, all commanding approaches being mounted with the latest type of guns. A small naval squadron is maintained. Hongkong is also the naval base for the British warships of the China station.

In 1912 the revenue amounted to $8,180,694 (Hongkong currency), and expenditures to $7,202,543. To the military expenses Hongkong contributed $1,421,352, the highest pro rata of any part of the Empire. The ratable value of

the city of Victoria in 1911–12 was $9,006,555, and the assessment for the entire colony amounted to $11,161,390. December 31, 1912, the assets of Hongkong exceeded the liabilities by $2,805,129 (£280,513). The public debt, Jan. 1, 1912, amounted to £1,485,732. Public revenue is derived mainly from land taxes and land sales, licenses, court fees, the post offices, rent of government property, light and harbor dues, opium, etc. Important items of expenditure are public works, the military, police, sanitation, and the section in British territory of the Hongkong-Canton Railway, begun in 1907 and opened 1910, with a branch line completed in 1912.

Hongkong is a crown colony, administered by a governor assisted by an executive council of eight and a legislative council of 14, which are composed of leading government officials, with the exception of six unofficial members of the Legislative Council, two of whom are always Chinese.

There are about 75 schools under government supervision or aid, with 6333 students, and 312 unaided schools, with 9764 pupils. A Technical School was started in 1906 and has 421 students. The University of Hongkong was opened in 1912, and in 1917 the Hongkong College of Medicine will be incorporated with it. The patron is the King of England, and the chancellor the Governor. The university offers courses in arts, medicine, and engineering, including instruction in Chinese and public health. It is modeled on the plan of the University of London and started with 76 students. Queen's College numbers 555 boys, mainly Chinese. Hongkong has four daily English newspapers, five weekly, including the *Government Gazette*, eight Chinese publications, one Japanese, and an annual.

The great bulk of the population is found in the city of Victoria (called by the Chinese Kwantailo), which extends for nearly 4 miles along the north shore, opposite the rocky peninsula of Kowloon, about 1½ miles distant. There are the government buildings and the great business houses and warehouses, stretching along the water front or perched in terrace-like rows on the steep hillsides. The city is well built, and its roads and streets, lighted with gas and electricity, are kept in good repair. There are many trees, and the authorities are actively engaged in reforestation. The European quarter is in the middle of the city, with the Chinese densely populating the lower and western parts. Notable buildings are the Government House, the city hall, built in 1866–69 by subscription and containing a fine theatre, library, and museum, the post office, the courts of justice, supposed to be the most substantial building in Asia, and the clock tower, erected in 1862. There are also a fine botanic garden, a large parade ground, and several good hotels. Two Chinese theatres give native performances. Many statues adorn the prominent points. One of the numerous hospitals was the gift of Madame Wu Ting Fang. Over a dozen churches are found, some of them very beautiful buildings; also two Mohammedan mosques, a Sikh temple, and a Jewish synagogue. The Hongkong Chamber of Commerce meets annually, and its advice is often asked by the government on matters of trade. Among clubs the principal ones are the Hongkong, Germania, Lusitano, and Nippon. There are a Philharmonic Society, a Dramatic Club, and also golf, football, polo, cricket, hockey, and two yacht clubs. The Hongkong races form the great society and sporting event of south China. The Peak district, high up on the hill, abounds with pretty bungalows and residences, and has also a club, church, hospital, public garden, and military sanatorium. Near the summit is the summer house of the Governor. An inclined plane and steam tramway, of the wire-rope system, goes two-thirds of the way to the top, while a well-made road runs to the summit. Besides the tramway the methods of conveyance in Victoria are by jinrikishas and sedan chairs. There is an electric tramway of 9¼ miles in length running from the capital. Of other towns on the island, the most important is Aberdeen, which has a good harbor and two docks.

The New Territories (Kowloon Extension) is on the mainland. Yaumati is the principal village, with considerable junk trade, also gas works and water works. Three regiments of Indian infantry are stationed at Tsimtsatsui, where they have a mosque. There are also fine godowns, wharves, many churches, schools, hotels, a building yard, docks and works, a brewery, and a cigar factory. Much reclamation work has been done. The city of Kowloon remains under Chinese jurisdiction by treaty agreement.

Hongkong was ceded to the British in 1842 by the Treaty of Nanking. June 26, 1843, it became by proclamation a separate colony, but was governed by the Minister Plenipotentiary to China until 1857. Four square miles of the mainland were first leased and then ceded in perpetuity by the Peking Convention in 1860. In 1898 China ceded the territory behind Kowloon peninsula on a lease of 99 years, consisting of 376 square miles—286 square miles of mainland, 90 square miles of neighboring islands. Possession was taken by the British in 1899. Consult: Mayer and Dennis, *Treaty Ports of China and Japan* (London, 1867); E. J. Eitel, *Europe in China: The History of Hongkong* (ib., 1895); Norman, *The Far East* (ib., 1898); James Cantlie, *Hong Kong*, in the "British Empire Series," vol. i (ib., 1899); W. E. Curtis, *Egypt, Burma, and British Malaysia* (New York, 1905); J. S. Thomson, *The Chinese* (Indianapolis, 1909).

HONI SOIT QUI MAL Y PENSE, ō'nē' swä kē mâl ē päns (Fr., Evil to him who evil thinks). An exclamation popularly believed to have been uttered by Edward III at a ball when he tied about his leg a garter which the Countess of Salisbury had dropped while dancing. The words form the motto of the Order of the Garter (q.v.).

HONITON. See Lace.

HONITON, hŏn'ĭ-ton. A market town and municipal borough in Devonshire, England, on the Otter, 16 miles northeast of Exeter (Map: England, C 6). It is famous as the original manufacturing seat of "Honiton lace," and it now has a school for lace makers. The manufacture was introduced by the Lollards during the reign of Elizabeth. There are also produced bricks, tile, pottery, and iron. Pop., 1901, 3271; 1911, 3191.

HONNECOURT, Wilars de. See Wilars de Honnecourt.

HONOBERTUS. See Cunibert, Saint.

HONOLULU, hŏn'ō-lōō'lōō. The capital and commercial centre of the Hawaiian Islands, situated on the south coast of the island of Oahu, in lat. 21° 18′ N., and long. 157° 55′ W., 2089 miles southwest of San Francisco (Map: Hawaii, D 2). It is wholly modern, surrounded by lux-

uriant fruit and ornamental trees and foliage, and is famed for its beauty and the loveliness of the region. It has a very healthful and mild climate, especially favorable for pulmonary troubles. The streets are well laid out, and the houses, although unpretentious, are rendered picturesque by gardens. Honolulu has about 37 miles of macadam streets. The area of its public parks is 194 acres. Among the public buildings are the royal palace, completed in the Italian style in 1882, the government buildings, several churches, a museum containing interesting remains relating to the early history of the archipelago, a theatre, and a bank. There are 32 public schools and one high school, with 238 teachers and a total attendance of 5363 pupils in 1914. Oahu College had, in 1913, 743 students and 22 teachers. Honolulu has several hospitals and a public library. There are manufactures of machinery, pineapple canneries, and a factory for transforming the algaroba bean into stock food. The town is equipped with a good water supply, electric lighting and railway and telephone service. Its water-works plant, costing $1,300,000, and its electric-light plant are owned and operated by the Territorial government. The harbor is well protected by coral reefs. The light from its lighthouse is visible 8 leagues. The number of ships entered and cleared in the fiscal year 1913 was 835, with a tonnage of 3,004,000. Honolulu has regular steam communication with San Francisco (with which it is also connected by cable), Seattle, Vancouver, New Zealand, Sydney, and Japan. It has also wireless communication with the coast of the United States and with the principal islands of the Hawaiian group and is an important relay station in the transpacific cable system. It forms the chief outlet for the trade of the entire archipelago. It is the seat of an Anglican and of a Roman Catholic bishop and of a number of European consular agents as well as of the government officials of the islands. As late as 1815 the present capital was a mere village. In that year, at the suggestion of John Young, an Englishman, then Governor of Hawaii, it was fortified, and in 1820 it became the capital of the archipelago. Pop., 1900, 39,306; 1910, 52,183 and estimated at 60,000 in 1914. The 1910 population included 9674 Chinese, 12,093 Japanese, 6147 Portuguese, 7910 Hawaiians, 4233 Caucasian-Hawaiians, and other Caucasians, 9200. The ocean distances from Honolulu are, to San Francisco 2100 miles, to Panama 4720, to Manila 4890, to Yokohama 3400, to Sydney (Australia) 4410, to Hongkong 4920.

HONOR. In English feudal land law, an estate or lordship made up of two or more manors held by one person of the king or of some mesne lord. The several manors comprised in the honor might in their turn be held by separate tenants of the lord of the honor. Where this was the case each manor retained its independent jurisdiction, exercised through its court baron, but where the manors were not separately held, one court baron was often, though not invariably, held for the entire honor. In this case, however, the court was regarded as the court baron of each manor and administered for each its own customary law, however this might differ from the law of the other manors. See BARONY; COURT BARON; LORDSHIP; MANOR; and, generally, FEUDALISM.

HONOR, COURT OF. A fraternal insurance society founded in 1895. Its objects are to furnish life indemnity to its members, to encourage them in business, and to promote benevolence and charity. It is governed by a body of elected delegates, one for each 500 benefit members. In 1914 the society had 1204 courts, with about 75,000 members, chiefly in the North Central States. Since its organization the society has disbursed in death and disability claims nearly $10,000,000.

HONOR, KNIGHTS AND LADIES OF. See KNIGHTS AND LADIES OF HONOR.

HONOR, KNIGHTS OF. See KNIGHTS OF HONOR.

HONOR, LEGION OF. See LEGION OF HONOR.

HONOR, MAIDS OF. See HOUSEHOLD, ROYAL.

HONOR, MEDAL OF (UNITED STATES). See MEDAL OF HONOR.

HONOR, TITLES OF. See TITLES OF HONOR.

HONO'RIA, JUSTA GRATA. A daughter of Constantius III and sister to Valentinian III, born about 418 A.D. in Constantinople. Living at Valentinian's court in Rome, she secretly invited, it is said, Attila the Hun to marry her; but as he did not entertain the proposition, she sent another invitation, and Attila, accepting it, claimed with her a portion of the Empire. As Valentinian refused to accede to such a demand, Attila invaded Gaul. Honoria's fate is unknown. For a criticism of this story, consult the *Cambridge Mediæval History*, vol. i (New York, 1911).

HONO'RIUS. The name of four popes and one antipope.—HONORIUS I, Pope 625–638. He was born of a consular family in Campania. Of his early history little is known, except that he took an active part in bringing to a close the disputes which arose in northern Italy about the controversy of the three chapters. (See VIGILIUS.) As Pope, his name is connected with the history of the paschal controversy in Ireland and with that of the early Anglo-Saxon church, and his pontificate is particularly memorable on account of the Monothelite heresy. (See MONOTHELITISM.) Honorius, misled, it is alleged, by a letter of Sergius, Patriarch of Constantinople, replied that the terms in controversy should not be used and even appeared to condemn the doctrine of two wills of Christ. In a decree of the sixth general council (Constantinople, 680–681) Honorius is anathematized in company with Sergius and others, of whose heterodoxy there can be no doubt. Catholic theologians, however, defend his orthodoxy, or point out that his case is not one of those in which infallibility is claimed by the Vatican decree, or that he was not Monothelite, but only sanctioned the suppression of orthodox as well as heterodox terms for the sake of peace. It was because Döllinger (q.v.) believed that the heresy of Honorius was irrefutably established that he could not conscientiously accept the dogma of papal infallibility, because it was retroactive and implied that there never had been a pope who was heretical. This assertion in regard to Honorius was an important factor in the Old Catholic movement. He died in 638. The controversy in the Vatican council produced an extensive literature. Consult: Pennacchi, *De Honorii Causa in Concilio Sexto* (Rome, 1870); Hefele, *Causa Honorii Papæ* (Naples, 1870), a defense presented to the Vatican council; Willis, *Pope Honorius and the New Roman Dogma* (London, 1879); Döllinger, *Fables and Prophecies of the Middle Ages* (New

York, 1892); Mann, *The Popes in the Early Middle Ages*, vol. i (London, 1902); Chevalier, *Répertoire des sources historiques; Bio-bibliographie s. v. Honorius I* (Paris, 1905); F. A. Gasquet, *Henry III and the Church* (London, 1905). The letters of Honorius are in Migne, *Patrologia Latina*, lxxx.—HONORIUS II (Lambert, Cardinal of Ostia). Pope 1124–30. He recognized Lothair of Saxony as German Emperor (see LOTHAIR III) and was unable to crush the growing power of Count Roger of Sicily in south Italy. (See ROGER II.) His letters are in Migne, *Patrologia Latina*, clxvi. —HONORIUS II was also the title taken by Peter Cadalous, Bishop of Parma, antipope to Alexander II, 1061. He died 1073. Consult Hauck, *Realencyclopädie*, vol. viii (Leipzig, 1900).—HONORIUS III (Cencio Savelli). Pope 1216–27. He crowned Frederick II as Emperor, tried in vain to institute a crusade, and confirmed the orders of the Dominicans and Franciscans. To him we owe the famous *Liber Censuum Romanæ Ecclesiæ*, in which the income of the Church of his day is detailed. It was reprinted by Paul Fabre, *Liber Censuum* (Paris, fasc. 1, 1889; fasc. 2–5, 1901–04). Consult Tauge, *Die päpstlichen Kanzleiordnungen von 1200–1500* (Innsbruck, 1894). His works are in Horoy, *Medii Ævi Bibliotheca Patristica* (Paris, 1879–82). Consult: *Regesta*, edited by P. Pressutti (Rome, 1888–95), and, for his life, Clausen (Bonn, 1895); Knebel (Münster, 1905).—HONORIUS IV (Giacomo Savelli). Pope 1285–87. He was born in 1210 and, notwithstanding his years when called to the papal see, was very energetic. Consult his life by Pawlicki (Münster, 1896), and F. Gregorovius, *Rome in the Middle Ages*, vol. v (London, 1900–02).

HONORIUS, FLAVIUS (384–423 A.D.). Roman Emperor of the West from 395 to 423, second son of Theodosius the Great. When, on the death of his father, 395 A.D., the Empire was divided into two parts, Honorius received the western half, with Rome as his capital, while his brother Arcadius received the eastern half, with Constantinople as his capital. Honorius was put under the guardianship of Stilicho (q.v.), who was for 13 years the de facto ruler of the Western Empire. Honorius at first took up his residence at Milan; later for the most part he held his court at Ravenna. In 398 he married Maria, the daughter of Stilicho. In 401 Alaric (q.v.), King of the Visigoths, invaded Italy. Stilicho, who was then in Germany, marched against him, and a great battle was fought at Pollentia in 403 (or 402), followed by another encounter at Verona (403). Alaric, unable to withstand Stilicho, withdrew from Italy. Another irruption of barbarians, under Radagaisus, took place in 405, which was again repelled by Stilicho, who nevertheless lost the favor of his master and was treacherously slain at Ravenna, 408 A.D. Alaric, quick to take advantage of the opportunity afforded him, invaded Italy in 408 and besieged Rome, which escaped only on the payment of a heavy ransom; and in the following year he again besieged and took it, raising Attalus to the Imperial purple as a rival to Honorius, but a little later deposing him. In 410 the Visigothic King again appeared before Rome and handed it over to be pillaged by his troops. The death of the invader in the same year again freed Italy. A new champion of the falling Empire arose in the person of Constantius, who suppressed the rebellions of Constantine, Jovinus, and Sallustius in the northern provinces and of Heraclian in Africa. He was now appointed the colleague of Honorius in the consulship and received in marriage the hand of Placidia, sister of Honorius, along with a share in the Empire (417), which he did not long enjoy, as his death took place a few months after. The Gothic and German tribes had for some time been slowly but steadily encroaching upon the Western Empire, and in the reign of Honorius, a feeble ruler, Spain, Gaul, and Pannonia, some of the finest provinces, were snatched from its grasp. In support of the Church, however, and in persecution of the heathen Honorius showed much energy. He died Aug. 27, 423. Consult Bury, *Later Roman Empire* (London, 1889), and the *Cambridge Mediæval History*, vol. i (New York, 1911).

HONORS, MILITARY. The courtesies, salutes, and other ceremonies, granted as a matter of custom and regulations to civilian officials of the government, to military officers of high rank, to the national and regimental flags, to the national anthem, and to the official and military dead. These honors include playing the national anthem on ceremonial occasions, sounding "to the color" with field music or bugles, "dropping" the regimental colors or standards by way of salute, sounding "flourishes" on trumpets and "ruffles" on drums, hand salutes, salutes with cannon, visits of courtesy, escorts of honor, escort of the color, funeral escorts of honor, half-masting the flag in case of death or on Memorial Day, etc. See SALUTES.

HONORS OF WAR. Stipulated privileges allowed a capitulating enemy; formerly a chivalrous appreciation of his valor, but in later times dictated almost entirely by the political or economic phase of the question. Honors of war include the retention of arms or standards, the granting of parole, and the general treatment of the surrendered troops and stores.

HONSHU, hŏn'shōō'. The most important of the group of islands constituting the Empire of Japan. See HONDO.

HONTAN, A. L., BARON DE LA. See LA HONTAN.

HONTHEIM, hŏnt'hīm, JOHANN NIKOLAUS VON (1701–90). A German Roman Catholic prelate and writer. He was born at Treves, Jan. 27, 1701. He was educated in the Jesuit school of his native city, studied canon law at Louvain under the celebrated Van Espen, and afterward taught at Treves and Coblenz. He wrote two voluminous works on the history of Treves, *Historia Trevirensis Diplomatica* (1750) and *Prodromus Historiæ Trevirensis* (1757); but his literary career is chiefly memorable for a theological essay, *De Statu Ecclesiæ et Legitima Potestate Romani Pontificis* (1763), which by the novelty and boldness of its views created an immense sensation in the theological world. The work was composed with a view to the reunion of Christian sects. The work was published under the pseudonym of Justinus Febronius (a name taken from that of Hontheim's niece, a canoness at Juvigny, who was called Justina Febronia), and the system of Church government which the work propounds has been called Febronianism (q.v.). The work, immediately after its appearance, was condemned by Clement XIII as well as by many individual bishops. It drew forth a number of replies, the most im-

portant of which are those of Zaccaria (1767) and Ballerini (1768). Pius VI, in 1778, required from Hontheim a retraction of these doctrines. This retraction, however, was modified by a subsequent *Commentary*, published at Frankfort in 1781, to which, at the desire of the Pope, Cardinal Gerdil replied. Hontheim made full submission to the Church in 1788 and died in his ninetieth year at Montquintin in Luxemburg, Sept. 2, 1790. Consult Mejer, *Febronius* (Freiburg, 1885), a work biased in favor of Hontheim.

HONTHORST, hŏnt'hôrst, Gerard van (1590–1656). A Dutch portrait, genre, allegorical, and historical painter, born at Utrecht. He was a pupil of Abraham Bloemaert. At 20 he went to Italy and was greatly influenced by Caravaggio; it was there that he gained the sobriquet Gherardo della Notte, from his frequent painting of night scenes. When he returned to Utrecht, he was made the head of the Guild of St. Luke (1623) and opened a large school. An invitation from Charles I took him to England in 1628. There he decorated Whitehall with allegorical pictures and painted portraits of the royal family and of many of the English nobility. On his return to Holland he decorated the palace of The Hague. In the National Portrait Gallery, London, are portraits by him of the Duke of Buckingham, the Earl of Craven, the Queen of Bohemia, James Harrington, Ben Jonson; at Hampton Court, a picture of the King and Queen of Bohemia enthroned in the clouds as Apollo and Diana, with the Duke of Buckingham as Mercury (for this Honthorst received 3000 gulden, a silver service for 12 persons, and a horse). His historical and religious pictures are unimportant, and his portraits, though excellent as likenesses, sometimes lack ideality.

HONVÉD, hôn'vād (Hung., land defenders). The name given in Hungary under the earlier kings to the national champions. With the disappearance of these the word, too, disappeared; but in the summer of 1848 it was revived and applied first to those Hungarian volunteers dispatched to the south against the Serbs and subsequently, when the war with Austria commenced, to the whole patriotic army. Since the reconstruction of the Austro-Hungarian monarchy the name "honvéd," or "honvédség," has been given to the militia of the Hungarian portion of the Empire. In 1893 a monument was erected in their memory at Budapest. See Austria-Hungary, *Army*.

HOOBLY, hōō'blĭ. A town in the Province of Bombay, British India. See Hubli.

HOOCH, hōg, or **HOOGH,** Pieter de (1629–after 1677). One of the principal Dutch genre painters. Recent research has shown that he was born at Rotterdam in December, 1629, not at Utrecht in 1632, as was formerly supposed. According to Houbraken (q.v.) he was a pupil of Nicolaes Berchem; his early work, however, does not resemble this supposed master's, but rather the art of the painters of Delft and Leyden. In 1653 he is mentioned as "painter and footman," in the service of Justus de la Grange, a rich merchant, with whom he lived at Delft, Leyden, and The Hague. Leaving his service, the artist was married in 1654 to a girl of Delft, in which city he is recorded as member of the painters' guild in 1655. From his dated pictures showing views of Delft, we know that he probably lived there till 1665. This is the period of his best works, painted in rivalry with Jan Vermeer. The two artists were closely associated and mutually influenced each other to such an extent that their works have been sometimes confused. Both are essentially painters of strong light effects, usually in interior scenes; but De Hooch usually adds the vista of a second room, brightly illuminated. His colors are warmer, including a strong red, like that of Nicolaes Maes, and he uses more figures than does Vermeer in his compositions, representing scenes from the home life of the middle class. After his removal to Amsterdam, where his presence is recorded in 1668, his art declined. He became a fashionable painter of high society in large and magnificent salons, with a superficial execution and exaggerated light effects. His last-known work is dated 1677, soon after which he died. Owing to the variety as well as the excellence of his works, they bring the very highest prices. The Rijks-Museum, Amsterdam, has six, including the well-known "The Pantry," "Maternal Tasks," and "Country House"; the Berlin Museum four, including "Woman beside a Cradle"; the National Gallery of London three, including "Young Woman with Five Cavaliers." He is also well represented at St. Petersburg, in the Louvre, Buckingham Palace, the Wallace collection (London), and elsewhere. Indeed, according to De Groot, most of his best works are in England and the United States. In the Metropolitan Museum, New York, are two—"The Courtyard," Morgan collection, and "Interior with a Young Couple," Altman collection; in the Widener collection, Philadelphia, are "Woman and Child in a Courtyard" and "The Bedroom"; others are in the Havemeyer, Blodgett, and Borden collections, New York.

Bibliography. The best accounts of De Hooch's life and art are in Hofstede de Groot, *Catalogue of Dutch Painters* (London, 1908), and Bode, *Great Masters of Dutch and Flemish Painting* (ib., 1909). Consult also De Rudder, *Pieter de Hooch et son œuvre* (Brussels, 1914).

HOOCHENOO, hōō'chĕ-nō, or Kootznahoo. A spirituous liquor concocted by the natives of Alaska and named from one of the tribes of Indians. The name has been shortened by the white man to *hooch* and is used as a synonym for any ardent spirit.

HOOD, Alexander (1758–98). An English naval officer. His first voyage (1767) was aboard the *Romney* with his cousin, Capt. Samuel, afterward Viscount, Hood; but in 1772 he went round the world on the *Resolution* with Captain Cook. From 1776 to 1783 he was in active service in North America and the West Indies. In 1797 he was appointed to command the *Mars* of the Channel fleet and was one of the captains put ashore by the mutineers off St. Helens and Spithead. The next year, when his frigate was engaged in the famous duel with the *Hercule*, Captain Hood was mortally wounded at the moment of victory.

HOOD, Edwin Paxton (1820–85). An English Congregationalist. He was born in London, Dec. 18, 1820, educated privately, and became a Congregational clergyman in 1852. He held various charges and from 1880 to his death in Paris, June 12, 1885, he was pastor of the Falcon Square Church, Aldersgate Street, London. He rendered conspicuous service in raising the funds for the Royal College for Incurables, his pamphlet, "The Palace of Pain"

(1885), having brought in £2000. He was the author of numerous popular volumes; among others, *Lamps, Pitchers, and Trumpets: Lectures on the Vocation of the Preacher* (1867), a racy volume on homiletics and the history of preaching, and *The World of Moral and Religious Anecdote* (1870). He added to his books on preaching *The Throne of Eloquence: Great Preachers, Ancient and Modern* (1885) and *The Vocation of the Preacher* (1886). His agreeable bookmaking powers were exhibited in the biographies of John Milton (1852), Andrew Marvell (1853), Emanuel Swedenborg (1854), William Wordsworth (1856), Thomas Binney (1874), Isaac Watts (1875), Thomas Carlyle (1875), Christmas Evans (1881), Robert Hall (1881), and Oliver Cromwell (1882).

HOOD, James Walker (1831–). An American bishop of the African Methodist Episcopal Zion church. He was born in Kennett Township, Chester Co., Pa., and was largely self-educated. Entering the ministry in 1858, for two years his work was in Nova Scotia. In 1863 he was a missionary among the members of the negro race in the Union army. He was a member of the Constitutional Convention of North Carolina in 1868, and during the same year was assistant superintendent of public instruction in North Carolina. Elected a bishop in 1872 he came to be senior bishop of his church. In 1879 he was elected president of the board of trustees of Livingstone College, Salisbury, N. C. He is author of *The Negro in the Christian Pulpit* (1884); *One Hundred Years of the African Methodist Episcopal Zion Church* (1895); *The Plan of the Apocalypse* (1900); *A Second Book of Sermons* (1908).

HOOD, John Bell (1831–79). An American soldier, prominent on the Confederate side during the Civil War. He was born in Owingsville, Ky., graduated at West Point in 1853 and saw service for two years in California and against the Indians. He remained in the United States army until 1861, when he resigned to accept a commission in the Confederate service. During the first years of the war he took part in the Virginia campaigns, where his gallantry gained him the rank of major general. At Gettysburg his division was stationed on the extreme right of the Confederate line and took part in some of the most desperate fighting of that bloody battle. He was severely wounded, losing the use of one of his arms. In September, 1863, he was sent to the aid of General Bragg in Tennessee and took part in the battle of Chickamauga, September 19–20, where he lost a leg. The next spring he again took the field and was made a lieutenant general in Johnston's army. During the campaign by which this general sought to impede Sherman's advance on Atlanta, Hood was engaged in several battles, and on May 25, 1864, his corps was attacked by Hooker at New Hope Church. On July 17 he was given the temporary rank of general and was appointed to succeed Johnston in command of the Army of the Tennessee, the Fabian policy of that officer having caused his removal. Sherman was exultant at this change, for he knew that Johnston's wearing tactics would now give place to a policy which would enable him to make good use of his superior fighting strength. On July 20 was fought the battle of Peach Tree Creek, as a result of which Hood was compelled to withdraw into the fortifications about Atlanta, and two days later the battle of Atlanta followed his flank movement towards Decatur. On July 28 he attacked the Federal forces, but was again compelled to withdraw into his fortifications. After another engagement at Jonesboro, on September 1, he abandoned Atlanta, which was entered by Sherman on the 2d. Hood, after operating for several weeks along the line of Sherman's communications and moving westward into northern Alabama, crossed the Tennessee River about the end of October and began to move northward through Tennessee against General Thomas. After his attack on the Federal forces under Schofield at Franklin had been repulsed (see Franklin, Battle of), he proceeded to Nashville, where he found Thomas stationed with a force about equal to his own. Thomas was not prepared at the outset and for nearly two weeks the two armies faced each other. At last, on December 15, Thomas ordered the attack. The Confederates fought desperately, but were forced back all along the line. That night Hood reformed his army and the next day awaited the Federals on the Overton Hills. Owing to his strong position, he succeeded in repelling the first assault; but the second was more successful, and soon the Confederates were driven in utter rout. As a military force, Hood's army disappeared, and on Jan. 23, 1865, at his own request, he was relieved of his command. After the war he became a commission merchant in New Orleans and president of the New Orleans branch of the Life Association of America. He wrote a book entitled *Advance and Retreat: Personal Experiences in the United States and Confederate States Armies* (1880), and wrote a number of articles for *Battles and Leaders of the Civil War* (New York, 1887).

HOOD, Mount. A peak of the Cascade Range (q.v.), on the west border of Wasco Co., Oreg. (Map: Oregon, D 2). It is about 50 miles east by south of Portland, whence it is reached by rail to Hood River, 66 miles, and thence by stage to the base of the northern glaciers. It has an altitude of 11,225 feet; there are no formidable obstacles to its ascent, and the summit commands an extensive and magnificent view.

HOOD, Robin. The hero of a group of English ballads, which represent him as an outlaw, dwelling in Sherwood Forest, Nottinghamshire, or in Barnsdale, a woodland district in the West Riding of Yorkshire. The earliest-known mention of him is in the second version of *Piers Plowman* (about 1377), where Sloth says he "knows rymes of Robyn Hood" (*Skeat,* passus v, II. 401, 402). A most important ballad of which he is hero is "A Lytell Geste of Robyn Hode," first printed in 1510, but probably to be dated considerably earlier. This poem consists of 456 four-line stanzas. Among succeeding ballads, of which Professor Child collected 39, are "Robin Hood and Guy of Gisborne," "Robin Hood and the Monk," and "Robin Hood's Death." As early as the last half of the fifteenth century Robin Hood became a popular character in the semidramatic celebrations of May Day, both in England and in Scotland, and later in the regular drama, as in Ben Jonson's beautiful pastoral *The Sad Shepherd.* Robin is the ideal outlaw, courteous, liberal, and reverent. Skillful with the bow, he shoots the King's deer, but he loves the King. He takes from the rich clergy their superfluous goods, but what he does not need himself he gives to the poor. He is chival-

rous towards all women and reveres the Virgin Mary. His chief foe is the sheriff of Nottingham. With him are Little John, Scathlock or Scarlock, Friar Tuck, Maid Marian, Much the Miller's Son, and several others. In his illness Robin goes to a prioress, who is his cousin, to be bled. She allows him to bleed to death. There is a legend that he died at Kirkless, or Kirklees, in the parish of Dewsbury (q.v.), and Martin Parker declares in his *True Tale* (?1632) that an epitaph to him was formerly to be read at the first-named place.

Unsuccessful attempts have been made to prove the real existence of Robin. True, his career as eventually developed has all the details of authentic history; but these were taken from the ballads themselves, or from semihistorical personages, as Hereward the Wake and Wallace, and applied to Robin. Others have tried to connect the surname Hood with Woden, the chief of the Norse gods, or with Hödr (warrior), another Norse divinity. It is now rather thought to be a variant of Hodeken, an elf in Germanic folk tales. Robin is of course a diminutive of Robert. Robin Hood then seems to have been at first only an elf of the woods, about whom later gathered typical adventures of the outlaw. Robin Hood is the hero of a comic opera by Reginald De Koven (q.v.), and of a play, *Sherwood*, by Alfred Noyes (q.v.), and Tennyson's *The Foresters* has Robin Hood as its main character.

Bibliography. *Bishop Percy's Folio*, ed. Hales and Furnivall, vol. i (London, 1867); Child, *English and Scottish Ballads* (Boston, 1883 et seq.); Pollard, *An English Garner: Fifteenth Century Prose and Verse* (Westminster, 1903); Krout, *Bold Robin and his Forest Rangers* (New York, 1905); and for an attempt to prove the existence of Robin Hood, Hunter, *The Great Hero of the Ancient Minstrelsy of England* (London, 1852). Sidney Lee's article in the *Dictionary of National Biography*, vol. xxvii (New York, 1895–1901) is an important résumé of the subject; and two valuable articles were contributed by E. Brabrook to *The Antiquary*, June, July, 1906 (London, 1906).

HOOD, Samuel, Viscount (1724–1816). An English admiral, born at Butleigh, Somersetshire. He embarked at first as captain's servant, then as seaman, was midshipman on Rodney's ship (1743), was lieutenant at 22 and post captain at 32. In 1757 he captured two French privateers and was rewarded by an appointment to a ship of his own. During his retirement from active service (1778–80) he was commissioner of the dockyards at Portsmouth, but went to sea again under Admiral Rodney, as next to him in rank upon the North American squadron. Hood took part in several famous naval battles in 1781–82, notably that of Dominica, for his share in which he was granted an Irish peerage. He was elected member of Parliament for Westminster in 1784, was made Lord of the Admiralty four years later, took command of the British fleet in the Mediterranean in 1793, was promoted to the rank of full admiral in 1794, and in 1796 was made Viscount. He was specially strong as a tactician, and, at the time of his retirement, was described as "the best officer, take him altogether, that England has to boast of." He was governor of Greenwich Hospital from 1796 until his death. Consult Laughton, *From Howard to Nelson* (London, 1899).

HOOD, Sir Samuel (1762–1814). A British naval officer. Having entered the navy in 1776, he took part in the fight off Ushant in 1778 and in subsequent engagements, including the capture of the French squadron in the Mona Passage in 1782. Early in 1794 his resourcefulness saved his ship, the *Juno*, from the French at Toulon. As commander of the *Zealous*, he participated in Nelson's attack on Santa Cruz in 1797 and in the Battle of the Nile. In 1801 he commanded the *Venerable* in the action at Algeciras and in the victory in the Straits; in 1802 he became commodore of the Leeward Station, where he captured several islands and also the enemy's privateers and men-of-war; and in 1805 he defeated a French squadron off Rochefort, but the engagement cost him an arm. Soon afterward he was promoted to rear admiral. He reduced Madeira in 1807 and in 1808 with the *Implacable* destroyed the Russian ship *Sewolod*. A year later he was made Baronet, and in 1811 vice admiral; from then until his death he served as commander in chief in the East Indies.

HOOD, Thomas (1799–1845). An English poet and humorist, born in London, May 23, 1799. After leaving school he was placed in a merchant's countinghouse, but, his health failing, he was sent to Dundee. At the age of 19 he returned to London and studied the art of engraving with his uncle. In 1821 he became assistant subeditor of the *London Magazine*. He contributed to it considerable verse and made the acquaintance of its brilliant staff, which included De Quincey, Hazlitt, and Lamb. His first separate publication was entitled *Odes and Addresses on Great People*, written in conjunction with J. H. Reynolds (1825). In 1826 he published *Whims and Oddities*, of which a second series appeared during the following year. In 1830 he began the *Comic Annual* and continued it for nine years. The same year he edited the *Gem*, one of the popular annuals, contributing to its pages his striking poem entitled "Eugene Aram's Dream." In 1824 Hood married the sister of J. H. Reynolds, and in 1831 he went to reside at Wanstead in Essex, where he wrote his novel *Tylney Hall* (1834). While there he suffered from the failure of a publisher. In 1835, now weakened in health, he went to the Continent, where he remained five years, first at Coblenz on the Rhine and then at Ostend. He, however, continued his *Comic Annuals*, started *Hood's Own* (1838), containing a portrait and reminiscences, and made Smollett's *Humphrey Clinker* a framework for some humorous sketches called *Up the Rhine* (1839). In 1840 he returned to England and began to write for the *New Monthly Magazine*, of which he became editor the following year. Here appeared "Miss Kilmansegg," his best comic poem. Withdrawing from this magazine towards the close of 1843, he started *Hood's Magazine*, January, 1844, and in the same year collected his fugitive pieces under the title of *Whimsicalities*, which were illustrated by Leech. By Christmas he took to his bed, which he never again left. During his last illness Sir Robert Peel conferred on him a pension of £100 a year, which he transferred to his wife. He died May 3, 1845, and was buried in Kensal Green Cemetery.

Hood takes a high place both as humorist and as serious poet. He excels at once in comedy and in pathos, and he sometimes curiously mingles and combines both. As a punster, he is—whether to his glory or no—supreme; he con-

nects far-separated words and ideas by the most subtle analogies and sends them loose. Much of his comedy, however, is verbal and shallow and will be soon forgotten. It is as a poet that Hood will be remembered. His "Eugene Aram's Dream," "Song of the Shirt," and "Bridge of Sighs" are among the most perfect poems of their kind in the English language. Consult: *Literary Reminiscences in Hood's Own* (1st series, London, 1838); *Memorials*, edited by his daughter (ib., 1860); Eliot, *Hood in Scotland* (Dundee, 1885); W. C. Jerrold, *Thomas Hood: His Life and Times* (New York, 1909); *Works*, edited by his son and daughter (10 vols., London, 1869–73); *Poems*, edited by Ainger, in "Everley Series" (12 vols., ib., 1897); *Haunted House*, with memoir by Austin Dobson (ib., 1895). His collected works appeared in 1882–84.

HOOD'ED CROW (so called from the marking on the head). A true crow (*Corvus cornix*) of the north of Europe, also called in England dun, or gray, and Royston crow, and in Scotland hoodie. The head, fore parts, and wings are glossy black, the remainder of the body ash color, the bill and feet black. It is slightly migratory and retreats southward in winter from the most northerly parts of Europe and Siberia when the other crows go south. Its general habits are those of the carrion crow, with which it interbreeds extensively, so that some naturalists believe the two birds to be varieties of one species. See Newton, *Dictionary of Birds* (London and New York, 1896).

The hooded crow of India is a smaller species (*Corvus splendens*) of similar appearance. It is tame to the point of being a nuisance to Europeans wherever it is numerous. Hardly a station or camp in British India, it is said, is free from a crowd of these feathered thieves. They have the amusing habit of building their nests of the wire from discarded soda-water bottles.

HOODED MERGANSER. See Merganser.

HOODED SEAL. A large seal (*Cystophora cristata*), inhabiting the coasts of Greenland and North America as far south as the United States. It also occurs on the coasts of Sweden and Norway and in the Arctic Ocean. It is found generally in the icy islands or floating ice fields in the open sea and visits the land in April, May, and June. About 2 inches from the extremity of the upper jaw there is a cartilaginous crest, increasing in height as it passes backward to the back part of the head, where it is about 7 inches high and has a longitudinal depression in the middle, about an inch deep. This crest is an elongation of the septum of the nose, and the true nostrils open on either side of it. It is covered by a muscular hood clothed with fur. The whole apparatus is probably defensive, but may be accessory to the organ of smell and, as the fishermen suppose, may serve as a reservoir of air while the animal is under water. The hood is wanting in the females and young. The hooded seal is polygamous and brings forth its young on the ice. It has a voice resembling the bark and whine of a dog and when attacked weeps copious tears.

HOODED WARBLER (so called from the marking on the head). One of the most beautiful and active of the American fly-catching warblers. (See Warbler.) It is olive green above and yellow below, with the head, neck, and breast deep black. It inhabits in summer the eastern United States, where it frequents thickets and undergrowth and makes a soft, cuplike nest in low bushes. Its systematic name is *Wilsonia citrina*. See Colored Plate of Wood Warblers with Warbler.

HOOD'IE. See Hooded Crow.

HOOD OF AVALON, Arthur William Acland Wood, Baron (1824–1901). A British naval officer, born at Bath. Entering the navy in 1836, until 1854 he served on the *President* and the *Arethusa*, largely in the Mediterranean. In command of the *Acorn* he participated in the engagements at Fatshan, China, and in the capture of Canton in 1857, and for these services was promoted to captain in 1858. He commanded the *Pylades* in 1862–66, had charge of the school of gunnery on board of the *Excellent* in 1866–69, and then was appointed director of naval ordnance. After commanding the *Monarch* in 1874–76 he was promoted to rear admiral, was Lord Commissioner of the Admiralty in 1877–79, commanded the Channel fleet in 1880–82, became full admiral in 1885, and retired in 1889. He was made a peer in 1892.

HOOD RIVER. A city and the county seat of Hood River Co., Oreg., 66 miles by rail east of Portland, on the Columbia River, and on the Mount Hood and the Oregon-Washington Railroad and Navigation Company main lines (Map: Oregon, D 2). It contains a Carnegie library, county hospital, fine high school, and municipal water works. Hood River is in a great fruit-growing region, noted particularly for its apples and strawberries, and has saw and planing mills, evaporators, canneries, a vinegar factory, a coöperation creamery, a meat-packing plant, a concentrated cider and apple sirup factory, machine shops, and wagon works. Pop., 1910, 2331.

HOOF (AS. *hōf*, OHG. *huof*, Ger. *Huf;* connected with OChurch Slav. *kopyto*, hoof, or with Skt. *śapha*, Av. *safa*, hoof). The exterior horny covering of the foot of many animals. The healthy soundness of the horse's foot is mainly preserved by permitting it to grow uninjured by the rasp and knife; its toughness is secured, and undue dryness and evaporation prevented, by smearing daily the crust, sole, and frog with a little glycerin, or a mixture of a pound of lard and a quarter of a pound each of tar, honey, beeswax, and glycerin melted together. Softness and brittleness of the hoof, which are common sources of cracks and corns, may be remedied by the regular use of such dressings, by placing the feet for several hours daily in thick woolen swabs, kept cool and moist by frequent applications of cold water, and by encouraging a more healthy growth of horn by occasional mild blisters round the coronary band. Cracks—or sand cracks, as they are termed—mostly occur among horses much upon the road, cause lameness, and constitute unsoundness. When serious and recent, poulticing, thinning away of the crust about the crack, and perfect rest are essential. After the earlier heat and tenderness are removed, a hot iron should be drawn at right angles to the crack, both above and below, so as to separate the diseased from the sound horn. Waxed thread or fine wire should be wound round the hoof, and a sound growth of horn stimulated by a blister round the coronet. The horse's hoofs are too hard and coarse to be employed for the making of the better class of combs and buttons, for which purpose the hoofs of cattle are extensively employed. They are, however, largely used by manufacturers of prussiate of potash and artificial manures. See Corn.

HOOFEN, Jan van der. See Hoeven.

HOOFT, hōft, Pieter Corneliszoon (1581–1647). A Dutch poet and historian, born in Amsterdam—after Vondel, probably Holland's greatest author. He was the son of an Amsterdam burgomaster, received a thorough education in the classics, and made an extensive journey through France, Germany, and Italy. After his return in 1601 he studied jurisprudence at Leyden, and was appointed bailiff of Muiden. At the castle of Muiden and in Amsterdam he gathered around him the most celebrated artists, poets, and scholars of the day, known in Dutch literary history as the "Muiden circle." He is considered one of the first, if not the first, of Dutch prose writers, despite his too frequent Latinisms. His letters are particularly charming and are free from this failing. Among his poetical works are the pastoral play in Italian style, *Granida* (1615), the tragedies *Geeraerdt van Velzen* (1613), *Theseus en Ariadne* (1614), and *Baeto* (1626). His chief historical works are *Hendrik de Groot* (1626); *Rampzaaligheiden der verheffing van den huize Medicis* (1636); *De nederlandsche Historien* (2 vols., 1642). The latter is one of the classics of Dutch literature and Hooft's chief work. He also translated Tacitus, of whom he was an imitator, and he is often called the "Dutch Tacitus." His *Poems* were published in 1636 (new complete edition, ed. P. Leendertz, Haarlem, 1864). His erotic verse is particularly notable as being the first of this genre to appear in Dutch literature. Consult his *Breven*, edited by J. van Vloten (Leyden, 1855–57).

HOOGEVEEN, hō'ge-vān'. One of the fen colonies of the Netherlands, situated in the Province of Drenthe (Map: Netherlands, E 2). It has extensive peat mines and shipyards and is engaged in farming and cattle raising. Pop., 1899, 11,924; 1911, 12,691.

HOOGH, Pieter de. See Hooch.

HOOGLY, hōōg'lī. See Hugli.

HOOGSTRAETEN, hōg'strä'ten, Samuel van (1627–78). A Dutch painter and engraver, born at Dordrecht. He was the pupil of his father, Dirk van Hoogstraeten (1596–1640), and afterward of Rembrandt. He began as a portrait painter in the manner of his last master, but afterward was influenced by the Italian school and did landscape and still life. In this style he is reminiscent of Pieter de Hooch. In 1651 he went to Vienna and Rome and in 1662 visited England. He is the author of an *Introduction to the High Art School* (1678), which is full of admiration for Rembrandt and has preserved many of his sayings. There are pictures by him in the museums of Amsterdam, The Hague, Vienna, and Dordrecht, and in the Metropolitan Museum, New York.

HOOGSTRATEN, hōg'strä'ten, Jakob van (c.1454–1527). A Belgian priest and inquisitor, born at Hoogstraeten. After studying at the universities of Louvain and Cologne, he entered the Dominican Order and became doctor and professor of theology and prior of the order at Cologne (1507). He is widely known through his controversy with the celebrated humanist Reuchlin. Hoogstraten proposed to burn all the Jewish books, on the ground that they contained nothing but calumnies against Christ. Reuchlin persuaded the Emperor Maximilian against this course and thereby incurred the enmity of the inquisitor, who subjected him to every persecution. Thereupon there ensued the polemic war called by Erasmus "the beginning of the Lutheran tragedy," and this was the occasion of the famous *Epistolæ Obscurorum Vivorum.* Hoogstraten's epitaph, as composed by his enemies, is a severe arraignment of the man's character—*Hic jacet Hoogstratus viventem ferre patique quem potuere mali, non potuere boni.* Among his treatises are *Destructio Cabbalæ contra Reuchlinum* (1518) and *De Christiana libertate Tractatus V contra Lutherum* (1526).

HOOK, James Clarke (1819–1907). An English marine painter, born in London. He entered the schools of the Royal Academy in 1836 and was elected academician in 1860. In 1846 he won the traveling scholarship with "Rizpah Watching the Dead Sons of Saul" and went abroad for three years, working diligently at the Louvre and in Italy gaining much from Titian, Tintoretto, Carpaccio, and other Venetians. Among his best paintings are: "A Dream of Ancient Venice" (1848); "A Rest by the Wayside" (1854); "A Signal on the Horizon" (1857); "A Widow's Son Going to Sea" (1859); "Stand Clear" (1860). All except the first are pastoral and idyllic English scenes. In the Tate Gallery are "Home with the Tide," "Young Dreams," "The Seaweed Rakes," and "The Stream." Hook's work is characterized by brilliant color and fresh realism.

HOOK, Theodore Edward (1788–1841). An English wit and novelist, son of James Hook, a musical composer, born in London, Sept. 22, 1788. Educated mostly at private schools, he attended for a short time Harrow and Oxford. Between 1805 and 1811, while yet a boy, he produced, either single-handed or in conjunction with his father, 13 comic operas and melodramas, all of which were popular at the time. His ready wit, sparkling humor, and wonderful powers of improvisation made him the delight of society; and having pleased the Prince Regent, he was appointed (1813) Accountant General and Treasurer at Mauritius, with a salary and allowances amounting to nearly £2000 a year. These offices he held till 1818, when the discovery of a deficiency of £62,000 in the military chest caused him to be arrested and sent to England, and his effects seized and sold. The peculation, it afterward appeared, had been committed by a clerk, who committed suicide. On obtaining his liberty Hook supported himself by writing for the newspapers and magazines, and on the establishment of *John Bull*, a weekly Tory newspaper, in 1820, he was appointed its editor. From his connection with this bold, clever, and virulent print he derived during its prosperous state fully £2000 a year. In August, 1823, he was arrested for his debt to the crown, and his property sold. He remained within the rules of the King's Bench till May, 1825, when he was released from custody. In 1824 appeared, in three volumes, the first series of his *Sayings and Doings*, which yielded him £2000. A second series followed in 1825, and a third in 1828, for each of which he seems to have received about 1000 guineas. Several other novels followed: *Maxwell* (1830); *Gilbert Gurney* (1836), in part autobiographic; *Gurney Married* (1838); *Births, Deaths, and Marriages* (1839). From 1836 to 1841 he edited the *New Monthly Magazine.* He died Aug. 24, 1841. Hook's novels are sketches of contemporary manners, and as such they possess value. Exceedingly popular in their own day, they are now difficult reading, for the witty thrusts are no longer obvi-

ous. Hook himself was regarded by his later contemporaries as a jester. He is the original of Lucian Gay in Disraeli's *Coningsby* and is introduced in *Vanity Fair* as Mr. Wagg. The better side of his character is given by Lockhart in the *Quarterly Review*, vol. xxii (London, 1845). Consult *Humorous Works* (ib., 1873), and Barham, *Life and Remains of Hook* (ib., 1849; revised, 1899).

HOOK, Walter Farquhar (1798–1875). An English dean and ecclesiastical historian. He was the nephew of the humorist Theodore Hook and the son of Dr. James Hook, dean of Worcester. He was born in London and graduated M.A. at Christ Church, Oxford, in 1824. He took holy orders in 1821 and, after holding curacies in the Isle of Wight and in Birmingham, was vicar of Holy Trinity, Coventry, from 1828 to 1837, when he became incumbent of Leeds. Here by his tact and resourcefulness he overcame strenuous opposition on the part of Dissenters and among the working classes, who objected to compulsory Church rates, won great popularity, and in 1859, when he became dean of Chichester, left Leeds richer by 21 new churches, 29 vicarages, and 27 schools. From 1827 he was chaplain in ordinary to George IV, William IV, and Victoria, on the accession of the latter preaching in the Chapel Royal his famous sermon, "Hear the Church," of which 28 editions, numbering over 100,000 copies, were sold in a short time. Its great vogue was due to the claim that the Anglican church of the sixteenth century was a reformed church and a return to the early English church founded by the Apostles. At Chichester he wrote his most important work, *Lives of the Archbishops of Canterbury* (12 vols., 1860–76). Besides sermons and devotional works, he published *A Church Dictionary* (1842; 14th ed., 1887) and *Dictionary of Ecclesiastical Biography* (8 vols., 1845–52). His memory is perpetuated in Leeds by a handsome Gothic memorial church, completed in 1880. Consult Stephens, *Life and Letters of Dean Hook* (London, 1878).

HOOKE, Nathaniel, or Nathanael (?1690–1763). A British author, born in Ireland, a friend of Pope, of Martha Blount, and of many notables of his day, and a disciple of Fénelon. He studied law, but practiced literature, beginning with a translation of the *Life of Fénelon* (1725) and *An Account of the Conduct of the Dowager Duchess of Marlborough* (1742), taken down from her dictation, and ending with a *Roman History from the Building of Rome to the Ruin of the Commonwealth* (4 vols., 1738–71), the latter half of which was not published till after his death, while the latest edition (6 vols.) came out in 1830. In 1791 a work of his attacking Chesterfield's *Letters* appeared.

HOOKE, Robert (1635–1703). An English physicist. He was born on the Isle of Wight and was educated at Westminster School and at Christ Church, Oxford. He assisted Boyle in the construction of his air pump, and in 1662 was appointed curator of experiments to the Royal Society. In 1664 he became professor of geometry in Gresham College, London. In 1667 he was appointed city surveyor, though his model for rebuilding the city of London after the great fire of 1666 had not been adopted. From 1677 to 1682 he was secretary to the Royal Society. Though a man of extraordinary acuteness of perception and inventive genius, Hooke did not always enjoy the esteem of his contemporaries, owing to his peevish and excitable temper. He claimed priority—in many cases justly—to some of the most important discoveries and inventions of the time, and authorities admit that he was the first to recognize clearly that the problem of planetary motion should be treated as a purely mechanical one. He undoubtedly grasped the fundamental principle upon which Newton subsequently constructed the theory of gravitation; he failed, however, to develop it mathematically. Among his important inventions were the use of the balance spring for the regulation of watches, and many useful improvements in physical and astronomical instruments. His publications include *Micrographics* (1666), the *Lectiones Cutlerianæ* (1678–79), and his *Posthumous Works* (1705).

HOOKE, William (1601–78). An English clergyman, domestic chaplain to Oliver Cromwell. He was born in Southampton, was educated at Oxford, and after one charge in Devonshire went to America and took charge of a church at Taunton, Mass. (1637–44). His next congregation was in New Haven; but he returned to England in 1656, and, as his wife was Cromwell's cousin, the Protector made him master of the Savoy Hospital in Westminster, also his own chaplain. Some of Hooke's sermons were published, as well as his *New England's Tears for Old England's Fears* (1640).

HOOK'ER, Brian (William Brian) (1880–). An American author. He was born in New York City and was educated at Yale University (A.B., 1902; A.M., 1904). He served as an assistant in English at Columbia University in 1903–05 and as an instructor in rhetoric at Yale in 1905–09. He won the Cook prize in 1901 and the Heald prize in 1907, became a contributor to magazines, and wrote the libretto for an opera, *Mona* (music by Horatio Parker), which in 1911 was awarded a $10,000 prize by the Metropolitan Opera Company. In 1912 he received an honorary M.A. from Yale, and he was made a member of the National Institute of Arts and Letters, and in 1914, together with Horatio Parker, was awarded a $10,000 prize by Los Angeles for the libretto of an opera to be produced on the occasion of the city's centenary. He is author of *The Right Man* (1908); *The Professor's Mystery* (1911), with Wells Hastings; *Poems* (1913); *Mother of Men, Old Yale* (new ed., 1914).

HOOKER, Joseph (1814–79). A distinguished American soldier. He was born at Hadley, Mass., Nov. 13, 1814, graduated at West Point in 1837 in the same class with Jubal Early and Braxton Bragg, and was assigned to the First Artillery. He served in Florida and on the Maine frontier in 1837–40 and was adjutant at West Point in 1841 and of his regiment from 1841 to 1846. During the Mexican War he served as aid to Generals Persifer F. Smith, Thomas L. Harmer, William O. Butler, and Gideon J. Pillow; participated in the principal battles both of the northern and of the southern campaign, receiving the brevets of captain, major, and lieutenant colonel for gallantry; became captain in 1848; was assistant adjutant general to the Pacific Division in 1849–51 and resigned from the army Feb. 21, 1853. From that date until the outbreak of the Civil War he was in turn farmer, civil engineer, and colonel of California militia. He was appointed brigadier general of volunteers, May 17, 1861, and in March, 1862, was assigned to the command of the Second Di-

vision, Third Corps, Army of the Potomac. On May 5, 1862, he became major general of volunteers, and at the battle of Williamsburg, Va., fought on that day, handled his division with skill and valor. Hooker's soldierly qualities won for him the sobriquet of Fighting Joe. He was active throughout the Peninsular campaign and subsequently was conspicuous in the battles of Bristoe Station, the second battle of Bull Run, and Chantilly. In the Maryland campaign, as commander of the First Corps, he took part in the battles of South Mountain and Antietam, being wounded in the latter engagement. He was appointed brigadier general in the regular army Sept. 20, 1862.

In November, 1862, he was placed in command of the Fifth Corps and at the battle of Fredericksburg (q.v.) commanded the centre grand division of the Army of the Potomac, comprising the Third and Fifth Corps. On Jan. 26, 1863, he was assigned by President Lincoln to the command of the Army of the Potomac. His first act was to refit and reorganize the army. In a few months he had recruited depleted regiments, supplied them with new clothing and equipments, weeded out incompetent officers, armed, equipped, and organized the mounted troops in a single corps, and in other ways had infused new life into the army.

In his new command General Hooker failed, however, to show those qualities on the battlefield which had distinguished him as a corps and division commander. With the greater part of his army he advanced against General Lee, who then had a force half the size of his own, and who was stationed south of the Rappahannock, with the intention of attacking him in flank and rear and crushing him at one blow. His plans were somewhat deranged by high water and the failure of his cavalry under Stoneman to cut Lee's communications. While in position around Chancellorsville, his right flank was surprised by the Confederate General Jackson, one corps was thrown into confusion, and after a protracted struggle, lasting from the 2d to the 4th of May, in which both armies suffered great losses, the Army of the Potomac was forced to recross the Rappahannock. While the fighting was hottest, on May 3, Hooker was stunned, a pillar against which he was leaning having been struck by a cannon ball. The disastrous result was largely due to his vacillation and his inability to cope with an emergency. (See CHANCELLORSVILLE, BATTLE OF.) After the battle Hooker and Lee stood for some time facing each other across the Rappahannock, and shortly after Lee had started on his aggressive campaign which terminated in the battle of Gettysburg, Hooker broke up his camp and followed. The pressure of public opinion in the North, however, combined with friction between General Hooker and General Halleck, and growing lack of confidence in Hooker on the part of President Lincoln caused him to offer his resignation, and on June 28, 1863, General Meade succeeded him. The government then gave him command of the Eleventh and Twelfth Corps, later combined to form the Twentieth Corps (Army of the Cumberland), and sent him (Sept. 24, 1863) to reënforce Rosecrans at Chattanooga. On November 24, in the so-called "battle among the clouds," at the head of his new command, he led a charge in the face of the Confederate artillery and infantry posted on Lookout Mountain. For his conduct on this occasion he was, on March 13, 1865, brevetted major general in the regular army. He further distinguished himself under Sherman at Dalton and Resaca and in the attack on Atlanta. At his own request (July 30, 1864), he was placed on waiting orders September 28, when he was put in command of the Northern Department. On July 8, 1865, he was given charge of the Department of the East and soon afterward of the Department of the Lakes, with headquarters at Detroit, where he remained until 1867. A paralytic attack occasioned his retirement from active service (Oct. 15, 1868), with the full rank of major general in the regular army. General Hooker was a man of handsome physique and of great personal magnetism. He died at Garden City, L. I., Oct. 31, 1879. An equestrian statue of him by French and Potter stands in State House Park, Boston.

HOOKER, SIR JOSEPH DALTON (1817–1911). One of the most eminent of English botanists, the second son of Sir William Jackson Hooker (q.v.). He was born at Halesworth, Suffolk, England, and graduated in medicine (1839) at the University of Glasgow, where his father was professor. Hooker's botanical work began in his father's herbarium, and his early interests were mainly in the lower groups of plants, particularly the mosses. In 1839 he was commissioned botanist to the Antarctic expedition under the command of Sir James Ross, and in this capacity acquired an extensive knowledge of the floras of the south temperate and subantarctic regions. The results of this expedition were published in six large quarto volumes, under the general title *The Botany of the Antarctic Voyage of H. M. Discovery Ships Erebus and Terror in the Years 1839–1843 under the Command of Captain Sir James Clark Ross* (1844–60). Hooker also early developed an interest in fossil botany, and this was fostered by his appointment in 1845 to the position of botanist to the Geological Survey of Great Britain. He remained in the service of the survey for about two years and made important contributions to paleobotanical literature. The desire for a more extended knowledge of the flora of the Oriental tropics led him to organize a botanical expedition to India, which entered this field in 1848. Some of the results of Hooker's early observations in India were published in *The Himalayan Journals* and *Flora Indica*, the latter work being written jointly with Dr. Thomas Thomson of the Botanical Gardens, Calcutta. For 10 years after 1855 he was assistant director of the Royal Botanical Gardens at Kew. This was a decade of extraordinary activity in botanical exploration and in the study of herbarium collections. Hooker's greatest undertaking during this period was the *Genera Plantarum*, in collaboration with George Bentham (q.v.); the first part was issued in 1862. Upon the death of his father Hooker succeeded him in the directorship of the Kew Gardens, a post which he occupied for about 20 years. Under his supervision great improvements were made at the Gardens, the collections at the Kew herbarium were largely increased, and important publications were completed or continued. With all these duties Hooker found time for further botanical explorations in various parts of the world, including an expedition to Morocco (1871) and a visit to the United States (1877), where in company with Asa Gray (q.v.) an expedition was made across the continent to California. In 1885 Hooker retired from the directorship of Kew, but continued actively in

botanical work. The number of his titles exceeds 200 and includes not merely standard taxonomic publications, covering various regions of the world, but also publications in plant geography. In this field Hooker was perhaps at his best. His personal knowledge of the floras of the world was unrivaled, and his papers upon plant geography are full of originality and are regarded as a conspicuous part of the foundations of that science. He was an intimate friend of Darwin, and it was through his influence and that of Sir Charles Lyell that Darwin was induced to publish the first statement of his theory of natural selection, in 1858. He was president of the British Association in 1868 and delivered a remarkable presidential address in which he championed Darwin's theory of natural selection. He was knighted in 1877, received the Order of Merit in 1907, and was honored by numerous scientific societies at home and abroad.

HOOK'ER, MOUNT. One of the loftiest peaks of the Rocky Mountains in Canada, situated near the boundary of British Columbia and Alberta (Map: Canada, G 6). It has an estimated elevation of 15,700 feet.

HOOKER, RICHARD (c.1553–1600). An English clergyman, author of the most famous existing treatise on the constitution of the Church of England. He was born near Exeter in the year 1553 or 1554, of poor parents. He was a grave, bashful, and quiet boy, diligent in his studies and quick at learning. His early progress was so rapid that his uncle, John Hooker, was induced to aid him in pursuing his education further. With additional help from John Jewel, Bishop of Salisbury, who afterward became his patron, he was enabled to go to Oxford, where he entered Corpus Christi College in 1567. He became a scholar of Corpus Christi in 1573, was admitted to the degree of M.A. in 1577, and the same year became a fellow. The range of his learning was wide and by no means confined to theology. From the age of 19 he served as tutor, and in 1579 he was summoned, in an emergency, to deliver the Hebrew lecture, which he did so much to the satisfaction of the authorities that he continued to perform this duty so long as he remained at Oxford. For some unknown reason —perhaps through Puritan influence—he was once temporarily suspended from college, but honorably restored within a month. In 1582 Hooker took holy orders and not long after married, Walton says, to his own sorrow. This marriage put an end to Hooker's quiet and congenial Oxford life. He was now obliged to seek a parish. He received the modest living of Drayton-Beauchamp in Buckinghamshire (1584), where he lived, rather uncomfortably, for about a year. At the end of that period his fortunes were bettered by his being made Master of the Temple, London, though his preference was for a living in the country.

Hooker's London life was troubled with ecclesiastical controversy, which he disliked, yet which he would not attempt to avoid when once it was forced upon him. His colleague, Travers, represented that party in the Church of England which desired the adoption of Genevan ideas and usages, whereas Hooker stood for the episcopal establishment. These opposite views were reflected in the preaching at the Temple. "The forenoon sermon spake Canterbury, and the afternoon Geneva," was the current saying. Presbyterianism was either more popular, or else it had the better presentation, for we hear that the congregation "ebbed in the morning" (when Hooker preached) and "flowed in the afternoon" (to hear Travers). The Puritan champion was at last silenced by Archbishop Whitgift, but the discussion was continued in print. Hooker was so deeply stirred by the question at issue that he determined to give it exhaustive treatment in book form and at once entered upon the preparation of what became the celebrated *Laws of Ecclesiastical Polity.* To carry out his design a change of scene was necessary, and Hooker sought once more the quiet of a country parish and found it at Boscombe in Hants (1591). At the same time he was made a minor prebend of Salisbury, which added to his income without increasing his labor. In Boscombe Hooker wrote the first four books of the *Laws,* and they were published in 1594. The following year he removed to Bishopsbourne in Kent, where he spent the remainder of his life. Book v of the *Laws* appeared in 1597, and there is reason to believe that the other three books were written here, although they were not published. There were to be eight books in all, according to Hooker's original plan. The *Laws* were hailed as the best defense of the Anglican position ever written. Visitors sought the author out in his retreat, but he himself was all unconscious of the important position he had come to occupy. His days were passed in quiet labor, and he continued to fulfill every duty of his parish with conscientious fidelity until his death, Nov. 2, 1600, at the comparatively early age of 47.

Hooker's reputation rests upon his writings, not upon his preaching. In personal appearance he was not prepossessing, and his manner in the pulpit was not effective. But as the author of the *Ecclesiastical Polity* he stands in the front rank of English men of letters. This work is a monument of literary style, in the formative period of English prose, besides being the most important contribution to the subject of Church government in the language. We have the first five books precisely as Hooker wrote them. The fate of books vi to viii in their completed form is shrouded in mystery. Walton relates that the manuscript was destroyed by Puritan relatives of Mrs. Hooker, but that the earlier rough drafts were preserved. From these, long afterward, the seventh and eighth books were printed. What claimed to be a sixth book appeared in 1648, along with the eighth, but most of this probably does not belong to the *Laws* at all. The whole eight books were republished, with a life of Hooker by Izaak Walton, in 1666, since which time they have passed through many editions. In substance the *Ecclesiastical Polity* is a treatise on Church and civil government. His object was to defend episcopacy, but he also states a theory of government which was fruitful in English thought. Hooker's conception of the origin of the state resembles the "social compact" theory of more recent times. The Church he holds to be simply the English state, looked at from the religious point of view. He defends the Established church system, with all its ceremonial; but he does this with singular moderation, holding it to be a matter of expediency rather than of necessity, and he invariably accords courteous treatment to his opponents. In discussing the theories of Presbyterians and Independents, he points out what he believes to be their fundamental defects, and he defends the episcopal theory on scriptural and rational grounds as well as because of its antiquity and practical success.

All succeeding writers on the English church have built upon the foundations which Hooker laid.

Hooker's *Works* (including the *Ecclesiastical Polity*, the controversy with Travers, a *Discourse of Justification*, and a few *Sermons*) were published by John Keble (4 vols., 1836). This edition superseded all previous ones. It was reissued, with improvements (7th ed.) by Dean Church and Canon Paget, in 1888. Consult Izaak Walton, *Life of Richard Hooker*, prefixed to most editions of his works (Oxford, 1836).

HOOKER, Thomas (c.1586–1647). A New England clergyman, the real founder of the Colony of Connecticut. He was born at Markfield, Leicestershire, England, and was educated at Emmanuel College, Cambridge, where he took the degree of B.A. in 1608 and that of M.A. in 1611. After holding a fellowship for some time at Cambridge, he became, about 1620, rector of a little church at Esher in Surrey. In 1626 he accepted a lectureship at Chelmsford, Essex, where he soon won renown as an eloquent preacher, but by this very prominence attracted the attention of Laud, then Bishop of London, to his Puritanism. In May, 1629, he appeared before Laud and was threatened by him with action before the Court of High Commission, and in the following year, upon being cited to appear before that tribunal, he left England and settled in Holland. In Holland he remained for three years, preaching in the English churches at Amsterdam, Delft, and Rotterdam. In 1633 he sailed for New England, on the same ship with John Cotton (q.v.), settling in Newtowne (Cambridge) in October of that year and being admitted a freeman in the following spring. He was chosen pastor of the first church at Newtowne on Oct. 11, 1633, and soon afterward became one of the most influential clergymen in the Colony. It was he who in October, 1635, argued with Roger Williams before the General Court. There was something of a spirit of rivalry, not only between the people of Newtowne and Boston, but between their principal pastors, Hooker and Cotton. As early as May, 1634, the people of Newtowne complained to the General Court that they did not have room enough and sought either for permission to extend their boundaries or remove to a new location, and in July they sent a small party into the Connecticut valley to find a suitable place. The matter was temporarily adjusted by the extension of the town limits; but the spirit of unrest remained, and in 1636 Mr. Hooker and his church, with large delegations from the churches at Dorchester and Watertown, removed into the Connecticut valley. The Newtowne church members established themselves at Hartford, but the influence of Hooker extended also to the towns of Windsor and Wethersfield, which were settled by others who had followed his lead into the new country. It is not only as the leader and moving spirit of the new settlements that Hooker deserves to be known, but as the inspirer, if not the actual author, of the Fundamental Laws which delegates from the several river towns adopted for their government in 1639. In January, 1639, Hooker accompanied John Haynes, the first Governor of Connecticut, to Boston to confer with Winthrop concerning a proposed confederation of the New England settlements to provide for their mutual defense against the Dutch, the Indians, and the French. The year 1643 saw the result of their labors in the successful organization of the "United Colonies of New England," the first attempt at federal government in America. Hooker published a great many sermons and also: *The Soule's Preparation for Christ* (1632); *The Soule's Implantation* (1637); *The Soule's Ingrafting into Christ* (1637); *The Soule's Exaltation* (1638); *The Soule's Vocation* (1638); *An Exposition of the Principles of Religion* (1630); *The Saint's Guide* (1645); *A Survey of the Summe of Church Discipline* (1648), a defense of the New England churches which had great influence in the development of Congregationalism in America; *An Application of Redemption* (1657); *Poor Doubting Sinner Drawn to Christ* (7th ed., 1743). A selection from his works, with memoir by E. W. Hooker, was published in 1849. Consult: Cotton Mather, *Magnalia Christi Americana* (London, 1702); Johnston, *Connecticut*, in the "American Commonwealths Series" (Boston, 1878); Walker, *History of the First Church in Hartford* (Hartford, 1883); *Johns Hopkins University Studies*, vol. vii (Baltimore, 1889); Walker, *Thomas Hooker*, in "Makers of America Series" (New York, 1891).

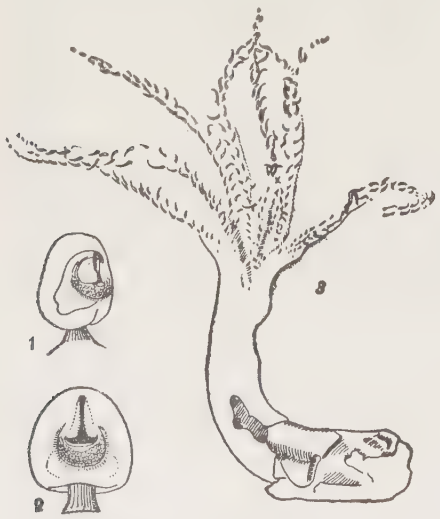
HOOKER, Sir William Jackson (1785–1865). A celebrated English botanist. He was born at Norwich and studied branches of natural history as a pastime during his youth. In 1811 he published his first work, *Journal of a Tour in Iceland*, of which a second edition was demanded in 1813. From that time forward he was constantly busy in the publication of botanical works. His investigation of the British Jungermanniæ and mosses led to his appointment to the chair of botany in Glasgow University, where he lectured with marked success until 1841, when he became director of the Royal Gardens at Kew. Here his pronounced executive ability wrought wonders. The Gardens, which at that time consisted of 11 acres, were extended to 45, in addition to which a park of 240 acres was added; the 10 old conservatories were replaced by 25 much larger ones of more modern construction; in conjunction with Henslow, he founded the most complete museum of botany in the world; and by his enormous correspondence with and ready aid to botanists throughout the realm, Kew Gardens became the distributing point of hundreds of useful plants, which were sent there in collections and then shipped to colonies for testing. Through his efforts Great Britain has largely extended her commerce in products of the soil. Accompanying his official duties he was collecting for his private herbarium and writing books on botany which at the time of his death numbered about 100 volumes. His herbarium was purchased by the nation after his death. His name was enrolled in the lists of all scientific societies at home and abroad, and on account of his scientific acquirements he was knighted in 1836. Among his works may be mentioned: *Monograph of the British Jungermanniæ* (1812–13); *Muscologia Britannica* (1818); *The British Flora* (1830, seven editions); *Flora Boreali-Americana* (1840); *A Century of Orchidaceous Plants* (1848); *Icones Plantarum*, in 10 volumes (1837–60); *British Ferns* (1862); *Garden Ferns* (1862).

HOOKER, Worthington (1806–67). An American physician, born in Springfield, Mass. He graduated at Yale in 1825 and in medicine at Harvard in 1829 and practiced in Connecticut until 1852, from which time until his death he was professor of the theory and practice of medi-

cine in Yale. He was vice president of the American Medical Association in 1864. His principal works are: *Physician and Patient* (1849); *Homœopathy: An Examination of the Doctrines and Evidences* (1852); *Rational Therapeutics* (1857). His *Child's Book of Nature* achieved a deserved reputation and is still widely used.

HOOK GAGE. An instrument invented by Uriah Boyden for measuring differences in level in a surface of water. It consists of a hook whose longer arm carries a vernier in connection with a graduated vertical scale, while the short arm terminates in a point which is adjusted in contact with the surface of the water from below, so that when the surface film is touched the point of contact is clearly and definitely indicated. Any difference in level may be read by adjusting the point at the different points and reading from the scale and vernier. In still water this instrument is said to be so delicate that a variation of 0.0001 of a foot may readily be observed.

HOOK SQUID. A squid of the family Onychoteuthidæ, allied to the common squids, but having the eyes destitute of any covering of skin. The two longer arms, or tentacles, and sometimes the shorter arms, bear suckers, each inclosing a powerful hook, which is retractile, like



HOOKS OF A HOOK SQUID.

1, side view of a sucker, showing a half-concealed hook. 2, front view of same. 3, a fossil hook squid (*Acanthoteuthis speciosa*); impression of arms, traceable by the preserved hooks, in the slates of Eichstädt, Bavaria.

the claws of a cat. Hook squids are found in the Sargasso Sea, in the Polynesian seas, etc., and are much dreaded by swimmers and divers, as they are sometimes 6 feet or more long. See CEPHALOPODA.

HOOK'WORM' DISEASE. ANKYLOSTOMIASIS; UNCINARIASIS; EGYPTIAN CHLOROSIS; MINERS' ANÆMIA. This widespread disease is due to an intestinal parasite, uncinaria, two distinct species of which are generally recognized, viz., the Old World hookworm and the New World hookworm. The Old World variety is called *Anchylostoma duodenale*, and the American *Necator americanus* (Stiles) or *Uncinaria americana*. Generically identical but specifically distinct parasites are found in dogs, cats, foxes, monkeys, and various other animals. In the American species the adult worm is from 7 to 11 millimeters long and possesses a dorsal and a ventral pair of strong, curved, ventral teeth, together with a pair of ventral lancets. The eggs closely resemble those of the Old World hookworm. Both parasites inhabit the small intestine, especially the jejunum and ileum, but also the duodenum and occasionally the stomach.

The eggs are laid in the intestine of the patient, are discharged with the fæces, develop within 24 hours or more into a rhabditiform embryo which sheds its skin in 48 to 72 hours and again within 5 to 9 days. The worm is now the so-called "encysted larva" and has reached the infectious stage. From this time the worm takes no more food until it reaches its animal host. Infection of man takes place either through the skin or by way of the mouth. When through the skin, the larva, as experimentally demonstrated by Looss, penetrates through the skin to the circulatory system, passes with the blood through the heart to the lungs, thence to the air passages up to the larynx, from which point it gets into the alimentary canal through the œsophagus to the stomach and finally to the small intestine.

Studies of the geographical distribution of hookworm made through the agency of the Department of State show that the disease belts the earth in a zone about 66° wide, extending from parallel 36° N. to parallel 30° S. lat. Practically all countries in this latitude are infected. In six countries, viz., Wales, Germany, the Netherlands, Belgium, France, and Spain, the disease is confined to miners. In 46 foreign countries, aggregating a population of about 920,000,000, the disease is general and widespread. The total population of the infected States in the United States is about 20,000,000. Together these constitute 58 per cent of the earth's estimated population. The degree of infection varies: in American Samoa it is found in 70 per cent of the population; in the southern two-thirds of China, in 75 per cent of the population; while in India from 60 to 80 per cent of 300,000,000 population have the disease; in Ceylon, 90 per cent in many parts; in Natal, 50 per cent of the coolies on sugar and tea estates; in Egypt, 50 per cent of the laboring class; in Dutch Guiana, 90 per cent in many parts; in British Guiana, 50 per cent of all; in Colombia, 90 per cent of those living between sea level and 3000 feet, which includes most of the population; and until 1904, when the activities of the Hookworm Commission began, 90 per cent of the working population of Porto Rico were infected. The problem is thus seen to be not local, but world-wide, and, unless controlled, sanitarians believe that the disease will produce the same evil results in the United States that it has in other lands, such as India, China, and Egypt, where it has undermined the physical and mental health of the population, destroying economic efficiency and preventing social development.

In the United States hookworm disease has come to be a sanitary problem of considerable importance. According to the yearly reports of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease, infection is widespread in the following 11 States: Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Maps of the areas indicate that hookworm infection in these States

occurs in belts or zones, the heaviest showings being in eastern Virginia and the eastern part of North and South Carolina, in central Tennessee, in the southern half of Alabama and Georgia, and in the northeastern corner and southern half of Mississippi, following the sandy plain in the seaboard States. In 1913, 186,277 persons were treated for hookworm disease in these States, and for the four years during which the commission has been in action a total of 539,107 cases have been treated.

Hookworm disease occurs in all degrees of severity. If infection occurs in childhood, both mental and physical development are greatly retarded. In well-developed cases the skin is waxy white or dirty yellow, dry and parchment-like, and perspiration more or less suppressed. The mucous membranes are pale or even white, corresponding to the degree of anæmia. The victims have an anxious, stupid expression with a fishlike stare. The body is apt to be emaciated, and the abdomen prominent. Œdema of the face, feet, ankles, or the entire body may be present. There are generally digestive disturbances, with tenderness in the epigastric region as a marked symptom. Many individuals develop an abnormal appetite for sour articles, such as lemons or pickles, or for salt, coffee, and buttermilk; others have a perverted appetite for resin, charcoal, chalk, tobacco, ice, rotten wood, mud (dirt eaters), clay, sand, and even cloth garments and books. Stiles described one boy who had eaten three coats, thread by thread, within a year. The pulse is rapid, palpitation is constant, and dyspnœa is very common among these patients. Examination of the blood shows varying degrees of anæmia. The red cells are pale and become irregular in shape. The mortality average in the United States is unknown, but the Porto Rico Commission, according to Ashford, expressed the belief that 30 per cent of all the deaths in Porto Rico were due to uncinariasis. The treatment of the malady is very satisfactory, thymol, male fern, and beta-naphthol being the three principal drugs used. They are administered after the intestine has been emptied by a saline purge and must be given with great care. Eucalyptus oil and chloroform have also been given with success.

The prevention and control of hookworm in the South depend almost entirely upon sewage disposal, and the work of the Rockefeller Commission is largely concerned in teaching the people of these districts how to accomplish this end. Consult: Stiles, *Report on the Prevalence and Geographic Distribution of Hookworm Disease in the United States* (Washington, 1903); id., *Hookworm Disease (or Ground-Itch Anemia): Its Nature, Treatment, and Prevention* (ib., 1910); id., *Hookworm Disease in its Relation to the Negro* (ib., 1909). The above pamphlets are issued by the United States Public Health Service. Consult also *Yearly Reports* of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease. See ANKYLOSTOMIASIS.

HOOLE, ELIJAH (1797–1872). An English Wesleyan clergyman and missionary. He went to India in 1819 and remained for 10 years. On his return to England he was appointed superintendent of schools for Ireland, in 1834 became assistant secretary of the Wesleyan Missionary Society, and in 1836 was made one of the general secretaries of the society and continued to serve until his death, a period of 38 years. He was the author of *Madras, Mysore, and the South of India* (2d ed., London, 1844); *Yearbook of Missions* (ib., 1847); *Oglethorpe and the Wesleys in America* (ib., 1863); *Byron and the Wesleys* (ib., 1864).

HOOLE, JOHN (1727–1803). An English translator and dramatist, born in Moorfields, London. He had little education, was too near-sighted to become a watchmaker like his father, so entered the India House as a clerk (1744), was made auditor of Indian accounts, then principal auditor. He was a friend of John Scott of Amwell and wrote (1785) a life of him; and a friend also of Dr. Johnson, whom he attended in his last illness. Hoole's works include: the translations, *Tasso's Jerusalem Delivered* (1763); versions of Metastasio's dramas; and Ariosto's *Orlando Furioso* (1783)—all severely criticized by Scott, Southey, and Lamb; three tragedies of his own, acted at Covent Garden; the life of Scott above mentioned and prefixed to Scott's *Critical Essays;* and a monody on *The Death of Mrs. Woffington* (1760). His translations of Ariosto and Tasso, despite a certain stiffness and artificiality which contrast unfortunately with the fluent and melodious stanzas of the originals, have their fine qualities and still hold their own in succeeding editions.

HOO'LOCK. The white-browed gibbon (*Hylobates hoolock*) of northeastern India, where it leads an active life among the hill forests. It is frequently kept captive and proves a docile, cleanly, and interesting pet. The name is a native imitation of their whooping call, heard most frequently at sunrise. See GIBBON.

HOONAH, hōō'nä, or **HOONIAH,** hōōn'yä. A native settlement on Icy Strait, Alaska (Map: Alaska, M 6). It has a Presbyterian mission, and a government school with an enrollment of 111 in 1912. The inhabitants, numbering 452 in 1910, live largely through furnishing fish to the salmon cannery at that place.

HOONOOMAN, hōō'nōō-män. The sacred monkey of India. A better spelling of the word is hanuman (q.v.).

HOOP ASH. See HACKBERRY.

HOOP'ER, FRANKLIN WILLIAM (1851–1914). An American institute director. Born at Walpole, N. H., he studied at Antioch College (Ohio) in 1867–71 and graduated from Harvard University in 1875. He was principal of the Keene (N. H.) High School in 1877–80, taught natural science at Adelphi College, Brooklyn, in 1880–89, and thereafter was director of the Brooklyn Institute of Arts and Sciences. He was president of Antioch College in 1901–05 and trustee after 1899. He served as director of the Brooklyn Art Association after 1890 and of the Brooklyn Public Library from 1895 to 1904 and as a member of the Brooklyn Board of Education in 1892–99; and he also became trustee of the New York School of Agriculture, Long Island, in 1912 and of Adelphi College in 1913. He frequently lectured on biology and geology and was active in the organization of museums.

HOOPER, JOHN (c.1495–1555). An English prelate and martyr. He was born in Somersetshire and educated at Oxford. He became a Cistercian monk and when the monasteries were dissolved went to London to live. He was converted to the Zwinglian form of Protestantism and, advocating his new views, had to flee to the Continent (1540) and spent some time in Switzerland under the influence of Bullinger. Some time after the accession of Edward VI he

returned to England (1549) and became a preacher in London. In 1550 he was appointed Bishop of Gloucester, but his objections to wearing the episcopal vestments caused delay and even imprisonment. In 1552 he received the bishopric of Worcester *in commendam*. On the commencement of Mary's reign in 1553 he was committed to the Fleet, where he remained for 18 months, being frequently examined before the Council, was condemned as a heretic, and burned at the stake at Gloucester, Feb. 9, 1555. He was the author of numerous sermons and controversial treatises, of which a collected edition appeared at Oxford (1855). The account of his death appears in John Foxe's *Acts and Monuments*, books x, xi (London, 1838).

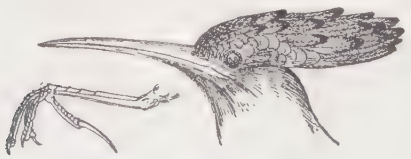
HOOPER, Johnson J. (c.1815–63). An American humorist. He was born in North Carolina, removed early to Alabama, edited a newspaper and practiced law there, and was secretary of the Provisional Confederate Congress. In 1845 he published the *Adventures of Captain Simon Suggs*, broadly, crudely, and uncouthly humorous, yet one of the raciest books of its time, descriptive of a gambling sharp of the Southwest in the "flush times." His *Widow Rugby's Husband and Other Tales of Alabama* (1851) is less successful.

HOOPER, William (1742–90). An American jurist and signer of the Declaration of Independence. Born in Boston, he graduated at Harvard in 1760. He studied law with James Otis and practiced very successfully in North Carolina, where he ably assisted the Provincial Government in suppressing the disturbances of 1770 and was elected to the Legislature in 1773. There he became a leader and, a year later, was elected to the Continental Congress, from which he resigned in 1777. In 1786 he was one of the Federal judges appointed to adjudicate the territorial dispute between Massachusetts and New York.

HOOPESTON, hōōp'ston. A city in Vermilion Co., Ill., 99 miles south of Chicago, on the Chicago and Eastern Illinois and the Lake Erie and Western railroads (Map: Illinois, J 5). It is the seat of Greer College, established in 1891, and has McFarren and other public parks and a Carnegie library. The city is in a fertile agricultural region and manufactures chemicals, gas engines, cans and canning machinery, and canned goods, among its establishments being two of the largest sweet-corn canning factories in the United States. In 1877 Hoopeston received a city charter, still in operation, which provides for a mayor, elected biennially, and a council. The water works are owned and operated by the municipality. Pop., 1900, 3823; 1910, 4698.

HOOPING COUGH. See Whooping Cough.

HOOPOE, hōō'pōō *or* hōō'pō (obsolete, *hoopoop*, reduplication of *hoop*, Fr. *huppe*, OF.



HOOPOE.

huppe, hupe, from Lat. *upupa*, hoopoe). One of a small and singular group of birds of the warmer parts of the Old World, which take both their common and systematic names (genus *Upupa*, family Upupidæ) from their cry. In this family the bill is long and slender, the wings of moderate size or short, the legs short, the toes long, and the claws strong and curved. The common European hoopoe (*Upupa epops*) is an African bird, visiting in summer most parts of Europe and Asia, but rare in Great Britain. It is about the size of a blue jay; its plumage exhibits a fine mixture of white, buff, and black, and it has a large crest of two parallel rows of feathers. Its strange appearance and habits have caused it to figure largely in European legend and folklore. It gets its food chiefly on the ground, and one of the myths has it that its peculiar notes are made by striking the bill on the ground as the note is uttered. The nest is made in a hole in a tree or wall, and the eggs are white. The hoopoes were formerly thought to be related to the crows, but it is now generally admitted that their nearest relatives are the hornbills, although they are apparently so different. An extensive account of the curious and interesting traits of this bird is given in the *Royal Natural History*, vol. iv (London, 1895). See Bird for other authorities. See Plate of Trogons, Hoopoe, etc.

Wood Hoopoe. The birds of the subfamily Irrisorinæ, which are found in South Africa, are nearly related apparently to the Upupidæ and are known as wood hoopoes. They are arboreal, have a glossy blackish plumage, no crest, and a long graduated tail. They are said to be noisy and restless birds and to climb about on trees like woodpeckers. Like the true hoopoes, they emit at times a rather disagreeable odor.

HOOPS, HOOP SKIRT. See Crinoline.

HOOP SNAKE. A small snake (*Abastor erythrogrammus*) of the South Atlantic States, foolishly feared by the negroes, who say it will put its tail in its mouth, stiffen its body, and roll along like a hoop, aiming to let go of its sting-tipped tail and dart it into the first person it meets. Similar stories are told of a closely related species, the wampum snake (*Farancia abacura*), common in swampy ground in the South; and both are called horn snakes. In fact, both species are perfectly harmless and spend most of their time beneath the ground, burrowing deeply into the soil. The former is blue black above, marked with three red lines, and flesh-colored below, with black spots; while the latter is uniform bluish black above and banded with red on the abdomen.

HOORN, hōrn. A seaport of the Netherlands, in the Province of North Holland, situated on the Hoornerhop, a bay of the Zuyder Zee, 25 miles northeast of Amsterdam (Map: Netherlands, D 2). It is a typical old Dutch town and has many quaint mediæval buildings, among them the Harbor Tower, St. John's Hospital, the mint, the weigh-house, the town hall, and the courthouse. Other notable edifices are the museum and the Groote Kerk (great church), the latter with a monument to Admiral Floriszoon. Hoorn was formerly one of the richest towns in Holland, the great nets for the herring fishery being employed here as early as 1416. It has now a considerable trade in dairy products and also some shipbuilding. The chief products are gold and silver work, canvas duck, tobacco, and lumber. Fishing is still followed. Hoorn is the birthplace of the navigator Willem Schouten, who named Cape Horn after his native town. Pop., 1899, 10,714; 1911, 11,244.

HOOSAC (hōō′sak) **RANGE.** A spur of the Green Mountain Range in west Massachusetts, extending about 16 miles north and south on the east side of the Hoosic River valley and forming the dividing line between that valley and the Connecticut River valley (Map: Massachusetts, A 2). About a mile southeast of North Adams the range, which here reaches an altitude of 2300 feet, is pierced (at an altitude of 745 feet) by the Hoosac Tunnel, about 5¾ miles long, built between 1855 and 1874 at a cost of about $20,000,000, for part of which the State lent its credit. The maximum altitude of the range, 2400 feet, is reached about a mile south of the tunnel. See TUNNEL.

HOOSE, hōōz *or* hōōs. A disease of sheep due to the presence of parasites (*Strongylus filaria* et al.) in the bronchial tubes. It is characterized by a husky cough.

HOO′SIC RIVER. A river of Massachusetts, Vermont, and New York states. It rises in the Berkshire Hills, Berkshire Co., Mass., flows nearly north to North Adams, and then northwest, crossing the southwest corner of Vermont, and emptying into the Hudson River about 15 miles north of Troy (Map: Vermont, A 8).

HOO′SICK FALLS. A village in Rensselaer Co., N. Y., on the Hoosic River, 27 miles northeast of Troy, on the Boston and Maine Railroad (Map: New York, G 5). It has extensive manufactures of agricultural implements, cotton and woolen goods, shirts and collars, electric insulators, paper, and paper-making machinery. Settled in 1688, Hoosick Falls was incorporated first in 1827. Under a charter of 1884, revised in 1890, the village is governed by a president, chosen every three years, and a board of trustees, elected from their respective wards. The village owns its water works. Pop., 1900, 5671; 1910, 5532. Hoosick Falls contains a large State park at the site of the British intrenchments at the battle of Bennington, Aug. 6, 1777.

HOOSIER (hōō′zhēr) **FROG.** See MINK FROG.

HOOSIER SCHOOLMASTER, THE. A novel by Edward Eggleston (1875), one of the first successful attempts to picture the rude surroundings of the pioneers of the Middle West.

HOOSIER STATE. Indiana. See STATES, POPULAR NAMES OF.

HOOVER, HERBERT C. See VOLUME XXIV.

HOOVE, or HO′VEN. See BLOAT.

HOP (from MDutch *hoppe*, Dutch *hop*, OHG. *hopfo*, Ger. *hopfen*, hop, of doubtful origin), *Humulus lupulus.* A perennial plant which belongs to the Urticaceæ, or nettle family. The single species, a native of America and England, where it is often found growing wild upon trees and shrubs, has given rise under cultivation to many varieties. The hop is a dicœcious climbing vine with rough stems and heart-shaped, three to seven lobed leaves. The pistillate flowers are the hop of commerce, used mainly in the manufacture of beer. Hop culture is not general, like the culture of cereals, but is confined to certain areas, comparatively limited in extent, which on account of soil and climatic conditions are especially suited to the production of the crop. The principal hop-producing regions of the United States are New York and the Pacific coast States. Wisconsin also produces a small quantity. In Europe the principal hop-growing countries are England, Austria-Hungary, Germany, France, and Belgium. The hops from Kent in England and from Saaz and Auscha in Bohemia have long been considered of the finest quality throughout the world. In general, the hops are known in the European markets by the name of the locality in which they were grown. This serves as an indication of their comparative quality and value.

The hop may be grown on a variety of soils, but it always requires a well-drained subsoil. It succeeds best on a moist, sandy loam. Soil conditions are generally considered the most important factor in determining the quality of the crop. In preparing land for hops it is plowed deeply and brought to a fine tilth. The hop is propagated by cuttings made from the underground stems which the plant sends out near the surface of the ground. These cuttings are made and set out in the spring. In the United States one male plant is grown per hundred or so, but in Europe, as a rule, only female plants are grown, as the presence of seeds in the hops injures the flavor of certain beers made from them. The vines are either trained on poles or on wire trellises. The latter method is gradually displacing the system of training on poles. During the growing season the soil is cultivated to keep it mellow and retentive of moisture and for the purpose of killing the weeds. Harvesting is done by hand and forms the hop grower's busy season, as the hop deteriorates when exposed too long to the weather after it is ripe. The yield varies from 1000 to 3000 pounds per acre. When the hops are harvested, they are immediately cured by air drying under cover or by drying in kilns constructed for that purpose. The cured product is pressed into bales of about 200 pounds each and is shipped in this form to distant markets. In Europe hops are generally shipped in large sacks without being baled. The world's annual commercial production of hops averages about 200,000,000 pounds, of which the United States, generally the leading producing country, furnishes from 25 to 30 per cent. Of the annual yield in the United

HOP.

States New York and Washington produce each approximately 15 per cent, California 30 per cent, and Oregon 40 per cent.

The valuable principle of the hop is a yellowish aromatic, resinous substance called lupulin, which has been found to contain two preservative or soft resins (oleoresins) and a nonpre-

servative or hard resin. The preservative resins are the most valuable, since they are particularly unfavorable to the growth of lactic ferments, but not to the true yeast of beer. The deterioration of hops caused by exposure when mature, or by excessive drying, consists in the waste of the lupulin. For brewing, the hop must be well ripened, properly dried, and with the resin and other qualities unimpaired. Consult: P. L. Simmonds, *Hops, Cultivation and Uses* (New York, 1877); Herbert Myrick, *The Hop: Its Culture and Cure* (ib., 1909); and publications of the United States Department of Agriculture.

HOP APHIS. See HOP LOUSE; HOP INSECTS.

HOPAT'CONG, LAKE. A picturesque body of water in Morris and Sussex Counties, N. J., 50 miles northwest of Newark (Map: New Jersey, C 2). The lake is about 6½ miles long, northwest by southeast, and generally narrow, though its shores are deeply indented by several bays, the largest of which makes its maximum width about 1 mile. It lies in a well-wooded fir and pine district, 928 feet above sea level. Its area is 2443 acres. The Musconetcong River drains it from the southwest into the Delaware, but it supplies water for the upper level of the Morris Canal, so that much of its drainage actually passes southeast into the Rockaway River. It is a popular summer resort.

HOPE. A city in Hempstead Co., Ark., 112 miles southwest of Little Rock, on the St. Louis, Iron Mountain, and Southern, the Louisiana and Arkansas, and the St. Louis and San Francisco railroads (Map: Arkansas, B 4). It is in a productive cotton and fruit growing region and has compresses, cottonseed-oil mills, lumber, grist and planing mills, wagon works, cotton gins, and metal frame screen, box, spoke, stave, and handle factories. It is also an important shipping point for cotton, lumber, cattle, and hides. There are municipally owned water works, electric-light and sewage plants. Pop., 1900, 1644; 1910, 3639.

HOPE (afterward BERESFORD-HOPE), ALEXANDER JAMES BERESFORD (1820–87). An English politician and author, son of Thomas Hope and stepson of William Carr, Viscount Beresford. He was educated at Harrow and at Trinity College, Cambridge, served in Parliament for Maidstone from 1841 to 1852, was reëlected in 1857, and from 1868 to his death represented Cambridge University. An independent Conservative, he opposed the abolition of Church rates, the legalization of marriage to one's deceased wife's sister, and, especially, the Reform Bill of 1867. In the debate on the last measure he broke lances with Disraeli, calling him the "Asian mystery," and getting recognition of his Dutch ancestry and poor delivery in Disraeli's allusion to "Batavian graces." A High Churchman and deeply devoted to the English church and to its control by the state, Hope bought, in 1844, St. Augustine's Abbey, Canterbury, as a missionary college, built All Saints' Church in London, and wrote on religious liberty, at the time of the excitement over Roman aggression, in the *Chronicle*, and later in the *Saturday Review*, being closely associated in both with John Douglas Cook. Hope was president of the Royal Institute of British Architects (1865–67), of the Architectural Museum and of the Ecclesiological Society. His publications include several works on Church politics; *The English Cathedrals of the Nineteenth Century* (1861); *A Popular View of the American Civil War* (3d ed., 1861); and a successful novel, *Strictly Tied Up* (4th ed., 1886).

HOPE, ANTHONY. See HAWKINS, ANTHONY HOPE.

HOPE, SIR JAMES (1808–81). A British admiral, born in Edinburgh. He was educated in the Royal Naval College, Portsmouth, and when 14 years old went as midshipman on a frigate bound for the West Indies. In 1827 he was promoted lieutenant and by 1830 had reached the rank of commander, having by that time made voyages to the Mediterranean and the East Indies. He saw service in North and South America (1833–45), and after opposing the Russians in the Baltic for two years was created rear admiral (1857) and commander of the Chinese squadron (1859–62). In 1859 he made a gallant attempt to enforce the ratification of a treaty the Peking government had entered into with France and England. He lost most of his ships and men and was himself severely wounded, but returned to the attack the following year and was successful (1860). From 1863 to 1867 he commanded in North American waters and the West Indies, and for three years (1869–72) was in charge at Portsmouth. He was made an admiral in 1870, chief naval aide-de-camp to Queen Victoria in 1873, and was retired in 1878, but was created honorary admiral of the entire fleet a year later.

HOPE, THOMAS (c.1770–1831). An English author and virtuoso. He belonged to a rich family of merchants, Scottish by descent, who had settled in Amsterdam. While still a youth he traveled extensively in southern Europe and in the East and collected many drawings, chiefly of buildings and sculptures. After 1796 he made England his home. He was of assistance as a patron to Canova, Thorvaldsen, and Flaxman. He first attracted attention by the decorations which he bestowed on the interior of his mansion in Duchess Street, Portland Place, London, a description of which appears in his book *Household Furniture* (1807). In 1809 he published *Costumes of the Ancients* and *Architecture of Theatres*. Three years afterward appeared *Modern Costumes*, and in 1819 *Anastasius, or Memoirs of a Modern Greek at the Close of the Eighteenth Century*. Published anonymously, this last work was ascribed to Lord Byron, who said that he had wept because he did not write it. It is a brilliant romance describing adventures and manners in the East.

HOPE COLLEGE. A coeducational institution of learning at Holland, Mich. It was organized by Dutch colonists in 1857 as an academy and in 1866 was chartered as a college under the auspices of the Reformed church in America. The Western Theological Seminary was founded in 1869. In connection with the college is a preparatory school, which admits pupils who have completed the eighth grade in the public schools. Among the principal buildings of the college are Van Raalte Memorial Hall, the Carnegie Gymnasium, Graves Library, Winants Chapel, Maria L. Ackerman Hoyt Observatory, and two dormitories. The campus comprises 16 acres. The college provides five courses—classical, philosophical, natural science, modern-language English, and modern-language mathematics. There were, in 1914, 152 preparatory, 179 collegiate, and 29 theo-

logical students. The faculty numbers about 25. The college had in 1914 an endowment of $388,400 and an income of $36,000. In the same year the library contained 22,000 volumes. The degree of Bachelor of Arts is conferred. In 1914 the president was Rev. Ame Vennema, D.D.

HOPE'DALE. A town in Worcester Co., Mass., 34 miles southwest of Boston, on the Grafton and Upton Railway (Map: Mass., D 4). The town contains the Bancroft Memorial Library and a bronze statue of Adin Ballou. It has large manufactories of cotton machinery. Pop., 1910, 2188. Hopedale was founded as a religious community in 1841 by a society under the leadership of Rev. Adin Ballou, in the town of Milford, Worcester Co., Mass. The chief aim of the founder was to restore the original ideals of Christian life rather than to reorganize society economically. A farm of 238 acres with mill sites was purchased by the society, organized as a joint-stock company. The community consisted of 28 persons, who observed strictly the rules of communism. As the community increased in numbers, these rules were somewhat relaxed. A board of trustees at first controlled the industries of the community, but later the several branches were farmed out to individuals. The community was not a success financially, nor was social harmony long maintained. In 1854 it had reached its highest point, embracing about 200 members. Agriculture and several branches of manufacture were carried on. Two years later the community was found to be deeply in debt, and the joint-stock company was dissolved. As a purely religious organization, it continued to exist for some years, but in 1867 merged in the Hopedale Unitarian Parish, with Mr. Ballou as minister, the industries founded by the society being carried on by private management. Hopedale was incorporated as a town in 1886. Consult Adin Ballou, *History of the Hopedale Community* (Lowell, 1897).

HOPE DIAMOND. A large blue diamond in the possession of Mrs. E. E. McLean, of Washington, D. C., and weighing 44¼ carats. It is supposed to have been cut from a stone purchased from Tavernier by Louis XIV, which weighed uncut 112½ carats and 67½ carats after cutting. The stone was lost in 1792 and came into the market in 1830, when it was bought by Thomas Henry Hope, the English banker whose daughter married the Duke of Newcastle. It went into the market again in 1901, and finally in 1909 was purchased for Mrs. McLean for the sum of $180,000. Legend has been busy with the history of this diamond, and tales of ill luck to its possessor, while eagerly told, are without foundation in fact.

HOPE-JONES, Robert (1841–1914). An Anglo-American organ builder. He early applied himself to the study of electricity, became chief electrician of the English telephone companies, and was a member of the British Institution of Electrical Engineers. An accomplished organist himself, and a member of the Royal College of Organists, he turned his attention to the application of electricity to organ building and produced instruments which took leading rank among their kind. Hope-Jones organs have been installed in Germany, England (notably Worcester Cathedral), France, India, Australia, New Zealand, and the United States (notably Ocean Grove, N. J., auditorium). In 1903 Hope-Jones came to America and built organ factories at Elmira, N. Y., and later at North Tonawanda, N. Y., the latter of which was sold to the Rudolph Wurlitzer Company in 1914. He made Buffalo his home. In September, 1914, he committed suicide.

HOPE THEATRE, The. A sixteenth-century bear garden, on the Bankside, Southwark, London, which was changed into a playhouse in 1581. It was restored to its former use at the Restoration, but towards the end of the seventeenth century gradually lost its popularity.

HOPFEN, hōp'fen, Hans von (1835–1904). A German novelist and poet, born and educated at Munich, where he was associated with the Munich school of poets, especially with Geibel. In 1866 he moved to Berlin, where he devoted himself to literature, having already contributed to the *Münchener Dichterbuch* (1862) and written the novel *Peregretta* (1864). *Der Pinsel Mings* (1868), a satirical tale in verse; a book of essays, *Streitfragen und Erinnerungen* (1876); a volume entitled *Theater* (1889); the plays *Aschenbrödel in Böhmen* (1870); *In der Mark* (1889); the *Neues Theater* (1892–93); the tragedy *Göttin der Vernunft* (1892); the drama *Helga* (1892); and the comedy *Es hat so sollen sein* (1893), comprise his best dramatic and miscellaneous work. The remainder of his writings include a score of novels and collections of stories—in which he did his best work—of which the following may be mentioned: *Verdorben zu Paris* (2d ed., 1892); *Die Heirat des Herrn von Waldenberg* (2d ed., 1884); *Der alte Praktikant* (3d ed., 1891); *Die Geschichten des Majors* (3d ed., 1882); *Neue Geschichten des Majors* (1890); *Im Schlaf geschenkt* (4th ed., 1896); *Zehn oder elf* (1901); and *Gotthard Lingens Fahrt nach dem Glück* (1902). Consult Muncker, in *Westermanns Monatschefte*, vol. lix (Brunswick, 1886), and P. Lindau, *Gesammelte Aufsätze* (Berlin, 1880).

HOP FLY. See Hop Louse.

HOP HORN'BEAM. See Hornbeam.

HOPHTHALMOS. See Haug, J. C. F.

HOPI, hō'pē, or **MOKI,** mō'kē. An interesting Pueblo tribe of Shoshonean stock, occupying seven villages upon three mesas in north central Arizona and numbering about 1900, including those of Tewa or Hano. The principal villages are Walpi and Oraibi. In many respects the Hopi may be considered the most interesting of Pueblo tribes. They are all mesa dwellers, and their villages, situated hundreds of feet above the surrounding desert, are only to be reached by steep, adventurous trails. They hold fast to their old aboriginal culture, which is of the typical Pueblo character, but better preserved than that along the Rio Grande. Their ceremonials are elaborately conducted, particularly those of the "new fire" and the various "katcina," or "masked dances," also the celebrated snake dance in which the performers carry living rattlesnakes in their mouths as they dance. They are industrious farmers and have always in their granaries abundant stores of corn, beans, and pumpkins. They also weave baskets and blankets and are skillful potters and wood carvers. (See Colored Plates in articles Basket and Blanket.) The clan system is rigid and highly developed among them. According to explicit traditions, the ancestors of these tribes were builders of many of the ancient ruins in the surrounding region. The people of the small village of Hano are of different language, originally being emigrants from a Tanoan pueblo in the Rio Grande

valley who left their eastern home shortly before 1700. Consult: B. I. Gilman, *Hopi Songs* (New York, 1908); numerous articles in *Annual Reports of Bureau of Ethnology*, Washington, and *Anthropological Publications of Field Museum*, Chicago. See SNAKE DANCE.

HOP INSECTS. The most destructive insect enemy of the hop crop is the hop aphis. Other species are of less importance, but they sometimes do considerable damage to the plant. The hop grub or hop-plant borer (*Gortyna immanis*) is the larva of a noctuid moth which lays its eggs in the early part of the season upon the young shoots of the plant. The young caterpillars, which are slender and greenish in color spotted with black, bore into the vine just below the tip and remain at this point for some time. The head turns downward and stops growing. Such vines are called muffled heads or stag vines, and sometimes bullheads, the caterpillar at this time being called tip worm. A little later it drops to the ground and enters the stem at the surface of the ground. It is then called the collar worm, changing to a white color with black spots. About the end of July it becomes full-grown and transforms to pupa near the roots of the plant. The moth issues in the fall or in the spring.

A number of different caterpillars feed upon the foliage. The hop-vine snout moth (*Hypena humuli*) is one of the principal forms. The larvæ of two butterflies (*Polygonia interrogationis* and *Polygonia comma*) feed quite abundantly upon this plant and are known to hop growers as hop merchants, from the gold and silver markings upon the chrysalids. The zebra caterpillar (larva of *Mamestra picta*), the common woolly-bear caterpillar (larva of *Spilosoma virginica*), and the saddle-back caterpillar (larva of *Empretia stimulea*) are the remaining principal species. One of the leaf hoppers (*Tettigonia confluenta*) causes more or less damage to the foliage, and the striped flea beetle (*Phyllotreta vittata*) also damages the leaves, while the so-called red spider or spinning mite (*Tetranychus telarius*) often causes the leaves to turn yellow. The best remedy for all of these insects consists in spraying at the proper time, using an arsenical spray for the caterpillars and the flea beetle, a kerosene emulsion for the leaf hoppers, and a sulphur wash for the spinning mite. Consult L. O. Howard, "Pests of the Hop Crop," in *The Hop Industry* (New York, 1898). See HOP LOUSE.

HÖPKEN, hĕp'kĕn, ANDERS JOHAN, COUNT VON (1712–89). A Swedish statesman. He became a leader of the Hat party, obtained a seat in the national Diet, and was one of the two commissioners who negotiated with Russia in 1741–42. In 1746 he became a senator and in 1751 accepted the premiership of Sweden. He lost his offices in the political turmoil of 1761, but in the following year was made Count, and in 1772 reëntered the Senate. He is author of several biographies. Carl Silfverstolpe published a selection of his writings under the title *Grefve Höpkens Skrifter* (2 vols., 1890–93).

HOP'KINS, ALBERT (1807–72). An American scientist, brother of Mark Hopkins. In 1826 he graduated from Williams College, where subsequently he was tutor (1827–29), and professor of mathematics and natural philosophy (1829–38), of natural philosophy and astronomy (1838–68), and of astronomy (1868–72). He had charge of a scientific expedition to Nova Scotia in 1835, and two years later he directed the building of an astronomical observatory at Williams.

HOPKINS, CYRIL GEORGE (1866–1919). An American chemist and agronomist, born near Chatfield, Minn. He was educated at the South Dakota Agricultural College (B.S., 1890), at Cornell University (M.S., 1894; Ph.D., 1898), and at Göttingen (1899–1900). After filling several less important positions he was chemist at the University of Illinois Agricultural Experiment Station from 1894 to 1900, thereafter professor of agronomy and chief in agronomy and chemistry, and after 1903 vice director. He invented Hopkins's condenser and Hopkins's distilling tube. He was president of the Association of Official Agricultural Chemists for the year 1905–06. His publications include, besides bulletins and articles: *Soil Fertility and Permanent Agriculture* (1910); *The Story of the Soil* (1911); *The Farm that won't Wear out* (1913).

HOPKINS, EDWARD (1600–57). A Colonial Governor of Connecticut, born at Shrewsbury, England. After being a tradesman in London for a few years, he came to Boston in 1637 and settled at Hartford. He was chosen Governor of the Colony of Connecticut several times during the period 1640–54. After that he lived in London. He assisted in forming the Union of the New England Colonies in 1643. He left £1000 to support grammar schools in Hartford and New Haven. With the sum of £500 left for "public ends," Harvard College, to which it was turned over, bought a township from the "praying Indians" and named it Hopkinton.

HOPKINS, EDWARD WASHBURN (1857–). An American Sanskrit scholar and philologist, born at Northampton, Mass. He graduated at Columbia College in 1878 and after studying in Germany was professor of Greek, Sanskrit, and comparative philology at Bryn Mawr College, Pennsylvania, from 1885 to 1895. In the latter year he was called to Yale University as professor of comparative philology and Sanskrit, to fill the chair left vacant by the death of Whitney. He wrote several important books connected with India: *Mutual Relations of the Four Castes according to the Manavadharmaçastram* (1881); *The Ordinances of Manu, translated from the Sanskrit* (1884); *Religions of India* (1895); *The Great Epic of India* (1901); *India Old and New* (1901); and numerous contributions to the *Journal of the American Oriental Society* and other periodical publications.

HOPKINS, ESEK (1718–1802). An American naval officer, born in Scituate, R. I. In the Revolutionary War he was at first a brigadier general in the army, but in 1775 Congress commissioned him commander in chief of the new American navy. Washington officially addressed him as admiral. He went to sea in February, 1776, with four ships and three sloops, and took the forts at New Providence, with all the guns, ammunition, and stores. On his return he seized a British schooner and a bomb brig. His later operations were less fortunate, and in January, 1777, he was dismissed from the service because he let the *Glasgow* get away from him and failed to appear before Congress when so ordered. He was afterward prominent in Rhode Island political affairs, for many years as a member of the General Assembly. Consult Field, *Esek Hopkins, Commander-in-Chief of the*

Continental Navy during the American Revolution, 1775–78 (Providence, 1898).

HOPKINS, EZEKIEL (1634–90). Bishop of Londonderry. He was born at Pinne, Devonshire, Dec. 3, 1634. His early education was conducted under Presbyterian and independent influences. He graduated B.A. at Oxford (1653) and became chaplain of Magdalen College (1656). In 1662 he conformed and was presented to the living of St. Mary Woolnoth in London. When the great plague broke out in the capital (1666), Hopkins withdrew to Exeter, where he obtained the living of St. Mary's. When Lord Robartes was made Lord Lieutenant of Ireland (1669), Hopkins went with him to Dublin and through his influence obtained the deanery of Raphoe (1670) and in 1671 the bishopric of Raphoe. In 1681 he was made Bishop of Londonderry. In the course of the siege of the town by the Irish adherents of James II, in 1689, Hopkins withdrew from the town and retired first to Raphoe and afterward to London, where he was made rector of St. Mary, Aldermanbury (1689). This charge he held until his death, June 19, 1690. His works, which have been frequently republished, comprise: *Sermons; Expositions of the Decalogue and the Lord's Prayer;* and elaborate discourses on *Regeneration* and *The Vanity of the World.* The best edition of his collected works is by Pratt (4 vols., London, 1809).

HOPKINS, HENRY (1837–1908). An American Congregational clergyman and college president, son of Mark Hopkins. He was born at Williamstown, Mass., graduated from Williams College in 1858, and studied at Union Theological Seminary in 1859–60. He entered the Congregational ministry in 1861 and served as an army chaplain at Alexandria, Va., in 1861–64. Thereafter he held pastorates at Westfield, Mass., in 1866–70, and at Kansas City, Mo., until 1902, when he was chosen president of Williams College. This office he held until shortly before his death.

HOPKINS, JOHN CASTELL (1864–). A Canadian editor and author. He was born of English parentage in Dyersville, Iowa, and was educated at Bowmanville, Ontario, whither his family had removed. For some years he was a banker in Toronto, then he was a member of the editorial staff of the Toronto *Daily Empire,* and later he devoted himself to political writing for reviews and magazines, on phases of Canadian progress and British imperialism, and to biographical work and the compiling and editing of works of reference. He edited *Canada: an Encyclopædia of the Country* (6 vols., 1897–1900) and in 1902 founded and became the editor of *The Canadian Annual Review of Public Affairs.* In 1914 he was elected a fellow of the Royal Geographical Society. In addition to the works already mentioned he published: *Life and Work of Sir John Thompson* (1895); *Life and Work of Mr. Gladstone* (1895); *The Story of the Dominion* (1899); *History of South Africa* (1900); *Life of King Edward VII* (1910); *French Canada and the St. Lawrence* (1913); and other works.

HOPKINS, JOHN HENRY (1792–1868). A Protestant Episcopal bishop. He was born in Dublin, Ireland, Jan. 30, 1792, came to the United States in 1801, and became an iron manufacturer in Pennsylvania. The War of 1812 having proved disastrous to the business, he studied law, and began practice in Pittsburgh, but in 1823 he entered the ministry of the Protestant Episcopal church, in response to the call of the church in which he was vestryman. In 1831 he accepted the charge of Trinity Church, Boston, and the next year was chosen Bishop of Vermont, taking also the rectorship of a church in Burlington. He took great interest in education and made heavy pecuniary sacrifices for its promotion. After 1856 he devoted his whole time to the care of the diocese. He was a prolific writer, leaving nearly 20 published works, among which are: *Christianity Vindicated* (1833); *The Primitive Creed Examined and Explained* (1834); *The Novelties which Disturb our Peace* (1844); *History of the Confessional* (1850); *The American Citizen: His Rights and Duties* (1857); *A Scriptural, Ecclesiastical, and Historical View of Slavery* (1864). He was prominent in the Lambeth Conference in London in 1867. He died at Rock Point, Vt., Jan. 9, 1868. Consult his biography by his son JOHN HENRY (New York, 1873).

HOPKINS, JOHNS (1795–1873). An American financier and philanthropist. He was born of Quaker parentage in Anne Arundel Co., Md., where he lived on a farm until he was 17, when he went to Baltimore and worked for a time in his uncle's grocery. Afterward he became a merchant, with wide connections in Maryland, Virginia, and North Carolina. His credit and counsel were highly valued in financial and mercantile affairs, and he became one of the leading financial men in Baltimore. His services to the Baltimore and Ohio Railroad were of great value. Towards the end of his life, having no children, he determined to devote his fortune to the service of the public. Accordingly he founded and endowed two great institutions which perpetuate his name—Johns Hopkins University and Johns Hopkins Hospital. Johns Hopkins Medical School, founded in 1893, is part of the university and closely allied with the hospital. The total gift for these two purposes was more than $7,000,000.

HOPKINS, LEMUEL (1750–1801). An American political poet, born in Connecticut. He practiced medicine at Litchfield and after 1784 in Hartford, where he became allied with the "Hartford Wits," Joel Barlow, John Trumbull, David Humphreys, Theodore Dwight, and others, and with them wrote *The Political Greenhouse, The Echo,* and—advocating strong Federal government—*The Anarchiad* (republished at Hartford, 1861). Hopkins also wrote *The Hypocrite's Hope* and *The Victim of a Cancer Quack.*

HOPKINS, MARK (1802–87). An American educator, grandnephew of the theologian Samuel Hopkins, and brother of the astronomer Albert Hopkins. He was born at Stockbridge, Mass., graduated at Williams College in 1824, was tutor there for two years, and, after studying medicine and practicing for a short time in New York, became professor of moral philosophy in Williams in 1830 and president of the institution in 1836. He resigned this position in 1872, but remained pastor of the college church and incumbent of the chair of moral philosophy. In 1857 he had become president of the American Board of Foreign Missions. Undoubtedly one of the greatest of American educators of his day, Hopkins did much to build up the prestige of Williams College and much more to develop the individual student. He was a powerful preacher and a successful lecturer. He pub-

lished: *The Influence of the Gospel in Liberalizing the Mind* (1831); *The Connexion between Taste and Morals* (1841); his Lowell Lectures, *The Evidences of Christianity* (3d ed., 1875); *Miscellaneous Essays and Reviews* (1847); a second series of Lowell Lectures, *Moral Science* (1862); *The Law of Love and Love as a Law* (last ed., 1881); *An Outline Study of Man* (last ed., 1893); *Strength and Beauty* (1874; in 1884 under the title *Teachings and Counsels*); *The Scriptural Idea of Man* (1883).

HOPKINS, Samuel (1721–1803). An American clergyman and founder of the Hopkinsian theology. He was born at Waterbury, Conn., Sept. 17, 1721. Having graduated at Yale College in 1741, he studied theology with Jonathan Edwards in Northampton, Mass., and from 1743 to 1769 was pastor of Housatonic, now called Great Barrington, Mass. He then removed to Newport, where he died Dec. 20, 1803. His writings consist of a life of Jonathan Edwards, sermons, addresses, a work on the millennium, and a system of theology, republished in Boston, 1852. He was remarkable for his simplicity, earnestness, and persevering industry. He held most of the Calvinistic doctrines, even in their most extreme form, but entirely rejected the doctrine of imputation, both the imputation of Adam's sin and of Christ's righteousness. The fundamental doctrine of the Hopkinsian system, based on Edwards' theory of virtue as "love to being," is that all virtue and true holiness consists in disinterested benevolence, and that all sin is selfishness. The self-love which leads a man to give his first regard even to his own eternal interests is sinful, so that one ought to be willing "to be damned for the glory of God." Consult his collected writings with memoir by E. A. Park (Boston, 1852), and Foster, *History of New England Theology* (Chicago, 1907).

HOPKINS, Stephen (1707–85). A Colonial Governor of Rhode Island and one of the signers of the Declaration of Independence. He was born in Providence, R. I., and was descended from an old English family, his great-grandfather, Thomas Hopkins, having settled in Providence about 1638. Stephen's early life was spent on a farm, and he had little opportunity to gain an education, though under the tutelage of his grandfather and uncle he learned surveying and later broadened his intellectual horizon by extensive reading. In 1732 he began his active participation in public affairs by becoming clerk of the newly constituted township of Scituate, a position which he continued to hold for 10 years. From 1732 to 1738 (excepting the year 1734) he was a representative from Scituate to the General Assembly, and upon being returned in 1741 he was chosen Speaker. He became a justice of the Court of Common Pleas in 1736 and was appointed its clerk in 1741. Six years later he was made assistant justice of the Superior Court at Newport and in 1751 Chief Justice. He was one of the Rhode Island delegates to the Albany Convention of 1754 and was a member of the committee which was appointed to draw up a "plan of union." (See Albany Convention.) In 1755 he was elected Governor of Rhode Island and was eight times reëlected, serving almost continuously until 1768, when he withdrew finally from the gubernatorial contest. Meanwhile he had acquired large shipping and commercial interests, and in 1764, in answer to the proposal of Parliament to tax the Colonies, he sent to the Assembly a forceful tract, *The Rights of Colonies Examined*, which was forthwith published in Rhode Island and reprinted in nearly every other continental English colony. After acting as chairman of several Colonial committees, he was a member of the General Assembly from 1770 to 1775. In 1772, when the commander of the *Gaspee* was by arbitrary measures invoking that hostility which expressed itself in the burning of the schooner, Hopkins, as Chief Justice of the Superior Court, held "that no commander of any vessel has a right to use any authority in the body of the Colony, without previously applying to the Governor, and showing his warrant for so doing"; and when it was proposed to send to England for trial persons charged with the burning, he declared that he would neither apprehend by his own order nor suffer any executive officers in the Colony to do so for that purpose. In 1774 Hopkins framed a bill to prohibit the importation of slaves and from 1774 to 1780 was one of Rhode Island's representatives in the Continental Congress, being one of the signers of the Declaration of Independence in 1776. He was also a member of the Rhode Island Council of War and a delegate to numerous New England conventions. He died in Providence, July 13, 1785. He wrote *A True Representation of the Plan Formed at Albany for Uniting all the British North American Colonies* (1755) and *An Historical Account of the Planting and Growth of Providence* (originally published in the Providence *Gazette* in 1762 and 1765), which, though a fragment, is of considerable value. It has been republished in the *Collections of the Massachusetts Historical Society*, vol. ix (2d series, Boston, 1822), and in the *Collections of the Rhode Island Historical Society*, vol. vii (Providence, 1885). Consult Foster, *Stephen Hopkins, a Rhode Island Statesman* (ib., 1884; forming nos. 19 and 20 of the Rhode Island Historical Tracts).

HOPKINS, William (1793–1866). An English geologist and mathematician, born at Kingston-on-Soar, Nottinghamshire. Graduating B.A. in 1827 and M.A. in 1830 from St. Peter's College, Cambridge, he early distinguished himself as a teacher of mathematics. After 1833 he devoted much time to the application of mathematics to physical geology, as in the motion of glaciers, transport of erratic blocks, and in earth movements producing faults and fissures. In 1850 he received the Wollaston medal. He served as president of the Geological Society in 1851 and of the British Association for the Advancement of Science in 1853. He published *Elements of Trigonometry* (1833) and various important papers on geology.

HOPKINS, William John (1863–). An American author. He was born at Bedford, Mass., and was educated at the Friends' Academy, at Harvard University, and at Massachusetts Institute of Technology. He early published *Telephone Lines and their Properties* (1893) and *Preparatory Physics* (1894); but he came to be known as a writer of stories. His books include: *The Sandman Series* (4 vols., 1902–08); *The Airship Dragonfly* (1906); *The Clammer* (1906); *Old Harbor* (1909); *The Meddlings of Eve* (1910); *The Indian Book* (1911); *Concerning Sally* (1912); *Burbury Stoke* (1914); *The Doers* (1914).

HOPKINSIANISM. See Hopkins, Samuel.

HOP'KINSON, Francis (1737–91). An

American politician, jurist, and miscellaneous writer, born in Philadelphia, Pa. He is best remembered for his *Battle of the Kegs* (1778), a humorous ballad based on an incident in the Revolutionary War. He was educated at the College of Philadelphia, admitted to the bar in 1761, and a few years later he spent a year in England, where his cousin was then Bishop of Worcester. Returning to Philadelphia, he practiced law, was active in learned societies, declared his republican sympathies, and, having removed to New Jersey, was made delegate to the Continental Congress (1776). He took part in drafting the Articles of Confederation and signed the Declaration of Independence. He held various offices under the Federal government, was Judge of Admiralty for Pennsylvania (1779–89), suffered an impeachment which failed, and was district judge there (1790–91). Hopkinson was a man of exceptionally varied accomplishments. He composed music for his facile songs, painted, was a dilettante in popular science, a humorist, and a political pamphleteer. His works were collected in three volumes (Philadelphia, 1792). Besides the *Battle of the Kegs*, his most popular production was a short prose allegory of the relations between the Colonies and the mother country, entitled *A Pretty Story* (1774). He was father of Joseph Hopkinson (q.v.). Consult A. R. Marble, *Heralds of American Literature* (Chicago, 1907).

HOPKINSON, JOHN (1849–98). An English physicist and electrical engineer. He was born at Manchester, England, and received his education at Owens College, Manchester, and at Trinity College, Cambridge, where he graduated with honors in 1871 and was appointed fellow and tutor. Commencing practical engineering, he soon became interested in electrical engineering and was led to many important investigations. He was made a fellow of the Royal Society of London in 1878, and in 1890 was awarded by it a royal medal for researches in electricity and magnetism. He was at the time of his death a member of the Councils of the Institutes of Civil and Mechanical Engineers and professor of electrical engineering in King's College, London. Among his most important researches are those in which he showed the effect of temperature upon the magnetic properties of various metals. He was an authority in the theory and practice of dynamo-electric machinery and discovered the method of employing the so-called "characteristic curve" in discussing such problems. This curve is obtained by taking the electromotive forces as ordinates and the current as abscissas and serves for the dynamo the same purpose as the indicative diagram in the case of the steam engine. He was the author of *Dynamic Electricity* (1884), *Original Papers in Dynamo Machinery and Allied Subjects* (1893), and many papers on various electrical and engineering subjects, which, with a memoir by his son, were collected and published in 1901. With one son and two daughters he was killed in an accident while climbing the Alps.

HOPKINSON, JOSEPH (1770–1842). An American jurist, born in Philadelphia, Pa. He graduated at the University of Pennsylvania in 1786 and in 1791 began the practice of law at Easton, Pa., but soon removed to Philadelphia, where he rose to the front rank in his profession. He was the leading counsel in the famous suit of Rush *v.* Cobbett in 1799 and defended Judge Chase in his impeachment before the Senate in 1800. From 1815 to 1819 he served as a Federalist Representative in Congress, where he distinguished himself in the debates on the tariff and the Seminole War and strongly opposed the rechartering of the United States Bank. In 1828 he was appointed by President Adams a district judge, an office which he held until his death. For several years he was president of the Philadelphia Academy of Fine Arts and vice president of the American Philosophical Society, to each of which he contributed many papers of interest. In 1837 he was a member of the Pennsylvania Constitutional Convention and served as chairman of his Judiciary Committee. His legal essays and decisions were long accepted as authoritative; but he will be longest remembered for his national song, "Hail Columbia," written in 1798, which attained immediate popularity and did much to fortify wavering patriotism.

HOP'KINSVILLE. A city and the county seat of Christian Co., Ky., 71 miles northwest of Nashville, Tenn., on the Louisville and Nashville, the Tennessee Central, and the Illinois Central railroads (Map: Kentucky, C 6). It is the seat of McLean College, Bethel Female College (Baptist), founded in 1854, and of the Western Kentucky Asylum for the Insane, and contains a Carnegie library, Odd Fellows Home, Peace and Latham parks, and a fine post office, city hall, and courthouse buildings. The city is engaged principally in tobacco manufacture and trade, but has a considerable business also in flour, wheat, corn, hay, dairy products, and live stock. Hopkinsville was settled in 1797, incorporated in 1798, and adopted the commission form of government in 1914. Pop., 1900, 7280; 1910, 9419; 1914 (U. S. est.), 10,328.

HOP'LOPHO'NEUS (Neo-Lat., from Gk. ὅπλα, *hopla*, arms + φόνιος, *phonios*, murderous). A Miocene fossil cat, found in the White River formation of Colorado, Wyoming, and the Dakotas. See SABRE-TOOTHED TIGER.

HOP LOUSE. A very destructive aphid or plant louse (*Phorodon humuli*), found commonly

WINGED MIGRANT, THIRD GENERATION.

on the hop plant and called in England hop fly. In certain years this insect causes an almost total loss of the hop crop in parts of England and New York and a number of years ago forced the abandonment of this industry in Wisconsin. About 1890 it made its first appearance in the States of Oregon and Washington and has since done great damage. The winter eggs are laid on plum trees in the neighborhood of the hopyards.

These eggs hatch in the spring at the time when the buds are about to burst, and three genera-

HOP LEAF, WITH LICE; NATURAL SIZE.

tions of wingless, parthenogenetic females are born upon the plum trees. Then a fourth gen-

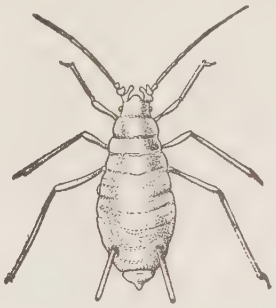
WINGED RETURN MIGRANT, OR PUPIFER.

eration, consisting of winged agamic females, makes its appearance. These females fly to the hop fields and establish themselves there, giving

WINGED MALE, AT END OF SUMMER.

birth to living young which, agamic and wingless, give birth to individuals like themselves.

The tenth or eleventh generation is winged, flies back to the plum, and gives birth to true sexual females which are wingless, but which mate with winged males which fly in from the fields. The winter egg is then laid once more upon the plum twigs. (See ALTERNATION OF GENERATIONS; APHID.) The best remedy for this injurious creature is to cut down all but one or



FOURTH GENERATION; FIRST ON THE HOP.

NORMAL PARTHENOGENETIC FEMALE; SIXTH GENERATION.

two of the plum trees near the hopyard and then to destroy in May all of the lice on the one or two remaining trees by spraying with a

SHRUNKEN FEMALE IN ACT OF DEPOSITING WINTER EGGS.

dilute kerosene-soap emulsion or a fish-oil soap wash. See HOP INSECTS.

HOP O' MY THUMB. The diminutive hero of a popular fairy tale, taken from Perrault's *Contes des fées*, the popular sources of which are the classic stories of Ulysses and Polyphemus and of Theseus and Ariadne.

HOP'PER, De Wolf (1858–). An American comedian, born in New York City. He first appeared on the stage in 1878 in *Our Boys*, and he first starred in *Castles in the Air* in 1890. Subsequently he played leading rôles in *Wang* (1891); *Panjandrum* (1893); *Dr. Syntax* (1894); *El Capitán* (1895), in which he made his first appearance in London in 1899; *The Charlatan* (1898); *Happyland; Mr. Pickwick.* After 1900 he took part in revivals of *Wang* and *Panjandrum*, appeared in the title rôle of *The Pied Piper* (1908), toured and played in New York in *A Matinee Idol* (1909–10). For several years he starred in his own company. Later he joined the Gilbert and Sullivan Opera Company, which from 1911 to 1913 was responsible for a notable revival of *Pinafore, Patience, The Mikado, The Pirates of Penzance, Iolanthe*, and Millöcker's *The Beggar Student.* Of this company, which included many "stars," Hopper was perhaps the leading figure. In such parts as those of Dick Deadeye and Ko-Ko his ability to realize the comic possibilities approached genius.

HOPPER, Isaac Tatem (1771–1852). An American philanthropist, prominent in the anti-slavery movement. He was born in Deptford Township, Gloucester Co., New Jersey, Dec. 3, 1771. At 16 years of age he was apprenticed to an uncle in Philadelphia to learn the trade of a tailor. In early manhood he became an active and leading member of the Pennsylvania Abolition Society, founded by Franklin, Rush, and others, and was also an overseer of a school for colored children, secretary of a society for the employment of the poor, inspector of a prison, guardian of abused apprentices, and a friend of the insane. He belonged to the Society of Friends, and in the division which occurred in 1827–28 he acted with those who were called Hicksites, influenced much, no doubt, by his great regard and admiration for Elias Hicks as an earnest antislavery preacher; in 1829 he went to New York to take charge of the bookstore opened by the Hicksite Friends. His activity in opposition to slavery exposed him to much abuse and even imperiled his life, but this did not in the least abate his zeal. In 1841 he gave up the charge of the bookstore and was appointed treasurer and office agent of the American Antislavery Society, and so continued until 1845, when he became the first agent of the New York Prison Association. Declining years and ill health compelled his resignation in February, 1852. He died in New York, May 7, 1852. Consult his life by L. M. Child (New York, 1881).

HOPPER, Nora (Mrs. W. H. Chesson) (1871–1906). An Irish poet of that group of Irish writers who collectively constituted the movement known as the Irish Literary Revival. (See Irish Literature, *in English.*) Her *Ballads in Prose* (1894) made an immediate impression. Her verse is characterized by the delicacy of sentiment, grace, wistfulness, and intensity which belong to the Celtic temperament. She published in addition to the book named, *Under Quicken Boughs* (1896), *Songs of the Morning* (1900), and *Father Felix's Chronicles* (1907). *Selected Poems* (1906) contains, besides her verses, an introduction by F. M. Hueffer and a biographical note by her husband, W. H. Chesson, who edits the book.

HOPPE-SEYLER, hŏp'pe-zī'lĕr, Felix (1825–95). A German physiologist and chemist, born at Freyburg-on-the-Unstrut and educated at Halle, Leipzig, Berlin, Prague, and Vienna in medicine and natural history. After five years as assistant to Virchow and director of the chemical laboratory of the Berlin Pathological Institute, he became professor of applied chemistry at Tübingen (1861) and (1872) of physiological chemistry at Strassburg. He wrote: *Handbuch der physiologisch- und pathologisch-chemischen Analyse* (7th ed., 1902); *Medizinisch-chemische Untersuchungen* (1866–71); *Physiologische Chemie* (1877–81). Consult Baumann and Kossel, *Zur Erinnerung an Felix Hoppe-Seyler* (Strassburg, 1895).

HOP'PIN, Augustus (1828–96). An American book illustrator, born in Providence, R. I. He graduated at Brown University in 1848 and was admitted to the bar, but soon gave up the law and went abroad to study art. Upon his return he devoted himself to drawing on wood and to the illustration of books, in which he was successful. His pictures in *Nothing to Wear* (1857), *Potiphar Papers* (1853), and *The Autocrat of the Breakfast Table* are widely known. He published several volumes of sketches and novels, among the latter *Recollections of Auton House* (1881) and *Married for Fun* (1885).

HOPPIN, James Mason (1820–1906). An American educator and writer. He was born at Providence, R. I.; graduated at Yale in 1840, at Harvard Law School in 1842, and at Andover Theological Seminary in 1845; studied for some time abroad; and was pastor of a Congregational church at Salem, Mass., from 1850 to 1859. From 1861 to 1879 he was professor of homiletics at Yale, where he was also professor of the history of art from 1879 to 1899, when he became professor emeritus. Among his publications are: *Old England: Its Art, Scenery, and People* (1867); *The Office and Work of the Christian Ministry* (1869); *Life of Rear-Admiral Andrew Hull Foote* (1874); *The Early Renaissance and Other Essays on Art Subjects* (1892); *Greek Art on Greek Soil* (1897); *The Reading of Shakespeare* (1904).

HOPP'NER, John (1758–1810). An English portrait painter. He was born in London, April 4, 1758. His mother was one of the German court attendants. Her husband is said to have accompanied George II to England as physician to the household and as such to have lived at St. James's. At any rate, young Hoppner was brought up there, was a choir boy in the Chapel Royal, and was given an annuity by George III in 1775 to enable him to study at the Royal Academy. It was generally believed that he was the natural son of the King. Hoppner's marriage to an American girl, Miss Phœbe Wright, in 1781, is said to have cost him the King's favor and to have been the cause of his receiving notice to "quit his apartments in Buckingham House, with the intimation that his bills would be paid up to a certain date." After losing the King's favor he apparently ranged himself definitely with the Prince of Wales on the side of the Whigs as against the Tories. In 1791 his rival Lawrence was made principal painter in ordinary to the King, and Hoppner was appointed portrait painter to the Prince of Wales in 1793 and elected member of the Royal

Academy in 1795. As a result of the Prince's patronage, many of Hoppner's finest portraits are in the state rooms of St. James's Palace, among them "The Prince," the "Duke and Duchess of York," "Lord Rodney," and "Lord Nelson." Paintings by Hoppner in the Metropolitan Museum, New York, are "Lady with the Coral Necklace" and "Mrs. Bache." (See BACHE, SARAH.) In the Morgan collection loaned to the Metropolitan Museum is one of Hoppner's finest pictures, that of the three Godsal children, engraved in mezzotint by J. Young in 1790 with the title "The Setting Sun." In the National Gallery, London, is the portrait of the beautiful Countess of Oxford, friend of Lord Byron. In the National Portrait Gallery, London, are: "Baron Colchester," "Baron Grenville," "William Pitt," "William Smith." While Hoppner was a pupil and an avowed follower of Reynolds, he had a marked personality of his own, and his portraits of women and children are distinguished for sentiment and poetical warmth. His portraits of men, with the exception of Lord Nelson and a few others, are colder and less intimate. For many years his work was neglected, but to-day the best of it stands beside that of Reynolds, Gainsborough, Romney, and Lawrence. Those of his pictures that are still in good condition show that his reputation as a brilliant colorist was deserved. Noteworthy is his use of luminous golden browns, as in the portrait of the Godsal children. While his drawing was seldom accurate, he had a knack for modeling in paint and getting a lifelike effect. But he was apt to flatter his subjects by eliminating or modifying facial blemishes, and most of his women have the romantic interest that is aroused by an appearance of gentle melancholy. Consult: J. C. Van Dyke, *Old English Masters* (New York, 1902); McKay and Roberts, *John Hoppner, R.A.* (London, 1909), an exhaustive folio volume elaborately illustrated, with catalogue raisonné; W. McKay, *Works of John Hoppner* (New York, 1914).

HOP TREE (*Ptelea trifoliata*). An American shrub of the rue family, called also shrubby trefoil, wafer ash, and wingspeed, which grows in rocky places from New York and Ontario to Minnesota and southward. It usually grows from 6 to 10 feet in height, but when well trimmed and cultivated sometimes attains a height of 30 feet or more. The leaves are trifoliate, the leaflets pointed, and downy when young; the flowers, which grow in terminal cymes, are greenish white and have a disagreeable odor. The fruit has a broad wing which resembles that of the elm and is very bitter, but does not possess the aromatic and bitter principle of the hop; nevertheless, it is said to have been used as a substitute for hops in making beer. The bark and root are of some repute in medicine. When dried, the bark has a peculiar, somewhat aromatic smell and a bitter, pungent, acrid taste. The bark contains an acrid, bitter oleoresin, starch, albumin, a yellow coloring substance, and salts of lime, potash, and iron; also the alkaloid berberine, probably the tonic principle.

HOP'WOOD, SIR FRANCIS JOHN STEPHENS (1860–). An English administrator. He was educated at Louth, was admitted a solicitor in 1882, became assistant law clerk (1885) and assistant solicitor (1888) to the Board of Trade, and, after serving a year as private secretary to the President of the Board of Trade, in 1893 was made Secretary to the Railway Department. He was British delegate to the International Railway congresses of 1895 and 1900, was sent on important missions to Canada and the United States, and served on royal commissions—on shipping rings, London traffic, canals, electoral reform, etc. In 1901–07 he was Permanent Secretary of the Board of Trade and then Undersecretary of State for the Colonies. In 1911 he was named "additional civil lord" on the Board of Admiralty, a nonpolitical appointment in an attempt to reorganize the board; and in 1912 he became Privy Councilor. He was knighted in 1901.

HOQUIAM, hō'kwĭ-*am*. A city in Chehalis Co., Wash., on Gray's harbor, 90 miles by rail southwest of Tacoma, on the Chicago, Milwaukee, and St. Paul, the Northern Pacific, and the Oregon-Washington Railroad and Navigation Company systems (Map: Washington, A 3). It is surrounded by timberlands, has a fine harbor, and is an important shipping point for lumber products, salmon, canned sea clams, and furs. The chief industrial establishments are shipyards and large lumber and shingle mills. Hoquiam has a Carnegie library and a fine high-school building. It adopted the commission form of government in 1911. Pop., 1900, 2608; 1910, 8171; 1914 (U. S. est.), 10,540.

HOR, hôr. A mountain where, according to one tradition, Aaron (q.v.) died (Num. xx. 22 ff., xxiii. 38 f.; Deut. xxxii. 50). Josephus (*Ant.*, iv, 4, 7) and Eusebius (*Onom.*, 303, 144) located this mountain at Petra, northwest of Wadi Musa, where a peak bears to-day the name of Jebel Harun (mount of Aaron). There is a structure on the top of the mountain within which is a sarcophagus covered with black cloth. One of the sides is partly exposed, and there is a Hebrew inscription in square characters on the marble slab. The tomb is not older than the Moslem possession. But the sanctuary is evidently old, and there is no reason to doubt that it was ascribed to Aaron long before the time of Josephus. Schmidt has suggested that the figure of Aaron was connected with this mountain even before David's conquest of Edom, and that another centre of his veneration was Moserah (Jebel Madhera) in the Negeb, where he also is said to have died. (See AARON.) There is no mountain by the name of Hor in the Lebanon Range. The Greek version shows that Hor in Num. xxxiv. 7 is simply caused by dittography. Consult: Schmidt, in *Hibbert Journal* (London, 1908); id., "Kadesh Barnea," in *Journal of Biblical Literature* (Boston, 1900); Musil, *Arabia Petræa, I: Edom* (Vienna, 1906); Dalman, *Petra und seine Heiligtümer* (Leipzig, 1911).

HORA, hō'rå, JUON (c.1740–85). A Ruman patriot and national hero of Transylvania, sometimes called *Nikla Urss*, Nicholas the Bear. With Juon Kloska and George Kriszán, he roused the people to rebellion against the Imperial order for general conscription (1784). The uprising spread until 30,000 men had joined. But Imperial troops were hurried in in such numbers that the revolt failed, the three leaders were captured, and Hora was killed. Hora's exploits form the theme of popular Ruman songs.

HORACE, ô'rås'. A five-act tragedy in verse, by Pierre Corneille, produced in 1640. It is founded on the old Roman legend of the Horatii and Curiatii.

HORACE, hŏr'ăs (QUINTUS HORATIUS FLACCUS) (65–8 B.C.). A Latin poet, born at Venusia, on the borders of Lucania and Apulia. His early years were thus passed amid a picturesque environment of mountain, forest, and stream, which made a deep impression upon his mind and strengthened that love of nature which so often finds expression in his verse. To the men and the women of Apulia, also, he ascribes all the characteristic Italian (Roman) virtues. Horace's father was a *coactor,* a collector of taxes or of money due for goods sold at public auctions, and by his thrift was successful not only in buying his own freedom, but also in acquiring a small estate and an income which enabled him to give to his son the best education Rome itself could offer. Thither, at an early age, Horace went with his father, who in his affection and devotion to his son's interests made himself the boy's comrade in the daily round of study and play and helped to form his son's standards of life and conduct by his own shrewd comments upon men and manners. It was naturally the *mos maiorum* rather than any abstract ideal of which the freedman pointed out the advantages, but the familiar talks had their desired effect in the rise in Horace's mind of an instinctive aversion to excess of every sort, and trained him, besides, in habits of keen observation and pointed though kindly criticism. It was then customary among young Romans of birth and means to complete their education by what may be called a university course in the schools of philosophy at Athens or in those of oratory at Rhodes, and so, between 18 and 20, Horace took up his residence at Athens, listened to the exposition of conflicting philosophical theories, and entered into the social life of his fellow students. Purely speculative problems attracted him as little as they did the average Roman, nor had he, in fact, much relish for the technicalities of any philosophical system. The paradoxes and social eccentricities of the Stoic thinkers, e.g., long made it difficult for him to do justice to the real moral elevation of their essential principles. But he had already become profoundly interested in the practical problem of how to order one's life aright, and his stay at Athens confirmed this taste for ethical inquiry. At this time, too, he must have come to know more intimately the work of Alcæus (q.v.), Sappho (q.v.), Archilochus (q.v.), and the other Greek lyric poets who were to be his models in the *Epodes* and the *Odes.*

But these peaceful and congenial pursuits were suddenly interrupted by the news of the assassination of Cæsar in March, 44, and the subsequent arrival of Brutus in Athens to secure recruits for the republican cause. Brutus, himself a lover of letters and an eager student of philosophy, was received with enthusiasm and was so much taken with Horace's promise that the latter, despite his youth and lack both of family connection and of military experience, was made a staff officer and ultimately served in the campaign of Philippi as *tribunus militum.* That decisive defeat and the suicide of his chief seem to have convinced him of the futility of further effort in the republican cause, and he made his way back to Rome, where, finding that his father's estate had been confiscated, he obtained employment as a clerk in the quæstor's office. It was the darkest period of his life, and, as the earliest of the *Epodes* show, the bitterness of his feeling found unrestrained expression in the verses which, in his own words, poverty drove him to write. But he was so fortunate as to win the regard of Vergil and Varius, who, two or three years after his return to Italy, introduced him to Mæcenas. Nine months after the first interview Mæcenas again sent for the young writer and bestowed upon him the friendship that saved Horace for poetry.

But it was in metrical prose rather than imaginative poetry, as he himself viewed his work, that Horace first tried to gain an audience. Early training and the mood of the moment combined to make the choice of satire almost inevitable. Lucilius (q.v.), a member of the Scipionic circle, had for the first time in Latin literature used the old *mélange* form of Ennius (q.v.) as a vehicle for witty and often stinging criticism of the political and the social life of his time. The range of topics was naturally exceedingly wide, the treatment often dramatic and cast in the dialogue form, the metres varied, though in the end the hexameter decidedly predominated. The new *satura* (see SATIRE) was marked by at least one original and noteworthy feature. This was the establishment of a personal and intimate relation between Lucilius and his reader, so that the frankest revelation of the poet's inmost feelings seemed yet free from egotism and consistent with self-respect. It was thus natural that Horace should be strongly attracted by Lucilius, though, with a mind already much occupied with the niceties of phrase and cadence, he could not but feel that, despite all its vigor and charm, the work of the older poet was sadly lacking in artistic finish. To write in the manner of Lucilius, but with a more perfect art, was the end Horace proposed to himself and achieved in the *Satires* (*Sermones,* "*causeries,*" as he calls them), of which the first volume, containing 10 pieces, appeared about 35 B.C. The second, containing eight pieces, published about 29 B.C., is far superior in execution to the first and shows Horace at his best in this kind of writing. In reading this volume we are listening to an accomplished man of the world, intimately acquainted with human nature, whose whims and weaknesses he probes with delightful humor. He is exceedingly fond of the weapon of irony, which he uses against himself quite as often as against others, and every page reflects his sunny nature, genuinely tolerant and charitable. These "talks," however light in their touch, have yet a definite and serious purpose. It is the art of living that is ever under discussion, and, as he studied others, so also Horace studied most minutely the nature best known to him (his own), so that one of the special charms of the *Satires* is the presence of this constant self-analysis. Of egotism in the sense of vanity or selfishness Horace was of all men the most devoid; but he was nevertheless a watchful and ever interested observer of the motions of his own mind. He saw himself as he saw everything else (to borrow the words of Mr. Andrew Lang), with the lucidity of genius, and loved to put himself on terms of confidence with his readers.

One notices already in the *Satires* an attitude of mind that became characteristic and was later both to limit his range and to widen his appeal as a lyric poet. He takes counsel of his head rather than of his heart and distrusts enthusiasm, especially about ideas, as if warmth of feeling, not held carefully in check by reason,

rendered impossible that equipoise through which alone one may hope to see things as they really are. This is true of even his friendships, where he is tenderness and loyalty itself. But this studied moderation of thought and utterance is the fruit of experience and self-discipline. His earliest attempts in lyric verse show all the ardent temper of youth and are marked by an exuberance of phrase in striking contrast with the wonderful compression of his later work. In these *iambi*, as he called them, published about 30 B.C., Archilochus (q.v.) is his model, though not more than half of the 17 poems that Horace deemed worthy of preservation show the personal animosity associated with the name of the Greek poet. With one exception, the seventeenth, they are written in couplets, the second verse of which forms a refrain (*epodus*, *ἐπῳδός*) to the first, and thus they came in time to be known as *Epodes*. (See EPODE.) Immature as they are as a whole, and interesting chiefly as the first lyric essays of the Horace of the *Odes*, three certainly reveal poetical power of no mean order—the idyllic second, with its sudden turn to satire at the close, the fifth, with its extraordinary picture of the sorceress Canidia, and the sixteenth, with its passionate appeal to his countrymen to forego civil strife.

Shortly after the appearance of the first book of the *Satires*, Mæcenas presented Horace with a small farm among the Sabine hills, in the valley through which the cool Digentia flows south to join the Anio near the market town of Varia, the modern Vico-Varo. Perhaps no gift ever exercised a more important influence upon a man's career. It was not merely that he was thus enabled to devote himself wholly to his art without thought of pecuniary return. The farm was his *arx*, his sure retreat from the fatigues and distractions of the great world. The peace of nature, loved since the days of Venusia, entered into and possessed his soul, and the pure air—it was about 2000 feet above the sea—renewed his physical strength, of which, as the years passed, he had to take increasing care. He has immortalized the farm and, indeed, the whole valley in his affectionate praise. One may doubt whether he could have been happy without active participation in the brilliant life of the capital, but much of what is truest and best in the inspiration of the *Odes* and the *Epistles* is due to the many quiet days spent with his books *in Sabinis*. Excavations made in 1912–13 have settled, Italian archæologists claim, the site of this Sabine farm. The results of these excavations have not yet, however, been officially and fully set forth to the world; for partial accounts, subject to correction later by the official publication, consult Haight, *The Classical Weekly*, vii, 85–86 (New York, 1914).

The 88 lyrics that are comprised in the first three books of the *Odes* were undoubtedly privately circulated among his friends previous to their final collection and publication in one little volume in the year 23. Their composition extended over about seven years, for the earliest that can be dated with certainty (i, 37) was written upon the receipt at Rome of the news of Cleopatra's suicide, and few, if any, could have preceded this. They were the outcome of long and loving study of the great Greek lyric poets, especially Alcæus and Sappho, of the early Greek classical period rather than of the Alexandrian age. But, while their form is similar to that of the Greek lyric poets, their content is vitally different in its effect, and it is difficult to define precisely the nature of that unfailing charm which almost from the moment of their appearance they have been universally felt to possess. Shelley, in his *Defence of Poetry*, following a famous passage in Plato's *Phædrus*, and Sidney, in his *Apologie for Poetry*, both maintained that "poets are so beloved of the gods that whatsoever they write proceeds of a divine fury." But nothing could be more alien to Horace's temper than this. He has neither the passion of Burns or Catullus in the expression of feeling, nor the absorbed and ecstatic earnestness of Lucretius in urging the claims of the true philosophy of life, nor yet the imaginative and mystical power of Vergil. Gray, however, a poet whose method of composition resembled Horace's in its critical deliberateness—in the second poem of the fourth book of *Odes* Horace compares himself to a bee that with infinite labor gathers its sweets from many a flower—says in one of his letters: "Extreme conciseness of expression, yet pure, perspicuous, and musical, is one of the grand beauties of lyric poetry." The three adjectives here used are peculiarly appropriate to Horace's work; indeed, no other lyric poet in Latin literature has so exquisite a verbal technique. The *Odes* abound in phrases of such perfect finish that no change save for the worse seems possible, phrases which have been the common property of educated men for centuries: *Persicos odi, puer, apparatus; carpe diem; dulce et decorum est pro patria mori; vixere fortes ante Agamemnona; matre pulchra filia pulchrior; nil desperandum; splendide mendax; dulce est desipere in loco; post equitem sedet atra cura*—to give a complete list would be almost to quote the *Odes* entire. Yet it is all a *curiosa felicitas verborum*, as Petronius (q.v.) aptly described it; the effects are carefully and minutely wrought out by a mind trained in the nicest apprehension of the color values of words and an ear attuned to all the subtleties of cadence. And no artist was ever more alive to the delicate shades of meaning that words gain from their context. Partly, no doubt, from the difficulties inherent in the use of foreign metres, but more especially because of his own liking for moderation and simplicity, the vocabulary which he has chosen to employ is notably limited. Yet the oft-recurring words produce so different an effect in their ever-changing settings that one does not notice the repetition. The themes themselves are even more limited in their range than the vocabulary, but upon the few that he selects he plays variations of surpassing beauty. There is nothing transcendental, nothing of what Poe held to be the essence of poetry, "no mere appreciation of the beauty before us, but a wild effort to reach the beauty above." The *Odes* are rather the expression of idealized common sense, and just for this reason Horace has been in all ages the favorite poet of minds the most diverse, for none makes a surer appeal to the finer sensibilities of humanity in its everyday moods. In a word, he speaks to the world of subjects which the world fully understands, in words and forms of surpassing beauty.

In the *envoi* to the first three books of the *Odes* (iii, 30), Horace expresses his entire confidence in their abiding fame, and with this achievement his lyrical impulse seems to have satisfied itself. A new series of "talks" engaged his attention, cast, however, in a different literary form, that of the letter. These *Epistles*, of

which the first book appeared towards the end of 20, or, at the latest, in 19, do not differ much from the *Satires* in the subjects discussed. Conduct is more than ever "three-fourths of life." But the years of reading and reflection have brought truer insight and greater breadth of view. He is still a searcher after the philosophy of life (his mind was far too independent to accept any creed formulated by others), but he urges with tactful insistence the elementary principles of whose truth he has become convinced. The humor is kindlier and more subtle; in fact, one is often in doubt whether he is speaking in jest or earnest, so that he has the inexhaustible charm of one whose secret is never wholly surprised. He is no idealist; it is rather the doctrine of the mean, the *aurea mediocritas*, that he so winningly inculcates. Not even virtue itself is to be sought beyond the bounds of reason, as indeed Aristotle had claimed long before him. Both the language and the metre of the *Epistles* show the effects of the seven years devoted to lyric composition. There is the same wealth of terse and happy phrase, and the hexameter, which even in the *Satires* was an immense advance upon the rhythm of Lucilius, is always smooth and often musical.

The death of Vergil in 19 left Horace by general consent the greatest living poet; and it was as such that in 17 Augustus commissioned him to write the hymn for the religious festival of the Secular Games (q.v.). The result to modern ears may seem rather stiff and unimaginative in spite of the technical excellence of the verse, but to the great Roman audience—we must remember that the *Carmen Sæculare* (q.v.) was chanted in the open air—there must have been something peculiarly impressive in the linking of the old liturgical formulas with the new faith in the city's Imperial destiny. Two years later, at the personal request of the Emperor, he composed two odes in celebration of the victories of Drusus (see DRUSUS, 3) and Tiberius (q.v.), the stepsons of Augustus, over the Rhæti and Vindelici, and, about the same time, two others in praise of the beneficent results for Italy of Augustus' reign. But Horace, though he had long been a sincere supporter of the new régime, was ill fitted for work of this kind, and these poems, especially the first two, show the laboriousness that not infrequently attaches to the official odes of a poet laureate. To give them permanence, he added 11 fugitive pieces (one of which, however, the seventh, on spring, is a perfect gem), and published this fourth book of the *Odes* in 13.

According to Suetonius, the charming bit of literary criticism which opens the second book of the *Epistles* was written to meet a complaint of Augustus that to him alone Horace had dedicated nothing. It is in substance an attempt to show that no true parallel could be drawn between the development of poetry in Greece and that at Rome, and that the work of the modern school, of which he regarded Vergil, Varius, and himself as the best representatives, marked the highest level yet reached of artistic achievement. (On the struggle between the new and the old in Latin literature, consult Knapp, "Archaism in Aulus Gellius," in *Classical Studies in Honor of Henry Drisler*, 135 ff., New York, 1894.) In the second of the two epistles of this book he sets forth at length with characteristic irony and indirection the reasons why henceforth lyric poetry must give place to the "rhythms and harmonies of real life." The latest of his letters and the one which is most nearly a formal essay is that addressed to the Pisos. It is generally known as the *Art of Poetry* (*Liber de Arte Poetica*), though this title seems not to have been given to it by Horace himself, and is, indeed, scarcely appropriate, for only one branch, the drama, receives any systematic treatment. The discussion has all the sanity and breadth of judgment that mark the moral epistles, and is in effect another defense of the poetic ideals of the Augustan school.

Of the details of the closing years of his life we have no record. The death of Mæcenas, who in his last words commended his lifelong friend to Augustus, was a severe shock. Horace, who had once (*Carmina*, ii, 17) prayed that they might not be separated in death, did not long survive him, dying on the 27th of November, 8 B.C. He was buried on the Esquiline, close to the tomb of Mæcenas.

Mr. Mackail (*Latin Literature*, 118–119) has admirably summed up the significance of Horace's work: "Among the many amazing achievements of the Greek genius in the field of human thought were a lyrical poetry of unexampled beauty, a refined critical faculty, and, later than the great thinkers and outside of the strict schools, a temperate philosophy such as we see afterward in the beautiful personality of Plutarch. In all these three Horace interpreted Greece to the world, while adding that peculiarly Roman urbanity—the spirit at once of the grown man as distinguished from children, of the man of the world, and of the gentleman—which up till now has been a dominant ideal over the thought and life of Europe."

Bibliography. The *editio princeps* was published at Venice in 1470. The most important editions before Bentley were those of Lambinus (last ed., Coblenz, 1829), Cruquius (Antwerp, 1578), and Heinsius (Leyden, 1612). Richard Bentley's edition, first published at Cambridge in 1711 (3d ed., Berlin, 1869), made a new era in Horatian criticism. The best critical edition of the text is that of Keller and Holder (2 vols., Leipzig, 1864–70). Keller issued a second edition of the first volume (*Odes, Epodes*, and *Carmen Sæculare*) in 1899 and also a supplementary volume of text discussion, *Epilegomena zu Horaz* (Leipzig, 1879–80). The best general editions are those of Orelli revised by Hirschfelder and Mewes (4th ed., 2 vols., Berlin, 1886–92, with Latin notes and complete word index); Kiessling (2d ed., 3 vols., ib., 1890–97; vol. i, the *Odes*, in 5th ed., 1908; vol. ii, the *Satires*, in 4th ed., 1910); Müller, *Odes and Epodes* (Leipzig, 1900), *Satires and Epistles* (1891–93); Wickham, *Odes and Epodes* (3d ed., Oxford, 1896), *Satires and Epistles* (1891); Schütz (Berlin, 1880–83; vol. i, containing *Odes and Epodes*, 3d ed., 1889). The *Odes* have been edited separately by Nauck (13th ed., Leipzig, 1889), Page (4th ed., London, 1890), Smith (Boston, 1895, 1903), Shorey (ib., 1898, 1910), Bennett (ib., 1901), Moore (New York, 1902); the *Satires* by Krüger (14th ed., Leipzig, 1897), Palmer (4th ed., London, 1891), Rolfe (Boston, 1901), Morris (New York, 1909); the *Epistles* by Wilkins (3d ed., London, 1889), Morris (New York, 1911). Porphyrion's *Scholia* have been edited by Holder (Innsbruck, 1894); those of the Pseudo-Acron by O. Keller (2 vols., Leipzig, 1902–04).

The translations of Horace are all inferior to the original. Among the best are those of Francis, entire (London, 1778); Lord Ravensworth, *Odes* (ib., 1858); Martin, entire (Edinburgh, 1888, with an interesting memoir and good illustrative notes); Conington, *Odes and Epodes* (3d ed., London, 1865); Lord Lytton, *Odes and Epodes* (ib., 1869); *Satires and Epistles* (1892); Sargent, *Odes* (Boston, 1893); De Vere, *Selected Odes and Epodes* (London, 1893); Gladstone, *Odes* (New York, 1894); Bennett (London, 1914). A sumptuous edition of the *Odes and Epodes* is that of the Bibliophile Society (6 vols., Boston, 1901–02), with introduction, life, and Latin text, translated and annotated by "eminent scholars, statesmen, and poets." Pope's *Satires and Epistles of Horace Imitated* is very brilliant (best ed. by Pattison). Conington translated also the *Satires* and *Epistles* (London, 1869; frequently reprinted). Interesting is C. W. F. Cooper, *Horace's Odes Englished and Imitated by Various Hands* (ib., 1880).

The most valuable literary treatment of Horace is Sellar's *Horace and the Elegiac Poets* (Oxford, 1892). Good also are Plüss, *Horazstudien* (Leipzig, 1882), and Boissier's *The Country of Horace and Vergil* (trans. from the French, London, 1896). There are good chapters on Horace in Patin, *Etudes sur la poésie latine* (3d ed., Paris, 1883); Nettleship, *Lectures and Essays* (1st series, Oxford, 1885); Tyrrell, *Latin Poetry* (Boston, 1895); Mackail, *Latin Literature* (New York, 1900); Duff, *A Literary History of Rome* (London, 1909). For further bibliographical material, consult Teuffel, *Geschichte der römischen Literatur*, vol. ii (6th ed., Leipzig, 1910), and Schanz, *Geschichte der römischen Litteratur* (3d ed., Munich, 1911). Consult also A. C. E. Allinson, *Roads from Rome*, 72–106 (New York, 1913).

HO'RÆ (Lat., hours; from Gk. Ὧραι, *Hōrai*, seasons). In ancient Greece, goddesses of the seasons of the year, at first with special reference to the farmer. At Athens they seem to have been originally two, Thallo and Carpo, the goddesses of the blossoming and of the ripening fruit. In general they were at first three, Eunomia, Dike, Eirene (Good Order, Justice, Peace), whose names show that the ethical side of their nature, as guardians of the due order and peaceful succession of natural processes, has become prominent. In the legend they are daughters of Zeus and Themis, guardians of the gates of Olympus, attendants upon the gods. They bring flowers and fruits to mortals and are closely connected with the Charites (q.v.) or Graces. In the Hellenistic time the Horæ become more closely connected with the seasons, and now the number is increased to four, to each of whom are given attributes appropriate to a special season. These four Horæ, however, rarely appear in literature until the late epic of Quintus Smyrnæus and Nonnus. The fiction of 12 Horæ for the hours of the day is also very late and cannot be found in art with any certainty. Consult: Rapp, in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886 et seq.); Preller-Robert, *Griechische Mythologie*, vol. i (Berlin, 1894); Jolles, in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913). See Hours, Book of.

HOR'APOL'LO, or **HOR'APOL'LON** (Lat., from Gk. Ὡραπόλλων, *Horapollōn*). An Egyptian who wrote on Greek grammar, probably in the fourth century A.D. He lived in Alexandria and at Constantinople and wrote commentaries on the Greek poets Sophocles, Alcæus, and Homer. Another Horapollo lived at the close of the next century. It is uncertain whether we should ascribe to the former or to the latter the extant work on hieroglyphics, in two books, professedly a Greek translation of the work in Egyptian of one Horapollo, or possibly Horus, which has some value to the Egyptologist. There are editions of the work on hieroglyphics by Leemans (Amsterdam, 1835), and by A. T. Cary, with English translation and notes (London, 1840).

HORATII, hō-rā'shĭ-ī. According to Roman legend three Roman brothers, born at one birth, cousins to the Curiatii, of Alba Longa, also three brothers born at one time. Their mothers were twins who had been married on the same day and gave birth to their sons at the same time. During the Roman wars, when Cluilius, the Alban King, and Tullus Hostilius, the Roman King, were in conflict, it was decided to leave the issue to a personal combat between these brothers. Two of the Horatii were soon slain, and the third brother, feigning flight, was pursued by the Curiatii, all wounded, whom he slew one by one. The sister of the Horatii was betrothed to one of the Curiatii and had made for him a beautiful mantle. As the victor entered the gate of Rome bearing his spoils, he was met by his sister, who, upon recognizing the cloak in her brother's hands, broke out in lamentations. Enraged that she should prefer her lover to her country, her brother slew her on the spot, and her body remained unburied until passers-by covered it with stones. Horatius was condemned to be scourged to death, but was afterward pardoned. The story is given by Livy (i, 24–26); behind the pure myth lies the fact of the close union in early times between Rome and Alba Longa and the later subjection of Alba Longa.

The famous Horatius (Cocles), who, with Titus Herminius and Spurius Lartius, in 507 B.C., so gallantly defended the Sublician bridge against the army of Lars Porsena (q.v.), King of Clusium, while their companions broke down the bridge behind them, was a worthy descendant of the survivor of the three Horatii. Consult Pais, *Ancient Legends of Roman History* (Eng. trans., Chicago, 1906).

HORATIUS COCLES, hō-rā'shĭ-ŭs kō'klēz. See Cocles, Horatius; Horatii.

HÖRDE, hēr'de. A town of the Prussian Province of Westphalia, situated on the Emsche, 2 miles by rail from Dortmund (Map: Germany, B 3). In the vicinity are productive iron and coal mines, and the town has important iron and steel works, foundries and coke ovens, employing over 8000 men. Pop., 1900, 25,126; 1910, 32,791.

HORDEIN, hôr'dē-ĭn (from Lat. *hordeum*, barley). A substance that can be extracted from barley. It is a mixture of starch, cellulose, and a little nitrogenous matter.

HORDE'OLUM. See Stye.

HOR'DEUM. See Barley.

HOREB, hō'rĕb. See Sinai.

HORE'HOUND (AS. *hārhūne*, from *hār*, hoar + *hūne*, hoarhound), *Marrubium*. A genus of plants of the mint family. The species are mostly herbaceous perennials, natives of the south of Europe and the East. One species, the

common or white horehound (*Marrubium vulgare*), is found generally throughout Europe, except in the more northern regions, and in the United States, growing in waste places, waysides, etc. It is about 1 to 1½ feet high, bushy, with roundish, ovate, crenate, wrinkled leaves and whorls of white flowers. The whole plant has a whitish appearance, from the down with which its leaves are covered. It has an aromatic but not very agreeable smell. It is tonic, stimulant, and laxative, and is popularly and efficaciously used for coughs, as an infusion as a sirup with sugar, or as a candy. In England the name "horehound" is applied also to another plant, *Ballota nigra*, sometimes called black or fetid horehound, also of the family Labiatæ, and of a genus very closely allied to *Marrubium*. It closely resembles the white horehound in taste and possesses similar medical properties. A third British plant, *Lycopus europæus*, a plant of the same family, is sometimes called water horehound and is also known as gypsywort. All these species have been introduced in the United States, and, in addition, six or eight species of *Lycopus*, or water horehound, are rather abundant.

HOREHOUND.

HORGEN, hôr'gen. A town in Switzerland, on Lake Zurich, 10 miles southeast of Zurich (Map: Switzerland, C 1). Surrounded by vineyards and fruit orchards, it is a thriving industrial centre, with manufactures of cotton and silk goods and chemicals. Pop., 1900, 6914; 1910, 8006.

HOR'ICON. The Indian name of Lake George, N. Y.

HO'RITES. An ancient people who dwelt in and around Mount Seir before the Edomites came there (Deut. ii. 12, 22). Biblical tradition preserves a recollection that the Horites formed a group of seven tribes (Gen. xxxvi. 20–30). They are said to have been smitten by Chedorlaomer and the kings of the East when they attacked Sodom in the days of Abraham (Gen. xiv. 6). They seem to have been absorbed by the Edomites, among whom several Horite clans continued to exist. The name is probably identical with the *Haru* of the Egyptian inscriptions. If so, it appears that the Horites also occupied territory in the West Jordan country, as the name seems to apply to the whole of southern Syria. Folk etymology explained it as "cave dwellers"; but this is doubtful, as is also the attempted identification with the *Harri* or Aryans, found among the Mitannians. Consult Ed. Meyer, *Die Israeliten und ihre Nachbarstämme* (Halle, 1906), and Böhl, *Kanaanäer und Hebräer* (Leipzig, 1911). See EDOM.

HORI'ZON (Lat. *horizon*, from Gk. *ὁρίζων*, pres. p. of *ὁρίζειν*, *horizein*, to bound, from *ὅρος*, *horos*, boundary). 1. In popular language, the circular line formed by the apparent meeting of earth and sky. Astronomers call this the *sensible horizon*, distinguishing it from the *rational horizon*, i.e., the circle formed by a plane passing through the centre of the earth, perpendicular to the plumb line, and produced to meet the heavens. 2. A term in geology, referring to a bed or beds which are characterized by some special forms of fossils found in them.

HORLA, ôr'lȧ', LE. A story dealing with madness, by Guy de Maupassant (1887), who himself became insane in 1892.

HORMAYR, hôr'mīr, JOSEPH, BARON (1782–1848). An Austrian historian, born at Innsbruck. He studied law at the University of Innsbruck and afterward entered the Ministry of Foreign Affairs at Vienna. In collaboration with Archduke John he published a number of pamphlets against Napoleon, and in 1809, as intendant in the army commanded by John, he incited the popular uprisings in the Tirol, Vorarlberg, and Salzburg. After the truce of Znaim he returned to Vienna and devoted himself to historical work until his unauthorized attempt to stir up another revolt among the Tyrolese led to his being arrested at Metternich's command. On his release the Emperor made him court historiographer, but his imprisonment had so embittered him against Metternich that in 1828 he accepted the position of Councilor in the Bavarian Ministry of Foreign Affairs. Four years afterward he was sent to Hanover to represent the Bavarian government and in 1837 was transferred to Bremen. In 1846 he was given charge of the government archives at Munich. His intimate connection with public men and events during one of the most interesting periods of European history gives a peculiar value to his writings, many of which deal with subjects of which he had a first-hand knowledge. His publications include: *Allgemeine Geschichte der neuesten Zeit, vom Tode Friedrichs des Grossen bis zum zweiten Pariser Frieden* (1817–19; 2d ed., 1831); the much criticized but highly entertaining *Lebensbilder aus dem Befreiungskriege* (1841–44); and *Das Land Tirol und der Tirolerkrieg von 1809* (1845).

HORMIZD, hôr'mīst, or **ORMAZD.** The name of several kings of Persia. See SASSANIDÆ.

HOR'MOGO'NIA (Neo-Lat. nom. pl., from Gk. *ὅρμος*, *hormos*, chain + *γόνιμος*, *gonimos*, productive, from *γόνος*, *gonos*, seed). A term applied to the fragments into which the filamentous colonies of certain blue-green algæ separate, each of which produces a new colony. See CYANOPHYCEÆ.

HORMONES, hôr'mōnz (Gk. *ὁρμάω*, *hormaō*, I excite). A name applied by Sterling and Baylies to certain secretions which are supposed to act as "chemical messengers" between glands having an internal secretion (e.g., the pituitary body, thyroid gland, and suprarenal capsules) and to harmonize their activities. Schäfer holds that the term should be restricted to those principles which promote glandular activity, applying the term "chalone" (from Gk. *χαλάω*, *chalaō*, I relax) to the principles which check activity. Consult Biedl, *Internal Secretory Organs* (New York, 1913).

HOR'MOS (Gk. *ὅρμος*, *hormos*, chain). A Greek dance in honor of Diana and supposed to have been instituted by Lycurgus. The dancers, both men and women, were entirely nude and wound through the public streets, a young couple leading. The rhythmic steps were now towards

the east and now towards the west, and the dance is therefore believed by some to have had astronomical significance. The figures were chaste and beautiful, and the nudity of the women was defended by Plutarch, who said he wished to have them become the equals of men in all respects and "learn to despise the opinion of the vulgar." The name was also applied to an ancient Scottish dance.

HOR'MUZ. See ORMUZ.

HORN (AS., Icel., OHG. *horn*, Ger. *Horn*, Goth. *haúrn*, Runic *horna*, horn; connected with Ir., Welsh *corn*, Galatian *κάρνον*, *karnon*, Lat. *cornu*, horn, and ultimately with Gk. *κέρας*, *keras*, Skt. *śṛnga*, horn, as well as with Lat. *cervus*, AS. *heorot*, Eng. *hart*). (1) A modification of the cuticle observable in man and most other vertebrated animals; and (2) a special adaptation of this substance to form appendages of the head in certain mammals. The word has many other applications, more or less remote from this, in zoölogy as elsewhere. Thus, the chitinous material of the harder parts of insects is frequently termed horn, whereas the tortoise shell, which is truly of this nature, is rarely so designated. The projections from the prothorax of stag and other beetles, the feelers or ovipositors of other insects, the eye stalks of snails, frontal feathers (plumicorns) of owls, the projecting front teeth of the narwhal, etc., are frequently called horns, though all are different in both substance and function from the true horns to which this article is restricted.

Nature and Service of Horn. Horn is the connective tissue of the epidermis hardened and thickened and in some cases mixed with or composed of agglutinated hairs. Its purpose is to form a resisting or protective surface or a tough tool or weapon. The whole, or principal part, of the epidermis may become of this nature, as is the case in the hide of armadillos and the scaly anteaters, ancient and modern, in serpents and lizards (whose scales are horny), and in the turtles which supply tortoise shell (q.v.). In the higher ranks it constitutes the whalebone developed from the palate of the baleen-bearing whales; becomes the protective sheath of the mandibles forming the serviceable beaks of birds and turtles; and, by more or less completely insheathing and extending the outermost bone of each digit, forms nails, claws, and hoofs (see NAIL), strengthening and arming the fingers and toes of such reptiles as have feet, of all birds, and of all the mammals except whales. Horn enters also into spurs on the legs and other parts of certain animals, forms one or more shields or weapons, or both, on the head; and callosities elsewhere, such as on the heel of man (and the corns on his toes), the knees of camels, etc., as use and habit call for a hardening of the cuticle to resist wear and relieve pressure. Further particulars as to these structures will be found in the articles BIRD, *The Beak;* CORN; INTEGUMENT; NAIL (nails, claws, hoofs, spurs, etc.); SKELETON; SNAKE (scales, rattle, etc.); TORTOISE SHELL; TURTLE; and under HORNS. The chemical composition of the various horny tissues is exhibited in the table accompanying this article.

These tissues differ slightly in the quantity of inorganic matter which they contain, but the difference does not vary much beyond 1 per cent. Hair yields from 0.54 to 1.85 per cent of ash, containing, among other ingredients, peroxide of iron and a little silica. In feathers the quantity of silica is very considerable, and it is doubtless to this constituent that the shaft in a great measure owes its strength and hardness.

Horny Tissue appears as a variety of tumor upon different regions of the human skin, but especially upon the face and occasionally in dermoid cysts. These manifestations are considered as warts, of which the epidermal cells are intimately united in the same manner as in the nails; and they are classed with warts, corns, and some nævi, under the term "corneous papillomata." The tendency to horny excrescences on the skin is rare and belongs to advanced age. There is a disease of the skin called hystricismus, which is a peculiar variety of papillary hypertrophy, with hornifying of the epidermis of such a nature that it resembles short porcupine quills. Horny excrescences occasionally break and fall off spontaneously; but they grow again if not cured radically by the excision of the portion of skin upon which they are located.

Economic Uses of Horn. The horns of animals enter largely into the manufacture of many useful and ornamental articles and are employed for useful and ornamental purposes. The principal horns employed are those of the ox, sheep, and goat. These are quite different in structure from the antlers of various deer, which are really bone and resemble ivory in structure. More like true horns are hoofs, claws, nails, and quills. Horns have but 2 or 3 per cent of earthy matter, while bones have over 50 per cent. Horn can be softened and split into thin layers or laminæ or pressed into molds. As it recovers its peculiar character of flexibility, toughness, and transparency when cold, it is particularly adapted for a great variety of purposes. It can also be dyed various colors. A solution of gold in aqua regia dyes it red; a solution of nitrate of silver in nitric acid, black; a paste of red lead, made with a solution of potash, colors it brown; so that with a proper arrangement and application of these materials, the most admirable imitations of the much more costly tortoise shell can be produced, which, indeed, it resembles in structure. The more common vegetable dyestuffs, as logwood, brazilwood, barwood, saffron, indigo, etc., will also color horn, but neither so permanently nor so brightly as the metallic materials.

By long-continued soaking, the horns of all the animals above mentioned can be softened, and those of the sheep and goat can easily be split into several layers after they have been soaked and boiled. These layers can not only be flattened out by putting them between smooth iron plates heated and placed in a press, but can be welded together firmly by pressing their edges together between polished copper plates and then plunging them for some time into boiling water and then into cold water. This property enables the horn worker to use up the smallest cuttings with profit. Another valuable property of horn is that when heated it can be pressed into a die and not only takes a beautiful sharp impression, but if left in the die until cold it retains it. In this way it is employed in making handles for umbrellas, knives, forks, and a variety of other articles. Combs are made out of the flattened sheets, and beautiful carvings were made out of the solid parts of buffalo horns. Ox horns, too, are sometimes of fine quality and color and are fashioned into drinking cups and other articles, often highly orna-

mental. Before the horn is softened for manufacture the solid tip is usually sawed off, to be treated separately. This is usually sawed into blanks to be used for buttons and other purposes. These blanks are heated, pared, heated

CONSTITUENTS	Hair	Horse's hoof	Cow's horn	Nails	Epidermis	Whalebone	Tortoise shell
Carbon	50.65	51.41	51.03	51.09	50.28	51.86	54.89
Hydrogen	6.36	6.96	6.30	6.82	6.76	6.87	6.56
Nitrogen	17.14	17.46	16.24	16.90	17.21	15.70	16.77
Oxygen	20.85	19.94	22.51	22.39	25.01	21.97	19.56
Sulphur	5.00	4.23	3.42	2.80	.74	3.60	2.22

again in water, and pressed between dies, after which they are buffed and polished.

HORN. A musical instrument, belonging to the family of brass wind instruments and distinguished by a cupped mouthpiece, a flaring bell, and a narrow, conical tube which is between 9 and 18 feet long and is twisted back on itself. The natural or French horn (q.v.), although having an exceedingly tender, sonorous tone, was a very imperfect instrument and is now entirely superseded by the valve horns. The horn is built in almost any key; there are horns in A, B♭, C, D, E♭, E, F, G. Its range is from C to c^3. As the horns (except the one in C) are transposing instruments, lower tones than C can be obtained by using different horns. For instance, on the low B♭ horn the note C sounds B♭, on the E♭ horn E♭, etc. The music for horns is always written in the G clef, except the very low tones. Strange to say, the tones written in the bass clef are always written an octave *lower* than the actual sound. In the smallest orchestra there are always two horns. The ordinary symphony orchestra has four, and Wagner employs as many as eight. When four horns are used, the first and third are written on the same staff in the score, and the second and fourth together on another staff. What kind of horns are employed depends upon the tonality of the composition and also to some extent upon the modulation within the tonality. Thus, a composer writing in C major might employ two horns in C and two in F or two in C and two in G. Some modern masters use the F horns for all keys. A peculiarity in writing music for horns is that no key signatures are used. All music is written in C, and every chromatic alteration is specially marked. Muted tones can also be produced upon the valve horns. They have a peculiarly ominous sound and are sometimes employed in dramatic works to express situations of fear, horror, mystery, etc. In view of the expressiveness of the instrument and the beautiful and varied effects obtainable it is somewhat surprising that composers have practically neglected it as a solo instrument. Schumann wrote a quadruple concerto for four horns with orchestra, op. 86, and R. Strauss a horn concerto, op. 11. Beethoven and Brahms employed it with splendid effect in their chamber music. Consult V. Mahillon, *Le cor* (Brussels, 1907), and J. Blaikley, *The French Horn* (London, 1909).

HORN, hōrn, ARVID BERNHARD, COUNT (1664–1742). A Swedish statesman, born at Vuorentaka, Finland. After seeing service on the Continent for several years, he joined the Swedish army and was rapidly promoted to be general of brigade (1700). He assisted in the deposition of King Augustus of Poland (1704), and under Stanislaus Leszczynski, his successor, he remained as Ambassador. In 1705 he was made counselor to the King. In 1710 he became Prime Minister and favored the calling of the estates. After the death of Charles XII he persuaded the latter's sister, Ulrica Elinore, to submit to an election before she could ascend the throne and later imposed on her the constitution of 1719. The years when he was marshal of the Kingdom were spoken of afterward as the "time of Arvid Horn," so successful had the country been under his leadership. He retired from active life in 1738. Consult Svedelius, *Arvid Bernard Horn* (Stockholm, 1879).

HORN, CAPE. See CAPE HORN.

HORN, GUSTAF, COUNT (1592–1657). A Swedish general, born at Orbyhus. He studied at the universities of Rostock, Jena, and Tübingen, entered the army in 1612, and served in the Russo-Swedish War (1612–14). In 1630 he commanded half the army of Gustavus Adolphus in the advance of that monarch upon Frankfort-on-the-Oder. He directed the Swedish left in the battle of Breitenfeld, in 1631, and participated in the defeat of Tilly's army on the Lech. In 1634 he was completely defeated, together with his ally, Bernhard of Weimar, at Nördlingen and made a prisoner by the Imperialists. He was not released until 1642. He later distinguished himself in the war against Denmark. Consult *Seine Briefe*, edited by Sondén (Stockholm, 1897).

HORN, PAUL (1863–1908). A German specialist in modern Persian philology, born at Halle. His education was at the university in that city, where he devoted himself chiefly to Oriental and linguistic studies and received the degree of Ph.D. in 1885. In 1889 he became privatdocent and in 1900 professor at the University of Strassburg. He wrote: *Die Nominalflexion im Avesta und den altpersischen Keilinschriften* (1885); *Sassanidische Siegelsteine* (1891); *Die Denkwürdigkeiten Schah Tahmāsp's* (1891); *Grundriss der neupersischen Etymologie* (1893); *Neupersische Schriftsprache* (1898); *Die deutsche Soldatensprache* (1899); *Geschichte Irans in islamitischer Zeit* (1900); *Geschichte der persischen Litteratur* (1901); *Geschichte der türkischen Moderne* (1902); *Die persischen Gedichte des türkischen Sultans Selim* (1904); "Die türkische Literatur," in *Die Orientalische Literaturen* (1906).

HORN, HOORNE, HOORN, or **HORNES,** ôrn, PHILIP DE MONTMORENCY-NEVELE, COUNT OF (c.1518–68). A Flemish statesman and soldier, born at Nevele. Trained to arms under Charles V, he distinguished himself in the war against the Schmalkaldic League and later accompanied Philip II on his travels in Germany, Italy, Spain, and England. At the battle of Saint-Quentin (1557) Horn did brilliant service as commander of the artillery. Later he accompanied Philip to Spain, but in 1561 returned to Brussels, as Councilor of State. In this capacity he sided with Egmont and the Prince of Orange

in opposition to Cardinal Granvella and the Spanish party. He urged on Margaret of Parma to a policy of concession, and, having been sent to Tournay to reëstablish order there, he showed a spirit of toleration which won for him the regard of the patriotic party, but increased the animosity of the Ultramontanes. The failure of Egmont (q.v.) and Horn to throw in their lot with the Spanish party was, however, fatal. When the Duke of Alva arrived, the two noblemen were treacherously seized and, after an illegal trial before the Council of Blood, were executed in the great square of Brussels, June 5, 1568. Besides the contemporary chronicles, consult: Juste, *Le comte d'Egmont et le comte de Hornes* (Brussels, 1863); the popular account by Schiller, "The Trial and Execution of Counts Egmont and Horn," in his *Works*, vol. iv (Philadelphia, 1883); *Cambridge Modern History*, vol. iii (New York, 1905); also the histories by Motley and others, cited under NETHERLANDS.

HORN, VAN DE, or VAN (1635–83). A Dutch buccaneer. After studying seamanship on board of merchant vessels, at the age of 24 he bought one of his own and set up as a pirate. Next he became a sailor of fortune, serving whichever European power would pay him most highly, and it was chiefly France that engaged him to wage war upon Spanish ships by fair means or foul, generally the latter. He was with De Graff in the despoiling of Vera Cruz (1683), but fought a duel with him over the division of plunder and died from the results of the wound that he received.

HORN'ADAY, WILLIAM TEMPLE (1854–). An American zoölogist, born at Plainfield, Ind., and educated at the Iowa State Agricultural College and in Europe. In 1875–79 he was collecting naturalist for Ward's Natural Science Establishment, Rochester, N. Y., and he served as chief taxidermist of the United States National Museum in 1882–90 and as superintendent of the National Zoölogical Park in 1889–90. After some years in the real-estate business at Buffalo, N. Y., he was appointed director of the New York Zoölogical Park in 1896. He became president of the Wild Life Protective Association and was president of the American Bison Society in 1907–10; through his efforts, especially in the direction of legislation, much was done to protect wild birds, game, seals, bison, and wild life in general. Besides numerous magazine articles, he is author of *Two Years in the Jungle* (1885; 7th ed., 1901); *Free Rum on the Congo* (1887); *The Extermination of the American Bison* (1887); *Taxidermy and Zoölogical Collecting* (1891); *The Man-who Became a Savage* (1896); *Guide to the New York Zoölogical Park* (1899); *The American Natural History* (1904; rev. ed., 4 vols., 1914); *Camp-Fires in the Canadian Rockies* (1906); *Camp-Fires on Desert and Lava* (1908); *Our Vanishing Wild Life* (1913); *Wild Life Conservation in Theory and Practice* (1914).

HOR'NAU, BARON VON. See GERBERT, MARTIN.

HORN'BEAM' (*horn* + *beam*, AS. *beam*, OHG. *boum*, Ger. *Baum*, tree; connected ultimately with Gk. *φύειν*, *phyein*, to grow, Skt. *bhū*, to become), *Carpinus*. A genus of the family Betulaceæ, which consists of trees with compact, tough, hard wood, almost smooth whitish-gray bark, deciduous leaves, and monœcious flowers. The common hornbeam, or white beech, of Europe (*Carpinus betulus*), very frequent in moderately moist, shady woods of many parts of Europe, is a beautiful tree which attains a height of 60 to 100 feet. It has ovate, acuminate, almost triply serrate leaves, and the small nutlike fruit is subtended by large, deeply three-partite bracts. The wood, which is much used by carpenters and wheelwrights, is white, very hard, uncommonly strong and tough, and therefore suitable for bearing heavy strains. It takes a very fine polish and, when well stained, might readily be mistaken for ebony. In the earth, or where exposed to the changes of the weather, it is not very durable. It burns readily and is one of the best kinds of firewood; it affords an excellent charcoal, and the ashes yield much potash. The young stems, by reason of the dense growth of their twigs, are very suitable for forming live fences and bowers; and as it bears clipping well, the hornbeam was often employed to form live walls, formerly fashionable. The genus is represented in North America by *Carpinus caroliniana*, a small tree 25 to 40 feet high, which occurs from Quebec to Florida and west to Minnesota and Texas. Its wood is very hard, dense, and heavy, and is one of the toughest woods of the Northern States. It is known as hornbeam, blue beech, water beech, and ironwood. The hop hornbeam (*Ostrya virginiana*) is of much the same habit, range, and properties. It is of slow growth and is seldom planted, although a very ornamental tree. This tree is also known as ironwood and leverwood.

HORN'BILL'. The name of an African and East Indian family of large birds, forming the family Bucerotidæ and remarkable for the enormous size of the bill and for a large bony protuberance (epithema, or casque) with which it is usually surmounted. The bill is curved, broad at the base, compressed towards the tip, the bony protuberance on the upper mandible assuming different forms in different species. Two subfamilies are sometimes recognized—the Bucorvinæ and the Bucerotinæ. The former are African, have the casque hollow, and are of terrestrial habits. They are described under GROUND HORNBILL. The latter contain the "true" or typical hornbills, of which there are many genera and species scattered over northwestern Africa, India, and the Oriental region. All are rather large birds, the biggest 5 feet in length from the tip of the beak to the end of the tail, have long full tails and strong feet, fitted for arboreal habits. Their colors are mainly black and white; the great bills are yellow, often strongly marked with red and black. They are omnivorous and in captivity show an ostrich-like voracity, swallowing anything offered, bones and all. The food is always caught in the tip of the bill, then tossed into the air and recaught. In nature they feed largely upon flowers and fruit, cut from their fastenings by the saw-edged beak. Their flight is slow and heavy, but it may be long sustained. The bird is very noisy, the sound of the wings of a large hornbill being audible for a mile, and when two or three are flying together the noise is said to resemble that made by a steam engine.

Breeding Habits. Some, if not all, of the species have the remarkable habit of imprisoning the female during incubation. This is done by stopping up the entrance to the nest, which is in a hollow tree, with mud or excrement. There seems to be some doubt whether it is done

HORNBILLS AND TOUCANS

1. FLAT-CASQUED HORNBILL (Hydrocorax planicornis); male.
2. RHINOCEROS HORNBILL (Buceros rhinoceros).
3. ARIEL TOUCAN (Rhamphastos ariel).
4. MEXICAN TOUCAN (Rhamphastos carinatus).
5. CRESTED TRUMPETER HORNBILL (Bycanistes cristatus).
6. PAPUAN WREATHED HORNBILL (Phyllodoceros plicatus); mal-

from the outside by the male, using mud, or from the inside by the female, using her own excrement. Perhaps the method differs in different species. In any case a small opening is left through which the female can extend her bill and secure the food which the male brings. Such nests are an excellent protection against enemies and are said to be used repeatedly. The young are born naked.

This remarkable method of nidification is connected with a strange feature of bird economy first noticed and studied by Bartlett, who shows (*Proceedings Zoölogical Society of London*, 1869) that hornbills at intervals cast the epithelial layer of their gizzards—a layer formed by the secretions of certain glands. This is ejected entire in the form of a bag, the mouth of which is closely folded, and which is filled with the fruit the bird has been eating. Whether these castings form a nutritious and partly digested supply of food for the sitting female is not known. Consult Newton, *Dictionary of Birds*, London, 1896.

Species. The bird ordinarily presented as *the* hornbill, *Buceros rhinoceros*, from the East Indies, is shown on the accompanying plate. It was known and quaintly described, from preserved heads alone, by Pliny and the naturalists of the Middle Ages. A closely allied species (*Buceros sylvestris*) is a native of Java. Another style of casque, the flat table, is shown in Fig. 1 of the plate (*Hydrocorax planicornis*, of the Philippines), which illustrates almost equally well the "homurai" of India (*Dichoceros bicornis*), whose plate casque is bent into a trough and terminates in two horns in front. This familiar species is found eastward to Sumatra, where also, among other kinds, lives that solid-casqued one (*Rhinoplax vigil*) out of whose "helmet" ivory-like ornaments are carved. This seems to be a remarkable species in several ways. Another curious form of beak is that of the Papuan *Rhytidoceros plicatus*, in which the top of the bill has numerous curving transverse folds. Prominent among African genera are the trumpeter hornbills, one species of which is the "crested" (*Bycanistes cristatus*). Here the beak is comparatively short. In some genera the bill approaches the shape of a toucan's and has little or no casque. Consult history of the family, with colored plates, by D. G. Elliot, entitled *Monograph of the Bucerotidæ* (London, 1882). An excellent popular account is given in the *Royal Natural History* (ib., 1895) and in Knowlton, *Birds of the World* (New York, 1909). See Plate of HORNBILLS AND TOUCANS.

HORNBILL CUCKOO. A channelbill (q.v.).

HORN'BLENDE' (*horn* + *blende*, Ger. *Blende*, from *blenden*, to blind). A greenish-black or black variety of amphibole that crystallizes in the monoclinic system and is a ferrous magnesium-calcium-aluminium silicate. It is found both in crystals and granular masses. Hornblende is a common constituent of various igneous rocks, such as granite, syenite, diorite, and those of more basic composition. Hornblende schist and hornblende slate are varieties of rocks that contain hornblende with more or less feldspar, quartz, or mica. The black crystallized varieties of hornblende are sometimes called *schorl* and may be cut into ornaments. The term "hornblende" was formerly used to designate the entire group of the amphiboles, and the term is still used by petrographers in a somewhat broad sense to include a great number of the rock-forming amphiboles.

HORN'BLENDITE. An igneous rock of granitic texture very largely composed of hornblende. Hornblendite occurs in the so-called Cortland series of eruptives in the Highlands of the Hudson River, near Peekskill, N. Y.

HORN'BLOW, ARTHUR (1865–). An American playwright, born in Manchester, England. Educated in England and in France, in 1889 he came to the United States, where he was connected with various newspapers until 1900. He then became editor of the *Theatre Magazine*. He translated certain writings of Marcel Prévost and of Gabriele d'Annunzio; novelized several of Charles Klein's plays, including *The Lion and the Mouse* (1906), *The Third Degree* (1909), *John Marsh's Millions* (1910), *The Gamblers* (1911), *The Money-Makers* (1914); collaborated on various plays; and is sole author of *The End of the Game* (1907), *The Profligate* (1908), *By Right of Conquest* (1909), *The Mask* (1913), *The Price* (1914).

HORN'BLOW'ER, or HORNWORM. A local name in the southern United States for the tobacco worm (*Phlegethontius carolina*). See TOBACCO WORM.

HORN'BOOK'. The primer for learning the elements of reading, used in England before the days of printing, and common down to the time of George II. It consisted of a single leaf, containing on one side the alphabet large and small, in black letter or in Roman, often followed by a number of monosyllables. Then came a form of exorcism and the Lord's Prayer and the Roman numerals. The leaf was usually set in a frame of wood, with a slice of transparent horn in front; hence the name. There was a handle usually with a hole for a string, whereby the apparatus was slung to the girdle of the scholar. Sometimes the leaf was simply pasted against a slice of horn. At first the leaf was of vellum, with the characters in writing; later, of paper and printed. The hornbook was prefaced and ornamented with figures of the cross and hence came to be often called christ-cross-row, or crisscross-row. Common as hornbooks at one time were, copies of them are now exceedingly rare. Consult G. W. Tuer, *History of the Hornbook*, with illustrations and facsimiles (London, 1897).

HORN'BOSTEL, HENRY (1867–). An American architect. Born in Brooklyn, N. Y., he graduated from the School of Architecture of Columbia University in 1891 and studied four years at the Ecole des Beaux-Arts, Paris. As a member of the architectural firm of Palmer and Hornbostel, he was collaborative architect notably of the Manhattan and Queensborough bridges in New York City, of the Carnegie Technical Schools, of the University of Pittsburgh, and the Memorial Building at Pittsburgh, Pa., and of the State Education Building at Albany, N. Y. He served as an assistant in architecture (1897–1900) and as lecturer (1900–03) at Columbia, and later he became professor of architecture in the Carnegie Technical Schools.

HORN'BY, SIR GEOFFREY THOMAS PHIPPS (1825–95). An English admiral, son of Admiral Sir Phipps Hornby (1785–1867), born at Winwick, Lancashire. He entered the navy when he was 12, was present at the bombardment of Acre, served in 1844–46 under Wyvil, who was at that time engaged on the east coast of Africa in suppressing the slave trade, and

was flag lieutenant to his father in the Pacific from 1846 to 1850. He was promoted to the rank of captain in 1852. Six years later he was appointed to the *Tribune*, then at Hongkong, but immediately afterward was ordered to Vancouver Island, where the right to the island of San Juan was in dispute between Great Britain and the United States. Subsequently he saw almost continuous service in European waters. He was promoted to flag rank in 1869, became vice admiral and Lord of the Admiralty in 1875, and two years later was put in command of operations in the Mediterranean. In February, 1878, he "proceeded to Constantinople," in spite of the protests of the Turkish government, and prepared to meet any attack on the city by Russia. He was made an admiral (1879), president of the Royal Naval College (1881–82), and admiral of the fleet (1888). Consult the life by his daughter, Mrs. Edgerton (London, 1896).

HORNBY, James John (1826–1909). An English educator, born at Winwick. He was educated at Eton and at Balliol College, Oxford, after his graduation being elected fellow of Brasenose. From 1853 to 1864 he served as principal of Bishop Cosin's Hall at the University of Durham. He then returned to Oxford for a short time as classical lecturer, in 1867 became second master of Winchester School, from 1868 to 1884 was head master of Eton, and thereafter until his death was provost.

HORNE, C. Silvester (1865–1914). An English Congregational clergyman, born at Cuckfield, Sussex. He was educated at Glasgow University and studied theology at Mansfield College, Oxford. In 1889–1903 he was minister of Kensington Chapel and then of Whitefield's Church, Tottenham Court Road, until January, 1914, when his health began to fail. In the spring of 1914 he delivered the Lyman Beecher lectures on preaching (*The Romance of Preaching*) at Yale University, and he died near Toronto. In 1910–11 he had been chairman of the Congregational Union, and from 1910 on he was a member of the House of Commons (the only member who was a clergyman with a charge) from Ipswich, being an "impenitent Radical," a supporter of woman suffrage, and a home-ruler. He wrote on the history of the Free churches and of the London Missionary Society, and in 1914 published *Pulpit, Platform, and Parliament* and *The Romance of Preaching.*

HORNE, George (1730–92). An English bishop, born at Otham. He was educated at Oxford and spent the greater part of his life there, being elected president of Magdalen College in 1768 and in 1776 vice chancellor of the university. He was made dean of Canterbury in 1781 and in 1790 Bishop of Norwich. From 1771 to 1781 he was chaplain in ordinary to the King. His only important work, *A Commentary on the Psalms* (1771), exhibits a deep acquaintance with Hebrew and biblical lore and is marked by a spirit of earnest piety. He wrote many pamphlets against such antagonists as Sir Isaac Newton, Hume, Adam Smith, and David Law, all of whom he ludicrously underrated. He adopted the views of John Hutchinson (q.v.) and wrote in his defense.

HORNE, Richard Henry, or Hengist (1803–84). An English author. He was born in London, received a military education, and served as a midshipman in the Mexican navy during the war of that country with Spain. After a few years spent in adventurous wanderings he returned to England and from 1828 devoted himself to literature. In 1837 he published two tragedies, *Cosmo de Medici* and *The Death of Marlowe;* in 1843, *Orion: An Epic Poem.* During the period 1839–46 he carried on a correspondence with Elizabeth Barrett (afterward Mrs. Browning), and her letters to him were afterward published in two volumes in 1877. With her he collaborated in the *New Spirit of the Age* (1844). A report prepared by him on the employment of children in mines and factories inspired Mrs. Browning's *Cry of the Children.* Going to Australia in 1852, he served as a gold-fields commissioner and a magistrate and published *Australian Facts and Figures* (1859). Returning in 1869, he wrote thereafter a number of books, few of which were of any special note.

HORNE, Thomas Hartwell (1780–1862). An English Bible scholar. He was born in London, Oct. 20, 1780, was educated at Christ's Hospital, and became clerk to a barrister. His leisure hours were devoted to study and to miscellaneous literary labors. In 1818 he published his *Introduction to the Critical Study and Knowledge of the Holy Scriptures* (12th ed., 1869), a work which procured for him admission into orders without the usual preliminaries. This book was long a standard work, but is now antiquated. In it he presented the results of 17 years of hard work. In 1824 he became senior assistant librarian in the department of printed books in the British Museum. In 1831 he became a prebendary of St. Paul's Cathedral; in 1833 rector of the united parishes of St. Edward the King and Martyr and St. Nicolas Acons, London. He resigned his assistant librarianship in 1860. He died in London, Jan. 27, 1862. Consult his life by his daughter, Mrs. S. A. Cheyne (London, 1862).

HORNED DACE. A fish. See Dace.

HORNED FROG. One of the large toadlike South American frogs of the genus *Ceratophrys*, especially *Ceratophrys cornuta*, which has hornlike protuberances on the head. It is one of the most beautiful frogs known. The ground colors are black, brown, and green, with an orange stripe over the head and back; and these colors are irregularly and most pleasingly arranged and blended. Various other gaudy and interesting species are known in the American tropics. See Colored Plate of Frogs and Toads, under Toad.

HORNED GREBE. See Grebe.

HORNED HOG. See Babirussa.

HORNED LARK. See Shore Lark.

HORNED OWL. Any owl with plumicorns, i.e., tufts of upright feathers on the top of the head which simulate horns. The eagle owls (q.v.) are thus distinguished, and their American representative is commonly called the great horned owl. Other horned species are mentioned and illustrated under Owl. See Plate of Owls, Representative.

HORNED PHEASANT. A sportsman's name in India for the tragopans (q.v.), especially the black-headed species (*Tragopan satyra*), common in the eastern Himalayas. The name is given because of the presence of two fleshy horns on the head which become very conspicuous at the breeding season.

HORNED POUT. See Bullhead; Catfish.

HORNED RATTLESNAKE, or Sidewinder. See Rattlesnake.

HORNED SCREAMER. A bird. See SCREAMER.

HORNED TOAD, or HORNED LIZARD. The common name of several short-legged, depressed, toadlike horny lizards, all of which occur in North America. According to Cope and others, there are two genera, *Phrynosoma* and *Anota*, containing about 20 species, 10 of which occur in the United States. *Anota* differs from *Phrynosoma* only in the fact that the tympanic drum is concealed by a scaly integument. Horned toads range from British America into Mexico. They feed mainly on insects, which they capture with a rapid thrusting out of their mucilaginous tongues. They are sluggish, harmless lizards, with little power of self-defense save their pointed scales, which, when bristled up, are a disagreeable mouthful for snakes, their most formidable foes. They will, however, fight and even kill a snake small enough to be an even match.

Horned toads at rare intervals exhibit a most interesting habit of self-defense, the ejection of jets of blood from the corner of the eye. Ditmars gives some details of such an occurrence which took place when a specimen from Mexico was being measured. This handling seemed greatly to excite the creature, which "finally threw the head slightly upward, the neck became rigid, the eyes bulged from the sockets, when there was a distinct sound like that produced if one presses the tongue against the roof of the mouth and forces a small quantity of air forward. This rasping sound, consuming but the fraction of a second, was accompanied by a jet of blood at great pressure. It hit the wall, 4 feet away, at the same level as that of the reptile. The duration of the flow of blood appeared to be about one and a half seconds, and towards its termination the force gradually diminished, as noted by a course of drops down the wall and along the floor to a position almost under the spot where the reptile had been held. The stream of blood seemed to be as fine as a horsehair and to issue from the eyelid, which was momentarily much swollen. For some time after the performance the eyes were tightly closed, and nothing could induce the lizard to open them. Within two minutes after it was placed on the ground the protruding aspect of the eyeballs and the swelling of the eyelids had disappeared. Most surprising was the amount of blood expended. The wall and floor showed a course of thickly sprinkled spots about one-eighth of an inch in diameter. There were 103 of these spots."

The majority of the species are desert inhabitants and escape pursuit by hiding beneath the prickly agaves, yuccas, and cacti of the plains. Other species live in cedar and pine belts. Both those forms that live on the bare stones or sand of the plains and those that occur in the pine belt are remarkably well protected by resemblance to their background. The young, a dozen or more at a time, are born from eggs, which are laid by the mother only an hour or so before they are ready to hatch. When the little ones emerge, they are able to begin at once to catch and eat minute insects. Both young and old make interesting pets, largely because of their amusing irascibility, and can be taught to take flies from the hand and do other simple things. Consult Bryant, "The Horned Lizards of California," in *University of California Publications*, ix (Berkeley, 1911). See LIZARD; and Plate of IGUANA AND OTHER AMERICAN LIZARDS.

HORNED VIPER. See VIPER.

HORNEL, hôr'nĕl, EDWARD ATKINSON (1864–). A Scottish painter of landscapes, flowers, and foliage, with children. He was born in Australia, of Scottish parents, and he was brought up and lived practically all his life in Scotland, at Kirkcudbright. He studied for three years in the art school at Edinburgh, and for two years at Antwerp under Professor Verlat. Returning from Antwerp in 1885, he met George Henry (q.v.) and associated himself with the Glasgow school. Hornel and Henry collaborated upon "The Druids," a procession of priests bringing in the sacred mistletoe, gorgeous with polychrome and gold. The two worked side by side to achieve decorative splendor of color, Hornel boldly and freely employing texture effects produced by loading and scraping, roughening, smoothing, and staining. In 1893–94 the two artists spent a year and a half in Japan, where Hornel learned much about decorative design and spacing. Towards the close of the nineties his colors, while preserving their glow and richness, became more refined and more atmospheric, and his drawing more naturalistic, combining sensuous appeal with emotional and poetic significance. In 1901 he declined election to the Royal Scottish Academy. There are examples of his work in the museums of Buffalo, N. Y., St. Louis, Toronto, Montreal, Glasgow, Edinburgh, Leeds, Manchester, Hull, Bath, and Liverpool.

HORNELL'. A city in Steuben Co., N. Y., on the Canistea River, 93 miles southeast of Buffalo, on the Erie, and the Pittsburgh, Shawmut, and Northern railroads (Map: New York, C 6). It has a free academy, a public library, hospital, courthouse, sanitarium, and public parks, and manufactures brick, silks, white goods, railway supplies, furniture, beer, electrical machinery, sash, doors, and blinds. The government is administered under a revised charter of 1906, which provides for a mayor in whose power, subject to the consent of the council, rest the appointments to subordinate offices, and a unicameral council. The water works are owned by the city. Settled in 1790, Hornell was part of Canisteo and was called Upper Canisteo until 1820, when it was incorporated as a separate town under the name of Hornellsville, given in honor of Judge George Hornell, who was prominent in the town's early history. Pop., 1910, 13,617; 1914 (U. S. est.), 14,341; 1920, 15,025.

HOR'NER, FRANCIS (1778–1817). A British statesman and economist, born in Edinburgh. He entered Edinburgh University in 1792, but left (1795) before finishing his course to take up the study of law, and was called to the Scottish bar in 1800. Later, in 1807, after a course at Lincoln's Inn, London, and a telling application to the study of philosophy and economy, he began practice in the western circuit of England. Entering Parliament for Wendover in 1806, he sided with the Whigs, gaining special prominence in the debates on questions of finance and political economy. Horner was much interested in the "bullion" question which arose in 1810 and was chairman of the committee which drew up the first report on the subject. The recommendations embodied therein failed of adoption, but, as a result of his influence, restrictions were placed upon the issue of paper money, thus paving the way for the

success of Peel's Currency Reform Bill in 1841. Horner was one of the three original founders of the *Edinburgh Review*, to which he was a frequent contributor. He died at Pisa, where he had gone to regain health, after a short but brilliant career. Consult Horner, *Memoirs and Correspondence of Francis Horner* (Boston, 1853).

HORNER, Leonard (1785–1864). A Scottish geologist and publicist, born in Edinburgh and educated at the university of that city. He joined his father's linen business in 1804 and moved to London, but his chief interest was in science. In 1808 he became a fellow of the Geological Society, of which he was president in 1846 and in 1860, and in 1853 he was elected a fellow of the Royal Society. He returned to Edinburgh in 1817 and there founded the School of Arts in 1821 and helped to organize the Edinburgh Academy. During this period he took a very active part in the educational and political reform movements of Scotland. He was a warden of London University from 1828 to 1831, lived for a time in Bonn, Germany, and from 1833 to 1853 rendered notable service as chief factory inspector. He was author of many papers on geology, education, and the employment of children.

HORNER, Ralph Cecil (1854–). A Canadian religious leader. He was born in the township of Clarendon, Pontiac Co., Quebec, and was educated at the National School of Elocution and Oratory, Philadelphia. Ordained a Methodist minister in 1887, he filled several pastorates, specially emphasizing the evangelistic side of his work during the latter part of his career in the Methodist church. Disapproval of his attitude in this respect led to his suspension in 1895. As a result, he became the founder of a denomination called the Holiness Movement Church, which has duly constituted conferences in Ontario, Manitoba, and Michigan, and supports missionaries in China and Africa. He established also, in 1895, the Holiness Movement College at Ottawa. He published several tracts and religious books.

HORNER, William Edmonds (1793–1853). An American physician, born in Warrenton, Va. He graduated at the University of Pennsylvania in 1814, served as assistant surgeon in the United States Navy during the War of 1812, and from 1831 until his death was professor of anatomy in the University of Pennsylvania. In 1847 he founded St. Joseph's Hospital. In 1824 he announced the discovery of the muscle (tensor tarsi) known as Horner's muscle. He published a number of medical works, including *Pathological Anatomy*, *Practical Anatomist* (1856), *Special Anatomy and Histology* (8th ed., 1851), *The United States Dissector* (5th ed., 1856); and superintended the preparation of an *Anatomical Atlas* by Henry H. Smith (1844).

HORNER, William George (1786–1837). An English algebraist. He was educated at Kingswood School, near Bristol, and afterward became master there. He also established a school at Bath (1809), where he remained until his death. He had no university training and was not a profound mathematician. He is known solely for his discovery of the ingenious algorism for approximating the roots of higher numerical equations, which was made known in a paper read before the Royal Society in 1819 and published in the *Philosophical Transactions*. The process is commonly known in England and America as *Horner's method* and may be found in any higher algebra. Related to it is a process of synthetic division which also bears his name. While this process of approximating the roots of a numerical equation was unknown in Europe at the time of Horner's discovery, it was known to the Chinese algebraists in the thirteenth century. It is given by Ch'in Chiu-shao in 1247 and was used by several later writers in China and Japan.

HORNES, ôrn, Philip, Count of. See Horn.

HOR'NET (AS. *hyrnet*, *hurnitu*, OHG. *hornuz*, *hornaz*, Ger. *Horniss;* connected with Lat. *crabro*, OChurch Slav. *srŭsheni*, Lith. *szirszone*, hornet, OChurch Slav. *srŭsha*, Lith. *szirszŭ*, wasp; less plausibly connected with *horn*, either from its antennæ or from its buzzing sound). A name applied to several large stinging insects belonging to the family Vespidæ and genus *Vespa*. They differ from *Polistes*, the other common genus of this family, in having larger, thicker bodies and always inclosing their nests with a grayish paper covering. In color they are usually black or dark brown, conspicuously ornamented with white or yellow. The hornet builds its nest, which is in the form of a number of combs placed one above another, in a hole in the ground, or in the open, attached to the branches of a tree, or under the eaves of buildings. Its manner of constructing the nest and caring for the young is the same as that described elsewhere under the title Wasp. It is among the most voracious of insects, eagerly laps up all sorts of sweets, and seizes and devours other insects of various kinds. One of the most common species in the United States is *Vespa maculata*, which builds its great nest in the branches of trees. It is very vigilant, and especially irritable when attending to the duties of its nest. The females may often be found hibernating in the autumn and winter in decaying wood.

The European hornet (*Vespa crabro*) has been accidentally introduced into the United States and has established itself in the vicinity of New York City. Its spread has been very slow, and although its original introduction and establishment must have taken place many years ago, it is still apparently restricted to an area of little over 100 miles square. See Wasp, and consult the authorities there referred to.

HORNE-TOOKE, John. See Tooke.

HORN FLY.

The adult horn fly; and a cow's horn about the base of which is clustered a swarm of the flies.

HORN FLY. A European fly (*Hæmatobia serrata*), which was imported into the United

States in 1886 or 1887, multiplied with excessive rapidity, and soon spread over the entire country. It breeds in cow dung and with very great rapidity and prolificacy. It is a biting fly and greatly annoys cattle. The name "horn fly" is derived from a habit which the flies have of clustering in great numbers so as to form black bands around the bases of the horns of cattle. They do not damage the horns, as has been supposed, but simply rest in this location, where they cannot easily be reached by the cow. Consult: Osborn, *Insects Affecting Domestic Animals* (Department of Agriculture, Washington, 1896); Lintner, "The Cow-Horn Fly," in *The Country Gentleman* (London, 1897); Parrot, "Horn-Fly Remedy," in the *Kansas Farmer* (Topeka, 1899).

HORNIMAN, hôr'nĭ-măn, Annie Elizabeth Fredericka (1860–). An English dramatic manager. She was born in Forest Hill, Kent, and was privately educated and studied art at the Slade School, London. In 1894 she attempted her first dramatic experiment at the Avenue Theatre. In 1904 she provided the Irish National Theatre Society with a theatre—the Abbey Theatre, Dublin—at her own expense, and subsidized it for a term of years. In 1908 she bought the Gaiety Theatre of Manchester and made of it a repertory house, the first (as it was the first endowed theatre) in England. Her company was very successful, appearing in London at the Coronet Theatre in 1912–13 and giving there Stanley Houghton's *Hindle Wakes* and *The Younger Generation* and Galsworthy's *The Mob*.

HORN'ING, Letters of. In Scots law, a writ which issues to compel a party to execute or carry out a judgment or decree of the court. The writ was formerly the only form of enforcing civil decrees by imprisonment. The process has been shortened, and other forms of execution are now more commonly employed. The title of the writ is derived from the ancient custom of denouncing a person disobeying the writ with three blasts of a horn. This was technically called "putting him to the horn."

HORNITOS, ôr-nē'tōs, or **HORNOS**, ôr'nōs (Sp., little ovens). The name given to the low oven-shaped hillocks which emit smoke and vapors, and which occur in great numbers on the sides and in the neighborhood of the large volcanoes of South America.

HORN'PIPE'. See Black Gum.

HORNPIPE. A lively English dance, originally in $\frac{3}{2}$, later in $\frac{4}{4}$ time. The universal peculiarity of the music was the length of the final note in each phrase. Its history can be traced back to the sixteenth century in England and to about 1740 in Scotland. During the eighteenth century it was widely popular, but since then it has been distinctively a sailor's dance. Chaucer speaks of the hornpipe as a musical instrument, but little is known about it. The general belief is that it was a rude instrument made from the horn of an ox. Consult H. Balfour, *The Old British Pibcorn or Hornpipe* (London, 1890), and F. Galpin, *Old English Instruments of Music* (Chicago, 1911).

HORNS. Under this term are commonly confused two very distinct structures forming outgrowths on the head of ungulate animals, to which order they are confined. The word ought not, strictly, to include the bony antlers of deer or the giraffe, since these, although to a certain extent epidermal outgrowths, consist of true bone built up from blood deposits and are not at all transformed cuticle or "horn." Nevertheless, as Beddard points out (in *Mammalia*, London, 1902), the difference is one of degree rather than of kind. The simplest condition is seen in the giraffe, each of whose paired horns is a straight, bony outgrowth, the os cornu, originally separate from the skull, but becoming permanently fused with it early in life, and is covered with wholly unmodified furry skin. In deer there is the same os cornu, which may here be branched and never becomes fused with the skull, but, on the contrary, is shed and renewed annually and is covered with a skin modified into "velvet" (see Deer) which decays and drops off as soon as the horn core (antler) is perfected. Between these two falls possibly the extinct *Sivatherium* (q.v.), and certainly the modern pronghorn (q.v.). Here the bony core (os cornu) is fixed as in the giraffe, but begins to be branched as in the deer; and it is covered by a sheath formed of agglutinated hairs, the hairy skin beginning from the tip of the horn and proceeding downward, gradually transforming into perfect horn, which is shed and renewed annually. This is an isolated case, but connects the giraffe and deer with the Bovidæ, or proper "hollow-horned" ruminants (Cavicornia). In this family the males of every species, and in most cases the females also, possess upon the top of the skull protuberances of bone into which air cells often extend from the frontal sinuses. These are called horn cores and form the support of the cornubus sheaths that cover and often extend far beyond them. They are not present at birth, for obvious reasons, but begin to grow immediately afterward. The horn sheaths grow with them and continue, even after they have reached normal size, to push out at the base as fast as they wear away at the tip. Their form and position on the head is characteristic of each group: round and lateral in the oxen; slender, retrocurved, or twisted, and somewhat compressed or sharply keeled in most antelopes; heavy, cross-ridged, triangular in section, and often spiral in the sheep and goats, and so on.

Evolutionists regard horns as in most cases a secondary sexual character. An examination of the fossil history of the tribe shows that these appendages have been gradually acquired, and it is only recently that the females of many forms, now provided with small horns, have acquired them by heredity. Moreover, castration or injury to the reproductive organs is likely to affect the growth and size of the horns. Lastly, among the deer, where the does (except in the reindeer) are hornless, these appendages are acquired just previous to the mating season and are dropped when the breeding season is over. Their service as weapons of defense and offense is therefore largely, if not primarily, in contests with each other for the supremacy of the herd—i.e., in the combative process of sexual selection. They are, nevertheless, in many instances powerful weapons in resisting and attacking outside enemies. The spearlike thrusts of the lowered horns of an enraged sable, or other large, long-horned antelope, are feared even by lions and leopards, which more than once have been killed by them. The goring power of a bull is irresistible. A heavy sheep, armed with its great horn coils, is a "battering ram," indeed, not to be despised. Many horns, however, seem to be ornaments rather than

weapons of value; or tools helpful in various ways, as snow shovels, for one pertinent example, among the reindeer. Some of the great extinct ungulates of Tertiary time had very powerful horns, especially *Coryphodon* and the group of great Dinocerata, where in some cases a pair upon the forehead was supplemented by one or a pair on the snout. At present a ruling distinction between the artiodactyls and perissodactyls is, that in the former the horns are always paired and on the forehead, while in the latter they are set on the nose and are single or two in number, one behind the other. This is the case with the rhinoceroses, where the horn is a growth from the skin of the nose, composed of a solid mass of agglutinated hairs, based upon a knob of the underlying nasal bones.

HORNSEY, hôrn'zĭ. A suburban municipality of London, England, 6 miles north of St. Paul's (Map: London, C 7). It is a favorite holiday resort, contains several parks, a public library and branches, museum, and public baths, and is chiefly composed of the homes of the working class, most of which are under municipal control. It was incorporated in 1903 with a mayor, 10 aldermen, and 30 councilors. Pop., 1901, 72,056; 1911, 84,592.

HORN SILVER. A term applied to the mineral cerargyrite (q.v.) on account of its waxy or resinous lustre.

HORN SNAKE. See Hoop Snake.

HORN'STONE'. A variety of quartz, resembling flint, but more brittle, and having a structure that is more splintery. This variety of quartz is also frequently called *chert.* See Quartz; Chert.

HORN'TAIL'. One of a group of hymenopterous insects forming the superfamily Siricoidea. They are distinguished from the sawflies by the fact that the fore shanks have only one spur at the tip instead of two. They are called horntails because the end of the body with the adults usually bears a spine or horn. The ovipositor is fitted for boring, and the eggs are usually laid in the woody tissue of trees and plants. The larvæ feed beneath the outer bark. The group is not a large one, but contains a number of common and interesting species in the United States. The large pigeon tremex, e.g., is often a rather serious enemy to certain shade trees, such as the elm, sycamore, oak, and maple. The holes of this borer may be recognized by their regular, evenly cut shape. Another species is known as the willow-shoot horntail (*Phyllæcus integer*) and does much damage by ruining the terminal shoots of osier-willow plantations in parts of the United States. The families included in this group are the Oryssidæ, Siricidæ, Xyphydridæ, and Cephidæ. Consult: L. O. Howard, *Insect Book* (New York, 1905); V. L. Kellogg, *American Insects* (2d ed., ib., 1908); J. H. and A. B. Comstock, *Manual for the Study of Insects* (8th ed., Ithaca, 1909).

HOR'NUNG, Ernest William (1866–1921). An English novelist, born in Middlesborough, Yorkshire. He passed two years (1884–86) in Australia. In 1893 he married a sister of Sir A. Conan Doyle. After returning to England he began a series of adventure novels. Among them are: *A Bride from the Bush* (1890); *Irralie's Bushranger* (1896); *The Rogue's March* (1896); *The Amateur Cracksman* (1899); *Dead Men Tell No Tales* (1899); *The Belle of Toorak* (1900); *The Shadow of the Rope* (1902); *Dennis Dent* (1903); *Stingaree* (1905); *A Thief in the Night* (1905); *Mr. Justice Raffles* (1909); *Fathers of Men* (1912); *Witching Hill* (1913); *The Crime Doctor* (1914).

HORN'YHEAD'. One of the most widespread and numerous of American minnows (*Hybopsis kentuckiensis*). It is a graceful, highly colored fish, 6 to 9 inches long, the fins all pale orange without a black spot, and the males in spring marked with a crimson spot on each side of the head. The distinguishing feature, however, is the tubercle-covered crest on the top of the head of the adults, and especially of the males in nuptial dress. It is a congener of the silver chub and is known as river chub, or jerker, in some places.

HORODENKA, hō'rō-dĕn'kä. A town in the Austrian Crownland of Galicia, on an affluent of the Dniester, 33 miles north-northwest of Czernowitz (Map: Austria-Hungary, J 2). It has an agricultural school, linen-weaving factory, potash and soap works, makes vinegar and brandy, and does considerable business in cereals. Pop., 1910 (district), 56,864.

HOROLO'GIUM. The name given by the Greeks and the Romans to devices for measuring time. Consult the article "Horologium," in Smith, *A Dictionary of Greek and Roman Antiquities*, vol. i (3d ed., London, 1890). See Clepsydra; Horology.

HOROL'OGY (from Lat. *horologium*, Gk. *ὡρολόγιον*, from *ὡρολόγος*, *hōrologos*, telling the hour, from *ὥρα*, *hōra*, hour + *λόγος*, *logos*, word, from *λέγειν*, *legein*, to say). That branch of applied science that has for its object the measurement of time. Although it is easy to look back on a period when time, according to the modern conception of it, as measured by hours and minutes and seconds, was unknown, yet we find progress early made in the measurement of larger periods of time, by observations of the heavenly bodies; and although, in the later progress of astronomy, it is found that the movements of the more conspicuous heavenly bodies do not afford accurate marks for the equable measurement of time, they were, for practical objects, sufficient, and afforded at least a better measure of time than any other phenomena which came under the observation of mankind. Thus, time was early divided into years, according to the motion of the sun among the constellations; into months, according to the motion of the moon relatively to the sun's place in the heavens; and into days, by the alternate light and darkness caused by the rising and setting of the sun. It was long, however, before any accurate measure was found for a division of the day itself. The earliest measure employed for this purpose that we can trace is the shadow of an upright object, which gave a rough measure of time by the variations in its length and position. This suggested the invention of sundials. Another means early adopted for the measurement of short periods of time was by the quantity of water discharged by dropping from one vessel into another. Instruments for measuring time on this principle were called clepsydræ (see Clepsydra). The running of fine sand from one vessel into another was found to afford a still more certain measure, and hence the invention of the hourglass (q.v.). King Alfred is said to have observed the lapse of time by noting the gradual shortening of a lighted candle. It is not very easy to trace to its source the history of the invention to which the modern clock owes its

parentage; the earliest clock, however, of which we have a complete description, and perhaps the earliest which attained any distinct superiority over the rude contrivances already mentioned, was the clock of Henry Vic (De Vick or De Wyck), a German, erected in the tower of the palace of Charles V, King of France, in 1379.

For the description of this first mechanical timekeeper, and for the subsequent history of clock and watch making, see CLOCK; WATCH; PENDULUM; ESCAPEMENT. The history of the science of horology and of the mechanical art of the clock, watch, and chronometer maker are so intermingled that they cannot be considered separately. They may therefore be found under these heads. See also TIME, STANDARD; TRANSIT INSTRUMENT.

HOR'OSCOPE (Fr. *horoscope*, from Lat. *horoscopium*, from Gk. *ὡροσκοπεῖον, hōroskopeion, ὡροσκόπιον, hōroskopion*, horoscope, from *ὡροσκόπος, hōroskopos*, one who observes the hour of a birth, from *ὥρα, hōra*, hour + *σκοπεῖν, skopein*, to view). In astrology, strictly speaking, that part of the ecliptic which is ascendant or rising in the east at the moment of an occurrence whose outcome is to be calculated, such as the birth of a child; thence, more generally, the figure of the heavens, constructed with this as starting point, on which the subsequent predictions are to be based. See ASTROLOGY.

HORR, GEORGE EDWIN (1856–). An American Baptist theologian, born in Boston. He graduated from Brown University in 1876 and studied at Union Theological Seminary (1876–77) and at Newton Theological Institution (B.D., 1879). Ordained to the Baptist ministry, he held pastorates at Tarrytown, N. Y. (1879–84), and at Charlestown, Mass. (1884–91), from 1891 to 1903 was editor in chief of the *Watchman*, and thereafter was professor of Church history at Newton, and after 1903 also president. He became president of the Watchman Publishing Company and contributing editor of the *Watchman-Examiner* and is author of *Hid in the Heart* (1903), *The Training of the Chosen People* (1907), *The Great Ministry* (1908).

HOR'ROCKS, or **HOR'ROX,** JEREMIAH (c.1617–41). An English astronomer, born at Toxteth Park, near Liverpool. He entered Emmanuel College, Cambridge, in 1632 and remained there until 1635, devoting himself principally to the study of astronomy. In the latter year he returned to Toxteth and commenced, under extremely unfavorable circumstances, his original observations. In 1639 he was appointed to the curacy of Hoole, Lancashire, and in that village, on Nov. 24, 1639 (O. S.), he made his famous observation of the transit of Venus—the first observation of this phenomenon ever made. Hearne, in his memoranda, tells us how Horrocks was called away, during his observation of the transit, "to his devotions and duty at church," the day being Sunday. Newton, in the *Principia*, bears honorable testimony to the value of Horrocks's astronomical work, especially commending his lunar theory as the most ingenious yet brought forward; adding, "and if I mistake not, the most accurate of all." Horrocks is frequently mentioned by the scientific men of the seventeenth century; the observation of the transit is by no means regarded as the most important of his astronomical achievements. He died suddenly at the age of about 23, on Jan. 3, 1641. Hevelius printed Horrocks's Latin treatise entitled *Venus in Sole Visa* in 1662. In 1672 Horrocks's fragmentary works were published under the auspices of the Royal Society, being edited by Wallis, with the title *Jeremiæ Horroccii Opera Posthuma*, etc. Other works of Horrocks's perished in manuscript. Consult Whatton, *Memoir of the Life and Labours of the Rev. J. Horrox* (London, 1859).

HOR'SA. See HENGEST.

HORSE (AS. *hors*, OS., Icel. *hross*, OHG. *ros*, Ger. *Ross;* possibly connected with Lat. *currere*, to run, less probably with Skt. *kūrd*, to spring, Gk. *κόρδαξ, kordax*, wanton dance, or with AS. *hrēodan*, OHG. *rusten*, Ger. *rüsten*, to adorn). The term is usually applied only to the domestic horse (*Equus caballus*), but it is also sometimes used as a general term for other members of the Equidæ (q.v.), which include the ass, quagga, and zebra. The characteristics which distinguish the horse from its nearest relatives are the long mane, the long hairs at the base of the tail, and the callosities on the inner side of the hind legs just above the hock.

There are two general types of horses: (1) the northern dun, which includes the dun pony of Norway, the Celtic pony, and the wild pony of Mongolia; and (2) the southern, which includes the Arabian, Barb, and thoroughbred. The horse was domesticated in Asia long before the Aryans migrated to Europe, but was a later acquisition than the ox. The wild horse furnished abundant food for man in Europe during the Neolithic period, but had been domesticated before Cæsar went to Britain.

Professor Ewart believes that at least four wild species have contributed to the making of modern breeds: (1) *Equus robustus*, adapted for a forest life; (2) *E. przewalskii*, the steppe horse, which still exists in a wild state; (3) *E. agilis*, specially adapted for life on plateaus and deserts; (4) *E. sivalensis*, the Sīvalik horse, that lived in the upland valleys of northern India. For early use by man, see PALEOLITHIC PERIOD. According to the inscriptions on monuments the horse was introduced into Egypt at the time of the Shepherd kings. His use, however, was very limited, both the Egyptians and Assyrians confining the use of the horse to warfare. Subsequently, however, his services to man increased, and he became an emblem of rank and an object of luxury or sport as well as an aid in war.

The speed of a horse is its greatest asset because it is its chief value to man. It is the recognition of this value that has been the important factor in the evolution of the horse, an animal especially plastic in the hands of the breeder. His size, form, action, and instincts are subject to modification to a degree unknown in that of any of the other larger species. During his early history modifications of type were due to the changing conditions of warfare; but to-day the principal variations of type are to a far greater extent due to the exigencies of commerce or the demands of sport. It has been suggested that the different breeds of the modern domestic horse have been developed out of the interbreeding of several original wild species; this, however, is only conjecture. What is known is that domestic breeds have existed in Europe from prehistoric times, and also that they have been improved continually by blending with Oriental horses.

Arabian horses are divided into three classes, which have been recognized as subbreeds since

the fifteenth century. The genuine Arabian is found in the region from Damascus to the Euphrates as well as in Arabia proper. The breed is found in its greatest purity and excellence in the stables of the Sultan of Turkey. The Turk, or Turkish horse, found in portions of European Turkey, but principally in Asia Minor, was of considerable importance in the seventeenth century, but it has deteriorated very much since then. The Barb is a native of the Barbary States, whence its name. It is found in greater perfection among the Moors, who introduced the Barb blood into Spain during their rule in that country and so improved the Spanish horse that for several centuries it occupied the first place throughout Europe. Spanish horses of this stock brought to America by the Spaniards are regarded as the progenitors of the mustangs and the other wild breeds common to Mexico and California. (See section on *The Horse in America.*) About the middle of the sixteenth century Italian and Spanish horses (the former heavy types, and the latter, owing to their Barb blood, very much lighter and fleeter) were in the greatest demand. It is during this period that horsemanship (q.v.) began to be studied as a science, the first book concerning which was published by Grisoni in Italy in 1552. The Italians were also the first to take up the teaching of horsemanship as an accomplishment, after which riding came into vogue throughout western Europe. The English thoroughbred is spread over a larger portion of the earth to-day than is that of any other breed. It is used more than any other to improve the blood of horses of general utility throughout the world, and, according to statistics, more capital is influenced by it than by any other two or three breeds combined.

The history of English horse breeding has been divided into three periods: the first extending from the earliest records to the end of the sixteenth century; the second from the accession of James I to the first year of the *Stud Book* (q.v.), 1791 (in which period the thoroughbred came into existence); and the third period extending to the present time, in which the thoroughbred has become a clearly defined as well as a pure breed. The original British horse was a small pony, shaggy and hardy and rarely more than 14 hands high, but the importation of stallions from Spain, Italy, and France improved the breed from time to time. During the Crusades and the consequent general use of heavy armor, which continued up to about the year 1600, large horses came into vogue. A knight in armor, together with his horse accoutrements, weighed from 350 to 425 pounds, so that during the age of chivalry all breeding was directed towards improvements in the size of the horse. Stallions under a certain size were condemned by law, and, in 1217, 100 stallions were imported from Normandy, and for nearly 500 years subsequently size was sought for rather than speed; thus laying the foundation of the different modern breeds of British draft horses. What was the case in England was equally so with the nations of western Europe and their horses; so that the horse of this period is particularly remarkable for its broad chest, heavy neck, and round buttocks. With the appearance of gunpowder and firearms, and the disappearance of armor, these breeds became useless for the purpose of warfare, which now demanded fleetness as a first essential. They passed, however, to a greater sphere of usefulness and to-day constitute the heavy draft breeds known as the Dutch and Flemish, the Percherons (q.v.) of France, the Clydesdale of Scotland, and the cart and shire horse of England. See SHIRE HORSE.

Before the days of the tournaments in England large horses were scarcely known, but the needs of the knights compelled the keeping of a sufficient number, so that by intermixture with smaller native animals the size of the British horse gradually increased; but the result proved that, although they were bigger, they did not nearly possess the qualities of the smaller horse. During the Crusades the excellence of the Saracen horses deeply impressed the British Crusaders, who brought many Asiatic horses with them on their return to England. The Eastern horses were Barbs, Turks, Arabs, and Persians, not more than 14½ hands high, and it is to them that the English horse owes in part its present conspicuous qualities. Laws were passed to promote the breeding of large horses by improving the type of British ponies. During the reign of Henry VIII it was ordained by law that no stallion less than 15 hands and no mare less than 13 hands should run wild in the country. Colts two years of age and under 11½ hands high were not permitted to run on any moors, forests, or commons where mares were pastured, and to guard against any mishaps it was further ordered that at Michaelmastide the magistrates of the neighborhood were to search the countryside, the forests, and the commons, for the purpose of destroying all stallions under the required height, as well as "all unlikely tits, whether mares or foals." Prelates and nobles, and every one whose wife wore a velvet bonnet, were compelled to do their "leaping and riding upon stallions not less than 15 hands high." There were two classes of horses throughout the country—the first a "very indifferent, strong, slow, heavy draft horse," and the second "light and weak." Private matches were often arranged, showing that speed was becoming a greater factor than size and weight.

Although there had been public horse racing in Elizabeth's time, it was not until James I ascended the throne that horse racing was legally established. He introduced into England the Markham Arab, which was known to be a purebred animal, and in many other ways did much to improve the breed of horses. A distinction was drawn between race horses and common horses; the race horses were trained for their competitions, and 140 pounds was the average weight of a professional jockey. During the reign of Charles I a memorial was presented to the King bewailing the gradual disappearance of stout horses fit for the defense of the country, by stating that the breed of strong horses was likely to disappear unless measures were taken for their propagation. The tournament was no more, the pack horse had practically disappeared, the introduction of the coach had removed a large part of the pack from the horse's back, and everything was done to encourage cross breeding with foreign importations. From such ancestors the modern thoroughbred has descended. After the civil wars and during the reign of Charles II the race courses at Newmarket and at Datchet Mead, near Windsor, were laid out, and the King himself became the first great supporter of the turf. The most conspicuous English horseman of this time was the Duke of Newcastle, who in 1667 published his celebrated work on horsemanship, the reading of which is said to have so in-

HORSES

1 WILD ASS - EQUUS ASINUS
2 BURCHELL'S ZEBRA - EQUUS BURCHELLI
3 HORSE (THOROUGHBRED)
4 DOMESTIC DONKEY

terested Charles that he became the largest individual importer of foreign blood in the country. The Stuart kings maintained magnificent studs and constantly employed purchasing agents to secure the best Oriental blood; but, unfortunately, the pedigree of many of these animals is largely a matter of tradition, owing to the fact that the *Stud Book* had not been issued. In spite of the infusion of foreign blood, however, the English race horse in the time of the Stuarts was a clumsy-looking animal in comparison with the pure Oriental type or with the race horse of to-day. He was strong and of large build, but neither as elegant nor as swift on the racecourse as was the Barb. The combination of native English stock and such horses as the Helmsley Turk, Byerly Turk, Pace's White Turk, D'Arcy's White Turk, Selaby Turk, and by such Barbary stallions as Dodsworth, Carwen, Bay Barb, Greyhound, Compton Barb, and Toulouse Barb, produced a horse remarkable for its well-proportioned locomotive parts, legs, shoulders, etc., strong carcass and deep chest, the typical animal of speed and endurance.

Since the middle of the eighteenth century the practice of interbreeding with Oriental blood has been discontinued, and although half-bred horses were raced until the first part of the nineteenth century, the thoroughbred has, ever since the foundation of the "racing calendar," been the recognized race horse, and his pedigree has been strictly and authentically kept. During the seventeenth century speed was not the sole qualification of a race horse; it was required to have strength and endurance. From racing matured horses at long distances it was an easy transition to shorten the length of the course and increase the speed of the horse, besides which the element of gambling entered into the sport, and it soon happened that three-year-old horses were used in the races. It was found, however, that they could not "stay" the old four-mile course, so that of necessity the distances had to be reduced to accommodate the horses. The result of this policy is seen in modern horse racing (q.v.), in which two-year-old horses developed for speed alone take part in races over courses less than half a mile in length.

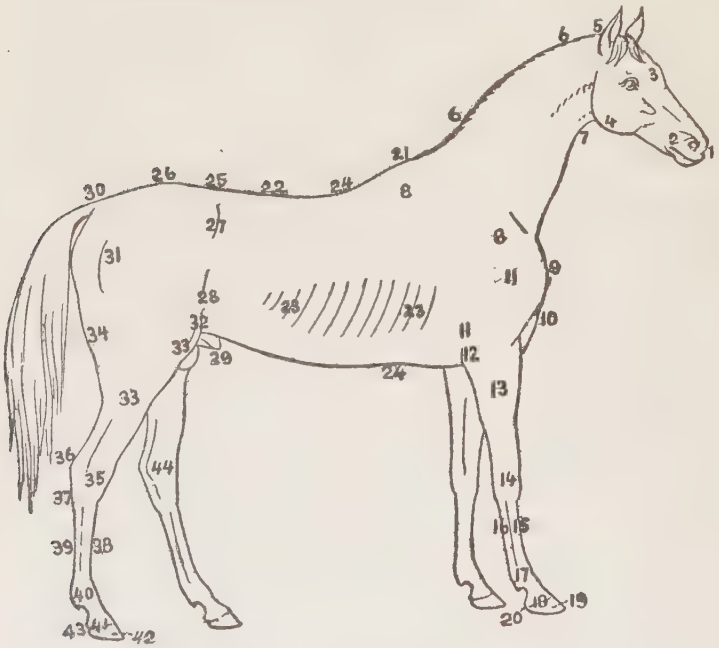
The Horse in America. Fossils of the forerunner of the horse have been found on the American continent, but it is generally believed that the American horse of to-day is the descendant of animals brought here by Europeans and the first settlers. Cortés used but few horses in his Mexican conquest, but undoubtedly some of them became progenitors of the American wild horse; and similarly the horses abandoned by the unfortunate Ferdinand de Soto near the Texas border became the progenitors of all the wild horses of North America. Recent discoveries of fossils in South America have led some to believe that at least one type of South American horse is indigenous. (See HORSE, FOSSIL.) The character and action of the American horse will be found fully described under TROTTING and PACER.

The earliest colonists of Virginia were not remarkable as pioneers, so that it is not surprising to learn that their first supply of domestic animals (including horses) was consumed as food. Although there had been several shipments of horses from London down to about 1640, in 1646 there were only between 200 and 300 horses of both sexes in the Colony. In 1656 the exportation of mares was prohibited by law, but in 1667 the restriction was removed. The horses of the period are described as having been of hardy and strong quality, but undersized, and, like the horses in other Colonies, they were branded and turned loose to find their own subsistence. Owing to the rapidity of their increase, they were soon very numerous and became practically wild; so much so that at the close of the seventeenth century it was a common as well as profitable sport to hunt wild horses, for an animal without a brand became the property of its captor. On the island of Chintoteague, off the coast of Virginia, there are still in existence bands of wild horses, and only within recent decades has there been any attempt to domesticate any of their number. They are of all colors and uniform in size, not averaging over 13 hands, and are accounted for in their present location as being the descendants of a band of Virginian wild horses which located there when it was a peninsula and had their retreat cut off when time converted what had been a peninsula into an island. Notwithstanding occasional efforts to increase its size, the Virginian horse retained the characteristics of its English ancestor.

The settlers of New Netherlands brought their horses from Utrecht. They were larger, better, and more valuable, so far as prices were concerned, than the English horses of the other Colonies, but were not regarded as being as good for saddle work. The two breeds soon intermixed, and a larger breed resulted, for at the time of the Revolution the average height was 14 hands and 1 inch. Horse racing was introduced by Governor Nicholls, of New York, in 1665. He established a racecourse on Hempstead Plains, L. I., which was the first official and properly organized racecourse on the continent. It is supposed that the horses were of the Dutch breeds, because the people attending were largely of that nationality. The English race horse was not at that time thoroughly developed and in any case was not imported into New York until nearly 100 years afterward. The New England Colonies played a very important part in the development of the modern American horse. In 1629 the first horses were imported into New England from the proprietary company in London. In 1635, 27 mares and 3 stallions were shipped from Holland and sold in Salem; and five years later conditions were such that the colonists were enabled to export a shipment of 80 animals to Barbados. It has been ascertained, from an investigation covering the period 1756–59, that the average height of horses was 14 hands 1 inch, and that three-fourths of the total number were pacers and one-fourth trotters. The founders of Hartford, Conn., brought horses with them (1636), and in 1653 the General Court at New Haven ordered all horses to be branded and instituted a system of public saddle horses for hire. The average size was 13 hands and 3 inches. Roger Williams and the settlers of Rhode Island Colony (1636) obtained their horses from Massachusetts and succeeded so well in the breeding of them that in 1690 horses were their principal export, and they shipped them to all the Colonies of the coast. Pacers were raised in Rhode Island and were widely known as Narragansett pacers. Trade with Canada was not permitted; but there is no reason to doubt that an occasional trade was made, whereby a Narragansett pacer changed owners for the consideration of a bale of peltry, such as only the French Canadian could offer.

Racing was especially encouraged in Rhode Island, and thus was developed the speed that made their horses famous. In 1768 the average size of a Narragansett was 14 hands and 1 inch. In the early part of the seventeenth century the Pennsylvania horse was the largest and heaviest horse in the country; but 100 years later they seem to have ranked in both respects below the horses of all the other Colonies. Up to 1750 the average size in eastern Pennsylvania was about 13 hands and 1¼ inches. Philadelphia boasted the speediest and finest horses, and pacers were the most fashionable and popular. New Jersey supplied itself from New York and Pennsylvania, a stallion, Justin Morgan, that was foaled at Springfield, Mass., in 1793.

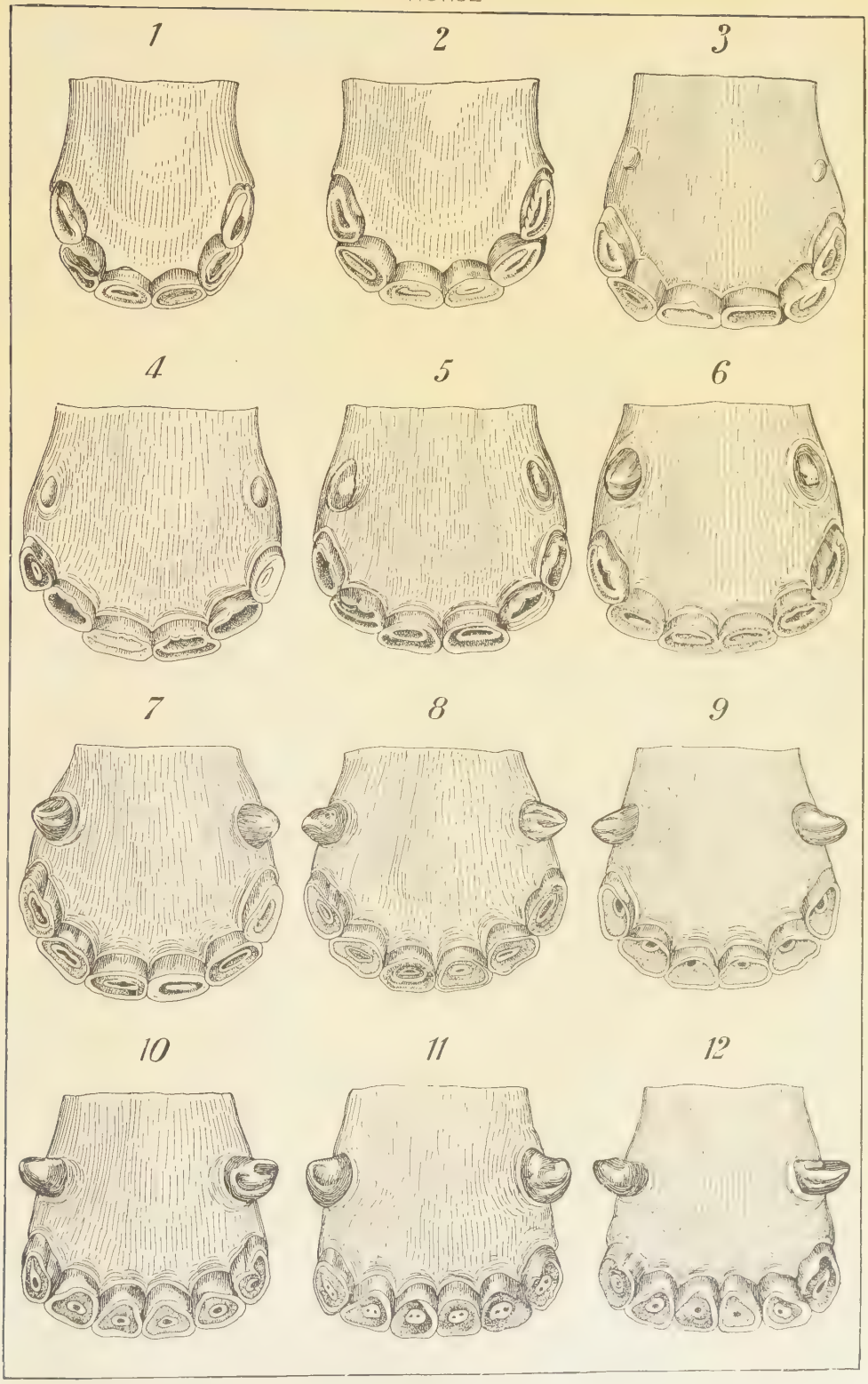
The American horse was for 200 years the sole means of inland travel and the great essential to all business in and between the various Colonies of the country. Improved roads have made him a driving horse, and none of the inventions of modern times, from the introduction of railroads to bicycles and horseless vehicles generally, has affected his popularity or his value. To the superficial observer it would appear as if improved means of vehicular transport would diminish the breeding of horses as well as decrease their value, but thus far such has not been the case. Good horses have a higher value than ever, and as the demand for cheap or poorly bred horses diminishes, the better bred ones survive, and what is lost in number is more than balanced in breed and consequent value. (See Breeding.) The principal families of racing horses are the Bashaws, Clays, Black Hawks, Hambletonians, Mambrino Chiefs, Pilots, American Stars, and Blue Bulls. (See Trotting; Pacer.) The most prominent types of the pony include the Shetland, Galloway, Welsh, Dartmoor, Exmoor, and Canadian breeds. (See Pony.) See also Ass; Mule; Shire Horse; Percheron Horse; etc.



Head—1, muzzle; 2, nostril; 3, forehead; 4, jaw; 5, poll.
Neck—6, 6, crest; 7, throttle, or windpipe.
Fore Quarter—8, 8, shoulder blade; 9, point of shoulder; 10, bosom, or breast; 11, true arm; 12, elbow; 13, forearm (arm); 14, knee; 15, cannon bone; 16, back sinew; 17, fetlock, or pastern joint; 18, coronet; 19, hoof, or foot; 20, heel.
Body or Middle Pieces—21, withers; 22, back; 23, 23, ribs (together forming the barrel, or chest); 24, 24, circumference of chest, called the girth; 25, the loins; 26, the croup; 27, the hip; 28, the flank; 29, the sheath; 30, the root of the dock, or tail.
Hind Quarter—31, hip joint, or whirlbone; 32, stifle joint; 33, lower thigh, or gaskin; 34, the quarters; 35, the hock; 36, point of the hock; 37, the curb place; 38, the cannon bone; 39, the back sinew; 40, pastern, or fetlock joint; 41, coronet; 42, foot, or hoof; 43, heel; 44, spavin place.

Types, etc. The *hackney* is, strictly speaking, not a breed, but a type, indigenous to the eastern counties of England, bred chiefly for carriage purposes. It is of excellent symmetry of proportion and is capable of a very true rhythm in action; although it is slower and heavier than the roadster, it is faster and much lighter than the middle-weight draft horse. A well-bred hackney should be properly balanced in fore and hindquarters and middle piece. Since 1890 there have been large importations of this breed to America, although the hackney has been known here by occasional single importations since 1822. It has been especially valuable in the breeding and development of the American trotter. The *cob*, another useful type, is a native of Norfolk and Lincolnshire in England and is a stoutly built, short-legged animal of from 13.3 to 14.3 hands high. It is smaller than the hack and larger than the pony. The *Galloway* is a horse common to Wales and North Britain. It seldom ranges above 14 or 14½ hands in height and is not a particularly valuable animal. Specimens below 13 hands are called ponies. The *hunter* is not required to be a thoroughbred animal, although where the hunting warrants it he is

and by the beginning of the eighteenth century racing had become so common as to be a nuisance; so much so that in 1748 there was enacted a law for the suppression of "running, pacing, and trotting races." The year before the Colony of Maryland, which had in all probability received its supply of horses from Rhode Island, Pennsylvania, and Virginia, passed a similar law. North and South Carolina secured their horses from Virginia. In Canada horses were received from Picardy, France, in 1665, and it is assumed they were largely of the English type. Many of them are supposed to have been pacers; but whether they were, or whether, as is sometimes argued, the Canadian pacer is derived from the illicit trading with Rhode Islanders for their Narragansetts, is a question much discussed. The Morgan horse is a type which has had deserved popularity. It originated from



AGE-MARKS ON THE TEETH OF THE HORSE

1. One Year Old.
2. Two Years Old.
3. Three Years Old.
4. Four Years Old.
5. Five Years Old.
6. Six Years Old
7. Seven Years Old.
8. Nine Years Old.
9. Eleven Years Old.
10. Thirteen Years Old
11. Fifteen Years Old.
12. Seventeen Years Old.

frequently thoroughbred, or half bred at least. He is chosen to suit the country over which he is hunted as well as to carry the weight of his rider. In any case he should have the following characteristics: a lean head and neck, firmly set on good oblique shoulders; a strong back and loin, deep body, wide hips, good quarters, and firm legs and feet. Among horsemen the following terms are in use: A *stallion* is a male horse, and when desexed is termed a *gelding*. A *mare* is the female. Animals of both sexes when young are termed *foals;* the male foal is a *colt*, and the female a *filly*. Young animals become "of age" when the outer incisors (corner nippers) are developed. A horse is *aged* when in its eighth or ninth year, a fact determined by the front teeth. The period of gestation is 11 months, the foal usually being dropped in the spring.

Indications of Age. It is very difficult, if not impossible, to formulate any rules by which the age of a horse may be accurately determined. To an expert horseman the lightness and elasticity of step of the animal under examination will afford a general clew; or, better still, the contour of the lower jaw, which grows more and more angular with increasing age. It is to some structure of the animal little liable to change, however, that we must look for any very accurate gauge, and the only structure answering that requirement is that of the teeth, which must be examined according to the following rules: The six teeth, or nippers, situated in the front of the lower jaw, are the ones examined to determine the question, although the tushes are a partial indication and are sometimes used in arriving at a decision. In this article the two middle nippers will be referred to as the central nippers; the ones on each side of these as the middle nippers, and the ones at each end of the group as the corner nippers. At two and a half years of age the permanent central nippers are just through the gum, the temporary middle and corner nippers still remaining; one year later the permanent middle nippers are in evidence, and between the fourth and fifth year the corner nippers will be through. About this time changes will be noticed in the condition of the earlier teeth; e.g., the middle pair look as the central pair did at two and one-half years, and the central nippers are showing signs of wear. Between the ages of five and nine considerably more experience is necessary for an accurate judgment than has been required before. At nine years of age the previous oval shape of the teeth becomes more triangular; at 10 the central nippers take a pronounced triangular shape, and the middle pair give evidence of a like tendency, followed at 11 years by the growth of the corner nippers in the same direction. The tushes become rounded at the points, and the nippers are longer and project more, the central nippers being completely triangular. The signs of wear and tear, and the growth of the evidences already described, continue with increasing age, so that at 20 years the nippers are all exceedingly triangular, projecting forward to a great degree, and are very long.

The Character, or temperament, of a horse cannot be discerned short of actual experience, by any known formula or given rules; for while the experienced horseman may judge approximately by noting the shape of the face and head and the expression of the eyes, he will, as a rule, be unable to explain the method or rules upon which his conclusions are based. Like men, horses are of different dispositions and exhibit such varied characteristics as pride, dignity, intelligence, stupidity, courage, cowardice, etc. Generally stated, an intelligent horse shows considerable width between the eyes, which latter are very prominent. The width between the ears is taken to indicate courage and strength of character, and roundness and elevation between the eyes as denoting a mildness of disposition. A timid horse is usually narrow between the ears, and a stupid one narrow between the eyes.

Diseases of the Horse. No other domestic animal is so large a sharer with humanity in the accidents and dangers incident to modern civilized life as the horse. It is practically a copartner with man in every detail of his life and work, and yet no other animal suffers so much from ignorance, abuse, maltreatment, and quackery. Modern civilization is doing much to alleviate the condition of the less fortunate of his kind, notably the various societies for the prevention of cruelty to animals. (See CRUELTY TO ANIMALS, PREVENTION OF.) The practice of veterinary medicine has become one of the most exacting and advanced of professions, and diseases long considered incurable are now amenable to treatment. In European countries the horse is an object of governmental solicitude, as much for his value as a factor in warfare as for purely humanitarian reasons; and a careful census record is kept (particularly in Germany) of the number, pedigree, and value of the horses throughout each country. The government of the United States, through its Department of Agriculture, alone of all the nations of the world has compiled a special *Report on the Diseases of the Horse*, which is published as a guide and aid in the cultivation of a proper knowledge of the care and treatment of the animal. Below are described some of the more prevalent diseases, which will be found more fully treated in the above-named publication. See also DISEASES OF ANIMALS.

The Teeth.—Dentition covers the period during which the young horse is cutting his teeth, usually from birth up to the age of five years. As a rule, the horse has more difficulty in cutting the second, or permanent, teeth than he has with his first, or milk, teeth. With regard to the latter the mouths of young horses should be frequently examined in order that the milk teeth may not remain too long and thus cause the permanent teeth to grow in crookedly. Toothache is rare with the average horse, and then only where a tooth is allowed to decay. Usually it is only observed in the molar teeth and may be discovered by the evidences of pain given by the horse when feeding or drinking cold water.

Diseases of the Mouth.—1. *Lampas* (q.v.): a swelling of the mucous membrane of the hard palate, projecting in a more or less noticeable ridge immediately behind the upper incisors. 2. *Stomatitis:* an inflammation of the mucous membrane of the mouth, generally produced by irritating medicines, foods, or other substances, such as often follows in the case of city horses from eating out of ash barrels. 3. *Glossitis:* an inflammation of the tongue very similar to stomatitis both in origin and in symptoms. 4. *Ptyalism*, or salivation, is an abnormal and excessive secretion of saliva, often caused by irregular teeth, inflammation of the mouth or tongue, or the use of medicines, and occasionally by the eating of second-crop clover. 5. *Pharyngitis*

(q.v.): an inflammation of the mucous membrane lining of the back part of the mouth, or pharynx. 6. *Paralysis of the pharynx*, or, as it is more generally called, paralysis of the throat, is a disease first discovered from the fact that the animal is unable to eat, and the manger is found to contain much saliva and frothy food that has been returned through the nose.

Diseases of the Œsophagus, or Gullet.—It will be found in the vast majority of instances exhibiting these diseases that the cause is the introduction into the organ of foreign bodies too large to pass, or else that there are present erosions and ulcerations of the throat (followed by constriction or narrowing of the gullet) caused by the administration of caustic medicines not thoroughly diluted. The designations "pharyngeal," "cervical," and "thoracic choke" are used to denote where the obstruction is located, the symptoms varying according to the position of the agent responsible for the choke.

Diseases of the Stomach.—1. *Stomach staggers* (see STAGGERS), or gorged stomach (*Impaction*): distention of the stomach caused by food, in which the stomach loses the power of contracting upon its contents. 2. *Tympanites of the stomach:* a disease corresponding to that of "hoven" or "bloat" in cattle, and frequently due to the overloading of the stomach with young, succulent herbage, which, after its arrival in the stomach, liberates quantities of fermentation gas sufficient to distend the stomach seriously. Overfeeding is a very frequent cause of stomach bloat, particularly if the overfeeding is followed immediately by hard work. The symptoms are very much the same as for stomach staggers, and the treatment must be at once vigorous and immediate. As a rule, cases of this trouble occur away from the stable. Absorbents are of some service, and charcoal may be given in any quantity. Chloral hydrate in doses of one ounce in a pint of water as a drench is well adapted to the treatment of wind colic. Diluted alcohol or whisky or aromatic spirits of ammonia may be given in one-ounce doses at short intervals. 3. *Rupture of the stomach:* powdered opium in one-dram doses may be given every two or three hours, thus keeping the stomach as quiet as possible. The case should be kept under the observation of a skilled veterinarian. 4. *Bots:* there are so many opinions extant concerning this disease, many of which are erroneous, that it will repay any owner of stock to make a careful study of it. With regard to the insect itself, see BOT; GADFLY. Of the numerous insect parasites on solipeds, the gadflies (Œstridæ) are the most important. The species responsible for the above-named disease infest chiefly the stomach and duodenum—the small gut leading from the stomach. Nearly all country horses, as well as those experiencing their first year in the city, have the bots, but the common opinion that bots frequently cause colic pains is erroneous, although they may occasionally do so. If in large enough numbers they may sadly interfere with digestion. The animal may not thrive and emaciation may follow, but beyond this they are harmless. 5. *Indigestion:* indigestion is imperfectly performed digestion, which in the horse causes symptoms closely resembling those of dyspepsia in man. A great cause of indigestion with the horse is found in the food itself. (See section on *Care of the Horse.*) The teeth are in many instances to blame, their sharp, irregular, or decayed condition preventing any perfect mastication, and causing the animal to swallow his food before it receives the requisite admixture of saliva. The principal seat of indigestion is in the stomach or small intestine. It is characterized by an irregular appetite, refusal of food or gorging, and a disposition to eat unusual substances, as wood, salt, bedding, and frequently his own fæces. The animal loses flesh, and the skin becomes hard and dry and hidebound. The treatment usually consists of a careful regulation of food as regards quality, quantity, and time of feeding, and an exercise of similar care as regards the water supply. The condition of the mouth and teeth must also be attended to, and the teeth if sharp or irregular must be rasped down, or extracted if decayed. If the indigestion is caused by ravenous eating, the animal should be fed from a manger sufficiently wide to allow the spreading of the grain, which will usually compel the horse to eat slowly. Frequently a cathartic is given at the outset.

Intestinal Worms.—Worms are very frequently found in young horses as well as in those that are weak or debilitated. They almost invariably exist in horses pastured on low, wet, or marshy ground as well as in those that drink stagnant water. The most common form of intestinal worm is the lumbricoid worm, which closely resembles the common earthworm. It is white or reddish in color, measuring from 4 to 12 inches in length and varying in thickness from the size of a rye straw to that of a cigar, being thickest at the middle and tapering towards each end. At first slight colicky pains are noticed, or a vigorous switching of the tail, and frequent passages of manure; the animal does not shed its coat and is hidebound and pot-bellied. He will be particularly fond of salt and will bite at the woodwork of his stall; the bowels are irregular, either constipation or diarrhœa being present. Among the best medicines for worms are santonin, turpentine, tartar emetic, infusion of tobacco, and bitter tonics. Whatever remedy is given, it will be found much more effective if administered after a long fast, and then the worm medicine must be supplemented by physic to force out the worms. There are many varieties of worms, the treatment for which is usually along the lines above described.

Spasmodic, or *Cramp, Colic* is the name given to colic which is produced by contraction or spasm of a portion of the small intestines. It is usually caused by indigestible food, foreign bodies, excessive drinking of cold water when overheated, drafts of cold air, etc. To insure correct treatment, it is very necessary to keep in mind the type of horse, the force of the attack, the intervals of ease or violent pain, the temperature and pulse, and a frequent attempt to urinate, which will prevent the confounding of this with any other form of colic. The treatment indicated is any antispasmodic medicine, of which probably there is none better than chloral hydrate given in a dose of one ounce in a half pint of water as a drench. *Flatulent colic, tympanites, wind colic, bloat*, are common among animals subject to sudden changes of food, careless feeding or treatment, too much green food, or any other food that has become stale and sour. See ENTERITIS.

Herniæ.—There are several kinds of herniæ, not all of which, however, are to be regarded as serious or dangerous. Abdominal herniæ, or ruptures, are divided into reducible, irreducible, and strangulated, according to their condition: and

into inguinal, scrotal, ventral, umbilical, and diaphragmatic, according to their situation. In many instances treatment is not necessary; or, where the hernial sac is extensive, treatment is ineffective. A good deal will depend on whether any one is present when the hernia happens, as to the possibilities of a perfect cure. Umbilical hernia, or diaphragmatic hernia, calls for the most skilled treatment, and even then little or nothing can be done.

Acute Inflammation of the Kidneys.—The causes of this disease are many and varied. Congestion occurs from retained products passed through the kidneys during recovery from inflammation of other parts, or fevers. Detained urine, and the possible production of ammonia and other irritants, are also frequent causes. The symptoms consist of fever, stiffness of the back, straddling gait, difficulty in lying down, rising, or walking in a circle. The recognized treatment is as follows: removal of any cause that can be discovered; then, if suffering from high fever, the removal of from two to four quarts of blood, which should be followed as much as possible by throwing the work of the kidneys on the bowels and skin.

Catarrh, or *Cold in the Head.*—A fluid discharge from the mucous membrane. Inflammation, as a rule, extends to the membrane of the sinuses of the head, and of the larynx and pharynx, causing the added complication of sore throat. Frequently the eyes are also affected. At the first stage of the attack the membrane is dry and irritable, followed by a watery discharge from the nostrils. Fever, more or less, makes its appearance, which is usually detected by placing a finger in the animal's mouth. In itself the disease is not very serious, but if neglected or treated wrongly may become complicated and dangerous. A few days of cessation from work, together with pure air and good food, is regarded as the best treatment.

Roaring (q.v.).—A chronic disease, evidenced by a loud, unnatural noise in breathing, and caused by an obstruction to the free passage of the air in some part of the respiratory tract. External causes are nasal polypi, thickening of the membrane, the pharyngeal polypi; deformed bones; paralysis of the wing of the nostril; and, more than anything else, paralysis of the muscles of the larynx.

Grunting.—A horse is usually first tested by veterinarians for grunting, when, if the fault is discovered, he will be further tested for roaring. Grunting is a sound emitted during exhalation, when the animal is suddenly moved or struck at.

High Blowing is distinctly a nasal sound, but it must not be confounded with roaring; it is a habit and does not constitute unsoundness. In the same class should be placed whistling and thick wind.

Bronchitis, or *Inflammation of the Bronchial Tubes.*—While the causes of this disease are of the same order as for other diseases of the respiratory organs, some special causes are the inhalation of irritating gas or smoke, and fluids or solids gaining access to the parts. It is also occasionally associated with influenza, or fever, and frequently supervenes a common cold or sore throat. The animal appears dull, the appetite is partially or wholly lost, the head hangs, and the cough, at first light, is succeeded by a high rasping cough. He prefers to stand with his head to a door or window to secure fresh air and persists in standing. He has more or less thirst, and frequently the mouth will be found full of saliva. The first step in the treatment of the disease is to secure a pure atmosphere and comfortable quarters whenever possible; a well-ventilated box stall will be found the best. The body should be covered with a blanket according to the season of the year; the legs should be hand-rubbed until they are warm, then flannel bandages applied to the knees and hocks. If the legs cannot be made warm after hand-rubbing, take any liniment used for sore throat and thoroughly rub in, after which the legs should be covered with bandages. It will be well to rub the same liniment over the chest, the elbow, and shoulder blade, and from the elbow below to within about 6 inches of the ridge of the backbone above. *Pleuropneumonia* (q.v.) may attack both lungs, but, as a rule, one lung only is affected.

Diseases of the Eye.—It is impossible to overestimate the value of sound eyes in a horse, for not only does disease or injury depreciate the selling price of the animal, but it is a great source of danger at all times. Some diseases, like recurring inflammation or moon blindness, as it is called, are congenital. The structure of the eye is that of a spheroidal body, flattened behind. The posterior four-fifths is inclosed by an opaque, strong, fibrous membrane, which has on its inner side a more delicate membrane consisting principally of blood vessels and pigment cells, which in its turn is lined by the extremely delicate and sensitive expansion of the retina. The anterior fifth of the globe of the eye bulges forward from what would have been the direct line of the sclerotic, forming a segment of a much smaller sphere than is inclosed by the sclerotic. There are four straight muscles of the eye, and two oblique and one rectractor, enabling the eye to turn inward, outward, upward, and downward, and when all act together the eyeball is drawn deeply into its socket. One of the most common diseases is inflammation of the eyelids, which is caused usually by exposure, bites, or stings of insects, pricks with thorns, or by a whip or club, or as a result of infecting inoculations. All the known causes may ordinarily be divided under the following heads: (*a*) inflammations due to constitutional causes; (*b*) those due to direct injury, mechanical or chemical; and (*c*) those due to inoculation with infecting material. The local treatments ordinarily advised consist of astringent, soothing lotions (sugar of lead, 30 grains; laudanum, two teaspoonfuls; rain water, boiled and cooled, one pint), applied with a soft cloth kept wet with the lotion and hung over the eye by tying it to the headstall of the bridle on the two sides. The horse should be fed from a high manger, so as to help the return of the blood from the head; and his diet should be laxative and nonstimulating. For a stye or boil of the eyelid, the practice is to apply a poultice of camomile flowers, with the addition of a few drops of carbolic acid. The poultice should be applied in a very thin muslin bag. Wounds such as torn eyelids, caused by the horns of cattle, or perhaps by teeth, or by nails, or the barbs of wire fences, are also frequent. In such cases the edges should be brought together as promptly as possible, so as to secure union without any unsightly distortions. It is an operation that requires experience and skill.

Lameness.—By this is meant any irregularities or derangements of the functions of locomotion. There are innumerable forms of lameness,

the sources of many of which are so obscure as to defy location until the resulting disease has gained sufficient headway to be serious. In veterinary nomenclature each two of the legs, as referred to in pairs, are denominated a biped, the two forelegs being the anterior biped, and the two hinder the posterior; the two on one side are designated the lateral; and either the front or the hind biped, with the opposite leg of the hind or the front biped, forms the diagonal biped. In health each biped as well as each individual leg has to perform an equal and uniform duty and carry an equal share of the total weight of the body, so that the result ought to be a regular, evenly balanced, and smooth displacement of the body. According to the rapidity of the motion of the animal in different gaits, each single leg is required at certain moments to bear the weight which had the moment before rested on its congener; or again the legs of one biped may be required to carry the weight of its opposite biped. Beginning with diseases of the bones as a common source of lameness, the "splint" (q.v.) will be found to be of the commonest occurrence. Indeed, a horse which does not possess one or more belongs to a very small minority. The splint is a bony enlargement on the cannon bone, between the knee or hock and the fetlock joint. *Ringbones* (q.v.) usually result from heavy labor before the animal was of sufficient age, and consequently before the bones were sufficiently ossified; or else from bruises, sprains, or other forms of violence. *Spavin* (q.v.), or exostosis of the hock joint, is a disease of the most serious kind for many reasons, not the least of which is the slowness of its development and the insidiousness of its growth. *Fractures* are of less serious consequence in the horse than in man, but nevertheless they are always a matter of grave import and demand at once a most skillful treatment. *Windgalls* (q.v.) is a name given to the dilated bursæ found at the posterior part of the fetlock joint. *Sprains* are diseases of the muscles and tendons. Ordinarily the cause of a sprain may be attributed to a fall or overstrain, and subsequent soreness, swelling, and suspension of functions. Rest is the prime essential, the treatment consisting of local applications, stimulating liniments, counterirritation, and occasionally firing. Lameness of the shoulder from sprain is the most frequent and is popularly described as slip of the shoulder. With draft horses it frequently is caused by the effort necessary to move off a heavily loaded vehicle. In the great majority of cases a rest is all that is necessary to effect a cure. Under the general classification of diseases of the fetlock, ankle, and foot are to be found many of the most common as well as most fatal (so far as the value of the animal is concerned) diseases known to veterinary science. Many horses are predisposed to injuries and diseases because of imperfectly formed feet, in consequence of which they are peculiarly liable to diseases of this character. Flat-footed horses are liable to corns, pumiced sole, bruises of the sole, and kindred troubles, owing to the fact that the soles of their feet have little, if any, convexity. The flat foot has no arch, so that the weight of the animal falls on the entire plantar surface instead of on the wall, which allows of little, if any, elasticity in the sole. In *clubfoot* the feet have the wall set nearly perpendicular, and consequently the heels stand high and the fetlock joint is either thrown forward or knuckled, and the weight of the animal is thrown onto the toes. In *crooked foot* one side of the wall is higher than the other, causing the animal to be pigeon-toed as well as making it "interfere." *Interfering* is when one foot in action strikes the opposite leg. *Knuckling* is another fault, which causes stumbling, and while not always an unsoundness in itself, yet frequently leads to fracture of the pastern. It is a partial dislocation of the fetlock joint and is caused more often by heavy work in hilly districts or fast work on race tracks or hard roads than anything else. The principal remedy for all faults of conformation will be found in suitable horseshoeing; which subject is discussed at some length under HORSESHOEING. *Sprains of the fetlock* are the consequence of knuckling or any diseases which interfere with proper locomotion, such as *navicular disease, chronic laminitis, contracted heels, side bones;* or such external causes as a rut or hole in the road, or any accident which causes the animal to fall. For slight injuries cold-water bandages and a few days' rest will be found sufficient. Should there be severe lameness or much swelling, a stream of cold water playing upon the leg will be found very beneficial. On the subsidence of the inflammation a blister should be applied to the joint. When the shoe of the hind foot strikes the heel or quarter of the forefoot, the animal is said to *overreach*, a trouble common to trotting and running horses. When the hind foot catches well back on the heel of the forefoot, the horse will frequently be thrown on his knees or the shoe torn from the forefoot—an accident known colloquially as *grabbing*. The art of the shoeing smith is demanded if future injuries are to be avoided. Wounds should be dressed with tincture of aloes, oakum, and a roller bandage; and in any case the animal should never be driven at a very fast gait unless his heels and quarters are protected with quarter boots. Heavy or draft horses are liable to calk wounds, caused from tramping either on themselves or each other. Good shoeing and the use of boots will be found the best remedy. *Quittors* (see QUITTOR) are authoritatively divided into four classes: (*a*) Cutaneous quittor; (*b*) tendinous quittor; (*c*) subhorny quittor; and (*d*) cartilaginous quittor. *Thrush* (q.v.) is more common with draft horses than any other breed and is usually caused by a filthy, ill-kept stable. *Corns* are injuries to the living horn of the foot, appearing in that part of the sole which is included in the angle between the bar and the outside wall of the hoof. They are described, according to the character of the conditions which follow the primary injury, as the dry, the moist, and the suppurative. The disease is confined almost exclusively to the forefeet, because of the greater weight which they support, and because the heel of the forefoot in action first strikes the ground and thus receives much more shock or concussion than the heel of the hind foot, in which the toe first makes contact with the ground. Faulty shoeing is the great predisposing cause, or else the presence of small stones or other objects between the sole and shoe. Lameness caused by bruises of the frog is best treated by putting the foot at once in a bath of cold water in order to prevent suppuration; and this will frequently be effective if the disease is caught at the beginning. If suppuration, however, has already commenced, the horn of the frog and of the bars and branches of the sole, if necessary, is to be pared thin in

order that the foot may be poulticed and all pressure removed. When the lameness has subsided and the exposed part is covered by a new layer of horn, the foot may be shod. Punctured wounds of the foot are of everyday occurrence, and when they, as frequently happens, involve the more important organs contained in the hoof, no disease or wound can be more serious. Most frequently a "picked-up" nail is the cause of trouble, and again the wounds may happen from sharp pieces of rock, glass, wire, etc. The nearer the injury is to the centre of the foot, the more possibilities there are of disastrous results. Punctured wounds of the anterior parts of the sole are the more dangerous because of the possibility of injury to the coffin bone, the most serious wounds being those which puncture the centre of the foot. Sometimes it happens that a nail has penetrated the frog and remained there for several days without causing lameness, the first evidence of an injury betraying itself when the foot is being cleaned. It must be remembered that, if the injury is not too deep, suppuration will be established before lameness develops, so that the feet should always be most closely scrutinized. Should the coffin joint have been penetrated either by the external cause or by the process of suppuration, an acute inflammation of the joint will follow, which will be invariably accompanied by high fever as well as loss of appetite. In all cases of punctured wounds the horn near the seat of injury should be thinned down, a free opening created for the escape of suppurated matter, and the foot itself placed in a poultice. Where the injury is not serious, recovery in a few days' time is ordinarily assured; but where serious injuries have been inflicted, the foot should be treated to a cold bath or the stream of cold water described in the treatment for quittor (q.v.). *Contracted heels,* or, as it is more frequently called, hoofbound, is common among saddle horses and those kept on hard floors in dry stables. Ordinarily but one foot is affected at a time, and one of the forefeet principally. The disease itself is an atrophy or shrinking of the tissues of the foot, which diminishes in particular the diameter of the heels. Another very prevalent cause is faulty shoeing, although it sometimes happens that it results from other diseases of the foot, as, e.g., thrush, side bones, corns, etc. The disease is indicated by a pinched and shrunken frog, high heels, long bars, straight walls, and hoof so dry that it is almost impossible to cut it. The treatment consists first of all of preventive measures. The feet are kept moist and the horn is prevented from drying out by the use of moist sawdust, occasional poultices of boiled turnips, and a free use of greasy hoof ointments on the sole and walls of the feet. Careful shoeing, however, will be found to be one-half of the cure. *Sand cracks* may happen on any part of the wall, although usually they appear directly in front and are called *toe cracks,* or on the lateral parts of the walls and are known as *quarter cracks* (q.v.). The latter usually affect the forefeet, and the former the hind feet. A sand crack, which is a solution of continuity or fissure in the horn of the wall of the foot, may be superficial, involving only the outer parts of the wall, or it may be deep, involving the whole thickness of the wall as well as the soft tissues beneath. The disease is most serious when it involves the coronary band and may be further complicated by hemorrhage, inflammation of the laminæ, suppuration, and gangrene. The predisposing cause of sand cracks is the relative dryness of the horn, although excessive dryness is not more dangerous than alternate changes from damp to dry. Other predisposing causes are heavy shoes, large nails, and bad shoeing in general, together with such diseases as canker, quittor, and suppurative corns. Very little can be done in the way of prevention; but the suppleness of the horn may be maintained by the use of ointments, damp floor, bedding, etc., as well as by proper shoeing. After the fissure has made its appearance, all efforts should be directed to prevent its growing longer and deeper, the usual method being to arrest all motion in the edges. A very simple appliance for holding the borders of a toe crack together is the vachette clasp. This is made of stiff wire and is strong enough to prevent all motion in the borders of the crack. Where these instruments cannot be obtained, a good substitute is to drill a hole through the horn across the fissure and close the crack by means of a thin nail made of tough iron and neatly clinched at each end.

Care of the Horse. Careless and improper feeding and watering are responsible for most of the digestive disorders with which the horse may be troubled. With the horse digestion takes place principally in the intestines, and in selecting food for a horse the anatomical arrangement of its digestive organs and the physiological functions they perform should be carefully studied. All food should be wholesome and clean: the animal should be fed regularly and, because of his small stomach, in small quantities and frequently. A horse should never be fed too soon after a hard day's work. He may be given a small quantity of hay, but one or two hours should elapse before he gets his regular meal. When it is contemplated to change the food, care should be taken to make the change very gradually, and in any case the quantity of food given must be in a direct proportion to the amount of labor performed. Should the horse stand several days in the stable, his food should be of a more laxative nature. The following foods are considered the best: the best hay for horses is "timothy," preferably that about one year old, of a greenish color, and possessing a sweet aroma. A horse fed on grain should be allowed from 10 to 12 pounds of good hay a day. Wheat and rye chaff should never be used. Of the grain foods, oats easily take the precedence. The best oats are one year old, plump, short, hard, bright, and sweet. They are given either whole or crushed. A fair allowance for the average horse is about 12 quarts of good oats a day. Wheat and rye should not be used except in small quantities and mixed with other grains or hay. The bran of wheat is the one most used, although its value is variously estimated. It is always fed with other grains and tends to keep the bowels open. Corn on the cob is generally used as food for horses affected with "lampas." It is better given ground and fed in quantities of from one to two quarts at a meal, mixed with crushed oats or bran. Linseed is occasionally fed with other foods to improve the condition of the skin and keep the bowels open. It is of particular service during convalescence. Steamed or boiled roots and potatoes are frequently used as an article of food; but carrots make the best diet, particularly during sickness. Grass is the natural food of the horse, but it is not sufficient to keep it in condition for work. The amount of water re-

quired by the horse varies according to the character of his food; but, roundly stated, about eight quarts a day will be a fair average. When resting, water should be given three times a day; when at work, more frequently. The very prevalent impression that when a horse is warm he should not be allowed to drink is very erroneous. No matter how warm a horse may be, it is always safe to allow him from 6 to 10 swallows of water. The danger is not in the water, but in the excessive quantity that the animal will take when warm, if not restrained. It should not be given when ice cold. The total number of horses in the United States continues to increase despite the fact that much of the service formerly rendered by horses is now performed by the automobile. The number on farms in 1914 was estimated by the Department of Agriculture at 20,962,000 against 16,736,059 in 1904; the value, in 1914, $2,291,638,000 against $1,136,940,000 in 1904. The number in cities was, in 1910, 3,182,789 against 2,936,781 in 1900.

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HORSE. A miner's term, applied to any intruded material which is the apparent cause of a sudden interruption in the continuity of a mineral that is being quarried, as when a dike of igneous rock cuts across an ore body. In vein mining a detached mass of rock which fills the vein is called a horse, while colliers apply the term to the shale which replaces the coal bed, as well as to such interruptions as seem to have been the channels of small streams, and which were subsequently filled up by the clay that formed the roof of the coal.

HORSE. On shipboard, an iron jackstay or rail used as a guide for a traveler or as a securing bar, usually called a *horse rail*. Also the old name for a footrope on a yard. The secondary footrope at the end of a yard is still called the *Flemish horse*.

HORSE, FOSSIL. Remains of horses, often of extinct species, have been found in the cave beds, river gravels, bone licks, and loess deposits of the Quaternary period, or Age of Man, in almost all parts of the world. In the more ancient deposits of the Tertiary period, or Age of Mammals, have been found remains of a series of ancestors of the horse which illustrate the evolution of this race through this entire geological period, a time probably of some millions of years. Fossil horses of the Age of Man are much like the existing species and are included for the most part in the same genus (*Equus*). They have been found in Europe, Asia, Africa, North and South America, but none in Australia or in the Oceanic islands, except in those which, like the British Isles, were joined to the continental mainland during the early part of the Quaternary period. With these exceptions the animal was of world-wide distribution and inhabited especially the open grassy plains and high plateaus of the interior of the great continents, at the beginning of the Age of Man. All these races were at first wild.

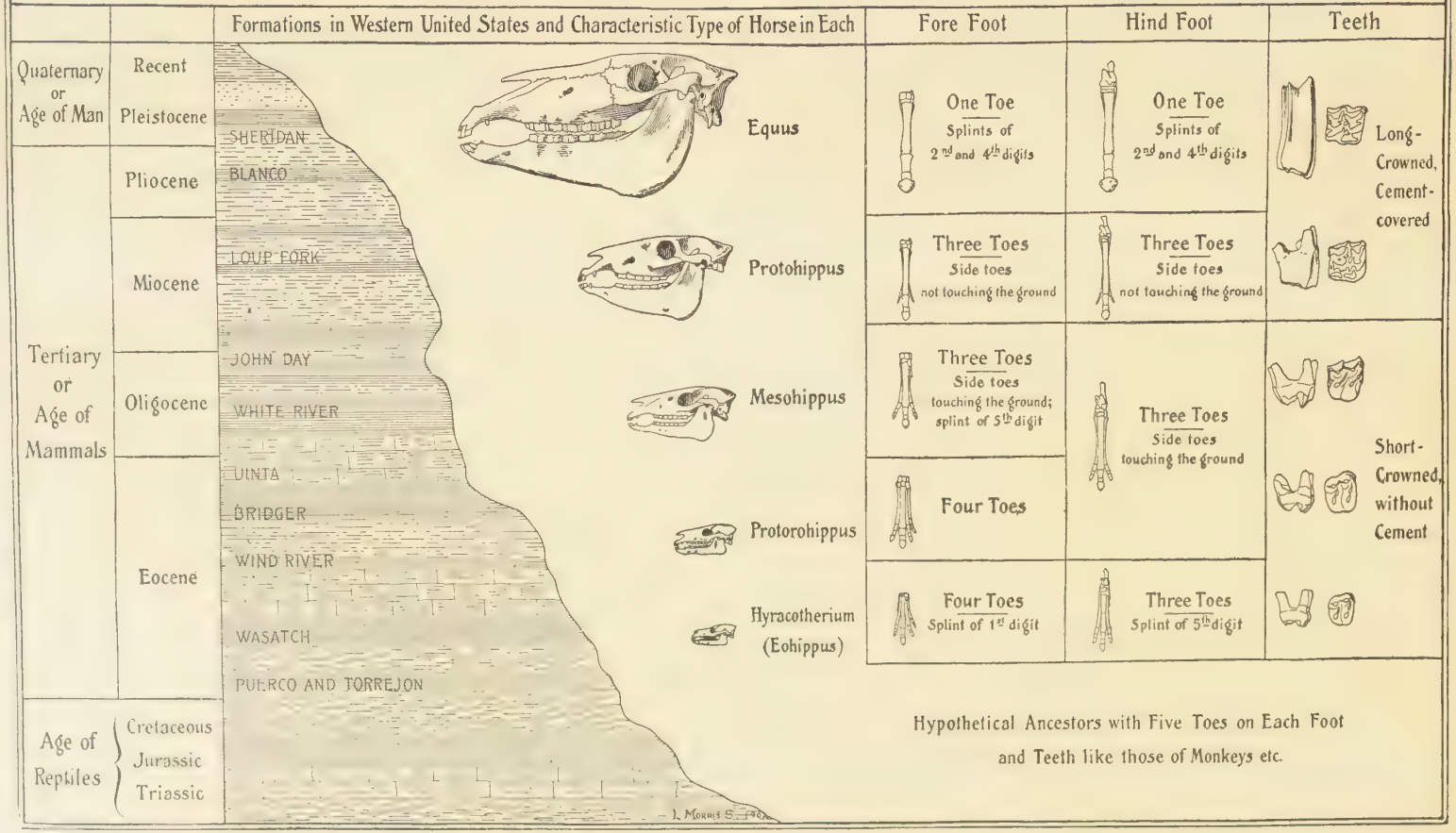
In the New World they apparently became extinct, for when the Spaniards invaded America, they found no horses, wild or domesticated. The Indians, who had domesticated the llama, the alpaca, and the dog, knew nothing of the horse and were astonished and terrified at the sight of the strange and unfamiliar animals which the newcomers rode. Yet, when introduced by the white races, the horse ran wild and flourished and increased greatly in the same regions where its native cousins had formerly lived, showing how well the country was suited to its needs.

In Central Asia two wild races, Przewalsky's horse and the Asiatic wild ass, or kiang (q.v.), persist to the present day; others were domesticated by man in the earliest times, and their use in Chaldæa and Egypt for draft and riding is depicted in the ancient mural paintings. In Africa the larger species became extinct, but the smaller zebras still survive in the southern part of the continent and the African wild ass in the northern part (Somaliland).

The wild species of Europe, a small race, short-legged and shaggy-haired, was domesticated by man, for it is represented in rude prehistoric drawings scratched on bone or ivory by men of the Neolithic or Polished-Stone age.

The domesticated horses now in use are chiefly derived from the Asiatic race, but it is probable that in some breeds there is a considerable

THE EVOLUTION OF THE HORSE.



strain of this European species or variety, and it is possible also that African races may have been domesticated and to some extent mixed with the Asiatic species. The existing wild horses of North and South America, the bronchos and mustangs, are descendants of the animals brought over by the Spaniards; but it is possible that in South America some survivors of the native races still existed at the time of the discovery of the continent, and mixed with the introduced species when it ran wild.

In general, only fragmentary specimens, parts of skulls, bones, or teeth of these extinct horses have been found fossil, so that their characters are very imperfectly known. A number of complete skeletons were found in Texas in 1899, one of which was placed in the American Museum of Natural History, New York. This species, *Equus scotti*, was of the size of a trotting horse, but in proportions more like a zebra, with deep jaw, short neck and legs, and small feet. Another extinct species, the *Hippidium* of Argentina and Patagonia, was large-headed, with extremely short and stumpy legs and feet, exaggerating some of the peculiarities of the Shetland pony, although of larger size.

Tertiary Ancestors of the Horse. The history of the evolution of the horse through the Tertiary period affords the best-known illustration of the doctrine of evolution by means of natural selection (q.v.) and the adaptation of a race of animals to their environment. The ancestry of this family has been traced nearly as far back as the beginning of the Tertiary without a single important break. During this long period of time, estimated at nearly 3,000,000 years, these animals passed through important changes in all parts of the body, but especially in the teeth and in the feet, by which they became adapted more and more perfectly to that particular environment, viz., the open plains of a great plateau region with their scanty stunted herbage, which are the natural habitat of the modern horse.

Equine Characteristics. The horse (including under his name the asses and zebras, as well as the true horses—see EQUIDÆ) is unique among modern animals in the fact that it walks on the extreme tip of the central digit of the foot, corresponding to the middle finger nail of man, and that all the remaining toes have completely disappeared. The feet are greatly elongated, so as to equal the other segments of the limbs in length, and to raise the animal much higher above the ground than if he walked, as does a man or a bear, on the sole of the foot. In each foot the first and fifth digits (thumb and little finger) have completely disappeared and left no trace, while of the second and fourth digits only a small slender rudiment exists which represents the metapodial, or bone of the palm, and is called a splint. These two splint bones lie closely against the cannon bone, or metapodial of the central digit, and are not indicated on the surface of the foot. The modern horse is therefore one-toed.

The teeth are equally peculiar. There are six grinding teeth in a closely set row on each side of each jaw; the crowns of these are very much elongated, so that they can be pushed up in their sockets as fast as they wear away at the grinding surface. The grinding surface displays a complicated pattern caused by infoldings of the enamel of the tooth, the enamel edges being supported on one side by the dentine of the tooth, on the other by a similar substance called cement, deposited on the outer surface of the unworn enamel before the teeth are extruded from the gums. This arrangement secures at all stages of wear a series of hard enamel ridges projecting a little above the surface of the softer dentine and cement, and makes a remarkably efficient grinder for the hard, dry grasses which are the natural food of the horse (q.v.). In the series of animals which lead up to the modern horse we can trace every step in the evolution of these marked peculiarities of teeth and feet, from an ancestor so little suggesting the horse that when first found it was named by Richard Owen, the greatest comparative anatomist of his time, *Hyracotherium* (coney-like beast). Its relation to the horse was not at all suspected and was recognized by Huxley and Marsh only when the series of intermediate stages between *Hyracotherium* and the modern horse was discovered. This first ancestor of the horse line is very much more like the contemporary ancestors of other lines of descent and indicates how all the modern quadrupeds have diverged from a single type, each becoming adapted to its especial mode of life.

Stages in the Evolution Series. The *Hyracotherium* (renamed *Eohippus*) of the Lower Eocene was a small animal, no larger than the domestic cat, with four complete toes on each forefoot and three on each hind foot. There is reason to believe that the still more ancient ancestors of this and all other mammals had five toes on each foot, and in the *Hyracotherium* forefoot we find a splint bone representing the missing first digit, or thumb, while in its hind foot there is a splint bone representing the missing outer (fifth) digit, but here no trace is left of the innermost (first) digit. The proportions of the skull, the short neck and arched back, and the limbs of moderate length were very little horselike, recalling some modern carnivorous animals, especially the civets. The teeth, short-crowned, covered with low rounded knobs of enamel, suggested those of monkeys and of pigs, but not at all the long-crowned complicated grinders of the horse. Beginning with this small and primitive animal, 11 stages have been recognized from as many successive formations, showing the gradual evolution of the race into its modern form. Each stage is characteristic of its particular geological horizon. Some have been found in several parts of the world, but by far the most complete and best-known series comes from the Tertiary Bad Lands of the Western States. Besides the main line of descent, which has led into the modern horses, asses, and zebras, there were also collateral branches, which have left no descendants. Only the more important stages can be mentioned here.

The successors to the *Hyracotherium* were the *Protorohippus* and *Orohippus* of the Middle Eocene. A complete skeleton of the former animal, from the Wind River valley, Wyoming, is in the American Museum of Natural History in New York City. It is about the size of the kit fox, and much like its predecessor, the *Hyracotherium*, except that the splint representing the fifth digit in the hind foot has disappeared.

In the Upper Eocene the *Epihippus* occurs, but only fragmentary specimens have been found. These show that the middle toe was

becoming more prominent, and the side toes, especially the outer toe of the forefoot, were quite slender. Contemporary with this animal was the very much larger *Palæotherium* of Europe, related to the horses, but not in the direct line of descent.

In the Oligocene is found *Mesohippus*, of which several complete skeletons are known. The various species range in size from that of a red fox to a mastiff. There are but three toes in each foot, the outer digit of the forefoot being now reduced to a splint bone and no longer appearing as a separate toe. The central toe in both fore and hind feet is much larger, and the side toes, although they still reach the ground, are quite slender and can support but a small part of the weight of the animal.

The teeth are of the crested or lophodont type, the crests higher and sharper than in the preceding genera. This constitutes the necessary intermediate stage in the conversion of the low, round-knobbed, or bunodont crown into the high, sharply crested crown with cement bracing which characterizes the later horses. See TOOTH.

In the Miocene is found *Protohippus*, in which the side toes, although still complete, are extremely small and slender and do not reach the ground. They can therefore no longer assist in supporting the weight of the animal and are merely useless rudiments. Various species range from the size of a mastiff to that of a Shetland pony. The teeth in this animal are much more like those of the modern horse; the crown is greatly lengthened, the crests or ridges being higher and more complicated, and the valleys between the ridges are filled up with a material (cement) approximating the dentine in texture and hardness. A new and very effective method of grinding is thus begun, for when the sharp enamel crests wear down, they form a double ridge of enamel supported within by dentine and without by cement; the two latter are softer than the enamel and wear away more rapidly, leaving it as a sharp projecting ridge, continually renewed with the wear of the tooth. The tooth is pushed up from the jaw as fast as it wears off on the grinding surface, so that it becomes an efficient grinder for those hard, siliceous grasses which would rapidly wear down a tooth of the old pattern to a useless stump.

In the Pliocene lived the *Pliohippus*, of which very little is known, except that it was either one-toed or had the side toes reduced to extremely small rudiments, and the teeth were much like those of *Protohippus*, which it a little exceeded in size.

In the Pleistocene is found the modern genus *Equus*, of larger size, with but one toe on each foot, the lateral digits represented by splint bones, and with teeth longer-crowned than those of *Protohippus*, enabling the animal to grind hard grasses still more efficiently. Extinct species have been found in Europe, Asia, Africa, North and South America, as we have seen above.

Meaning of the Changes in Feet and Teeth. Along with the disappearance of the side toes in the evolution of the horse there is a considerable increase in the proportionate length of the limbs and especially of the lower part of the leg and foot. The surfaces of the joints, at first more or less of the ball-and-socket kind, permitting of free motion of the limb in all directions, become keeled and grooved like a pulley, thus permitting free motion forward and backward, but limiting the motion in all other directions and increasing considerably the strength of the joint. By this means the foot is made more efficient for locomotion over a smooth, regular surface, but less so over very rough ground, of little use for striking or grasping, or the varied purposes for which the feet of many-toed animals are used.

The increased length in the lower leg and foot increases the length of the stride without decreasing its quickness, for the heavy muscles of the leg are chiefly in the upper part, and to increase the length of the lower part changes the centre of gravity of the limb very little, and it consequently swings to and fro from the socket nearly as fast; for in an ordinary step the leg swings like a pendulum, and the speed of the swing is regulated by the distance of the centre of gravity from the attachment, as that of a pendulum is by the height of the bob.

To increase the length of lower leg and foot will therefore give the animal greater speed; but it puts an increased strain on the ankle and toe joints, and these must be strengthened correspondingly, by converting them from ball-and-socket joints to ginglymoid or pulley joints. Additional strength, likewise at the expense of flexibility, is obtained also by the consolidation of the two bones of the forearm (ulna and radius) and leg (tibia and fibula) into one, the shaft of the lesser bone practically disappearing while its ends become fused solidly to its larger neighbor.

Corresponding with the increase in length of limb, it is necessary for a grazing animal that the head and neck should increase in length in order to enable the mouth to reach the ground. So in the modern horse we find the neck and head much elongated when compared with the little *Hyracotherium*, and this elongation has taken place at equal pace with the elongation of the legs. The reduction and disappearance of the side toes, and the concentration of the step on the single central toe, serve likewise to increase the speed over smooth ground. The soft yielding surface of the polydactyl foot is able to accommodate itself to a rough, irregular surface, but on smooth ground the yielding step entails a certain loss of speed. An illustration is afforded by the pneumatic tire of a bicycle; a soft tire accommodates itself to a rough road and makes easier riding, but a hard tire is faster, especially on a smooth road. Similarly the hard, firm step from the single toe allows of more speed over a smooth surface, although compelling the animal to pick its way slowly and with care on rough, irregular ground.

The change in the character of the teeth from brachydont, or short-crowned, to hypsodont, or long-crowned, enables the animal to subsist on the hard innutritious grasses of the dry plains, which require much more thorough mastication before they can be of any use as food than do the softer green foods of the swamps and forests.

All these changes in the evolution of the horse are adaptations to a life in a region of level, smooth, and open grassy plains, which are the natural habitat of the horse. The race, better fitted at first for a forest life, has become more and more completely adapted to live and compete with its enemies or rivals under the conditions which prevail in the high, dry plains of the interior of the great continents. The great increase in size, which has occurred in

almost all races of animals whose evolution we can trace, is dependent on abundance of food. A larger animal, as may be shown on ordinary principles of mechanics, requires more food in proportion to its size than does a smaller one, in order to keep up a proper amount of activity. On the other hand, a larger animal is better able to defend itself against its enemies and rivals. Consequently, as long as food is abundant, the larger animals will have the advantage over their smaller brethren, and by the laws of natural selection the race will tend to become continually larger until a limit is reached when sufficient food becomes difficult to obtain, and the animal is compelled to devote nearly all its time to getting enough to eat.

Cause of the Evolution. The evolution of the horse, adapting it to live on the dry plains, probably went hand in hand with the evolution of the plains themselves. At the commencement of the Age of Mammals the western part of the North American continent was by no means so high above sea level as now, great parts of it had but recently emerged, and the Gulf of Mexico still stretched far up the valley of the Mississippi. The climate at that time was probably very moist, warm, and tropical, as is shown by the tropical forest trees found fossil even as far north as Greenland. Such a climate, with the low elevation of the land, would favor the growth of dense forests all over the country, and to such conditions of life the animals of the beginning of the Mammalian period must have been adapted. During the Tertiary the continent was steadily rising above the ocean level, and at the same time other influences were at work to make the climate continually colder and drier. These conditions restricted and thinned the forests and caused the appearance and extension of open grassy plains. The ancient forest inhabitants must then either retreat and disappear with the forests or adapt themselves to the new conditions of life. The ancestors of the horse, adopting the latter course, changed with the changing conditions, and the race became finally—as we see it to-day—one of the most highly specialized of animals in its adaptation to its peculiar environment. At the end of the Age of Mammals the continents stood at a higher elevation than at present, and there was a broad land connection between Asia and North America as well as those now existing. At this time the horses became cosmopolitan and inhabited the plains of all the great continents, excepting Australia.

It is a question whether the direct ancestry of the modern horse is to be searched for in western America or in the little-known interior plains of eastern Asia. It is also unknown why the various species which inhabited North and South America and Europe during the early part of the Age of Man should have become extinct, while those of Asia (horse and wild ass) and of Africa (wild ass and zebra) survive. Man since his appearance has played an important part in the extermination of the larger animals; but there is nothing to show how far he was responsible for the disappearance of the native American species of horse.

Parallel Evolution in Other Races. It is interesting to observe that while the evolution of the horse was progressing during the Tertiary period in North America another group of hoofed animals, now extinct, the Litopterna, in South America evolved a race adapted to the broad plains of Argentina and Patagonia, and singularly like the horse in many ways. These animals likewise lost the lateral toes one after another and concentrated the step on the central toe; they also changed the form of the joint surfaces from ball-and-socket to pulley joints; they also lengthened the limbs and the neck; and they also lengthened the teeth and complicated their pattern; but, unlike the true horses, they could not form cement on the tooth, and it was by no means so efficient a grinder. This group of animals, native to South America, became totally extinct and were succeeded by the horses which immigrated from North America, which in their turn became extinct before the appearance of civilized man. Many of the contemporaries of the horse in the Northern Hemisphere, such as the camels in America, the deer, antelopes, sheep, and cattle in the Old World, were likewise lengthening the limbs, lightening and strengthening the feet, and elongating the tooth crowns, to adapt themselves to the changing conditions around them, but none paralleled the horse's evolution quite so closely as did the pseudo-horses of South America.

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HORSE ANT. A popular name for certain hymenopterous insects forming the family Mutillidæ. They are also known as cow ants, cow-killer ants, and velvet ants. Although they resemble the true ants, they are more closely related to the social wasps, though their females are wingless and solitary in their habits. They are ferocious stingers and are clothed with hair. In their early stages some are parasitic in the nests of wild bees. The term "horse ant" is also applied in England to certain true ants of the genus *Camponotus*.

HORSE ARTILLERY. A special type of field artillery, having greater mobility than light artillery and designed especially to accompany cavalry at any gait. The organization of the United States army requires the assignment of one horse-artillery regiment (24 guns) to each cavalry division. In the great European armies the proportion of guns to sabres is usually larger. Most armies use the same calibre and weight of gun and projectile for both light and horse artillery in order to avoid the difficulty of ammunition supply if different calibres were used. Increased mobility is obtained by reducing the weight behind the six-horse team in one or more of the following ways: by individually mounting all the cannoneers on horses instead of on the carriages; by using special light limbers; by reducing the

number of rounds carried in the limbers. Great Britain is an exception to the general custom. Her horse artillery is equipped with a light 13-pounder, the light artillery with an 18-pounder. In the former case the weight behind the team is 3200 pounds, in the latter 4300 pounds. The United States three-inch light-artillery equipment, which is also used for horse artillery, puts 4260 pounds behind the team. The weight of the projectile is 15 pounds. On account of its superior mobility, horse artillery may be used for promptly reënforcing any part of the line; for occupying advanced positions seized by the cavalry; with the cavalry on raids, during reconnoissance in force, in combat, and in the pursuit of a defeated army. See ARTILLERY; FIELD ARTILLERY; ARMY ORGANIZATION; TACTICS, MILITARY.

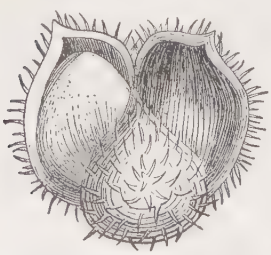
HORSE BALM. See BALM.

HORSE BOT. The botfly of the horse (*Gastrophilus equi*). See BOT.

HORSE-CHESTNUT (so called probably from the large size of the nuts; less plausibly

A HORSE-CHESTNUT TWIG.

explained from the former use of them when ground as food for horses), *Æsculus*. A genus of trees of the family Sapindaceæ, in which the leaves are large, opposite, digitate; flowers with five spreading unequal petals, and the capsule leathery, three-valved, and covered with soft spines. The seeds, of which there are from one to three in each fruit, are large and somewhat resemble chestnuts; but the habit of the tree, its leaves and flowers, are very unlike those of chestnuts, with which it has no botanical affinity. The common horse-chestnut (*Æsculus hippocastanum*) is a much esteemed ornamental tree, extensively used as a street tree in Europe and very frequently planted whenever the climate is suitable, on account of its rich foliage and its erect racemes of beautiful reddish-white flowers, which are produced on the extremities of the branches and contrast admirably with the dark green of the leaves. It is supposed to be a native of Persia or some parts of the East and was introduced into western Europe from Constantinople at the end of the sixteenth century. It attains a great size, sometimes rising to the height of 100 feet and extending its branches very widely. Sometimes they droop almost to the ground. The leaves have long stalks and five to seven obovate wedge-shaped leaflets. The wood is soft, not very strong, nor very durable in the open air, but is used for many ordinary purposes and by carvers, turners, etc. The bark is bitter and astringent, contains a bitter principle called *æsculin*, and has been used in tanning and dyeing. The seeds are unpleasantly bitter and contain so much of the saponaceous substance peculiar to this family that when reduced to powder they may be used for washing. They contain, however, a large quantity of starch, which may be extracted and freed from bitterness by means of an alkaline solution or repeated washing. This starch is prepared on a large scale and at a cheap rate in France. Horse-chestnuts have long been employed in various countries as food for live stock, which are fond of them and grow fat upon them.



HORSE-CHESTNUT FRUIT.

In the other species of *Æsculus* which are natives of North America the foliage is very similar to that of the common horse-chestnut. Both the leaves and fruit of the American buckeye (*Æsculus glabra*) are reputed to be poisonous. This tree ranges from Pennsylvania to Alabama and west to Kansas and Texas. North America possesses a number of other species with very similar foliage, smaller flowers, and smooth fruit. In California the seeds of *Æsculus californica* are used as food by some Indian tribes, as are those of *Æsculus turbinata* in Japan. The seeds of *Æsculus octandra*, the sweet or edible buckeye, are eaten, either boiled or roasted. This species is a shrub with long and beautiful racemes of fragrant white flowers which have long projecting stamens. It is a native of the Southern States. *Æsculus pavia*, a shrub or small tree found from Virginia southward, has bright red flowers. *Æsculus indica* is a lofty tree which grows at elevations of 8000 to 10,000 feet in the Himalayas and produces seeds very similar to those of the horse-chestnut, which, although bitter, are eaten in time of scarcity.

HORSE CREVALLÉ, kre-vàl-lā′. See CREVALLÉ.

HORSE FAIR, THE. A well-known painting by Rosa Bonheur (q.v.), exhibited at the Salon of 1853. After passing through several hands it formed part of the Stewart collection and was finally purchased by Cornelius Vanderbilt and presented by him to the Metropolitan Museum, New York, where it now hangs. There are several replicas by the artist in England and an engraving of the painting by Thomas Landseer. The canvas shows a number of horses on the road to a fair—some with riders, some led, and some free.

HORSE′FISH′, or HORSEHEAD. See MOONFISH.

HORSE′FLY′. See GADFLY.

HORSE′FOOT′ SNIPE. See TURNSTONE.

HORSE GENTIAN. A North American medicinal plant. See FEVERWORT.

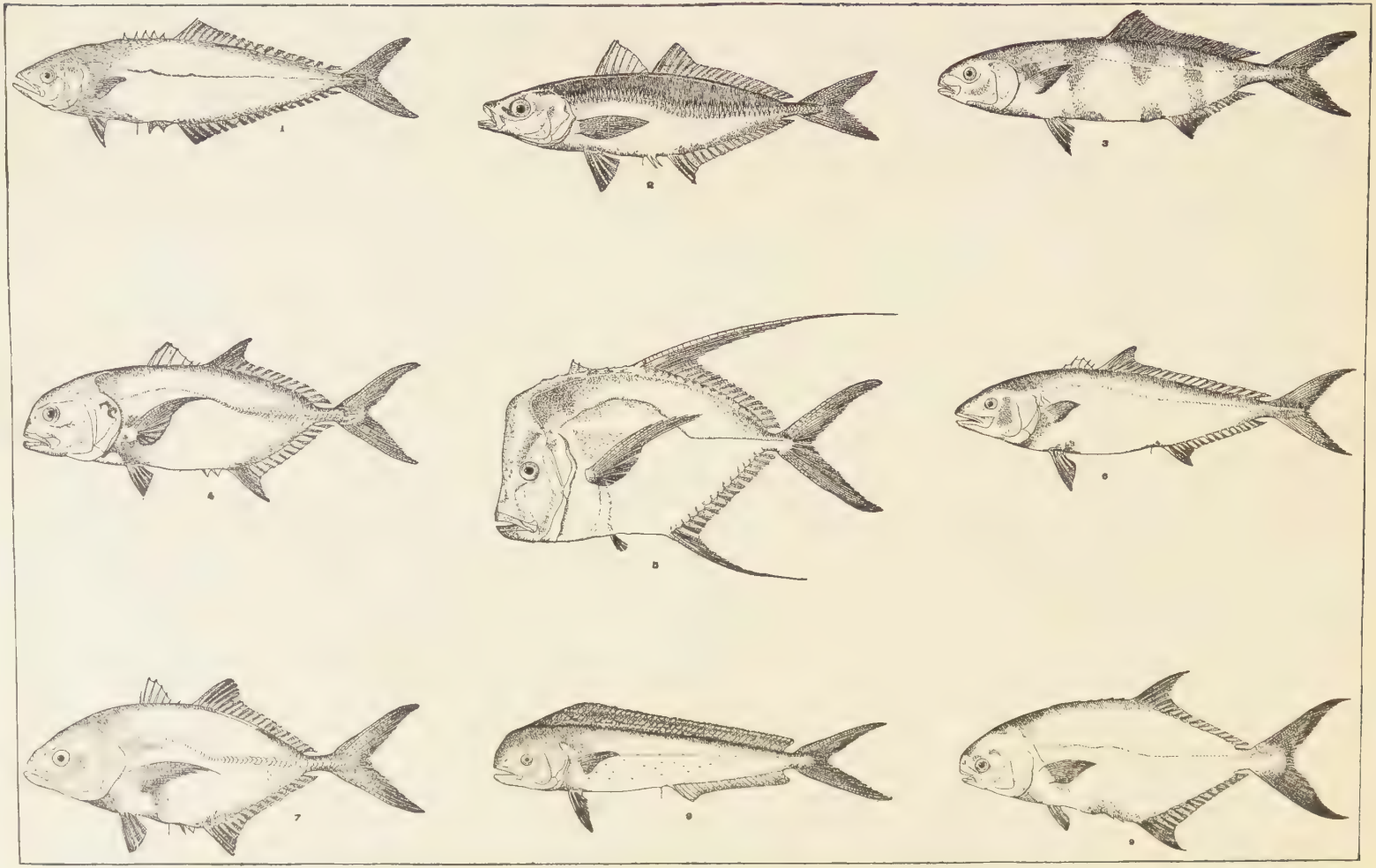
HORSE GRENADIERS. See MOUNTED INFANTRY.

HORSE GUARDS. The military headquarters of the British army and the offices of the

1. HORSE CHESTNUT TREE (Æsculus Hippocastanum) IN BLOOM

2. OHIO BUCKEYE (Æsculus glabra).

HORSE MACKEREL



1. LEATHER-JACKET (Oligoplites saurus).
2. SAUREL (Trachurus trachurus).
3. PILOT-FISH (Naucrates ductor).
4. CREVALLE (Caranx hippos).
5. MOONFISH (Selene vomer).
6. YELLOWTAIL (Seriola dorsalis).
7. JUREL (Caranx latus).
8. DOLPHIN (Coryphæna hippurus).
9. POMPANO (Trachynotus Carolinus).

field marshal, commander in chief, War Office, Pall Mall, London, S. W. It is a term used to distinguish the purely military part of the army organization from that of the civil authority, the Secretary of State for War. The oldest cavalry regiments of the British army are also known as the Horse Guards, the term including the Oxford Blues, first raised by the Earl of Oxford in 1660 and now styled the Royal Horse Guards, or The Blues; and the First and Second Regiments of Life Guards (q.v.), organized in 1661–62.

HORSE LATITUDES. See CALM LATITUDES.

HORSELESS CARRIAGE. See AUTOMOBILE; MOTOR VEHICLE.

HORSELEY POWDER. See EXPLOSIVES.

HORSE MACKEREL. A name given to several species of fishes of the family Carangidæ, and especially in Great Britain to the scad (*Caranx trachurus*) and in the United States to the crevallé (*Caranx hippos*). The carangids are all trim, vigorous fishes and are peculiar in that the teeth, when present, are villiform or conical. Usually the scales are very small, or they may be altogether wanting. In many instances the lateral line is entirely or partially armed with shieldlike, overlapping plates. (See Fig. 2, on the Plate of HORSE MACKEREL, accompanying this article.) The horse mackerels are distributed over all seas except the polar, and their remains go back to Cretaceous time, while they are profusely represented in marine strata of Eocene date. They sometimes gather in enormous shoals and are captured in vast quantities in seines. They are carnivorous and swift and fierce in pursuit of lesser fishes. Their flesh is excellent food. The typical genera are slender, compressed, mackerel-like fishes; but the family includes many others of different form, such as the amber fishes (*Seriola*), the pilot fishes (*Naucrates*), the moonfishes (*Vomer* and *Selene*), and the pompanos. These are described individually under their names elsewhere. Consult A. C. L. G. Gunther, *Introduction to the Study of Fishes* (London, 1880), and G. B. Goode, *American Fishes* (new ed., Boston, 1903). See TUNNY; CREVALLÉ.

HORSE'MANSHIP. The art of managing horses. It is to the Greeks that we must look for our first knowledge of the history of horsemanship, for when primitive man first ventured upon the back of a captured horse is, at the best, a matter of conjecture. The bit could not have been known before the age of bronze, but undoubtedly the first horsemen employed a halter or thong of rawhide passed through the animal's mouth in order to direct and control it. According to the evidence of the Egyptian monuments, bit, bridle, harness, and chariot were employed; and we know from other sources that the bridles of the early horsemen of Egypt and Asia were considerably decorated with tassels, crests, and embroidery, in a manner both rich and elaborate; but anything approaching the modern saddle was unknown to either Egyptian, Assyrian, or Persian. Instead, a decorated and fringed cloth fastened to the animal by a girth was employed to afford the horseman a seat. The warlike tribes occupying the northern border of Greece are credited with the introduction of horsemanship among the Greeks, among whom the art was held in very high esteem. Horse races were a conspicuous feature of their festivals and games; a noteworthy feature in connection with which was the fact that the tact and judgment of the rider were frequently more important factors in gaining the decision than the superiority of the horse. The Athenians were especially devoted to the art, and the rules of horsemanship, so far as the seat is concerned, did not differ in essence from the good horsemanship of to-day. That the Greeks excelled in the exercise is evident from the fact that they were in the habit of taking all sorts of "leaps" (according to Xenophon), "across ditches, over walls, upon and from banks," and in military evolutions particularly, demonstrated their mastery of the art of equitation. The stirrup was not known to the Greeks, and probably its absence helped to make them the finished horsemen they undoubtedly were. The Romans undoubtedly learned the art of horsemanship from the Greeks and, in fact, ascribed the inventions of bridle and chariot, as well as attributed the first conquest of the horse, to their teachers.

Mediæval Horsemanship. Although there is no proof of the fact, it is nevertheless probable that the saddletree had been used for pack animals from a very early date, and that the riding saddle in some form or shape was known before the fifth century B.C., the era of its reputed first appearance. The difficulty of mounting into the saddle encumbered with heavy armor led through a series of contrivances to the introduction of the stirrup.

Modern Horsemanship. The first treatise upon the subject was that published by Federigo Grisoni, entitled *Gli ordini del cavalcare* (Naples, 1550). A contemporary of Grisoni was the celebrated teacher, Pignatelli, who is regarded by many as the author of the foundation of our present system of riding. Two of his pupils, La Broue and Pluvinel, became famous throughout Europe. Subsequent important writers and their works in England are: Blundeville, *The Fower Chiefest Offices Belonging to Horsemanshippe* (c.1570); translations from the Italian, by Gervase Markham (1593) and Sir William Hope (1696); Thomas de Gray, *Compleat Horseman and Expert Farrier* (London, 1639). The Duke of Newcastle's *Méthode nouvelle de dresser les chevaux* (Antwerp, 1648) was first written in English and afterward translated into the language in which it was published. It was for a long period regarded as the great standard authority on horsemanship, although to-day its teaching would be regarded as impossible.

Speaking generally, there are at present two forms of riding, (1) with the stirrup straps shortened so that the legs are necessarily somewhat bent, and the rider is thereby enabled to rise in his saddle when his horse is at a trot, and (2) with the stirrups let down so that the rider's legs are straight and carry practically none of his weight, with the result that he literally *sits* in his saddle, whatever the gait of his horse. The first-named method is commonly employed by English riders. The second form is always used by the American cowboys —among the most expert riders in the world— who doubtless had it from the plains Indians, and is the one adopted by the United States cavalry. It is much less tiring to the horse as well as the rider than is the method which involves more or less constant and considerable use of the rider's leg muscles.

There are several methods of mounting a

horse, each one with its own distinct advantages and disadvantages. Ordinarily the young horseman is taught to mount from either side, but usually from the "near," or left, side of the horse. The common English method is to place the snaffle rein round the third finger of the left hand, grasp a wisp of the horse's mane between the finger and thumb of the same hand, placing the left foot in the stirrup, and the right hand on the cantle, then with a spring to throw the right leg over the horse, and seat oneself in the saddle, meanwhile releasing the mane. The rider next secures the curb reins in the left hand, in such a manner that the left rein is outside the little finger, and the right between the first and second fingers. When the rein has been drawn in sufficiently for the rider to feel the horse's mouth gently, the loose part, or slack, is thrown over the first finger and held between that and the thumb. In America both reins are placed in position in the left hand before mounting. The whip in mounting is held in the fork of the thumb of the left hand and afterward taken into the right hand. The manner of holding the reins differs in different countries of Europe as well as in America, the more general method, other than that of the English already described, being its exact opposite in that the curb is held inside the snaffle. An interesting variant is the method used by the cowboys of the western United States. The single curb rein with which they ride is hung over the little finger of the left hand, the "romel" or permanent quirt attached to the rein, coming up through the fork of the thumb. The hand is laid lightly on the horse's mane as the rider stands by the horse's nigh foreleg facing the rear; he takes the stirrup in his right hand and reverses it, inserts his left toe, and catching the projecting horn of the saddle with his right hand, swings lightly to his seat, the horse being trained to start the instant he feels the rider's weight on the stirrup. This form of mounting has been developed through the necessity of getting on half-broken and often plunging horses.

Upon mounting, the rider should firmly seat himself in the middle of the saddle, which ought to be placed well behind the rise of the shoulders, his legs, which should work in sympathy with his hands, just about covering the girth, so that when using leg pressure to the horse, it may be easily and effectively applied immediately behind the girth. The elbows should hang loosely and naturally from the shoulder, permitting a free use of the hands, which latter should always be in a position to "give and take" without compromising control over the horse, irritating, or otherwise fretting him. The action of the leg, like that of the hand, should be sensitively active and supple, exerting as little pressure as possible, but ready and in position to exert sufficient pressure to maintain the rider's seat and position under any and all circumstances. The horse must at all times be kept well up to the bit, and the rider will do well to remember that guiding the horse military fashion by the pressure of the reins on the animal's neck is not generally advised.

Pacing in America and *ambling* in England are practically the same gait. The two legs on each side rise and fall together. It does not call for any different method of riding than that employed for the walk. The *trot* is a diagonal pace, the right fore and left hind legs working together and alternately with the left fore and right hind legs. It is possibly the most perfect pace of the horse. The body should be erect, but playing loosely from the hips; the legs must not be allowed to swing backward and forward, nor must the rider work his shoulders. The expert horseman rides by the aid of grip and balance, the former always ready should the balance be disturbed and there be any danger of a throw. The pressure of the legs should be according to the demand of the moment, ready to keep the rider from losing his balance, which latter saves the strain of a constant exercise of the grip. The *canter* is a very comfortable pace to the rider. It is not a natural pace, however, but, on the contrary, is fatiguing to the horse and particularly injurious to the animal's forelegs. When cantering in a circle, the horse should be made to lead with his inside leg, i.e., with the right leg if cantering to the right and with the left if cantering to the left. To secure this the rider when preparing to canter should pull the right rein rather tighter than the left one, so that the horse in describing a small portion of a circle will of necessity lead with the right leg.

The Gallop.—In this pace the movements of the horse follow so quickly one on the other that the eye cannot detect the various positions which constitute a cadence. The first preparation for the rider is a firm seat, which should be well down in the saddle. The reins are shortened slightly, and the hands kept low; at the same time the body should be leaning slightly forward and a moderate grip maintained with the legs. Care must be taken that the horse is held together and restrained from breaking into a headlong gallop and possibly beyond the rider's control. To avoid this the reins are held somewhat tighter in the gallop than in any of the other paces.

Leaping requires good nerves as well as a good seat. The rider must be careful to maintain an upright position in the saddle until the horse is close to the jump, when (if it is a fence) he should swing well back from his hips, keeping his hands low and clear of the withers. The feet should be drawn back and never under any circumstances allowed to swing forward towards the animal's shoulders. Should the feet be forward and the horse make a mistake on landing, the rider would be more easily thrown than if his feet were in the proper position. In landing, the horse makes contact with the ground on one foreleg followed instantly by the other, after which come the hind legs. When jumping natural obstacles, such as water, ditch, etc., the general rule never to ride fast at an obstacle holds good, although expert horsemen interpret the rule to suit themselves; in any event, the rider must be careful not to pull at the reins or in any way check the horse in his effort to jump either water or ditch. Much depends on the horse in leaping, no two going at the jump in exactly the same style. One may need a little encouragement and another a great deal of steadying, so that it is an important essential for the rider to know his horse. When nearing the jump, the reins should be tightened so as to secure a firm hold of the head and at the same time make him shorten his stride so that he may the better gauge his distance. It requires some little experience on the part of the rider before he is able to tell when the horse is in his proper stride. When the animal is properly collected and is nearing

the obstacle, the hold on the reins should be relaxed, and care taken that the free action of his head or limbs is in no way interfered with by pulling, etc. On landing the rider should gently feel the animal's mouth. The horse will then collect himself, all four legs will make contact with the ground, and he will be away again without any hesitation.

The common vices of shying, bolting, kicking, rearing, etc., are much more serious in a horse kept for the saddle than in one used for driving. The horseman will usually be able to tell when his mount is about to shy, so that he will slacken the pace gently and at the same time keep a firmer hold upon the rein on the side towards which the horse is leaning. On no account should he prepare for it by giving his horse any intimation that something unusual is to happen; neither should he whip or spur, or, as is sometimes done, strike him on the head on the side towards which it is feared he will plunge. The important thing for the rider is to grip fast with the legs, preserve his balance, and be careful not to hang on by the reins. If necessary, stop and encourage the horse by patting him on the neck and otherwise making much of him.

Perhaps the most dangerous vice next to rearing is that of *bolting* or *running away*, which in many instances, however, is only exuberance of spirits on the part of the horse which temporarily overcomes the control of the rider. With a skillful and ordinarily strong horseman it is very rarely that a horse runs away, but where bolting does happen the method of combating it will depend very much on the country and route the runaway selects. Where the route abounds with sharp turns or shut gates, the danger to be feared will be the running into a fence or gate; but on a road not much frequented and well known to the rider, it will generally be possible to guide the horse past any vehicle which may be met or overtaken. In such a case the rider should not hesitate to turn the rein around his hand and pull with all his strength towards the side he desires the horse to take. "Sawing the mouth," though not horsemanship, is permissible, if by its employment only the runaway can be brought to a standstill. A kicking horse should be approached and treated very carefully, and if a vicious kicker should, if possible, be just as carefully avoided. The rider usually has some sort of warning, such as the laying back of the animal's ears, in which case he should sit well back and secure his grip. Only the expert horseman should attempt to ride a rearing horse; for no amount of nerve will suffice to guard the rider from the terrible injuries likely to occur if a rearing horse should fall back on him. Of all horses, the rearer should be the most carefully shunned. There is only one thing for the rider to do in such an emergency —to remember not to hold the reins tight or use them in any way as a support. On the contrary, he should catch hold of the horse's mane, or place an arm round his neck and try in that manner to force him back on his feet.

Military horsemanship is designed to secure a uniformity of style and method, and the best results from both horse and rider. Long stirrups are used; the rider sits well down in the saddle, his seat being preserved largely by balance. *High school* riding is largely an accomplishment of the manège and includes skill in horsemanship and in the performance of feats requiring a trained animal. Women are now taught to ride astride as well as by means of the sidesaddle. Hygienic reasons are advanced in favor of the former method, but authorities generally are doubtful of their reasonableness. A fair statement of the question would be that a poor horsewoman derives little benefit from either method and runs a minimum of risk of injury when riding astride; a clever horsewoman will invariably ride sidesaddle with a greater degree of comfort, enjoyment, and safety, than when riding astride.

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HORSE MEAT. See HIPPOPHAGY.

HORSE MUSHROOM. See Colored Plate of FUNGI, EDIBLE.

HORSE MUSSEL. The large mussel (*Modiola modiolus*) growing abundantly on salt meadows as well as under water. See MUSSEL.

HORSE NETTLE. See SOLANUM, with Illustration.

HORSENS, hôr'sĕns. A seaport of Denmark, in the Province of Aarhus, situated at the head of the Fiord of Horsens, 32 miles southwest of Aarhus (Map: Denmark, C 3). The town possesses a fine church with carvings of the seventeenth century, an old convent chapel, and a high school. The chief industries are weaving, ironworking, shipbuilding, and the manufacture of woodenware and lime. The town carries on an active trade, importing grain, hay, and fertilizers, and exporting dairy products, pork, and beef. Pop., 1906, 22,237; 1911, 23,843.

HORSE POWER. A unit for the rate of work, or for the power represented by a force exerted through a path or distance in a unit of time; usually the minute, though sometimes the second, is taken. The term originated in the eighteenth century, when the mechanical force of expanding steam in engines was replacing the muscular force of horses in hoisting and pumping in the British mines. What number of horses formerly used would the steam engine replace? was the question asked. Experiment by Boulton and Watt using the massive dray-horses of England showed that a horse could lift 330 pounds at a rate of 100 feet per minute,

which of course was the same (if gearing were to be used) as lifting 33,000 pounds one foot in a minute, or 550 pounds one foot in one second. Accordingly steam engines at that time and since have been designed and sold on this basis. The quantity, however, must be used with reserve and care as the measure of the work which a horse can do in traction or otherwise. D'Aubuisson, taking the work of horses of lighter weight working on capstans at Freiburg, made the unit 16,440 foot pounds; Desagulier under similar circumstances made it 44,000 foot pounds; Smeaton, 22,000; Tredgold, 27,000. The horse can haul for a few seconds greatly in excess of this rate; for eight hours he will average less. A muscular man usually develops one-tenth of a horse power, but cannot keep this up all day.

In calculating horse power of mechanical motors the pressure in pounds per square inch exerted over the area in square inches which receives this pressure, when multiplied together, gives the total force in pounds. This force multiplied by the number of feet per minute through which this force is exerted gives the total of foot pounds. As often as 33,000 is contained in the total foot pounds, so many horse-power units will the motor develop. In the steam engine the mean pressure of each stroke multiplied by the piston area, each in square inches, gives the force in pounds per stroke; the stroke in feet multiplied by the number of traverses of the piston in the cylinder per minute gives the feet passed over. The product of these factors divided by 33,000 gives the horse power. In symbols:

$$\text{H.P.} = \frac{\text{P.A.L.N.}}{33{,}000}.$$

The kilowatt (q.v.), or the electrical unit consisting of 1000 watts, is the electrical unit of rate of work, corresponding to 1.3405 horse power of mechanical work, and is being urged as a more defensible unit than the horse power which has been used for over a century.

HORSE RACING. The earliest recorded organized trials of speed with horses were the chariot races at the Greek national festivals, of which the most notable were the Olympic games (q.v.), held every fourth year. Greek sculpture frequently represents the horse as used for riding, apparently without a saddle in most cases; but not as so employed for sport, except as an incident to the chariot racing. On the other hand, the horses in the Roman contests were to a very great extent ridden. All the formalities of entering and of differentiation of classes and of starting were minutely laid down and followed, even to the color of the riders' uniforms. In the earlier times these Roman races were held on the open plain. There has always been a tradition in England that on Salisbury Plain, just outside Stonehenge, the remains of a Roman race course exist; and the oldest race which still takes place in England is run over a flat meadow just outside the walls of the Roman city of Chester. The natives, too, were great horsemen and charioteers, and contests were likely enough to be provoked at the feats which the Romans took with them the world over. Their successors, the Saxons, maintained the use and training of the horse; when Hugh Capet sought the hand of the sister of King Athelstan, in the ninth century, he brought as a propitiatory present several "running horses." Fitzstephen, in his description of the city of London, written at the end of the twelfth century, says that "races are common, of which the gentry and wealthy citizens are very fond." In the metrical romance of "Bevis of Hamtoun" we get our first account of a regular recurring annual meet of racing horses. In 1540 the mayor of Chester presented a silver bell to be given to the winner of a race five times round "The Roody." The horse that won not only bore away the bell, but 8 or 10 pounds, "which moneys were collected of the citizens for that purpose." In the reign of James I (1603–25) public race meetings were held at Garterly in Yorkshire, Croydon in Surrey, Linton in Cambridgeshire, and on Enfield Chase. In the days of his successor, Charles I, Newmarket, now the metropolis of the racing world, first came into prominence, and Oliver Cromwell, whose farm at Coveney was only a few miles from Newmarket, bred and kept race horses. Charles II was a great patron of the turf.

The horses that practice flat racing are known the world over as thoroughbreds, yet, as a matter of fact, they are the product of cross-breeding continued for many centuries. Vegetius, who wrote in the fourth century, gave to African horses of Spanish blood the first place as chariot racers, but commended the Persian as the best saddle horse. James I bought a very celebrated Arab for breeding purposes; but the Darley Barb, imported in 1705, laid the foundation (through his great-grandson Eclipse, born 1764) of the modern turf. He was the sire of Almanza and Aleppo, but his best-known son was Flying Childers. This importation was followed by many others of sires and dams, among which the Taffolet Barb and the white-legged Lowther Barb are the best known. The Byerly Turk produced Highflyer, and the Godolphin Arab was the grandsire of Matchen. Among the horses whose names have become familiar may be mentioned: Diomed (who won the Derby in 1780 and was exported to America), Bay Middleton, The Flying Dutchman, West Australian, Blink Bonny, Hermit, Galopin, Bend Or, Saint-Simon, Saint-Blais, Ormond, and Persimmon.

There is no radical difference between the methods of training horses for flat racing in England and America, except in the time of taking the foal in hand. In England the majority of foals are practically left to nature until well into the second year. In America, on the other hand, so considerate a trainer as W. E. Wishard would have them backed when weanlings at nine months and tried out when 15 months old. A thorough preparation for a great race is a long and troublesome operation, depending largely upon constitution, general capacity, and temperament. It has been found that practically the speed of almost all horses can be equalized by addition or subtraction of weight to be carried when running. See HANDICAPPING.

The most celebrated race course in England is Newmarket, established in 1667, where the Cambridgeshire, the Cesarewitch, the 1000-guineas, and the 2000-guineas are annually run. There are six meets there in the year, in May, July, and October, each occupying two weeks, with an interval of a week between them. The Derby (see DERBY DAY) has been run at Epsom since 1730, and the Oaks since 1779. The Ascot meeting has been continuous since 1727, and Goodwood since 1802. The other most im-

portant races are at Doncaster, Lincoln, Chester, and on the Curragh of Kildare, Ireland. The Jockey Club, a semipublic organization, is the flat-racing authority. In France within the last 30 years great interest has been taken in breeding and racing the thoroughbred. The Grand Prix de Paris, which is run at Longchamps, near the capital, is one of the great races of the world. Austria, too, has its enthusiasts, and in Australia flat racing is a national pastime.

In America the first and natural home of the thoroughbred was in the South, where the early settlers were of the class which in England made the breeding and care of high-mettled horses one of their delights. Many well-known horses were imported. Diomed, the Derby winner already mentioned, of the Byerly Turk blood, was one of them. He was brought over by Col. John Hoomes, of Virginia, and became the sire of Sir Archy, who in turn was the father of American Eclipse, Vingt Un, and other well-known horses. Another of these importations was Messenger, by Blais (the son of Flying Childers and grandson of the Darley Barb) out of Turf, a descendant of the Godolphin Arabian, thus combining on both sides the best thoroughbred blood in the world. Breeding continued with great success, so that in 1881 Pierre Lorillard was able to send over to England his Iroquois and win the Derby.

Even in the North flat racing flourished as early as 1812. In 1830 Barefoot, a Saint-Leger winner, found a home in Westchester, N. Y., and was raced there against his great rival, American Eclipse. The Wagner-Grey Eagle contests caused unparalleled interest there in the autumn of 1839, and Lexington and Le Comte had their famous meetings in New Orleans in 1854–55.

The Civil War was a temporary check to thoroughbred racing, and although scarcely a city of any size was without a course, it was not until the American Jockey Club was formed, with August Belmont (q.v.) as chairman, and Jerome Park (in 1886) was constructed by Leonard W. Jerome, that racing in the modern sense became a widely spread pastime. The Coney Island Jockey Club at Sheepshead Bay, the Brooklyn Jockey Club at Gravesend, the Brighton Beach Racing Association at Brighton Beach (all in Brooklyn); the Westchester Racing Association, at Morris Park, N. Y.; the Monmouth Park Jockey Club, at Long Branch, N. J., and minor tracks at Elizabeth and Linden, N. J., followed. Enormous sums were added by the clubs to the entry fees, and racing was at the height of its popularity. The Board of Control, made up of race-track and race-horse owners, was formed, and, under the Ives Pool Law, which permitted open betting, New York City became racing mad. Scandals became frequent, and under great agitation the Ives Law was repealed. Members of the Coney Island, Brooklyn, and Westchester clubs got together and formed the Jockey Club in 1894, and stringent rules regarding racing were enacted. The Gray-Percy Racing Law was passed, and betting was made punishable by civil suit when carried on within a race track and made a felony outside its gates. A State Racing Commission was instituted (1895) and the tracks racing under the law were taxed 5 per cent of their receipts for the benefit of the agricultural fairs throughout the State. Under this control the Aqueduct, Jamaica, and Queens, L. I., tracks were built—the first two, new organizations; and the last named, Belmont Park, a magnificent race course, to take the place of Morris Park. Saratoga's track was bought by members of the Jockey Club and restored to much of its old popularity.

The demoralizing effects of this wholesale public gambling, and the rank dishonesty of the methods under which much of the racing was conducted, finally aroused and crystallized intelligent public opinion against it in various parts of the country. In 1905 Illinois passed laws forbidding race-track betting, and this put a stop to racing in Chicago. In New York it received its deathblow in 1908 from Gov. Charles E. Hughes (q.v.), who, in spite of most powerful and unscrupulous opposition, forced the Legislature to pass acts (chaps. 506, 507, 131st Session, June 11) declaring horse racing for stakes a public nuisance (with certain exceptions) and making pool selling, bookmaking, betting, etc., misdemeanors. This practically put an end to racing in New York. In 1914 a decision of the Appellate Court of the State held that individuals as such could make and record bets; but this decision did not materially change the effect of the law of 1908, so far as racing in the State was concerned. Consult: Cook, *History of the English Turf* (3 vols., New York, 1904); Watson, *The Racing World and its Inhabitants* (London, 1904); Busbey, *Trotting and Pacing Horses in America* (New York, 1904) and *Recollections of Men and Horses* (ib., 1907); Parlin, *American Trotter* (Boston, 1905); Trevathan, *American Thoroughbred* (New York, 1905); *American Trotting Register* (Chicago, issued annually). See TROTTING.

HORSE'-RAD'ISH (*Cochlearia armoracia*). A perennial herb of the family Cruciferæ, with long, cylindrical white roots of strong pungence, due to a volatile oil which resembles mustard oil. It has flower stems about 2 feet high, large, much-veined, oblong, crenate root leaves on long stalks, and elongate-lanceolate stem leaves. It grows in damp meadows in the middle and south of Europe, is naturalized in many places in America, and is cultivated for the sake of its roots, which are scraped or grated down and mixed in salads or used as a condiment. Horse-radish root is used also in medicine as a stimulant and is often useful in promoting digestion; it is also regarded as an antiscorbutic and is sometimes applied as a rubefacient instead of mustard. Since horse-radish does not produce seed, it is generally propagated by root cuttings planted in rich, moist soil and treated as an annual. The crowns are also sometimes used, but they do not produce as good roots. Horse-radish is very difficult to eradicate from the ground in which it has become established, as almost any portion of the root will grow.

ROOT OF HORSE-RADISH.

HORSE-RADISH TREE (*Moringa pterygosperma*, by some written *Moringa moringa*). A tree of the family Moringaceæ, native of India, and introduced into the West Indies and other tropical countries, in many of which it is cultivated for its fruit, which is either pickled or

eaten as a vegetable. The fresh root and the leaves suggest the odor and flavor of horse-radish—hence the common name. Its winged, triangular, globose, bitter seeds furnish about 30 per cent of a bland, inodorous, nearly colorless fixed oil of long-keeping qualities which resembles olive oil and is similarly used. At a temperature of about 32° F. a deposition of its solid fats occurs, and the remaining clear fluid is removed for use in the extraction of perfumes from flowers and the lubrication of delicate machinery. The oil is known as ben oil or behen oil—a name which is said to be misapplied, since it is claimed properly to belong to the oil obtained from the wingless seeds of *Moringa aptera*, a tree native to Abyssinia and Arabia. The oil of neither species should be confounded with bene oil, which is derived from the seeds of *Sesamum indicum*. (See SESAMUM.) In Australia the name "horse-radish tree" is given to species of *Codonocarpus* on account of the pungency of the leaves.

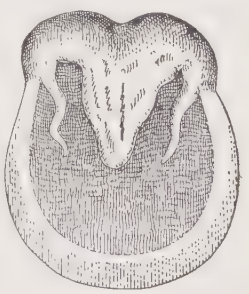
HORSESHOE BAT. See BAT.

HORSESHOE, or HORSEFOOT, CRAB. See KING CRAB.

HORSESHOE FALL. The name given to the portion of Niagara Falls included between Goat Island and the Canadian shore, also called the Canadian Fall. See NIAGARA RIVER AND FALLS.

HORSE'SHOE'ING. An artificial protection of some kind for the horse's foot has been well said to be "one of the penalties which civilization inexorably exacts." When it is remembered that every time that a horse is shod it implies damage to the foot and that the best and most expert shoeing of necessity inflicts some injury, the importance of horseshoeing to the horse owner is evident. All authorities agree "that there is no such thing as absolute immunity from an evil which must always exist in inverse ratio to the skill displayed in the execution of the work." The value of the domesticated horse to man is in his fleetness and strength. It was early discovered, however, that his usefulness was limited by the condition of his feet, so that the history of horseshoeing is practically an account of the various devices that have led up to the modern shoe.

The entire weight of the body, as well as the pressure of every muscular effort, is largely concentrated in the feet. The nails or claws and their corresponding digits of other animals have in solipeds disappeared from atrophy, with the exception of the middle digit, which became much more developed and surrounded by an hypertrophied nail called the hoof, the structure of which is designed to meet every requirement of the animal except those that have devolved upon it since its domestication, such as constant traveling over hard roads or stony ground. Should the horn of the hoof be worn away, the structures which it was designed to protect are of necessity injured, the animal becomes lame, unable to work, and consequently ceases to have any value. According to Diodorus, Cinnamus, and Appian, entire armies were occasionally jeopardized through the breaking down of their horses by reason of worn hoofs. Xenophon sought to solve the problem by making the hoofs hard and tough; and from other Greek and Roman writers we learn that resort was had to socks or sandals (*ippopodes, embatai, carbatinai, solea*, etc.). These were clumsy as well as ineffectual means of protection; but, strangely enough, they have their modern counterpart in the straw sandals still to be seen in various parts of the Japanese Empire. According to Beckmann, *Beiträge zur Geschichte der Erfindungen* (Leipzig, 1792), it was greatly to be doubted whether the Romans practiced, as was alleged, the art of shoeing, by attaching a metal plate or rim to the horse's foot—a doubt strengthened by the fact that on no monuments or sculptures (so far as was then known) in which horses appear could any evidence of shoeing be seen. On the other hand, a bas-relief dating from the second century, at present in the museum of Avignon, shows a chariot drawn by horses which are unmistakably shod; and Cohen, in his *Description des monnaies frappées sous l'empire romain*, tells of a medal supposed to date from the time of Domitian commemorating a cavalry victory upon which was a design of two horseshoes, surrounded by two twined serpents. Another coin, in the British Museum, from Tarentum, about 300 B.C., is supposed to represent a horse being shod. According to historical writers the horses of the Huns when they invaded Europe were shod. Some evidence that nail shoes were employed previous to the sixth century is perhaps supplied by Chifflet (*Monuments de la monarchie française*), who tells of a fragment supposed to be part of a horseshoe found by him at Tournay in the tomb of Childeric (King of the Franks, died 481 A.D.). Absolute evidence as to nail shoes in the ninth and tenth centuries is comparatively plentiful, not the least important being the *Tactica Imperatoris Leonis* of Emperor Leo VI, dating from the ninth century. There is no reason to doubt that the Arabs of the Hejira (622 A.D.) shod their horses with iron; while, according to the *Chroniques de Saint-Denis*, Charlemagne was capable of breaking with his hands an "iron" shoe belonging to his horse. In the nature of things it was not likely that shoeing with iron was at all common in the early part of the Middle Ages. William the Conqueror is believed to have introduced the art into Britain. For centuries the art of the shoesmith ranked with that of the scholar and bard in England and France, and not only noblemen, bishops, and squires, but even kings, practiced the craft. In fact, according to Solleysel (c.1665), a knowledge of the art was a necessity for all persons of high estate, which explains the fact that many of the oldest families of England, France, and Poland have to-day a horseshoe device in their insignia. Occasionally shoeing took the form of extravagance, as when Poppæa, the wife of Nero, had her mules shod with shoes of gold—a fantastic fashion often recorded in history. As late as 1616 the English Ambassador to France entered Paris riding a horse whose silver shoes were so lightly fastened on that when he came to a spot where "eminent men or beautiful women were standing" he caused his steed to prance, and so cast its shoes, which were scrambled for by the crowd.



NORMAL FOOT READY FOR SHOEING.
Illustration of healthy frog and bars.

His "argentier," wearing a rich livery, replaced the shoes with similar ones just as loosely fastened.

Modern Horseshoeing. The advanced farriery of to-day owes its excellence to modern veterinary science; so that there is no longer

TOE-WEIGHT SHOE. SHOE TO BALANCE ACTION; HIND FEET. SIDE-WEIGHT SHOE FOR HIND FEET.

excuse for the ignorance which in comparatively recent times was universal, and which even to-day is prevalent to some extent. Notwithstanding State examinations and increased general knowledge, it is admitted that the horse's feet are unnecessarily mutilated by wholesale cutting, regardless of the anatomy, physiology, and economic relations of the parts of the hoof. This

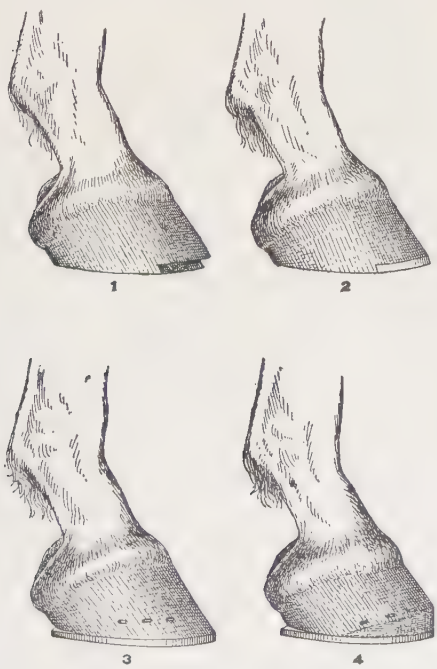


FIG. 1. FOOT PREPARED FOR CHARLIER TIP.
FIG. 2. THE CHARLIER TIP.
FIG. 3. RIGHT FITTING SHOE.
FIG. 4. WRONG FITTING.

practice is followed solely on the score of tradition; and, great as the financial loss has been, it is little compared to the agony which horses have endured. The frog of the hoof is designed to act as a cushion which by its elasticity protects the other structural parts from jar and harmful concussion. Normally the resilience of the frog helps to maintain the natural expansion of the hoof—a vital function which is entirely destroyed by the too common use of the "drawing knife," and which converts what should be a means of protection into a source of danger. The further fault of paring down the sole until the living structures within are almost exposed through the soft, moist, half-formed horn, which is all that the paring knife has left, is very severely condemned. Bad farriery and shoeing are frequently guilty of still further maiming the horse in endeavoring to improve upon nature by removing the bars, or "opening" the heels; such a foot becomes predisposed to contraction of the heels. In the effort to use a shoe too small for the foot the rasp is brought into play, and the foot made to fit the shoe. It is generally conceded that the outside or horny wall of the hoof, together with that portion of the sole which is in immediate contact with it, and upon which the shoe should rest, are the only portions which require paring, and then not with the knife, but with the rasp. There is considerable difference of opinion among authorities with regard to the various details of shoeing, but all are agreed on the barbarity as well as uselessness of the frog and sole mutilation already described.

The shoe should be as light in weight as the circumstances will permit, the determining factors being the weight of the horse and the nature of the work it must do. The old adage that "an ounce at the toe means a pound at the withers" is undoubtedly true in essence, but a still greater handicap is the increased concussion inseparable from progression. It is not true that a heavy shoe necessarily wears longer than a light one, while it is well known that a light shoe is just as effective as a heavy one in performing its legitimate mission of preventing undue wear of the walls of the hoof. The shoe should be made to conform exactly to the natural tread of the foot and should be permitted on no account to remain on for too long a time, as the truncated cone of the hoof, which has its base downward, constantly increases in circumference, so that in time the shoe becomes too small and a source of pain to the horse. Common errors in shoeing are the employment of too many and too heavy nails and the driving of them too high up into the walls. If shoes could be securely attached and safely worn without the use of nails, much would be gained: but although numerous alternative devices have been put on the market, the best of which fastens the shoe by means of metal bands or

stubs, none has been found to be generally satisfactory.

Winter shoeing demands that the shoe be capable of affording foothold as well as protection against undue wear, and for this purpose shoes are made fashioned with toe and heel calks, or calkins. Care is necessary to avoid making the calks any larger than is absolutely necessary, or else serious injury may be done to the horse. The art of shoeing for specific purposes is of American origin and is a result of the development of the trotter. At first designed to influence speed or action, shoes are now made to remedy defects, natural or acquired, due to faulty conformation or bad habits. Shoes for racers, trotters, and speed horses generally have an adaptable variety of form and principle. Among those designed to remedy defects in the horse most generally employed in the business and pleasure of the community at large may be mentioned the scoop-toed or roller-motion shoe for the forefeet and a shoe for the hind feet, designed to do away with "forging," or "clicking." The scooped or rolled toe hastens the action of the forelegs and enables them to avoid being struck by the hind foot; while the lengthening of the branches of the hind shoes, by increasing the ground surface, retards the "breaking over" of the hind foot. A common practice to open the action is to increase the outside web of the hind shoes. The faults of "dishing" or "paddling" are remedied by similar devices. The principal diseases common to neglected or faulty shoeing will be found treated under HORSE, or under their own title throughout the work.

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HORSESHOES, LUCK OF. See SUPERSTITION.

HORSESHOE SNAKE (so called from its markings). A large, handsomely marked colubrine serpent (*Zamenis hippocrepis*) of the Mediterranean region, closely allied to the American black snake.

HORSE'TAIL', or HORSETAIL RUSH (so called from the shape). A common name given to species of *Equisetum* (scouring rush), a genus which is the only living representative of one of the great orders (Equisetales) of Pteridophytes. See EQUISETUM.

HORSETAIL FUNGUS. See Colored Plate of FUNGI, EDIBLE.

HORS'FORD, EBEN NORTON (1818–93). An American chemist, born at Moscow, Livingston Co., N. Y. He graduated as a civil engineer at the Rensselaer Polytechnic Institute in 1838 and was engaged during the following year on the geological survey of New York State. In 1844 he went to Germany and studied chemistry for two years under Liebig. From 1847 to 1863 he held the Rumford professorship on the application of science to the useful arts at Harvard College. He left Harvard to engage in chemical manufactures. He endowed the library and laboratory of Wellesley College. He was interested in antiquarian research and was generally credited at one time with having identified the site of the supposed Norse settlement Norumbega (q.v.) as being on the Charles River near Boston. His dictionary of the Iroquois and Algonquin languages is a valuable contribution to Indian philology. He published *The Discovery of Norumbega* (1892).

HORSLEY, hôrs'lĭ, ALFRED E. See ORCHARD, HARRY.

HORSLEY, JOHN CALLCOTT (1817–1903). An English genre painter, born in London. He studied at the Royal Academy's schools, became R.A. in 1864, and treasurer in 1882, retiring in 1897. He received several prizes for his cartoons at the Westminster Hall competition in 1843 and painted al fresco the "Spirit of Religion," in the House of Lords, and "Satan Touched by Ithuriel's Spear," in the Poet's Hall of the palace of Westminster. Some of his easel paintings are: "Malvolio in the Sun"; "L'Allegro" and "Il Penseroso," both done for the Prince Consort; "Caught Napping"; "Scenes from Don Quixote"; "Healing Mercies of Christ"; "Hide and Seek." During the eighties, on account of his energetic protests against nudes, he was referred to by *Punch* as Mr. J. C(lothes) Horsley. The color of his pictures is good, but the motives are often strained. He wrote *Recollections of a Royal Academician* (New York, 1904), and for many years was prominent in organizing the winter exhibitions of "Old Masters" at Burlington House.

HORSLEY, SAMUEL (1733–1806). An English prelate. He was born at St. Martin's-Place, London, Sept. 15, 1733. He was educated at Westminster School and Trinity Hall, Cambridge. In 1758 he became curate to his father, then rector of Newington, and the next year succeeded to the rectory, a living which he held for 34 years, though he also enjoyed in the interval many other preferments. In 1781 he became Archdeacon of St. Albans. He was a scientist as well as a theologian and first attracted attention by scientific writings. In 1779–85 he edited, with a commentary, the works of Isaac Newton. He is chiefly remembered, however, for his controversy with Dr. Joseph Priestley, growing out of the publication of the latter's *History of the Corruptions of Christianity* (1782), among which corruptions was included the doctrine of Christ's uncreated divinity. Horsley reviewed the work with great severity in his charge delivered to the clergy of the archdeaconry of St. Albans, May 22, 1783. Priestley replied the same year in a publication entitled *Letters to Dr. Horsley in Answer to his Animadversions, etc.* In 1784 Horsley retorted in 17 *Letters from the Archdeacon of Saint Albans in Reply to Dr. Priestley, etc.* These were, in return, met by a new series from Priestley. After a silence of 18 months Horsley again replied in his *Remarks on Dr. Priestley's Second Letters, etc.*, and in 1789 collected and published the whole that he had written on the subject. His services were rewarded with the bishopric of St. David's in 1788, whence he was translated to the bishopric of Rochester in 1793, then to St. Asaph's in 1802. He died at

Brighton, Oct. 4, 1806. His collected theological works were published (London, 1845).

HORSLEY, Sir Victor Alexander Haden (1857–1916). An English surgeon and neurologist. He studied medicine in London at University College Hospital, from which in 1881 he received the gold medal in surgery. He was elected president of the Medical Defense Union and of the pathological section of the British Medical Association (1892–93) and a fellow of the Royal Medical-Chirurgical Society and became a member of numerous important scientific societies at home and abroad. For many years he was professor of clinical surgery and consulting surgeon at University College Hospital (emeritus, 1906); and he was professor superintendent of the Brown Institution (1884–90), Fullerian professor at the Royal Institution (1891–93), and professor of pathology at University College (1893–96). He was secretary of the Government Commission on Hydrophobia in 1885 and a year later became surgeon to the National Hospital for Paralysis and Epilepsy. In 1902 he was knighted. The results of his researches in cerebral localization are of the greatest value and have made him eminent. He is the author of a *Report on Septic Bacteria* (1882); articles in Heath's *Dictionary of Surgery* and Quain's *Dictionary of Medicine* (1883); *Surgical Reports of University College Hospital* (1882 and 1883); "Functions of the Marginal Convolutions," in *Proceedings of the Royal Society* (1884) and *Philosophical Transactions of the Royal Society* (1888); "Analysis of Movements Produced by Stimulating Ferrier's Cortical Arm Centre" (ib., 1886–89); "On the Thyroid and Pituitary Bodies," in *British Medical Journal* (1886); *The Pathology of Epilepsy and Canine Chorea* (1885–86); "On the Functions of the Thyroid Gland," in *British Medical Journal* (1885); *Brain Surgery* (1887); "On Localization of Disease in the Cerebrum," in *International Journal of the Medical Sciences* (1887); *Hydrophobia and its Treatment* (1888); *An Experimental Investigation of the Central Motor Innervation of the Larynx* (1890), with Felix Semon; *The Structure and Functions of the Brain and Spinal Cord* (1892); *Preliminary Report on Œdema* (1893), with Boyce; *Experiments upon the Functions of the Cerebral Cortex* (1888), with Schäfer.

HORSTMANN, hôrst'mȧn, August (1842–). A German chemist, born at Mannheim. He was educated at the universities of Heidelberg, Zurich, and Bonn, and became a lecturer in 1867 and professor in 1872 at Heidelberg. He became known especially for his work in theoretical chemistry. He was the first to formulate the theory of the loss of heat, and he worked out the conditions of chemical equilibrium. He wrote for the third edition of Graham-Otto's *Lehrbuch der Chemie* (1885) and published *Abhandlungen zur thermodynamik chemischer Vorgänge* (1903).

HORSTS. A name introduced by Eduard Suess and now generally used by geologists to denote those blocks of the earth's crust which retain their position during the general subsidence of the structure. Such blocks are bounded by faults along which the adjacent areas have sunk, leaving the included masses as protuberances. The Black Forest and Vosges highlands are examples of horsts, flanked by areas of subsidence. The opposite condition is found in a *graben*, which signifies a sunken block between parallel fault lines. The basin occupied by Lake George, N. Y., is an example of such a depression, as shown by the series of rocky cliffs on both sides and the precipitous shore lines. The middle Rhine valley has a similar character.

HORT, Fenton John Anthony (1828–92). A distinguished British theologian. He was born of English ancestry at Leopardstown, near Dublin, Ireland. He was educated at Rugby and at Cambridge, where he was a fellow of Trinity College (1852–57). He was vicar of St. Ippolyts, Hertfordshire (1857–72), and at Cambridge was lecturer (from 1872) and professor from 1878 to his death. Hort was one of the most learned men of the nineteenth century. He distinguished himself not only by his marvelous attainments in classical and patristic literature, but by an extensive acquaintance with botany and mathematics. Nevertheless he was always reluctant to publish the results of his studies. The great monument of his life work is the Westcott-Hort Greek Testament (1881). For more than 30 years he made the Greek text of the New Testament his chief study and at his death was one of the first authorities in the world on this subject. To him textual criticism owes the clear and convincing exhibition of the principles of genealogical evidence presented in the *Introduction to the New Testament in Greek* (1881). Since his death many of his lectures have been edited and published. Consult Sir A. J. Hort, *Life and Letters* (New York, 1896).

HORTA, hôr'tȧ, *Portug. pron.* ōr'tȧ. A seaport of the island of Fayal, Azores, and capital of the District of Horta (Map: Spain, A 4). It has a safe and good harbor. Pop., 1900, 6734; 1910, 6057.

HORTEN, hôr'tĕn, Max (1874–). A German Orientalist, born at Elberfeld and educated at Fribourg and Bonn. In 1898–1900 he traveled in Egypt and Palestine. In 1911 he succeeded Jacob as professor of Oriental languages at Erlangen and in 1913 refused an invitation to become head of the Khedive's library in Cairo. He edited and translated important Arabic texts, especially philosophic, and wrote *Die philosophische Probleme der spekulativen Philosophie im Islam* (1910) and *Die philosophischen Systeme der spekulativen Theologen im Islam* (1912).

HORTENSE EUGÉNIE DE BEAUHARNAIS, ōr'tȧNs' ē'zhā'nē' de bō'är'nā'. See Bonaparte.

HORTENSIO, hôr-tĕn'shĭ-ō. A suitor of Bianca, the younger sister of Katharine, in Shakespeare's *Taming of the Shrew.*

HORTENSIUS, hôr-tĕn'shĭ-ŭs, Quintus (c.350–286 B.C.). A Roman legislator. His *Lex Hortensia*, passed in his dictatorship (286), after the plebs had seceded, decreed that the resolutions passed by the plebs (technically called *plebiscita*) were binding on the whole people, without approval by the senate, and so brought to an end the struggle between plebeians and patricians. Hortensius died while he was dictator. Consult G. W. Botsford, *The Roman Assemblies* (New York, 1909).

HORTENSIUS, Quintus, surnamed Hortalus (114–50 B.C.). A Roman advocate and orator, a contemporary of Cicero, with whom he was personally on good terms, though opposed to him in politics. Hortensius had already obtained a name as an orator before he was 20, and he passed through the several grades of the public service, as quæstor in 81, ædile in 75, præ-

tor in 72, until he obtained the consulship in 69; afterward, about 61, he withdrew largely from politics and devoted himself to pleading in the courts. In 70 he opposed Cicero in the famous case of Verres (q.v.); from this time he was eclipsed as orator by Cicero. He was an effective though florid orator, with a marvelous memory and a fine voice, but often showed himself unscrupulous. He wrote on oratory, composed poems and a historical work called *Annales*. None of his orations or writings has been preserved. Consult: Sandys, edition of Cicero's *Orator*, p. xli (Cambridge, 1885); Sears, *History of Oratory* (Chicago, 1903); Schanz, *Geschichte der römischen Litteratur*, vol. i, part ii (3d ed., Munich, 1909).

HOR'TI CÆS'ARIS. See CÆSAR, GARDENS OF.

HOR'TICUL'TURAL SOCIETIES. Associations for the encouragement of gardening. They are now numerous in almost all civilized countries, but seem to derive their origin only from the beginning of the nineteenth century, when the London Horticultural Society was formed. The society obtained a charter in 1808. The Experimental Garden of the society, the first of its kind, was established in 1817 and was removed to its present situation at Chiswick in 1822. The progress of the society was very rapid, and its usefulness is still very great. Societies of the same kind soon began to spring up in Germany and other parts of the continent of Europe and now exist in almost all parts of the civilized world. In the United States there are about 500 horticultural societies. The New York Horticultural Society, organized in 1818 and now extinct, was the first to come into existence. The American Pomological Society, established in 1850, is now one of the strongest organizations of its kind in the world. The purpose of these societies is education and the development of interest along horticultural lines.

HOR'TICULTURE (from Lat. *hortus*, garden + *cultura*, cultivation, from *colere*, to cultivate). The branch of general agriculture that deals with the raising of fruits, vegetables, and ornamental plants. On the one hand, horticulture merges into agriculture in its restricted sense, i.e., the raising of cereal, forage, textile, and root crops; on the other into landscape gardening, which is really a fine art. To illustrate, peas raised to be used as an esculent are classed as a horticultural crop, but if grown for the dry seed they are considered an agricultural crop; the names "garden peas" and "field peas" sufficiently indicate the distinction. Again, plants raised for their intrinsic ornamental merit are properly subjects of horticulture (see FLORICULTURE; FORESTRY); but if their primary use is as units in a general landscape effect, they are subjects of landscape gardening (q.v.). While the development of agriculture, in the restricted sense of the term, springs from sheer necessity, that of horticulture, which serves to gratify the sense of beauty and the desire for comfort, naturally implies a state of communal or national ease, of thrift, and even luxury. This fact is emphasized by the time at which horticulture becomes industrially important in a nation's history. For it attains commercial importance in a community only when the pioneer days have passed, when the rugged soil has been educated by the practices of general farming, and prosperity seeks new channels by diversification of interests.

But horticulture is really much less simple than may be inferred from the ordinary definition of its scope. Problems of plant physiology, of breeding and variation of plants under domestication, of the operation within its domain of natural laws in opposition or in conjunction, of the life histories of innumerable organisms, such as insects, mites, bacteria, and microscopic fungi, are closely connected with the ordinary problems of horticulture proper and render it an art of great complexity. Further, with its growth, which, especially in America, has been phenomenal, many industries, such as the nursery and the seed industries; the manufacture of tools and implements; of artificial fertilizers; baskets, barrels, tins, jars, and other packages; the preparation of canned, evaporated, or otherwise preserved fruits and vegetables; storage by refrigeration; the transportation of all materials for manufacture and of the finished product—these and other industries have either sprung into existence or have been vastly increased in magnitude with the development of horticulture. Moreover, since each of its branches may be carried on in the open air or under glass by specialists; since each species, and in many instances each variety, cultivated, demands some special knowledge of its peculiar needs; since a total of fully 25,000 plants, some of which have thousands of varieties, are cultivated for use or ornament; since climates, soils, and other conditions differ as widely as do details of raising; since markets are as whimsical in their demands as persons; and finally, since improvements and discoveries in plants, varieties, methods of culture, marketing, etc., are annually reported—it is apparent that the realm of horticulture is exceedingly broad.

The main divisions of horticulture are floriculture, or flower growing; pomology, or fruit growing; and olericulture, or vegetable growing. Each of these divisions may be further subdivided into amateur and commercial branches—the former dealing with personal ideals, the latter with commercial demands. Of course, these two are blended to some extent, and it should be noted that examples of the former are annually increasing to the no small advantage of the community, the nation, and the world.

The ancient methods of gardening were so crude, the means of disposal so limited, and the areas devoted to horticultural industry, if such it might be called, so small, that the term "horticulture," as now understood, if applied to that early gardening would be a misnomer. Not until within the past 200 years was the term more than occasionally employed, and only during the past century did it come into general use. As proof of the interest taken in horticultural matters during the nineteenth century may be mentioned the development in America of a horticultural literature. In 1800 there were very few agricultural works that devoted more than a few chapters or even pages to fruits and vegetables. The first American horticultural book was published in 1804. Not only was there at the time no periodical devoted wholly to horticulture, but there was none that had even a horticultural department. Not until 1821 did a horticultural column appear in the *Massachusetts Agricultural Repository*, the first agricultural journal printed in America. During the nineteenth century fully 600 books were published and the total number had increased to over 1200 books by 1914. During this period 500 horticultural journals were started, of which about 50 were in circulation in

1914. The tendency of recent horticultural literature has been to substitute for the long series of specific rules formerly popular a set of general principles, which, if thoroughly grasped, might enable the reader to judge as to what working method may best suit any given case under any combination of local conditions. Outside of North America, during the past century, the development of horticulture, though less marked, has been, nevertheless, very remarkable as compared with previous centuries.

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See FRUIT, CULTIVATED; HARVEST AND HARVESTING; FUNGI, ECONOMIC; DISEASES OF PLANTS; FUNGICIDE; INSECTICIDE; ELECTROCULTURE OF PLANTS; PLANT BREEDING; POMOLOGY; HORTICULTURAL SOCIETIES; IRRIGATION; MANURES AND MANURING; NITRIFICATION; WINDBREAK; GRAFTING; AGRICULTURE; FORCING; HOTBED; GREENHOUSE.

HOR'TI LU'CULLIA'NI. See LUCULLUS, GARDENS OF.

HOR'TI MÆ'CENA'TIA'NI, or MÆCENATIS. See MÆCENAS, GARDENS OF.

HOR'TON. A city in Brown Co., Kans., 49 miles north of Topeka, on the Chicago, Rock Island, and Pacific Railroad (Map: Kansas, G 3). It is located in a farming and stock-raising district and has railway repair shops, machine shops, culvert and broom factories, etc. It is governed under a charter of 1887 by a mayor and a council. There are municipal water works and an electric-light plant. Pop., 1900, 3398; 1910, 3600.

HORTON, ROBERT FORMAN (1855–). An English Congregational minister. He was born in London, was educated at Shrewsbury and at New College, Oxford, of which he became fellow in 1879, and where he was lecturer in history until 1883, and in 1880 became minister of Lyndhurst Road Church, Hampstead. He was chairman of the London Congregational Union in 1898 and of the Congregational Union of England and Wales in 1903. Dr. Horton delivered the Lyman Beecher lectures on preaching at Yale in 1893 and in 1909 was again in America for the seventy-fifth anniversary of Hartford Theological Seminary. He wrote many volumes—sermons, biographies, and devotional works—including: *Inspiration and the Bible* (1887); *Revelation and the Bible* (1893); *the Apostles' Creed* (1895); *John Howe* (1895); *Oliver Cromwell* (1897); *Alfred Tennyson* (1900); *The Pastoral Epistles* (1901); *The Bible as a Missionary Book* (1904); *The Early Church* (1908); *Great Issues* (1909); *My Belief* (1909); *The Hero of Heroes* (1911); *National Ideals and Race Regeneration* (1912).

HORTON, SAMUEL DANA (1844–95). An American publicist, born in Pomeroy, Ohio. He graduated at Harvard College in 1864 and at the Harvard Law School in 1868, studied in Berlin from 1869 till 1870 and was admitted to the bar in Ohio in 1871, practiced in Cincinnati until 1874 and afterward in Pomeroy. He was among the first to argue the advantage of the establishment of an international ratio between silver and gold. In 1878 he served as secretary of the International Monetary Conference assembled in Paris and was a delegate to the second conference held there in 1881. His most important writings are: *The Monetary Situation: An Address* (1878); *Silver and Gold: Their Relation to the Problem of Resumption* (1880); *The Silver Pound and England's Monetary Policy since the Restoration*, together with *The History of the Guinea* (1887); *Silver in Europe* (1890).

HOR'TUS SIC'CUS. See HERBARIUM.

HORUK, hō'rụk. The name of a Greek pirate, also called Barbarossa (q.v.).

HO'RUS (Lat., from Gk. Ὧρος, Egyptian *Hôr*). An Egyptian deity. His name *Hôr(u)* is by some scholars explained as meaning "the superior, highest," but this is an improbable etymology, not more probable, perhaps, than the earlier comparison with Hebrew *ôr* (light), which is generally ridiculed at present. It is questionable where Horus had his original local cult; usually Edfu, where a large temple is still standing, is considered to have been the locality, although the god was worshiped at a great many other places. He was patron of Upper Egypt. On the very earliest monuments we find Horus as the chief god and type of the King; from the first the hawk is his symbol, and there are allusions to his antagonism to Set, so that the later theological ideas seem to be traceable to the time of the first dynasty. The original dominating position of Horus within the pantheon is shown by the fact that his hawk stands as hieroglyph for "god" in general. He appears as a sky god; then he personifies the sun, originally thought to fly over the sky in form of a hawk, and is usually represented as a young warrior with the head of a hawk, wearing the crown of Egypt. More specially he personifies the young sun, rising victoriously in the morning out of the hostile darkness. Therefore he is connected with Osiris, the sun dying in the west, and as his son he takes vengeance for his father on the powers of darkness. More rarely he is called the son of Rê, the midday sun. He is frequently called a posthumous son of Osiris, and after the nineteenth dynasty he is constantly represented as the son of Isis, who is even said to have formed him from the mutilated members of her murdered husband. Rising gloriously, Horus begins the fight with Set-Typhon, his wicked uncle, every morning—although later (partly euhemeristic) views consider the great fight between the gods as a single event, occurring at the beginning of the world. Avenging his murdered father, Horus overthrows and emasculates Set; but he loses one eye in the contest. Possibly this refers to the moon, which loses its light every month; or else the sun may be the single eye in the face of the god, i.e., the sky. The wounded eye is healed by the moon god (Dhouti, Thoth), which means that the second eye appears in the night. The blood of the wounded eye drips down and creates plants, animals, and all good and useful things on earth. It is curious to note how Horus is differentiated in regard to his various functions and phases. We find, e.g., Harpocrates (Horus as a child) distinguished from

Haroëris (the adult Horus); Harondotes (Egyptian: Harnez-iotef, the avenger of his father); Horus in Khemnis, as a babe hidden by his mother in the marshes of the Delta from the persecutions of Set; Harmachis (q.v.); "Horus uniting both lands"; and various other forms became localized and had their special cults. Many details of the Horus myth are obscure; e.g., the legend that he once cut off the head of his mother, which may have been borrowed from an Asiatic cosmogonic myth. The later theology explained this story by the statement that Isis had set free the wicked Set after Horus had delivered him to her in fetters, and that Horis mutilated her in his indignation at her act. The moon god (see above) replaced the head of Isis by a cow's head. The story of the fight against Set-Typhon is told with a great many variations, and the wicked adversary and his many helpers resist Horus in many forms and at many places. Later, the serpent Apap, as the personification of night and the hostile ocean, became confounded with Set (q.v.). The later Egyptians, under Greek influence, made strange attempts to harmonize these hundreds of different, contradictory myths. (Consult especially Plutarch's *De Iside et Osiride*, and the accounts given by Diodorus.) Like Osiris, Horus was explained as typifying everything good in nature, although the solar meaning of most of the mythological facts was too manifest to be entirely overlooked. The planets Mars, Jupiter, and Saturn were also considered as manifestations of Horus ("the red Horus," "the brilliant Horus," "Horus the bull"). In the mythical accounts of the early history of Egypt Horus was counted as the last of the divine rulers of the land. The principal temples of Horus were at Letopolis, in Lower Egypt, at Kus (Apollinopolis Parva), and at Edfu (Apollinopolis Magna—the Greeks identified Horus with their Apollo); he was worshiped also at Ombos, Denderah (Tentyra), Damanhur (Hermopolis Parva), etc. In Imperial Rome he became as popular as Isis and the other members of the Osirian family. See Plate of EGYPTIAN DEITIES, in the article EGYPT. Consult E. A. T. W. Budge, *The Gods of the Egyptians*, passim (London, 1904).

HORUS. An Egyptian name, usually understood as that given by Manetho to the last King of the eighteenth dynasty, the Har-em-heb of the hieroglyphic inscriptions. He had been Prime Minister of several of his predecessors, and by marrying a princess he ascended the throne somewhat after 1380 B.C. The duration of his reign is uncertain; five years are assigned to him by Manetho, while according to the monuments he reigned for 21 years at least, though this may be due to an artificial reckoning. His principal buildings are the pylons in the temple at Karnak. Of military achievements only an expedition against the negroes of the Sudan is mentioned in his rock-hewn temple at Silsileh. He completed the religious reaction against the reformation introduced by Amenophis IV. Harmais, of whom Herodotus has preserved some strange popular tales, is the same person. In other places, however, Manetho gives the name Horus to the heretic King Amenophis IV (q.v.).

HORUS THE ELDER. See HAROËRIS.

HORVÁTH, hôr'vät, MICHAEL (1809–78). An Hungarian ecclesiastic, statesman, and historian, born at Szentes in the County of Csongrád. He entered the priesthood in 1830, but his liberal ideas led him to abandon temporarily his priestly calling, and he became, in 1844, professor of the Hungarian language and literature at Vienna. In 1848 he was made Bishop of Csanád and in the following year, upon the declaration of Hungarian independence, became Minister of Public Education and Worship. After the collapse of the revolutionary movement he lived for a time in Paris, Brussels, and Zurich, but returned to his country in 1867. He reëntered politics (1876), and until his death was a member of the Lower House of the Diet, voting with the Deák party. His principal works are: *History of the Hungarians to 1823* (3d ed., 8 vols., Budapest, 1873); *Twenty-five Years of Hungarian History, 1823–48* (2d ed., ib., 1868); *History of the War of Independence in Hungary, 1848–49* (2d ed., ib., 1872).

HORWICH, hôr'ij. A town in Lancashire, England, 4 miles west-northwest of Bolton. Its industries comprise railway works, paper making, cotton manufactures, bleaching works, coal mining, and stone quarrying. It owns its water supply. Pop., 1901, 15,084; 1911, 16,285.

HOSACK, hôs'ak, DAVID (1769–1835). An American physician and scientist, born in New York. He graduated at Princeton in 1789, studied medicine in Philadelphia and afterward in Europe, and was chosen professor of botany in Columbia College in 1795. In 1807 he became professor of materia medica and of midwifery in the College of Physicians and Surgeons, then newly founded, and subsequently of the theory and practice of medicine and of obstetrics and the diseases of women and children. He was the founder of the first botanic garden in the United States. He was connected with Drs. Mott, Macneven, and Francis in organizing the medical department of Rutgers College at New Brunswick, N. J., and in New York City he held various medical positions in asylums and hospitals. He was one of the founders and for 12 years president of the New York Historical Society and was a fellow of the Royal Society of Great Britain. His publications include: *Essays on Various Subjects of Medical Science* (1824–30); *System of Practical Nosology* (1829); *Lectures on the Theory and Practice of Medicine*, edited by Henry W. Ducachet (1838).

HOSANNA, hō-zăn'nâ. The cry with which Jesus was greeted at His last entry into Jerusalem, according to Matt. xxi. 9; Mark xi. 9; John xii. 13. It is probably identical with the Hebrew expression *hoshia-na* (save now), occurring in Ps. cxviii. 25, abbreviated to *hosha-na*, as the imperative in Ps. lxxxvi. 2 suggests. This expression occurs as part of the Psalter used at the Feast of Tabernacles. When this word was said, the boughs were waved. Gradually the boughs themselves came to be called "hosannas," and the day on which the hosanna prayer was said seven times came to be called "day of the great hosanna." But in the New Testament passage "hosanna" seems to be used as an acclamation, almost as "hail!" in English; and the same applies to *Didache*, x, 6. If the passage occurred in the original Aramaic gospel, a phrase meaning "Deliver now" (or "Give victory now") "to the son of David" may have been misunderstood. But grave doubts have been expressed by many scholars as to the accuracy of the tradition. As Jesus' entry took place at the Passover and not at the Tabernacle season, there would hardly be any occasion to introduce "hosanna" in the ordinary sense, and there are many difficulties in harmonizing the accounts of

this episode with the general tenor of His teaching and His apparent conception of His ministry. Consult the discussion in Dalman, *Die Worte Jesu*, vol. i (Leipzig, 1898); id., *Grammatik des jüdisch-palästinischen Aramäisch*, p. 249 (2d ed., ib., 1905); Schmidt, *The Prophet of Nazareth* (2d ed., New York, 1907).

HOSE. A flexible tube or conduit, used for the flow of liquids or gases, and formed of some fabric, such as cotton or linen, with or without a lining or outer surface of India rubber. It may be also of rubber alone, or of metal spirally wound so as to form a tube. Ordinarily, however, the term "hose" is applied to tubing made of rubber with cotton or linen covering. It is used for a wide range of purposes, from the familiar hose of the lawn and garden and the fire department to the armored hose for conveying compressed air to drills and other mining machinery in the interior of the earth. A few of the purposes for which hose may be employed are given in the following list of varieties, listed in the catalogue of a large American manufacturer: air, air brake, air drill, brewing, car heating, gas, hot water, oil, pneumatic signals, steam, steam drills, tanners, water, wine.

Where pure rubber is used without some such fabric as cotton or linen, the term "tubing" is usually applied, and this is generally confined to the smaller sizes. On the other hand, in addition to being formed of various woven fabrics, the hose may be strengthened by wire, rope, or marline wound or applied by special machinery, to increase its strength, prevent excessive expansion, and resist abrasion, as when used in mines or quarries. Possibly the most important use of hose is for conveying water and especially for fire protection. For this purpose hose made of leather was used until 1859, although it is said that India-rubber hose was brought out in England in 1827. In the year 1859 hose made of cotton and having a rubber lining was shown at a fireman's parade in Manchester, N. H. This was a natural result of Goodyear's discovery of the vulcanizing of rubber in 1844. In Great Britain Charles Macintosh, of Manchester, and Thomas Hancock, of London, were pioneers in a similar branch of manufacture. The original rubber hose consisted of a single coat of solid rubber covered with folds of proved canvas. It was made by weaving cotton yarn into a belt, which was coated with rubber and then turned over a mandrel and its edges riveted with copper. This was the essential method of manufacture until 1877, the cotton being woven on flat looms; but in the year mentioned B. L. Stover, the president of the Eureka Hose Company, devised a circular loom to make a seamless tube of cotton, and since that time this process has been used, especially in the United States. For fire hose the cotton yarn is carefully selected with a staple not less than 1 inch in length and of adequate strength. It is woven to the length and thickness required. There may be several sets of fabrics employed, but all are interwoven or connected by binder threads, so that the cotton tube is essentially homogeneous and strong. The best grades, as for the fire department, have a number of sets of fabrics, termed jackets or plies; but smaller sizes require but two and sometimes merely one. The lining with rubber is performed entirely by machinery. The rubber compound, which should contain 40 per cent of pure fine Para gum, and no injurious substitutes or adulterants for fire hose, is passed through calender rolls which are adjusted to one-third of the ultimate desired thickness. After the first sheet is rolled the second and third, of similar thickness, are pressed, and the sheets are carried to a table, where they are cut to strips of the width required, and the edges of the tube are lapped and cemented. This forms a lining, which is vulcanized with suitable mineral filler in the usual way. These rubber tubes may be faced or manufactured entirely from a single thickness and finished without a seam; but superiority is claimed for the lap and joint process, as not only can defects in the rubber be detected more readily, but with the three plies defects in one or two may be remedied. This lining tube, previous to being inserted in the walls of the jacket, is cleaned of all foreign substances and attached to a cylinder, which is forced through the cotton tube by power. The ends are then fastened respectively to a steam head and the exhaust head of a steam table, upon which the hose is stretched, and live steam is admitted, inflating the lining, and pressing it against the interior surface of the fabric. At the same time the heat softens an adhesive cement backing on the surface of the lining and attaches the latter to the jacket. The finishing process involves attaching the brass or bronze couplings of the hose and giving a final test, which in extent and severity depends upon the purpose for which it is intended, as hose is made that will stand up to 700 pounds' pressure, while at least 300 pounds must be resisted for fire service.

American fire departments use rubber-lined hose covered with a cotton jacket or with a cotton duck which is rubber-covered. The rubber-lined hose is the more durable and the more flexible and consequently can be handled with greater facility by the firemen, but it has the disadvantage of having to be dried each time that it is used. The rubber-jacketed hose, on the other hand, does not need to be dried, but it has an average life of about five years, as compared with seven years for the cotton-covered hose. Not only is it essential to have adequate strength, but a smooth interior surface, as where this is irregular there may be an extraordinary loss of pressure, amounting to as much as 25 pounds per 100 feet. This loss of pressure in the interior of the hose is a serious consideration in fire fighting. It varies with the nature of the hose and the length of time that it has been in service.

In most fire departments hose of 2½ inches' internal diameter is employed, but in the larger cities 3-inch or 3½-inch hose is available for high pressure or fire-boat service and for long lines, being especially desirable for outside service, as with the same hydrant pressure a 3-inch hose will deliver a stream of water twice as far as a 2½-inch hose. To preserve hose it must receive suitable care, must be tested under pressure at least once a year, and after use, if wet or muddy, must be cleaned and exposed to air in towers or on racks to dry. For this reason hose towers are a feature of most city fire-engine houses, and spare hose is kept stretched out in slanting ventilated racks. It should not be kept in warm rooms, and short bends in hose of any kind should be avoided: when it is stored or stowed in folds, as in most modern hose-wagons or tenders, the folds should be changed from time to time to avoid permanent set. Rubber-lined hose should have water passed through it at

least four times a year to moisten the rubber. Rubber-lined hose is liable to crack if bent while frozen, and there is probably deterioration of the rubber when exposed to intense cold.

Standard specifications for the various kinds of hose for fire protection, both public and private, have been considered and prepared by the National Board of Fire Underwriters, the National Fire Protection Association, the Associated Factory Mutual Fire Insurance Companies, all of whom have prepared bulletins and specifications, copies of which will be furnished on application to these bodies. There is a tendency towards more rigorous as well as uniform specifications on the part of the fire departments of the United States and Canada, and with the use of increasing high pressure a better quality of hose is demanded and is being furnished. Bursting hose is a serious hindrance at a serious fire and has figured in not a few American conflagrations.

It is obvious that means should be provided for joining lengths of hose, and there should be absolute interchangeability of all couplings, not only of a single fire department, but of those of adjoining towns and cities, which may be called upon to aid one another in case of a conflagration. Accordingly in America the National Fire Protection Association has recommended national standard hose couplings and hydrant fittings for public fire service which have been approved and adopted by the more important insurance, fire, water-works, and municipal-engineering associations.

For interior service, especially in dry, warm rooms, as of textile mills or the corridors of office buildings, where hose must be hung, as on hose racks, for emergency service, unlined linen hose is recommended, both on the score of economy and of longer life when not used. Furthermore, it will not become stuck together by the ordinary heat of the building and is lighter and more readily used by one man. While linen is injured every time it is wet and is not suitable for lines of more than 50 or 100 feet in length on account of the interior friction, yet, if kept in a dry place, it is considered a reliable safeguard for 20 years or more. Unjacketed cotton rubber-lined hose is recommended for yard hydrants of an ordinary factory, as preferable to the thicker and heavier jacketed hose used by the city fire departments.

A large amount of hose is required in railway operation for the air brake and for steam heating. Air-brake hose is internally wired so as to provide increased strength and must be flexible and durable. In fact, while it is being tested, it is placed in a machine where the swing and kinking motion of a moving train is counterfeited. Hose designed for suction is also wired.

In the United States rubber hose is ordinarily made in lengths of 50 feet, and the sizes are indicated by the internal diameter. In Great Britain 60 feet is not an uncommon length. As rubber hose is vulcanized by the action of heat at a temperature of 250° to 260° F., it should not be used at temperatures in excess of this amount, for the intense heat of the steam is apt to harden the rubber and cause it to lose its life, elasticity, and adhesiveness. For garden or lawn hose the usual size is ¾ of an inch internal diameter, as ½ inch presents too much internal friction, while few manufacturers make an intermediate size, which would serve many purposes; 10 to 20 grades of garden hose are manufactured, and numerous qualities are available for customers. See FIRE PROTECTION.

HOSE, CHARLES (1863–). An English tropical administrator and naturalist, born at Willian, Hertfordshire. He was educated at Jesus College, Cambridge, and from 1884 to 1907 was in the service of the Rajah of Sarawak, being member of the Supreme Council in 1904–07. He studied the flora and fauna of Sarawak, and it was due to his investigations and suggestions as to the cause of beri-beri that Stanton and Fraser in 1909 discovered that the disease was due to polished rice. With McDougall he wrote *The Pagan Tribes of Borneo* (1912), a valuable anthropological work.

HOSEA, hō-zē'ȧ (Heb. *Hōshē'a,* deliverance). One of the prophets, whose discourses, forming the Book of Hosea, come first in the group of minor prophets. Of his life we know nothing except what may be inferred from references in the discourses. His father's name is Beeri (Hos. i), and his home is in the Kingdom of Israel. In the first three chapters he uses as an illustration a strange incident in his own life. Following a divine command, he had taken for his wife a woman, Gomer, the daughter of Diblaim, who was a harlot. What is probably meant is that she was a Kedeshah, or sacred prostitute, attached to some shrine. He had with her three children, to whom, like Isaiah (q.v.), he gave symbolical names, Jezreel, Lo-ruhama (no grace), and Lo-Ammi (not my people), indicating his prophetic feeling concerning Israel and possibly also his growing consciousness of her faithlessness to him. She left him and seems to have fallen into the condition of a slave when Hosea found her, purchased her freedom, and brought her to his home. The interpretation of the passage referring to this transaction is not quite certain. At any rate, Hosea took her back, though without resuming marital relations with her. There is no reason to question the reality of this personal experience, or that the prophet derived from his own sorrow a keener horror of his people's faithlessness to Yahwe, but also from his own pity to his erring wife a realization of Yahwe's unchanging love for Israel. According to the heading of the book, his activity extended over the reigns of Uzziah, Jotham, Ahaz, and Hezekiah of Judah (about 777–686 B.C.) and the reign of Jeroboam II of Israel (c.782–740). This heading is likely to come from some editor of the oracles, and grave doubts have been expressed as to its accuracy. It does not necessarily imply that Hosea's prophetic ministry began before the last decade of the long reigns of Uzziah and Jeroboam II; but if it continued into the reigns of Jotham and Ahaz, it is strange that the last six kings of Israel are not mentioned, and Hezekiah's reign seems to have begun after the fall of the Kingdom of Israel. From internal evidence it may perhaps be inferred that his oracles were uttered between 750 and 734 B.C., when Tiglath-pileser IV attacked the Northern Kingdom. Hosea addresses himself chiefly to Israel, the Northern Kingdom, and the burden of his message is the people's infidelity towards Yahwe as exemplified by their adoption of foreign rites, by political alliances that subjected the people to foreign influences, and by the general neglect of moral standards in public and private life. These conditions were brought about by the energetic political policy inaugurated by the dynasties of Ahab and Jehu, and the prophet fairly exhausts

the vocabulary in his denunciation of this policy and in predicting the dire destruction, not only of the dynasty, but of the people. The book may be divided into two parts: (1) chapters i–iii, detailing his personal experience of marriage to a faithless woman, and the application of the experience to conditions existing in the Northern Kingdom; (2) chapters iv–xiv, in which (*a*) the evil and licentious features in the Hebrew cult are denounced and the attendant moral degradation of the people; (*b*) the misrule of the kings, the riotous life of the court, and the fondness for foreign alliances are pictured in vivid colors. Many scholars hold that there are a number of later additions and interpolations to the original text of the discourses. In these supposed additions (1) references are supplied to the Kingdom of Judah, with which it appeared the prophet did not concern himself at all; and (2) the gloomy outlook is modified by holding out the hope that a remnant at least, uncontaminated by the prevailing religious and political conditions, will escape the awful doom and form the nucleus for the reconstitution of the people on the basis of true Yahwe worship and with obedience to Yahwe's laws as the corner stone. In regard to the latter group, however, it should be borne in mind that the prophet's own pity for a faithless wife had manifestly taught him to expect the same of Yahwe in his relations to Israel, though the original expressions of hope may easily have been colored in transmission. Consult the commentaries mentioned in the article MINOR PROPHETS; Cheyne, in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1889); Valeton, *Amos and Hosea* (London, 1894); W. R. Smith, *The Prophets of Israel* (ib., 1895); W. R. Harper, "Amos and Hosea," in *The International Critical Commentary* (New York, 1898); G. A. Smith, *Twelve Minor Prophets* (2 vols., ib., 1906–07).

HOSEA BIG'LOW. The fictitious signer of a number of Lowell's *Biglow Papers* (q.v.).

HOSEIN. See HASAN AND HOSEIN.

HOSEMANN, hō'ze-män, ANDR. See OSIANDER.

HO'SIERY (from *hose*, AS., OHG. *hosa*, Ger. *Hose*, hose, stockings). In its most limited sense this term refers to the manufacture of stockings (hose); but in its more general application it comprises all knitted goods, either made by hand or by machinery. The use of stockings originated in the cold countries of the north of Europe, and probably the first were made of skins and subsequently of cloth; they were also, until a comparatively late period, made all in one piece with the trousers, constituting trunk hose. These garments were separated, and the art of knitting was invented, it is supposed in Scotland, about the commencement of the sixteenth century, for knitting of bonnets and hose is referred to as early as 1550. Knitted stockings found their way to France from Scotland and led to the establishment of a guild of stocking knitters, who chose for their patron saint St. Fiacre of Scotland. Queen Elizabeth and her court were the first to wear silk stockings, and a machine for knitting them was invented in 1589 by William Lee, of Woodbridge, Nottinghamshire, which entirely altered the hosiery trade. In 1689 German immigrants of the sect known as Mennonites set up in Germantown, Pa., their stocking frames. By 1790 the stocking industry was established at several towns in Connecticut. In 1822 the stocking industry was established at Ipswich, Mass., with stocking machinery secretly brought over from England, and in 1825 the first knitting mill was established at Germantown. From this time the hosiery industry spread rapidly and from the manufacture of stockings developed to include underwear and an ever-increasing variety of apparel as demanded by modern conditions and fashions. The hosiery product of the United States was, in 1899, $27,420,000, and in 1909, $68,722,000; the number of pairs produced in 1899 was 29,904,000 dozen, and in 1909, 62,825,000 dozen. See KNITTING.

HOSIUS, hō'shī-ŭs (c.256–c.358). Bishop of Cordova. He became Bishop about 295 and retained the office till his death about 358. Having suffered persecution under Maximian, he was honored for his steadfast faith. The Emperor Constantine was strongly attached to him and it may be owed his conversion to him. In 324 he sent him to Alexandria to mediate between the Bishop of that city and Arius as well as to settle the dispute concerning the observance of Easter. In the following year the Council of Nicæa was called for the purpose of considering both subjects, and Hosius was one of its presiding officers. At the close of the council he drew up, or, as some say, announced the decree, signed it first, and prevailed on the Emperor to sanction it. He was president of the Council of Sardica, called in 343–344 by Constantius and Constans at the desire of Athanasius. In 355 Constantius requested him to join in condemning Athanasius, but, instead of doing so, Hosius defended him. Having persisted in this course a second and even a third time, he was at the close of the year banished by the Emperor. Two years afterward he was summoned to attend the Council of Sirmium, where, worn out with extreme age and hardship, he was prevailed on to sign a document favoring Arianism, yet he steadfastly refused to condemn Athanasius. He was then allowed to return to his home and office. Consult: Gams, *Die Kirchengeschichte von Spanien* (Regensburg, 1864); Hipler, *Die Biographen des Stanislaus Hosius* (Braunsberg, 1879); Harnack, *History of Dogma* (Boston, 1894–1900); Gwatkin, *Studies of Arianism* (2d ed., London, 1900); Hefele, *Histoire des conciles* (Paris, 1907).

HOS'LEY, HARRY HIBBARD (?–1908). An American naval officer. He graduated from the United States Naval Academy in 1875 and was promoted to lieutenant in 1889, to lieutenant commander in 1899, and to commander in 1904. He will be remembered as commander of the towing expedition which took the dry dock *Dewey* from Chesapeake Bay to the Philippine Islands by the way of the Mediterranean Sea, the Suez Canal, and the Indian Ocean. The expedition started on Dec. 26, 1905, and after traveling 13,080 miles reached its destination at Olongapo July 10, 1906. The feat was regarded as extremely difficult because of the unwieldy nature of the great dry dock, displacing more than 11,000 tons; but although the *Dewey* broke her towing cable six times, she arrived at her destination without injury. Hosley was a supervisor of New York harbor.

HOSMER, hōz'mēr, HARRIET (1830–1908). An American sculptor. She was born in Watertown, Mass., and studied drawing and modeling in Boston and anatomy in the St. Louis Medical College. Her first important instruction in art was received in the studio at Rome of the Eng-

lish sculptor, John Gibson (q.v.), with whom she worked for seven years. There she modeled her original heads "Daphne" and "Medusa," executed for Samuel Appleton, of Boston; "Beatrice Cenci," in the public library of St. Louis; and "Œnone" (1855), her first full-size figure. Her spirited and original statue of "Puck" was esteemed so successful that 30 copies were ordered, among others by the Prince of Wales and the Duke of Hamilton. Her most ambitious work is a colossal statue of "Zenobia in Chains," completed in 1859. Her bronze statue of Thomas H. Benton is in Lafayette Park, St. Louis. The "Sleeping Faun," exhibited in Paris in 1867, is one of her best works. Its companion is called "A Waking Faun." A fountain in Central Park, New York, and the heroic statue of Queen Isabella of Castile, unveiled in San Francisco in 1894, are by her, as are also the "Queen of Naples" and the "Heroine of Gaeta." She invented several technical processes in connection with her art and, like her master John Gibson (q.v.), was a "classicist." Nathaniel Hawthorne described her picturesquely in his *Italian Notes* and in his *Marble Faun* alludes to her "Clasped Hands of the Poet Robert Browning and his Wife." For personal anecdotes and letters, consult Carr, *Harriet Hosmer* (New York, 1912).

HOSMER, James Kendall (1834–). An American author, born in Northfield, Mass., and educated at Harvard. He left the Unitarian church at Deerfield, of which he was pastor, to go to the Civil War as a private soldier and upon his return took a professorship of rhetoric and English in Antioch College. Thence he went to the University of Missouri, taught English and history for two years, and in 1874 was appointed professor of English and German literature at Washington University, St. Louis, a post he retained until his appointment as librarian of the Minneapolis Public Library in 1892. He was elected president of the American Library Association in 1902. His writings include: *Color Guard* (1864); *Thinking Bayonet* (1865); *Short History of German Literature* (1878); *Memorial of G. W. Hosmer, D.D.* (1882); *Story of the Jews* (1885); *Life of Samuel Adams,* in the "American Statesmen Series" (1885); *Life of Sir Henry Vane* (1888); *Short History of Anglo-Saxon Freedom* (1890); *How Thankful was Bewitched* (1894); *Life of Thomas Hutchinson* (1896); *Short History of the Mississippi Valley* (1901); *History of the Louisiana Purchase* (1902); and vols. xx (*The Appeal to Arms*) and xxi (*The Outcome of the Civil War*) of *The American Nation* (1907); published in 2 vols., entitled *The American Civil War* (1913). He edited *The Expedition of Lewis and Clark* (1902), *The Journal of John Winthrop* (1908), and *The Last Leaf* (1912).

HOSPICE, hŏs'pīs. See Inn.

HOSPIN'IAN, Rudolf (1547–1626). A Swiss Reformed polemical writer. He was born in the Canton of Zurich. After studying there he went to Marburg and Heidelberg and on his return in 1568 combined the position of preacher with that of school-teacher. From 1576 to 1595 he was head of the famous Karolinenschule attached to the Great Minster. Meanwhile he entered the lists as a doughty champion of the Reformed church against Roman Catholics and Lutherans. Bellarmine wrote against him on the side of Rome and Hutten on the side of Luther. His fellow townsmen highly honored him. In 1588 he was made Archdeacon of the Great Minster and in 1594 pastor of the Fraumünster Church. He died in Zurich, March 11, 1626. His works were collected under the editorship of J. H. Heideffer and published in seven folio volumes (Geneva, 1681). The latest of his writings was *Historia Jesuitica* (1619; trans., *The Jesuits' Manner of Consecrating Persons and Weapons Employed for the Murdering of Kings and Princes by Them Accounted Heretics,* Dublin, 1681).

HOS'PITAL (from OF. *hospital,* Fr. *hôpital,* from ML. *hospitale,* inn, from Lat. *hospitalis,* relating to a guest or host, from *hospes,* guest, host). A place used for the shelter and treatment of the sick or wounded; old English usage, also, an asylum for orphans and helpless children or for the aged and infirm. Leper hospitals were established in early times and were called spitals or *hospitia.*

The term "hospital" is now rarely used for those teaching and custodial institutions that care for foundlings, orphans, and the aged, destitute, etc. These are termed asylums, homes, colleges, and almshouses. A number in England retain the old name, such as Christ's Hospital in London, Heriot's Hospital, and Donaldson's Hospital in Edinburgh, St. Cross Hospital at Winchester, etc. The term "hospital" has come to be restricted to an institution in which the sick are treated, whether such illness be of the brain or of other parts of the body.

At the present time two general classes of hospital relief work are carried on in the large cities of the world. In *dispensaries* patients are treated who are able to be about and have temporary or serious illness, not sufficiently severe to confine them to bed. In *hospitals* patients are treated who must be confined to their beds, for certain times at least. Many dispensaries are associated with teaching institutions and are then termed *clinics,* and the patients who come are in some instances utilized to instruct the students of medicine. The word "infirmary" is a common English term for both dispensaries and hospitals.

Hospitals were founded in very early times. India, Persia, and Arabia had hospitals supported by their kings and rulers before the Christian era. There is good evidence that King Asoka of India in the third century B.C. commanded the establishment of hospitals, and that these hospitals were flourishing in the seventh century A.D. As far back as the earliest period of Greek history the sick are said to have been treated in the temple of Æsculapius at Epidaurus. In the early Jewish period a house for the reception of the sick was called Beth Holem. Such an institution was Beth Saida, mentioned in the New Testament. These hospitals seem to have been wooden huts. In ancient Egypt hospitals were unknown, the sick being tended at home or in temples. Plato says that the Greeks, on the other hand, maintained shelter houses for the sick in various parts of the country, supplied with attendants. The best institutions of the kind in ancient times were undoubtedly in Rome. The inscription upon a tablet discovered near Piacenza, dated in the time of Trajan, shows that the Romans not only possessed such houses, but that they were actually endowed. One of the earliest hospitals on record was probably that founded by Valens in Cæsarea between 370 and 380 A.D.

The advent and spread of Christianity in and after the fourth century gave a great impetus to all forms of public charity; but it was the monastic orders that earliest recognized the Christian necessity of systematic institutional care of the sick; out of the early monastic hospital system as its germ has grown the entire marvelous hospital system of modern times. One of the earliest of recognized hospitals was in France, and the present Hôtel Dieu of Paris is supposed to have had its origin as early as the seventh century. During the Crusades many hospitals were built, and there arose a special class, the *Hospitalers*, or knights whose duty it was to take care of the sick. The present orders of Sisters of Mercy, Sisters of Charity, and allied societies, had a somewhat similar origin. With the establishment of the schools of learning, and more particularly with the development of the study of medicine, many of the hospitals formed departments in the universities, and the university towns developed large and important hospital facilities. Bologna and the Italian towns led the way. Paris and the schools of France followed, and in England and Scotland the hospitals of London and Edinburgh were the great medical schools. Thus, St. Thomas's, of London, was established in 1553; St. Bartholomew's in 1546, where in 1609 Harvey, who discovered the real nature of the circulation of the blood, was physician; and Bethlehem in 1547. American hospitals of the United States were largely founded on English models, although the influence of the French school was not absent in the early history of the United States and Canada. It seems probable that the earliest hospital founded in the United States was the Pennsylvania Hospital, although there were earlier institutions in Canada and Mexico. Efforts were set on foot as early as 1709 to establish a hospital in Philadelphia. In 1730–31 the city almshouse was founded and did medical work; but it was not until 1750–51 that the Pennsylvania Hospital first had its actual birth. Joshua Crosby was the first president of the board of managers, and Benjamin Franklin the first clerk. The New York Hospital was the second hospital of importance. Its charter was granted in 1771. From these early beginnings there has now grown up in America a veritable forest of hospitals. Nearly every city and town has its duly appointed hospitals, and the hospitals of the United States are now acknowledged the most handsomely and thoroughly equipped in the world; they serve as models for European architects.

In most of the larger cities of the United States there are two or more hospitals that are under the control of the city government and used exclusively for the city poor. Such are the Johns Hopkins Hospital in Baltimore, the Philadelphia Hospital in Philadelphia, Bellevue and allied hospitals in New York, Massachusetts General and Boston City in Boston, Cook County Hospital in Chicago, etc. In addition to these municipal hospitals there are numerous institutions founded by private gift and by sectarian societies, such as the New York Hospital, Roosevelt, Presbyterian, St. Luke's, German, French, Mount Sinai, St. Vincent's, St. Mark's, Flower, etc., hospitals in New York, and hundreds of others in other cities. Further, there are numberless special hospitals for the treatment of separate diseases: hospitals for diseases of the eye, the ear, the nose, the throat; cancer hospitals; maternity hospitals; hospitals for diseases of women, for diseases of the skin, and for all the various specialties. The Rockefeller Institute for Medical Research in New York City maintains a hospital which is unique in receiving only patients who, while receiving the best and most scientific medical treatment, lend themselves to further research into the various problems under investigation at the time, so that a thorough test of new remedies can be made.

The details of hospital management cannot be entered into here. The medical side of the work is usually fashioned on well-established lines. In the larger hospitals the patients are immediately cared for by the nurses (nurses are paid a small salary unless they are sisters of some religious denomination); these are under the orders, so far as the treatment is concerned, of the *internes*, or young graduates in medicine who have gained this privilege by competitive examinations, and who serve in graded positions for periods of time of from one to three years. These generally reside in the hospital, receive no salary save their living, and are constantly in attendance. Furthermore, the *internes* are under the supervision of the *attending* or *visiting physicians*, who are practitioners in the city, chosen by the governing boards of the hospitals for their ability or for other reasons. These visit the hospitals at specified times and outline the plans of treatment for the patients. Their time and services are usually given gratis, always so in the municipal hospitals. Many hospitals have consulting physicians and surgeons who may be called in to diagnose rare conditions, but such appointments are usually rewards for work done in the other grades and carry with them honor and position. Furthermore, most large hospitals, especially those where teaching is carried on in connection with the care of the sick, maintain well-equipped pathological departments where constant study is made by scientific methods of specimens and material to aid in determining the disease, this being intrusted often to a group of specialists who are not concerned with methods of treatment.

In 1905 a hospital boat, with fully equipped wards, was devised and adopted by the New York City Health Department for transportation of contagious cases to the island isolation hospitals.

Chiefly within the past century a system of hospitals specially designed for the care and treatment of the insane has been established all over the world. In the United States these institutions are supported by the several States. The State of New York has 16 such hospitals, each accommodating from a few hundred to a few thousand patients. The physicians who serve in these hospitals are specialists in mental diseases and receive salaries which vary with the length of service. Very recently acute psychopathic hospitals have been established in some of the large cities in connection with the principal general hospitals. In these institutions patients afflicted with mild and curable forms of mental trouble receive treatment without being regularly committed to an insane asylum. Such are the insane pavilions in Bellevue and Kings County hospitals in New York.

History and Architecture. There are no data available on the design and arrangement of the earlier monastic hospitals; but with the remarkable development of monastic architec-

ture (see MONASTERY) in the eleventh and twelfth centuries, the hospital was given an important place in the architectural scheme, and its design was further developed in the Gothic period. Several of these mediæval hospitals are still extant, wholly or in part. The most notable is that at Ourscamp, not far from Compiègne, in France. The hospital of this type was a vast and lofty hall, usually vaulted upon one or two rows of columns, and provided with latrines and other accessories. The building was isolated and, being spacious, lofty, and well lighted, served admirably the simple requirements of the time. In closely built cities, however, the tendency was to build in several stories and around inclosed courts, as in the vast Ospedale Maggiore at Milan, which, dating from the sixteenth and seventeenth centuries, has nine courts and accommodates 3500 patients. The result was loss of light and ventilation, overcrowding, and progressively increasing danger from accumulated deposits of noxious germs.

In 1778 the French Academy of Sciences first among scientific bodies promulgated principles and rules for hospital design, and during the nineteenth century, especially after the Crimean War (1854–56), with its frightful mortality among the sick and wounded in the great barrack hospitals at Scutari and Kuleli (Constantinople), medical and surgical science occupied itself increasingly with the problem of hospital design and construction. The vice of inclosed courts, low ceilings, and inadequate sunshine and air was recognized, and the pavilion type was recommended for all permanent hospitals, the wards being housed in wings of not over three stories, exposed to the light and air on three sides, and connected at one end by a continuous structure containing the administrative and other accessories.

The great Hôtel Dieu at Paris, built in 1854, very imperfectly embodied these ideas; they are realized to perfection in such modern hospitals in cities as the Johns Hopkins at Baltimore, the Mount Sinai at New York, the New King's College Hospital at London, and most modern examples.

The same principles have led to the isolation of many wings or buildings in large complex hospitals, especially those for contagious and infectious diseases. Following the American Civil War it became a common practice to provide, where the space permitted, small isolated, inexpensive, and temporary buildings for such cases, to be burned or destroyed after a few years' service and replaced by similar pavilions; and this practice is still followed in some places. But the tremendous scientific advance which came with the discovery of the agency of germs —microbes and bacteria—in the causation and spread of disease, and with the development of aseptic surgery and of the efficient use of antiseptics, brought about a revolution in the details of hospital construction and put an end, so far as new hospitals are concerned, to the old-time scourge of hospital infection, which in the Scutari Hospital raised the mortality to 42 per cent of all patients.

In all strictly modern hospitals not only is artificial ventilation added to natural ventilation and carefully regulated artificial heat provided in addition to abundant sunshine, but floors, walls, and ceilings are made of the most impervious materials available, moldings, cracks, and projections of all sorts avoided, all the corners and angles of floors, walls, and ceilings rounded to facilitate cleansing and to prevent the lodgment of dust, and every means employed to prevent secondary infection. Hospitals for the tuberculous are preferably built in an open or wooded country where a dry soil and atmosphere prevail and are arranged to provide for sleeping as far as possible in the open air, in tents or in rooms or porches broadly open to the outside atmosphere.

In general, a modern hospital in a large community comprises many distinct services. The administration building contains offices, examination room, visitors' parlors, chapel, pharmacy, refectory, stores, and various other functions serving the whole institution. The wards, housed in wings or pavilions, in one, two, or three stories, are divided between the medical and the surgical services and comprise both public wards, each with many beds in one large room, and private wards and rooms for one patient each. Adjoining the wards are service rooms (diet kitchens, dining rooms, toilets, baths, nurses' room, etc.). The operating room in the surgical section is sometimes isolated, except for connecting passages, sometimes in a surgical wing on the top floor, with skylight and side windows, etherizing, sterilizing, and recovery rooms. Nurses' living quarters, recreation rooms, a laundry, power house, mortuary house, sun parlors, and various other accommodations are housed variously—sometimes in separate buildings, sometimes in portions or wings of the central building. The equipment for heating, lighting, and ventilating, for baths, toilets, and medical and surgical functions of all kinds, is of the most elaborate and costly description in hospitals of the first class; and there is no kind of building or group of buildings upon which more care and pains and expense are, or should be, lavished than upon hospitals, or which is more complex and exigent in the problems it imposes upon the architect.

Military Hospitals. This term is descriptive, but broadly inclusive in its application to institutions for the care of sick and wounded of military forces. The history of military hospitals is the story of the progress of the healing art and the development of the sanitary departments of armies. As in all civil communities there have always been individuals who have ministered to the ills of the body through methods in which spiritual and material agents were confused, so fighting men have always been accompanied by medicine men of some sort, but in the earlier days they were not a part of the organizations of the armies. In all of the progressive armies of the world the personnel of sanitary departments has always kept pace with the progress of civil medical practice.

Until the thirteenth century, in Europe, the practice of surgery was in the hands of the monks, and when this was prohibited by papal decree it fell into the hands of the barber-surgeons, who for centuries after, under the German name of Feldscherer (field barbers)—a name still surviving as "felcher" in the Russian army medical service—were almost the only medical attendants with fighting units.

The first organized medical service in the German army was established in the sixteenth century, and from that day to this its progress has been steady and consistent, with a scientific attempt to add the experience of each successive war to its system.

The first attempt of the French to organize a medical service was made in the fifteenth century by the Duke of Burgundy; before this time the wounded were left to find their way to monasteries or to fall into the hands of the charlatans who accompanied the army.

Army commanders have always complained that their losses from disease and wounds weakened their military strength, but all the advance in sanitary measures that has ever been accepted has been forced by the demands of the medical service, supported by public opinion. The French military surgeons endured a system of farming out their hospitals under contract until 1747, and their sanitary service was subordinate to their commissary department until 1780. Outbursts of economy in administration at times caused a return to old systems, but the general progress has been such that the French and German armies have developed the principles of medical service organization which all other armies have since followed. Military disaster is always attended by sanitary failure, and the efficiency of medical organizations can only be tested by actual warfare, which is generally followed by sanitary advance, as, e.g., the reorganization of the medical services of the American and British armies after the Spanish-American and Boer wars.

The two widely different classes of military hospitals are those for peace and those for war, as the one is permanent and the other mobile.

Permanent Hospitals.—These hospitals receive soldiers who are living in garrison rather than in camp, and the service to the patients does not differ from that of civil hospitals, although the management and administration are technically adapted to general army methods. The executive and professional functions are exercised by a commanding officer who holds military control over his patients, and all records are kept so as to exhibit the relation of the patient to the government and the responsibility of the government to the patient.

The two classes of permanent hospitals are (1) *post* or *garrison hospitals,* which are under the direct control of the local commander as a part of his command, and (2) *general hospitals,* which, regardless of their geographical location, are not under the command of territorial commanders but are under the direct control of the War Office through the surgeon-general of the army.

Post hospitals vary in size with the military population, which is called the garrison. In the United States army the bed capacity is estimated at 4 to 5 per cent of the garrison, depending upon the climatic conditions of the locality; but this ratio does not obtain in European armies, as their civil hospitals are used to some extent for military purposes, while in the United States there is no relation between the civil and military institutions. A post hospital may be larger and more important clinically than a general hospital. In the smaller post hospitals no female nurses are employed, as only soldiers of the Hospital Corps care for patients. Nurses of the Army Nurse Corps, who are always attached to general hospitals, may be detailed by the surgeon-general for duty in any post hospital where their services may be required. A woman may be employed in any post or general hospital, as a hospital matron, for the purpose of washing and mending hospital linen; this arrangement is found expedient only in the smaller and especially the more isolated posts.

In the United States there are two ordinary general hospitals which care for patients from the army who need extended treatment or who are up for final review as to disposition on account of physical disability; one is the Walter Reed General Hospital, Washington, and the other the Letterman General Hospital, San Francisco. There are also two special general hospitals for the treatment of special diseases; one is the Fort Bayard General Hospital at Fort Bayard, N. Mex., and the other the Army and Navy General Hospital at Hot Springs, Ark.

The Fort Bayard General Hospital has been established on the site of an old army post, where climatic conditions have been found favorable, for the treatment of officers and enlisted men of the army suffering from pulmonary and laryngeal tuberculosis. Other surgical conditions requiring operation may be admitted by the Secretary of War.

The Army and Navy General Hospital is devoted to the treatment of such diseases as the waters of Hot Springs have an established reputation in benefiting. It is administered by the surgeon-general of the army with a medical officer of the army in command, but naval medical officers may be detailed as assistants. Army regulations formerly denied admission to venereal cases, but this proscription was removed in 1910. It is supplied with extensive hydrotherapeutic equipment designed to give that sort of treatment known as a "cure" at Carlsbad or Aix-la-Chapelle. Admission to this hospital is restricted to officers and enlisted men of the regular and volunteer army and navy on active, retired, or discharged status; officers of the revenue cutter service; the public health service, and cadets from the military and naval academies.

In the armies of other countries there are the same two classes of permanent hospitals; but, owing to the economical indications of large standing armies and the location of their barracks in or near large cities, their garrison hospitals are frequently a part of the civil hospitals, which are usually institutions of the state. The larger general military hospitals in Europe are usually associated with the education and training of army medical officers, e.g., Netley Hospital in England, Val-de-Grace in France, and the Charité Hospital in Berlin.

Mobile Hospitals.—The hospitals of real and vital importance to an army's sanitary service are the mobile hospitals, which are a part of the field organization of the army. Permanent hospitals are only associated with the preparation for war, and their management is simple and formal compared with that of mobile hospitals, which must meet widely varying conditions always in an informal clinical way and are never able to provide the formal service of a peace hospital. "Field hospital" is a term used in the United States army, and similar terms are used in almost all other armies, to designate a particular mobile sanitary unit, as, e.g., the *hopitaux de campagne* of the French, the *feldlazeret* of the Germans, and the *feldspitaler* of the Austrians.

Ambrose Paré, who in the seventeenth century taught the new doctrine that gunshot wounds were neither poisons nor burns, and who laid down what may be considered in this day ra-

tional rules for the treatment of wounds, made the first effort to establish a mobile field hospital, which first achieved fame in the battle of Dettigen in 1743, when the wounded of the French army were systematically evacuated by the Main and the Rhine into Alsace. Larrey, in Napoleon's Italian campaign in 1797, organized the first of flying hospitals, consisting of 1 staff surgeon, 2 assistant and 12 undersurgeons, 2 administration officers, 3 noncommissioned officers, 1 carrier of dressing materials, and 12 sick attendants, all mounted; 6 noncommissioned officers, 1 mechanic, and 25 sick attendants on foot. The transportation consisted of 4 heavy wagons, 4 light four-horse ambulance wagons for four recumbent patients, 8 drawn by two horses for two recumbent patients, and pack animals for mountain service.

This was the parent of the organized mobile units of all armies, and except for a few numerical differences and a somewhat scant equipment it might be taken as a combined field hospital and ambulance of the United States army to-day.

Frederick the Great in 1744 imported from France barber-surgeons to act as operators and instructors in his own army, but he thought they were so expensive that he sent them back after 28 years. Goercke (1750–1822) was to the German medical service what Larrey and Percy were to the French; and he organized the first German field hospitals, although they failed in mobility. Sometime later, and after the battle of Jena (1806), there were 18,000 Germans wounded with no field hospital to care for them, but in 1809 an efficient mobile hospital service was organized which ever since has been consistently improved. With the 20,000 Prussian troops forming part of Napoleon's Grand Army in 1812, there were three flying hospitals of 200 beds each and an evacuation hospital of 1800 beds, which is a proportion of sanitary troops comparing favorably with those accompanying a division of the United States army of a strength of about 20,000. As an example of sanitary progress, it may be noted that in the German army the carrying of first-aid packets was made universal throughout the army in 1869.

In the United States army the attempts at organization of field mobile units have been fitful and with varying success. With all the experience of the past centuries in the organization of field sanitary units the Federal army at the beginning of the Civil War had no field medical service, except the regimental aid. Surgeon Jonathan Letterman of the regular army, who became medical director of the Army of the Potomac in 1862, first organized field hospitals and ambulance companies, after the surgeon-general had protested against the neglect of wounded due to the utter lack of field sanitary units, and General Halleck had disapproved the plan of organization. An effective and efficient organization was then established, but the United States army was again as wholly lacking in 1898. Mobile field sanitary units were next provided as a part of the organization of the army by an Act of Congress in 1903, and since that time efficient units have been provided.

The mobile medical units of the United States army may be taken as an illustration, as they are adopted from the medical services of the Germans and French.

1. *Regimental infirmary*, one to each regiment, made up of the regimental sanitary detachment of 4 medical officers and 24 Hospital Corps men, with special equipment carried by 1 wagon and 1 pack mule, furnishes the first aid in battle.

2. *Field hospital*, three to each division (about 20,000 men), provides 200 beds and receives the casualties at the regimental aid stations. The *personnel* is 5 medical officers (1 major commanding), 9 noncommissioned officers, and 48 privates. The equipment, including tentage and 3 days' rations and forage, weighs 20,000 pounds and is hauled in 8 four-horse wagons.

3. *Ambulance company*, three to each division, provides the litter bearers, works in conjunction with a field hospital, and transports the casualties from the regimental aid when possible and from the dressing stations to the field hospital. There are 12 four-horse ambulances, 3 four-horse wagons, and 4 pack mules. The *personnel* is 5 medical officers (captain commanding), 9 noncommissioned officers, and 70 privates.

4. *Transport column*, two to each division, evacuates wounded from field hospitals to evacuation hospitals. It consists of 4 medical officers, 20 noncommissioned officers, and 64 privates. The ambulances and equipment are the same as for an ambulance company, except the pack mules. Supply wagons returning to the rear are also used when necessary.

5. *Evacuation hospitals*, two to each division, are movable but not mobile, and are located indefinitely along lines of communication and receive the wounded from field hospitals, which latter must be free to move with the division. The capacity is 300–400 beds, with 14 medical officers (lieutenant colonel commanding), 24 noncommissioned officers, and 130 privates.

6. *Base hospitals*, one to each division, provide 500 beds, with an organization somewhat larger than that of the evacuation hospital. No transportation is provided, and, while sufficient tentage is furnished, it is expected that permanent buildings will be occupied whenever they are available.

The combined service of these units provides for the patient's care and transport from where he falls in battle to the base of operations, whence he is conveyed to home territory—to a general military or a civil institution.

Hospital ships are not provided for in the United States army, except that their *personnel*, uses, and method of operation are mentioned in the Medical Department regulations. No arrangements are made for the purchase or conversion of a merchant vessel to a hospital ship, and the matter of supply and equipment must be left until the emergency arises which requires a hospital ship. In other countries hospital ships are specially constructed, and, if not actually in service as such, they are operated as merchant vessels under subsidy, with their equipment and supplies in some port to which the ship at any time can be ordered, to be placed in commission as a hospital ship. See HOSPITAL SHIP.

Hospital trains have not been organized in the United States army, although sets of apparatus are in storage by which empty cars can be equipped to suspend 500 field litters, which will be used as beds. Foreign armies have developed this unit in great detail, and the French army may be taken as an example of the most efficient organization. These are of three classes: (1) *permanent hospital trains;*

(2) *improvised hospital trains;* (3) *improvised hospital trains for carrying patients in ordinary passenger cars.* For the permanent hospital trains two great railroad systems of France have cars of special construction, in regular service, for which is provided special equipment to be put in place when the cars are taken into hospital service. The material is held in mobilization stores and is sent to the railroad company within five days of the date of the requisition order, and the railroad authorities are responsible for completing the preparation of the train 15 days after receipt of requisition. Each train consists of 16 cars for 8 patients each, 1 car for officers, 1 car for ward orderlies, 1 for kitchen, 1 for pantry, 1 for operating room, dispensary, and linen, 1 for provisions, and 1 for soiled linen and fuel; total, 23 cars. Four spare cars must be kept in reserve in the Paris depot for replacement. The *personnel* of this train is 2 medical officers, 1 pharmacist, 1 quartermaster, 1 military clerk, and 27 noncommissioned officers and men.

Improvised hospital trains, to carry 396 recumbent patients, are made up of freight cars fitted with special apparatus for suspending litters, and the preparation of one of these trains is carried out according to a carefully timed plan in seven hours.

In general, it may be said that the efficiency of all units organized for the succor of wounded and sick in time of war is based on the same principles that are involved in the efficiency of all combat units, viz., the assembling of proper equipment, the distribution of necessary supplies, and the training of sufficient *personnel* in times of peace. See HYGIENE, *Military Hygiene.*

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HOSPITAL CORPS, UNITED STATES. In the United States recruits are enlisted for the Hospital Corps and permanently attached to the Medical Department, and in time of war perform the necessary field hospital and ambulance service under such officers of the Medical Department and assistants as may be detailed for that duty. They are not required to perform any military duties other than those pertaining to their corps, receiving instruction in such drills, both foot and mounted, as are necessary for their efficiency. Their field equipment is like that of other enlisted men (except that they have no arms or ammunition), with the addition of a large Hospital Corps knife, and an emergency medical pouch or case. Arms are issued only by the authority of the commanding officer when it is probable that rights under the Geneva Convention will not be recognized. At every permanent military post there is at least one noncommissioned officer of the Hospital Corps and an additional one for every additional four privates of the corps. Special instructions in the duties of litter bearer and the methods of rendering first aid to the sick and wounded are given to all enlisted men of the signal corps and of the line of the army by their company officers, for at least 12 hours in each calendar year, post surgeons under the direction of post commanders being responsible for the professional instruction of the company officers.

In field service troops are accompanied by detachments of the Hospital Corps, each medical officer on the march being attended by a mounted private of the Hospital Corps. For the regulations of the *sanitary service* in the field, including the use of the first-aid packet, regimental aid station, dressing stations, ambulance companies, field hospital companies, evacuation points, station for the slightly wounded, the sanitary train, etc., consult *Field Service Regulations, United States Army* (Washington, 1914).

HOSPITALERS (OF. *hospitalier*, from ML. *hospitalarius*, from *hospitale*, hospital, inn, from Lat. *hospitalis*, relating to a guest, from *hospes*, guest). Charitable brotherhoods, founded at various times and in different countries, for the care of the sick in hospitals. The vow to devote one's self to this work of mercy is usually superadded to the ordinary vows of poverty, chastity, and obedience, commanded by St. Augustine. One of the earliest recorded instances of such a brotherhood is the Order of the Madonna della Scala in Italy in the ninth century. The Knights of St. John of Jerusalem (q.v.), as also the Teutonic Knights (q.v.), were originally Hospitalers. There are many other local institutes or congregations having various names and living under various rules. The sisterhoods are now much commoner than the brotherhoods; over 100 are known to be in existence.

HOSPITAL SHIP. A ship designed to take care of the sick and wounded either as a floating hospital or as a transport hospital. The second Geneva Convention in 1868 provided that hospital ships, merchantmen (i.e., unarmed ships not used for any military or naval purpose), having wounded on board, and boats picking up wounded or wrecked men, shall be neutral. They are required to fly the Red Cross flag, and their men must wear the Red Cross armlet. Government hospital ships are required to be painted white with a broad longitudinal green stripe on each side extending from bow to stern; hospital ships belonging to aid societies to be similarly painted, but the stripe is to be red. Both varieties of ships must fly the Red Cross flag as well as their national ensign, and no arms of any sort are to be allowed on board. Any evidence amounting to presumption that the enemy is violating the rules of the convention and using the ships for improper purposes constitutes sufficient ground for refusing the further granting of immunity until the contrary is proved. The hospital ship *Solace* of the United States navy accompanies the fleet even in times of peace to take care of the serious cases of illness or injury. See HOSPITAL, *Hospital Ships.*

HOSPITAL SUNDAY. In the United States, the last Sunday of December; in England, the Sunday nearest June 15, on which days the collections in the churches are devoted to the support of hospitals. The custom has been generally adopted since 1873.

HOSPITAL TRAINS. See HOSPITAL.

HOS'PODAR (Upper Sorbian, master, lord). A title formerly given to the governors of Moldavia and Wallachia. Hospodar (*gospodar, gospod, gospodin,* in the various Slav languages) means simply 'master.' The hospodar held his power at the pleasure of the Sultan, who made a practice of farming out the office to the highest bidder. The incumbent held his office for a short period or else secured reappointment by repeated gifts. The Lithuanian princes were likewise called hospodars, and the Polish kings, down to the time of Sobieski, assumed that title in their diplomatic negotiations with Russia. *Gosudar* (ruler, monarch) is even now one of the titles of the Emperor of Russia. In Little Russia hospodar is the title for the head of a family.

HOSS, ELIJAH EMBREE (1849–1919). An American Methodist Episcopal bishop and educator, born in Washington Co., Tenn. He graduated from Emory and Henry College (Virginia) in 1869 and entered the ministry of the Methodist Episcopal Church South in 1870. He was president and professor in Martha Washington College from 1876 to 1881, vice president and president of his alma mater (1881–85), for five years professor of ecclesiastical history in Vanderbilt University, and from 1890 to 1902 editor of the *Christian Advocate,* published at Nashville, Tenn. In 1902 he was elected Bishop of his church.

HOST. A term used in pathology, especially plant pathology, to designate the living plant or animal upon which a parasite is living. For example, in the case of wheat rust the wheat is the host and the rust is the parasite. In the case of disease following the attack of a parasite it is the host that is diseased, while the parasite induces the disease.

HOST. See LORD'S SUPPER.

HOS'TAGE (OF. *hostage, ostage,* Fr. *ôtage,* It. *ostaggio,* from Lat. *obsidatus,* state of being a hostage, from *obses,* OLat. *opses,* hostage, from *obsidere,* to remain, from *ob,* at + *sidere,* to sit; influenced in popular etymology by Lat. *hostis*). A person or thing given in pledge for the performance of conditions. When a town capitulates, victors and vanquished usually give into the custody, one of the other, several officers, as pledges that each party will duly carry out the terms stipulated. When the terms are fulfilled, the hostages are exchanged; but if the terms be evaded, the opposite side holds the right to put to death or otherwise punish the hostages in its possession.

HOSTEL. See HALL.

HOSTILITY, ACTS OF. See ACTS OF HOSTILITY.

HOSTIL'IUS, TULLUS. A semilegendary king of Rome, grandson of Hostus Hostilius, the champion of Rome in the first war with the Sabines; he succeeded Numa Pompilius on the throne of Rome (670 B.C., according to the common chronology). Consult Livy, i, 22–31.

HOS'TIUS. A Roman epic poet of the second century B.C., author of metrical annals after the manner of Ennius (q.v.), and *Bellum Histricum,* in 7 books, a poem on the Istrian War of 129 B.C., in which the consul Gaius Sempronius Tuditanus was victorious. Fragments of the latter work, quoted by Macrobius (*Saturnalia,* vi, 3. 5, vi, 5. 8) and Servius (*Ad Æn.,* xii, 121), are printed in Baehrens, *Fragmenta Poetarum Romanorum* (1886). Some authorities think he is the *doctus avus* alluded to by Propertius (iii, 20. 8); some ancient authorities declare that the real name of Cynthia, the mistress of Propertius (q.v.), was Hostia.

HOSTRUP, hōs'trup, JENS CHRISTIAN (1818–92). A Danish poet and dramatist, born at Copenhagen. His first comedy, *Gjenboerne* (The Neighbors, 1843, published in 1847), was acted by his fellow students before he left the university. It was played afterward at the Royal Theatre and remains a favorite piece. Among his other plays, composed under the pseudonym of Kristrup, are: *Intrigerne* (1848); *En Spurv i Tranedands* (1846); *Eventyr paa Fodreisen* (1850); *Soldaterlöjer* (1849); *En Nat mellem Fjeldene* (1852, music by Emil Hartmann); *Mester og Lærling* (1852). From 1855, when he took orders, to 1881, he had charge of a parish. His *Folkelige Foredrag* (Popular Lectures) appeared in 1882. A volume of his poems, *Sange og Digte,* appeared in 1884, and his drama, *Eva,* in 1881. After this he wrote little but what was demanded by his parochial work. The last years of his life were spent at Copenhagen. His popularity is largely due to the national character of his many plays, his humor without vulgarity, and the vivacity of his dialogue. His poems were published in six volumes (1852–56) and a fifth edition of his comedies in 1888–89. Consult his *Erindringer fra min Barndom og Ungdom* (Copenhagen, 1891) and *Senere Livserindringer* (ib., 1893), and Klint, *Jens Christian Hostrup* (ib., 1893).

HOT-AIR ENGINE. An engine in which the pressure acting on the piston is produced by increasing the temperature of air through the application to it of heat by transfer through a separating metal wall. This definition distinguishes the hot-air engine from the compressed-air engine (see COMPRESSED-AIR ENGINE) on one hand and the internal-combustion engine (see GAS ENGINE and INTERNAL-COMBUSTION ENGINE) on the other hand. The action of hot-air engines, like that of all other heat engines, consists in admitting the air at a high temperature and pressure and by allowing it to perform work on the piston reducing its pressure and temperature, after which it is either exhausted into the atmosphere and a fresh supply is introduced or else it is cooled and again heated for a repetition of the former process. In their principal working parts hot-air engines are very similar to ordinary steam engines. The heated air is introduced into a cylinder in which works a tightly fitted piston, which is thus compelled to move up and down and transfer its motion to a revolving shaft by means of piston and connecting rods and the other usual mechanisms of steam engines. (See STEAM ENGINE.) Hot-air engines are of several types, which may be described and explained as follows: Closed-cycle engines are those which operate continuously with the same mass or weight of air, only taking in a fresh charge to replace leakage or to increase the mass in use. Open-cycle engines are those in which at each stroke a new charge is drawn in from the atmosphere and after being heated and expanded is exhausted again into the atmosphere. Regenerative and nonregenerative engines are those which respectively use or do not use a regenerator to absorb the heat of the exhaust air and to restore it to the incoming cooler air. Finally, closed-cycle engines may be divided into two subclasses, which differ by having the temperature change take place in

the air at constant pressure or at constant volume. Each of these types is identified with the name of some designer or engineer. Hot-air engines have been designed in great numbers, but the limited extent to which they have been

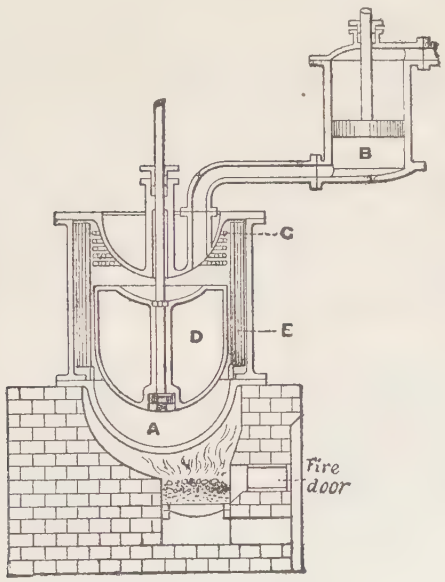

FIG. 1. STIRLING HOT-AIR ENGINE.

used makes most of them but little more than names.

The hot-air engine, as defined at the beginning of this article, seems to have been invented by the Rev. Robert Stirling, an Englishman, in 1816. His first successful engine was built in 1827, and one afterward was used in a foundry in Dundee, Scotland, developing 20-brake horse power on the consumption of 50 pounds of coal per hour. In this engine, shown diagrammatically in Fig. 1, the same volume of air was alternately heated and cooled, producing a variation of pressure which actuated a working piston. The heating and cooling were effected by changing the air by means of a plunger, *D*, from end to end of a cylinder, *A*, one end of which was kept hot by a fire and the other cool by a coil of water pipe, *C*. On its way from end to end the air passed through a passage partly filled with thin plates of metal, *E*, which alternately absorbed the heat from the air and gave it back on the return. This was the first application of the economizer or regenerator, and its invention is said to be due to James Stirling, a civil engineer. This engine failed through the giving out of the heaters, which required to be kept red-hot. In 1844 Franchot, a Frenchman, patented an arrangement of the Stirling engine with large and efficient heating and cooling surfaces. Further attempts at improvement were made by Rankine and Napier, and by Professor Jenkin in England, and also by Lauberau in France. The Stirling engine belongs to the type of hot-air engines with temperature changes at constant volumes. Another hot-air engine which has much the same classic and historical interest as the Stirling engine is that invented by John Ericsson (q.v.). The engines of Ericsson differed from the Stirling engine in that they drew their supply of air from the atmosphere at each stroke, heated it, allowed it to expand while doing work, then exhausted it again into the external air; they belonged to the type of hot-air engine with temperature changes at constant pressure. The first engine was installed in the ship *Ericsson* in 1852; but the idea dates from 1833, and it enjoys the distinction of having been built on the largest scale and of having made the most noted failure of all hot-air engines. To Ericsson is to be credited also the term "caloric engine," which he applied as a sort of trade name to his invention. Briefly described, Ericsson's first engine was designed for a 2200-ton seagoing ship; it was intended for 600 horse power, but actually ran at about 300 horse power. There were four cylinders, each 14 feet in diameter and having 6-foot stroke, and the engine ran at nine revolutions per minute. As stated above, the engine proved a failure after several attempts had been made to remedy its faults. First the 14-foot cylinders were removed and replaced by others, which also failed; and finally the engine was replaced entirely by a steam engine. Afterward Ericsson made another attempt to drive a ship by an air engine. The *Primera* was built and fitted with horizontal engines drawing their supply from and exhausting into an artificial atmosphere of high pressure. As in the former attempt, however, the heating surface proved inadequate, and the available pressure was too small to give much power, so that again steam was substituted after a short trial. Economizers were employed with both of his large engines, but in the small engines, to the design of which Ericsson turned his attention after the failure of his large motors, the economizer was abandoned. Ericsson's first design for a small motor was brought

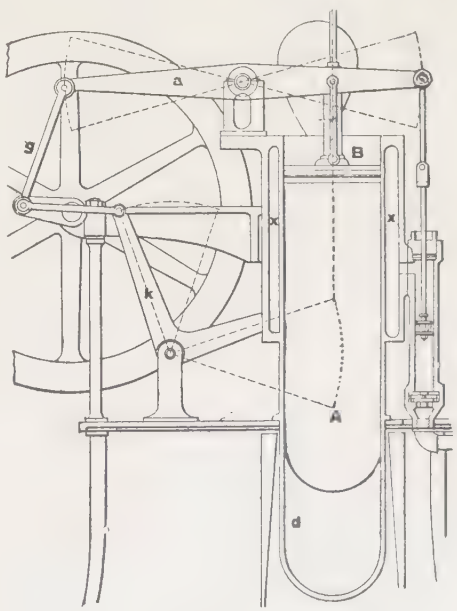

FIG. 2. ERICSSON CALORIC ENGINE.

out in 1860, and in 1880 the latest form for pumping purposes was produced. Fig. 2 shows this type of engine. The fire of coal or gas is below the cylinder *d*, which is water-jacketed at the upper end, *x x*. In tank pumping en-

gines the pumped water circulates through the water jacket. At *A* is the hollow displacing piston, and *B* is the working piston proper. The displacer is coupled to the bell crank *k*, and so to the crank *e*, to which the beam *a* is linked directly by *g*. These engines do not use less fuel than steam engines of similar size; but as they require no water or licensed engineer, they have come into considerable use.

The Stirling engine and the Ericsson engine between themselves embodied all the characteristic features of the several types of hot-air engines defined above. The Ericsson engine is an open-cycle, nonregenerating engine, with temperature changes at constant pressure; the Stirling engine was a closed-cycle, regenerating engine, with temperature changes at constant volume. The hot-air engines produced by other inventors of this kind of prime motor have resembled sometimes the Ericsson engine and sometimes the Stirling engine, but have had the details of operation worked out in different ways. Two of these only need be mentioned for the purpose of illustration: The Wilcox engine, of which large numbers were made about 1860 to 1865, was, like the Ericsson ship engine, an open-cycle, regenerative engine, with temperature changes at constant pressure. Its distinctive characteristic was a peculiar supply cylinder fitted with a piston operated from the main shaft. This supply cylinder took in the atmospheric air and passed it through the regenerator to the operating cylinder, where it was heated and expanded to perform its work, after which it was exhausted through the regenerator into the external air. The Merrill engine, one of which of 10 horse power was used for some years previous to 1885 to run a factory at Winchendon, Mass., worked on the same principle as the Stirling engine; i.e., it used the same volume of air over and over. It had two working cylinders, each of which was double-acting (see STEAM ENGINE), and two reverser plungers, which effected the transfer of the air between the heating and cooling devices.

Mention was made at the beginning of this article of hot-air engines employing previously compressed air. These are commonly known as compression engines. In them a constant quantity of air is constantly changed in volume, being compressed while cold and expanded while hot. There are usually two cylinders—one cold and kept cold by a water jacket or other means, and the other hot and kept heated by external means. The piston in the hot cylinder is generally timed from one-sixth to one-quarter revolution in advance of that in the cold cylinder, whereby the air is first changed into the cold cylinder, sometimes through a regenerator, then compressed therein, then changed to the hot cylinder back through the regenerator, taking up again the stored heat, and finally expanded in the hot cylinder. The first engine of this kind seems to have been invented by Charles Louis Felix Franchot, a Frenchman, in 1853, and it is deserving of brief mention for the clear manner in which it illustrates the working principle. Hot and cold cylinders of different areas were placed side by side, as shown by Fig. 3, with their pistons connected to cranks 135° apart. The bottom of the cold cylinder, *A*, was connected to the top of the hot cylinder, *B*, and vice versa through heating and cooling chambers, *C* and *D*, containing Stirling regenerators. The arrangement of the pistons was such that the air was compressed in the cool cylinder; passed through the regenerator into the hot cylinder, where it was expanded; then transferred to the cold cylinder through the cooling chamber, and

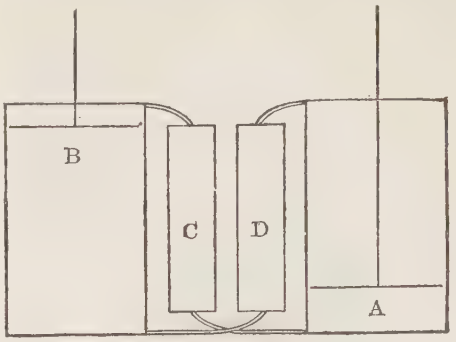

FIG. 3.

the cycle repeated. From four to six cylinders, each double-acting, were proposed to be combined in a series. A model of one of these engines was exhibited at the Paris Exposition of 1855. This same principle was embodied in an engine patented by the famous engineer Sir William Siemens in 1860, but he neglected to

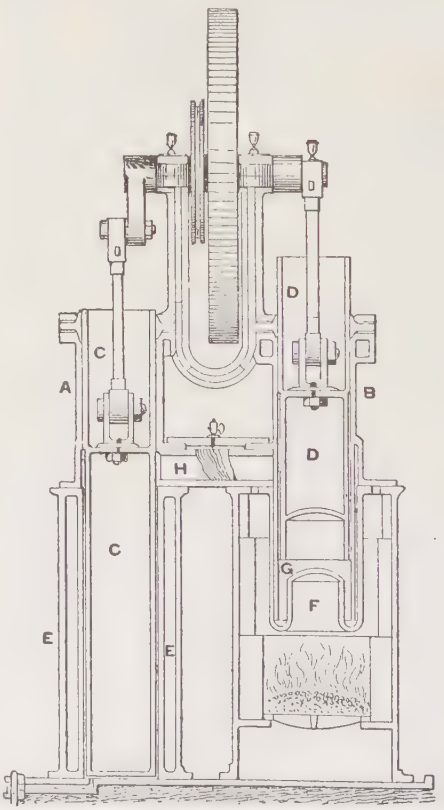

FIG. 4. RIDER CALORIC ENGINE.

put it into practical use. The Siemens engine employed four cylinders, each hot at one end and cold at the other, all connected to one shaft, and so arranged that the hot end of one communicated through a regenerator with the cold

end of the next. The heat was supplied by hot products of combustion from producer gas in a chamber connected with the hot ends of the cylinders, while the opposite ends were fitted with refrigerating devices. One of the latest forms of compression engines is the Rider, shown by Fig. 4. In this sectional view *C* is the cold cylinder or compression cylinder, surrounded by the water jacket, *E*, and *D* is the hot cylinder. The compressed air from the cold cylinder is changed through the regenerator, *H*, to the hot cylinder, where it is expanded by the heat from the grate underneath the cylinder.

Hot-air internal-combustion engines, or, more properly, hot-air products of combustion engines, operate by forcing atmospheric air through a closed fire, which may be and generally is a solid fuel fire, and carrying the air and gases of combustion to the engine cylinder. An historic form of such air engines is shown by Fig. 5. The furnace was placed in a chamber

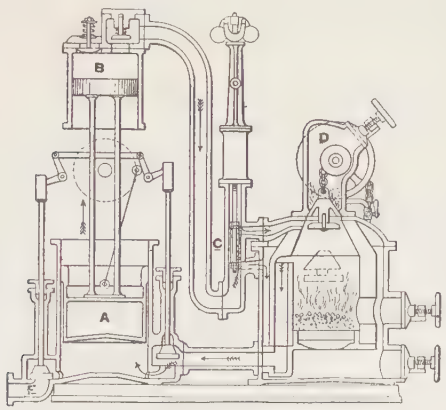

FIG. 5. HOT-AIR PRODUCTS OF COMBUSTION ENGINE.

strong enough to withstand the pressure. The compressing pump *B* forced air below the ash pit up through the fire, where it was expanded by heat and by combustion with carbon. Being admitted to the working cylinder against the piston, it was exhausted into the chimney. The furnace had to be charged with fresh fuel through a combination of double doors, *D*, working on the principle of an air lock. A hot-air product of combustion engine was described by Sir George Cayley, an Englishman, in 1807 and 1825, and again in 1837 this inventor patented a modification of the same design and built several engines, none of which gave any marked success. In 1821 Dr. Neil Arnott (q.v.), the celebrated scientist, took up the same idea and patented a form of engine in which, to avoid the abrading action of the ashes on metal pistons and cylinders, he used oil pistons. Following Cayley and Arnott, a number of inventors worked on the idea, among them being the Americans Stephen Wilcox, S. H. Roper, and Philander Shaw, each of whom built and sold a number of engines. Broadly speaking, the difficulties of operating these engines were so great that they recorded a general failure. These difficulties were caused by flue dust and the grit in the cylinders, the rapid destruction of the working surfaces and valves by the intense heat, and the practical impossibility of lubrication. They were also more bulky than other types of hot-air engines in proportion to the power developed.

The possibilities of the hot-air engine as a competitor of the steam engine have been often urged, but so far it has never reached any practical success which warranted much hope that the competition would prove serious. With the improvements and progress in the internal-combustion motor using cheap fuels, hot-air engines now are mainly of historic interest. The two sides of the question may be fairly and concisely summarized as follows:

The hot-air engine in small sizes is more economical than the steam engine of the same capacity. In larger sizes it has about the same economy as the less economical steam engine, measured in coal consumed per horse power. It has the advantage of avoiding the steam boiler as a magazine or reservoir of energy which may be liberated by accident so suddenly as to be explosive. It can be run by less skilled and expensive labor, and no steam runner's license is demanded. It is safe and odorless. The objections to the hot-air engine are the greater bulk and greater weight for the same power as compared with the steam engine; the low mean pressure with high initial pressure, which latter compels great strength of structure; the deterioration of heating surfaces exposed to high heats and consequent oxidation; the difficulties of packing and lubricating at high temperatures; the difficulty of regulation closely to varying resistances. If there is any danger to the present supremacy of the steam engine, it will be in relatively small plants that a hot-air engine can be a substitute; the gas or internal-combustion engine is more to be feared than the hot-air engine proper.

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HOT-AIR TREATMENT. A method of treatment of sprains, flatfoot, arthritis, synovitis, gout, rheumatism, neuralgia, myalgia, sciatica, and chronic ulcers by means of air at a temperature of from 250° to 300° F. It was introduced in 1893, largely through Mr. Willet of St. Bartholomew's Hospital, London. Adjustable ovens are adapted to the joint or limb affected and are at first brought to a temperature of 150°. A sense of comfort follows, with copious sweating, enormous increase of circulation, and an anodyne effect. The heart rate increases from 10 to 25 beats, the respiration from 2 to 6 breaths a minute; the mouth temperature rises 2° to 5°. See BIER'S HYPERÆMIA.

HOT'BED. Fermenting compost or manure covered with earth, and generally surmounted by a frame, for cultivating plants which require more than the natural heat of the climate, but not so much as to render the hothouse necessary. The heat is the result of fermentation. Hotbeds are in very general use for growing plants from seed in spring, to be planted in the open ground as summer advances, and for forcing vegetables

and flowers. The material mostly used is horse manure, either alone or mixed with litter; but tan bark, leaves, the waste of flax, cotton, or woolen factories, etc., are sometimes substituted for it. It is necessary that the heat of very rapid fermentation be expended before the hotbed is planted; and it is usual, on this account, to prepare the materials some days in advance of planting. A hotbed is made highest at the back, sloping towards the south. The bed extends on all sides 12 inches or more beyond the frame, according to the temperature of the outside air. The frame has a movable glass sash or sashes, according to its size, or is covered with cloth. The thickness of the hotbed and of the earth upon it is accommodated to the purpose intended and the degree of heat required. When the heat decreases, it is for some purposes necessary to keep it up by "linings" of the same material as the hotbed, added to the sides of it. The sashes of hotbeds must be partially removed during the day to permit ventilation and the escape of vapor.

HOTCH'KISS, Benjamin Berkely (1826–85). An American inventor, born in Watertown, Conn., of humble parentage. He was at an early age employed in a gun factory, where he came into contact with Samuel Colt (q.v.) in the manufacture of revolvers. During the Civil War he was engaged in the manufacture of ordnance in New York and later invented the Hotchkiss magazine gun, used by the United States troops in the West and the United States Marine Corps. This was followed in 1882 by the Hotchkiss machine gun, for use in the fighting tops of war vessels. He was also the inventor of several important improvements in projectiles and heavy ordnance. His guns were in general use throughout the armies and navies of the world until displaced in the more advanced nations by later inventions. His death occurred in Paris, where in 1870 he established a gun factory, a branch of which he was organizing in England at the time of his death. See Machine Gun; Rapid-Fire Gun.

HOTCHKISS GUN. See Machine Gun; Rapid-Fire Gun; Ordnance.

HOTCH'POT (OF. *hochepot*, from ODutch *hutspot*, chopped beef or mutton boiled in a pot, from *hutsen, hotsen*, to shake + *pot*, AS. *pott*, from Ir. *pota, puite*, Welsh *pot*, Bret. *pōd*, pot; connected with Lat. *potare*, Skt. *pā*, to drink, Gk. *ποτός, potos*, drunk). In law, the mixing and blending together of advancements made to children during a parent's life and of property left at his death, in order that the whole may be equally divided among all the children. According to Blackstone the doctrine came into English jurisprudence from the law of the Lombards, but the term is explained by him in the language of Littleton, as follows: "Hotchpot is in English a pudding; for in a pudding is not commonly put one thing alone, but one thing with other things together." By this housewifely metaphor, adds Blackstone, our ancestors meant to inform us that the lands which had been given to one or more daughters in frank marriage, as well as the lands descending to them in fee simple, should be mixed and blended together and then divided among all the daughters. After estates in frank marriage fell into disuse, the principle of the law of hotchpot was revived and applied by the Statute of Distributions (22 and 23 Car. II, c. 10). The provisions of this statute have been reënacted by the legislatures of the United States with some shades of difference and on the basis of the rules as to hotchpot throughout the country. The great object of these rules is to produce equality among the children of a deceased person. Property which has been turned over to a child as an advancement, instead of a pure gift, is to be brought into hotchpot as a condition of his taking a child's share in the parent's estate. It is not necessary that he actually bring and surrender the very chattel or other form of property advanced to him. It is enough that its fair value be allowed for. In arriving at this value its worth is to be estimated at the death of the parent. Accordingly, where a slave boy, 12 years old, was given to a child as an advancement, the child was charged with the fair value of the slave at the father's death; not at the date of the gift, nor yet at the time of the distribution of the estate, which did not occur till a much later date. On the other hand, the profits of an advancement between the date of the gift and the death of the donor, or the enhanced value due to improvements, need not be accounted for. Consult the *Commentaries* of Blackstone and Kent. See Advancement.

HOT CROSS-BUN. See Cross-Bun.

HOTEL (Fr. *hôtel*, OF. *hostel*, from ML. *hospitale*, large house, palace, inn). The origin of the modern hotel, especially in the United States, dates from the introduction of the railroad. Its advent transformed the small road house, which was planned for occasional guests, into the more pretentious hotel. Again, about 1888, came another revolution in hotel building, and the modern fireproof structures began to replace their poorly planned prototypes. Still later, the idea of specialization, i.e., of providing particularly for a certain class in the community, began to gain ground. The concentration of wealth, commerce, and industry in large cities attracted to them numerous persons for whose permanent or transient accommodation there were required comfort and luxury independent of a permanent domicile. In the United States there are four general kinds of hotels: (1) those which are run on the American plan; (2) those using the European plan; (3) those combining both systems; (4) the so-called apartment hotel, where suites of rooms, furnished or unfurnished, are rented for more or less extended occupancy, while a restaurant is maintained in the house primarily for the benefit of the guests. The European plan, on which practically all the great hotels of Europe are run, consists in paying a certain daily rate for a room and then paying separately for whatever food is ordered. By the American plan the guest pays a certain amount a day for both room and meals. With changes in life and habits the American plan is encountered less frequently, especially in the hotels of large cities, where a charge is made for rooms and meals are usually *à la carte*, the guest paying for what he orders. The difference between an American hotel which is run on the European plan and the continental hotel is that in the former the various minor items, such as light and service, are included in the price of the room; while on the Continent these items are often charged for separately, though this custom is not as prevalent as formerly. One of the most characteristic establishments of Europe is the village road house, or inn, which is found throughout the Continent, but especially in France, Germany,

and Austria. It is, as a rule, marked by simplicity and comfort and is preferred by many to the more elaborate hotel. Indeed, the small hotel in Europe is a model of its kind, and its cuisine is generally superior to that of second-class hotels in the United States, though great improvement is to be noted in recent years, and extensive touring in motor cars has brought about better conditions of accommodations. The large first-class hotels of the United States are to-day unexcelled for comfort, luxury, convenience, and service. Both in Europe and America changes have been wrought in recent years through the operation of hotels by large corporations or syndicates, which control large hostelries in different cities. Sometimes these may be operated as a chain of hotels under a single management, as by a large railway system, with purchasing and commissary departments available, or there may be but two or three hotels where the same customs, traditions, and conditions are maintained. Such high organization of the business has led to large investments in enormous buildings, where every convenience and luxury is provided for the guests and where facilities are employed to attract to its restaurants, banquet rooms, tea rooms, music room, etc., other patrons, so that the greatest return will be secured on a very large investment. The following description applies to the modern hotel.

By far the greater part of the space in a modern hotel usually is occupied with private rooms for guests, but the central feature of the design of a modern hotel is the great office and lobby, or chain of connected halls and corridors, which form the common place for arrival and departure and for meeting people from both without and within the building. A large and generally imposing entrance and vestibule lead to the office or lobby, which frequently occupies an inclosed central court, two or three stories in height, while sometimes there are several such entrances. The lobby generally contains not only the public office of the hotel, often with separate desks for its room clerks, cashier, mail clerks, and information clerks, but also news and cigar stands, a telegraph office, and telephone booths; or, if these are not in, they are adjacent to and connect with the lobby. Theatre and other amusement tickets may be secured, baggage checked, cabs ordered, flowers and small articles purchased, and high-grade shops are usually near by. Reading, writing, and smoking rooms also adjoin the lobby, and there may be parlors or reception rooms near at hand, with tea and palm rooms arranged for music. The hotel parlors are more generally on an upper floor, commonly on the second. Both public and private parlors are usually provided. Another marked feature of a hotel is its dining room. Here the object is to get a large, unobstructed floor space, with plenty of natural light, where possible, and at the same time to have the room only second in general accessibility to the lobby or office. Smaller public dining rooms, frequently called breakfast rooms, are generally provided, and also a gentlemen's café and grill room, while roof or other outdoor dining or tea rooms are provided for the summer months, besides which there are private dining rooms in proportion to the size and general character of the hotel. A conspicuous feature of American hotels is the bar, which is likely to be near, if not connected with, the café, and in the larger hotels several of these may be provided. The bar is often on the office floor, but where this floor is well above the street level the bar and café, together with barber shop, lavatories, and perhaps the public baths, are on the ground floor or in the basement. The hotel kitchen must be either near or in speedy communication with the dining room. It may be on a different floor, if dumb-waiters are provided. Where there are numerous dining rooms, public and private, several kitchens are a practical necessity.

Spacious stairways almost invariably lead from the office or lobby to the parlor or dining room, although the universal use of elevators has lessened their importance, and they are apt to be more for decorative effect than for extensive use save in an emergency. An impressive feature of some of the finest hotels is a gallery above and around the lobby, giving access to whatever public rooms may be located on the second floor. The elevators should be conveniently arranged so as to give quick access to private dining rooms, ballrooms, and parlors; and there should be separate elevators for servants and freight. The guests' rooms, if any, on the lower floors of large hotels are generally in suites (bedroom, parlor, and bathroom), but similar suites may, of course, be distributed on the other floors, and in the newer hotels the upper floors are often the most luxurious in their arrangement and appointments. Above the second floor the building commonly assumes, at least in city hotels, the form of a hollow square, or rectangle, though many large hotels are built L-shaped or with a series of wings to secure a maximum number of outside rooms. The guests' rooms are arranged along corridors—the outer ones fronting on the street, the inner ones on the court. Even third or fourth rate hotels of the present day rarely offer guests a room which does not have an ample window opening into the outer air. Fire escapes must be provided on each floor, and red lights are placed near them and at the heads of staircases to mark their location. Besides the various rooms, public and private, already mentioned, baggage and storage rooms, ballrooms, halls for concerts, conventions, and other assemblies, music rooms, and often roof gardens, are, some or all, found in the best hotels. Indeed, there is practically no end of the comforts and conveniences available in a large hotel. Not only are maids and valets at the command of the guests, but physicians, trained nurses, and even an operating and hospital room are found in at least one hotel, which has in addition a nursery for the children. Specialization has been carried to such an extent that, in at least one large metropolitan hotel, a floor has been set aside for guests whose working hours are such that they are obliged to sleep during the day, and another floor for women. The great revival of interest in dancing in 1913 and 1914 attracted many persons to hotels for dinner and supper as well as the superior music and floors that were provided, such being beyond the reach of a private dwelling.

Mountain and seaside resorts call for various modifications in design, including many spacious verandas and balconies, sun parlors for winter use, and other features suited to the changed conditions of a hotel life where recreation and social amusements, or perhaps the search for health, are the main objects. The constructional features of hotels are not sufficiently different in the material employed and the way in which it is put together to require separate treatment.

In modern city hotels, which are for the most part buildings of extreme size and height, the same conditions as regards fireproof construction obtain as are found in the best office buildings. The fire hazard of hotels at summer and health resorts is attracting increased attention, and with added comfort greater safety is being demanded by guests and enforced by insurance and State authorities.

The governing principle in the design of a hotel should be to make it as safe, convenient, comfortable, and generally attractive as possible. Unfortunately the order of these requirements sometimes is reversed, or, at least, inadequate attention is given to the safety of the guests. Safety is used broadly here, to include all that goes to make the building structurally sound, to reduce dangers from fire, and to conduce to good sanitation. Fireproof construction (q.v.) is now universally demanded for all hotels of any size, and there should be adequate fire escapes, plainly marked both by night and day, and fire-protection facilities. The latter, at least in all large hotels, include apparatus in the way of fire pumps, stand pipes, hose, chemical extinguishers, and the like, and regular drills of employees and tests of alarms and other apparatus and appliances. A plentiful supply of water is, of course, essential. This necessity frequently entails an independent pumping plant, and often in addition filtration, and always requires an extensive system of piping for both hot and cold water. To meet the demands for purity in drinking water, it is frequently advisable to install a filter plant in the basement of the hotel, or, where possible, to sink deep artesian wells. Spring waters are often supplied at table, and travelers demand that drinking water not only shall be safe but shall be clear and palatable.

Both public and private baths are required. The latter should be in separate rooms with independent air and light. Private water-closets generally accompany private baths. The public lavatories and water-closets, both as regards spaciousness and good sanitation, may be taken as a fair index of the rank of most hotels. In general, all plumbing should be of the simplest possible design and should be readily accessible for inspection and repairs. In the choice of floors and floor coverings, wall finish and decorations, window and other hangings, it should never be forgotten that frequent and thorough cleansing is imperative, and that everything that creates or serves as a lodging place for dust or that cannot be thoroughly disinfected is a menace to health. With the more general provision of vacuum-cleaning apparatus there is little excuse for dust, and it is rarely to be found in the best hotels so equipped. The furniture demanded and installed in modern hotels is of high grade, and the same as regards design as would be found in well-fitted private residences. Expert decorators are employed not only for the adornment but for the furnishings, and with luxury and elegance there has been a distinct gain in taste and homelikeness. Ventilation is most important and, together with heating, its arrangement should be intrusted to a heating and ventilation engineer. In the best hotels in the colder sections of America the buildings are heated with steam or hot water throughout, supplemented in some instances by open fireplaces. Automatic heat control is frequently found, but this must be supplemented by devices that will enable a guest to adjust the temperature of his rooms to his own requirements. Well-equipped laundries, with drying closets, are becoming more and more common even in smaller hotels, and special arrangements are made for supplying prompt service to transient guests. Electric lights are provided in most hotels, and the illumination of both public and private rooms is carefully studied and planned so as to secure the maximum effect and convenience.

Whatever the rank of a hotel, some means is provided for making known wants without leaving one's room. The most common method is a simple push button electrically connected with an annunciator in the hotel office. In some hotels elaborate signal systems are provided so that by moving a pointer over a dial in one's room any want may be made known in the office. Such cumbersome devices, however, largely have been superseded by the house telephone system, with a telephone in every room, which often through the central switchboard can be connected with ordinary local and long-distance lines. In large hotels there may be a floor operator or manager on each floor who receives visitors' cards through pneumatic tubes from the reception-room floor, supervises the chambermaids and bell boys of that floor, and performs similar duties.

The management of modern hotels presents a difficult executive problem. The number of employees (which varies according to the hotel, but which is always over 50 per cent of the guests), the constantly shifting crowd of guests, the numberless mechanical details, and the large amount of provisions and supplies which is necessary, all complicate the problem. Under the manager, and directly responsible to him, are a steward and a chef. The former has charge of the supplies and general supervision over the housekeeper, storekeeper, head laundress (and their subordinates), and over the clerks of the accounting department and the plumbers, carpenters, and upholsterers. The chief engineer also is no unimportant individual, as he is charged with the oversight of the electric-lighting plant, heating and ventilation, refrigeration, and elevator system, all of which consume large quantities of fuel. Everywhere in the modern hotel mechanical appliances are employed. For transmitting messages, as the order of a dinner, the telautograph may be employed; the occupancy of a room may be denoted in a special indicator; the whereabouts of a chambermaid may be revealed automatically. In the kitchen manual labor is supplanted wherever possible by automatic machinery, and temperature regulators are used in ovens and ranges, not to mention automatic measuring devices, knife cleaners, dishwashers, soup passers, and similar appliances. The steward generally buys the necessary provisions and supplies. Most of the provisions are ordered fresh every day, though usually the larder is stocked with a supply sufficient for two days, while the supply of dry stuff on hand is sufficient for a week. The chef has absolute charge of the kitchen and its staff, which includes special cooks in various departments. The steward makes his purchases according to lists furnished him by the chef, who oversees all details in connection with the cuisine. A head waiter with numerous assistants superintends the dining rooms and arranges for private dinners and suppers. For the history of the early hotel, see INN.

HOTEL, IN LAW. See INNKEEPER.

HÔTEL CARNAVALET, kär'nȧ'vȧ'lĕ'. See MUSÉE CARNAVALET.

HÔTEL CLUNY. See MUSÉE CLUNY.

HÔTEL DE CLUNY, ô'tĕl' de klụ'nĕ'. See CLUNY, HÔTEL DE.

HÔTEL DE RAMBOUILLET, de răn'-bōō'yȧ'. See RAMBOUILLET, HÔTEL DE.

HÔTEL DES INVALIDES, dȧ zăn'vȧ'lĕd'. See INVALIDES.

HÔTEL DE VILLE, de vĕl. The French name for a town hall; applied especially by preëminence to the city hall of Paris. This was originally on the left bank of the Seine, whence it was transferred to a position near the Châtelet on the right bank in the thirteenth century, and in 1357 to the Place de la Grève, now the Place de l'Hôtel de Ville. Under Francis I a new edifice was begun (1539) by the architect Domenico da Cortona or Boccador (or, as is contended by some authorities, by Pierre Chambiges); it was completed under Henry IV, but altered and extended under later reigns. It was totally destroyed by the Communists in 1871, with the loss of 600 of their companions who were unable to escape from the building, and was rebuilt between 1873 and 1883. The new building, by Ballu and Déperthes, is a fine Renaissance structure, with an imposing façade enriched with allegorical groups and single statues typifying the principal French cities. The interior is richly ornamented with sculpture and paintings by great French artists and contains a fine grand staircase and a sumptuously decorated festival hall. See TOWN HALL.

HÔTEL DIEU, dyē. One of the oldest hospitals in Europe and the most important in Paris, said to have been founded in 660. It formerly stood on the south side of the Ile de la Cité and was connected with an annex on the right bank of the Seine. In 1772 the hospital was destroyed and subsequently rebuilt on the same spot. The institution was transferred in 1868 to its present position on the north side of the island, near Notre Dame. It contains 559 beds, and three medical professorships are attached to it.

HOTHAM, hŭth'ȧm, WILLIAM, first BARON (1736–1813). A British naval officer, educated at Westminster School and at the Royal Naval Academy. He was appointed to the North American station in 1751, in 1759 captured a French frigate, and having joined Lord Howe (1776) at the American station, participated in the engagement in the cul-de-sac of St. Lucia in the West Indies in 1778. On his return to England in 1781 many of the ships of his convoy were taken from him by a superior French force. In 1782, with the rank of commodore, he joined the Mediterranean fleet, to the chief command of which he was eventually appointed, succeeding Admiral (Viscount) Hood. He had been promoted rear admiral in 1787 and vice admiral in 1790 and on his return to England in 1795 was made admiral. The French fleet, which he twice met in situations of advantage to himself, escaped with minor losses. In 1797 he was made Baron Hotham of South Dalton.

HOT'HOUSE. A building intended for the cultivation of exotic plants which require a higher temperature than that of the open air. The term is more generally applied to those buildings in which artificial heat is used. It includes such terms as "stove," "bark stove," etc., in the former of which the heat was derived from fires, and in the latter by fermenting tan bark, which not only produced heat, but kept the air moist. See GREENHOUSE.

HOTMAN, ŏt'măn', or **HOTMAN'NUS,** FRANÇOIS (1524–90). A French jurist and author, born in Paris. He received the degree of doctor at Orléans, and afterward, though but 22 years old, gave lectures on Roman law at the University of Paris. At this time he became a convert to the Reformed religion and was forced to take refuge in Geneva. On the recommendation of Calvin he was made professor of belles-lettres and history at Lausanne in 1549. Afterward he went to Strassburg as professor of civil law (1555); then to Valence (1562) and Bourges (1567). For a short time he returned to Paris, where he actively interested himself in the fortunes of the Huguenots; but the Massacre of St. Bartholomew sent him back to Geneva. His last years were spent at Basel. Hotman's books had a great influence on the time and wrought a reformation in the study and teaching of law. His two most important works are *L'Anti-tribonian, ou discours sur l'étude des lois* (1567) and *Franco-Gallia* (1573), often reprinted with changes of matter and titles.

HOT SPRINGS. See GEOLOGY; SPRING; THERMAL SPRING.

HOT SPRINGS. An Alaskan town, the centre of the Hot Springs mining district, on Baker Creek, near the mouth of the Tanana River (Map: Alaska, J 3). It is also a health resort and truck-farming district, which received its name from its numerous hot springs, which are the best known of all in Alaska. Its population was 101 in 1910.

HOT SPRINGS. A city and the county seat of Garland Co., Ark., 54 miles west by south of Little Rock, on the St. Louis, Iron Mountain, and Southern, the Memphis, Dallas, and Gulf, and the Chicago, Rock Island, and Pacific railroads (Map: Arkansas, B 3). It is one of the most beautiful towns in the United States and is widely noted for the hot waters that flow from 72 springs, included in a space of 10 acres on the west side of Hot Springs Mountain. The waters of these springs range in temperature from 76° F. to 157° F. and are beneficial in a multitude of diseases. In 1832 four sections of land, the thermal springs being in the centre of the district, were set off by Congress as a government reservation. Since then the government has established on the mountain the Army and Navy General Hospital and expended large sums in improving and developing the reservation. The government bathhouses, extending along Central Avenue, are tasteful in design and have attractive surroundings. There are many hotels here, the Eastman, the Arlington, the Majestic, and the Park ranking among the largest in the country; and the city is one of the most popular resorts in America, having annually 150,000 visitors. The city has a fine courthouse, city hall, and opera house. One of the features of the place is the tower on the summit of the mountain, from which four States can be seen. Settled about 1804, Hot Springs was incorporated as a town in 1876 and was chartered as a city of the first class in 1879. The government is administered by a mayor and a municipal council. Pop., 1900, 9973; 1910, 14,434; 1914 (U. S. est.), 16,334; 1920, 11,695.

HOT SPRINGS. A town in Madison Co.,

N. C., on the French Broad River, 38 miles northwest of Asheville, on the Southern Railway (Map: North Carolina, B 4). It has an elevation of more than 1300 feet and is a noted health resort because of the medicinal value of its hot mineral waters. These springs are visited by many persons yearly. Dorland Institute, a mission boarding school for mountaineers, was established here in 1894. The principal industries are lumbering and mining. Pop., 1900, 445; 1910, 443.

HOT SPRINGS. A city and the county seat of Fall River Co., S. Dak., 104 miles south of Deadwood, on the Chicago, Burlington, and Quincy and the Chicago and Northwestern railroads (Map: South Dakota, A 4). It is situated at an altitude of 3400 feet, in the beautiful Minnekahta (hot water) vale, at the source of Fall River, and is noted for its thermal and medicinal springs, which have more than a local reputation. Hot Springs is the seat of the State Soldiers' Home and contains a Carnegie library and several hospitals, sanitariums, and hotels, notably the Battle Mountain Sanitarium, built by the United States government at a cost of $2,000,000. The city is the commercial centre for important mining, live stock, and lumber interests, and has good water power, manufactures of stucco, and pink sandstone quarries. Pop., 1900, 1319; 1910, 2140.

HOT SPRINGS. A health resort in Bath Co., Va., about 75 miles north of Roanoke, on the Chesapeake and Ohio Railroad (Map: Virginia, E 3). It contains mineral springs having medicinal properties, a public library, and the old Homestead Hotel. The region was settled about 1740 and attracted people to its springs as early as 1754. Pop. (permanent), about 500.

HOT'SPUR. A name given to Henry Percy (q.v.).

HOT'TENTOT BREAD (*Testudinaria elephantipes*). A species of the family Dioscoreaceæ, indigenous to South Africa. Its slender, many-branched, vinelike stems, which die down during the dry season, grow to a height of 30 to 40 feet and bear bright heart-shaped leaves. The hemispherical or nearly globular rootstock, sometimes 3 feet in diameter, protrudes conspicuously aboveground and is covered with a brown corklike substance with many-sided protuberances separated by deep cracks and fissures. Both the scientific name and one of the common names, elephant's foot, have been derived from fancied resemblances to the foot of an elephant. It is sometimes called tortoise plant. The fleshy interior affords food to baboons and other animals. The plant is cultivated as a greenhouse curiosity. The rootstocks are exported apparently dead, but when placed in the ground they soon throw out rootlets, and stems grow rapidly from the upper surface. The genus *Testudinaria* is combined with *Dioscorea* by some botanists. See DIOSCOREACEÆ.

HOTTENTOT FIGS. See ICE PLANT.

HOTTENTOTS (*Khoi-Khoin*, men of men). A race in South Africa (census of 1904, 85,892 Hottentots proper, 1138 Korana, 7955 Griqua in the Cape Colony, Natal, and the Orange River Colony; census of 1909, 14,359 Hottentots in German Southwest Africa). Their domain is said to extend from Orange River to Walfish Bay and far into the Damara upland. A study of their somatology shows them to have the following characteristics: cranial capacity, 1290; cephalic index, 74.3; stature, 160.4 centimeters. They are accordingly short, but not dwarfish. Their skin is yellow, brown, or gray, not black; the hair is long and woolly; the cheek bones are prominent; eyes are dark chestnut or black, wide apart; the nose is very broad and flat, nostrils thick; the mouth is large, with heavy, upturning lips and enormous prognathism, chin pointed, and receding jaw. They have little beard, and no hair on the body. The ears are large, without lobules. (See Colored Plate of AFRICA, DARK RACES OF.) Steatopygia is common. There are three divisions of them—the Hottentots proper, the mongrel Griquas of Griqualand West, and the Koranas on the Orange, Vaal, and Modder rivers. Between the persecutions of the spreading Bantu tribes and later the occupation of the lowlands by Dutch and English settlers, most of them have been driven into the mountains and waste places, and they are slowly dying out. They live in low, oval, dome-shaped huts, made by setting rough poles in the ground, bending them down, and tying them together. Over all is a thatch or layer of mats woven by the women. In the centre of each hut is the fire pit where meat is roasted, and around the sides are holes in which they sleep. They wear little costume beyond a cloak of skin, but smear their bodies lavishly with fat and soot. At the time of the advent of the Europeans their wealth consisted largely in cattle. Their chief weapons were bows and poisoned arrows. In their villages the huts were arranged in a circle, forming what is known as a kraal. A portion of the Hottentots shared the fortunes and stood the oppressions of the settlers, and their descendants form a mixed race, many of whom are prosperous in flocks and herds.

Hottentot men do little work besides helping to tend cattle and occasionally hunting and fishing. Some pursue the trades of smith or armorer, tailor or tanner. The women make cords, mats, and pottery, cook, tend cattle, and perform most of the labor.

Trade is carried on by barter in cattle, and oxen are used for bearing burdens. Little beef is eaten, and meat is procured by hunting, milk being the chief food; from their environment the Hottentots secure many roots and fruits, which supply the vegetable element in their diet. Cooking of meat is by roasting or seething in a skin bag by means of hot stones. They make an intoxicating mead and chew a narcotic root.

Puberty, marriage, and funeral feasts are held. Their amusements are mock fights, games accompanied with music, drinking, and smoking. Family affection seems strong, and they are friendly, liberal, and hospitable among themselves.

Their yellow skin has been an enigma to anthropologists, and the discovery of similarities in grammar, together with the existence of words representing abstractions of a high order, strengthened the theory that the Hottentots had separated from the Caucasian kindred in the north in prehistoric times, settling the southern portion of the continent, where they were pressed upon later by the black Bantu tribes. More probably they are an isolated race, like the Australians. The theory that they are lost Hamites has recently been readvanced by Meinhof, largely because of the existence of grammatical gender; and Von Luschan has attempted

to support this linguistic argument on somatological and cultural grounds. The linguistic basis of the theory seems, however, very far from convincing, for the Hottentot gender system differs widely from that of the Hamites.

A peculiar phonetic element shared with the Bushmen consists of clicks, resembling the smacking of the mouth in clucking, etc., made by pressing the tongue against the teeth, the palate, the sides of the upper jaw, or doubling it backward and then producing an explosive noise. These clicks usually occur at the beginning of words, and while each one is not difficult to imitate, the European is quite unable to follow them up with the vocal sounds that make up the word. The name Hottentot is an effort of the Dutch to imitate the dental clicks pronounced like the expression of surprise, tut! tut! with an inhalation. See AFRICAN LANGUAGES.

The unit of government among the Hottentots was the kraal, with its subchief, who with the leading men had jurisdiction even to the extent of the death penalty. The tribes were ruled by hereditary chiefs, who were greatly revered and received their pay in kind, being entitled to a share of whatever was killed or produced. Descent was in the female line for sons, and initiation into the tribe was with ceremonial scarification of the body. Their instruments of music were the gorah, or musical bow, a rude fiddle, *l'gutha*, an imitation of European violin, a tomo, a bow rubbed with another bow, and a single-head drum.

The religious belief of the Hottentots was in keeping with their social scale and organization. They held to the existence of the soul after death. The ruler of all things is a deified patriarch, Heitsi-Eibeb, or a Great Captain Tsu-goab, who was formerly one of their mighty chiefs and came from the East. Hence all Hottentots' graves are oriented, and when they pass a cemetery they leave stones on the spot to express good will and ask a blessing. The existence of this practice in former times enables the student to follow the trail of the Hottentot in his wanderings. The cult of these people is obscure. It has been stated that they had no temples or places of united worship, no altars on which offerings or sacrifices were laid, and no class with priestly function; yet medicine men, witch doctors, or sorcerers, were common among them, called in to heal the sick by magic. An immense folklore is based on the primitive conceptions of ghosts, charms, signs, offerings, luck, and causation by spirit influences that cram the air. The folk tales reveal many resemblances with those of the neighboring Bantu, indicating a common origin.

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HOTTINGER, hŏt'tĭng-ẽr, JOHANN HEINRICH (1620–67). A Swiss Orientalist and biblical scholar. He was born at Zurich. After studying at Geneva, Groningen, and Leyden, he became professor of Church history in Zurich, where he remained until 1655, holding successively the chairs of theology and Oriental languages and rhetoric and logic. In 1655 he became professor of Oriental languages at Heidelberg. In 1661 he returned to Zurich to take charge of a German translation of the Bible, and in 1662 he was elected rector of the University in Zurich, which title he kept for life. In 1667 he was called to Leyden, but was drowned at Zurich by the capsizing of his boat while on a pleasure excursion before leaving for his new work. Hottinger was a prolific writer on Oriental subjects. The most important of his works are the following: *Thesaurus Philologicus seu Clavis Scripturæ* (1649); *Historia Ecclesiastica* (1651–67); and the *Etymologicon Orientale, sive Lexicon Harmonicum Heptaglotton* (1661).

HOTTINGER, JOHANN JAKOB (1783–1860). A Swiss historian and educator. He was born at Zurich, studied there and at Leipzig, and, returning to his birthplace, taught history in the girls' academy, in the art school, and in the university (1833). As a member of the council on education, Hottinger was prominent in the introduction of reform measures. He edited the *Archiv für schweizerische Landeskunde* (1827–29), *Archiv für schweizerische Geschichte* (1843–53), and the *Schweizerisches Museum für historische Wissenschaften* (1837–39); and wrote *Geschichte der Eidgenossen während der Zeiten der Kirchentrennung* (1825–27), *Huldreich Zwingli* (1841), *Geschichte des Untergangs der Eidgenossenschaft der 13 Orte* (1844), and *Hans Konrad Escher von der Linth* (1852).

HOT-WATER HEATING. See HEATING AND VENTILATION.

HOT-WIRE ANEMOMETER. See ANEMOMETER.

HOUARIOS, ōō-ä'rē-ŏz. Small coasting vessels and pleasure boats used in parts of the Mediterranean. They bear lateen sails and have each two masts and a bowsprit.

HOUBARA, hōō-bä'rä. See BUSTARD.

HOUBRAKEN, hou'brä'ken. A Dutch family of artists.—ARNOLD (1660–1719) was born at Dordrecht and studied under Samuel van Hoogstraeten and others. In 1713 he visited England. He practiced his art chiefly at Amsterdam and painted a number of historical pictures and figure subjects, none of great value. His chief claim to fame is a biography of Dutch painters, *Groote schoubourgh der nederlandsche konstschilders en schilderessen* (1718), an invaluable contribution in view of the absence of a similar account, but which, by reason of its uncritical and anecdotic character, must be cautiously used. Consult Hofstede de Groot, *Arnold Houbraken und seine Groote Schoubourgh* (The Hague, 1893).

His son and pupil, JACOBUS HOUBRAKEN (1698–1780), a well-known engraver, was also born at Dordrecht and practiced chiefly at Amsterdam. His first work was a series of portraits for his father's book. He did 100 plates for *The Heads of Illustrious Persons of Great*

Britain (1743–52), by T. Birchs, but his best work is a series of scenes after C. Troost. His individual portraits are said to number more than 600. (Consult Alexander Ver Huell, *J. Houbraken et son Œuvre*, Paris, 1875–77.) After Houbraken's death engraving in the Netherlands became almost a lost art.

HOUDAN, hōō′dan. A breed of domestic fowls, in the French class with the Crevecœur and La Fleche. They are widely bred in the United States and are hardy and profitable. These fowls are of medium size, mottled black and white in color, with black wing bars and primaries, and a heavy crest divided in the middle of the crown in the cock, but falling backward in the hen. They have five toes, like Dorkings. A hen should weigh six pounds, a cock seven. The other breeds mentioned are highly esteemed in France, but little known in America.

HOUDARD, ōō′dȧr′, Georges Louis (1860–). A French composer and musical savant, born at Neuilly-sur-Seine. While still studying composition under Hillemacher and Massenet, he manifested a strong leaning towards musical archæology and research. His reputation was securely established by his very first book, *L'Art dit Grégorien d'après la notation neumatique* (1897). This was followed the next year by the not less important *Le rythme du chant dit Grégorien d'après la notation neumatique.* Other works, all embodying the results of original research, are: *La richesse rythmique musicale de l'antiquité* (1903); *La cantilène Romaine* (1905); *La rythmique intuitive* (1906); *Vade-mecum de rythmique grégorienne* (1912). His compositions, the most important of which is a *Requiem*, belong exclusively to the field of sacred music.

HOUDETOT, ōō′d'-tō′, Elisabeth Françoise Sophie de la Live de Bellegrade, Countess d' (1730–1813). The mistress of Saint-Lambert and probably also of Rousseau. She was the wife of a French general and the sister-in-law of Madame d'Epinay. Rousseau mentions her in his *Confessions* and attributes to her influence much of his poetical inspiration. Their love is partly represented in *La nouvelle Héloïse.*

HOUDINI, Harry (1874–). American magician born at Appleton, Wis. He began his career as a trapeze performer in 1882. He made many tours of the world. He is the author of *Handcuff Secrets* (1907); *Unmasking of Robert Houdin* (1908); *Miracle Mongers* (1920).

HOUDIN, ōō′dăn′, Robert (1805–71). A French conjurer and mechanician. His apprenticeship to the watchmaking trade schooled his fingers in the manipulation of intricate machinery, and his hatred of shams led him to apply his mechanical knowledge to the unveiling of the conjuring tricks of his time, especially those which appealed to the religious side of human nature. By producing more wonderful illusions, with the credit given to natural causes, than those which his predecessors had attributed to supernatural, he completely revolutionized the art of magic and was honored by medals in 1844 and 1855 for his mechanical toys and the practical value of some of his inventions. In 1852 he was sent by the government to Algiers to convince the Arabs by his magic that the French were a far superior race. He was the author of an autobiography, *Robert Houdin* (1857); *Confidances* (1859); *Les tricheries des Grecs dé voilées* (1861); *Secrets de la prestidigitation et de la magie* (1868).

HOUDON, ōō′dôN′, Jean Antoine (1741–1828). One of the foremost French sculptors of the eighteenth century. He was born at Versailles, France, March 20, 1741, the son of a domestic attached to the house of De la Motte, a courtier. His first impulse towards art came from the splendid decorative sculpture of the park at Versailles, and as a boy of 10 or 12 he haunted the ateliers of the Royal School of Sculpture. In the catalogue of the Salon of 1795 he calls himself a pupil of Slodtz, but he was really much more influenced by Pigalle and the younger Lemoyne. In 1761 Houdon won the Prix de Rome, but was not influenced greatly by the treasures of art in Rome. His personality was too healthy and powerful to follow the lead of any other master and could only be satisfied by its own direct and intelligent interpretation of nature. His stay in Rome is marked by two characteristic and important productions—the superb "Ecorché," an anatomical model, which has served as a guide to all artists since his day, and the statue of St. Bruno in the church of Santa Maria degli Angeli in Rome, a work of very powerful characterization.

After 10 years' stay in Rome Houdon returned to Paris and soon became one of the foremost French sculptors; he was admitted to the Academy April 23, 1769. In 1785 he visited America in company with Benjamin Franklin in order to make the statue of Washington which had been ordered by the Legislature of Virginia. He visited Washington at Mount Vernon, and the marble statue which followed now adorns the capitol at Richmond. During the French Revolution Houdon was in danger before the Tribunal for executing a statue of St. Scholastica, but succeeded in convincing the judges that his saint was in reality a statue of Philosophy. Houdon died July 16, 1828, in Paris.

Houdon was a perfectly trained and competent technician, producing easily and abundantly, with equal success both in marble and bronze. His knowledge of anatomy was marvelous, and he was a thorough naturalist who succeeded best in portraiture. His name is principally connected with a fine series of more than 200 portrait busts, which form one of the chief monuments of French sculpture. Among these were those of Diderot (about 1769), Benjamin Franklin (1778), and of Gluck (1777); on the death of Rousseau in 1778 he made two busts in bronze and terra cotta from a cast of his face. One of the most characteristic of his busts is that of Molière, in the Théâtre Français, Paris. Among his statues are those of "Morpheus," in the Ecole des Beaux-Arts; "Diana the Huntress," the best of his nude female figures; "The Bather," combined with which there was originally a negress pouring water over her mistress's shoulders, in the Altman collection, Metropolitan Museum, New York; and especially the portrait statue of Voltaire (1781), in the Théâtre Français, one of the finest in modern art. Consult: Hermann Dierks, *Houdons Leben und Werke* (Gotha, 1887); Albert Terrade, *Autour de la statue de Jean Houdon* (Versailles, 1892); Hart and Biddle, *Jean Antoine Houdon* (Philadelphia, 1911).

HOUGH, hŭf, George Washington (1836–1909). An American astronomer, born at Tribes Hill, Montgomery Co., N. Y. He graduated at Union College in 1856 and three years afterward

was appointed assistant astronomer at the Cincinnati Observatory. The next year he became astronomer and director of the Dudley Observatory in Albany and in 1879 went West to become director of the Dearborn Observatory and professor of astronomy in Chicago University; but in 1887 he gave up the latter position to accept a similar one in Northwestern University. He discovered more than 600 double stars and invented a number of astronomical instruments. His chief publication is *Annals of the Dudley Observatory* (1866–71).

HOUGH, Lynn Harold (1877–). An American Methodist Episcopal clergyman and theologian, born at Cadiz, Ohio. He graduated from Scio College in 1898 and from Drew Theological Seminary in 1905 and studied also at Columbia University. He entered the ministry in 1906. After serving large churches in Brooklyn and Baltimore he was elected professor of historical theology in Garrett Biblical Institute in 1914. He lectured much before institutes and conferences, contributed to the religious press, and is author of *Athanasius the Hero* (1906); *The Lure of Books* (1911); *The Theology of a Preacher* (1912); *The Men of the Gospels* (1914).

HOUGH, Theodore (1865–). An American physiologist, born at Front Royal, Va., and educated at Johns Hopkins University (A.B., 1886; Ph.D., 1893). From 1893 to 1903 he was instructor and assistant professor of biology at Massachusetts Institute of Technology, from 1893 to 1907 was also instructor in physiology and personal hygiene at the Boston Normal School of Gymnastics, and from 1903 to 1907 was associate professor and professor of biology at Simmons College, Boston. In 1907 he became professor of physiology at the University of Virginia. He is coauthor of *The Human Mechanism* (1906). His researches deal mainly with cardiac inhibition, alcohol and fatigue, the physiology of muscular fatigue and soreness, and the effect of temperature on cutaneous circulation.

HOUGH, Walter (1859–). An American ethnologist, born at Morgantown, W. Va. He was educated at Monongalia Academy, West Virginia Agricultural College, and the University of West Virginia (A.B., 1883; Ph.D., 1894). He was assistant in 1886–94, assistant curator of ethnology from 1896 to 1910, and curator after 1910 in the United States National Museum. In 1892 he went with the United States Commission to Madrid and was made Knight of the Order of Isabella. He was a member of Dr. J. Walter Fewkes's expedition to Arizona (1896–97), went to Mexico with Dr. J. W. Rose (1899), and made important explorations in the Southwest in 1901, 1904, and 1905. He published some 35 papers on ethnology.

HOUGHTON, hō'ton. A village, port of entry, and the county seat of Houghton Co., Mich., on Portage Lake, near Lake Superior, with which it is connected by a canal, 94 miles northwest of Marquette, on the Duluth, South Shore, and Atlantic, the Copper Range, and the Mineral Range railroads (Map: Michigan, A 1). It is the centre of a rich mineral district, copper being mined and exported in great quantities. The Michigan College of Mines, established here in 1885, occupies many fine buildings, which, with the high school and county courthouse and jail, are the finest structures of the village. Other features are the United States customhouse, county sanitarium, Good Will Farm, Carnegie library, and agricultural school. Among the industrial establishments are a large foundry and machine shop, lumber mills, dry docks, coal docks, breweries, and manufactories of cigars, candy, handles, jewelry, etc. The water works are owned by the municipality. Pop., 1900, 3359; 1910, 5113.

HOUGHTON, George Hendrick (1820–97). An American Protestant Episcopal clergyman. He was born in Deerfield, Mass., and graduated at New York University in 1842 and at the General Theological Seminary in 1845. In 1848 he organized, and until his death was rector of, the church of the Transfiguration, better known as the "Little Church around the Corner," in New York City. The story which explains the origin of this name is that, a certain actor having died, his friends requested one of the city pastors to conduct the funeral services. The latter refused, but advised them to try the "little church around the corner." Dr. Houghton was distinguished for his activity in benevolent work. At his death he was succeeded by his nephew, George Clarke Houghton.

HOUGHTON, Henry Oscar (1823–95). An American publisher, born at Sutton, Vt. He graduated in 1846 at the University of Vermont and worked in Boston as compositor and newspaper reporter. In 1849 he entered the Cambridge firm of Messrs. Bolles and Houghton, printers, and in 1852, upon Mr. Bolles's retirement, transferred the office to its present site and established the well-known Riverside Press. In 1864 he became a member of the publishing firm of Hurd and Houghton, which in 1878 became Houghton, Osgood, and Company and in 1880 Houghton, Mifflin, and Company. In 1872 he was elected mayor of Cambridge. In 1878, by acquiring control of the large list of the old firm of Messrs. Ticknor and Fields, the Houghton house secured exclusive publication rights for the works of many leading American authors, such as Emerson, Longfellow, and Holmes. For many years *Webster's International Dictionary*—now *Webster's New International Dictionary*, published by G. and C. Merriam Company of Springfield, Mass.—has been printed by the Riverside Press.

HOUGHTON, hą'ton *or* hou'ton, Richard Monckton Milnes, Lord. See Milnes, Richard Monckton.

HOUGHTON, hō'ton (William) Stanley (1881–1913). An English dramatist. He was born in Manchester, was educated at the Manchester Grammar School, and was employed for a time in the cotton trade. From 1906 to 1912 he was assistant dramatic critic and reviewer for the *Manchester Guardian*. He was connected with the movement that resulted in the establishment by Miss Horniman (see Horniman, Annie E. F.) of her repertory theatre at Manchester in 1908, and it was there that his first plays were produced—*The Dear Departed* (1908), *Independent Means* (1909), *The Master of the House*, and *The Younger Generation* (1910). The first and last of these were produced in London in 1912–13 by the Repertory Players, who gave there in 1912 his best play, *Hindle Wakes*, a gloomy piece of Lancashire mill-town realism. This play was produced in New York the next year, as was *The Younger Generation*. His other plays, all produced in London in the last few months of his life, were, in 1912, *Fancy Free*, *Phipps*, and

Pearls, and, in 1913, *Trust the People* and *The Perfect Cure*. His *Five One-Act Plays* were collected in 1913.

HOUGUE, La. See Hogue, La.

HOULTON, hōl'ton. A town and the county seat of Aroostook Co., Me., 140 miles northeast of Bangor, on the Bangor and Aroostook and the Canadian Pacific railroads (Map: Maine, E 2). It is surrounded by a farming and lumbering district and has considerable commercial importance. There are foundry and machine shops, saw, planing, and molding mills, woolen mills, starch factories, a flour mill, a butter factory, and a large slaughterhouse. The town has a public library, two hospitals, parks, and the Ricker Classical Institute. The water works and electric-light plant are owned by the municipality. Pop., 1900, 4686; 1910, 5845.

HOUMA, hōō'mȧ (Indian, mound). A city and the parish seat of Terrebonne Parish, La., 54 miles southwest of New Orleans on the Barataria Canal, the Bayou Terrebonne, and on the Southern Pacific Railroad (Map: Louisiana, H 7). It has several oyster-packing establishments, a large moss factory, canneries, saw and planing mill, brickkilns, manufactures of sugar, molasses, and lumber, and considerable trade in rice and grain. The water works and electric-light plant are owned by the city. Pop., 1890, 1280; 1900, 3212; 1910, 5024. The place was first inhabited by the Houmas Indians.

HOUND (AS. *hund*, OHG. *hunt*, Ger. *Hund*, Goth. *hunds;* connected with Lat. *canis*, Gk. *κύων, kyōn*, OIr. *cú*, Lith. *szů*, Skt. *śvan*, dog). Broadly the term "hound" distinguishes hunting dogs, who follow their animal quarry by scent, from the greyhound group, who hunt by sight, and also from the field dogs (q.v.).

Hounds, then, comprise the bloodhound—or sleuthhound, as he is still called in Scotland—the buck or stag hound, the foxhound, the otter hound, the harrier, the beagle, the basset, and the Great Dane. The origin of all the breeds of hounds is the Talbot, or old Southern hound (*Canis sagax* of Linnæus), of which probably no true example exists to-day, although a few were preserved well up into the nineteenth century. These dogs were remarkable for their great size and strength, the depth of the chest, length of ears, and the breadth of the head in the region covering the olfactory nerves; hence their capacity for tracing the "sleuth," "slot," or track. Before the Christian era the bloodhound, or sleuthhound, of Great Britain had become so celebrated for these qualities that, as we know on the authority of Gratius, they were imported into Gaul. Strabo, who flourished somewhat later, confirms this, and Oppian praises their powers of scent and their courage.

The Bloodhound. This hound is the nearest to the original Talbot and for centuries was the hound of the huntsman whose quarry had to be followed by scent. During many centuries he was the principal agent in Europe in bringing the bear, the boar, and the stag to bay; but swifter breeds were gradually evolved, and the bloodhound's occupation dwindled to that of employing his extraordinary capacity to maintain a trail, however crossed and faint, in tracking human poachers to their hiding places. Had it not been for this need, the breed would in all probability have entirely disappeared, as, in fact, it nearly had when in the middle of the nineteenth century a few enthusiasts took up the breeding and restored the dog to his rightful position. The stories of carnage following the dog's overtaking man do not apply to the true bloodhound. When he has treed or fixed his man, he gives tongue and takes care that the pursued does not escape; but he will never lay hold viciously and maliciously. The bloodhound's practical use to-day is in tracking fugitives, refugees, and missing persons; and for this purpose packs of them are maintained by many public authorities. Their capacity to do this borders on the incredible; for, however the footsteps of the one sought for may be crossed by others, in country or street, the nose of this hound, once it has taken up the trail, will follow it. Running water is apparently the only medium that will baffle him. This sense is, of course, natural; but to develop it and bring the dog's use of it into subjection and make it intelligently useful, the puppy has to be trained and his powers gradually extended and kept in practice.

The characteristics adopted as the standard by the American Bloodhound Club depict the modern dog. He should be from 25 to 27 inches high at the shoulder for dogs and a little less for the other sex; in color, black and tan—the black, extending to the back, top of neck, and top of head, is, however, always more or less mixed with tan. The tan is a deep rich red; the coat should be short and hard on the body, but silky on the ears and top of head. The ears should be long enough to overlap each other when drawn down together in front of the dog's nose. The eyes should be hazel, deeply sunk, and with triangular lids, showing the third eyelid, or "haw." The head should be large in all dimensions except width, the muzzle deep and square, the brows fairly prominent. The skin covering the forehead and cheeks is wrinkled, and the general expression of the whole head is majestic. The neck is long, to enable him to drop the head to the trail without altering his pace. The chest and ribs are wide and deep, and the legs straight and muscular; the ankles of full size, and the feet round and catlike.

The Foxhound. As a breed distinctly characteristic and solely used for the hunting of the fox, the foxhound is a comparatively modern development, not reaching farther back than 200 years; but it has been developed from the bloodhound and the Talbot or old Southern hound, traceable for 2000 years. When England gradually became more or less deforested, and animals of the chase had more open spaces for their speed, it naturally followed that this dog had to have increased pace, and for all kinds of game except the very heaviest the bloodhound and Talbot gradually gave place to lighter hounds grafted on the old model. The stag, or buck, hound was the first variety of what we now class under the general term "foxhound." He was the first to come and practically the first to go, for not one pack of the larger buckhound exists to every hundred packs of the true foxhound. The establishment of regular packs of hounds for hunting the fox, the first of which was the Pytchley in 1750, stamped the breed on the lines from which the English hound has never varied—indeed, into some packs not a single drop of extraneous blood has ever been introduced. Most of the packs established in the latter part of that century are still, so far as other blood is concerned, in unbroken existence; such are the Belvoir (founded, 1756), the Quorn, and the Cottesmores.

Where the game chased is as swift and crafty as the fox, and the country is open, yet studded with hedgerows and walls, which act as an ever-recurring screen from sight, it follows that the pursuing hound must have unfailing powers of scent, endurance, and swiftness. These are the three characteristics of the bony, muscular, compact, big-bodied, typical foxhound. His height is not so material as are other points; 23 to 24 inches at the shoulder is a safe medium. Nor is color imperative, though necessarily, from the jealousy with which the breed has been guarded, there are no variations outside the yellow or tan, black and white, in ever-varying and clearly marked blotches over the whole body. The head should have a girth in front of the ears of fully 16 inches; the nose should be 4½ inches long, and wide, with open nostrils, and ears set low and lying close to the cheeks. The neck should taper from the shoulders to the head. The chest of a dog 24 inches high should be more than 30 inches in girth, to give the necessary lung capacity, and the ribs must be deep and grade into the loins without an observable break. The hind quarters must be very strong, and the front legs straight and strong. So important are these two features that in judging they call for 20 points out of the total 100. The modern dog, being better trained, is lighter than his ancestor; 70 to 80 pounds is the limit of a dog's weight, and the female may be 10 pounds lighter.

In America the local conditions differ so widely and are so various that it is almost impossible to define the American foxhound. In some districts, like Maryland and in the Genesee valley, the fox is followed very much after the English fashion, on horseback, over rolling grasslands; elsewhere the dog does the hunting and the man waits behind a wall on the supposed runway with a gun; in a third the men follow the dogs afoot; in still others they hunt the fox at night. It follows, therefore, that the dogs locally needed must be as various as the methods, and they are so; but, speaking broadly, and of the hound favored by the American Foxhound Club, it need only be said that it is bred on lighter and finer lines than its English ancestor. It is shorter at the shoulder—21 to 23½ inches—and weighs not more than 57 pounds. The chest is narrower in proportion to depth than the English standard; 20 inches in a 23½-inch hound is considered good. In most other respects, naturally, the requirements are very similar. One minor point of some importance may be noticed: the English dog always has his ears artificially rounded, while the American dog retains them untrimmed.

The Harrier. From the earliest times the hare has been hunted by dogs. There is a cameo among the Greek gems which depicts him chased by his special enemy, the long dog, or greyhound; but he had an equally persistent foe in the old Southern hound, the immediate ancestor of the modern harrier. The original harriers must not be confused with the dwarf foxhound, which does duty as a harrier to-day. It was only after the draining and clearing of England and Ireland at the beginning of the nineteenth century, when for the first time the chase could be followed on horseback, that the old Sussex blue-mottled harrier, the first step in refining the old stock, came into fashion. The persistence with which a scent-hunted hare can be worried by dogs with good noses, and the sport it afforded to watch the tricks and subtleties of hare and hounds, made hare hunting very popular. In order further to insure the needed qualities, the smaller foxhound strain was called into requisition, and "Tyrant," a sire from the Duke of Grafton's kennel, became the foundation of the pack of Sir John Dashwood King, of West Wycombe, whence the strain spread throughout Great Britain. There are still packs of the older and slower kind, however, and there is a "standard of points," but it is scarcely worth repeating here.

The Beagle. The harrier looks like a diminutive foxhound, and the beagle looks like a diminutive harrier; but he is not that. He has a most ancient lineage, and for beauty of form, gentleness of manner, sweetness of voice, and hunting qualities he has no equal. The length of the separate existence of the beagle has allowed opportunity for many varieties besides the "rough" and the "smooth." A very pygmy breed called "lap-dog beagle" was once popular. So small were one pack of these that the whole 10 or 12 couples were carried to the field in a pair of panniers slung across a horse. Even the common-sized beagle is slow enough to allow any ordinarily active man to follow the chase afoot. There is a Beagle Club in America which sets the standard, and field trials are annually held under its auspices. Though diminutive, some classes not exceeding 15 inches, the beagle is every inch a dog, with a wiry frame and a determined though placid look. His standard of form closely follows that of the foxhound.

The Basset. This dog is the French equivalent of the English beagle, inasmuch as he is the diminutive of an ancient breed, and his quarry is the rabbit. In other respects, as the beagle follows the characteristics of the old Southern hound, the basset resembles their other ancient common ancestor, the bloodhound. His body is longer, and his legs even shorter than the beagle's. His head is long and narrow, with heavy flews, and his forehead wrinkled to the eyes, which, like the bloodhound's, show the haw; his expression is dignified; the neck is very powerful, with heavy dewlaps, and the ears so long he is likely to tread on them, for his legs are not more than 4 inches long. The stifles are bent, and the quarters full of muscle. He is very barrel-like and has a character easily recognized.

The Dachshund. Except that this dog hunts rabbits and, like the beagle and the basset, is short on the leg and long in the body, he has nothing in common with the others. He is a curious mixture. He has the smooth coat and body of a pointer, the tail and nose of a black and tan terrier, the ear of a foxhound, with more than the foxhound's sensitiveness, the hinder legs taller than the front ones, and the latter comically bowed. He is a very ancient breed. One of his kind is painted on an Egyptian monument of the period 2000 B.C. He has many modern admirers, and a club devoted to his interests, whose standard calls for a general appearance long, low, and graceful, not cloddy: a wedge-shaped head, long and lean, broadest at its base; skull moderately arched, bridge of nose somewhat curved or nearly straight, no stop: muzzle strong, not snipy, but fairly pointed, with open nostrils; ears medium, long, broad, and soft, round at end, set on high and well back; eyes showing no white and with keen expression; jaws strong, with strong and regular

teeth; neck tapering from the shoulders to the head; shoulders well muscled and plastic; chest well developed, especially the breastbone; body long, back ribs very short; foreribs well sprung; forelegs short and strong in bone; forearms crooked; feet large, round, and strong; hind legs smaller in bone and higher than forelegs; lower thigh very short and forming nearly a right angle with the upper thigh; feet of hind legs smaller than those of forelegs; coat short (except on the wire-haired), dense, strong, and glossy, but short and fine on the underside of the body; skin loose and supple; color red in all tints, black and tan, liver and tan, gray and tan, and spotted. White is objectionable, except in a small stripe from the breastbone (which is prominent) downward.

Turnspit. A dog closely akin in build to the dachshund, and called the bath hound, or turnspit, was used in England in some localities well into the nineteenth century to drive a wheel by which the roasting spits were turned before the fire. He was put in a box in such a position that he could apply his forefeet one after another to a paddle wheel, and by that means the spit went round. A similar dog, used for rabbiting, was early known to English hunters as the wry-legged terrier.

The Otter Hound. This is the gamiest and pluckiest of dogs. His prime requisite is such hardihood as will enable him to follow the otter to its water den and fight him there, withstanding without complaint the severest bites from this most vicious of animals. If fish are to be "preserved" in certain streams, otters must be limited, and to this end otter hounds are a necessity. This dog must have powerful jaws and good teeth, also a rough grizzly coat, which defies alike the chill of the water and the teeth of the otter. Beneath the wiry outer coat an undercoat of oily wool is essential. This hound is a large dog, standing about 25 inches high, and weighing 50 to 75 pounds.

The Great Dane, or German Boar Hound. This is the last visible remnant of one of the two great classes into which dogs were divided by Xenophon and the early Greek writers—the "fighting dogs," famed for their huge frame, their pugnacity and ferocity under training. Most of the ancient nations cultivated this dog as an ally in their armies. Arrian enumerates those of "the Mede, Celt, Ser or Indian, Albanian, Iberian, Lycaonian, Libyan, Egyptian, Magnesian, Molossian, Briton, Arcanian, and a few others nearly allied." Cyrus had his war dogs, and at Marathon dogs shared the honors of the day. That their use was continued by the Romans is evidenced by the fact that from the ruins of Herculaneum have been exhumed the calcined corpses of dogs wearing mail armor. The use of this huge dog for aggressive pugnacity has long since passed, but as a companion and safeguard he has always been valued by German game wardens.

The standard adopted by the Great Dane Club of America maintains all the great and marked qualities of this giant of the canine world, decreeing for dogs a minimum height of 30 inches and a weight of 100 pounds, with an approximate height of 32 inches and a weight of 140 pounds. It requires a powerful and elegant brute. The body must be long, round, and compact; the coat short and fine; the ears small and carried high; the eyes small, deeply set, and with a sharp expression. The recognized colors are the various shades of gray or blue, mouse color, black, white, red or fawn; also brindle or tiger-striped or white ground, with patches of dark colors.

The Mastiff. This dog (the *Canis anglicus* of Linnæus) is a true hound and undoubtedly is of British origin, for he was exported from there before the Roman conquest of the islands. He was used by the Britons as a guard dog for their persons and their flocks, more than in the hunt; and he remains preëminently *the* watch-dog of the present day. Watching has become almost instinctive with him. He is the largest and most muscular dog known, exceeding even the Great Dane, and has the courage of the bulldog, yet withal is so gentle that he is the especial favorite of children. In color he is apricot, or silver fawn, or dark fawn brindle, with the muzzle, ears, and nose black in all cases; his coat is short and close-lying; his head is a very ideal of strength and massiveness, and it is set on a neck and chest in proportion. No height is set in the standard, but a dog which must weigh from 155 to 175 pounds should be very little under three feet tall.

Bibliography. Consult authorities mentioned under DOG.

HOUND. A small shark. A name more common in Great Britain than in America for the dogfish of the genus *Mustelus*, especially the blue or "smooth" hound (*Mustelus canis*), common to both sides of the Atlantic. See DOGFISH.

HOUND'FISH. 1. A needlefish, especially *Tylosorus raphidoma*, also called guardfish. See NEEDLEFISH, and Plate of NEEDLEFISH, PIKES, ETC. 2. A dogfish.

HOUND, HOUNDING. A hound is a dog employed in the chase; specifically, in England, one adapted to fox hunting. Hounding is the pursuit of game by hounds. The keeping of hounds and the sport of hounding are, to a greater or less extent, regulated by law. Those who follow hounds in fox hunting, in England, are exempt to some extent from the common-law liability of other trespassers, such sport ranking as a privileged pursuit. The employment of hounds in deer hunting is prohibited by statute in some of the United States. Consult Peer, *Cross Country with Horse and Hounds* (New York, 1902), and the authorities referred to under GAME LAWS.

HOUND'S-TONGUE (so called from the shape and texture of the leaves), *Cynoglossum*. A genus of coarse-appearing, small-flowered plants of the family Boraginaceæ, of which there are many species. The common hound's-tongue (*Cynoglossum officinale*) is a native of Europe, Asia, and Africa, introduced in North America. It has soft downy leaves, of a dull-green color, purplish-red flowers, and a stem about 2 feet high. Its odor is very disagreeable. The root was formerly administered in scrofula, dysentery, etc., and is said to be anodyne. It is also one of the pretended specifics for serpent bites and hydrophobia. The hound's-tongue is considered a pernicious weed on account of its burs, which adhere to the wool of sheep and to other animals. *Cynoglossum virginianum*, known as wild comfrey, is a common plant from New York to Florida, and *Cynoglossum boreale* occurs in Canada and northern United States as far west as Minnesota. The species of *Echinospermum*, formerly united with *Cynoglossum*, are weeds, *Echinospermum* being the beggar-lice

or sticktights. The quality of sheep's wool is often considerably lowered from the abundance of their burs in it.

HOUNS'LOW HEATH. A region west of the township of Hounslow, London, covering in 1546 an extent of 4293 acres. It was formerly notorious as the resort of highwaymen, and it was customary to leave the bodies of those who had been executed hanging on gibbets along the road. In 1686 James II established a camp on the Heath for the purpose of overawing the Londoners. Extensive barracks were erected in 1793, and part of the land is now occupied by powdermills. The region is in great part under cultivation and inclosed.

HOUR (AF. *ure*, OF. *ure, hure, ore, hore*, Fr. *heure*, from Lat. *hora*, from Gk. ὥρα, hour, season). A measure of time equal to one twenty-fourth part of a day (q.v.). As there are two kinds of days, the solar and sidereal, so there are two kinds of hours, the solar and sidereal. The latter is shorter than the former by 9.856 solar seconds.

HOUR'GLASS'. An instrument for measuring intervals of time. It is made of glass and consists of two bulbs united by a narrow neck; one of the bulbs is nearly filled with dry sand, fine enough to run freely through the orifice in the neck, and the quantity of sand is just as much as can run through the orifice in an hour if the instrument is to be an hourglass, in a minute if a minute glass, etc. The obvious defects of this instrument are the expansion or contraction of the orifice produced by heat or cold, and the variations in the dryness of the sand, all of which produce deviations from the true measurement of time. Instruments constructed on this principle are occasionally used by navigators in "heaving the log," for the purpose of measuring the time during which the log line is allowed to run out. Similar instruments are also employed by cooks in fixing the proper time for boiling eggs.

HOURI, hou'rĭ (Ar. *ḥawrâ*, woman with bright black eyes, from *ḥawira*, to have brilliant black eyes). The beautiful celestial maidens, described in the Koran (Sura lvi, 24; lv, 55 et al.) and Mohammedan tradition as dwelling in Paradise, whose companionship is one of the rewards held out to the pious Moslem. Numerous descriptions amplifying the notices in the Koran are found in Mohammedan writers. They repose on gorgeous couches in pavilions of pearl. Their countenances are so bright that one can see his face reflected from a houri's cheek. They are made by "a peculiar creation," not of clay, like ordinary women, but of musk, saffron, incense, and amber. While retaining all the qualities of virgins, they have none of the failings of women, remain ever young and free from physical defect, and have the power to conceive and bear children at will, who within an hour grow to maturity. The later Mohammedan theologians, like Ghazali (q.v.), whose more refined instincts were offended by this rather sensual picture of Paradise, endeavored to place an allegorical interpretation upon the houri; but there can be little doubt that to Mohammed and to his immediate followers, as to the bulk of present-day Mohammedans, they represent an intense reality. This follows from the details of the houri given by Mohammed and amplified by subsequent writers, on the basis of tradition, which accord with the general view of Paradise as a place where life will be full of secret delights, where there will be plenty of water, delicious fruits, with attendants waiting on the pleasure of the inhabitants, and the like. Mohammed's conception of Paradise, while based in part on the current Jewish and more particularly Christian views, embodies as its original factors the adaptation of these views to his own mental horizon and to that of his surroundings; and one is inclined to conjecture that the houri represent the reverse of the popular conception of demoniac beings, frequently pictured as female spirits, who plague and torture man in this world.

HOURS. See HORÆ.

HOURS, BOOK OF. The name given to books of private devotion designed for the laity, which were very popular and in general use throughout the Catholic church from the fourteenth to the sixteenth centuries. These books were wont to open with an almanac giving the movable feasts, etc., followed by a calendar, which in turn was followed by passages from the Gospels, by portions of the canonical hours, penitential Psalms, and litanies, and, finally, by diverse miscellaneous prayers. These devotional works were also called Prymers, or Primers, and frequently they were referred to simply as Hours. Both before and after the discovery of printing they were often beautifully illuminated, and fine examples of them are to-day much coveted by collectors. Great personages were fond of having these books made specially for themselves, with decorations and illustrations of an individual appeal. A book responding to this taste is the famous *Très riches heures* of the Duc de Berry, where pictures by Chantilly, appropriate to the different months, represent the Prince's châteaux set off against landscape backgrounds exquisitely executed in color. In the embellishment of these works of devotion distinguished artists—miniaturists, engravers, and others—labored. Consult: E. H. Longlois, *Essai sur la calligraphie des manuscrits du moyen-âge et sur les ornements des premiers livres d'heures imprimés* (Rouen, 1841); Felix Soleil, *Les heures gothiques* (ib., 1882); Wordsworth and Littlehales, *Old Service Books* (London, c.1890); Armand d'Herbonnez, "Les heures de Chantilly et l'exposition des primitifs français," in *Revue des Questions Historiques*, vol. lxxviii (Paris, 1905).

HOURS, CANONICAL. See CANONICAL HOURS.

HOURS OF LABOR. See LABOR LEGISLATION; EIGHT-HOUR DAY.

HOURWICH, hōōr'wĭch, ISAAC A(RONOVICH) (1860–). An American statistician, born at Vilna, Russia. He graduated from the Classical Gymnasium at Minsk in 1877, studied at the St. Petersburg Academy of Medicine and Surgery, and at the University of St. Petersburg, and graduated from the Demidov Juridical Lyceum at Yaroslavl (LL.M., 1887) and from Columbia University (Ph.D., 1893). He was admitted to the bar in Russia in 1887, in Chicago in 1893, and in New York in 1896, and he practiced law until 1900. He served as docent in statistics at the University of Chicago in 1893–95, as translator to the Mint, Washington, in 1900–02, as expert special agent of the Census Bureau in 1902–06 and 1909–13, and as statistician of the Public Service Commission of New York in 1908–09. He is author of *Peasant Migration to Siberia*, in Russian (1887); *The Economics of the Russian Village* (1892); *Immigration and Labor* (1912).

HOUSATONIC, hōō'sâ-tōn'ĭk. A river of

Massachusetts and Connecticut (Map: Connecticut, C 5), which rises in the Berkshire Hills about 2 miles south of Hinsdale, Mass., flows northward past that town, then northwestward to Dalton, then southwestward to Pittsfield, where it turns southward through Connecticut, entering Long Island Sound, four miles east of Bridgeport, after a course of 150 miles. It supplies water power to numerous manufactories.

HOUSE (AS. *hūs*, ME. *hous*, OHG. *hūs*, Ger. *Haus*, perhaps akin to Eng. *hide*, to conceal). A human habitation of fixed and permanent character, as distinguished on the one hand from huts, cabins, tents, wigwams, etc., and on the other from palaces (q.v.). The word is also used in other senses, e.g., of a dynasty, a commercial company, a superstructure on a vessel (deck house), a shelter for vehicles (carriage house), etc. In this article it is discussed only in its primal meaning.

The history of human habitation is important, both socially and architecturally, since it is intimately concerned with the social and family life both of the individual and of the community. Probably 99 per cent of all buildings in the world are houses; and in the plan, arrangement, construction, and decoration of the house one may trace the progress of human society and civilization. The house, as distinguished from the tepee, wigwam, or kraal, embodies and is the product of the family life as against that of tribe or clan; and since the earliest temples were undoubtedly conceived of as the dwellings of the gods, they were planned after the type of the human house, so that all religious architecture has sprung from that of the primitive house.

Little is known about the houses of the ancient Egyptians and Assyrians, as the only extant ruins of dwellings are of palaces, not common houses; and the pictures and reliefs on the monuments throw little light on the form and construction of the latter class. We know much more about the primitive Greek house, from the ruins of Mycenæ and Tiryns; more, indeed, than about those of the historic period, of which the remains are very scanty. The Mycenæan house consisted of a hall (*megaron*), with four columns about the central hearth; an anteroom, or *prodomos*, and a porch, or *aithousa*. The rooms, few or many, were grouped around the megaron. The type of the Greek house of historic times has probably been preserved for us in the Roman or Pompeiian house, whose *atrium* (q.v.) recalls the primitive Greek megaron, surrounded by the various living rooms, while the *faux* takes the place of the prodomos and aithousa.

Throughout the entire Mediterranean basin and as far East at least as the Euphrates it has been the immemorial practice to build all houses of any pretension whatsoever around a court (q.v.), of greater or less size. Even in Paris to this day the larger houses are built around courts. The Spaniards carried their *patio*, or court, with them, so to speak, to Mexico, Central and South America, and the West Indies, where it is still the custom, as about the Mediterranean, to build each house around a patio. Security and privacy are afforded by the court, from which the living rooms receive both access and light, without exposure to the dust, noise, and publicity of the street.

The excavation of Pompeii (q.v.) has given us almost complete details of the Roman provincial town house of the last century B.C. and first century A.D. in southern Italy. This was usually of one story, although portions might have a second story. It comprised an entrance passage (faux) leading from the street to the first atrium, or court, with its two lateral extensions, or *alæ*, its roof open in the centre (*compluvium*) and discharging its rain water into a central basin below, the *impluvium;* its *tablinum* where the family records and tablets were kept; three or four small rooms opening from it, and beyond these the *fauces*, or passages connecting it with the second court. This was larger than the atrium, was surrounded with columns, adorned with basin, fountains, marble table, flowers, and statues, and flanked by living rooms, while on one side or at the end was the *triclinium*, or dining room, open to the court. Beyond this, again, was the garden. The *cubicula*, or sleeping rooms, were hardly more than cells, and the kitchen was small and primitive. In crowded cities, at least in Rome, there were also tenement houses of many stories; but of their form and arrangement we know nothing.

The *villa*, (q.v.) was an establishment with many wings and numerous rooms, approaching the elaborate elegance of a palace. In central Syria there are many ruins of houses of the late Imperial and early Christian centuries, showing courts only in part inclosed by buildings, the other sides protected by high stone walls; and a similar arrangement is found in many mediæval French buildings, e.g., the Hôtel Cluny in Paris, the Hôtel Jacques Cœur at Bourges, Hôtel d'Assézat at Toulouse, and others. In the ancient Roman houses one notes the scanty provision for indoor life and for individual privacy. The nearest approach to our "living rooms," parlors, and drawing-rooms was the peristyle, where in sheltered corners, under the roof or awnings, a couch, chairs, tripod, and table might be grouped for rest and familiar converse. In the villas, on the other hand, there was an abundance of special accommodations; but these were only for the rich.

In northern Europe the Teutonic and Slavic races developed a quite different type of house, taking its light and air from the outside, not from an interior court, and having its rooms therefore more compactly put together, in two, three, or even four stories. The climate, with its rain and snow, forbade the flat roof, and the high gabled roof was universal. The mediæval houses of north European cities, closely built in blocks, taking light from front and rear only, were sometimes of stone, more often of half-timber (q.v.) construction. In the country the house was evolved out of the barn; for the primitive type sheltered under one roof horses, cattle, and the family. A fireplace at one end of a central hall, stalls along one side for the beasts, along the other for the family, and lofts above—such was the type, surviving still in some Swiss chalets. As civilization developed, and the demand for privacy and comfort increased, rooms were partitioned off, and finally the live stock was removed to separate quarters, connected with the house only by a common courtyard inclosed by a wall. The central space became the spacious, lofty hall or gallery (see GALLERY; HALL) of the manor house, in which, as in the peristyle of the Romans, the social life of the family was passed. About the huge fireplace at one end of the hall, with its projecting hood or mantle, was the gathering place of

the family; the servants and feudal dependents gathered at the other end. The hall was the common dining room.

In the fifteenth and sixteenth centuries the spread of the Renaissance and the growing security of public institutions and private life gave a great impulse to the development of domestic comfort and convenience, of privacy and elegance. In England a carved screen in the hall now separated the family from the servants; everywhere rooms were multiplied, many of them provided with fireplaces. In England the number of chimney stacks and their elaborate decoration are especially notable. City houses, still in southern Europe built around or partly around courts, became architecturally sumptuous. The stairs were everywhere made more and more spacious and important—at first of spiral form in turrets, one for each group of rooms, they were now built in straight flights with landings, starting not from a court but from the hall. Corridors were introduced into the planning, securing private access to every room. This was one of the greatest of all improvements in house planning and marked the attainment of complete privacy for the individual. It came earlier in the North than in the South. In Italy and Spain the court arcade provided independent though less private access than the corridor to the rooms of two or three stories. See MANOR HOUSE; MUSÉE CLUNY.

Modern individualism has tended to greater variety of house type than was ever known before. Even in the houses of one country or city the greatest variety is seen, especially in rural and suburban houses, where limitations of space are less exacting than in closely built towns. Local building materials play a great part in these variations, which are too numerous to be even catalogued here. The English manor house retains many of its mediæval features—its great hall and stairs, irregular plan, kitchen wing, high gables, multiplied chimneys, garden front with terrace, and inclosed kitchen or servants' court. The modern German country house is more compactly built, but more irregular and picturesque, than the average modern French château, which since the time of Henry IV (1589–1610) has displayed a somewhat formal regularity, with a compact plan instead of an open or inclosed court. The American country house varies both with the region and the individual; the country houses of the very wealthy reproduce French, English, and Colonial types. Thus, Biltmore, in North Carolina, is a French château of the sixteenth century. The Colonial types are derived from the pre-Revolution and post-Revolution houses respectively, of the North in wood and of the South in brick, and these from the English Queen Anne and Georgian styles. In city dwellings we recognize four main types with many subtypes: (1) the French, built between the garden in the rear and the service court in the front; (2) the Italian and Spanish, built wholly around a court, or patio; (3) the mansion, isolated in its garden or set upon the street with the grounds on the other three sides; (4) the house in a block, as in Venice and in all north European and many American cities. This type is much subdivided according to the planning, arrangement of hall and stairs, position of kitchen and dining room, etc. Until about 1880 all American city houses in closely built towns were of almost identical plan, with a basement, high stoop, narrow hall, and straight stairs, and rooms at front, back, and one side of hall. Great variety has replaced this dull uniformity.

Very interesting are the smaller rural and suburban houses of modern times, especially in England, Germany, and the United States. Those of England are peculiarly interesting in exterior design, picturesque use of material, and harmony with the landscape. In the United States wood has been the dominant material, and the piazza or veranda an essential feature of the design; the plans are irregular, the masses picturesque; convenience and personal comfort are sought everywhere. But with much that is admirable in these houses they have not yet attained that pervading charm that is noticeable in England. The Colonial type—rectangular, spacious, and dignified—is much seen in the smaller towns. Brick, concrete, and hollow tile are gradually replacing clapboards and shingles for the exteriors of American rural houses; the extreme inflammability of the wooden houses and the increasing price of lumber have stimulated this change. Half timber (q.v.) and brick are the chief materials in England, except in some districts where stone abounds and clay is scarce. On the continent of Europe city houses are of brick or stone; country houses almost universally of brick or rubble, stuccoed, except in Switzerland, parts of Russia, Sweden, and Norway, and Turkey, where wood abounds. The wooden mansions of the Bosporus are extremely picturesque, and their planning is not unlike that of the Colonial mansions of the United States.

Bibliography. E. E. Viollet-le-Duc, *Story of a House*, translated by G. M. Towle, (Boston, 1874); id., *Dictionnaire Raisonné de l'Architecture* (10 vols., Paris, 1876); id., *Habitations of Men in all Ages*, translated by Benjamin Bucknall (London, 1876); Charles Garnier, *L'Habitation humaine* (Paris, 1891); Russell Sturgis, *Dictionary of Architecture* (3 vols., New York, 1901); *Handbuch der Architektur* (Leipzig, 1911). See APARTMENT HOUSE; CASTLE; MANOR HOUSE; PALACE; also BUILDING and CARPENTRY, for American frame construction.

HOUSE, COLONEL EDWARD M. See SUPPLEMENT.

HOUSE ANT. The little red ant of households (*Monomorium pharaonis*), a species which has accommodated itself perfectly to the conditions of civilization. It nests in the walls of houses or in rubbish in cellars or old closets and feeds on all sorts of household stores. It becomes a great nuisance, not so much from the amount it eats as from its inordinate propensity for getting into things, especially sugar, sirup, and sweet substances generally. Careful watching will sometimes reveal the crack from which most of them come, and the nest may thus be found and destroyed. They may be trapped by thousands by a sponge moistened with sweetened water, which is daily relieved of its burden of ants by plunging it into scalding water. The cracks by which the ants enter storerooms and pantries may be plugged with cotton soaked

RED HOUSE ANT.
a, female; *b*, worker; in relative proportions.

with kerosene, or the entire house may be fumigated with bisulphide of carbon or hydrocyanic acid gas. Directions for such fumigation are printed in circular form by the Department of Agriculture at Washington and are sent to all applicants free of charge. Two little black ants (*Monomorium minutum* and *Tetramorium cæspitum*) are also found in houses, but nest outside. Consult Howard and Marlatt, *Principal Household Insects of the United States* (Department of Agriculture, Washington, 1906), and other publications of the department.

HOUSE'-BOAT'ING. The passing of the summer time, as a recreation, on what really is a flat-bottomed raft supporting a more or less extensive and luxurious suite of rooms, occupying the centre of the raft. Generally at each end of the house there is an open deck, and there is an open gallery along the sides; the top, which is railed round and covered by an awning, often forms an open court or garden. This manner of passing the summer holidays began about 1870 on the Thames, England. Today a hundred house boats are to be found on it, and a weekly paper is published, which gives the whereabouts of every such boat from day to day. Some of these boats are models of beauty in decorations and fittings, and veritable floating palaces of luxury and fashion. They are either poled from point to point or towed from the path by a horse or else by an auxiliary launch. The proximity of riverside villages and inns precludes the necessity of giving up much of the internal space to stores.

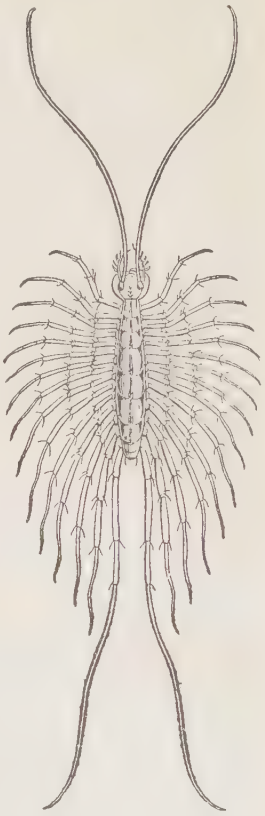
American conditions are so different as to need a much greater variety of treatment, and in every section of the country house-boating is popular. House boats are abundant on the Pacific coast, and the Mississippi system is dotted with them wherever a great city forms the necessary social nucleus. On the St. Lawrence and Lakes George and Champlain they are a summer feature, and the neighborhood of New York is especially favorable to them. In the Florida waters are some of the largest ever built, as well as many of the humbler and truer kind.

House boats may be divided into three classes —those which simply float and are moved from place to place by towing, those which move from place to place under sail, and those which move under their own power. Consult: A. B. Hunt, *House Boats and House Boating* (New York, 1905); F. W. and C. Hutchins, *Houseboating on a Colonial Waterway* (Boston, 1910); also various magazine articles, such as Lord, "How to Build a Houseboat for $300," *Scientific American*, May 14, 1910; Wanstall, "A Commuter's House Boat," *Country Life in America*, May 1, 1911; White, "A Year-Round Houseboat," *Country Life in America*, Dec. 1, 1911.

HOUSE'BOTE'. In English law, the right of a tenant for life or years to take from the land sufficient timber to keep the buildings on the place in repair. Housebote belongs to the class of ancient tenant rights, dating back, it would seem, to the Anglo-Saxon period, now generally known as estovers. They constituted a class of exemptions from the law of waste which severely restricted the right of a tenant for life or years in his enjoyment of the lands held by him. These rights still exist in the United States as well as in England. See Estover; Landlord and Tenant; Waste.

HOUSEBREAKING. See Burglary.

HOUSE CENTIPEDE. A myriapod with very long legs and long antennæ, which is numerous in the Southern States and brightly colored. It haunts houses and is feared by ignorant persons as poisonous, but is harmless and really beneficial, as it feeds on small insect vermin. It is the only representative in the United States of the chilopodous family Cermatiidæ, and is named *Scutigera forceps*. Consult Howard and Marlatt, *Principal Household Insects of the United States* (Washington, 1906). See Myriapoda.



HOUSE CENTIPEDE.

HOUSE CRICKET. See Cricket.

HOUSE FINCH, or Linnet. A small finch (*Carpodacus mexicanus frontalis*) very common throughout California, Arizona, and northern Mexico, and familiar in all valley towns and rural gardens, where it is welcome for its beautiful plumage and exceedingly sweet, canary-like song, heard throughout the year. It is related to and resembles the purple finch of the Eastern States, but is smaller and trimmer. The head and breast of the male are a rich red-wine color, varying from carmine to crimson, and the remainder of its plumage a mixture of reds, soft grays, and browns; the females and young have no red, and in winter the colors are less bright than in early summer. This finch makes its nest normally in trees, but now also occupies holes and crannies about houses and buildings, where it is never disturbed by the people, although much harassed by swallows in competition for desirable quarters. The eggs are pale blue, sparingly marked with dark lines and dots about the large end. Other names for this bird are adobe finch, red-headed linnet, and burion. Consult Bergtold, "A Study of the House Finch," in *The Auk*, xxx (Cambridge, Mass., 1913).

HOUSE FLY (*Musca domestica* L.). An insect belonging zoölogically to the order Diptera, or two-winged flies. It belongs to a very large group containing a number of families and species which closely resemble it in appearance. House flies breed and are found largely outside of houses, and conversely other flies of allied families are found within domiciles which are not the true *Musca domestica*. A true house fly is distinguished from the Sarcophagidæ by having four black lines instead of three on the back of its thorax. The Tachinidæ also possess four black lines, but they have the bristles of the antennæ smooth, whereas the house fly has

them feathered. From the Anthomyidæ it is distinguished by a bent vein near the tip of the wing. In addition to this characteristic *Musca domestica* possesses no bristles on the abdomen except at the tip. The house fly breeds in fermenting organic matter, preference being given to horse manure, although the eggs will be deposited on the excreta of almost any animal. The larvæ have been found in decomposing garbage, vegetable waste, kitchen slops, decayed meat, animal hair, and chicken feathers, and even in snuff; but, most important of all, they are found in abundance upon human excreta, upon which the fly feeds as well as deposits its eggs. It is often referred to as the typhoid fly, its habits in the above respect favoring the dissemination of this disease. House flies have been accused by various observers with the dissemination of a long list of diseases, including cholera, dysentery, diphtheria, erysipelas, contagious ophthalmia, cerebrospinal meningitis, anthrax, and possibly smallpox. The evidence in regard to typhoid is conclusive. It is believed to be most active in spreading diarrhœal affections, such as cholera morbus, dysentery, summer diarrhœa, paratyphoid and typhoid fever. Torrey in 1912 found, by observing the flies in New York City during the warm months, that they were only mildly infected with disease germs in the spring, but as the summer advanced the bacterial count steadily increased.

Life Cycle. Depending largely upon conditions of heat and moisture, the duration of the life cycle of the domestic fly varies from 10 to 15 days. According to Hewitt, the minimum rate of growth in the various stages is as follows: eggs, eight hours; the first larval stage, 20 hours; second larval stage, 24 hours; third larval stage, three days; pupa, three days; a total of eight days and four hours. The rate of generation based on the climatic conditions in Washington, D. C., assuming that all eggs survive, is astonishing. A single female laying 120 eggs on April 15 would have descendants by September 10 to the number of 5,598,720,000,000. This calculation is based only upon one batch of eggs, whereas there is a possibility of four such layings from a single fly. The house fly has a keen sense of smell, and its first impulse on issuing from the pupal inclosure is to seek warmth and food; it flies from its filth heap unerringly towards the nearest kitchen. It feeds on a variety of food and is apparently equally fond of the milk jug, the slop bucket, garbage can, or filth heap, passing freely from one to the other and distributing on its way many varieties of bacteria which cling to its feet. Its intestinal canal is comparatively simple, and pathogenic bacteria and other microorganisms pass unchanged through it and thus find another method for distribution. The digestive fluids are very weak, and the insect absorbs merely those substances which are readily soluble in them. Although the fly is capable of traveling at great speed and for long distances, Hewitt is of the opinion that normally they do not migrate very far from their place of origin. The facts in regard to the life history of the fly make it a comparatively simple matter to deal with the problem. Measures urged by boards of health throughout the country are to destroy all possible breeding places of the insect and to keep garbage cans and other refuse receptacles screened and to destroy by traps or otherwise all flies that can be caught, particularly in the early part of the summer. The fly has many enemies. It is readily attacked by fungous and parasitic diseases, by certain microscopic protozoa, one species known as *Herpetomonas muscæ domesticæ* being most active; nematode, or thread, worms are active enemies. The mite called *Atomus parasiticum* attacks it. Besides these spiders of many varieties, the house centipede, the false scorpion, and ants may be mentioned among the natural enemies of the house fly. The common toad feeds upon flies and will catch enormous numbers; domestic poultry feed with avidity upon the larvæ; many lizards and a certain species of rat feed largely upon flies. Birds, on the other hand, play very little part in the destruction of this pest. Consult: Hewitt, *The House-Fly: A Study of its Structure, Development, Bionomics, and Economy* (Manchester, England, 1910); id., *House Flies and How they Spread Disease* (New York, 1912); L. O. Howard, *The House-Fly—Disease Carrier* (ib., 1911), and references there given; id., *House Flies* (Washington, 1911); C. V. Chapin, *The Source and Modes of Infection* (New York, 1912); W. E. Britton, *House Fly as a Disease Carrier and How Controlled* (Hartford, Conn., 1912); E. H. Ross, *Reduction of Domestic Flies* (Philadelphia, 1913). See also FLY; INSECTS, PROPAGATION OF DISEASE BY.

HOUSE'HOLD, ROYAL (of Great Britain). The personal attendants upon the reigning sovereign. Among all primitive Germanic peoples we find such attendants. The chief officers of the household are usually four in number: the steward, who is the head of the household; the marshal, or head of the royal stables; the cupbearer; and the chamberlain, who has charge of the King's chambers. These four officers are found among the Anglo-Saxons and at the court of the Norman dukes. As the royal power developed, the household attendants became officers of state, and the King's household is his ministry. Under the Norman kings of England the royal household consisted of two sets of officers, whose functions greatly resembled each other. Foremost among them was the justiciar, the King's chief adviser and his representative in England when the King was abroad. The steward, whose most important functions of state passed over to the justiciar, remained head of the royal household. Other members were the treasurer, who had charge of the King's treasury, and the chamberlain, who audited the accounts; the constable, a sort of quartermaster-general of the court and the army, who had a seat in the exchequer, and the marshal, whose functions were similar. Some of these officers, viz., the steward, the constable, butler, and marshal, were hereditary in the great Norman families and either lost their importance or became merely household officers. Others which were appointed, like the justiciar, chancellor, and treasurer, became the important officers of state.

In the present organization of the royal household the lord steward is the chief officer. His authority extends over the treasurer, the controller, and the master of the household, and over all the other household officers and servants except those of the chapel, the chamber, and the stable. The dean and the subdean are the principal officers of the chapel, which is composed of a number of clerks and chaplains. The lord chamberlain controls the officers and servants of the royal chambers and appoints the trades-

men who are purveyors to the sovereign. The master of the horse is in charge of the royal stables and has under his charge the master of the hounds, the grand falconer, the crown equerry, and other servants. In the court of a female sovereign the ladies of the household play an important part. The mistress of the robes is the head of this department, and under her are the ladies of the bedchamber, maids of honor, and other attendants. The ladies of the bedchamber are the personal attendants of the Queen. Besides these there are a large number of physicians, surgeons, apothecaries, druggists, and dentists in attendance. The other members of the royal family have similar households, but on a much smaller scale.

The expenses connected with the royal household have varied greatly in the different periods of English history. In the Middle Ages the King was always attended by a large following of lords, both spiritual and temporal, besides knights, esquires, and other inferior attendants. He obtained provisions for his court by exercising the right of purveyance (q.v.), which has been abolished. Notwithstanding this, the expenses of the royal household often proved a burden to Parliament, which sometimes regulated them. This was most carefully done in the *Household Book* of Edward IV, which rigorously defined the officers of the household and the duties of its members. The expenses of the household of Edward IV were £13,000 a year, which may be taken as a fair average sum for the household expenses of a king during that period. Since the accession of William III Parliament has fixed the amount of the appropriation at the beginning of each reign. Queen Victoria received an allowance of £385,000 a year, distributed as follows: privy purse, £60,000; household salaries and retired allowances, £131,260; household expenses, £172,500; royal bounty, arms and special services, £13,200; leaving an unappropriated balance of £8040, to be used at discretion. The Prince of Wales received an annuity of £40,000 over and above his other revenues, the Duke of Connaught £25,000, and the other members of the royal family in proportion to their rank. By a grant of May 9, 1901, Parliament increased the Civil List to £415,000, the King's privy purse being increased to £110,000. See CIVIL LIST.

Consult: *The Ordinances and Regulations for the Government of the Royal Household*, published by the Society of Antiquaries (London, 1790); Larson, *The King's Household in England before the Norman Conquest* (Madison, 1904); Round, *The King's Serjeants and Officers of State* (London, 1911).

HOUSEHOLD ECONOMICS. See HOME ECONOMICS.

HOUSEHOLD GODS (Lat. *di familiares*, or *di domestici*). Among the ancient Romans, the divinities supposed to watch over the house and the family. Thus, Vesta (q.v.) was the goddess of the hearth and guardian of domestic unity. But the name was applied especially to the *lares* (q.v.) and the *penates* (q.v.).

HOUSEHOLD SUFFRAGE. The form of the parliamentary franchise at present in force in Great Britain. It was established in the boroughs by the Reform Bill of 1867–68, which conferred the right of voting for members of Parliament on all adult male household owners or lodgers who were the occupants of a dwelling capable of bringing in a yearly rental of £10 and over. By the Franchise Bill of 1884 the right was extended to the inhabitants of the counties who possessed the same qualifications.

HOUSEHOLD TROOPS. Specifically, the term applies to those regiments of the British army which form the permanent garrison of the city of London, and whose especial duty it is to attend the sovereign. Details from these troops mount guard over the royal residences and important public buildings and institutions. The term includes the following troops: two regiments of the Life Guards (First and Second); the Royal Horse Guards; the first, second, and third battalions of Grenadier Guards; the first and second battalions of Coldstream Guards; the first and second battalions of Scots Guards; and the Irish Guards. The term "household troops" is frequently used by English and American writers to describe the élite regiments of Germany and other monarchical countries.

HOUSEHOLD WORDS. A weekly periodical, founded March 30, 1849, by Charles Dickens, who became its chief editor. The opening numbers contained a serial story by Mrs. Gaskell. *Hard Times*, and many of Dickens's minor stories, first appeared in it. It was discontinued in 1858 and was succeeded by *All the Year Round* (April 30, 1859).

HOUSE INDUSTRY. A form of industrial organization in which the workman labors at home for a manufacturer or contractor. It is to be contrasted, on the one hand, with the artisan organization of industry in which the master craftsman was his own business manager and produced for the needs of a local market and, on the other, with the factory organization with its groups of workmen coöperating under a common direction and division of labor. Historically it forms a transition from the former to the latter. It was the outgrowth of a widening market for goods and marked a change in the mercantile organization of industry which kept pace with and in many cases outstripped its technical progress. As a dominant form of organization, it marked especially the closing years of the eighteenth and early years of the nineteenth centuries, and while it still lingers in backward regions and even grows up anew under peculiarly favorable circumstances, it is in the main a thing of the past.

The characteristics of the system are the isolation of the worker's production by the crude processes of hand labor and the marketing of the product by third persons. The workman may in the first instance supply his materials, but the need of uniformity in the product soon brings it about that the latter are supplied to him, and he is paid at piece rates for the work he does upon them.

Such an organization can compete with factories only when the technical processes of production remain comparatively primitive. When complicated machinery and minute subdivision of labor are introduced into factory work, house industry is doomed. It has under such circumstances kept up for a time an unequal struggle in which long hours of labor and the assistance of the entire family marked the labor in the homes. Bad as were the conditions in the factories of England in the early part of the last century, their misery was exceeded by that of the poor hand workers with whom the factories competed.

The modern counterpart of house industry in

Great Britain and America is found in the sweating system. This system is most extensively employed in the garment trade, in which the mercantile transformation was later than in other lines of industry, and in which the relative scope of hand labor as compared with use of machines is very large. The textile industries and the manufacture of boots and shoes both passed through this stage. While spinning machines and power looms were yet primitive, the hand workers were able to maintain themselves for a while by working for others. In New England the factory system had its beginnings in the domestic occupations of the people. Throughout northeastern Massachusetts may still be seen about the farms ruins of small workshops where during the winter the farmers made shoes for the merchants of Lynn and Boston. Elsewhere in the State straw for the manufacture of hats was plaited by the women on the farms, and by men in the winter time. In Sweden and Russia such industrial occupation among the rural population is quite frequent. In central Europe house industry is far more extensive. The hilly region of central Germany, from the Thuringian to the Silesian mountains, is its peculiar home. See SWEATING SYSTEM.

HOUSE'LEEK', or LIVE-FOREVER (*Sempervivum*). A genus of plants of the family Crassulaceæ, the members of which have succulent leaves which generally form close rosettes. The common houseleek, or cyphel (*Sempervivum tectorum*), grows wild on the rocks of the Alps, but has long been common in almost every part of Europe, planted on walls, roofs of cottages, etc. It sends up leafy flowering stems of 6 to 12 inches in height, which bear branches of pale-red starlike flowers, equally curious and beautiful. The leaves, cut or bruised and applied to burns, insect stings, ulcers, and inflamed sores, afford immediate relief. They were formerly in high esteem as a remedy for fevers and other diseases, and an edict of Charlemagne contributed greatly to the extensive distribution of the plant. Other species possess similar properties. *Sempervivum globiferum*, with yellowish-green flowers, is very frequently planted on walls in Germany. Some of the species, natives of the south of Europe, the Canary Isles, etc., are shrubby; others are common greenhouse plants.

HOUSE'MAID'S KNEE. A term commonly applied to an acute inflammation of the bursa, or sac that intervenes between the patella, or kneepan, and the skin. Housemaids are especially liable to it from their kneeling on hard surfaces. It causes considerable pain, swelling, and febrile disturbance. The only disease for which it can be mistaken is acute inflammation of the synovial membrane lining the cavity of the joint; but in this disease the patella is thrown forward, and the swelling is at the sides, while in housemaid's knee the swelling is very superficial and is in front of the patella. The treatment consists essentially in the employment of rest, cold applications, and bandaging. Where the condition has become chronic, radical relief can be secured by the excision of the bursa or the injection of iodine. If suppuration occurs, the sac must be opened and the pus evacuated.

HOUSE MARTIN. See HOUSE SWALLOW.

HOUSE OF COMMONS. See GREAT BRITAIN, *Government;* PARLIAMENT.

HOUSE OF CORRECTION. See REFORMATORIES.

HOUSE OF FAME, THE. A poem by Chaucer, in three books, probably written in 1384. The influence of Dante is evident in the construction of the poem.

HOUSE OF KEYS. See MAN, ISLE OF.

HOUSE OF LIFE, THE. A century of sonnets by Dante Gabriel Rossetti, published among the *Ballads and Sonnets* in 1881. Some of the poems were reprints from the *Poems* of 1870.

HOUSE OF LORDS. See GREAT BRITAIN, *Government;* LORDS, HOUSE OF.

HOUSE OF THE FAUN (It. *Casa del Fauno*). One of the largest and finest houses of Pompeii, famous for its sumptuous decorations. In it was discovered the statue of the "Dancing Faun," from which the house received its name. Its mosaics are the most beautiful that have been preserved to the present day. Among them, occupying the floor of the exedra, was discovered the celebrated mosaic of the Battle of Issus, showing Darius fleeing from Alexander, now in the Naples Museum, where the other mosaics belonging to the House of the Faun are also preserved. These include a representation of the creatures of the Nile, which formed the threshold to the Battle of Issus; the Genius of Autumn riding on a panther; doves pulling a necklace out of a jewel box; and other compositions.

HOUSE OF THE SEVEN GABLES, THE. A novel by Nathaniel Hawthorne, published in 1851. It is the story of a decayed New England family and deals with the heritage of evil which has been passed down to an inoffensive generation.

HOUSE SNAKE. See MILK SNAKE; MOCCASIN SNAKE.

HOUSE, or "ENGLISH," SPARROW. This typical sparrow (*Passer domesticus*) is the most familiar fringilline bird of Europe and latterly of the whole civilized world. It is indigenous to Europe and in closely related subspecies to Asia, where it is only partly migratory and a constant attendant upon mankind. It was not known south of the Sahara, nor in Australasia, until the European colonization of those regions caused its introduction there; and since 1850 it has become a resident of both North and South America. Everywhere it flourishes, increases with amazing rapidity, and impresses itself upon the locality by its adaptability and pugnacity towards native birds. From the earliest times it has associated fearlessly with mankind and has been a denizen of towns more than of the country. This characteristic is most prominent in the new countries, where it clings at first to cities and later spreads along railroads and other highways to the interior towns. It remains everywhere a town bird, rarely visiting and never nesting in the wilderness. To this urban habit are due in large measure its extraordinary hardihood and prolificacy, for in town it can always find an abundance of food in the streets or about warehouses, railroads, etc. Consequently it is nearly independent of season in breeding and may rear several broods a year; moreover, its nests and fledglings are safe against nearly all the enemies and dangers which beset the lives of wild birds. The result is a longevity and a rapidity of multiplication which may speedily render the species a serious local nuisance. This is felt in the more populous parts of the Old World as

well as in the countries to which it has been transplanted and where it flourishes with aggressive vigor.

While the sparrow seems able to eat all sorts of food, it is naturally graminivorous, and only when young or in feeding its young does this species consume insects in any considerable quantity. Its services to agriculture in this way are so limited in time and amount that they are insignificant, and more than overbalanced by its incessant attacks upon the smaller insect-eating birds, which otherwise would come freely about villages, orchards, and farmhouses. In the United States it has greatly lessened the number of such birds in some localities, or at any rate has driven them away from villages and farmsteads—particularly bluebirds, wrens, and all sorts of swallows, whose nests it destroys or appropriates; but there is reason to believe that the native birds are learning more and more how to cope with this bandit. Moreover, in some districts, besides great destruction wrought to the buds of fruit trees, the sparrows annually migrate in summer in large companies to the grainfields and devour or shake down quantities of ripening grain. A third evil attributed to this bird is the spread of disease, due to its propensity for using feathers and rags in the construction of the nest and for placing this nest upon or as near as possible to the house, since it may and frequently does gather these materials from infected clothing or bedding thrown out of sick rooms.

Introduction into America. The house sparrow was first brought to the United States from England in 1850 by Nicholas Pike and other directors of the Brooklyn Institute, when eight pairs were liberated in Brooklyn, N. Y.; but a second importation in 1853 was needed to establish the race. Sparrows were brought in and colonized elsewhere during the next 20 years, in various parts of the country, including California, the city government of Philadelphia importing and letting loose in that city over 1000 pairs in 1869. The motive in most cases was to free the shade trees of devastating caterpillars, which about that time were especially numerous and annoying throughout the Eastern States. A few far-seeing persons protested, but were not listened to. Only a few years elapsed, however, before a mass of evidence was presented that the sparrows were of no practical service as insect destroyers and were an increasing nuisance and menace. The outcome of much discussion and writing was an exhaustive inquiry, conducted by the United States Department of Agriculture, the results of which, unfavorable to the bird, were published in 1889 in *Bulletin No. 1* of the Department, a document of 400 pages. Whether, as many believe, a balance will after a time be obtained, and these imported sparrows cease to be relatively more numerous and troublesome than native birds of the same nature, remains to be seen. The fact that the people of Great Britain make the same complaint as those of the United States against their prolificacy and destructiveness discourages this expectation.

Bibliography. T. G. Gentry, *House Sparrow at Home and Abroad* (Philadelphia, 1878); Elliott Coues, *Present Status of Passer Domesticus in America* (Washington, 1879); W. B. Barrows, *English Sparrow in North America, especially in its Relation to Agriculture* (ib., 1889); Newton and Gadow, *Dictionary of Birds* (London, 1893–96); S. D. Judd, *Relation of Sparrows to Agriculture* (Washington, 1901).

HOUSE SWALLOW, or HOUSE MARTIN. The English name of the familiar European swallow (*Hirundo*, or *Chelidon, rustica*), which makes its mud nest about houses and barns, more often than otherwise in the interstices of farmhouse chimneys, so that it is also called chimney swallow (q.v.). It is widely distributed throughout the Old World and everywhere a familiar of civilization. See SWALLOW, and Plate of SWALLOWS.

HOUSE TAX. The duty laid on inhabited houses in Great Britain. This tax was first imposed by Act of Parliament in 1778 (18 Geo. III, c. 26) and was suggested by Adam Smith, in his *Wealth of Nations*, as a substitute for the unequal and obnoxious window tax which had been imposed on householders since 1696. The house tax has been continuously collected since, except for a brief period (1834–51) when it was suspended. It differs from the real-property tax, which is the universal basis of direct taxation in the United States, in two respects, viz., it is levied on the legal occupier and not on the owner of the premises, and it is based, not on the value of the real estate, but on the rental value of the house. Houses used exclusively for trade or other business purposes, houses that have a rental value of less than £20 per annum, unoccupied houses, and charity hospitals, charity schools, etc., are exempt from the tax. The question as to what is and what is not a house for the purposes of the act has given rise to much litigation. The results that have been reached betray some singular inconsistencies. Thus, it has been held that where a dwelling house is let in different stories, tenements, or lodgings to different people, it is to be charged as one house; but, on the other hand, each set of chambers in the Inns of Court and each set of rooms in the colleges or halls of any university is treated as a separate house. See TAX; TAXATION.

HOUSE THAT JACK BUILT, THE. A nursery rhyme in *Mother Goose*. It relies for its interest on the accumulative manner in which it is told. Hallowell conjectures that its original was a Chaldæan hymn or fable, in *Sepher Haggadah*, which is strikingly like the rhyme of *The Old Woman and the Crooked Sixpence*.

HOUSING PROBLEM. The concentration of population in cities, resulting from the progress of modern industrialism, has given rise to serious evils connected with the housing of the poor. Scarcity of accommodations, coupled with high rents, has resulted in a degree of overcrowding and an exploitation of cheap and obsolete dwellings that threaten the physical and moral health of the working class.

The housing problem presents various aspects according to local conditions. In American cities, especially in New York, its chief feature consists in undue aggregation of population upon a limited area of ground, with the resultant tendency to occupy as much of the building space as possible with lofty structures, thus depriving the tenants of adequate light and air. In European cities, on the other hand, where building operations have been less active, the evil is manifested in the form of occupancy by several persons of apartments designed for one, with consequent menace to health and morals.

Previous to the nineteenth century little at-

tention was paid to the homes of the common people. The poor of the rural districts were generally housed in wretched hovels; but this, like the state of poverty, was assumed to be natural. Sporadic attempts to provide housing for certain limited classes have, indeed, been recorded. In the early seventeenth century Christian IV of Denmark erected what would then have been considered model dwellings for sailors of the royal navy, and a Portuguese noble founded at Lisbon, after the earthquake of 1759, a "workingmen's city," some vestiges of which still remain.

With the appearance of large industrial establishments in the nineteenth century, the housing problem became acute. Villages adjacent to the new factories were unable to provide satisfactorily for the influx of workers. The owners of factories were forced to erect buildings to house their workers. An early example of this kind of enterprise was the workingmen's village erected by Legrand, a coal-mine owner, at Mons, Belgium, in 1818. The plan was widely adopted by employers and quickly degenerated into an auxiliary means of profit, the cheapest and most unsanitary cottages being provided at the highest possible charges. In 1833 another Belgian employer established at Verviers what may be considered one of the earliest model factory villages. Forty-three cottages, each with its garden, were erected at a cost of 100,000 francs. After 1850 the model factory village began to make its sporadic appearance in other countries as well. Much more frequent, however, was the appearance of the factory village designed to extract from the worker in rent as much as possible of his wages in return for accommodations unfit for habitation. Of the model village type are the Krupp villages (see KRUPP FOUNDRIES, SOCIAL WORK AT), erected to house the workers in the Krupp works at Essen; the buildings of Lever Brothers, Birkenhead, England; and the Pullman cottages at Pullman, Ill. (see PULLMAN). Other instances of the same type are numerous in all industrial states. They appear, as a rule, where a single powerful company occupies a dominating position in a small community. Necessity drives the employer to erect workingmen's dwellings; and interest in a healthy and contented working force, as well as philanthropy, leads to an endeavor to supply the best practicable accommodations. Where stress of competition or the presence of a great body of low-standard labor intervenes, the same condition may produce some of the most frightful cases of overcrowding and sanitary neglect. The unsanitary factory village affords a problem still far from solution.

The housing problem at present most prominent in the public mind concerns overcrowding in the great cities. The problem is coextensive with modern industry. Investigations carried on in New York, Chicago, Berlin, London, Paris, and Stockholm tell the same story of a working population overcrowded in houses and tenements, with resultant weakening of health, prevalence of infectious diseases, and moral decay. In the United States the problem first assumed acute form in New York City. Agitation for public control of housing in New York began with a report by Dr. James H. Griscom, inspector of the board of health, submitted in 1842. No action was taken until 1864, when a council of hygiene and public health was organized. In 1867 the first law on the subject of tenements was enacted. Its provisions were hopelessly inadequate, and builders were practically free to follow their own devices until the Law of 1901 was enacted, after a prolonged agitation in which the most prominent part was taken by Jacob Riis (q.v.). This law, improved by successive amendments and efficiently enforced, has done much towards improving housing conditions in New York. It has not been possible to overcome all the worst consequences of the earlier period of license. As late as 1910 there were in New York City 1000 "dumb-bell" tenements, 20,000 houses in which most of the rooms were dark, 100,000 rooms without windows, and 1,000,000 persons with no facilities for baths in their homes. None the less the condition of the tenements has been notably improved. To this improvement must, at least in part, be credited the decline in the death rate from 20 per thousand in 1900 to less than 14 per thousand in 1914.

The regulation of housing in other cities received a great impetus from the New York Law of 1901. In 1904 a similar law was enacted in New Jersey, and by 1912 such laws had been enacted in six other States, applying for the most part only to large cities. In 1913, 82 cities in the United States and five in Canada had housing regulations in force.

American housing regulations include, as a rule, restrictions upon the percentage of lot area that may be covered by a building; requirements as to cubic content of each room intended for occupation and as to light and air; regulations as to plumbing; provision of safeguards against fire, such as the specification of fireproof or slow-burning materials for buildings above a given height, noncombustible stairways, fire escapes, etc. Such regulations may be enforced through the regular police, through a board of health, or through a special administrative organ like the Tenement House Commission of New York. The last method is essential to effectiveness.

In the case of buildings in existence at the time of the enactment of housing laws it is possible to make only limited improvements. On grounds of public safety and health an energetic administrative board can impose certain improvements, such as the provision of fire escapes, the cutting of windows in dark rooms, and the installation of proper plumbing. The serious evils of overbuilding in respect to area of lot and of improper construction cannot thus be reached.

The public regulation of housing in Great Britain began with the Act of 1857. Additional measures were enacted at almost every session of Parliament. At present the subject is regulated by the Public Health Acts of 1875 and 1891, the Housing of the Working Classes Act of 1890, amended in 1894, 1900, and 1903, and the Housing and Town Planning Act of 1909. The Public Health Act requires the local authorities to provide appropriate inspection of houses. The Housing Acts authorize the local governing bodies to demolish unsanitary buildings and to construct habitations for the working classes, or to encourage private enterprise in this work. Under this provision several cities have carried through extensive projects for the reclamation of slum areas. Unfit habitations have been demolished, and their places taken in some cases by open spaces and thor-

oughfares, in others by model tenements erected by the city and leased to working-class families. As compared with the American plan of exclusive reliance upon restrictions on private builders and owners, the British plan presents certain obvious advantages. A thorough reconstruction of an unsanitary quarter is possible under the latter plan, but not under the former. The results of the British plan have not, however, been wholly favorable. It has placed heavy burdens upon the city treasury; at the same time, since the city-built tenements occupy less ground area than the old tenements demolished and consequently house fewer persons, the process has resulted in an aggravation of overcrowding in adjacent tenement districts.

Serious attention has long been given to the housing problem in Germany. Restrictive measures of great minuteness, severely enforced, characterize most of the larger cities. The cities, like those of England, have authority to acquire real property, to demolish old buildings and erect new, or to encourage private enterprise in the provision of housing. In general, the policy of German cities has been not so much to reconstruct areas already developed as to develop new centres. While the municipalities frequently erect apartment houses and cottages at public expense, either to let or for sale, the prevailing method is to encourage coöperative societies or private individuals to erect buildings under appropriate restrictions. This encouragement takes the form of building loans from public or semipublic funds, such as municipal savings and public insurance funds. Rates on such loans are low, and provision is made for the gradual amortization of the loan through small additions to the interest payments.

Methods similar to the German are employed in Scandinavia, Austria-Hungary, and Italy. In this connection should be noted the Belgian plan of providing workingmen's trains, enabling the workers from the city to remove their residences to distant suburbs, where land is cheap. Coupled with provision for loans at low interest of semipublic funds, the workingmen's trains have given Belgium a far larger proportion of wholesome semirural dwellings than was to have been expected from its position as one of the most highly industrialized of modern nations.

Much attention has been given to private efforts to contribute to the solution of the housing problem. Two methods have been in vogue —one purely philanthropic, the other a combination of sound business and philanthropy. An early instance of the philanthropic method was the project of Octavia Hill, undertaken in 1864, with the financial support of John Ruskin. The plan was to secure unsanitary property by purchase, employ the sums received in rent to improve it, and eventually to use the funds thus accumulated to erect new and better buildings. The plan involved both improvement in the property and in the standard of housing of the tenant population. Similar methods have been employed sporadically in many cities of America and Europe. While they provide improved housing for a few, their effectiveness is limited to the original funds, which, since they are managed without a view to profit, are apt to become dissipated in time through some miscalculation.

The plan involving both philanthropy and business principles has had far greater success. It is a well-known fact that much of the very worst tenement property, though ill adapted to its use, pays very high profits on the capital invested. Accordingly there would appear to be good reason for the belief that an enterprise operating on a considerable scale, erecting buildings with the utmost economy consistent with the requirements of comfort and sanitation, and limiting itself to a moderate scale of profits, could furnish good habitations as cheaply as, or even at a lower rate than, the owners of unsanitary shacks can furnish such habitations as they have. It is upon this principle that the most successful model housing projects have been based. Among these may be mentioned: in England, the Metropolitan Association for Improving the Dwellings of the Industrious Classes (1841), which owns 14 estates in London and pays 4½ per cent; the Peabody Donation Fund, which owns enormous blocks of tenements; the Improved Industrial Dwellings Company of London, founded by Sir Sidney Waterlow as the result of a successful experiment (1862), which endeavors to combine beauty and utility in large blocks; the Guinness Trust. In 1899 the Garden City Association, later organized as the Garden City Pioneer Company, Limited, was formed to provide suburban homes, with spaces reserved for gardening, for the city population. On the continent of Europe are the Berlin Mutual Building Company (1849) and other commercial and semiphilanthropic companies in different cities. In the United States A. T. White founded the Improved Dwelling Company of Brooklyn (1876), which has erected the Home Tower and Riverside buildings, the older buildings paying 10 per cent, the new buildings 5 or 6 per cent. Other New York enterprises are the Astral Apartments (Brooklyn) of Pratt Institute; Improved Dwellings Association, with model tenements at Seventy-first Street, paying 5 per cent; Tenement House Building Company, with property on Cherry Street. In Boston are the Harrison Avenue Estate, the Rufus Ellis Memorial Building, Coöperative Building Company (1871), and the Improved Dwelling Association (1885). In Philadelphia is the Theodore Starr Property. The City and Suburban Company of New York City was organized in 1896 as the outcome of the Improved Housing Conference. It aims to offer a safe investment returning 5 per cent and to provide the best accommodations for working people.

Under this head the most striking development is the Garden City movement, which seeks to solve the housing problem by removing city workers to suburban areas. By acquiring large tracts of land remote from the path of city development and providing adequate transportation facilities, all the benefits that would ordinarily accrue to the speculative landowner from improvements may be reserved to the occupier of the land. Model dwellings may be erected in adequate spaces and leased or sold to city workers at prices which, while affording a fair profit, are none the less much lower than those prevailing in the city. The Garden City movement is the outgrowth of Ebenezer Howard's book, *Garden Cities of Tomorrow*, published in 1898. In 1902 the Garden City Pioneer Company was organized. In 1904 the company purchased 3500 acres of land at Letchworth, 34 miles northwest of London. The land was laid out in small parcels by experts; two-thirds of

the land was retained in small farms. The number of houses that could be erected on one acre was limited to 12. Returns from the enterprise were limited to 5 per cent on the investment. The population resident in the Garden City exceeded 7500 in 1912. Enterprises of a similar character, but with the philanthropic element predominant, are Bourneville and Port Sunlight. The Garden City movement has aroused great interest in Germany. In 1909 the garden city of Helleran, just outside of Dresden, was founded. One hundred and fifty cottages were erected in the first year of its existence, and as many the second year. The cottages are erected by coöperative building societies and are rented to members of the societies at from $62 to $150 annually. Similar suburban garden cities have been founded at Karlsruhe, Nuremberg, and Munich. An American example of the movement is the community established at Forest Hills, L. I., by the Russell Sage Foundation.

Important as philanthropic efforts at housing reform really are, it is easy to exaggerate their influence upon the general housing situation. According to estimates of Veiller, in the years 1862–1901, 25 groups of tenements, accommodating 3588 families, were erected in New York under philanthropic auspices; 27,100 tenement houses, accommodating 253,510 families, were erected by speculative builders. In the years 1902–08 the philanthropic enterprises provided accommodations for 1871 families, while speculative enterprise provided for 253,255 families. It is obvious that even a slight improvement, imposed by public authority upon the mass of speculative builders, may contribute more to the solution of the general housing problem than the aggregate of philanthropic endeavor. American students of the housing problem accordingly concentrate their efforts upon improving the housing regulations and securing their efficient administration.

The Great War which broke out in Europe in 1914, had a revolutionary and far-reaching effect on the housing situation throughout the world. The situation became particularly acute shortly after the close of the war. In the United States the rapid development of numerous industrial communities under the stimulus of war demands made the housing problem a very pressing one. It was made much more severe by the shortage of labor and materials and the resultant increase in wages and prices. The housing shortage made itself felt very early in the cities where homes became scarce, rents very high and profiteering prevalent. In the industrial centres conditions were bad. This had the effect of making labor dissatisfied and prone to move from one centre to another.

As early as October, 1917, the Federal government took cognizance of conditions and measures to remedy them. The Council of National Defense appointed a committee on housing. This committee reported that production in certain essential lines would be curtailed unless additional facilities were provided. It recommended a system of government loans to private builders. It thought the government would suffer loss by any reasonable plan, but that such loss would be more than made up in increased production. It also recommended that in unusual cases the government itself should undertake the building of houses; and that in order to limit congestion of workers government contracts be as widely distributed as possible.

One government agency that early began to take steps to provide homes for workers was the Shipping Board. It set aside $10,000,000 for the erection of thousands of houses at the great Hog Island plant; it began the construction of a community site at Bristol, Pa.; and gradually developed plans for the housing of workers at other plants under its control. In March, 1918, Congress appropriated $50,000,000 for the purpose of building houses and otherwise providing housing facilities for workers in the shipyards. This fund was later augmented by appropriations of $45,000,000 and $50,000,000.

The Housing Branch of the Ordnance Department was another government agency which devoted much time, money, and energy to the attempt to solve satisfactorily the house shortage. Besides houses built solely for construction gangs, the Ordnance Department constructed dormitories, dwellings, barracks, dining rooms, stores, and schools. Further work for the Ordnance Department was taken over by the Bureau of Industrial Housing and Transportation, which was formed as a bureau within the Department of Labor. Congress appropriated $60,000,000 for its use in June, 1918, $40,000,000 was subsequently appropriated. An important division of the work of this bureau was the Homes Registration and Information Service, which made special investigations of housing needs in numerous industrial centres and maintained registries of houses and rooms for rent. Investigation revealed some forty cities in which additional housing was a necessity. In Washington were constructed residence halls for women, with a cafeteria, a central auditorium, and recreation facilities; also a few apartment houses. By September, 1918, projects had been undertaken in 65 communities. An important aspect of the works of the Bureau of Industrial Housing was the development by a group of architects, city planners, contractors, engineers, public health officers, and housing experts of standards for industrial housing.

On July 9, 1918, the United States Housing Corporation was formed under the laws of New York to meet the housing situation by supplying additional dwellings. Upon the signing of the Armistice a large part of the corporation's work was halted and only those projects then in an advanced stage were completed. The corporation sought to solve the housing problem in five ways: (1) By making available housing facilities found by careful investigation to exist in or near the particular communities in question; (2) By connecting through improved transportation, places where labor was needed with places capable of housing it; (3) By encouraging and aiding private capital to build; (4) By aiding in the distribution of labor and the placing of war contracts in such a manner that housing congestion might be avoided or reduced; (5) By construction and operation of houses, apartments, and dormitories. The last-named was the principal purpose for which the corporation was created, but it was used only as a last resort.

Despite the efforts of the government agencies the housing situation remained acute. Rentals of rooms and houses rose continually and increased construction was unable to supply the demand. The rise was most marked in cities. This was due to increased cost of maintenance and to profiteering. To meet this latter condition, committees were formed in many cities.

In many instances these committees succeeded in preventing profiteering and staying evictions, as well as bringing about necessary repairs and sanitary conditions. In 1919 it was estimated that 1,000,000 houses were needed in the United States.

During 1920 the housing situation took on two general tendencies. One was legislation, mainly on the part of municipalities, preventing profiteering on the part of landlords, and the dispossessing of tenants already paying a fair rent. Although this legislation did not work out as well as was intended, because the law was unable to say exactly what constituted a fair rent, it alleviated extreme cases of overcharging. The legislation took the form of forbidding more than a certain percentage of increase during a certain period.

The second trend was the formation of housing corporations in cities and in some States. Included in this work is the investigation of conditions, the procuring of building materials for sale at moderate prices, and the loaning of money on mortgage to persons wishing to own their own homes. This procuring of funds was difficult and in some cities it was found necessary to use municipal funds. Money was loaned to 50 per cent of the value of the improved property, usually with a maximum of $5000 and a minimum of $2000. Statistics showed that not more than 10 per cent of the required number of homes needed were being built, normal requirements being about 450,000 in the United States each year. There were built in 1919 but 70,000 and there were over 1,000,000 marriages. Statistics from the national banks showed that loans on real estate fell far short of the limit allowed by law, and that a large part of the loans made were for agricultural purposes and not for buildings and dwellings. Most of them made were in the Middle West and Southwest.

Conditions were slightly improved during 1921, but nevertheless there was a shortage in that year estimated as high as 2,000,000 homes and involving 4,000,000 people.

The housing problem resulted in the passage of several laws aimed at its solution. In 1919, North Dakota passed a series of laws to help the inhabitants of that State. One provided for the establishment of the North Dakota Home Building Association, operated by the State, and was authorized to acquire property rights and to construct, repair and remodel buildings. Wisconsin passed a law permitting municipalities to engage in home construction. In the same year the legislature of New York State passed several bills to stimulate building and to protect tenants against profiteering. Massachusetts empowered a State commission to investigate rents and to require landlords to produce their books on demand. Several States discussed the possibilities of State housing, but found it impracticable owing to constitutional limitations. Many States passed laws permitting municipalities to exempt new buildings from taxation as a stimulus to increased construction. The report of the Massachusetts Special Commission on the Necessaries of Life (January, 1921), stated that increased building will take place "when rents are sufficiently high to attract investors." Rents would come down after building had increased. But in the meantime, "if rents are kept unduly low by law, the supply of dwellings will not increase."

Chambers of Commerce throughout the United States concerned themselves with housing. The reports of the Civic Development Department on this subject shows them to be concerned more with the permanent problems than with meeting an acute shortage. They submitted three plans for local inquiry and study: (1) A financing corporation organized to loan to local builders; (2) The erection of houses by the local industries for their employees; (3) Community housing corporation.

The housing situation abroad was just as acute if not more so than in the United States. A memorandum published in June, 1918, by the Advisory Housing Panel of the Ministry of Reconstruction indicated that the shortage of houses in England and Wales amounted to 250,000, and was increasing by 75,000 per year. It was estimated that 50,000 houses should be built in rural districts in addition to their share of the foregoing. It recommended the following scheme: The State should provide the entire cost and should own houses for a period, of say, five years; during this transitional period the local authorities acting under the local government board should build and manage the houses; thereafter control would be transferred to the local authorities, the houses being revalued; after such transfer rents sufficient to cover the annual charge should be procured so far as practicable. Meanwhile the government was proceeding with a programme of providing houses both by loans and direct investment. Both permanent and temporary structures were erected, the former where conditions warranted. In some cases plans were worked out with the local authorities, in others with local housing companies, in others with manufacturing concerns, and in several places the Munitions Ministry carried out extensive plans directly.

The Housing Bill of July 31, 1919, made it incumbent upon the local authorities to prepare and carry out housing schemes. Under this act the central government is to pay deficits where they occur to the municipal building. A new Rent Act was passed on July 1, 1920, providing that a landlord may increase his rent 8 per cent for improvements or structural alterations, besides 5 per cent the first year, 10 per cent the second year, and where the landlord is responsible for repairs another 25 per cent may be added. Further provisions deal with dispossession of a tenant. England in 1920 was proposing to build 500,000 houses for her people, at an estimated cost to the taxpayers of Great Britain of over £100,000,000 loss every year for a period of 60 years. The capital needed was placed at over £517,000,000, and was to be raised by a bond issue at 6 per cent by the local authorities. On July 14, 1921, the virtual abandonment of this housing scheme was announced by the minister of health. The new policy of the government in regard to housing allowed for the subsidence of 198,000 houses at a cost of £10,005,000, and for the improvement of slum areas to the extent of £200,000. The decision to cut down the housing programme was due to the growing feeling against the volume of government expenditures. Were it not for the success of the Building Guilds in England the outlook was exceedingly black. These 60 local guilds of building workers (organized as self-governing bodies conducted for the public benefit, insuring to each member a fair remuneration, but eliminating profits) were able to supply dwellings of standard material and superior

workmanship at a cost lower than that of private contractors.

Besides the natural shortage of houses in France she suffered from the devastation wrought by the war. According to the Minister of Liberated Territories 550,000 buildings are to be erected in the devastated areas. In order to relieve the acute shortage in the vicinity of Paris the government ordered the abolition of the Paris wall and the military zone. By February, 1921, 2000 coöperative societies of reconstruction were in operation, all of which were receiving assistance from the government in one form or another.

Belgium lost 150,000 dwellings during the war and in 1920 only 4000 had been erected in the devastated regions. In order to promote house building Belgium allocated 100,000,000 francs for use in 1920 in grants at the rate of 2 per cent; no loan to exceed half the cost of the building, to a maximum of 6000 francs, and no building so built to be rented at a rent above 4 per cent of the total cost.

Conditions in Germany were exceptionally bad. 1,000,000 buildings were needed and could not be built because of the unsettled condition of labor and money. The Housing Commission requisitioned all unoccupied dwellings. No family might have more than one house, and the general limitation was a room per person with kitchen. In February, 1921, a national law was passed requiring all the states to spend at least thirty marks per inhabitant on home construction during 1921, and 1922.

In Canada $27,000,000 was made available by the dominion government to be borrowed by the local government for building purposes. Many municipalities took advantage of this action and appointed commissions to carry out the building work. Australia and New Zealand passed laws containing provisions similar to the Canadian law.

In Italy the task of meeting the shortage of homes was given to the communes and local authorities. The government provided 100,000,000 lire which could be borrowed on comparatively easy terms. Drastic rent laws were passed to check profiteering.

These are simply a few examples of conditions that were virtually world-wide.

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HOUS'MAN, ALFRED EDWARD (1859–). An English Latin scholar, an elder brother of Laurence Housman. He was educated at St. John's College, Oxford, was a division clerk in the Patent Office in 1882–92, and, after being professor of Latin at University College, London, from 1892 to 1911, was made professor of Latin at Cambridge and fellow of Trinity College. He wrote *A Shropshire Lad* (1896; music by C. F. Manney, 1914) and edited two books of Manilius (1903 and 1912) and selections from Juvenal (1905), besides publishing articles in classical periodicals.

HOUSMAN, LAURENCE (1867–). An English illustrator and author, brother of Alfred Edward Housman (q.v.). He began his career, after studying art at South Kensington, as a book illustrator, working somewhat in the Pre-Raphaelite tradition, in which capacity he is seen to advantage in his designs for Meredith's *Jump to Glory Jane* (1892), Christina Rossetti's *Goblin Market* (1893), *Werewolf* by his sister, Clemence Housman—who engraved his designs on wood—and Shelley's *Sensitive Plant* (1898). As a poet, one thinks of him in connection with Rossetti, whose influence is felt in his mysticism and in the technique of his verse, as will be seen in such representative poems as those collected in *Spikenard* (1898), *Mendicant Rhymes* (1906), and in *Selected Poems* (1909). As a writer of tales of a symbolical and allegorical cast, he is perhaps at his best in *All Fellows* (1896), *The Blue Moon* (1904), and *The Cloak of Friendship* (1905); as a biting if cheerful satirist, in story form, of the England of his day, in *John of Jingalow* (1912); and as a novelist, in the finely written *An Englishwoman's Love Letters* (1900), in *A Modern Antæus* (1901), and in *Sabrina Warham* (1904), probably his strongest novel. His *The Royal Runaway* appeared in 1913. In 1902 his *Bethlehem*, an attempt to recapture the homely, naïve piety of the old miracle play, was performed in London. Other dramatic pieces of his are the modern paraphrase of *Lysistrata* (1910) and the quaint and engaging *Prunella, or Love in a Dutch Garden* (1911; 1914), written in collaboration with Granville Barker, and played in London in 1904 and in New York in 1913. Housman identified himself actively with the militant suffrage movement.

HOUSSA. See HAUSA STATES.

HOUSSAYE, o͞o'sā', ARSÈNE (1815–96). A French author, born at Bruyères. His real name was HOUSSET. He went to Paris at an early age and at 21 became widely known as the author of two romances, *La couronne de bluets* and *La pêcheresse*. He attracted attention particularly as an art critic, publishing his *Histoire de la peinture flamande et hollandaise* in 1846. In 1849 Houssaye was appointed director of the Comédie Française, at the suggestion of Rachel, and held the place until 1859. He was long editor of *L'Artiste* and for some years was editor and proprietor of *La Presse*. Among his works are, in addition to those already named: *Mlle. de la Vallière et Mme. de Montespan* (1860) and *Galerie de portraits du XVIIe siècle* (1844), historical studies; *Le roi Voltaire* (1858) and the well-known and

entertaining *Histoire du quarante et unième fauteuil de l'académie française* (1855), both volumes of literary criticism; his play, *Comédiennes* (1857); *Symphonie des vingt ans* (1867) and *Cent et un sonnets* (1873), poems; *Les filles d'Eve* (1852) and other novels. Consult his *Confessions* (4 vols., Paris, 1885–91), and Ernest Lemaître, *Arsène Houssaye: Notes et souvenirs* (Rheims, 1897), which latter contains a good bibliography.

HOUSSAYE, Henry (1848–1911). A French historian and critic, born in Paris. He distinguished himself in the Franco-Prussian War and was subsequently an editor of the *Journal des Débats* and the *Revue des Deux Mondes.* His *Histoire d'Alcibiade et de la république athénienne depuis la mort de Périclès jusqu'à l'avènement des trente tyrans* (1873) received from the French Academy the prize established by Thiers. In 1894 he was elected to the Academy. His further works include: *Histoire d'Appelles* (1867); *L'Armée dans la Grèce antique* (1867); *Athènes, Rome, Paris* (1879); *L'Art français depuis dix ans* (1882); *Aspasie, Cléopatre, Théodora* (4th ed., 1890). He made a careful study from the original documents of the fall of Napoleon and of the First French Empire. The results are embodied in two works of the first importance: *1814, Histoire de la campagne de France et de la chute de l'empire* (1888), which went through some 46 editions, and *1815,* comprising three parts, of which *La première restauration, le retour de l'île d'Elbe, les cent jours* appeared in 1893, *Waterloo* in 1899, and *La seconde restauration, la terreur blanche* in 1905. In 1903 he published *Napoléon homme de guerre.* He was an Officer of the Legion of Honor and an honorary president of the Society of Men of Letters. Consult Louis Sonolet, *Henri Houssaye: Biographie critique avec notes et bibliographie* (Paris, 1905).

HOUSTON, hū'ston. A city and the county seat of Harris Co., Tex., on Houston Ship Channel, an arm of Galveston Bay, at the head of navigation, 48 miles northwest of Galveston, on the International and Great Northern, the Gulf, Colorado, and Santa Fe, the Texas and New Orleans, the Missouri, Kansas, and Texas, the Houston and Texas Central, and several other railroads (Map: Texas, E 5). It is a railroad centre of great importance, and improvements on the channel by the Federal government at a cost of $2,500,000 have added to its transportation facilities by giving direct water communication with the Gulf of Mexico and the Atlantic Ocean; while local transit is facilitated by several bridges across the channel. The area of the city, which was about 16 square miles, was increased by annexation in 1914 to over twice that amount. It has the Houston Lyceum and Carnegie libraries and a large city hospital. Other prominent structures include the municipal auditorium (costing $400,000), the new South End Junior High School ($1,000,000), Union Station ($5,000,000), the United States government building, the city hall, the courthouse, the cotton exchange and market, and the Masonic Temple. The William M. Rice Polytechnical Institute (coeducational), endowed with the estate of the founder, amounting to $10,000,000, is situated in Houston. The city controls extensive commercial and financial interests; it is one of the most important cotton markets in the United States, and in its lumber trade ranks with the leading cities of the Southwest. Cottonseed oil, rice, and sugar are also exported, and a large general trade contributes to the city's prosperity. There are extensive railroad car and machine shops, cotton compresses and oil mills, planing mills, foundries and machine shops, rolling mills, potteries, brick and tile works, flour mills, carriage and wagon shops, etc. Iron and lignite are found in the vicinity. The government, under a charter of 1905, is vested in a municipal commission, consisting of a mayor and four commissioners, chosen from the city at large every two years. The water works are owned by the municipality. Houston spends annually in maintenance and operation $2,717,000; the principal items of expenditure being $430,000 for schools, $172,000 for the street department, $171,000 for the fire department, $193,000 for the police department (including amounts for courts, jails, reformatories, etc.), $135,000 for maintenance of water works, and $63,000 for the health department (including amounts for charitable institutions). Houston was laid out and settled in 1836, was named in honor of Gen. Sam Houston, and in 1837–39 and 1842 was capital of the Republic of Texas. Pop., 1890, 27,557; 1900, 44,633; 1910, 78,800; 1914 (U. S. est.), 93,122; 1920, 138,076.

HOUSTON, David Franklin (1866–). An American public official, born at Monroe, Union Co., N. C. He graduated from South Carolina College in 1887 and from Harvard University (A.M.) in 1892, and received the honorary degree of LL.D. from Tulane (1903), the University of Wisconsin (1906), Yale (1913), and Harvard (1914). He taught ancient languages at South Carolina College in 1887–88, was superintendent of Schools at Spartanburg, S. C., in 1888–91, and served as adjunct professor (1894–97), associate professor (1897–1900), and professor of political science (1900–02) at the University of Texas, where he was also dean of the faculty (1899–1902) and president in 1905–08. In 1902–05 he was president of the Agricultural and Mechanical College of Texas; and he served as chancellor of Washington University, St. Louis, from 1908 until his appointment in 1913 as Secretary of Agriculture in President Wilson's cabinet. He became vice president of the American Economic Association in 1914. He published *A Critical Study of Nullification in South Carolina* (1896).

HOUSTON, Edwin James (1847–1914). An American electrical engineer, born at Alexandria, Va. He graduated from the Central High School, Philadelphia, where he afterward taught physical geography and natural philosophy. In Philadelphia, also, he was professor of physics at Franklin Institute and at the Medico-Chirurgical College. He was one of the inventors of the Thomson-Houston system of arc lighting, was a member of the United States Electrical Commission, and was chief electrician of the International Electrical Exposition at Philadelphia in 1884. In 1893–95 he served as president of the American Institute of Electrical Engineers. His publications include: *Elements of Physical Geography* (1878; 9th ed., 1909); *Dictionary of Electrical Word Terms and Phrases* (1889; 4th ed., 1898); *Arc Lighting* (1897; 1906); *Electricity in Every Day Life* (3 vols., 1904); *Wonder Book of Magnetism* (1908); *The Land of Drought* (1910); *Born an Electrician* (1912).

HOUSTON, Sam (1793–1863). An American

soldier and political leader—a leader, with Stephen F. Austin, in the movement which gained Texas independence from Mexico and a conspicuous figure in the early history of Texas as a State. He was born near Lexington, in Rockbridge Co., Va., March 2, 1793, of Scotch-Irish parentage. After his father's death, in 1806, the family emigrated to Tennessee, where he entered an academy, but left to try a clerkship in a store and, wearying of this, went to live among the Cherokees of east Tennessee. He remained with them three years, when he returned to civilization and taught school. His own opportunities for obtaining an education were scant. In 1813 he enlisted as a private in the United States army, served bravely in General Jackson's campaign against the Creeks, being wounded at Tohopeka, and soon rose to be lieutenant. In 1817 he was appointed agent to aid in negotiations with the Cherokees, incurred the criticism of the War Department, of which John C. Calhoun was Secretary, for attempting to prevent the smuggling of negroes from Florida into the United States, resigned his commission, 1818, and began the study of law at Nashville. He soon opened an office at Lebanon, was made adjutant general of the State in 1819, and major of the State militia. He was elected to Congress in 1822, was reelected in 1824, and in 1827 was elected Governor by the Jackson Democrats. In January, 1829, he married Miss Allen, a Tennessee lady, but three months afterward left her and, resigning his office without giving either public or private reasons for his course, went to live among his old friends the Cherokees, who had emigrated to Arkansas, and was formally adopted a member of their nation. He championed their cause before Congress, incurring by this much enmity, especially from the "Indian ring," and becoming involved in an encounter with William R. Stanberry, Representative from Ohio, who had accused him of fraudulent attempts to obtain a contract for Indian rations. For beating Stanberry he was reprimanded in the House of Representatives and was tried and fined, but President Jackson remitted the fine. Between Jackson and Houston there existed an unbroken friendship. The incident served to give Houston once more a national notoriety.

Visiting Texas in December, 1832, he was invited to settle there and become the leader of the American colonists in their struggle for their rights. He complied and was elected a delegate to the convention held April 1, 1833, to form a State constitution and seek membership in the Mexican Republic, separate from the State of Coahuila, with which Texas had hitherto been joined and in which the anti-American party was predominant. The rejection of the constitution and the attempt to disarm the Americans led to open warfare, and Houston was then chosen general of the military district east of Trinity River and soon afterward commander in chief of the Texan army. At the head of a small force of undrilled volunteers he led in the military movements which resulted in the defeat of Santa Anna on the San Jacinto, April 21–22, 1836, and in the independence of Texas. His force numbered less than 800, the great majority of whom were old settlers, while the Mexicans had about 1600. In September he was elected President of Texas, succeeding David G. Burnett, the first president of the Republic, and from 1841 to 1844 he served again, succeeding M. B. Lamar. Texas having been admitted as a State of the American Union in 1845, Houston was chosen one of its representatives in the Senate from 1846 to 1859. In 1859 he was again elected Governor of Texas, but opposed secession in 1861 and refused to take an oath of allegiance to the Confederate States, for which, on March 18, 1861, he was declared deposed. Both as Governor and as Senator he upheld the rights of the Indians. He retired to Huntsville, Tex., where, on July 25, 1863, he died. Consult: W. C. Crane, *Life and Select Literary Remains of Sam Houston* (Philadelphia, 1884); Henry Bruce, *Life of General Houston* (New York, 1891), in the "Makers of America Series"; A. M. Williams, *Sam Houston and the War of Independence in Texas* (Boston, 1893); R. M. McElroy, *The Winning of the Far West* (New York, 1914). See TEXAS.

HOUSTON, hous'ton, WILLIAM (1844–). A Canadian educator and journalist, born at Lanark, Ontario, and educated at Toronto University. He was early a reporter and an editorial writer for the Toronto *Globe* and later an editorial writer on the St. John (New Brunswick) *Daily Telegraph* and the Toronto *Liberal*. In 1883–92 he was librarian of the Ontario Legislature, in 1887 member of a commission to investigate foreign municipal systems, in 1892–99 director of teachers' institutes for Ontario, and later, up to 1904, public-school inspector for Algoma and Manitoulin districts. In 1906 he was lecturer on Canadian constitutional history in Toronto University. He afterward became an editorial writer on the *Globe*. He contributed largely to educational and other journals, lectured on historical subjects before university extension classes, and edited *Documents Illustrative of the Canadian Constitution* (1891).

HOUTMAN, hout'mân, CORNELIS (?–1599). A famous Dutch traveler and founder of trade with the East Indies, born at Gouda in the middle of the sixteenth century. He went on a trading voyage with his brother, Frederik, to Lisbon in 1593, where he was thrown into prison. Released by a friend, he studied the Portuguese routes to the Far East and, returning with charts to Amsterdam, organized an expedition which sailed in four ships out of the Texel (1595). He rounded the Cape of Good Hope, passed through the Strait of Sunda to the south coast of Java, and returned safely to Holland in 1597, having demonstrated an easy route to the Spice Islands. This voyage was followed by many others and led to the formation of the Dutch East India Company. In a second expedition of two ships in a conflict with the natives of Achin, assisted by the Portuguese, he was killed.—His brother, FREDERIK (1570–1627), navigator of his fleet, also played an important part in the opening of the East to trade and commerce. In 1598 he was taken prisoner by the King of Achin, but, having been freed by Paulus van Caarden, he reached Holland in 1601; in December, 1603, he went again to the East Indies and in 1605 was made Governor of Amboyna, in 1618 of the Moluccas and in 1625 was honored with a gold medal for having opened the treasures of the East to Dutch enterprise. Almost as great as his exploits in war and commerce and explorations were his linguistic attainments. Having learned

the Malay language during his captivity in Achin, he opened the Malay languages to European study. In 1603 he published a dictionary with grammatical notes of Malay and Madagascar, with comparison of many Arabic and Turkish words, which work was republished in 1680 as a grammar and dictionary of Dutch and Malay. In 1880 bronze statues of the brothers Houtman were erected at Gouda, from models by Strackée of Amsterdam. See EAST INDIA COMPANY (*Dutch*), with bibliography.

HOUYHNHNMS, hōō-ĭn″mz *or* hōō′ĭn′mz. An imaginary nation of horses, of highly advanced civilization, gifted with reason and without passions, which Gulliver visits, in the fourth part of Swift's *Gulliver's Travels.* Their nature is supposed in the story to be as far superior to that of humanity as it is inferior in actual life.

HO′VA. See MADAGASCAR, *Ethnology.*

HOVE, hōv. A municipal borough in Sussex, England, on the English Channel, west of and adjacent to Brighton. The sea wall of Brighton continues into Hove and forms part of the famous promenade. Hove has all the characteristics of its larger neighbor—handsome streets, avenues, squares, public buildings, parks and recreation grounds, marine walk, and baths. It is lighted with electricity. It maintains a free library, with news room, lending and reference departments. It was incorporated in 1898 with a mayor, 10 aldermen, and 30 councilors. Pop., 1901, 36,535; 1911, 42,173.

HOVEDEN, hŭv′den *or* hōv′den, or **HOWDEN,** ROGER OF (?–c.1201). An English chronicler, born probably at Howden in Yorkshire. He was clerk in the household of Henry II and was employed by him on various missions. He was appointed an itinerant justice for the forests of Cumberland, Northumberland, and Yorkshire in 1189 and is supposed to have retired to Howden to write his *Cronica.* This begins with the year 732. Most of the work is copied, but from 1192 to 1201 is in his own writing and has a certain value. The *Cronica* was edited by Bishop Stubbs (4 vols., 1868–71). An English translation by Riley was published in London in 1853 in the *Bohn Library* and is still in print.

HOVELACQUE, ô′v′-lȧk′, ALEXANDRE ABEL (1843–96). A French linguist and anthropologist, born in Paris. He was a pupil of Chavée in languages and of Broca in comparative anatomy. In 1876 he was one of the founders of the Ecole d'Anthropologie, in which he was made professor of linguistic ethnography, and of which, after the death of Gavarret, he became director (1890). In spite of his scientific interests he took an active part in politics as an extreme Republican. From 1888 to 1890 he was mayor of Paris. His works include: *Mélanges des linguistique et d'anthropologie* (1889), with Emile Picot and Julien Vinson; *Les races humaines* (1882); *Précis d'anthropologie* (1887), with G. Hervé. In 1886 Hovelacque and Chavée founded the *Revue de Linguistique.*

HO′VEN. See BLOAT.

HO′VENDEN, THOMAS (1840–95). An American genre painter, born in Dunmanway, Ireland. He studied first in Cork; in New York at the National Academy of Design, having come to America in 1863; and in Paris for six years with Cabanel. He became a member of the National Academy in 1882. His French paintings picture life in Brittany; among them are: "A Brittany Woman Spinning," "News from the Conscript," "Loyalist Peasant Soldier of La Vendée," "A Breton Interior, 1793." Two of his American subjects are in the Metropolitan Museum, New York—"Jerusalem the Golden" and the "Last Moments of John Brown," his only historical picture. His studies of negro life, begun soon after his return from France, are excellent. Typical of his latest and best work is "Breaking Home Ties," a country boy leaving home to make his fortune. The story is told clearly and beautifully, and the sentiment rings true.

HOVEY, hŭv′ĭ, ALVAH (1820–1903). An American Baptist theologian. He was born at Greene, N. Y., and graduated at Dartmouth in 1844 and at Newton Theological Institution in 1848. After a year spent in the ministry he returned to Newton Centre as a teacher, became professor of Church history (1853), of theology and Christian ethics (1855), and was president from 1868 until 1899, and afterward was professor of apologetics. Among his works are: *The State of the Impenitent Dead* (1858); *The Scriptural Law of Divorce* (1866); *Manual of Christian Theology* (6th ed., 1900); *Systematic Theology and Christian Ethics* (1877); *Biblical Eschatology* (1888); *Studies in Ethics and Religion* (1892); *Christian Teaching and Life* (1895).

HOVEY, ALVIN PETERSON (1821–91). An American soldier and public official. He was born at Mount Vernon, Ind., attended the common schools, studied law, was admitted to the bar in 1843, and served successively as a circuit judge, judge of the Supreme Court, and United States district attorney. At the outbreak of the Civil War he was appointed major of Indiana Volunteers and later became major general. The battle of Champion's Hill in 1863, which Grant considered the turning point of his Vicksburg campaign, was won largely through General Hovey's efforts. When the war terminated, he returned to his native State and took an active part in politics. He became Minister to Peru in 1866, a member of Congress in 1886, and from 1888 until his death was Governor of Indiana. In 1888 Governor Hovey was elected president of the Service Pension Association of the United States.

HOVEY, CHARLES MASON (1810–87). An American horticultural editor and nurseryman, born at Cambridge, Mass. He edited the *Magazine of Horticulture,* which prospered under his management longer than any other American horticultural journal. He was the first to introduce a pistillate strawberry, the Hovey—the variety that marks the beginning of profitable strawberry culture in the United States. His *Fruits of America,* of which two volumes only were completed, is one of the best examples of art fruit work attempted in this country.

HOVEY, EDMUND OTIS (1862–). An American geologist, born at New Haven, Conn. In 1884 he graduated from Yale University (Ph.D., 1889), and he also studied at the University of Heidelberg (1890–91). He taught in Minnesota and Connecticut schools; assisted on the United States Geological Survey in 1890 and in 1901–06; had charge of the Missouri mineral exhibit at the Chicago Exposition in 1892–93; and was assistant curator (1894–1900), associate curator (1901–10), and curator after 1910 of the geological department of the American Museum of Natural History. He

published *Martinique and St. Vincent* (1902) and papers dealing with vulcanology, seismology, and meteorology.

HOVEY, Richard (1864–1900). An American poet, born at Normal, Ill. He was graduated at Dartmouth in 1885; studied for one year in the General Theological Seminary, New York; was for a time assistant in the church of St. Mary the Virgin, New York; and afterward journalist, actor, dramatist, poet, and lecturer on English literature in Barnard College, New York. He passed some years in Europe and was much influenced by French and Belgian poets, especially Maeterlinck, some of whose work he translated. His original verse was always marked by high aims and grew in grace and power. His untimely death closed a career of exceptional promise. His *Launcelot and Guenevere*—a series of dramas comprising *The Quest of Merlin, The Marriage of Guenevere,* and *The Birth of Galahad* (1880–98)—and *Taliesin: A Masque* (1900), though they scarcely show dramatic mastery, exhibit lyrical power and remarkable imagination. *Seaward* (1893) is an elegy upon T. W. Parsons (q.v.). Hovey also collaborated with Bliss Carman (q.v.) in *Songs from Vagabondia* (1893; two later series, 1896, 1900) and published a collection of his miscellaneous poems in *Along the Trail* (1898). In 1908 appeared *To the End of the Trail,* a volume of poems edited by his widow. In these works he showed that he could touch the more immediate and ordinary human interests; but these are, on the whole, not emphasized in his work, which is romantic and idealistic. Consult J. B. Rittenhouse, *Younger American Poets* (Boston, 1904).

HOW, William Walsham (1823–97). An English prelate, born at Shrewsbury. From Oxford he received the degree of B.A. in 1845 and M.A. in 1847, and after holding several curateships became rector of Whittington, Shropshire (1851), which position he held until he went to the parish of St. Andrew Undershaft in London (1879). In that year he was appointed Suffragan Bishop of Bedford and a year afterward Bishop of Wakefield. He was well known as a devotional writer. His numerous works in prose include *Private Life and Ministration of a Parish Priest* (1873), *Commentary upon St. John* (1879), *The Papal Claims in the Light of Scriptural History* (1881), and some *Pastoral Lectures* (1883). He also wrote some *Poems* (1886) and *Hymns* (1886).

HOWADJI, hou-ăj'ī. A nom de plume of George William Curtis.

HOW'ARD. A city and the county seat of Elk Co., Kans., on the Elk River, 76 miles south of Emporia, on the Atchison, Topeka, and Santa Fe Railroad (Map: Kansas, F 7). Farming and stock raising are the leading industries. The gas and electric-light plants are owned by the city. Pop., 1900, 1207; 1910, 1163.

HOWARD. A noble English family, which for many centuries has stood at the head of the English peerage and has held the Dukedom of Norfolk since the middle of the fifteenth century. The earliest of the house to gain distinction was Sir William Howard, a learned Chief Justice of the Common Pleas under Edward I and Edward II. His grandson, Sir John Howard, was admiral and captain of the King's navy in the north of England and also sheriff of Norfolk, in which county he held extensive estates, subsequently increased by the marriage of his grandson, Sir Robert, with the coheiress of the house of Mowbray, Dukes of Norfolk. The only son of this union was Sir John Howard, one of the leading supporters of the house of York, who, having gained early distinction in the French wars of Henry VI, was appointed by Edward IV constable of the important castle of Norwich and sheriff of Norfolk and Suffolk. Afterward he became treasurer of the royal household, obtained a grant of the whole benefit that should accrue to the King by coinage of money in the city and Tower of London and elsewhere in England, and was raised to the peerage as Lord Howard and Duke of Norfolk. We find him in 1470 made captain general of the King's forces at sea and most strenuous in that capacity in his resistance to the house of Lancaster. Finally he was created Earl Marshal of England, an honorary distinction still borne by his descendants, and in 1484 was appointed Lord Admiral of England, Ireland, and Aquitaine. He fell next year, however, on Bosworth Field, and after his death his honors were attainted, as also were those of his son Thomas, who had been created Earl of Surrey. The latter, however, after suffering three years of imprisonment in the Tower of London, obtained a reversal of his own and his father's attainders and became distinguished as a general, winning fame by his defeat of the Scots at Flodden in 1513. His son Thomas, third Duke of Norfolk, by his marriage with a daughter of King Edward IV, became the father of the accomplished but ill-fated Earl of Surrey, who was put to death by Henry VIII. Norfolk, too, was sentenced, but the death of Henry saved him from the block. The Earl's son Thomas, fourth Duke of Norfolk, suffered attainder and was executed on Tower Hill for high treason, for his communication with Mary, Queen of Scots. The family honors, however, were restored, partly by James I to his grandson, and partly by Charles II to his great-great-grandson, Thomas, who became eighth Duke, and whose cousin and successor, Charles, ninth Duke, was the direct ancestor of the present Duke of Norfolk.

In one or other of their widespread branches the Howards either have enjoyed within the last three centuries, or still enjoy, the earldoms of Carlisle, Suffolk, Berkshire, Northampton, Arundel, Wicklow, Norwich, and Effingham, and the baronies of Bindon, Howard de Walden, Howard of Castle Rising, and Howard of Effingham.

Among the other distinguished members of the family, Sir Edward Howard, brother of the first Earl of Surrey, was made by Henry VIII King's standard bearer and admiral of the fleet, in which capacity he lost his life in boarding a French vessel off Brest in 1513; his brother, Sir Edmund, acted as Marshal of the Horse at Flodden, and his half brother, Sir Thomas Howard, was attainted, and died a prisoner in the Tower, for aspiring to the hand of Lady Margaret Douglas, daughter of Margaret, Queen of Scotland, and niece of Henry VIII, one of whose ill-fated consorts was Lady Catharine Howard. Consult: Dugdale, *Baronage of England* (London, 1675–76); Collins, *Peerage of England* (5th ed., ib., 1779); Howard, *Memorials of the Howard Family* (privately printed, 1834); Lodge, *Portraits of Illustrious Personages* (London, 1835); The

Howard Papers, with a Biographical Pedigree and Criticism by Canston (ib., 1862); Yeatman, *The Early Genealogical History of the House of Arundel* (ib., 1882); Doyle, *Official Baronage of England* (ib., 1886); Brenan and Statham, *The House of Howard* (ib., 1907).

HOWARD, Benjamin Chew (1791–1872). An American statesman, born at Belvedere, Md., son of John Eager Howard, Revolutionary officer, and grandson of Chief Justice Benjamin Chew. He was educated at Princeton (1809), studied law, and practiced in Baltimore. In 1814 he was active in the defense of the city, and he fought at North Point. He was a United States Representative (1829–33, 1835–39), became head of the Committee on Foreign Relations, and wrote its report on the boundary question. For 20 years he was reporter of the United States Supreme Court. He was nominated for Governor of his State in 1861, but withdrew his name. In the same year he was delegate to the Peace Congress. His *Reports of Cases in the Supreme Court of the United States from 1843 till 1855* was published in the latter year.

HOWARD, Blanche Willis (1847–98). An American novelist, born in Bangor, Me. She was educated in New York City, but dwelt after 1878 in Stuttgart, where she taught and wrote. In 1890 she married Baron von Teuffel, a physician. The more noteworthy of her novels are: *One Summer* (1875); *Aunt Serena* (1880); *Guenn* (1882); *Aulnay Tower* (1886); *The Open Door* (1889); *No Heroes* (1893), a story for boys; *A Fellow and his Wife* (1892), in collaboration with William Sharp; *Seven on the Highway* (1897), a volume of short stories; the posthumously published *Dionysius the Weaver's Heart's Dearest* (1899); *Garden of Eden* (1900). She wrote also a book of travel, *One Year Abroad* (1877).

HOWARD, Bronson (1842–1908). A well-known American dramatist, born at Detroit. He prepared for college at New Haven, but instead of entering Yale turned to journalism in New York. From 1867 to 1872 he worked on several newspapers, among them the *Evening Mail* and the *Tribune*. So early as 1864 he had written a dramatic piece called *Fantine*, which was played in Detroit; but his first important play was *Saratoga*, produced by Augustin Daly in 1870. It was very successful and became the first of the long series of pieces which gave Mr. Howard a foremost position among American playwrights. Among his other best-known plays are: *The Banker's Daughter* (1878); *Old Love Letters* (1878); *Young Mrs. Winthrop* (1882); *One of our Girls* (1885); *The Henrietta* (1887; revived in 1913 as *The New Henrietta*); *Shenandoah* (1889); *Aristocracy* (1892). In 1899 he collaborated with Brander Matthews in *Peter Stuyvesant*. *Aristocracy*, which is a satire upon some features of Anglomania in American society, has been called its author's best play, though the war drama *Shenandoah* is more ambitious, and *Old Love Letters*, in quite a different line, is an inimitable bit of sentimental comedy. Howard married a sister of Sir Charles Wyndham, the English actor, and he had homes both in New York and in London, where some of his plays have been no less popular than in America. He was a member of the American Academy of Arts and Letters. Consult M. J. Moses, *The American Dramatist* (Boston, 1911).

HOWARD, Catharine (1520–42). Fifth wife of Henry VIII. She was a daughter of Edmund Howard, third son of the Duke of Norfolk. The King married her soon after the divorce of Anne of Cleves, in 1540. She was accused of immoral conduct before her marriage and of suspicious conduct after it. Her guilt before marriage was established, and, with Lady Rochford, who had connived at her wrongdoing, she was beheaded, Feb. 13, 1542. Consult Brenan and Statham, *The House of Howard* (London, 1907).

HOWARD, Clinton Norman (1868–). An American lecturer and temperance advocate. He was born at Pottsville, Pa., and was educated privately. In 1890 he founded and became president of the Prohibition Union of Christian Men, and in 1900 he began his work as a Chautauqua and lyceum lecturer, on such subjects as "God's Measure of a Man," "Why God Made a Woman," and "The Greatest Event in the World." He became vice president of the National Temperance Society.

HOWARD, George Elliott (1849–). An American educator and author, born at Saratoga, N. Y. He graduated at the University of Nebraska in 1876, studied at the universities of Munich and Paris in 1876–78, and was professor of history in the University of Nebraska from 1879 to 1891. From 1891 to 1901 he was head of the history department and professor of American and institutional history at Leland Stanford Junior University; in 1902 he gave special courses in history at Cornell University; and he lectured on history at the University of Chicago in 1903–04. He returned to the University of Nebraska in 1904 as professor of institutional history and in 1906 was transferred to the chair of political science and sociology. In 1885–91 he was secretary of the Nebraska State Historical Society. He wrote: *Local Constitutional History of the United States* (1889); *The Evolution of the University* (1890); *The King's Peace and the Local Peace Magistracy* (1891); *History of Matrimonial Instituiions* (3 vols., 1904); *Preliminaries of the Revolution* (1905); *Social Control and Function of the Family* (1906); *General Sociology* (1907); *The Family and Marriage* (1914). He was a contributor to the New International Encyclopædia.

HOWARD, George William Frederick. See Carlisle, seventh Earl of.

HOWARD, Henry. See Surrey, Earl of.

HOWARD, Jacob Merritt (1805–71). An American legislator, born at Shaftsbury, Vt. He graduated at Williams College in 1830, studied law, and began to practice in Detroit, Mich. He was a member of the State Legislature in 1838 and in 1840 was elected to Congress as a Whig, in which party he was an active campaign worker in 1844, 1848, and 1852. He took a prominent part in bringing about a coalition of the Whigs and Free-Soil Democrats in 1854; was the author of the platform drawn up at a State convention of the two parties held at Jackson, Mich., on June 6, 1854, and is said to have suggested the name "Republican" for the new political organization thus brought into existence. He was nominated for Attorney-General of the State by the new party in that year and was elected and reëlected twice thereafter, serving until 1859. In 1862 he was elected to the United States Senate, to fill a vacancy caused by the death of Senator Bingham, and was reëlected for a full term in 1864. He

translated from the French the *Secret Memoirs of the Empress Josephine* (1847).

HOWARD, JAMES E. (1851–). An American engineer physicist and commerce expert. He was born at Palmer, Mass., and was educated at Nichols Academy (Dudley, Mass.) and at the Highland Military Academy (Worcester, Mass.). From 1880 to 1910 he served as engineer of tests at the Watertown (Mass.) Arsenal; from 1910 to 1914 was engineer physicist of the Bureau of Standards, Washington, D. C.; and in 1914 he was appointed by President Wilson to the Interstate Commerce Commission.

HOWARD, JOHN (1726–90). An English philanthropist, best known for his work in behalf of prison reform. He inherited a considerable fortune from his father and spent his early life in travel. Settling at Cardington, Bedfordshire, in 1756, he erected model cottages for his tenants and furnished schools for children of all sects. In 1773 he was appointed high sheriff of Bedfordshire, and soon the defective arrangements of prisons and the intolerable distress of prisoners were brought under his notice. Finding that all the abuses he had seen at home existed in neighboring counties, he traveled all over the United Kingdom and finally became a self-appointed prison inspector, not only of Great Britain and Ireland, but of all Europe. He gave evidence before the House of Commons, and in 1774 laws were passed for the improvement of the sanitation of prisons and the abolition of jailers' fees. In 1777 he published his *State of the Prisons in England and Wales, with . . . an Account of Some Foreign Prisons.* After each of his many tours new editions, with additional facts, were published. One important result of this book was the adoption of the hard-labor system in English prisons. In 1785 Howard investigated the infection hospitals of Europe, with a view to discovering the best means of preventing the plague, and published *An Account of the Principal Lazarettos in Europe* (1789). He died of camp fever while studying the Russian military hospitals. He was a man of deep religious feelings. He traveled more than 50,000 miles in making his investigations, on which he spent at least £30,000 of his own fortune, refusing all government aid. Of the numerous works on Howard, consult, especially, his *Correspondence,* edited by J. Field (London, 1855); lives by Hepworth Dixon (ib., 1849), by J. Field (ib., 1850), by John Stoughton (new ed., ib., 1884), and by G. F. Russell Barker, in *Dictionary of National Biography,* vol. xxviii (ib., 1891).

HOWARD, JOHN EAGER (1752–1827). An American soldier and public official, born in Baltimore Co., Md. He served throughout the Revolutionary War, participating in many important battles, becoming lieutenant colonel in 1780, and receiving a silver medal from Congress for his conduct at the battle of Cowpens. He was wounded at Eutaw Springs. At the close of the war he represented Maryland in Congress from 1787 to 1788. He was the Governor of his State from 1789 to 1792. In 1795 he was a member of the Maryland Senate; was a United States Senator from 1796 to 1803, declining in 1796 the portfolio of Secretary of War; and in 1798 was made a brigadier general by Washington, when a war with France seemed certain. He organized a defense of Baltimore in 1814, when the English forces threatened the city, and two years later was a Federal candidate for Vice President.

HOWARD, JOHN GALEN (1864–). An American architect. Born at Chelmsford, Mass., he graduated from the Boston Latin School, and after three years of study at Massachusetts Institute of Technology, five years under private architects, and three years at the Ecole des Beaux-Arts, Paris, he established himself as a practicing architect in New York City. Notable buildings planned by him include the Montclair (N. J.) Public Library, the Hearst Memorial Mining Building at the University of California (Berkeley), and the Electric Tower at the Pan-American Exposition, Buffalo, 1901. In the latter year, also, he was appointed supervising architect of the University of California; and of the Alaska-Yukon-Pacific Exposition (Seattle, 1909) he was one of the two architects in chief. He became a member of the National Institute of Arts and Letters and in 1910 was elected an Associate National Academician.

HOWARD, LELAND OSSIAN (1857–). An American entomologist, born at Rockford, Ill. He graduated at Cornell in 1877 and was assistant in entomology at the United States Department of Agriculture until 1894, when he was made chief of the Bureau of Entomology. He edited the journal *Insect Life,* lectured on entomology at several colleges and universities, and wrote on that subject for the *Century* and *Standard* dictionaries and the NEW INTERNATIONAL ENCYCLOPÆDIA. He was made permanent secretary of the American Association for the Advancement of Science, honorary curator in the United States National Museum, and consulting entomologist of the Public Health Service in 1904. He wrote *Mosquitoes* (1901), *The Insect Book* (1901), *The House Fly—Disease Carrier* (1911), *Mosquitoes of North America* (1912), and bulletins and reports of the United States Department of Agriculture.

HOWARD, LUKE (1772–1864). An English meteorologist, born in London. From 1796 to 1803 he was a wholesale and retail chemist in partnership with William Allen, but later he conducted the business independently. His essay *On the Modification of Clouds* (1802; 3d ed., 1865) established his reputation as one of the founders of the science of meteorology. The names—cirrus, cumulus, stratus, and nimbus—which he gave to the different kinds of clouds were generally adopted by other meteorologists. His other published works include: *The Climate of London* (2 vols., 1818–20; 2d ed., rev., 3 vols., 1833); *Seven Lectures on Meteorology* (1837; 2d ed., 1843); *A Cycle of Eighteen Years in the Seasons of Great Britain* (1842); *Papers on Meteorology* (1854).

HOWARD, OLIVER OTIS (1830–1909). An American soldier. He was born in Leeds, Me., graduated at Bowdoin in 1850 and at West Point in 1854, served as chief of ordnance during the Seminole troubles of 1857, and was assistant professor of mathematics at West Point from 1857 to 1861. Leaving the regular army in June, 1861, he became colonel of the Third Maine Volunteers and commanded a brigade in the first battle of Bull Run. He was promoted to be brigadier general of United States volunteers in September, participated in the Peninsular campaign, and in the battle of Fair Oaks (June 1, 1862) received a wound

which necessitated the amputation of his right arm. After a short leave of absence he rejoined the Army of the Potomac, took a prominent part in the battle of Antietam, was promoted to be major general of volunteers in November, and was engaged in the battle of Fredericksburg (December 13). In April, 1863, he was placed in command of the Eleventh Army Corps and as such took a conspicuous part in the battles of Chancellorsville and Gettysburg. He then served in the Chattanooga campaign, taking part in the battle of Chattanooga and accompanying Sherman on his march for the relief of Knoxville. From April to July, 1864, he commanded the Fourth Army Corps of the Army of the Cumberland and during the march to the sea and the campaign in the Carolinas commanded the Army of the Tennessee, which constituted the right wing of General Sherman's army. In December, 1864, he was appointed brigadier general in the regular army and in March, 1865, was brevetted major general for services at Ezra Church and during the Atlanta campaign. From May, 1865, to July, 1874, he was commissioner of the Bureau of Refugees, Freedmen, and Abandoned Lands. Within less than three years 1400 schools (not including 700 Sabbath schools) had been established, and many of the freedmen had been enabled to buy and maintain homesteads of their own. (See FREEDMEN'S BUREAU.) In 1872 Howard was special commissioner to the hostile Apaches of New Mexico and Arizona, and, having been placed in command of the Department of the Columbia (1874), he conducted the operations against the Nez Percés Indians in 1877 and against the Bannocks in 1878. He subsequently was superintendent of the United States Military Academy at West Point (1881–82) and commanded successively the departments of the Platte, of California, and of the East. In 1886 he was appointed major general in the regular army, and in November, 1894, retired from the service. In 1895 he founded the Lincoln Memorial University at Cumberland Gap, Tenn., for the education of the "mountain whites." He was also instrumental in the establishment by the government in 1867 of Howard University, at Washington, D. C.; over this institution he presided from 1869 to 1873. Besides numerous magazine articles, his publications include: *Donald's School Days* (1879); *Chief Joseph, or the Nez Percés in Peace and War* (1881); *General Zachary Taylor* (1892), in the "Great Commanders Series"; *Isabella of Castile* (1894); *Fighting for Humanity* (1898); *Henry in the War* (1898); *My Life and Experience among our Hostile Indians* (1907); *Autobiography of O. O. Howard* (2d ed., 2 vols., New York, 1907). Consult H. B. Stowe, *Men of our Times* (ib., 1868).

HOWARD, SIR ROBERT (1626–98). An English dramatist, son of Thomas Howard, first Earl of Berkshire, by Elizabeth, daughter of William Cecil, Lord Burghley. During the Civil War he took the Royalist side; and he was knighted (1644). He was imprisoned under the Commonwealth in Windsor Castle; but after the Restoration lucrative posts were given him, and he sat in Parliament. He is the Crites of Dryden's *Essay on Dramatic Poesy.* Dryden married his sister Elizabeth. Of Howard's five extant plays, *The Committee* (1692), caricaturing the manners of the Commonwealth, is most interesting.

HOWARD, ROY WILSON (1883–). An American newspaper man, born at Gano, Hamilton Co., Ohio. After graduating from the Manual Training High School of Indianapolis, Ind., he became a reporter for the Indianapolis *News* in 1902; thereafter was sporting editor of the Indianapolis *Star*, assistant telegraph editor of the St. Louis *Post-Dispatch*, and news editor of the Cincinnati *Post;* and in 1906 he was New York correspondent of the Scripps-McRae League and then New York manager of the Publishers' Press Association. He became New York manager in 1907, and president and general manager in 1912, of the United Press Association.

HOWARD, THOMAS, EARL OF ARUNDEL. See ARUNDEL.

HOWARD, THOMAS BENTON (1854–1920). An American naval officer. Born at Galena, Ill., he graduated from the United States Naval Academy in 1873. At the battle of Manila Bay he was navigator of the *Concord* and was subsequently promoted, having command of the *Chesapeake* (1901), the *Nevada* (1903–05), the *Olympia* (1907), the *Tennessee* (1907), and the *Ohio* (1908–09). Becoming rear admiral in 1910, he commanded the fourth division of the Atlantic fleet in 1910–12 and the third division in 1912 and in 1912–13 was president of the Naval Examining and Retiring Board. In 1914 he became commander in chief of the Pacific fleet.

HOWARD, WILLIAM. See STAFFORD, VISCOUNT.

HOWARD, WILLIAM TRAVIS (1867–). An American pathologist. He was born at Statesburg, S. C., studied at the University of Virginia (1885–87), graduated from the University of Maryland (M.D., 1889), and took graduate work at Johns Hopkins (1889–93) and at Munich (1906–07). In 1894 he was appointed professor of pathology at Western Reserve University, and he became also pathologist to various Cleveland hospitals and bacteriologist to that city's board of health. In 1902 he was president of the American Association of Pathologists and Bacteriologists. His papers deal with heart hypertrophy, ulcerative endocarditis, origin of gas and gas cysts in the central nervous system, tumors, etiology of smallpox, vaccinia, and other subjects.

HOWARD UNIVERSITY. An institution for higher education, situated in Washington, D. C. It was incorporated by Congress in 1867 and was named for Gen. O. O. Howard, one of its founders and early presidents. It is controlled by a self-perpetuating board of trustees. The university is nonsectarian and is open to students of both sexes without regard to race. It is chiefly known, however, for its work in the higher education of the colored people. It has the following departments, each with the requirements and courses of the standard institutions: College of Arts and Sciences; Teachers College; School of Theology; School of Medicine, including medical, pharmaceutic, and dental colleges; School of Law; School of Manual Arts and Applied Sciences; Conservatory of Music; Library School; Commercial College and Academy. In 1914 it had 115 professors and instructors and 1463 students from 36 States and 10 foreign countries. The theological department is supported from income, from endowment, and from private benefaction; the medical department chiefly from tuition.

The other departments are largely supported by an annual congressional appropriation administered by the Secretary of the Interior. The university has a beautiful campus of over 25 acres in the midst of the city of Washington, D. C., and 10 large buildings. Its productive endowment is $304,000, and its other property is valued at $1,385,000. The annual budget is $196,000. The president in 1914 was Stephen M. Newman, A.M.

HOWARTH, hou'ĕrth, Ellen Clementine (Doran) (1827–99). An American poet, born at Cooperstown, N. Y. She wrote a number of songs, such as "'Tis but a Little Faded Flower," and published a volume, *The Wind-Harp and Other Poems* (1864). Her later work, under the title *Poems* (Newark, N. J., 1868), was edited, with an introduction, by Richard Watson Gilder.

HOWE, Albion Paris (1818–97). An American artillery officer in the Civil War, born at Standish, Me., and educated at West Point. He entered the Fourth Artillery, from 1843 to 1846 was a mathematical instructor at West Point, served creditably in the Mexican War, was made a captain in 1855, and after the outbreak of the Civil War became General McClellan's chief of artillery in western Virginia in 1861. During the campaign on the Peninsula, in 1862, he commanded a light-artillery brigade in the Army of the Potomac. Having been appointed a brigadier general of volunteers in 1862, he was assigned to a brigade in Couch's division, Fourth Army Corps, was in command of the artillery depot at Washington in 1864–66, and was brevetted major general in the regular army in 1865 for meritorious service during the war. General Howe took part in the battles of Manassas, South Mountain, Antietam, Fredericksburg, and Gettysburg. He was retired from the army in 1882.

HOWE, Elias (1819–67). An American inventor, born in Spencer, Mass. His father was a miller, and after working in his mills the boy went, in 1835, to Lowell, where he entered a manufactory of cotton machinery. Two years later he lost his position on account of the financial panic, but finally secured work in a machine shop, first in Cambridge and later in Boston. About 1843 he commenced the practical working out of his idea for a sewing machine, and by 1845 the invention was finished, but, despite its obvious advantages, met with bitter opposition. For the next nine years Howe was wretchedly poor. A trip to England in 1847 in hope of being able to interest capitalists there was unsuccessful, and he sold the English rights to his machine for £250. Upon his return to this country he found that his invention had been pirated, and that many sewing machines were already in use. He obtained influential backing and immediately began action to establish his patent. After long suits he won his case and thereafter was one of the leading manufacturers in the United States. Although improvements on Howe's machines were subsequently made by Singer and others, there is no doubt that the Howe was the original prototype of the present machine. When the Civil War broke out, Howe volunteered as a private in the Seventeenth Connecticut Volunteers. In 1867 he received the gold medal and the cross of the Legion of Honor at the Paris Exhibition.

HOWE, Frederic Clemson (1867–). An American authority on municipal problems. Born at Meadville, Pa., he graduated from Allegheny College (1889) and from Johns Hopkins University (Ph.D., 1892); and he studied also at Halle, Germany, at the University of Maryland Law School, and at the New York Law School. He practiced law from 1894 to 1909 in Cleveland, Ohio; in 1905, for the United States government, investigated municipal ownership in Great Britain; and in 1906–09 served in the Ohio Senate. He became professor in the Cleveland College of Law and lecturer on taxation at Western Reserve University and in 1906–09 lectured on municipal administration and politics at the University of Wisconsin. He is author of *The City, the Hope of Democracy* (1905); *The British City—The Beginnings of Democracy* (1907); *The Confessions of a Monopolist* (1907); *Privilege and Democracy in America* (1910); *Wisconsin: An Experiment in Democracy* (1912); *European Cities at Work* (1913); *The American City* (1914).

HOWE, Henry (1816–93). An American historian and publisher, born at New Haven, Conn., son of Gen. Hezekiah Howe, the publisher. He entered the publishing business in 1839 and in 1840 began his historical research in New York and New Jersey, together with John W. Barber. He made like studies in Ohio, sketching old landmarks and interviewing old settlers. Soon after the publication of his work in Ohio he removed to Cincinnati, where he published subscription books for nearly 30 years. In 1878 he returned to New Haven, but in 1885 went back to Ohio, prepared a second edition of his history of that State, and entered the publishing business again. He wrote: *Eminent Mechanics* (1839); *Historical Collections of New York* (1841), *of New Jersey* (1843), and *of Ohio* (1847 and 1891); *The Great West* (1851); *Travels and Adventures of Celebrated Travelers* (1853); *Life and Death of the Ocean* (1855); *Adventures and Achievements of Americans* (1858); *Our Whole Country* (1861); *Times of the Rebellion in the West* (1867); *Over the World* (1883); and *Outline History of New Haven* (1884) and *New Haven Elms and Greens* (1885), the two last named being pamphlets.

HOWE, Henry Marion (1848–1922). An American metallurgist, son of Julia Ward Howe and brother of Laura E. Richards (qq.v.). Born in Boston, he graduated from Harvard University in 1869 and from Massachusetts Institute of Technology in 1871. In 1897 he accepted the professorship of metallurgy at Columbia University and there remained until he became professor emeritus. In 1895 he received the Elliot Cresson gold medal of the Franklin Institute of Philadelphia, the Bessemer gold medal of the British Iron and Steel Institute, and the gold medal of the Verein zur Beförderung des Gewerbfleisses; and he was honored by the presidency of the American Institute of Mining Engineers (1893) and of the International Association for Testing Materials (1912). He is author of *Copper Smelting* (1885); *Metallurgy of Steel* (1890; 4th ed., 1904); *Metallurgical Laboratory Notes* (1902); *Iron, Steel, and Other Alloys* (1903; 2d ed., rev., 1906).

HOWE, John (1630–1705). A Puritan clergyman, called the *Platonic Puritan.* He was born May 17, 1630, at Loughborough in Leicestershire. He studied both at Cambridge and Oxford, and after preaching for some time

at Winwick in Lancashire and Great Torrington in Devonshire, he was appointed domestic chaplain to Cromwell in 1657. He held the same position under Richard Cromwell, but in 1659 returned to Torrington, where the position he had held during the Commonwealth made him an object of close suspicion to the government. The Act of Uniformity ejected him from his parish (1662), and he wandered about preaching in secret till 1671, when he was invited by Lord Massereene, of Antrim Castle in Ireland, to become his domestic chaplain. There he began his greatest work, *The Good Man the Living Temple of God* (1676–1702), which occupies one of the highest places in Puritan theology. In 1676 he became pastor of the dissenting congregation in Silver Street, London. In 1677 he published, at the request of Robert Boyle, *The Reconcilableness of God's Prescience of the Sins of Men with the Wisdom of His Counsels and Exhortations;* in 1681, *Thoughtfulness for the Morrow;* in 1682, *Self-Dedication;* in 1683, *Union among Protestants;* and in 1684, *The Redeemer's Tears Wept over Lost Souls.* In 1685 he was invited by Lord Wharton to travel with him on the Continent; and, after visiting the principal cities, in 1686 he settled, owing to the state of England, at Utrecht. In 1687 King James's "Declaration for Liberty of Conscience" induced him to return to England, and at the revolution the next year he headed the deputation of dissenting clergymen when they brought their address to the throne. Besides smaller works, he published, in 1693, *Carnality of Religious Contention;* in 1694–95, several treatises on the Trinity; in 1699, *The Redeemer's Dominion over the Invisible World;* and he continued writing till 1705, when he published *Patience in Expectation of Future Blessedness.* He died in London, April 2, 1705. His works have been several times reprinted. For his life, consult: E. Calamy, memoirs in Howe's *Works* (London, 1724); Henry Rogers (ib., 1879); and R. F. Horton (ib., 1896).

HOWE, Joseph (1804–73). A Canadian journalist, orator, and statesman. He was born near Halifax, Nova Scotia, and within a few years after 1817, when he began to learn printing in the office of the Halifax *Gazette,* he was on the editorial staff of that paper. In 1827 he was part owner of the *Weekly Chronicle,* under the name of the *Acadian,* and after 1828 for many years he owned and edited the *Nova Scotian.* Besides his editorial writing, he contributed notable sketches of Nova Scotian life and scenery and the "Legislative Reviews," a series of papers on public men and various needed reforms. In 1835 he was brought into wide public notice by his indictment and trial for alleged libel of the municipality of Halifax; and his speech in his own defense, which gained an acquittal, established his reputation as an orator. Elected a Liberal member of the Nova Scotia Legislature in 1836, he held his seat, except for short intervals, until 1863. Throughout his political career his one main object was the defense of responsible government in his native province, and to its establishment there he had contributed more than any other public man. In 1840 he became a member of the Provincial cabinet, in 1841 was elected Speaker of the Provincial Legislature, and in 1848 was made Provincial Secretary. He was active in promoting railways, in 1854 resigning the Provincial secretaryship to take charge of the construction of the first Nova Scotia railway. In 1863 he became Provincial Premier. In the issues which precipitated confederation (see Canada, *History*) he took the keenest interest, but he strongly opposed the plan outlined at the Charlottetown and Quebec conferences, and not until after 1867, when confederation was accomplished, was he willing to give it a qualified support. He was elected a member of the first Dominion Parliament, and, after procuring the passage of resolutions giving better terms to Nova Scotia, he entered the Conservative cabinet of Sir John A. Macdonald in 1869 as President of the Council and in 1870 became Secretary of State. To Nova Scotia Liberals this step was political apostasy. Howe was severely blamed; but his course was due to a wise submission to the inevitable, not to any consideration of personal advancement. Long before 1867 he had matured a plan of Imperial consolidation on broader lines than those of the British North America Act, and the failure to realize this embittered him. On May 1, 1873, he was appointed Lieutenant Governor of Nova Scotia, and he died at Halifax a month later. He was the greatest of Canadian political orators in English and was a writer of verse besides. His oratorical masterpiece was the speech delivered at the International Commercial Convention in Detroit in 1865. He published a large number of speeches, letters, and political pamphlets. Consult: William Annand, *Speeches and Public Letters of the Honorable Joseph Howe* (2 vols., Boston, 1858; new ed., 1909); G. M. Grant, *Joseph Howe* (Halifax, 1904); J. W. Longley, *Letters and Speeches of Joseph Howe* (Toronto, 1904). See also Canadian Literature.

HOWE, Julia Ward (1819–1910). An American poet, philanthropist, and sociological writer, active in the agitation for the legal and political rights of women. She was born in New York, of wealthy parents, and married, in 1843, Dr. S. G. Howe, a philanthropist, best known for his labors for the education of the blind. With him she edited the Boston *Commonwealth,* an antislavery journal, lecturing also on social subjects and preaching occasionally in Unitarian pulpits. After the war she became a noted advocate of woman suffrage and of prison and other reforms. She was the only woman ever elected a member of the American Academy of Arts and Letters. Her early publications, *Passion Flowers* (1854), *Words for the Hour* (1856), and *Later Lyrics* (1866), were in verse, the best known of her pieces being the stirring "Battle Hymn of the Republic," which was written in 1861. She wrote also two dramas, *The World's Own* (acted in 1855) and *Hyppolytus* (1858). The more significant of her later works are: *Sex and Education* (1874); *Modern Society* (1880); a *Life of Margaret Fuller* (1883); a valuable autobiographical *Reminiscences, 1819–99* (1899); and *Sketches of Representative Women of New England* (1905). Florence Howe Hall, Mrs. Howe's daughter, edited a selection from her mother's speeches and essays, *Julia Ward Howe and the Woman Suffrage Movement* (1913). Her verse is collected in *From Sunset Ridge, Poems New and Old* (1898). Consult L. E. Richards, *Two Noble Lives* (Boston, 1911).

HOWE, Mark Antony De Wolfe (1864–). An American editor and author, born

at Bristol, R. I. In 1886 he graduated from Lehigh University and in 1887 from Harvard University (A.M., 1888). He served as associate editor of the *Youth's Companion* from 1888 to 1893 and again from 1899 to 1913, as assistant editor of the *Atlantic Monthly* in 1893–95, and as editor of the *Harvard Alumni Bulletin* after 1913. Besides editing *The Memory of Lincoln* (1889), *Home Letters of General Sherman* (1909), *The Beacon Biographies* (31 vols., 1899–1910), and *Lines of Battle and Other Poems by Henry Howard Brownell* (1912), he published: *Shadows* (1897); *American Bookmen* (1898); *Phillips Brooks* (1899); *Boston: The Place and People* (1903); *Life and Letters of George Bancroft* (1908); *Harmonies: A Book of Verse* (1909); *Boston Common: Scenes from Four Centuries* (1910); *Life and Labors of Bishop Hare, Apostle to the Sioux* (1911); *Letters of Charles Eliot Norton* (1913), with Sara Norton; *The Boston Symphony Orchestra* (1914).

HOWE, Marshall Avery (1867–). An American botanist, born at Newfane, Vt. He graduated from the University of Vermont in 1890 and from Columbia University (Ph.D.) in 1898. He was instructor in cryptogamic botany at the University of California in 1891–96, served as curator of the Columbia University herbarium from 1899 to 1901, and thereafter was assistant curator (1901–06) and curator of the New York Botanical Garden. He also served as editor of *Torreya* (1901–07) and as associate editor (1898–1907, 1911–) and editor (1908–10) of the *Bulletin* of the Torrey Botanical Club. Between 1901 and 1910 he participated in scientific expeditions to Newfoundland, the West Indies, and Panama. Besides papers on marine algæ, he is author of monographs on *The Hepaticæ and Anthocerotes of California* (1899) and of *Phycological Studies* (1905–11).

HOWE, Richard, Earl (1726–99). A British admiral, born in London, March 8, 1726, the second son of Emanuel Scrope, second Viscount Howe of the Irish peerage. He left school at Eton when only 14 and went with Anson on the *Severn* to attempt a voyage around the world. He commanded the *Baltimore*, which, with the *Greyhound* and *Terror*, fought two large French frigates off the west coast of Scotland in 1746. The English squadron was beaten, and Howe was severely wounded. In 1755 his ship, the *Dunkirk*, captured the *Alcide* off Newfoundland. His next service was under Sir E. Hawke in the expedition against Rochefort. Ordered to attack the fort on the Isle of Aix with his ship, the *Magnanime*, he compelled it to surrender and achieved the only material success which attended the expedition. He was commodore of the squadron which sailed in 1758 for Saint-Malo. The troops were landed and reëmbarked without loss, after destroying all the magazines and shipping in the port. In the same year he took Cherbourg and destroyed the magazines and cannon. A second attack upon Saint-Malo was repulsed with great loss of life. In 1758, after his brother, a brigadier general, was killed at Ticonderoga, Howe succeeded to the Irish title of Viscount and to the family estate. He continued his distinguished naval service to the end of the Seven Years' War.

In 1760 he was made colonel of the Chatham division of marines and afterward First Lord of the Admiralty and Treasurer of the Navy. He was made a rear admiral in 1770 and a vice admiral in 1775. In 1776 he was placed in command of the fleet on the American coast. In 1778 he held his own against a superior naval force under D'Estaing. He was made a viscount of Great Britain in 1782. In that year he set out with a fleet to relieve Gibraltar. He succeeded in disembarking troops, ammunition, and supplies, and then offered battle to the combined fleets of France and Spain, which declined an engagement. This achievement gave Howe a brilliant reputation. He was made First Lord of the Admiralty in 1783 and received an English earldom in 1788. When the war with France broke out in 1793, he took the command of the Channel fleet and next year gained the victory known as that of "the glorious first of June." The French fleet consisted of 26 ships of the line, and the English of 25. Howe, in his flagship, the *Queen Charlotte*, engaged, off Ushant, the French admiral, who in less than an hour crowded all the sail he could carry, followed by as many of his ships as could get away. The English captured two ships of 80 guns and four 74's; another 74 sank immediately after she was taken possession of. London was illuminated three nights in honor of the victory; the thanks of Parliament were voted to Howe, and George III gave him a sword and made him Knight of the Garter. His last service was in bringing back the mutinous seamen at Portsmouth to their duty in 1797. He died Aug. 5, 1799. Consult: *British Magazine and Review*, June, 1783 (London, 1783); Sir John Barrow, *Life of Richard, Earl Howe* (ib., 1838); *Memoir of the Life of Admiral Sir Edward Codrington*, edited by Lady Bourchier (ib., 1873); J. K. Laughton, *From Howard to Nelson* (ib., 1899); E. Chevalier, *Histoire de la marine française* (Paris, 1900).

HOWE, Robert (1732–85). An American patriot and soldier, born in Brunswick Co., N. C. After serving against the Indians he was elected to the Assembly in 1765, and the same year Governor Tryon nominated him commander of Fort Johnson on the Cape Fear River. He served in the Assembly until 1775, was a member of the Provincial congresses of 1774 and 1775, and took a prominent part in the preparations for revolt. On Sept. 1, 1775, he was made colonel of the Second North Carolina Regiment, afterward a part of the Continental troops, and aided General Woodford in driving Lord Dunmore, the British Governor, from Virginia. He was made brigadier general of the Continental troops March 1, 1776, and was especially excepted from the general offer of amnesty issued by Sir Henry Clinton. He was made major general Oct. 20, 1777, and placed in command of the Department of the South. An unsuccessful expedition to Florida resulted in the abandonment of Savannah in December, 1778, and Howe was succeeded in his command by Gen. Benjamin Lincoln. He commanded the North Carolina troops at the defense of Charleston (1780) and was in command of West Point the same year. In 1781 he was tried by court-martial for the loss of Savannah on the complaint of the Georgia Assembly, but was honorably acquitted. During this year and again in 1783 he was sent by Washington to reduce mutinous regiments and was entirely successful. He was sent to pacify the Indians of the West in 1785, and the same year was elected to the

North Carolina Legislature, but died before taking his seat.

HOWE, Samuel Gridley (1801–76). An American reformer and philanthropist, born in Boston. He graduated at Brown in 1821 and took the degree of M.D. at Harvard Medical School in 1824. Stirred by the poems of Byron, he offered his services to the Greeks in their struggle for independence. In Greece his services were not confined to the duties of a surgeon, in which capacity he had volunteered, but were of a more military nature, and his bravery, enthusiasm, and ability as a commander, as well as his humanity and nobility of character, won for him the title of "the Lafayette of the Greek Revolution." He continued in the service until 1827, when he returned to America to raise funds and supplies to alleviate the famine and suffering in Greece. Through his efforts more than $60,000 was raised, besides large donations of food and clothing, with which, after writing his *Historical Sketch of the Greek Revolution* (1828), he went again to Greece, where he remained until 1830 and became surgeon in chief of the Greek fleet. Before leaving Greece he settled a successful colony of exiles at Corinth. He then spent some time in medical studies at Paris, where his enthusiasm for a republican form of government led him to take part in the July revolution. In the following year he returned to the United States and became interested in the work with which his name will be longest connected—the education of the blind. He returned to Europe to study the existing systems in England and France; but his investigations were interrupted in the winter of 1831–32, when he became chairman of the American-Polish Committee at Paris, organized by himself, J. Fenimore Cooper, S. F. B. Morse, and several other Americans living in the city, for the purpose of giving relief to the Polish political refugees who had crossed over the Prussian border into Prussia. Dr. Howe undertook to distribute the supplies and funds personally and while in Berlin was secretly seized by the Prussian authorities and imprisoned for five weeks. In the latter part of the same year (1832) he returned to Boston, where he met with great success in his educational work; and the Perkins Institution for the Blind, as it was named in honor of its principal benefactor, became the greatest school of its kind in the world. Dr. Howe himself was the originator of many improvements in method as well as in the processes of printing books in raised types. Besides acting as superintendent of the Perkins Institution to the end of his life, he was instrumental in establishing a large number of institutions of a similar character throughout the country. At the Perkins Institution his most remarkable achievement was in the education of Laura Bridgman. The care and education of idiots and feeble-minded, the reform of prisons, abolition of imprisonment for debt, and finally the abolition of negro slavery in the United States, all engaged Howe's attention. He entered publicly into the antislavery struggle for the first time in 1846, when, as a "Conscience Whig," he was an unsuccessful candidate for Congress against Robert C. Winthrop. In 1851 he was one of the founders and editor of an antislavery paper, the Boston *Daily Commonwealth*, upon which his wife, Julia Ward Howe (q.v.), whom he had married in 1843, assisted him. He was one of the most prominent members of the Kansas Committee in Massachusetts, and with Sanborn, Stearns, Theodore Parker, and Gerrit Smith, was interested in the plans of John Brown, although he disapproved of the latter's attack upon Harper's Ferry. During the Civil War Howe was one of the directors of the Sanitary Commission and at its close entered into the work of the Freedmen's Bureau. He was the originator of the State Board of Charities of Massachusetts, in 1863, the first board of the sort in America, and was its chairman from that time until 1874. In 1866 he made a last trip to Greece to carry relief to the Cretan refugees and in 1870 was a member of the commission sent by President Grant to inquire into the practicability of the annexation of Santo Domingo. It is probably not too much to say that no man ever lived in America who so truly deserved the name "philanthropist" in its highest and best sense—a lover of his fellowmen; and no American certainly was ever connected with more great reforms that were brought to a successful conclusion. Consult: F. B. Sanborn, *Dr. S. G. Howe, the Philanthropist* (New York, 1891); L. E. Richards (ed.), *Letters and Journals* (2 vols., Boston, 1906–09); id., *Two Noble Lives* (ib., 1911).

HOWE, Timothy Otis (1816–83). An American lawyer and politician, born in Livermore, Me. After graduating from Redfield Seminary he was admitted to the bar in 1839 and in the following year became a Whig member in the Maine Legislature. In 1840 he was obliged by ill health to give up his career in Maine and removed to Green Bay, Wis., which was his home during the rest of his life. In 1850 he was elected judge of the Circuit and Supreme courts of Wisconsin. From 1861 to 1879 he was a member of the United States Senate as a Republican and served on the committees of Finance, Commerce, Pensions, and Claims. He declined an appointment to the vacancy in the United States Supreme Court occasioned by the death of Judge Chase. In 1881 he became Postmaster-General in President Arthur's cabinet and in the latter part of that year went to Paris as a United States delegate to the International Monetary Conference.

HOWE, William, fifth Viscount (1729–1814). A British soldier in the American Revolution, younger brother of Richard, Earl Howe. Until 1799 he was known as Sir William Howe. He was born Aug. 10, 1729, was educated at Eton, was appointed a cornet in 1746, and saw service in Flanders. In 1750 he became captain, and in 1757, having attained the rank of lieutenant colonel, he was placed in command of the Fifty-eighth Foot and sent with it in the following year to America, where he took part in the siege and capture of Louisburg and accompanied Wolfe on his expedition to Quebec. After the capture of Montreal, in 1760, he returned to Europe, and in 1762 was adjutant general of the expedition against Havana. After the close of the Seven Years' War he was made colonel of the Forty-sixth Foot (1764), was elected to Parliament as a Whig from Nottingham, and in 1768 was appointed Lieutenant Governor of the Isle of Wight. He attained the rank of major general in 1772. Although opposed to the government's course, he commanded the reënforcements sent to General Gage at Boston in March, 1775. He commanded the British in the battle of Bunker Hill, on June 17

following. Later he was made a lieutenant general and in October succeeded Gage in command of all the troops in America outside of Canada, with the local rank of general. He was besieged in Boston by Washington during the winter of 1775–76 and, being compelled to abandon the city, withdrew his troops to Halifax and afterward transferred his command to Staten Island, whence he moved on New York, winning the battle of Long Island on Aug. 27, 1776, and occupying the city on September 15. On October 28 he defeated Washington at White Plains and afterward captured Forts Washington and Lee, after which he settled down in New York for the winter. It was not until June, 1777, that he again took the field. Wishing to reach Philadelphia, and finding that he had not a sufficiently large force to advance across New Jersey in the face of Washington's army, he embarked his troops and sailed down the coast and up the Chesapeake Bay as far as Elkton, where he landed his forces on August 28. Marching northward, he encountered and defeated Washington at the Brandywine on September 11 and on September 27 occupied Philadelphia. On October 4 the Americans were repulsed at Germantown. After hearing the news of Burgoyne's surrender at Saratoga on October 17, Howe made arrangements to stay in Philadelphia during the winter, while Washington went into winter quarters at Valley Forge. Howe had sent in his resignation shortly after taking Philadelphia, but it was not accepted until May, 1778, when Sir Henry Clinton was appointed to succeed him. He was severely criticized for his inactivity at Philadelphia, and in 1779, after his return to England, his conduct was the subject of a parliamentary inquiry; but the examining committee reached no definite decision in the matter. In 1782 he became lieutenant general of ordnance and attained the rank of full general in the following year. He died at Plymouth, July 12, 1814. Consult S. G. Fisher, *The Struggle for American Independence* (Philadelphia, 1908).

HOWE, William Henry (1846–). An American animal painter. He was born at Ravenna, Ohio, was educated in the public schools, and, having studied art in Paris under Otto de Thoren and Vuillefroy, became known especially for his paintings of cattle. He won a gold medal at the Paris Salon in 1888, and gold medals or other honors with pictures exhibited at various expositions (New Orleans, 1885; Paris, 1889; Chicago, 1893). His work was also represented in the art exhibitions of London, Boston, New York, and San Francisco. He became an officer of the French Academy in 1896, received the cross of the Legion of Honor in 1898, was elected an Associate National Academician in 1894 and a National Academician in 1897, and was a member of the jury of awards at the St. Louis Exposition in 1904.

HOWE, William Wirt (1833–1909). An American jurist, born at Canandaigua, N. Y. After graduating from Hamilton College he practiced law in New York and St. Louis, Mo. He served in the Union army during the Civil War, rising to the rank of major, settled in New Orleans, La., and from 1868 to 1873 was associate justice of the Louisiana Supreme Court. In 1897 Judge Howe was elected president of the American Bar Association. He was widely known as a lecturer and wrote several papers on the history of New Orleans and on civil law.

HÖWELKE, Johannes. See Hevelius.

HOW'ELL. A city and the county seat of Livingston Co., Mich., 33 miles east by south of Lansing, on the Pere Marquette and the Ann Arbor railroads (Map: Michigan, F 6). It has the State sanatorium for the treatment of tuberculosis and a Carnegie library. It is in the centre of a Holland Holstein-Friesian cattle-breeding region and has manufactures of flour, condensed milk, wheel plows, centrifugal pumps, etc. The water works and electric-light plant are owned by the city. Pop., 1900, 2518; 1910, 2338.

HOWELL, Clark (1863–). An American editor. He was born in Barnwell Co., S. C., and graduated at the University of Georgia in 1883. After an apprenticeship in newspaper work he succeeded Henry Grady as managing editor of the Atlanta *Constitution* in 1889 and became editor upon the retirement of his father in 1897. He was a member of the Georgia House of Representatives in 1886–91, serving as Speaker in 1890–91, and became a member of the Democratic National Committee in 1892. From 1900 to 1906 he was a member and president of the Georgia Senate.

HOWELL, Hector Mansfield (1842–). A Canadian jurist. He was born in Hastings Co., Ontario, and was educated at Albert College, Belleville. For several years he was a public-school teacher, but afterward studied law and was called to the Ontario bar in 1871 and in 1879 to the bar of Manitoba, where he rose rapidly to be one of the leaders in his profession. In 1904 he was elected president of the Manitoba Law Society. He entered politics, but was unsuccessful as a Conservative candidate for the Manitoba Legislature. Later he joined the Liberal party, owing to the Manitoba school question. (See Manitoba, *History*.) In 1906 he was appointed Chief Justice of the Court of Appeal.

HOWELL, James (c.1594–1666). An English author, born in Wales. He graduated B.A. from Jesus College, Oxford (1613); traveled extensively on the Continent as a representative of the government. He was imprisoned for a time during the Civil War, but after the Restoration he was appointed historiographer royal of England. Howell wrote with ease and grace many books, of which the best is *Epistolæ Hoelianæ; Familiar Letters, Domestic and Foreign, Divided into Sundry Sections, Partly Historical, Political, and Philosophical* (vol. i, 1645; vol. ii, 1647; together with a third vol., 1653). These were mostly written in the Fleet Prison and to imaginary correspondents for the most part. Consult reprint of the tenth edition by J. Jacobs (London, 1890) and, for a popular edition, the "Temple Classics Series."

HOWELL, John Adams (1840–1918). An American naval officer, born at Bath, N. Y. He graduated from the United States Naval Academy in 1858, participated in the battle of Mobile Bay in 1864, was stationed at the Naval Academy in 1867–71 and in 1875–79, and was promoted through the various grades to captain in 1884 and rear admiral in 1898. He was commandant of the navy yard at Washington in 1893–96 and of that at League Island in 1896–98, in 1898 commanded the European squadron and the Northern Patrol squadron, and from 1898 to 1902, when he retired, was president of

the Naval Examining and Retiring Board. He wrote the first truly scientific American work on the deviations of the compass, patented a disappearing gun carriage, and originated the gyroscopic steering torpedo. See TORPEDO.

HOWELL, JOHN CUMMING (1819–91). An American naval officer, born in Philadelphia, Pa., and educated at Washington College, Pennsylvania. He was appointed a midshipman in the United States navy in 1836, saw some service in the naval operations of the Mexican War, became commander in 1862, and participated in many engagements during the Civil War. He served as fleet captain of the European station in 1869–70, was commandant of the League Island Navy Yard at Philadelphia in 1871–72 and of the Portsmouth Navy Yard from 1872 to 1874. From 1874 to 1879 he was chief of the Bureau of Yards and Docks, at times acting as Secretary of the Navy; became a rear admiral in 1877; was in command of the European squadron from 1879 to 1881 and was retired on Nov. 24, 1881.

HOWELL, WILLIAM HENRY (1860–). An American physiologist. He was born in Baltimore and graduated in 1881 at Johns Hopkins, where he became associate professor of physiology (1888) and in 1893, after teaching in the University of Michigan and for one year at Harvard, was made professor. He was dean of the Medical School from 1899 to 1911. In 1905 he became a member of the National Academy of Sciences. Dr. Howell contributed to the London *Journal of Physiology*, the *Transactions of the Royal Society*, the *Johns Hopkins Biological Studies*, the *Journal of Morphology*, and the *Journal of Experimental Medicine*. In 1896 he edited *An American Text-Book of Physiology* and wrote a *Text-Book of Physiology* (1905; 5th ed., 1913). He contributed articles on physiology to the NEW INTERNATIONAL ENCYCLOPÆDIA. He was associate editor of the *American Journal of Physiology* after 1898.

HOW'ELLS, WILLIAM DEAN (1837–1920). An American novelist, editor, poet, and critic, born at Martin's Ferry, Ohio, March 1, 1837, of well-to-do Welsh-Quaker ancestry. Howells spent his youth among books. He began making verses almost as soon as he could read, serving a literary apprenticeship in his father's printing office, afterward as compositor on the *Ohio State Journal* and other newspapers, and still later as correspondent and editor. He first attracted marked attention by poems published in the *Atlantic Monthly*. In 1860 he published *Poems of Two Friends* with John J. Piatt (q.v.) and in the same year wrote a campaign *Life of Lincoln*, in recognition of which he received the Venetian consulate (1861–65). As a fruit of his first Italian sojourn we have *Venetian Life* (1866; latest ed., 1907), a work of vivid realism, flexible style, and genuine charm, which was followed by *Italian Journeys* (1867). On his return to America Howells was connected editorially with the *Tribune*, the *Times*, and the *Nation* of New York and from 1866 to 1881 with the *Atlantic Monthly* of Boston, of which he was the editor from 1872. *Their Wedding Journey* (1871), his first attempt at fiction, was followed, during his Boston residence, by *A Chance Acquaintance* (1872); *A Foregone Conclusion* (1875); *Out of the Question* (1877); *A Counterfeit Presentment* (1877); *The Lady of the Aroostook* (1879); and *The Undiscovered Country* (1880). *A Fearful Responsibility* (1881), *Dr. Breen's Practice* (1881), *A Modern Instance* (1882), *A Woman's Reason* (1883), *Three Villages* (1884), and *The Rise of Silas Lapham* (1885) were written during a residence in England and Italy. On his return in 1886 Howells assumed an editorial function for *Harper's Magazine*, developing strong critical powers and steadily opposing the romantic or pseudo-historic in modern fiction, while constituting himself the champion of an uncompromising realism, which he exemplified in his own work. He was also for a short time editor of the *Cosmopolitan Magazine*. The more noteworthy volumes of fiction in this period are: *The Minister's Charge* (1886); *Indian Summer* (1886); *April Hopes* (1888); *Annie Kilburn* (1889); *A Hazard of New Fortunes* (1890); *The World of Chance* (1893); *The Coast of Bohemia* (1893); *The Story of a Play* (1898); *Ragged Lady* (1899); *Their Silver Wedding Journey* (1899); *Heroines of Fiction* (1908), critical studies of a group of heroines of English novels; *The Flight of Pony Baker* (1902); *The Kentons* (1902). Howells has written also many farces, of which *The Sleeping-Car*, *The Mouse-Trap*, *The Elevator*, and *Out of the Question* are characteristic. Noteworthy also are *Tuscan Cities* (1885); *Modern Italian Poets* (1887); *Criticism and Fiction* (1891), essays; *A Boy's Town* (1890); *A Traveler from Altruria* (1894), in which his quondam leanings towards socialism find expression in the form of fiction; *Impressions and Experiences* (1896); *Literary Friends and Acquaintance* (1900), valuable records, especially as regards New England authors of a generation earlier than Howells; *Son of Royal Langbrith* (1904); *London Films* (1905), one of a number of his charming books of similar nature, in which graphic and subtle description and mellow reflection and comment blend delightfully; *Miss Bellard's Inspiration* (1905); *Certain Delightful English Towns* (1906); *Between the Dark and the Daylight* (1907); *My Mark Twain: Reminiscences* (1910); *New Leaf Mills* (1913); *Familiar Spanish Travels* (1913); *Seen and Unseen at Stratford-on-Avon: A Fantasy* (1914). A collected edition of his works, the Library Edition, was published (New York and London) in 1913.

His poems were collected in 1873 and 1886, and a volume under the title *Stops of Various Quills* appeared in 1895. Perhaps, of all the books named above, *The Rise of Silas Lapham* and *A Hazard of New Fortunes* represent their author at his best. He is the founder of the school of American realists who derive through the Russians from Balzac and has little sympathy with any other form of fiction, although full of encouragement for new writers in whom he discovers a fresh note. His style, while simple and natural, is at the same time finished, richly varied, and resourceful; and his knowledge of the details of life is accurate and minute. It can hardly be doubted that his was the most influential work done in American fiction during the last quarter of the nineteenth century.

Like Henry James, Howells has done his country a great service in interpreting America to Europe and hardly a lesser service in interpreting America to itself. Irving turned to legend and history for his material, Cooper to the Indian and border adventure, Hawthorne to a world apart from the light of common day, Poe to the terrible and the grotesque. It remained for Howells, and, with a difference, for

Henry James, to present with unswerving truth and minuteness everyday aspects of the life and character of their country and their countrymen, which the earlier novelists who were their compatriots had either idealized out of ready recognition or well-nigh ignored. With a sure sense for the finer elements of the national character, his genius found a way to seize upon and present them in high relief, and with a certain detachment bred of cosmopolitan culture. Howells has been with propriety referred to as the dean of American letters. Man of letters essentially he must certainly be counted, not only as a novelist, but as a writer of short plays and witty farces, as poet and literary critic, and as a writer of familiar essays full of ripe wisdom and marked by the subtlety and finish of an accomplished and resourceful literary artist. He was one of the seven chosen by the National Institute of Arts and Letters as first members of the American Academy, and of the latter body he became president.

HOWELL'S STATE TRIALS. See STATE TRIALS.

HOWE TRUSS. See BRIDGE.

HOW'ISON, GEORGE HOLMES (1834–1916). An American philosopher, born in Montgomery Co., Md. He graduated at Marietta College in 1852 and at the Lane Theological Seminary in 1855. After holding positions at Washington and Harvard universities, at Massachusetts Institute of Technology, and at the University of Michigan, he was Mills professor of philosophy at the University of California from 1884 until his retirement, in 1909. In philosophy he came to be known as a Kantian, but he developed Kantianism along original lines, arriving at a personal idealism according to which reality is a community of spirits bound together not by causal relations but by sharing a common ideal eternally realized in God, the highest Spirit. He was one of the most successful teachers of philosophy in America, his pupils being found in many colleges and universities in the United States; he also exercised a profound influence on the intellectual life of the Pacific coast, having among other things organized a most successful philosophical club, the Philosophical Union of the University of California, before which have been delivered as addresses what subsequently appeared as important published works, such as Royce's *The Conception of God* and Watson's *Christianity and Idealism.* William James first proclaimed his pragmatism before this Union in an address entitled "Philosophical Conceptions and Practical Results." Howison's publications include *Treatise on Analytic Geometry* (1869) and *Limits of Evolution* (1901; 2d ed., 1905). He edited and contributed to Royce's *The Conception of God* (1897).

HOW'ITT, WILLIAM (1792–1879) and MARY (1799–1888). Two English authors, who may well be treated together. William Howitt was born at Heanor, Derbyshire. His parents were Quakers. Though he attended several schools, he educated himself mostly by reading. From his youth he was fond of outdoor sports, and he celebrated in verse the scenery with which he was familiar. In 1821 he married Mary Botham, daughter of a prosperous Quaker of Uttoxeter, Staffordshire. After living for a year in Staffordshire they settled in Nottingham, where William set up as a druggist. Here they remained for 12 years. They subsequently lived at Esher in Surrey, London, Heidelberg, and Rome. William spent two years in Australia (1852–54). Somewhat after middle life they became spiritualists. Both died in Rome and were buried there. Soon after their marriage they began to write in collaboration and then independently. Among their joint works are contributions in verse and prose to annuals and periodicals; *The Forest Minstrel* (1823); *The Desolation of Eyam and Other Poems* (1827); *Literature and Romances of Northern Europe* (1852); *Ruined Abbeys and Castles of Great Britain* (1862). Among William's independent works are: *Book of Seasons, or Calendar of Nature* (1831); *Popular History of Priestcraft* (1833); *Pantika, or Traditions of the Most Ancient Times* (1835); *Rural Life of England* (1838); *Visits to Remarkable Places* (1st series, 1840; 2d series, 1842); *Boys' Country Book* (1839); *Rural and Domestic Life of Germany* (1842); *Popular History of England* (1856–62); *The Mad War Planet and Other Poems* (1871). Among Mary's independent publications, numbering 110 distinct works, are translations from Fredrika Bremer and Hans Andersen; *Sketches of Natural History* (1834); *Popular History of the United States* (1859); a novel called *The Cost of Caergwyn* (1864); *Tales in Prose for Young People* (1864); *Tales in Verse for Young People* (1865); *Tales for All Seasons* (1881). From these lists it may be seen that the Howitts did much for their generation by diffusing knowledge. On the other hand, they wrote little or nothing of permanent value. Consult *Mary Howitt: An Autobiography,* edited by her daughter, Margaret Howitt (London, 1889).

HOW'ITZER (from *howitz,* from Ger. *Haubitze,* formerly *Haubnitze,* from Boh. *haufnice, haufenice,* howitzer, sling for casting stones). A type of cannon intermediate between guns and mortars, which may be used as a gun or as a mortar. For example, the 6-inch siege howitzer of the United States army has a variation in elevation from $-5°$ to $+40°$. Combining this range of elevation with the three different charges of powder used, the howitzer possesses a flexibility in range and angle of fall not possible with guns and mortars. Field howitzers are designed for a curved fire greater than that of guns and less than mortars. Such fire reaches the *personnel* protected behind shielded guns and steep cover. The ammunition includes both shrapnel for the attack of men and animals, and high-explosive shell for the attack of material objects and overhead cover. A howitzer concealed behind steep cover, over which its curved trajectory makes it possible to fire, can attack the field gun which cannot effectively reply, on account of the flatness of its trajectory.

In recent years European artillerists have given much attention to the development of light and heavy howitzers designed to accompany an army in the field. The howitzers in service in the United States army are the 3-inch mountain gun or howitzer carried on pack mules, using a 15-pound projectile; the 3.8-inch and 4.7-inch howitzers using 30-pound and 60-pound projectiles respectively. One battalion (3 batteries, equipped with 12 howitzers) of the 3.8-inch pieces is assigned to the artillery brigade forming the divisional artillery. In addition to the above calibres the 6-inch howitzer (120-pound projectile) forms a part of the

heavy field artillery accompanying the mobile army. This piece, using the maximum charge giving a muzzle velocity of 900 feet per second, when fired at an angle of elevation of 40°, gives a horizontal range of 6704 yards, after rising a maximum vertical distance of 4478 feet. The angle of fall is 45°, or a slope of 1 on 1.

In the European War of 1914 the effective employment of large-calibre, powerful howitzers and mortars in the attack of permanent fortifications was one of the notable developments of artillery. For several years before the outbreak of this war Germany, in particular, had successfully experimented with novel types of heavy ordnance. This development was closely watched and copied by other European nations, especially by France, who was in the same position as Germany with respect to defending and attacking fortified places on the land frontiers. Germany, with her usual military foresight, prepared for the inevitable conflict by rushing the construction of a large number of 11-inch howitzers and mortars at the great works of Krupp and Ehrhardt. The characteristics of these are shown in the accompanying table, with the 11-inch French mortar designed

COMPARATIVE TABLE SHOWING THE CHARACTERISTICS OF THREE TYPES OF SIEGE HOWITZERS AND MORTARS USED BY THE GERMANS AND FRENCH IN THE EUROPEAN WAR, 1914

	French Schneider mortar	German Krupp howitzer	German Ehrhardt mortar
Calibre, inches	11.023	11.023	11.023
Extreme range, yards	.....	11,045	10,827
Common shell, pounds	758*	750*	760.6*
Weight of powder charge, pounds	.....	10 to 30	16.53 to 23.14
Muzzle velocity	853 f. s.†	1115 f. s.†	885 f. s.†
Limit of elevation	10° to 60°	0° to 65°	20° to 60°
Limit of traverse	20°	10°	10°
Weight of mortar, pounds	8,692	13,514	8,818.5
Weight of mortar and carriage complete, pounds	33,082	30,644	22,928
Number of loads after dismounting for transportation	4	2	2
Weight of loads, pounds	Gun load 10,837	Gun load 19,687	Gun load 13,117.5
	Chassis load 10,660	Carriage load 17,990	Carriage load 14,109.5
	Carriage load 8,750	.....	.....
	Platform load 11,220	.....	.....

* High explosive shells of less weight are also used.

† Variable, according to weight of ammunition used.

by the celebrated ordnance firm of the Schneiders of France. It will be noted that the German *matériel* is transported in two loads, the French in four. The latter therefore has a greater mobility, but takes longer to assemble for firing. The Germans were the first to transport on the gun-carriage wheels and fire therefrom a calibre as large as 11 inches. The results obtained in the reduction of the Antwerp forts in October, 1914, fully justified the existence of these great guns. It is true that the Japanese used 11-inch mortars in the reduction of Port Arthur in 1904–05, but these were coast-defense mortars dismantled in Japan and remounted in front of Port Arthur on specially prepared concrete foundations, whereas the German pieces are transported on and fired from their own carriages. See ARTILLERY; FIELD ARTILLERY; HEAVY FIELD ARTILLERY; SIEGE ARTILLERY; MORTARS; ORDNANCE; HORSE ARTILLERY; MOUNTAIN ARTILLERY.

HOW'LAND, WILLIAM BAILEY (1849–1917). An American publisher, born at Ashland, N. Y., and educated at Williston Seminary. He founded and published *Outing* (1882–85), was editor and proprietor of the Cambridge (Mass.) *Tribune* (1885–90), served as publisher and treasurer of the *Outlook* (1900–13), and in 1914 became president of the Independent Weekly Publishing Company (publishers of the *Independent*).

HOWLAND, SIR WILLIAM PEARCE (1811–1907). A Canadian statesman. He was born at Pawling, N. Y., but in 1830 went to Upper Canada, settled in York County, and later became a wholesale merchant in Toronto. Entering politics, in 1857–67 he was a Liberal member of the Canada Legislative Assembly. In 1862–63 he was Minister of Finance in the Macdonald-Sicotte administration, and in 1863–64 Receiver-General in the Macdonald-Dorion administration. In the coalition government of 1864–66 he was Postmaster-General and afterward Minister of Finance. In 1865 he and Sir A. T. Galt (q.v.) were commissioners to Washington in behalf of reciprocity of trade between Canada and the United States. He took a prominent part in the movement for Canadian confederation and in 1866–67 was a delegate at the conference in London, England, at which were finally settled the terms of union to be embodied in the British North America Act. In 1867 he was elected to the first Dominion Parliament, and until 1868 was Minister of Inland Revenue in the administration of Sir John A. Macdonald. In 1868–73 he was Lieutenant Governor of Ontario. In 1879 he was knighted.

HOWL'ER, or STENTOR. An American monkey of the genus *Mycetes*, or *Alouatta*, remarkable for the dilatation of the hyoid bone into a hollow drum, which communicates with the larynx, makes a conspicuous external swelling of the throat, and gives prodigious power to the voice, enabling these animals to emit hideous sounds, which are heard miles away, and to which all their names refer. There are two, and sometimes four, other resonators connected with the larynx, besides the one in the hyoid. The howlers live chiefly among the branches of trees and make extraordinary leaps from one to another, taking hold by the tail as readily as by the hands and often swinging by it alone. They are the largest monkeys in the New World.

About seven species are known, occurring from Central America southward to the Rio Grand do Sul. They are sometimes kept in captivity, but are always sullen and untamed. Their habits and brain structure both show that their position is properly among the lowest monkeys. The best-known forms are those of southern Brazil, such as the very black shaggy howler, or guereba (*Alouatta caraya*), of which the females and young are dingy white, and the brown araguata, or ursine howler (*Alouatta ursina*). The red howler (*Alouatta seniculus*) belongs to the Orinoco region and is distinguished by its bright chestnut color and the ridge of upright red hair across the top of its head. This one is said to furnish the principal animal food used by the natives of the eastern slopes of the Andes, but they are obtained only in the lowlands. Still another species, abundant along the lower Amazon, is the yellowish arabata (*Alouatta beelzebul*). See CEBIDÆ; MONKEY; and Plate of AMERICAN MONKEYS with the latter article.

HOW'LEY, JAMES PATRICK (1847–). A British-American surveyor and geologist. He was born in St. John's, Newfoundland, and was educated at St. Bonaventure's College. In 1867 he was appointed assistant geological surveyor and in 1887 became director of the geological survey of Newfoundland. In 1879 he was elected a member of the Mineralogical Society of Great Britain, in 1883 a fellow of the Geological Society (London), and in 1896 a member of the North of England Institute of Mining and Mechanical Engineers. He prepared a large number of reports and articles relating to the resources and geology of Newfoundland and published *The Geology of Newfoundland* (1877).

HO-WO, hō'wō'. See FUNG-HUANG.

HOWORTH, hou'ẽrth, SIR HENRY HOYLE (1842–). An English scientific writer and politician, member of the Royal Society. He was born at Lisbon, was educated at Rossall School, and was admitted to the bar, though he practiced law very little, but devoted himself to Lancashire politics and to literature. He served in the House of Commons as a Conservative from 1886 to 1900. He became a member of many geographical and anthropological societies, in 1899 he was made a trustee of the British Museum, and he also served as president of the Archæological Institute. Howorth's writings, besides letters to the *Times* and contributions to the *Quarterly* and the *Edinburgh*, are on geological, archæological, ethnological, and historical subjects. Among these are: *History of the Mongols* (2 vols., 1876–78); *The Vicars of Rochdale* (1883); *The Mammoth and the Flood* (1887); *Ice or Water* (3 vols., vols. i, ii, 1905); *St. Gregory the Great* (1912); *St. Augustine of Canterbury* (1913).

HOWRAH, hou'rå. A town of the Presidency of Bengal, India, on the right bank of the Hugli, opposite Calcutta (q.v.), of which it is the most important suburb (Map: India, F 4). Howrah has large jute works, manufactures cottonseed oil, iron, rope, and machinery. It is an important railway terminus and the seat of the Sibpur Civil Engineering College. Pop., 1901, 157,594; 1911, 179,006.

HOW'SON, JOHN SAUL (1816–85). An English clergyman and author, born at Giggleswick-in-Craven, Yorkshire. He graduated at Trinity, Cambridge, in 1837, was classical master and later principal of the Liverpool Collegiate Institute (1845–65), and from 1867 until his death was dean of Chester. During the latter period he practically restored the cathedral, raising nearly £100,000 for the purpose. He is best known for his *Life and Epistles of St. Paul* (1852), written in conjunction with Rev. W. J. Conybeare. He also published *The Character of St. Paul* (1862), *The Metaphors of St. Paul* (1868), and other religious works, including commentaries.

HOWTH, hōth *or* houth. A picturesque peninsula, forming the north shore of Dublin Bay, Ireland (Map: Ireland, E 5). It is about 2½ miles long by 2 miles broad and terminates in a cliff 563 feet high, at the foot of which is Howth village, an important fishing station and watering place.

HOX'IE, VINNIE REAM (1847–1914). An American sculptor, born at Madison, Wis. She studied under Bonnat in Paris and under Majoli in Rome. Shortly after Lincoln's death, and while she was still in her teens, she won a $30,000 prize in a competition for a statue of the martyred president. The first woman sculptor ever to receive a commission from the government, she executed a life-size figure, which is now in the rotunda of the Capitol at Washington. Congress later commissioned her to make the heroic statue of Farragut in Farragut Square, Washington. Among other works were statues of "The West," "Sappho," and busts of Mayor Powell of Brooklyn and of Ezra Cornell. In 1911 she was chosen to be the sculptor of the statue of Sequoyah to represent Oklahoma in the statuary hall in the Capitol at Washington. She married Gen. Richard L. Hoxie in 1878.

HOY. One of the Orkney Islands (q.v.), Scotland, situated in 58° 50′ N., long. 3° 20′ W., 2 miles southwest of Pomona (Map: Scotland, F 2). It is 14 miles long and 6 miles broad and rises abruptly from the sea, with precipitous cliffs 1000 feet in height fronting the west. Area, 53 square miles. Ward Hill, 1564 feet high, commands a fine panoramic view of the islands. Pop., 1891, 1320; 1901, 1216; 1911, 1082.

HOY (Flem. *hui*, Dutch *heu*, *heude*, of uncertain etymology). A small vessel, usually sloop-rigged, formerly used in large harbors and rivers and to some extent as a coaster. The term is now applied to *powder hoys*, *anchor hoys*, and similar heavy-built barges (sailing or steam) for carrying ammunition, anchors, or other heavy weights.

HÖYEN, hē'yĕn, NIELS LAURITS ANDREAS (1798–1870). A Danish art critic, born at Copenhagen, where he entered the university in 1816. In 1822–25 he traveled through Germany, Austria, and Italy to Rome, where he met many artists gathered around Thorvaldsen. After his return he lectured at the academy, where in 1829 he became professor, and at the university after 1856. For years he was, with C. J. Thomsen, director for *Den kongelige Malerisamling*, and he put into order the art collections in all the royal castles of the kingdom. As lecturer, he exerted a great influence, being an eloquent speaker and enthusiastic in his advocacy of a distinctly national art. The trend of Danish art in the middle of the last century towards the picturing of homely scenes of common life is largely due to Höyen's influence. His literary works, *Skrifter*, with

The constitution promulgated here in 1839 remained in force till 1860. Pop., about 5000.

HUANG-HSING, or **HWANG-HSING**, hwäng′-shĭng′ (1875–1916). A Chinese general and organizer of the revolution of 1911. He was born near Changsha, capital of Hunan Province, and was educated at the college of the Liang-lu (which means the provinces of Hunan and Hupeh). Later he graduated from Tokyo University in Japan. From his youth he was active against the Manchu monarchy and incurred the hostility of the court. He fled to Japan and there continued his republican activities. A good orator and skilled organizer, he did much to enlist the prominent people of Hupeh and Hunan provinces in the revolutionary cause. During the period of preparation which preceded the outbreak he was the representative of Dr. Sun Yat-sen in China and received the money for the cause which Dr. Sun collected in Europe and America. He commanded forces at Hankow, Hanyang, and Wuchang during the revolution. At Hankow he was second in command and at Hanyang conducted a brave defense against the superior number of well-trained northern troops opposed to him. The convention at Nanking, December, 1911, which named Dr. Sun provisional President, made Huang-hsing Premier and Minister of Navy and Marine. In March, 1912, when Yuan Shih-kai became President, Huang-hsing was appointed commander in chief of the southern army. As a member and the founder of the Kuomintang, or southern party, he got into difficulties with President Yuan and was expelled from the Peking Assembly. He took the leading part in the unsuccessful revolt which followed. In 1914 he visited the United States.

HUÁNUCO, wä′nụ-kō. A department of Peru, bounded by the Department of Loreto on the north and east, Junín on the south, and Ancachs on the west (Map: Bolivia, B 5). Its area is 14,027 square miles. It is exceedingly mountainous in the western part, with a general easterly slope towards the Ucayali River. It is watered by several streams, including the headwaters of the Amazon, and is covered to a large extent with thick forests. The climate is hot and moist in the east and cold in the mountainous regions of the west. The mountains contain deposits of gold, silver, and quicksilver, but the lack of good roads prevents their exploitation. Sugar cane, coffee, tobacco, and cereals are grown, and there are some manufactures of blankets and alcohol. Pop., 1876 (census), 78,991; 1896 (official estimate), 145,309. Capital, Huánuco (q.v.).

HUÁNUCO. The capital of the Peruvian department of the same name, situated at an altitude of nearly 6000 feet, near the river Huallaga, 170 miles northeast of Lima (Map: Bolivia, B 5). It has a healthful climate, is the seat of a bishopric, and was, until 1855, the capital of the Department of Junín. Its chief industry is the manufacture of cocaine. It was founded about 1543. About 35 miles west lies Huánuco Viejo, an Inca town settled by the Spaniards in 1535 and now almost abandoned. Pop. of Huánuco, about 7500. Consult C. R. Enock, "The Ruins of 'Huánuco Viejo,'" in *Geographical Journal*, vol. xxvi (London, 1905).

HUARAZ, or **HUARAS**, wä′räs. Capital of the Peruvian Department of Ancachs, situated on the Huaraz River, and connected by rail with the coast (Map: Bolivia, B 5). It has a cool and generally equable climate, its streets are narrow and its houses plain, and the only noteworthy buildings are the government building, a hospital, a school, and two churches. It is the seat of a bishop. Set in the wall of its cemetery is a very interesting collection of stones sculptured by the ancient Peruvians and collected from the surrounding country. Pop., about 17,000.

HUARTE DE SAN JUAN, wär′tå då sän hwän′, or **HUARTE Y NAVARRO**, ê nävär′rō, Juan de Dios (c.1530–c.1600). A Spanish physician and psychologist, who was born in Lower Navarre. He wrote a curious book on phrenology, *Exámen de ingenios para las ciencias* (1575), which was extremely popular and was translated into several European languages —into English as *A Trial of Wits*. Some of his theories on education are very enlightened for the time, while others are fantastic in the extreme. Consult J. M. Guardia, *Ensayo sobre la obra de J. Huarte* (Paris, 1855), and *Biblioteca de autores españoles*, vol. lxv (Madrid, 1873).

HUASCÁN, wäs-kän′. See Huascaren.

HUASCAR, wäs′kär (c.1495–1533). A Peruvian Inca, born in Cuzco. He was the legitimate heir of Huayna Ccapac, but his father allowed him to inherit only half the kingdom, leaving the other half to a younger brother, Atahualpa, of a more fierce and warlike character, who coveted the whole. A battle between the rival claimants took place near Mount Chimborazo (1532), and Huascar was defeated, falling afterward into the hands of his half brother, who compelled him to look on while the women of the royal household were tortured to death. The landing of the Spaniards was the beginning of the end for Atahualpa, whose dread that they might reinstate his brother caused him to have Huascar secretly drowned in the river Andamarca. Consult Pedro Sarmiento de Gamboa, *History of the Incas*, published by the Hakluyt Society (Cambridge, 1907), and C. R. Markham, *The Incas of Peru* (New York, 1910).

HUASCARAN, wäs-kä-rän′, or **HUASCÁN.** See Andes, *Peru.*

HUASCO, wäs′kō. A port of Chile, in the Province of Atacama (Map: Chile, E 3). The bay is sheltered, but it has poor facilities for shipping. It has several regular lines of steamers and is connected by railway with the interior. A very fertile valley lies back of Huasco, which is rapidly being placed under cultivation. The chief exports are copper, silver, gold, pressed hay, agricultural produce, and cattle. In 1911 its exports amounted to $174,255, and its imports to $1,697,579. It also carries on a large coast trade. Pop., 2500.

HUASTECS, wäs′tĕks. A detached tribe of Mayan stock (q.v.), on the shores of the Gulf of Mexico along the Pánuco in the states of Vera Cruz and San Luis Potosí. The language contains more archaic forms than any other of the stock, bearing out the traditional and other evidences that the Huastecs were left behind in the southward migration of the Maya people.

HUAULT DE MONTMAGNY, Charles J. See Montmagny.

HUAYNA CCAPAC, wä′ê-nå kä′påk (?–1525). A Peruvian Inca, born in Cuzco. His reign began in 1483, and, being by that time an experienced soldier, he waged war against his neighbors till he had conquered the country as far north as Quito, including Puná Island, Ecuador, and as far south as Atacama, Chile. A

ferocious warrior, he cultivated also the peaceful art of road making (notably the highway between Tumbez, Pachacamac, and Cuzco), while it was the magnificence of the palaces he had built which so impressed the first Spanish invaders. Huayna Ccapac had a harem of more than 600 members, and he decreed that his legitimate heir should share the huge kingdom with a younger brother, which led to the internal dissensions that made it fall an easy prey to Francisco Pizarro. Consult C. R. Markham, *The Incas of Peru* (New York, 1910).

HUAYULE. See GUAYULE.

HUB. See HUB OF THE UNIVERSE.

HUBAL, hōō'bȧl. A god worshiped at Mecca, whose image, probably in human form, stood in the Kaaba (q.v.). He is said to have been brought from Moab by 'Amr ibn Luhai, of the tribe of Khuza'a, who occupied the Haram before it passed into the hands of the Koraish, and a northern origin is suggested by the occurrence of his name in a Nabatæan inscription found at Hejr. When the Meccans had gained a victory over Mohammed near Medina, they shouted, "Hail, Hubal!" This may indicate that the personal name of the god of Mecca was especially affected by the Koraish after Mohammed had given a new conception to the appellative *al ilahu*, or Allah (q.v.). The identification of Hubal with Allah, proposed by Wellhausen, is altogether probable. Oracles were secured from Hubal through the casting of arrows kept near his image. Consult Wellhausen, *Reste arabischen Heidentums*, p. 221 (2d ed., Berlin, 1907), and Nöldeke, article "Arabs," in Hastings, *Encyclopædia of Religion and Ethics* (New York, 1908).

HUBALDUS. See HUCBALD.

HUBAY, hōō'bŏ-ĭ, JENÖ (1858–). An Hungarian violinist, born at Budapest. He studied the violin with Joachim in Berlin and in 1876 began to give concerts in Hungary and later in Paris. He was chief violin professor at the Brussels Conservatory (1882) and at the Budapest Conservatory (1886), succeeding his father, Charles Hubay, who was also a well-known violinist. As a composer, he ranks high, his operas *Der Geigenmacher von Cremona* (1893), *Alienor* (1892), the Hungarian *A falu rózsa* (1896), *Lavothas Liebe* (1906), and *Anna Karenina* (1915) being especially noteworthy. He also wrote a symphony, a violin concerto, and many solo pieces for violin.

HUB'BARD, ELBERT (1856–1915). An American writer, also a printer and binder of books, born in Bloomington, Ill. He made himself widely known as the originator of the Roycroft Shop in East Aurora, N. Y., founded for the purpose of reviving the old handicrafts, particularly that of artistic bookmaking. He also originated and edited *The Philistine*, a periodical characterized by a curious jumble of shrewd but generally kindly philosophy, sometimes marred by vulgarity. His writings have considerable vogue among dilettantes in literature. His work includes a long series of sketches, mainly of a biographical nature, published as *Little Journeys;* many pamphlets, such as *A Message to Garcia* (1899); *Time and Chance* (1899), a graphic account of John Brown's career; *Contemplations* (1902), short essays and miscellaneous selections from Hubbard's writings; *Hollyhocks and Golden Glow* (1912); *The Book of Business* (1913). Died on the *Lusitania*.

HUBBARD, GARDINER GREENE (1822–97). An American lawyer, born in Boston. He graduated at Dartmouth in 1841, studied law at Harvard, and was admitted to the bar in 1843. He practiced his profession in Boston until 1873, when he removed to Washington, D. C. There he was intimately connected with the organization and development of the American Bell Telephone Company. He was the founder, and for many years the president, of the National Geographic Society and was a trustee of several important educational institutions. Hubbard devoted much attention to the advancement of oral instruction among deaf-mutes. He made a large collection of etchings and engravings, which were given by his widow to the Library of Congress with a fund for additions.

HUBBARD, JOSEPH STILES (1823–63). An American astronomer, born at New Haven, Conn. He graduated from Yale College in 1843 and the next year went to Philadelphia, where he acted as assistant to Sears Cook Walker, who had built the observatory of the Philadelphia High School. Soon afterward he accepted a position offered him by General Frémont, then a lieutenant, as computer of the observations for latitude and longitude made during the explorer's journey across the continent. In 1845 he was appointed to a vacancy in the corps of professors of mathematics in the navy and was assigned to the Washington Observatory, where he remained during the rest of his life. He contributed frequently to the *Astronomical Journal* and twice, for long periods, was its editor. During his connection with the Washington Observatory he made a number of cometary investigations and important computations. He was a member of the National Academy of Sciences and of various other scientific societies.

HUBBARD, LUCIUS FREDERICK (1836–1913). An American soldier. He was born in Troy, N. Y., went to school in Granville, N. Y., learned the trade of a tinsmith, and followed it for three years in Chicago. In 1859 he started a newspaper in Red Wing, Minn., and afterward served in the Civil War, conducting himself gallantly and becoming brigadier general. Later he engaged in railroad building and milling. He was a State Senator (1872–76), Republican Governor of Minnesota (1882–87), and in the Spanish-American War commanded a volunteer brigade.

HUBBARD, RICHARD WILLIAM (1816–88). An American landscape painter, born at Middletown, Conn., and in later life a resident of Brooklyn, N. Y. He studied under Daniel Huntington and in France and England and became a member of the National Academy in 1858. His work pictures scenes in New York and Connecticut and is often graceful and pleasing but never vigorous.

HUBBARD, WILLIAM (1621–1704). An American clergyman and historian, born in England. As a child, he was brought by his parents to New England, graduated at Harvard (1642), was ordained and became assistant minister and afterward pastor of the Congregational church at Ipswich, Mass., a post which he resigned but a year before his death. He wrote, at the order of the Colonial government, which paid him 50 pounds for it, a *History of New England*, mainly compilation, which barely escaped destruction by fire when Gov. Thomas Hutchinson's house was mobbed in 1765. The Massachusetts Historical Society printed it in 1815. He wrote also *A Narrative of Troubles with the Indians* (Boston, 1677), which was for years popular in New Eng-

land and was even reprinted at the beginning of the nineteenth century at Worcester, Mass., 1801, and Roxbury, Mass., 1805. It is full of errors, but illustrates what was regarded by the writer's contemporaries as an elegant prose style. Minor works are a volume of sermons (1684) and *Testimony of the Order of the Gospel in Churches* (1701).

HUBBARDTON. A town in Rutland Co., Vt., 13 miles northwest of Rutland (Map: Vermont, B 5). It was the scene of a sharp conflict, on July 7, 1777, between the rear guard of General Saint Clair's army, retreating from Ticonderoga, and a British and Hessian force under Generals Fraser and Riedesel. The Americans, under Colonels Warner and Francis, were defeated, with a total loss in killed, wounded, and prisoners of 324 men, nearly one-third their number, while the British loss was only 183. A monument commemorates the battle. Pop., 1900, 488; 1910, 455.

HUBE, hōō'be, ROMUALD (1803–90). A Polish jurist, born at Warsaw and educated there, at Cracow, and in Berlin. From 1826 to 1832 he was professor of criminal law at Warsaw, then became head of a committee on revision of the laws of Poland, and was for a time professor at St. Petersburg. In 1846 and again in 1867 he went with Count Bludov on diplomatic missions to Rome. He died at Warsaw after 13 years' service in the Russian Council of State. His works include treatises on penal law (1828), on Polish criminalists (1830), *Antiquissimæ Constitutiones Synodales Provinciæ Gnesnensis* (1856), *Loi Salique* (1867), *Histoire de la formation de la loi Bourguignonne* (1867), *Droit romain et gréco-byzantin chez les peuples slaves* (1880), and on Polish law in the thirteenth (1874) and fourteenth (1881) centuries.

HUBER, hōō'bēr, EUGEN (1849–). A Swiss jurist, born at Stammheim, Canton of Zurich. He became a lecturer at the University of Bern in 1873 and professor of civil law at Basel in 1880, at Halle in 1888, and at Bern in 1892. He also served as a member of the Swiss National Council, as member of the Permanent Court of Arbitration at The Hague, and as editor of the *Schweizerisches Zivilgesetzbuch* after 1907. In Switzerland he did an especially important service in codifying the civil law and in bringing about a uniform law usage in the courts. His best-known work is the *System und Geschichte des schweizerischen Privatrechts* (4 vols., 1886–93).

HUBER, ụ'bâr', FRANÇOIS (1750–1831). A Swiss naturalist. He was born in Geneva, inherited a love of nature as well as keen powers of observation from his father, studied physics under Saussure and chemistry with a relative. At 15 he began to lose his sight. Before he became totally blind he married a Mademoiselle Lullin. Her devotion, his father's wealth, and the keen eyes of his manservant, Burnens, made it possible for him to carry out his pioneer researches of the life and habits of honeybees. In 1792 he published at Geneva, under the title *Nouvelles observations sur les abeilles*, letters to Bonnet. These were translated into English in 1806. In later works, especially on the origin of wax and the construction of cells, Huber was assisted by his son. Among his more important discoveries were the aërial impregnation of the queen bee (see BEE), the killing of the males by the workers, the rivalry of the queens, the use of the antennæ, the origin of the propolis, and the ventilation of the hives which supplies fresh oxygen.

HUBER, hōō'bēr, HANS (1852–1921). A Swiss dramatic composer, born at Schönewerd, near Olten. He studied at the Leipzig Conservatory and became well known as a music teacher, being appointed in 1896 director of the music school at Basel. His operas *Weltfrühling* (1894) and *Gudrun* (1896) were successfully produced at Basel, and his instrumental pieces are universally popular. He cultivated almost every branch of instrumental and vocal composition.

HUBER, JOHANNES (1830–79). A German theologian and philosopher, leader of the Old Catholics. He was born in Munich, was educated there, and became assistant professor of philosophy in the university in 1859 and a fearless opponent of the Ultramontanes. His work *Die Philosophie der Kirchenväter* (1859) was put on the Index Expurgatorius, and Catholic students were of course forbidden to attend his lectures. He actively opposed the dogma of infallibility and played a conspicuous part at the first general congress of the Old Catholics at Munich, in September, 1871. With Döllinger he wrote the famous *Der Papst und das Konzil von Janus* (1869). Among his other works are: *Johannes Scotus Erigena* (1861); *Die Freiheiten der französischen Kirche* (1870); *Das Papsttum und der Staat* (1870); *Die Lehre Darwins kritisch betractet* (1871); *Der Jesuitenorden* (1873); *Der Pessimismus* (1876); *Die Forschung nach der Materie* (1877). Consult Eberhard Zirngiebl, *Johannes Huber* (Gotha, 1881).

HUBER, LUDWIG FERDINAND (1764–1804). A German author, born in Paris. Taken to Leipzig when only two years old, he was educated in the German, English, and French languages and literatures and joined the intimate circle of Körner and Schiller. In 1798 he became editor of the *Allgemeine Zeitung* and shortly before his death, counselor of education for Swabia. He became well known for his political writings in the periodicals *Friedenspräliminarien* (10 vols., 1794–96) and *Klio* (1795–98); he published two volumes of criticism under the title *Vermischte Schriften von dem Verfasser des heimlichen Gerichts* (1793); and he wrote also many dramas, of which *Das heimliche Gericht* (1790; new ed., 1795) was the best. Consult his *Sämtliche Werke seit dem Jahre 1802*, with a biography by his wife, Therese Huber (4 vols., Tübingen, 1807–19).

HUBER, VICTOR AIMÉ (1800–69). A German literary critic and social reformer, born at Stuttgart. He studied medicine and modern languages at Würzburg and Göttingen. Between 1821 and 1823 he traveled extensively; he gave up medicine and taught at Bremen, was appointed professor of the history of literature and of modern history at Rostock in 1833, of the languages of western Europe at Marburg in 1836 and in 1843 at Berlin. He was one of the best scholars of the Spanish language and literature in Germany. From 1851 to 1869 he lived in retirement in the Harz Mountains. His writings on Spanish, French, and English literature include: *Die Geschichte des Cid* (1829); *Crónica del Cid* (1844); *De Primitiva Cantilenarum Popularium Epicarum (vulgo Romances) apud Hispanos Forma* (1844); *Skizzen aus Spanien* (4 vols., 1828–35), one of the best estimates of modern times; *Die neuromantische Poesie in Frankreich* (1833); *Die englischen Universitäten* (1839–40). He was for a time a Conserva-

tive in politics and founded the journal *Janus*, but later became a Socialist. Consult Rudolf Elvers, *Victor Aimé Huber* (Bremen, 1872–74), and Eugen Jäger, *Victor Aimé Huber, ein Vorkämpfer der sozialen Reform* (Berlin, 1879).

HUBERDEAU, ụ'bĕr'dō', GUSTAVE (c.1878–). A French dramatic basso, born in Paris. At the age of 17 he entered the Paris Conservatory, where he studied violin, singing, and theory, carrying off many prizes. After the completion of his studies he made his début in Rossini's *Barbiere di Seviglia* in 1898 at the Opéra Comique, of which institution he remained a member for 10 years, until his engagement for the Manhattan Opera House in New York in 1908. After the dissolution of that company, in 1910, he joined the Chicago-Philadelphia Opera. At the American première of R. Strauss's *Elektra* he created the rôle of Orestes. He possesses a splendidly trained voice of great volume and flexibility and is at the same time an excellent actor.

HUBERMANN, hōō'bĕr-mȧn, BRONISLAV (1882–). A Polish violinist, born at Czentochowa, near Warsaw. After some instruction from Michalowicz and Lotto, with whom his progress was nothing less than amazing, his father in 1892 took him to Joachim in Berlin. In less than a year the famous master declared the boy a finished artist. He made his début in 1893 in Amsterdam and the same year played in Brussels and Paris. The following year Patti (q.v.) heard him in London and was so impressed that she engaged him to appear with her at her farewell concert in Vienna (January, 1895). There he attracted the attention of no less a personage than Brahms. In 1896 he toured the United States. While concertizing in Italy in 1903, he was signally honored when the municipality of Genoa engaged him to play in the city hall upon the famous Guarnerius formerly owned by Paganini (q.v.). He visited every country of Europe.

HUBERT, hū'bĕrt. The custodian of Arthur, in Shakespeare's *King John*. The character is taken from that of Sir Hubert de Burgh, who died in 1243.

HUBERT, ụ'bâr', SAINT (c.656–727). The first Bishop of Liége, honored as its patron and founder. There are numerous legends concerning him, but there seems no doubt that he was of noble birth and was married to a lady of rank. It is related that the apparition of a crucifix upon the head of a stag which he was chasing on Good Friday turned him to the religious life. He became Bishop of Maestricht and made so many converts in the district that he was called the Apostle of the Ardennes. He is the patron saint of the hunter and the healer of hydrophobia. His anniversary (November 3) is made the occasion of curious ceremonies in French rural districts. Several military orders are named after him.

HU'BERT DE BURGH (?–1243). An English statesman. He held office under Richard the Lion-Hearted and about 1202 was made, by King John, castellan of Falaise and guardian of Arthur of Brittany, the young son of John's elder brother, Geoffrey. The story of his refusal to obey the King's orders to blind the young prince, incorporated by Shakespeare in his *King John*, is unauthentic. In the struggle between John and the barons he sided with the King, but is mentioned as one of those by whose advice Magna Charta was granted. In the same year he was made justiciar of England. He held Dover Castle against the Dauphin Louis in 1216 and on August 24 of the following year gained a notable naval victory over a French fleet which was bringing in reënforcements to Louis. After 1219 Hubert, at first with the papal legate Pandulf, carried on the government for the young Henry III. He was a bitter opponent of the foreign party headed by Peter des Roches, Bishop of Winchester, and attempted to put an end to the system by which the wealth of the English clergy was being taxed for the benefit of the papal court. His policy in general was dictated by a twofold desire to strengthen the power of the crown and to further his own fortunes. During his terms of office he amassed vast riches through prudent marriages, as well as by arrogating to himself lucrative offices and the guardianship of wealthy heirs. Members of his family were advanced to high positions in the Church. His ill success against the Welsh about the year 1228 afforded his enemies an opportunity for undermining his influence with the King. He was dismissed from office in 1232 and charged with malfeasance, murder, and treason. Though restored to the King's favor for a short period, he never again exercised any influence in the government. He died in London, May 12, 1243. Consult: William Stubbs, *Constitutional History of England*, vol. ii (4th ed., Oxford, 1896); H. W. Davis, *England under the Angevins and Normans* (New York, 1905); T. F. Tout, *History of England, 1216–1377* (London, 1905).

HUBERTI, ụ'bâr'tē', LÉON GUSTAVE (1843–). A Belgian composer, born at Brussels. He won the Prix de Rome (1865) at the Brussels Conservatory and from 1874 to 1878 was director of the Mons Conservatory. He was inspector of singing in the Antwerp schools (1880–89), becoming later a professor at the Brussels Conservatory and director of the music school of St. Josse-ten-Noode-Schaerbeek. His compositions, which are of sterling merit, comprise the oratorios *Een laatste Zonnestraal*, *Bloemardinne*, and *Willem van Oranjes dood;* the dramatic poem *Verlichting*, for organ, orchestra, soli, and chorus; a *Symphonie funèbre*, a romantic suite, many songs, piano pieces, and instrumental numbers.

HUBERTUSBURG, hōō-bĕr'tụs-bụrĸ, or **HUBERTSBURG,** hōō'bĕrts-bụrĸ (Ger., Hubert's castle). A royal hunting seat, not far from Leipzig, built in 1721–24 by Augustus the Strong (Frederick Augustus I) of Saxony. Here, on Feb. 15, 1763, was signed the treaty of peace between Austria, Prussia, and Saxony, marking the conclusion of the Seven Years' War (q.v.). It is now a lunatic asylum.

HUBLI, or **HOOBLY,** hōō'blī. A town and railway junction in the Dharwar district, Bombay, British India, 90 miles northeast of Karwar on the Malabar coast (Map: India, C 6). It is one of the principal cotton marts in that section of India and has manufactures of copper ware and silks. It has a fair trade in grain, salt, and agricultural produce. The chief objects of interest in the town and vicinity are the ancient Jain temples and numerous monasteries. Pop., 1901, 60,214; 1911, 61,440.

HÜBNER, hụp'nēr, EMIL (1834–1901). A distinguished German classical scholar, born at Düsseldorf. He studied at Berlin and Bonn and then traveled widely in Italy, Spain, and England. He was professor at the University of Berlin from 1870 until his death. His contribu-

tions to classical learning, above all in the field of Latin epigraphy, were very numerous. To his influence was due an awakening of interest in classical studies in general and especially in epigraphy in Spain, which he made a favorite field of study. Among his publications the most important are: *De Senatus Populique Romani Actis* (1859); *Epigraphische Reiseberichte aus Spanien und Portugal* (1861); *Die antiken Bildwerke in Madrid* (1862); *Inscriptiones Hispaniæ Latinæ* (1869; supplementary volume, 1892); *Inscriptiones Hispaniæ Christianæ* (1871; supplementary volume, 1900); *Inscriptiones Britanniæ Latinæ* (1873); *Inscriptiones Britanniæ Christianæ* (1876); *Exempla Scripturæ Epigraphicæ Latinæ* (1885); *Monumenta Linguæ Ibericæ* (1893); *Ueber mechanische Copien von Inschriften* (1881); *Grundriss zu Vorlesungen über die römische Litteraturgeschichte* (4th ed., 1878), a very valuable bibliographical work, translated, with large additions, by J. E. B. Mayor, as *Bibliographical Clue to Latin Literature; Grundriss zu Vorlesungen über lateinische Grammatik* (2d ed., 1880); *Bibliographie der klassischen Altertumswissenschaft* (2d ed., 1889); *La arqueología de España* (1888); *Römische Herrschaft in Westeuropa* (1890); *Römische Epigraphik* (2d ed., 1892). Hübner was also coeditor of *Hermes* (1866–81) and of the *Archäologische Zeitung* (1868–73).

HÜBNER, Joseph Alexander, Count (1811–92), called originally Hafenbredl. An Austrian author and diplomat, born and educated in Vienna. He held various minor diplomatic positions in Paris, Lisbon, and Leipzig, and was then sent to Paris as Minister Plenipotentiary (1849). He held this post under the Republic, and under Napoleon III until 1859. After this he was Minister of Police in his own country, but did not keep that portfolio long. From 1865 to 1867 he was Ambassador to Rome and then made a tour of the world, described in *Ein Spaziergang um die Welt* (1875). His best-known work is his history of *Sixtus V* (1870). His posthumous work, *Neun Jahre der Erinnerungen eines österreichischen Botschafters in Paris unter dem zweiten Kaiserreich, 1851–59* (2 vols., 1904), which also appeared contemporaneously in French, is important.

HÜBNER, Julius (1806–82). A German historical painter of the Düsseldorf school. He was born at Oels in Silesia, studied at the Academy School in Berlin and under Schadow there and at Düsseldorf. He first attracted attention by his picture of "Ruth and Boaz" (1825). He traveled in Italy and resided for the most part at Düsseldorf until 1839. In that year he settled at Dresden, becoming a professor in the Academy of Arts in 1841 and director of the Gallery of Paintings in 1871. He obtained the great gold medal at Brussels in 1851. Among the works of his first period are "The Fisherman" (1828), after Goethe's ballad; "Ruth and Naomi" (1833), in the National Gallery, Berlin; "Christ and the Evangelists" (1835); "Job and his Friends" (1838), in the Gallery of Frankfort; "Consider the Lilies" (1839); and the portrait of Frederick III, in the Kaiserhalle, Frankfort. To his second, or Dresden, period belong the "Golden Age" and "Dispute between Luther and Dr. Eck" (1866), in the Dresden Gallery; "Charles V at San Yuste"; "Last Days of Frederick the Great"; "Cupid in Winter"; and others. He was also known as a poet.

HÜBNER, Karl (1814–79). A German genre painter. He was born at Königsberg, and was a pupil of the Düsseldorf Academy. His works were especially popular in Holland and in America, where he was received with enthusiasm in 1874. His genre subjects include: "The Silesian Weavers" (1844); "The Sleeping Wood Thief" (1845); "The Abandoned" (1846); "The Seizure for Debt" (1848), Königsberg Museum; "The Sinner at the Church Door" (1874), National Gallery, Berlin; "Consolation in Prayer" (1875), Düsseldorf Gallery; "The Recovery," in the Pennsylvania Academy of Fine Arts.

HUB OF THE UNIVERSE. A name jestingly given by Oliver Wendell Holmes in one of his essays to the State House in Boston as the centre of a self-satisfied community. The term is frequently shortened to "Hub" and applied to the city itself, which is popularly supposed to boast of its superior wisdom and culture.

HUBRECHT, hụ'brĕkt, Ambrosius Arnold Willem (1853–1915). A Dutch zoölogist. He was born in Rotterdam, was educated at the universities of Utrecht, Leyden, Erlangen, and Heidelberg, was Selenka's assistant in zoölogy at Erlangen in 1874, in 1875–82 was in the Leyden Zoölogical Museum, and in 1882 became professor at Utrecht. In 1890–91 he traveled in Java, Sumatra, and Borneo, where he made embryological studies, notably of the tarsier. He visited the United States in 1896 and 1907. Honorary degrees were conferred on him by Princeton, St. Andrews, Cambridge, Dublin, Glasgow, and Giessen. His most important work was in embryology and placentation of the mammals. In papers in the *Quarterly Journal of Microscopical Science* in 1883 and 1887 he put forth the theory—also held by Sir E. Ray Lankester—that the vertebrates originated in a Nemertine form, basing this on his discovery in the Nemertines of a continuous nerve sheath. *The Descent of the Primates* (1897) is the title under which were published his lectures at the sesquicentennial celebration at Princeton.

HÜBSCH, hụpsh, Heinrich (1795–1863). A German architect. After studies in Heidelberg he traveled extensively in Greece and Italy (1817–24). In 1827 he was appointed Oberbaurath (inspector of buildings) at Carlsruhe. He designed the Basilica at Munich, but is chiefly known for his great work on basilican architecture, *Die altchristlichen Kirchen*, published also in French as *Monuments de l'architecture chrétienne* (Carlsruhe, 1865?).

HÜBSCHMANN, hụpsh'mȧn, Johann Heinrich (1848–1908). A German philologist, born at Erfurt. He studied Oriental philology at Jena, Tübingen, Leipzig, and Munich; in 1876 became professor of Iranian languages at Leipzig, and in 1877 professor of comparative philology at Strassburg. He was the first to put the Armenian language in right relation to the Indo-Germanic languages. He wrote: *Armenische Studien* (1883); *Das indogermanische Vokalsystem* (1885); *Etymologie und Lautlehre der ossetischen Sprache* (1887); *Persische Studien* (1895); *Armenische Grammatik* (1895); *Altarmenische Ortsnamen* (1904).

HUC, ụk, Evariste Régis (1813–60). A French Roman Catholic missionary and traveler. He was born in Toulouse, joined the Lazarist fathers in 1839, and at once went to China. After spending a few years in missionary labor in northern China, in 1844 he set out for Tibet.

With his two companions—one a Tibetan priest and the other, Joseph Gabet, a brother Lazarist—he spent several months in a Tatar monastery, learning the Tibetan language, and then made his way over the desert and glaciers to Lhasa, arriving in January, 1846. Although he was favorably received by the Tibetans, he was compelled to return, the Chinese Ambassador having successfully used his influence to that end. Such was the strain on Father Huc's health that he was forced to come back to France in 1852, after visiting India, Egypt, and Palestine. He published: *Souvenirs d'un voyage dans la Tartarie, le Thibet et la Chine pendant les années 1844–46* (2 vols., Paris, 1850); *L'Empire chinois* (ib., 1855); and *Le christianisme en Chine, en Tartarie et en Thibet* (4 vols., ib., 1857–58). All of these works have been translated into English. The strangeness of the things described caused them to be received with incredulity, but later travelers have established their truth, and now they are regarded as comprising one of the most authoritative accounts of Tibet. Consult Henri d'Orléans, *Le père Huc et ses critiques* (Paris, 1893).

HUC'BALD, or **HUBAL'DUS** (c.840–c.930). A Benedictine monk, author, and musician. He was noted for his piety and learning. He lived most of his life in the monastery of Saint-Amand, near Tournai, where he was head master of his uncle's convent school. His writings include some lives of the saints, but he is best known by his treatises on music. The authorship of these is disputed, excepting *Harmonica Institutio*, a criticism of a work by Reginon de Prun. The most celebrated of them is *Musica Enchiriadis*, which has now been proved to be by an unknown writer of the end of the tenth century. Other works attributed to him are *Alia Musica* and *Commemoratio Brevis de Tonis et Psalmis Modulandis*.

HUCH, hōōĸ', Ricarda (1864–). A German novelist, born in Brunswick. She prepared for university work privately and studied at Zurich, where she took her doctor's degree in 1891. She published the plays *Der Bundesschwur* (1891) and *Evoe* (1892), a volume of poems (1894), and two collections of tales, *Erzählungen* (1897) and *Fra Celeste* (1899). Her best work is found in her novels, which are marked by insight into the realities of life and fine stylistic passion. They include: *Aus der Triumphgasse* (1901); *Vita Somnium Breve* (1902); *Von den Königen und der Krone* (1904); *Seifenblasen* (1905); *Die Geschichte von Garibaldi* (2 vols., 1906–07); *Neue Gedichte* (1907); *Risorgimento* (1908); *Gonfalonieri* (1910); *Der grosse Krieg in Deutschland* (3 vols., 1912–13). In literary criticism she published *Blütezeit der Romantik* (1899) and *Ausbreitung und Verfall der Romantik* (1902). Consult E. A. Regener, *Ricarda Huch, eine Studie* (Leipzig, 1904), and Elfriede Gottlieb, *Ricarda Huch, ein Beitrag zur Geschichte der deutschen Epik* (1914).

HUCHET, ü'shā', Charles A. See Labédoyère, Count.

HUCK'ABACK (probably from LG. *hukkebak*, pickaback, from *huken*, to crouch + *bak*, back). A coarse kind of linen or cotton cloth, figured somewhat like damask; it is usually employed for toweling. A kind of crash.

HUCK'LEBERRY (probably a corruption of *hurtleberry*, *whurtleberry*, *whortleberry*, probably from AS. *wyrtil*, OHG. *wurzala*, Ger. *Wurzel*, root + *berry*). A term now generally restricted to various small shrubs of the genus *Gaylussacia* (q.v.), family Ericaceæ. In some sections, however, the term "huckleberry" is popularly given to several species of blueberries belonging to the closely allied genus *Vaccinium* of the same family. The flowers of these species have a four or

HUCKLEBERRY.

five toothed calyx, four or five cleft bell-shaped corolla, with the limb bent back, and eight to ten stamens with two-horned anthers. The fruit is a four to five celled, many-seeded berry. The numerous representatives of the genus *Vaccinium*, mostly confined to the Northern Hemisphere, are common in the north of Great Britain, Europe, and throughout North America. In nature the blueberry is represented by numerous species. The plants range in size from 6 inches in *Vaccinium pennsylvanicum* to 5 to 10 feet high in *Vaccinium corymbosum*, and bear fruits from ⅛ of an inch up to ⅝ of an inch in diameter. In color they show all shades from waxen black, blue, and white, to red in one species, *Vaccinium vitis-idæa*, which is often called cranberry because of the likeness of its acid fruit to that of the cranberry.

While the blueberry has been successfully transplanted to gardens, grown from seeds and grafted, it has nowhere been cultivated in a commercial way. In certain portions of the United States wild plants are protected and cared for in order that the fruit may be secured for the canneries or markets. Recent experiments in blueberry breeding and culture show that the berries can be greatly improved in size, and that their successful culture depends especially on the use of an acid soil and on the presence of a root fungus that appears to supply the plants with nitrogen. (Consult F. V. Coville, "Blueberry Culture," in *The Standard Cyclopedia of Horticulture*, New York, 1914.) The "blueberry barrens" of Maine, an area of some 150,000 acres in extent, is a notable example of the preservation of a native product from which is derived a large annual income. The annual pack from this region alone is about 30,000 cases of 24 cans each, valued at $57,000. Besides forming a valuable commercial product when canned, the blueberry is extensively gathered and marketed for dessert purposes. Although naturally a dry, rather seedy fruit, the larger specimens

are juicy and possess a most agreeable flavor. The blueberry is also used for preserves and jellies as well as for making wine and distilled liquors.

HUCKLEBERRY FINN. Hero of the novel of the same name, by Mark Twain (S. L. Clemens), first published in 1885.

HUCKNALL TORKARD, hŭk'nal tôr'kērd. A town in Nottinghamshire, England, 5 miles north of Nottingham. It has coal-mining industries and large tobacco and hosiery works. Lord Byron is buried in the old parish church of St. Mary Magdalene. Pop., 1901, 15,250; 1911, 15,870.

HUDDE, hŭd'de, ANDREAS (c.1600–63). A Dutch commander in New Netherland after 1629. As one of the four councilors of Wouter van Twiller, director general in America for the Dutch West India Company (1633), Hudde obtained a large grant of land upon Long Island, and in 1642 he was surveyor of Manhattan. Four years later, when trouble had arisen between the Dutch and Swedish settlers on the South (or Delaware) River, he was sent to guard the Dutch West India Company's interests there, and at once entered into strife with the governor of the Swedes, who tried to stir up the Indians against him. But Hudde held his own until 1655, when the Dutch authorities sent ships to help him, and he conquered the Swedish rulers. He continued to enjoy the company's confidence and was made commander of Forts Altona and New Gottenburg (1657) as well as Colonial surveyor and parish clerk. That he was a well-educated man is evidenced by the quality of his literary remains in the Albany archives.

HUD'DERSFIELD. A municipal, county, and parliamentary borough in the West Riding of Yorkshire, England, on the Colne, 16 miles southwest of Leeds. It has excellent railway and canal connections and is the chief seat of the English cloth and woolen manufacture (Map: England, E 3). It also makes silk, iron, and machinery. Its industries are largely run by its own water power. Coal mining and stone quarrying are profitable industries. The town is well built and thoroughly modern, with spacious thoroughfares and fine ecclesiastical, public, and commercial buildings. The town hall, market hall, and cloth hall are noteworthy. It has a proprietary college affiliated to London University, a collegiate school, a technical school, several grammar schools, and a museum. Its municipal government is of a high order, and the corporation has been a pioneer in several economic features. Artisans' dwellings were established in 1853 for married couples and for single women as well as for bachelors. Huddersfield was the first to own and work its tramways; it owns its gas, water, and electric works and several beautiful parks; maintains free public libraries, an art gallery, public baths and washhouses, a slaughterhouse, markets, technical schools, a fire brigade, a hospital, cemeteries, and a modern system of refuse and sewage disposal. It was the first town to adopt an eight-hour labor day. It is the seat of a United States consulate. Although a town mentioned in the Domesday Book as "Odersfelt," its importance dates only from the establishment of the woolen manufacture in the eighteenth century. Pop., 1901, 95,047; 1911, 107,821.

HU'DIBRAS. See BUTLER, SAMUEL.

HUD'SON. A town in Middlesex Co., Mass., on Assabet River, 28 miles west of Boston, on the Boston and Maine Railroad (Map: Massachusetts, D 3). It has a public library. There are manufactures of leather, leather and rubber shoes, rubber gossamer clothing, rubber goring and webbing, woolen goods, broaching machines, and wooden and paper boxes. The government is administered by town meetings. The water works, sewer system, and electric-light plant are owned and operated by the town. Pop., 1900, 5454; 1910, 6743.

HUDSON. A city and the county seat of Columbia Co., N. Y., on the east bank of the Hudson River, 28 miles south of Albany, on the New York Central and Hudson River, the Boston and Albany, and the Albany Southern railroads (Map: New York, G 6). It is finely situated on the slope of Prospect Hill and has a number of noteworthy buildings, the State Training School for Girls, State Volunteer Firemen's Home, Hudson Orphan Asylum, State Armory, and the courthouse, government building, city hall, and city hospital. Public Square and Franklin Square parks and Promenade and Reservoir hills are also of interest. There are extensive manufactures of knit goods, car wheels, ale, lumber, tobacco, iron, machinery, tools, ice elevators, underwear, steel springs, mattresses, Portland cement, etc. Under a charter of 1895 the government is administered by a mayor, elected biennially, and a city council. The water works are owned and operated by the municipality. Pop., 1900, 9528; 1910, 11,417; 1914 (U. S. est.), 12,221; 1920, 11,745. Hudson was settled as Claverack Landing by New Englanders in 1783; its present name was adopted in 1784, and a city charter was received in 1785. For some years the city carried on an extensive foreign trade and was an important whaling port, but its shipping was almost completely destroyed in the War of 1812.

HUDSON. A city and the county seat of St. Croix Co., Wis., on Lake St. Croix, an expansion of the St. Croix River, 20 miles by rail east of St. Paul, Minn., on the Chicago, St. Paul, Minneapolis, and Omaha Railroad (Map: Wisconsin, A 4). It has saw and planing mills, interior-finish factory, breweries, and railroad-car and machine shops. The city is the centre of a region the inhabitants of which raise vegetables, small fruits, poultry, etc., for shipment. There are a well-equipped sanatorium, a Carnegie library, and a park. The water works and sewerage system are owned by the municipality. Pop., 1900, 3259; 1910, 2810.

HUDSON, CHARLES (1795–1881). An American clergyman, politician, and author, born in Marlboro, Mass. He was educated for the Church, which he entered as a Universalist in 1819, and he presided over a congregation in Westminster, Mass., until 1839. Beginning his political career in the House of Representatives of his own State, he afterward went to Congress (1841–49) and then was stationed for four years at Boston as officer of the port. He edited for many years the Boston *Daily Atlas*—a Whig organ. His books include: *Letters to Rev. Hosea Ballou* (1827), *History of Westminster* (1832), and a *History of Lexington* (1868; revised and continued to 1912, 1913), with a genealogical register of its families.

HUDSON, ERASMUS DARWIN (1843–87). An American physician, born at Northampton, Mass. He graduated at the College of the City of New York in 1864 and at the College of Physicians and Surgeons, New York City, in 1867. During 1867–68 he was house surgeon at

Bellevue Hospital. In 1869–70 he was health inspector of New York City, in 1870 was attending physician to the class for diseases of the eye in the outdoor department of Bellevue Hospital, was attending physician at Northwestern Dispensary in 1870–72 and attending physician to Trinity Chapel parish and Trinity Home in 1870–75. He was appointed professor of principles and practice of medicine at the Woman's Medical College of the New York Infirmary in 1872 and held that position for 10 years, and from 1882 until his death was professor of general medicine and diseases of the chest in the New York Polyclinic. He was the author of the following professional works: "Report of Pulse and Respiration of Infants," in Eliot's *Obstetric Clinic* (1872); *Doctors, Hygiene and Therapeutics* (1877); *Methods of Examining Weak Chests* (1885); *Limitations of the Diagnosis of Malaria* (1885); *Home Treatment of Consumptives* (1886); *Physical Diagnosis of Thoracic Diseases* (2d ed., 1887).

HUDSON, Frederic (1819–75). An American journalist, born in Quincy, Mass. After a common-school education he went to New York City in 1836 and became attached to the New York *Herald,* of which he was managing editor for many years, until 1866. His long experience and diligence in collecting gave him abundant material for his *Record of Journalism in the United States from 1690 to 1872,* published in New York in 1873 and still in print, perhaps the most interesting history yet published of the rise and development of the American newspaper.

HUDSON, George (1800–71). An English speculator, known as the "railway king," born near York, the son of a farmer. He acquired a fortune as a linen draper and at the age of 27 inherited £30,000. Investing in railways, he soon carried out large schemes of annexation and extension, crushing roads and buying up embarrassed lines. In 1835 he was a town councilor, in 1836 an alderman, was three times elected Lord Mayor of York, and in 1845 was sent to Parliament. In 1847 the value of railway property fell rapidly, and it was found on investigation that Hudson was paying dividends out of capital and appropriating large sums to his personal use. He spent his last 20 years in contesting lawsuits.

HUDSON, Henry (?–1611). An English navigator. He is first mentioned as the commander of the ship *Hopeful,* sent in May, 1607, by the Muscovy Company in quest of a northeast passage to the Spice Islands. After a voyage of four and a half months, during which he touched the coasts of Greenland and Spitzbergen and sailed as far north as 80° 23′, he returned to England. In April of the year following he sailed again under the auspices of the Muscovy Company and reached Nova Zembla, attempting in vain to force a passage through the Vaigatch or Kara Strait, in the expectation of finding himself within easy reach of the Pacific. His next undertaking was made in behalf of the Dutch East India Company. In their employ he sailed from Amsterdam on March 25, 1609, with 18 or 20 men in the *Half Moon,* a vessel of about 80 tons. He made Nova Zembla, intending to try again the passage of the Vaigatch, but, his crew becoming quarrelsome on account of the cold, he directed his course towards the fortieth parallel of north latitude on the American coast because of a notion then dominant in the minds of Capt. John Smith and Richard Hakluyt that in that vicinity the Atlantic was separated from the Pacific only by a narrow isthmus. He crossed the Atlantic and sighted land in the latitude of Nova Scotia. He then sailed south as far as latitude 35° and, again turning north, carefully examined the coast up to Sandy Hook, which he reached on September 12. A month spent in exploring the Hudson River, which the *Half Moon* ascended to the present site of Albany, satisfied him that there was no passage from ocean to ocean in this part of the world and he was back in England the 7th of November. In 1610 he set out once more, this time to search for a northwest passage, under the patronage of an association of English gentlemen. He left England in April and by June 10 had reached the strait which now bears his name. Passing into the bay beyond (Hudson Bay), he spent three months exploring its coasts and islands. Early in November his vessel was frozen in. The winter seems to have been one of great suffering. Provisions were scarce, and dissensions arose among the sailors. Late in June, 1611, a part of the crew mutinied, seized and bound Hudson, his son, and seven others of the ship's company, and, putting them into the small boat, set them adrift. They were never seen again. A few wretched survivors from among those on board the ship reached England. Consult the introduction to G. M. Asher, *Henry Hudson, the Navigator,* edited for the Hakluyt Society (London, 1860)—this volume includes reprints of the earliest accounts of his voyages, both English and Dutch; Edgar M. Bacon, *Henry Hudson: His Times, and his Voyages* (New York, 1907); *List of Books and Magazine Articles on Henry Hudson,* published by the Brooklyn Public Library (Brooklyn, 1909); H. C. Murphy, *Henry Hudson in Holland* (The Hague, 1909).

HUDSON, Henry Norman (1814–86). An American Shakespearean scholar and editor, born at Cornwall, Addison Co., Vt. In early life he worked as a baker and a wheelwright. He graduated from Middlebury College, Vermont, in 1840, and then taught school in Kentucky and Alabama. He presently became an authority of considerable note on Shakespeare, lectured widely on his works, and was appointed a professor in Boston University. Among his works in this field are *Lectures on Shakespeare* (2 vols., 1848), a valuable annotated edition (11 vols., 1851–56), and *Shakespeare: His Life, Art, and Characters* (2 vols., 1872). Having entered the priesthood of the Protestant Episcopal church, he was for some years editor of the *Churchman,* was rector at Litchfield, Conn., 1859–60, and served as chaplain in the Union army during the Civil War. On his return he published *A Chaplain's Campaign with General Butler* (1865). He was author also of *Sermons* (1874), *Studies in Wordsworth* (1884), *Essays in Education* (1884), and other works.

HUDSON, William (c.1730–93). An English botanist, born at Kendal in Westmoreland. He became an apothecary, but devoted much time to botany, entomology, and other natural sciences. He is chiefly noted for his adaptation of the Linnæan system of plant classification to the flora of Britain, which he published under the title *Flora Anglica* (1762). A third and greatly enlarged edition appeared in 1798. The genus *Hudsonia* was named by Linnæus in his honor.

HUDSON, William Henry (1862–). An English author and professor of English literature, born in London and educated by private tutors. He was private secretary to Herbert Spencer, librarian of Sion College, London (1885–86), and later of the London City Liberal Club (1889–90) and of Cornell University (1891–92). From 1892 to 1901 he was professor of English literature at Leland Stanford Junior University; in 1902–03 professorial lecturer at the University of Chicago; and later staff lecturer in literature to the extension board of London University. His work, besides contributions to magazines, includes: *The Church and the Stage* (1886); *An Introduction to the Philosophy of Herbert Spencer* (1894; new ed., 1904); *Studies in Interpretation* (1896); *Idle Hours in a Library* (1897); *The Study of English Literature* (1898); *Sir Walter Scott* (1901); *The Sphinx, and Other Poems* (1900); *The Famous Missions of California* (1901); *Rousseau and Naturalism in Life and Thought* (1903); *An Introduction to the Study of Literature* (1910); *Keats and his Poetry* (1911); *Gray and his Poetry* (1911); *Lowell and his Poetry* (1911); *Milton and his Poetry* (1912); *The Story of the Renaissance* (1912); *An Outline History of English Literature* (1913); *The Man Napoleon* (1914). He also edited many English classics, notably, Goldsmith's *Vicar of Wakefield* (1898), *The Sir Roger de Coverley Papers* (1899), Bacon's *Essays* (1901), Dryden's *Essay on Dramatic Poesie* (1904), and *The Elizabethan Shakespeare.*

HUDSON BAY. A spacious landlocked gulf in the northeastern section of Canada, which may be regarded as an arm at once of the Arctic and the Atlantic Ocean (Map: North America, K 4). It communicates with the Atlantic by means of Hudson Strait and with the Arctic by Fox Channel and various passages to the north and west, which, notwithstanding the comparative lowness of their latitude, have proved less practicable for navigation than the Arctic Ocean itself. Hudson Bay extends from about lat. 51° to about 64° N., a distance of about 900 miles. Its area is about 400,000 square miles. Its depth is about 70 fathoms; on the west coast there is an average rise and fall of 11 to 12 feet at spring tides. The southern prolongation of Hudson Bay bears the name of James Bay. Hudson Bay contains several islands, in addition to the large Southampton Island at its north end, but no rocks or shoals, and the region is singularly free from storm or fogs. Neither the bay nor Hudson Strait is ever entirely frozen over, but both are beset by detached floes and bergs of ice, which render navigation difficult for sailing vessels. Steamships can make the voyage up the bay and reach land from about the middle of June to the end of October. The proximity of the entrance to the Magnetic Pole causes the compass needle to be unreliable and not an aid to navigation. The west shore lies low, but the east shore is bold and rocky. Thirty rivers of considerable magnitude flow into the bay, the Nelson River being the most important. The Churchill and the Severn come next—the former having a deep though comparatively narrow mouth, which can be entered with ease by the largest ships at all tides. Though the land lying south and west of James Bay is suitable for dairy farming, and though ironstone, manganiferous iron ore, galena, and plumbago are found in other portions of the surrounding territory, neither the soil, timber, nor minerals have been to any extent drawn upon. Caribou and musk ox inhabit the shores, and whale, walrus, seal, and salmon abound in the waters of Hudson Bay, and steam whalers visit it during the summer; but the only business developed lucratively is the fur trade by the Hudson's Bay Company, because of the severe long winter on the shores of the bay. The few summer months are genial and bracing. The bay was discovered in 1610 by Henry Hudson (q.v.).

HUDSON FALLS, N. Y. See Sandy Hill.

HUDSON-FULTON CELEBRATION. See Pageants and Celebrations.

HUDSO'NIAN CUR'LEW, Godwit, etc. See Curlew; Godwit; etc.

HUDSON RIVER. The principal river of New York State and one of the most picturesque and important waterways in the eastern United States (Map: New York, G 6). Its principal sources lie in the wildest region of the Adirondack Mountains, in Essex County, and any one of several small streams might be considered its origin, but the highest permanent body of water from which it is fed is Lake Tear-of-the-Clouds, which lies at an altitude of 4322 feet above sea level, in the centre of the triangle formed by Mounts Marcy, Gray Peak, and Skylight. After emerging from the mountains it flows almost due south until it empties into the Atlantic Ocean through New York Bay at New York City, its total length being about 300 miles.

Like the other Atlantic rivers, it flows transversely through the Appalachian ridges instead of following what would now be the natural course, along the great longitudinal valleys. (See Appalachians, especially under the subhead *Drainage Development.*) Accordingly its valley is in places very narrow, and its banks lined with high and steep hills and mountains, notable among which are the Highlands, 1500 feet in elevation, through which the river winds for about 16 miles, the gorge being narrowed at one point to about 1600 feet. Farther down, near the mouth, its west shore, for about 18 miles, is formed by a great dike of trap rock, the Palisades (q.v.). The Catskill Mountains, west of the Hudson, about 100 miles from the sea, approach to within 8 miles of the river.

The fall of the river in its upper reaches is very rapid, amounting to 64 feet per mile from Lake Tear-of-the-Clouds to North Creek, a distance of about 52 miles. From North Creek to the mouth of the Sacondaga the fall is almost 14 feet per mile, and in the next 26 miles (to Fort Edward) the descent amounts to 418 feet more, 175 feet of which, however, are accounted for by the abrupt descents at Palmer, Glens, and Baker's falls.

The chief tributaries of the Hudson are the Indian, Schroon, and Sacondaga rivers, above Glens Falls, Batten Kill, and Fish Creek, and the Hoosic and Mohawk rivers between there and Troy. Below Troy the tributaries include the Catskill, Esopus, and Rondout creeks and Wallkill River, from the west, and Kinderhook Creek, Jansen Kill, Wappinger Creek, Fishkill Creek, and the Croton River, from the east. The largest of these confluents is the Mohawk River (q.v.), which supplies more water than the main stream itself. The valley of the Hudson has a larger population in proportion to its area than that of any other large stream in the United States, excepting the Delaware River.

THE HUDSON RIVER

LOOKING NORTH FROM WEST POINT

The Hudson differs from other Atlantic rivers in that, owing to the considerable sinking or depression of the land in this region, its valley has been drowned and tide water affects the river and makes it navigable to Troy, 6 miles above Albany, or for about 150 miles. Below this point the so-called river is really an estuary or fiord, its volume being far out of proportion to its drainage area (about 13,370 square miles), though, owing to the narrowness of its valley, it still retains the aspect of a river, except for a stretch of about 20 miles between the Highlands and the Palisades, where it expands into Haverstraw Bay, about 6 miles long by 3½ miles wide, and Tappan Sea, about 8 miles long by 4 miles wide. Above Albany and Troy the river is a small stream, obstructed by falls and rapids. It is this drowning of the Hudson valley which is one of the principal causes of the commercial supremacy of New York City, as it has made this river the only deep-water passage cutting entirely through the Appalachian system. The connection of the Atlantic with the North Central States is completed by the Erie Canal (see CANAL), which extends from Troy to Buffalo on Lake Erie.

The Hudson proper is a majestic waterway, from ½ to nearly 1½ miles wide, with the exceptions noted above. It is navigated by a large number of vessels of all kinds, and elegant passenger steamers ply upon its waters. The principal places on the river are Glens Falls, Cohoes, Troy, Albany, Hudson, Catskill, Kingston, Poughkeepsie (where is the only bridge between Albany and the sea), Newburgh, West Point (seat of the United States Military Academy), Peekskill, Haverstraw, Ossining (Sing Sing), Nyack, Tarrytown, Yonkers, and at the mouth of the river, New York, Hoboken, and Jersey City. Sailing craft, whose numbers formerly added so much to the picturesqueness of the river, have to a great extent disappeared. The enormous traffic on the river is facilitated by the New York Central and Hudson River and the West Shore railroads, which run along either shore of the Hudson and the Mohawk. The Hudson was discovered by Verrazano in 1524, but first explored by Henry Hudson in 1609. It was called North River to distinguish it from the Delaware (or South) River, but the English named it in honor of its explorer. Its Indian name was Shatemuc. The Hudson was an important waterway in the Revolutionary War (see STONY POINT; WEST POINT), and it was on this river that steam navigation was first successfully introduced by Robert Fulton in 1807. Consult: R. S. Tarr, *Physical Geography of New York State* (New York, 1902); Edgar M. Bacon, *The Hudson River* (ib., 1902); J. B. Woodworth, *Ancient Water Levels of Champlain and Hudson Valleys* (New York State Museum, Bulletin No. 84, Albany, 1905); Barrows and Grover, *Surface Water Supply of Hudson, Passaic, Raritan, and Delaware River Drainages* (United States Geological Survey, Water Supply and Irrigation Papers, No. 202, Washington, 1907); C. Johnson, *The Picturesque Hudson* (New York, 1909).

HUDSON RIVER BEDS. The term "Hudson River slate group" was introduced by Mather in 1839 for the slates, shales, and grits, with interstratified limestones, of the Hudson River region. These were considered as lying above the Utica shale of the Mohawk valley and therefore correlated with the Frankfort and Lorraine beds of central New York. Later the term was extended to comprise all Ordovician formations above the Trenton limestone, and this usage became established in geological textbooks. The study of the fossils, notably the graptolites, has shown that the Hudson River beds, or group, are not a unit but are composed of many zones extending from the base of the Ordovician (Schaghticoke shale) through the Beekmantown (Deep Kill shale), Chazy and Black River (Normanskill shale) into the Trenton (Canajoharie and Snake Hill beds), while the Utica and Lorraine equivalents are entirely lacking in the group. The name "Hudson River beds" is now only used when the component horizons have not been distinguished. Consult: Mather, *Geology of New York: Report on the First District* (Albany, 1843); Ruedemann, *Hudson River Beds near Albany* (New York State Museum, Bulletin No. 42, Albany, 1901); id., *The Lower Silurian Shales of the Mohawk Valley* (New York State Museum, Bulletin No. 162, Albany, 1912).

HUDSON RIVER SCHOOL OF PAINTING. The earliest school of landscape painting in the United States. The name was derived from the practice of its members of depicting the scenery of the Hudson River, upon whose banks many of them lived. Although not the earliest landscape painter in the United States (see DOUGHTY, THOMAS), Thomas Cole, who lived at Catskill on the Hudson, may be called the founder of the school. This honor is shared by Asher Durand, originally an engraver, whose influence was wider and who transcribed nature more faithfully. Cole represented the romantic, Durand the realistic, side of the school. Among their followers were John F. Kensett, J. A. Richards, Worthington Whittredge; then J. F. Cropsey, Sanford R. Gifford, George Inness, F. E. Church, Bierstadt, and McEntee. Somewhat younger were Samuel Colman, William T. Richards, Homer D. Martin, Alexander Wyant, Thomas Moran, and R. Swain Gifford. These men by no means confined themselves to Hudson River scenery; F. E. Church, e.g., painted the Andes, Greece, etc., and Bierstadt, whose training was derived at Düsseldorf, the Rockies and other Western scenery. They shared the conviction that a landscape should represent a grand or romantic piece of nature. Their best work compares not unfavorably with that of contemporary English and German painters. Usually it was hard in line, overdetailed in execution, thin and dry in color. The art of the school culminated in the landscapes of three great masters of landscape, George Inness, Alexander Wyant, and Homer D. Martin. Consult Samuel Isham, *History of American Painting* (New York, 1905), and the articles on the painters mentioned.

HUDSON'S BAY COMPANY. An English chartered company. It was incorporated in 1670 by Charles II, who granted to a number of "adventurers," with Prince Rupert at their head, the sole right to trade with the native tribes on the shores of Hudson Bay. The company had power to establish laws and impose penalties, to erect forts, maintain ships of war, and "make peace and war with any prince or people not Christian." It started with a capital of about £110,000, and for a long time it maintained its monopoly intact. The progress made was not rapid, and by the middle of the eighteenth century the company had no more than 120 people

in its employ; but nevertheless three or four ships were sent out annually with a cargo of coarse English goods, which were sold to natives for furs and skins at rates which brought the proprietors a handsome profit. Conflicts soon arose with the French, who laid claim to the territory on the ground of an expedition made in 1656 by Jean Bourdon, who, according to Charlevoix, *Histoire de la Nouvelle France*, vol. i (Paris, 1744), traveled from Quebec to Hudson Bay and took formal possession of the country inclosing James Bay. There is no doubt, however, that the Hudson basin had been visited by English navigators long before 1656. In 1682 a trading post on the coast was surprised by the French, and in 1686 four more of the company's forts were taken. During the War of 1689–97 the same forts changed hands more than once, and by the terms of the Peace of Ryswick some of them were given to the French. It was not until the Treaty of Utrecht, in 1713, that the latter finally resigned all claims to the Hudson Bay territory. From 1713 to 1763 the company enjoyed a peaceful and prosperous but far from dazzling career. It imported annually into England about 30,000 skins, and its dividends were 8 to 10 per cent. The conquest of New France was the turning point in the company's history. When Canada became English, the vast territory of the Hudson's Bay Company became accessible from the south as well as from the sea. Trade increased tremendously, and in the next French war (1778–83), when its factories were surprised by a French squadron under Lapérouse, the company was strong enough to bear a loss of £500,000.

So profitable a monopoly could not be long enjoyed. Not only private trappers, but rival companies, entered the field, on the principle of free and open trade guaranteed to all British subjects in the Bill of Rights. Such a competitor was the famous Northwest Company, which, after years of strife amounting at times to actual war, was merged (1821) with its opponent under the name "Adventurers of England Trading into Hudson's Bay," for a period of 21 years. The territories of the company had been gradually extended until they reached to the Arctic on the north and the Pacific on the west. In 1859 the trade monopoly was abolished, but the claims of vested interests and property rights remained unsettled until 1869, when, in return for an indemnity of £300,000, together with a land grant of 7,000,000 acres made by the Dominion government, the company gave up all its ancient privileges and took its place on a footing with other business corporations, retaining, however, its forts or trading stations.

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HUDSON STRAIT. See HUDSON BAY.

HUÉ, ụ′ā′. Capital of the Kingdom of Annam, situated on the left bank of the Huong-giang (in French, the Hué) River, about 10 miles above its entrance into the sea, about lat. 16° 29′ N. and long. 107° 38′ E. (Map: Asia, M 7). It is a walled city, fortified in the beginning of the nineteenth century by French engineers after the style of Vauban. Hué consists of two parts, the city proper and the suburbs—the former being in the middle of a square island separated from the suburbs on three sides by the river and on one side by a canal. The walls, which have a circumference of about 8000 yards, are of brick and very high. The citadel is a large quadrilateral with eight gates and a bastioned front. The royal palace has yellow tiles on the roof; those of the nobles have red tiles. Inside the palace, which is kept in good order, is a museum of ancient Annamite art, mainly in gold and jade jewelry. The wall inclosing the royal palaces has three gates, the centre one being in the form of a pagoda elaborately carved and gilded; but most of the public buildings and nearly all the houses are comparatively mean and in poor repair. The official buildings of the French government are on the right bank of the river, also the houses of European officials and merchants. The population is estimated at 41,000, of which 300 are Frenchmen and 800 Chinese. Near Hué are the magnificent tombs of the old Annamite kings. The forts at the mouth of the river were taken by the French in 1883.

HUE, ụ, GEORGES ADOLPHE (1858–). A French dramatic composer. He was born at Versailles and gave early evidence of his musical gift. When 21 years of age, he won the Grand Prix de Rome and two years later the Prix Cressent. During his period of study at the Paris Conservatory he was the pupil of Reber and Paladilhe. His compositions include the following operas: *Les pantins* (1881), *Le roi de Paris* (1901), and *Titania* (1903). Among his orchestral works are the symphonic legend, in three parts, *Rübezahl*, and a dramatic sacred episode, *Resurrection*. He also wrote much chamber music and numerous pieces for individual instruments. He became known as one of the most successful teachers in Paris.

HUE AND CRY. A phrase, derived from the old process of pursuit with horn and voice, used in English law in the pursuit of felons. Whoever arrested the person pursued was so far protected that he required no warrant to justify the arrest; and even if the party turned out to be no felon, no action could be brought if the arrest was bona fide. But it was not only a ground of action, but an offense subject to fine and imprisonment, maliciously and wantonly to raise the hue and cry against a person. It was the duty of all persons to join in a hue and cry, and if a person who had been robbed or knew of a robbery failed to raise the hue and cry, he was liable to fine or imprisonment or, according to some authors, to indictment. Hue and cry is now regulated in England by the Sheriffs Act, 1887 (50 and 51 Vict., c. 55). *Hue and Cry* is the name given to the weekly printed list containing descriptions of persons wanted by Scotland Yard, London, and circulated among detective offices throughout the world. Consult the *Commentaries* of Blackstone and Pollock and Maitland, *History of English Law* (2d ed., Cambridge, England, and Boston, 1899).

HUECO, wā′kō. See WACO.

HUEFFER, hụf′fẽr, FRANCIS (1843–89). An

English musical writer and librettist, born in Münster, Germany. He studied in England and on the Continent and afterward settled in London, and became musical critic of the *Times* in 1878. He furnished the libretto for the operas *Columbia* and *The Troubadour* of Mackenzie and *The Sleeping Beauty* of Cowen. His works include an edition of the works of the troubadour Guillem de Cabestant (1868); *Richard Wagner and the Music of the Future* (1874); *The Troubadours: A History of Provençal Life and Literature in the Middle Ages* (1878); *Musical Studies* (1880), a collection of articles originally written for the *Times* and other newspapers, translated into Italian by Visetti (1883); and a translation into English of the correspondence of Wagner and Liszt. He was one of the first to advocate the cause of national English opera.

HUELEN, wā'lân (c.1540–1603). A Chilean patriot, native of Angol. In 1599 he was at the head of the forces of Araucania, mustered to repel the Spaniards, and by copying their methods and teaching his followers to ride the horses the invaders had brought to South America, was enabled to wage successful warfare against them, though no longer a young man. He was victorious at Valdivia (1599), near Concepción (1601), near Bio-Bio (1602), against the enemy with firearms and coats of mail; but his siege of Osorno failed, and he died of old wounds and new before he had succeeded in capturing the fort.

HUELSEN, hụl'zen, Christian (1858–). A German classical archæologist, born in Charlottenburg, where his father was a Gymnasium teacher and where he got his early education. He studied in Berlin under Mommsen and in Rome under Henzen. After two years' teaching in secondary schools, in 1887 he succeeded Helbig (q.v.) in the Royal German Archæological Institute at Rome and held this post until 1909. His works on ancient Rome, which won him honorary degrees from Oxford and Columbia, include parts of vol. vi of the *Corpus Inscriptionum Latinarum* (1882–1902); *Formæ Urbis Romæ* (1896; 2d ed., 1912), with Kiepert; *Die Thermen des Caracalla* (1898); *Forum Romanum* (1904; 2d ed., 1905; English by Carter, 1905; Italian, 1905); *Topographie der Stadt Rom im Altertum* (1907), part 3 of vol. i of Jordan's great work on the topography of Rome; *Die Thermen des Agrippa* (1910); *Skizzenbücher Marten van Heemskerks* (1912).

HUELVA, wāl'vä. The capital of the Spanish province of the same name, situated on the deep and navigable estuary of the Odiel River, 10 miles from its mouth in the Gulf of Cadiz (Map: Spain, B 4). It is a well-developed town, with a good harbor, and is a railroad centre. Among its buildings is a fine hotel built in 1883 by an English company. There are also several notable churches, that of San Pedro having formerly been a Moorish mosque. The Roman aqueduct has been restored and, after centuries of disuse, again supplies the city with water. The industries and commerce of the city have become very important, through the exploitation on a large scale of the copper mines of the province. The mining companies have built two large iron piers at the harbor, one of them costing $780,000. The city has also large machine shops and shipyards as well as various other industries. The United States is represented by a consular agent. The city is notable as the starting point of Columbus on his voyage to America on Aug. 3, 1492. Pop., 1910, 27,699.

HUENE, hụ'ne, Karl, Baron von Hoiningen (1837–1900). A German politician, born in Cologne and educated in Berlin. He entered the army and served in the wars of 1864, 1866, and 1870–71. He retired from the army in 1873 and, after engaging in business, became a member of the Prussian House of Deputies (1877). In 1884 he was elected to the Reichstag, where he rose to prominence as a leader of the Centre and author (1885) of the *Lex Huene* (rescinded in 1893), by the terms of which all taxes on cereals and cattle, save 15,000,000 marks, were divided among the various parochial governments of Prussia. In 1893 he lost his leadership of the Clericals by his compromise with the administration on the military budget and failed of reëlection in that year and again in 1895. But until his death he remained a member of the Prussian Council of State, to which he had been appointed in 1890. He was a recognized authority on matters of finance and political economy.

HUEPPE, hụp'pe, Ferdinand (1852–). A German bacteriologist, born at Heddesdorf and educated in Berlin. In 1890 he was appointed professor of hygiene in the German University at Prague. He established the fact that subterraneous water is free from germs and contended that the source of infection from bacteria is the decayed organism on which the bacillus feeds. Hueppe did much to simplify disinfection and to promote inoculation with benign bacteria. He was the first to advance the theory that the power of nitrifying microbes to absorb carbonic oxide, even in the dark, is due to the oxidation accompanying the ammoniacal preparation of saltpetre. After 1906 he was chief sanitary adviser at Prague. He wrote: *Die Formen der Bakterien* (1886); *Ueber die Beziehungen der Fäulnis zu den Infektionskrankheiten* (1887); *Ueber den Kampf gegen die Infektionskrankheiten* (1889); *Die Methoden der Bakterienforschung* (5th ed., 1891); *Die Choleraepidemie in Hamburg, 1892* (1893); *Ueber die Ursachen der Gärungen und Infektionskrankheiten* (1893); *Naturwissenschaftliche Einführung in die Bakteriologie* (1896); *Zur Rassen- und Socialhygieine der Griechen* (1897); *Handbuch der Hygieine* (1899); *Zur Sozialhygiene der Tuberkulose* (1904); *Wohnung und Gesundheit* (1912); *Sport und Reizmittel* (1913).

HUÉRCAL-OVERA, wâr'kàl ō-vā'rä. A town of southeast Spain, in the Province of Almeria, situated in a broad and fertile valley surrounded by mountains, 16 miles from the Mediterranean coast (Map: Spain, E 4). It has straight and wide streets and several plazas, on one of which stands a handsome church. The town is connected by rail with Murcia, and between it and the coast are the silver, lead, and copper mines of the Sierra de Almagrera, upon which the prosperity of the town depends. Pop., 1900, 15,774; 1910, 17,344.

HUERTA, wâr'tä, Vicente Antonio García de la (1734–87). A Spanish poet and critic. He was born at Zafra in Estremadura, was educated at Salamanca, and spent the greater part of his life in Madrid, where he held the office of principal librarian of the Royal Library, and where he died. He early distinguished himself by his poetic talent. His tragedy *Raquel*, founded upon the story of the love of King Alfonso VIII for the Jewess Rachel,

was received with great enthusiasm when first produced in 1778 and is still considered a work of some merit. Huerta was a most zealous but not always a wise or skillful defender of the ancient Spanish national taste against the Gallicism which then prevailed. His shafts were directed especially against the French school of dramatists and lyric poets inaugurated as a result of Luzán's crusade. As a lyric and dramatic poet, he shows great command of language and versification. His poems were published in two volumes, *Obras poéticas* (1778–79); they are accessible in the *Biblioteca de autores españoles*, vol. lxi (Madrid, 1869). Huerta edited the *Teatro español* (17 vols., Madrid, 1784–85), an unsatisfactory collection of the works of the older Spanish dramatists.

HUERTA, Victoriano (1854–1916). A Mexican soldier, born in the village of Colotlán, State of Jalisco, a descendant of the native and Spanish races. He secured the rudiments of an education from the village priest and when a boy determined to enter the army. His opportunity came when he was called upon to serve as amanuensis to the commander of a detachment of troops which passed through his town. His intelligence and ability attracted the general's attention, and when Huerta told of his desire to become a general, the officer took him to Mexico, and President Juárez placed him in the Chapultepec Military College. Huerta was a good student and distinguished himself in topography and astronomy. He graduated in time to take part in the battle of Tecoac (1876), which placed Porfirio Diaz in power. The next 30 years were occupied in the routine duties of the military career, in the command of minor posts, and in putting down incipient revolts. During this period he served as a member of the Geographical Survey Commission and became the best-informed man in Mexico on its geography. In 1902 he was the commander of a successful expedition against the Maya Indians of Yucatan, leaving the district pacified. For this service he was promoted to the rank of brigadier general by President Díaz, who recognized Huerta's abilities, but always distrusted him. From 1907 to 1910 he was on leave of absence and engaged in the contracting business in Monterey. He came into prominence in 1911, when he was placed in command of the army operating against the Zapatistas. The same year he was in charge of the escort which conducted ex-President Díaz on his flight from the capital. He was in active service in the army during Madero's administration, but was distrusted by the President. Difficulties arose between Huerta and Madero over the manner of dealing with Zapata; but these were adjusted, and in 1912 Huerta waged a campaign against Pascual Orozco in Chihuahua, winning a number of victories. He was recalled to Mexico, was promoted to the rank of general of division, and was offered a commission to Europe, which he refused. In February, 1913, he was placed in command of the government forces to suppress the insurrection under Felix Díaz. On February 18 he deserted the cause of Madero, forced the latter's resignation, and was made provisional President. Five days later President Madero and Vice-President Pino Suárez were murdered, revolt broke out in Sonora, and the United States refused to recognize the new government. Huerta refused to resign at the suggestion of President Wilson, and on October 10–11 he arrested 110 members of the Chamber of Deputies, dissolved the Congress, and assumed dictatorial powers. In November he ignored the ultimatum of President Wilson demanding his elimination from the affairs of Mexico. The Tampico incident (April 9, 1914) involved Huerta in more serious difficulties with the United States and was followed by the occupation of Vera Cruz by United States marines. The offer of mediation by the "A. B. C." powers (Argentina, Brazil, Chile) was accepted by both sides, but meanwhile the Constitutionalists were making rapid progress against Huerta's forces. There were rumors of his resignation, but on July 5 an election was held in the Federal territory, and he was chosen President by a small majority. Having reorganized his cabinet, he resigned on July 15, 1914, and Francisco Carbajal, the new Minister of Foreign Relations, became provisional President. Five days later Huerta went into exile, sailing from Puerto Mexico. Consult L. C. Simonds, "Victoriano Huerta," in the *Atlantic Monthly*, vol. cxiii (Boston, 1914), and J. de Kay, *Dictators of Mexico* (London, 1914). See Mexico, *History;* United States, *History.*

HUESCA, wā′skä (Lat. *Osca*). The capital of the Spanish province of the same name, situated in a fertile plain on the river Isuela, 45 miles northeast by rail from Saragossa (Map: Spain, E 1). It is an old town, retaining its mediæval aspect, surrounded by the ruins of its double line of ancient walls. It has a celebrated Gothic cathedral dating from the fifteenth century, in which is a magnificent alabaster reredos, representing the Passion; and the old Romanesque church of San Pedro dating from the twelfth century. There are also several old monasteries in the neighborhood, that of Monte Aragón containing in its crypt the tomb of Alfonso I. The institute for secondary education occupies the building of the old university, founded in 1354 and removed to Saragossa in 1845. In one of the vaults of this building the famous Bell of Huesca is said to have been constructed from the 16 heads, including one as the clapper, of as many insurgent nobles who were executed by command of King Ramiro II. The town is decaying, but still has some trade in wine and agricultural produce and has a few unimportant industries. Pop., 1900, 11,976; 1910, 10,147. Under the Romans Osca was a place of considerable importance, having a number of Greek and Latin schools and a college founded by Sertorius, who here met his death at the hands of Perpenna in 72 B.C. The Moors strongly fortified Huesca; after being taken by Pedro I in 1096 it became the capital of Aragon, but was superseded by Saragossa in 1118.

HUÉSCAR, wā′skär. A city in the Province of Granada, Spain, situated 75 miles northeast of the city of that name (Map: Spain, D 4). It has manufactures of flour, paper, linen, and woolen goods. Pop., 1900, 7917; 1910, 8096.

HUET, ụ′ā′, Paul (1803–69). A French landscape painter and lithographer, born in Paris. He was a pupil of the Beaux-Arts (1820–24) and of Gros and Guérin, made his début at the Salon in 1827, and in 1831 produced an impression by sending nine oil paintings and four water colors. He received the cross of the Legion of Honor in 1841. He painted in almost every province of France, and in 1910 there was a retrospective exhibition

of his work at the Beaux-Arts. He was altogether a Romanticist, one of the impassioned school of 1830, preparing the way for Rousseau, Dupré, and the painters of Barbizon (q.v.). His paintings have the dramatic contrasts and climaxes of Byronic poetry—now peaceful calms, now boisterous storms and tumultuous waters, with lightning flashing fiercely through grim masses of clouds. Among his paintings at the Louvre are "Inundation at Saint-Cloud," "Equinoctial Tide near Honfleur," "Forest at Compiègne," "Setting Sun at Seineport." Consult Hédiard, *Paul Huet*, in the series "Maôtres de la lithographie" (Le Mans, 1891).

HUET, Pierre-Daniel (1630–1721). A French Roman Catholic scholar. He was born at Caen, Feb. 8, 1630, and was educated in the Jesuit School there. He was a zealous follower of Descartes and a pupil of a Protestant Orientalist, Bochart, and accompanied the latter on his visit to Stockholm in 1652. On his return to Caen he gave himself up entirely to the study of philosophy, the sciences, and the Oriental languages. As a preliminary to the translation of the text of Origen, he published his *De Interpretatione* (1661), but it was only at the end of 15 years' study that he published his edition of Origen's *Commentaria in Sacram Scripturam* (1668). In 1670 he was summoned to Paris to take part with Bossuet in the education of the Dauphin. In 1679 he published his *Demonstratio Evangelica*. He had an active part, moreover, in the Delphin edition of the classics. In 1674 he was elected a member of the French Academy. In 1676 he entered into holy orders and in 1678 was named abbot of the Cistercian abbey of Aulnay, from which place is named his work, *Alnetanæ Quæstiones de Concordia Rationis et Fidei* (1690). In 1691 he published in Latin a work on *The Situation of Paradise* (Eng. trans., 1694); another in 1693 *On the Voyages of Solomon*, which were followed later by his work in classical geography, *History of the Commerce and Navigation of the Ancients*, in French (1716; Eng. trans., 1717). In 1685 he was named Bishop of Soissons, a dignity, however, on which he never entered, being transferred to the see of Avranches in 1692. Huet died in Paris Jan. 26, 1721. He was one of the most brilliant minds of the century, and his writings cover a field of marvelous breadth. His works were published in a collected form in 1712, and a volume of *Huetiana* appeared in 1722.

Bibliography. *Memoirs of the Life of Pierre Daniel Huet, Written by Himself and Translated from the Latin by J. Aikin* (2 vols., London, 1810); C. J. C. Bartholmess, *Huet, Evêque d'Avranches, ou le scepticisme théologique* (Paris, 1849); F. A. de Gournay, *Huet, Evêque d'Avranches, sa vie et ses œuvres* (ib., 1854); Flottes, *Etude sur Daniel Huet, Evêque d'Avranches* (Montpellier, 1857); Trochon, *Huet, Evêque d'Avranches* (Paris, 1877).

HUFELAND, hōō'fe-lânt, Christoph Wilhelm (1762–1836). A German physician, born at Langensalza in Thuringia. He studied medicine at Jena and Göttingen, was professor of medicine at Jena from 1793 to 1798, was physician in ordinary at the court of Weimar, and resided at Berlin from 1798, where he was professor of therapeutics and pathology from the foundation of the university in 1810. He had a very high reputation for learning and skill as a physician, and he was equally esteemed for his intellectual abilities and his noble and benevolent character. His published works are numerous, chiefly on medical and physiological subjects. His *Makrobiotik*, or the *Art of Prolonging Life* (1796), was translated into almost all the languages of Europe. Among his most important works are: *Ueber die Ursachen, Erkenntnis und Heilart der Skrofelkrankheit* (1795); *Guter Rath an Mütter über die wichtigsten Punkte der physischen Erziehung der Kinder* (1799); *Enchiridion Medicum* (1836).

HUFELAND, Gottlieb (1760–1817). A German political economist and lawyer, born at Dantzig. He studied at the universities of Leipzig, Göttingen, and Jena, where he graduated and became professor extraordinary of law in 1788 and professor ordinary in 1793. He held the professorship of law at Würzburg in 1803, but soon afterward went to Landshut. From 1808 to 1812 he was burgomaster of Dantzig, but in 1816 he returned to Landshut and in the following year went to Halle. His publications contain excellent exposition of the Kantian theories of lawmaking. These include: *Versuch über den Grundsatz Naturrechts* (1785); *Lehrbuch des Naturrechts* (1790); *Lehrbuch der Geschichte und Encyclopädie aller in Deutschland geltenden positiven Rechte* (1790); *Institutionen des gesammten positiven Recht* (1798); and his best-known work on political economy, *Neue Grundlegung der Staatswirthschaftskunst* (2 vols., 1807–13).

HUFF'CUT, Ernest William (1860–1907). An American lawyer and educator. He was born in Kent, Conn., and graduated from Cornell College in 1884 and from Cornell Law School in 1888. He practiced law in Minneapolis, Minn., in 1888–90, served as professor of law at Indiana University in 1890–92 and at Northwestern University in 1892–93, and thereafter was dean of Cornell Law School. Governor Hughes, of New York, at the beginning of his first term (1907), appointed Huffcut his legal adviser. Supposedly as the result of a breakdown due to overwork, Huffcut committed suicide. He was considered by his associates a man of very great ability. He published: *American Cases on Contract* (1884; 3d ed., rev., 1913), with E. H. Woodruff; *Cases on the Law of Agency* (1896; 2d ed., 1907); *Elements of Business Law* (1905).

HÜFFER, hŭf'fĕr, Hermann (1830–1905). A German historian and jurist, born at Münster and educated at Bonn and Berlin. He was appointed professor of jurisprudence at Bonn in 1860 and in 1884 was made Privy Councilor. From 1867 to 1870 he was a member of the North German Reichstag. Besides his main work, *Diplomatische Verhandlungen aus der französischen Revolution* (3 vols., 1868–79), the following may be mentioned: *Der Rastatter Gesandtenmord* (1896); *Quellen zur Geschichte des Zeitalters der französischen Revolution*, part i, dealing with the years 1799–1800 (1900–01); *Der Krieg des Jahres 1799 und die zweite Koalition* (1904); and the biographical writings: *Aus dem Leben Heinrich Heines* (1878); *Zu Goethes Campagne in Frankreich* (1883); *Annette von Droste-Hülshoff und ihre Werke* (1887–90); *A. L. Mencken, der Grossvater des Fürsten von Bismarck* (1890); *Alfred von Reumont* (1904).

HUG, hōōg, Johann Leonhard (1765–1846). A Roman Catholic scholar. He was born at

Constance, June 1, 1765, studied at Freiburg, and in 1789 entered into priest's orders. In 1791 he was appointed professor of Oriental languages and of the Old Testament at Freiburg and in 1792 of the New Testament also. The most important fruit of his biblical researches was his *Introduction to the New Testament* (1808; 4th ed., 1847; Eng. trans. of 3d ed., London, 1827, New York, 1830). His great eminence as a biblical scholar led to his being called on to take part in the arrangement of the newly organized studies of several German universities, as at Breslau in 1811, at Bonn in 1816, at Tübingen in 1817, and again at Bonn 1818 and 1831. He died March 11, 1846. Among his untranslated works are: *Erfindung der Buchstatenschrift* (1801); *De Antiquitate Codicis Vaticanæ Commentatio* (1810); *Das hohe Lied* (1813); *De Pentateuchi Versione Alexandrina Commentatio* (1818); *Gutachten über das Leben Jesu, kritisch bearbeitet von D. Fr. Strauss* (1835); and several on subjects of classical criticism, especially an interesting work on the ancient mythologies (1812). Consult A. Maier, *Gedächtnissrede auf Hug* (Freiburg, 1847), and Karl Werner, *Geschichte der kathologischen Theologie in Deutschland*, pp. 527–533 (Munich, 1867).

HÜGEL, hụ'gel, FRIEDRICH, BARON VON (1852–). An Austrian-English writer on religion, son of Baron Karl von Hügel. He was born in Florence and was privately educated there and in Brussels. Deafness, resulting from typhus in 1871, possibly strengthened his natural inclination for the study of mysticism. In England, where he settled in 1871, he was an intimate friend of W. G. Ward and of other liberal Catholic scholars. His knowledge of the languages employed in theological scholarship was thorough and extensive; and it was acutely applied in his historical criticism of biblical documents and religious experience. He believed in the methods of the higher criticism, and he followed them with great freedom, notably in his examination of the orthodox view of the Gospel of John; but his opinions did not separate him from his church. After the death of Lord Acton (q.v.) Von Hügel became the foremost representative of Catholic scholarship in Britain. Besides a large number of articles on biblical criticism and the philosophy of religion in English and foreign reviews, he wrote: *The Papal Commission and the Pentateuch* (1906), with Briggs; *The Mystical Elements of Religion as studied in St. Catherine of Genoa and her Friends* (1908–09); *Eternal Life* (1912–13); *Catholic Mysticism* (1914).

HÜGEL, KARL ALEXANDER ANSELM, BARON VON (1796–1870). An Austrian soldier, traveler, and naturalist, born at Regensburg. He fought with the expedition against Naples in 1821 and remained there until 1824 as an attaché. He visited Greece, Crete, and Cyprus, examined the ruins of Palmyra and Baalbek, made numerous journeys through Syria and Palestine, and arrived at Bombay in 1832. Thereupon he traversed the greater part of the Deccan, ascended the Nil-Gherria Range, undertook thorough geographical researches in Ceylon, and in 1833 sailed from Madras to Australia (then New Holland). He returned to India (Calcutta) by way of the Philippines and penetrated through Bengal to the Tibetan frontier. He finally arrived at Vienna early in 1837. He contributed papers regarding his expedition to Austrian scientific publications and to the *Journal of the Royal Geographical Society of London*, and wrote also: *Kaschmir und das Reich der Siek* (4 vols., 1840–42); *Das Kabulbecken* (2 vols., 1850–52); and *Der Stille Ozean und die spanischen Besitzungen im ostindischen Archipel* (1860). Other scholars—among them Endlicher, Heckel, Fenzl, and Schott—also prepared the results of his scientific collections. He obtained a European reputation as a horticulturist and founded and became president of the Austrian Horticultural Society.

HUGER, ū-jē', BENJAMIN (1806–77). An American soldier, prominent on the Confederate side in the Civil War. He was born in Charleston, S. C., graduated at West Point in 1825, and served in topographical and ordnance duty until the Mexican War, in which he was chief of ordnance in General Scott's army. For his services he was brevetted successively major, lieutenant colonel, and colonel. From 1848 until 1860 he commanded various arsenals. Shortly after the outbreak of the Civil War he entered the Confederate service as a brigadier general and was soon promoted to be a major general, in which capacity he commanded a division in the Seven Days' Battles against McClellan, but was relieved from his command for his failure to intercept the Federal army after the battle of Malvern Hill. He subsequently served in the ordnance department in the Trans-Mississippi District.

HUGER, ISAAC (1742–97). An American soldier in the Revolution, born on Limerick Plantation, S. C., of French-Huguenot ancestry. He was educated in France, and on his return to America served in 1760 as a lieutenant of a volunteer militia company in a campaign against the Cherokees. With his four brothers he entered enthusiastically into the Revolutionary movement. He served first as colonel in the South Carolina militia organization and in January, 1779, was commissioned brigadier general in the Continental army. He took part in all the campaigns in the South, was especially relied upon by General Greene, to whom he was second in command, in his North Carolina campaign against Cornwallis in the early months of 1781, and was wounded at the battle of Guilford Court House.

HUG'GINS, SIR WILLIAM (1824–1910). An English astronomer, born in London. He devoted himself to the study of astronomy and in 1856 built an observatory at his residence in Upper Tulse Hill, London, in which he mounted a telescope of 8-inch aperture and made careful drawings of Mars, Jupiter, and Saturn. His attention was first engaged in observations on double stars, but afterward he took up spectrum analysis. His first discovery in this line was presented to the Royal Society in a paper on the "Lines of Some of the Fixed Stars." He found also that some of the nebulæ gave a spectrum of a few bright lines only, which showed that the light had emanated from heated matter in the state of gas, and, further, that one of the principal constituents of the gaseous nebulæ is hydrogen. He concluded, therefore, that the nebulæ are not simply clusters of stars too distant to be separately distinguished, but relics of the mass of glowing gas from which the solar system is supposed to have been formed by condensation. (See NEBULÆ.) He also examined the spectra of comets and found that part of the light of these objects is different

from the solar light. He also proved the existence of carbon in comets. Huggins was the first to apply Doppler's principle (q.v.) to the measurement of stellar velocities towards the solar system or away from it. See ASTROPHYSICS.

He also made innovations along other lines. He introduced spectroscopic photography into astronomy, which, however, was of limited use till about 1875, when the invention of the gelatin dry plate enabled the astronomer by long exposure to accumulate sufficient amount of light to obtain good pictures of celestial objects, too faint to be seen even with the most powerful telescope. Huggins also invented a spectroscopic method for studying the red prominences of the sun and proved, through a laboratory experiment, the existence of calcium in the solar prominences and chromosphere. In all his various researches Huggins was ably assisted by his wife (née Margaret Lindsay), herself a scientist of distinction. In recognition of his services to science a number of honors were bestowed upon Huggins by various scientific bodies. He was president of the Royal Astronomical Society from 1876 to 1878, of the British Association for the Advancement of Science in 1891. He was president of the Royal Society from 1900 to 1905 and at different times received the Royal, the Copley, and the Rumford medals. Besides a number of original papers he published, jointly with Lady Huggins, *An Atlas of Representative Stellar Spectra* (London, 1899), which received the Actonian prize of the Royal Institution.

HUGH, hū (?–947). King of Provence and Italy. He was the son of Lothair, Count of Arles, and after the death of Louis the Blind (923) became ruler of Provence. In 926 he was crowned King of Italy at Pavia by the subjects of Rudolph, who were in revolt. His attempts to make himself Emperor involved him in constant war. Lombardy was invaded by the Hungarians, and an Italian rival, Berengar, finally drove him out of Italy.

HUGH, SAINT (c.1135–1200). Bishop of Lincoln. He was born at Avalon, near Pontcharra, Burgundy, on the border of Savoy, about 1135. His father was Lord of Avalon, but renounced the world when Hugh was eight years old and took his son with him into a monastery near Grenoble. In 1160 Hugh became a Carthusian monk at the Grand Chartreuse and won such high repute that he was called in 1175 by Henry II of England to put in order a monastery of the order at Witham, Somerset. His great success led to his election as Bishop of Lincoln in 1186. His moral courage made him fearless in resisting unjust demands from King or peasant, and his charity, which was boundless, endeared him to the people. So while he lived he was held in universal esteem, and when he died in London, Nov. 16, 1200, he was not forgotten, and his tomb in Lincoln Cathedral became a place of pilgrimage. He is reverenced in the Carthusian Order next to St. Bruno. His day is November 17. Consult his life, in Latin edited by Dimock (London, 1864), in English by Perry (ib., 1879), Thurston (ib., 1898), Bramley, in connection with memorial sermons on the seven-hundredth anniversary of his death (Lincoln, 1901), and by Charles Marson (London, 1901).

HUGH CAPET, hū kā′pĕt, Fr. **HUGUES CAPET,** ụg kȧ′pȧ′ (c.939–996). King of France from 987 to 996. He was a son of Hugh the Great, Count of Paris, and Hedwig, a sister of Otho the Great of Germany. Hugh Capet succeeded his father as Count of Paris in 956 and became thereby the real ruler of the country, though the title of King still belonged to the Carolingians. When, in 987, Louis V, the last Carolingian King of France, died without heirs, Charles, Duke of Lorraine, claimed the throne by descent, but at a meeting of the nobles and prelates of the realm at Senlis it was declared that the crown was elective, and thereupon Hugh was chosen, and became the founder of the Capetian dynasty (q.v.). Charles of Lorraine was easily defeated in the contest which ensued. In 988 he had his son Robert elected and crowned as his successor.

HUGHENDEN, hū′en-den (*Hitchendon*). A parish of Buckinghamshire, England, among the Chiltern Hills, 2 miles north of High Wycombe. It is noted for Hughenden Manor, long the residence of Benjamin Disraeli, Earl of Beaconsfield. Earl and Lady Beaconsfield are buried in the parish church, which contains a monument erected by Queen Victoria to the statesman's memory. Pop., 1901, 1728; 1911, 2134.

HUGHES, hūz, BALL (1806–68). An American sculptor, resident for some years in New York, later in Boston. He was born in London, studied with Edward H. Bailey, and won several prizes at the Royal Academy. In 1829 he came to America and modeled a marble statue of Alexander Hamilton that was destroyed with the Merchants' Exchange in the New York fire of 1835. He modeled also the high relief of Bishop Hobart in Trinity Church, New York, and the bronze statue of Nathaniel Bowditch in Mount Auburn Cemetery, Cambridge, Mass.

HUGHES, CHARLES EVANS (1862–). An American lawyer, public official, and jurist. He was born at Glens Falls, N. Y., April 11, 1862, a son of the Rev. David Charles Hughes; entered Madison (now Colgate) University at the age of 14 and remained there two years; graduated from Brown University in 1881; taught school for a year; and, having graduated with high honors from Columbia Law School (1884), was admitted to the New York bar. On Dec. 5, 1888, Mr. Hughes married Miss Antoinette Carter, and during the same year became a member of the law firm of Carter and Cravath, which he rejoined after two years (1891–93) as professor of law in Cornell University. In 1905 he was attorney for the Armstrong Committee appointed by the New York Legislature to investigate the financial administration of the great life-insurance companies chartered by the State and having their headquarters in New York City. His skill in uncovering the methods of these companies aroused public opinion and resulted in radical reforms. Nominated mayor of the city of New York by the Republican party in 1905, he declined to be a candidate, because of his unfinished task as counsel for the Armstrong Committee. He was nominated for Governor of New York by the Republican party in 1906 and was elected, defeating W. R. Hearst by about 60,000 votes. In 1908 he was the choice of a majority of the New York delegates to the Republican National Convention for the presidential nomination; in the same year he was reëlected Governor of New York.

Governor Hughes's administration was an unceasing fight for reform. In his first message to

the Legislature he recommended (1) a public service commission law, (2) extension of the Corrupt Practices Act, (3) the Massachusetts ballot, (4) direct primaries, (5) laws for the protection of women and children in factories, (6) pure election laws. The Public Service Commission Law was passed, and the suggestion for labor laws was carried out, but the remainder of the programme was defeated by a hostile Legislature. The first drawn fight between Governor Hughes and the Legislature came over the Direct Primary Bill. After a long struggle the measure was defeated. The Governor carried the matter before the people of the State in several public addresses and called an extraordinary session for a reconsideration of the bill, but it was again defeated. Public opinion was aroused by the contest, however, and the law was finally passed, together with the Short Ballot Act, under the administration of Governor Glynn in 1913. In his annual message of 1908 Governor Hughes recommended that the statute relating to pool selling and bookmaking on race tracks be amended in accordance with the constitution of the State, so as to place these practices upon an equality with other forms of gambling. After a hard contest this measure became a law, and the race tracks were closed. On the whole the administration of Governor Hughes was impartial and progressive and won the approval of a majority of the people of the State. He resigned, Oct. 6, 1910, to become an associate justice of the United States Supreme Court by appointment of President Taft. In 1916 he resigned from the Supreme Court and was an unsuccessful candidate for the Presidency against Woodrow Wilson. In 1921 he was appointed Secretary of State by President Harding.

HUGHES, David Edward (1831–1900). An English-American inventor. He was born in London, but was early brought by his parents to the United States, where he subsequently received his education at Bardstown College, Kentucky. In 1850 he was made professor of music and later of natural philosophy at that college. In 1855 he took out a patent for his first important invention—the printing telegraph, which bears his name. After his telegraph was adopted in the United States, he went to Europe (1857), where the instrument was successively adopted by France, Italy, England, Russia, Germany, Austria, Turkey, Holland, Belgium, Switzerland, and Spain. Among his other inventions and discoveries may be mentioned the microphone (1878) and the induction balance (1879). His publications comprise a number of papers on electricity and magnetism.

HUGHES, Edwin Holt (1866–). An American Methodist Episcopal bishop and educator, born at Moundsville, W. Va. He graduated from Ohio Wesleyan University in 1889 and from the Boston School of Theology in 1892 and was pastor at Newton Centre and Malden, Mass., until 1903. In this year he was chosen president of De Pauw University—a post he held until 1908, when he was elected Bishop. In 1904 he was president of the State Teachers' Association of Indiana. He published: *Letters on Evangelism* (New York, 1906); *Thanksgiving Sermons* (ib., 1909); *The Teaching of Citizenship* (ib., 1909).

HUGHES, Hugh Price (1847–1902). A British Wesleyan minister. He was born at Carmarthen, South Wales, and was educated at University College, London, and the theological school in Richmond, Surrey. After occupying pulpits in Dover, Oxford, and London, he became superintendent of the West London Mission and editor of the *Methodist Times* (1885). His publications include: *Social Christianity* (1889); *The Atheist Shoemaker* (1889); *The Philanthropy of God* (1890); *Ethical Christianity* (1892). Consult: *Hugh Price Hughes as we Knew him* (London, 1902); *The Life of Hugh Price Hughes*, by his daughter (3d ed., New York, 1904); Walters, *Hugh Price Hughes, Pioneer and Reformer* (London, 1907).

HUGHES, John (1797–1864). An American prelate, first Archbishop of New York, born in Annaloghan, County Tyrone, Ireland. His parents were poor and could give him little schooling, but he gave his spare time to study. In 1816 his father came to America, and he followed in 1817 and worked as a day laborer in Maryland and Pennsylvania for three years, until he gained admission to the Roman Catholic College of Mount St. Mary, Emmitsburg, Md. There he earned distinction as a debater and also as a collector of funds for the rebuilding of the college after it was burned down. He was ordained a priest in 1826, and the same year the first of his controversial pamphlets was published, *An Answer to Nine Objections Made by an Anonymous Writer against the Catholic Religion.* After being assistant at the church of St. Augustine, Philadelphia, he went to Bedford, Pa., thence returned to Philadelphia (1827), to take charge of St. Joseph's Church, afterward took charge of St. Mary's, and was the founder of St. John's Orphan Asylum (1829). From 1833 to 1835 he published in the *Catholic Herald* his replies to Dr. Breckenridge, a Presbyterian critic of Catholicism. In 1838 he was appointed coadjutor of the Bishop of New York, four years afterward became Bishop himself, and continued his controversies upon educational, political, and religious affairs, in which his oratorical powers exerted a potent influence. One of Bishop Hughes's first undertakings was the establishment of a short-lived theological seminary at Lafargeville, Jefferson County, which was reopened at Fordham under the name of St. John's College in 1841. In 1850 he was made Archbishop, and in 1861 was sent on a special embassy to gain the friendship of France for the North in the Civil War, extending his influence in the same cause both to Ireland and Italy. He was a loyal American and a statesmanlike prelate. Two volumes of his writings, edited by Lawrence Kehoe, were published in 1865 after his death. Consult: J. R. G. Hassard, *Life of John Hughes* (New York, 1866); H. A. Brann, *John Hughes* (ib., 1892), in the "Makers of America Series"; Smith, *History of the Catholic Church in New York*, vol. i (ib., 1905); J. M. Farley, *History of St. Patrick's Cathedral* (ib., 1908).

HUGHES, Rupert (1872–). An American writer. He was born at Lancaster, Mo., and graduated from Adelbert College (Western Reserve University) in 1892 and from Yale University (A.M.) in 1899; held assistant editorships on *Godey's Magazine*, *Current Literature*, and the *Criterion;* and from 1901 to 1905 served on the staff of the *Encyclopædia Britannica* in London and in New York. He is author of various juveniles; *American Composers* (1900); *Zal* (1905); *Excuse Me* (1911), successfully dramatized; *The Old Nest* (1912); *The Amiable*

Crimes of Dirk Memling (1913); *What Will People Say?* (1914), a satire on New York life; and he also wrote a number of plays.

HUGHES, Samuel (1853–1921). A Canadian statesman and soldier. He was born at Darlington, Ontario, and was educated at the Toronto Normal School, at Toronto University, and at the Royal Military School. For several years he was a public-school teacher. In 1875–85 he was lecturer on the English language and literature in the Toronto Collegiate Institute and in the latter year took up newspaper work and until 1897 was editor and owner of the Lindsay *Warder*. He early entered the volunteer militia and in 1897 became lieutenant colonel in command of the Forty-fifth Regiment. In 1897–98 he visited Australia and New Zealand in the interest of colonial assistance in Imperial wars, and upon the outbreak of the South African War (q.v.) served therein (1899–1900) in the intelligence and transportation departments, his name being several times mentioned in dispatches. In 1900 he was appointed assistant adjutant general of the South African field forces. In 1902 he was promoted colonel. In 1891 he was an unsuccessful Conservative candidate for the House of Commons, but in the following year was successful. On the defeat of the Laurier administration in 1911 he became Minister of Militia in the Borden cabinet. In 1912 he instituted a Military Transport Board. Upon the outbreak of the European War, in 1914, he was foremost in organizing Canadian troops for the assistance of Britain. The first contingent of 33,000 was, in September–October of that year, assembled and sent on transports, convoyed by British warships, to different English ports; and another contingent of 20,000 was sent in the early part of 1915. Hughes was also active in the movement which resulted in a further increase of about 50,000 to the Canadian armed force, nearly all of the latter number being retained for home defense. (See War in Europe.) He visited England in October, 1914, and was made major general.

HUGHES, Thomas (1822–96). An English author and politician, second son of John Hughes, of Donington Priory, Newbury, Berkshire, born at Uffington, Berks. He was educated at Rugby under the celebrated Dr. Arnold, graduated B.A. from Oriel College, Oxford, in 1845, was called to the bar in 1848, and became a member of the chancery bar. In 1857 he gave to the world *Tom Brown's School Days*—a picture of public-school life, evidently written from the author's own personal experience, and recording the vivid and enduring impressions he brought with him from Rugby. It remains the best story of schoolboy life in the language. It was followed, in 1859, by *The Scouring of the White Horse;* in 1861, by *Tom Brown at Oxford*, in which the mental history of his hero is continued, with sketches of college life and incidents; and in 1869, by *Alfred the Great.* Hughes pursued meanwhile the study and practice of the law, and was appointed queen's counsel in 1869. He was active in founding the Workingmen's College, Great Ormond Street, of which he was principal from 1872 to 1883. He gained the confidence and good will of the working classes by endeavoring to promote a better understanding between masters and men and by teaching the latter the value of coöperation as a means of social elevation. At the general election for Lambeth in 1865 he was placed at the head of the poll, the workingmen being especially enthusiastic in securing his return. In 1868 he was returned for Frome, which he continued to represent till 1874, and always took a prominent part in debates relating to the combinations of trade-unions and the amendment of the law of master and servant. In 1880 he took a leading part in the socialistic settlement at Rugby, Tenn. Hughes also wrote *Memoir of a Brother* (1873), *Vacation Rambles* (1895), and several other works.

HUGHES, William (1872–1918). An American legislator. He was born in Ireland, but coming early to the United States, was educated in the public schools and engaged in business. In 1898 he served with the Second New Jersey Volunteers in the Spanish-American War. He was admitted to the bar in 1900 and thereafter engaged in practice at Paterson, N. J. He was a Democratic member of the Fifty-eighth (1903–05) and the Sixtieth, Sixty-first, and Sixty-second congresses (1907–13), and was elected to the United States Senate from New Jersey for the term 1913–19.

HUGH OF LINCOLN, lĭn'kon, Saint. A boy who is the hero of a mediæval legend. The story is told variously in the chronicles and ballads. According to one version, 24 boys were playing ball. St. Hugh of Lincoln, who kicked the ball through the window of a Jew, was enticed into the castle by the Jew's daughter, murdered, and thrown into a well, from which he addressed his mother miraculously and thus disclosed the crime. The story, based upon the belief that the Jews murdered Christian children, is found throughout the popular literature of mediæval Europe. It received the highest artistic treatment in Chaucer's *Prioress's Tale.* Consult Child, *English and Scottish Popular Ballads,* part v (Boston, 1888).

HUGH OF LUSIGNAN, lu'zē'nyän'. The name of several counts of La Marche, of whom the best known is Hugh X, born before 1190; Count after the death of Hugh IX, who died at Damietta in 1219. King John of England had robbed his father of his fiancée, Isabella of Angoulême. After John's death Hugh X married Isabella, who was the mother of Henry III and styled herself Countess-Queen. During the minority of Louis IX he was one of the leading nobles who revolted against the Regent, Blanche of Castile, but was compelled to submit. In 1241 he insulted his overlord, the brother of St. Louis. The latter subdued him, but pardoned him. He took the cross in 1245, but it is not known whether he went on the crusade. The date of his death is uncertain, but his will was dated Aug. 1–8, 1248. Consult *Bibliothèque de l'Ecole des Chartes*, vol. xvii (Paris, 1856).

HUGH THE GREAT (?–956). Count of Paris (called also The White). On the death in 923 of his father, Robert I, who had been elected King of France in opposition to Charles the Simple, he could have taken the title of King, but instead permitted it to go to his brother-in-law, Rudolph of Burgundy. He took the same course after the death, in 936, of Rudolph, who was succeeded by Louis d'Outre Mer, a young son of Charles the Simple. Meanwhile Hugh had assumed large estates, and, as Louis proved anything but a docile King, Hugh was forced to seek the assistance of his brother-in-law, Otho the Great of Germany, in the war that ensued. The King was captured and released after giving up to his conqueror the city

of Laon. Louis immediately renewed the struggle, and this time was victorious. Peace was proclaimed in 950. Four years afterward Hugh again had the opportunity to make himself King, on Louis's death (954), but he favored the election of Lothair and in reward for his services was invested with the duchy of Aquitaine. It was his son, Hugh Capet, who ascended the throne 30 years later. Consult Lavisse, *Histoire de France*, vol. ii, part i (Paris, 1903).

HUGH THE GREAT (1057–1101). Count of Vermandois, the second son of Henry I of France. He joined the First Crusade (1096) and continued with the army until after the capture of Antioch, in 1098. He was then sent by the leaders on an embassy to the Emperor at Constantinople. From there he returned to Europe. Later he joined the Crusade of 1101 and died near Tarsus. There seems to have been no reason for his being called "The Great," except that the Latin chroniclers so translated the French word *Maines*, meaning 'the younger.' Consult Hagenmeyer, *Anonymi Gesta Francorum* (Heidelberg, 1890).

HUGLI, or **HOOGLY**, hōōg'lĭ. The westernmost and principal deltaic channel of the Ganges, British India, formed by the junction of the Bhagirathi, the Jalangi, and the Churni —known as the Nadiya rivers. It is 125 miles long, the estuary, as far as Saugor Roads, measuring 35 miles more. It is the most available for navigation of all the channels by which the Ganges reaches the sea and is commercially the most important. In the dry season the tide is felt as high as Chandernagar, 17 miles above Calcutta. During the southwest monsoon the Hugli is subject to a bore 7 feet high, often ascending at the rate of 22 miles an hour. Ships drawing 26 feet of water can ascend to the port of Calcutta. The entrance of the river is much encumbered with shoals, and dredgers are constantly employed in maintaining a clear channel. The river above Calcutta is not regulated and is no longer navigable because of silting.

HUGLI, or **HOOGLY**. A city and river port of Bengal, British India, capital of a district of the same name, on the right or west bank of the river Hugli, 24 miles north of Calcutta (Map: India, F 4). The city was founded by the Portuguese in 1537. Chinsura (q.v.), which now forms a part of it, was founded by the Dutch. Its educational institutions include Hugli College, a Mohammedan college, and several high schools. It is also the seat of an extensive military cantonment. Its chief products are jute bagging, bags, and oil; but both population and trade have declined rapidly. Pop., 1901, 29,383.

HUGO, hū'gō. A city and the county seat of Choctaw Co., Okla., 125 miles northeast of Dallas, Tex., on the St. Louis and San Francisco Railroad and on the Kiamichi River (Map: Oklahoma, F 4). It has railroad repair shops, cotton gins and compresses, cottonseed-oil, saw, and planing mills, a handle factory, and creosote works. Hugo was founded in October, 1901, and is governed by a mayor and eight aldermen. The water works are owned by the city. Pop., 1900, 2676; 1910, 4582.

HUGO, hōō'gō, GUSTAV VON (1764–1844). A German jurist, born at Lörrach, Baden, and educated in law at Göttingen. After acting as tutor to the Prince of Anhalt-Dessau (1786), he became professor of law at Göttingen (1788). In 1819 he was made Privy Councilor. He made important investigations of the sources of Roman law. He was, together with Savigny and Haubold, one of the founders of the historical method in jurisprudence. He edited *Ulpiani Fragmenta* (1788); translated Gibbon's chapter on Roman law as *Uebersicht des römischen Rechts* (1789), *Pauli Sententiæ Receptæ* (1796), and *Jus Civile Ante-Justinianum* (1815). But his most important labor was his own book, *Lehrbuch eines civilistischen Kursus* (7 vols., 1792–1821), and his *Civilistisches Magazin* (1790–1837), with its supplement, *Beiträge zur civilistischen Bücherkenntnis der letzten vierzig Jahre* (1828–45). Consult Eyssenhardt, *Zur Erinnerung an Gustav Hugo* (Berlin, 1845).

HUGO, ü'gō', *Fr. pron.* ụ'gō', VICTOR MARIE (1802–85). The greatest French poet of his century, a distinguished dramatist, novelist, essayist, and politician. His first volume appeared in 1822. For nearly two-thirds of the century he was a leader in French literature, for the greater part of that time preëminently the leader. He represents the supreme reach of an individualistic and Romantic movement. Besançon, his birthplace, had once been a Spanish city—a significant fact, for his work often shows Spanish influence. His father was a distinguished officer of the Republic and Empire, his mother the daughter of a sea captain of Nantes, of Royalist and Catholic sympathies. With her the child lived in Paris till 1811, when General Hugo summoned his family to join him in Madrid, whence he was constrained to send them back in 1812, as King Joseph's cause was growing desperate. The impressions of this year left deep marks on many of Victor's works, notably *Bug Jargal*, *Hernani*, *Ruy Blas*, and *Torquemada*. Afterward, until the fall of the Empire, he was once more with his mother in Paris in the abandoned convent of Les Feuillantines, which appears prominently in *Les misérables*. Set at technological studies by his father, he aspired at 14 "to be Chateaubriand or nothing," wrote a Miltonic *Déluge*, and planned dramas, epics, and operas. At 15 he competed for an academic prize, winning honorable mention and some minor literary patronage. Two years later (1819) he won three prizes at the poetic competition (*Jeux floraux*) of Toulouse. In the same year he founded a fortnightly literary journal, *Le Conservateur Littéraire*, the failure of which, with the withdrawal of his allowance from his father, reduced him to a poverty that gave materials for the Marius episodes in *Les misérables*. It was in the *Conservateur* that he wrote the first draft of the novel *Bug Jargal*, a story of Haiti, of great promise and weird power. *Bug Jargal* appeared in its final form in 1826. It was enlarged especially by the introduction of the dwarf Habibrah, whose dramatic death is imitated later in that of Claude Frollo, in *Notre-Dame*. His brother, Abel, generously helped him to print *Odes et poésies diverses* (1822), which paid him 700 francs and caused King Louis XVIII to grant him a pension of 1500 francs, increased later to 3000. On the strength of this he married (October, 1822) and thereafter enjoyed a happy domestic life. These verses, in their brilliant rhetoric and richness of rhythmic melody, had been approached in that generation only by Lamartine's *Méditations*. They show an ardent royalism, a per-

VICTOR HUGO

FROM A PHOTOGRAPH

functory and sonorous religiosity, and an intense political passion, on which Napoleon was already beginning to exercise a fascination that declared itself openly in the superb *Ode on the Vendôme Column* (1827).

The next few years were occupied with an extravagantly Romantic novel, *Han d'Islande* (1823), and with literary journalism. From July, 1823, to June, 1824, appeared *La Muse Française*, the organ of the First Cénacle (q.v.). In 1826 appeared *Nouvelles odes et ballades*, whose preface was a sort of literary manifesto of romanticism and of the First Cénacle. Versification and rhythm here begin to show an aggressive individuality, and several poems indicate that sympathetic study of the mediæval mind which is associated with French romanticism. Hugo was recognized as the Romantic leader and asserted and confirmed that position by *Cromwell* (1827). As early as 1826 the Odéon Theatre had offered hospitality to an English company, in which were Charles Kemble and Miss Smithson. This company played *Othello*, *Romeo and Juliet*, and *Hamlet*, all of which were enthusiastically greeted by the new French school. Indeed, Kemble and his companions did not leave the Odéon till July, 1828. *Cromwell* begins with an elaborate preface full of dramaturgic observations, more opportune than new; but they now became the rallying point of a school who thought "the drama the only complete poetry of our time, the only poetry with a national character." This school demanded for the drama an unconventional vocabulary and a mingling of tragic and comic, to show more fully the irony of destiny, thus unconsciously following Diderot (q.v.), while attempting to follow nature. In all Hugo's dramas the lyric element tends to delay the dramatic effect. *Hernani* and *Ruy Blas* alone are still played in France.

Cromwell was followed by a drama taken from Scott's *Kenilworth—Amy Robsart* (1829), a failure—and *Marion Delorme*, which the censorship forbade the stage till 1831. In January, 1829, appeared a volume in prose, *Le dernier jour d'un condamné*, which recounts the mental agony of a man on the eve of his execution and is a plea for the abolition of capital punishment. In the same year Hugo published *Les orientales*, a collection of poems containing some of the most striking pieces of metrical art in the world. They were followed by the long-contested triumph of *Hernani* and of romanticism on the French stage (1830), after Hugo had vainly tried to bring about the performance of *Marion Delorme*. For nearly 100 days, from February 26 to June 5, the battle raged nightly at the Théâtre Français, but no further organized effort was made to resist the retrograde evolution of the Romantic drama till it collapsed with Hugo's *Les Burgraves* in 1843. The situation in *Hernani* is strained and dramatically unreal, the sentiment is mawkish, the oratory grandiloquent; but a throbbing life and intensely expressed emotion maintain the interest, though this is a lyric rather than a dramatic one. The same qualities and the same defects, with more strained antithesis of grotesque and sublime, tragic and comic, foul and fair, characterize *Marion Delorme* (1831). They characterize also *Le roi s'amuse* (1832); the prose dramas, *Lucrèce Borgia* (1833), *Marie Tudor* (1833), *Angelo, tyran de Padoue* (1835). They reach their height in *Ruy Blas* (1838) and become most conspicuous in *Les Burgraves* (1843). Hugo's conceptions were too grandiose to be reconcilable with the limitations of the drama. He gave up the effort and turned to politics. But these 16 mainly dramatic years had produced work of great value in other fields —the novel *Notre-Dame de Paris* (1831), with its Gothic intensity of pathos and its marvelous reproduction of the Paris of Louis XI; the quixotic but eloquent *Claude Gueux* (1834), a plea against capital punishment; the *Feuilles d'automne* (1831), *Chants du crépuscule* (1835), *Voix intérieures* (1837), *Les rayons et les ombres* (1840)—four collections of poems that show growing democratic sympathies and satiric power, a deepening communion with nature, and a generous warmth of universal sympathy, a little shallow in its breadth, that was to give the keynote to his political activity of the next decade.

The 10 years from 1843 to 1853, from *Les Burgraves* to *Les châtiments*, count no literary work of import, but they mark a vital change in the mind of Hugo that affects all the work to follow. Till 1843 drama had taken the first place. From 1853 fiction becomes more prominent, poetry intermittent, with occasional political writings. Hugo sees that his power is essentially lyric and gives this a dominant place even in prose fiction. Through all there is a new earnestness, born in part of the death of his daughter, Leopoldine, and her young husband (1843), in part of a vague yet intense enthusiasm for the Socialistic ideas of Fourier and Proudhon which drew him into a political whirlpool and made him a revolutionary member of the Constituent Assembly of 1848. As a practical politician, then and always, Hugo was a failure. He favored the ambition of Louis Napoleon till Louis ceased to favor his own advancement; he was an advocate of several hopelessly unpractical schemes, and an unconscious convert to the caressing flattery of Emile de Girardin. Napoleon's coup d'état of 1851 saved Hugo from himself. It made a martyr and hero out of a visionary who was distrusted as a turncoat. In his eloquent *Histoire d'un crime* (finished in 1852 and published in 1877), he shows unconsciously how his efforts to organize resistance to the usurper were distrusted by his fellow Republicans. He fled to Brussels, whence he was urgently requested to move on to England, and resided first in Jersey, then in Guernsey, as near France as possible, consistently scorning every offer of amnesty till the collapse of the Second Empire brought him back to share the darkest days of the Terrible Year (1870–71).

These years of exile steeled his mind, and his genius was fired by what seemed his country's shame. In 1852 appeared the fierce and scurrilous *Napoléon le Petit*, a foretaste of *Les châtiments* (1853) in which the satiric unites with the lyric genius to produce a classic that will survive for generations the Empire that fired Hugo to a white heat. To calmer hours we owe *Les contemplations* (1856), a collection of lyrics closing in a noble strain, and the first of four volumes of *La légende des siècles* (1859, 1877, 1883), the high-water mark of his achievement in lyrical epic. In 1862 the long-heralded *Les misérables* appeared on the same day in 10 languages—an event till then unparalleled in the annals of letters. The 10 volumes of this vast romance reveal Hugo no longer, as in

Notre-Dame, an evoker of the past, but with eyes on the present and heart in the future. It lacks continuity and proportion. It is a chaos of eloquent special pleading, political reminiscences, Socialistic prophecies, bad psychology, grotesque situations, false pathos, and descriptions wonderfully vivid and absorbing. In the hurly-burly of this lyric-epic novel we find most of the virtues and all the intellectual vices of Hugo. Its value lies, not in its thought, but in its emotion, its lyric cry, and its epic power of description. On the development of fiction it had no influence, for it belonged to a type already outworn. The same may be said of *Les travailleurs de la mer* (1866), in which the descriptions are superb and the subject petty. *L'Homme qui rit* (1869), an historical phantasmagoria of the English court of Queen Anne and an unmitigated failure, closes the fiction of the exile. Meanwhile Hugo's poetic muse had had her Indian summer in *Chansons des rues et des bois* (1865). But as the Empire tottered to its fall, his inauspicious interest in politics became once more dominant. He wrote much for *Le Rappel*, a radical journal, founded by his sons and son-in-law, but revealed once more, in 1870, the hopelessly unpractical nature of his political ideas, alike as a prophet of the people and as a member of the National Assembly at Bordeaux in 1871. He resigned his seat in March and went to Brussels, where he barely escaped being mobbed, owing to his defense of the Paris Commune. He was expelled from Belgium and soon after returned to Paris. Here he failed signally in the elections of 1872, though he was elected life senator in 1876. But if he might not be a tribune, he was already the poet laureate of the Third Republic. Of *Les châtiments* 100,000 copies were sold within a year, several plays, notably *Ruy Blas*, were revived with success, and he rose to the new occasion in *L'Année terrible* (1872), a noble volume of patriotic verse that made a French critic exclaim, with just pride, that Germany had no such poet to sing her victory as France to glorify even her disaster.

Hugo was now past 70, but it is too early to speak of his decline. He could pose as old, indeed, in the poems of *L'Art d'être grandpère* (1877); but *Quatre-vingt-treize* (1874) is the most virile of his novels, with more intensity of action and a truer tragic catastrophe than *Notre-Dame* or *Les misérables*, though by no means without their faults and its own. The second part of *La légende des siècles*, if inferior to the first, is still grand; there are passages of primary quality in *Les quatre vents de l'esprit* (1881), *La pitié suprême*, and even in the *Philosophic Poems* (*Le pape, Religions et religion, L'Ane*, 1878–80); the drama *Torquemada* (1882) is vigorous at least by starts, and in the posthumous volumes (*Le théâtre en liberté, La fin de Satan, Toute la lyre*) one comes constantly on verses that bear his unmistakable mint stamp.

He died in Paris, May 22, 1885. His great age, reaching out into a new generation from an epoch that had passed away and was indeed more foreign to that day than to our own, could not but impress popular imagination, the more so as his talent, his manner, and his personal physique had something of the monumental and grandiose. Thus his death stirred an unparalleled wave of popular feeling. His body lay in state beneath the Arc de Triomphe. His funeral became a pageant that royalty might envy and could not equal. The relics of St. Geneviève, the patron saint of Paris, were removed from the Pantheon that it might receive the popular hero.

Despite his own belief, Victor Hugo had no new or deep theories of life. He was the confidant of his century, "the sonorous echo in the middle of things." Personally he was vain and rather ignorant, if we compare his knowledge with his pretensions. But he is Olympian in his defects—Zeus, Apollo, and Hephæstus turned into one. His convictions are not important. He thinks to proclaim an oracle and reiterates a commonplace. But he is perhaps the greatest compeller and gatherer of words, the greatest master of language, that we know; a great writer rather than a great author and therefore the more sure of an enduring democratic fame. He has formed the rhetorical and poetic taste of three generations of French youth. All schools of French verse that have arisen in the last half century have united to call him their father.

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HUGO OF FLAVIGNY, flà'vē'nyē' (1064–c.1140). A Franco-German monk and scholar, born in Verdun. He was educated in the monastery of St. Vannes, becoming a Benedictine monk, and afterward went to Dijon, where about 1090 he began his *Chronicle*. In 1095 he went to England and a year later became abbot of Flavigny. He was obliged to leave his abbey in 1099 and, though reinstated in 1100, was again forced to leave it by the hostility of Norgaud, Bishop of Autun, and retired to Verdun. His *Chronicle* is of value for its ac-

count of the last years of the eleventh century and extends from the birth of Christ to 1102. The original manuscript was in the possession of the late Sir Thomas Phillipps, the antiquary, and was one of the great Meerman collection before he bought it. It was published by P. Labbe in *Bibliotheca Manuscriptorum Nova* and in the *Monumenta Germaniæ Historica*.

HUGO OF SAINT-VICTOR (1096–1141). A French monk, mystic, and theologian, born in Saxony or Flanders. He was educated in the monastery of Hamerleve in Saxony and became monk in the abbey of Saint-Victor, near Paris. Until the middle of the thirteenth century his works were very popular. In his treatment of most of the general questions of theology he kept to the beaten path, but his views on psychological questions were original. There has been much discussion as to the authenticity of certain writings attributed to him. In *Les œuvres de Hugues de Saint-Victor* (1886) M. Hauréau gives a list of those about which there seems little doubt and disregards many heretofore considered his. Hugo's most famous book is *De Sacramentis Christianæ Fidei.* An excellent edition of his works was published at Venice in 1588.

HUGO VAN DER GOES, hū'gō văn dẽr gōōs (?–1482). An eminent painter of the early Netherlands school. He was probably of Dutch origin, born at Goes (Zeeland), whence his name. Very little is known of any but the last few years of his life. The assumption that he was a pupil of Jan van Eyck is impossible for chronological reasons, and, although he was influenced by that master's work, his art more nearly resembles that of Dirk Bouts; for he probably received his earliest training in Holland. He practiced chiefly at Ghent, where his name is first inscribed in the painters' guild in 1467. During the following year he took part in the decorations for the festivities which marked the marriage of Charles the Bold to Margaret of York at Bruges. In 1468–69 his name is twice mentioned as a decorator in the services of the city of Ghent, where he was dean of the painters' guild from Christmas, 1473, to 1475. Soon afterward he retired to the priory of Roedendal, near Brussels, of which his brother Nicolas was also an inmate, and where he died in 1482. The most celebrated of his works at Ghent was a decoration painted in oil on the wall of a patrician's house, representing the story of Abigail. It survives in several copies, the best being in the Novak Gallery, Prague. According to the legend the fair Abigail of the painting was his fiancée, while David was the painter himself, and it was the loss of this lady which led him to enter the convent. A fellow novice has recorded in the cloister chronicle the story of Brother Hugo's last years. Many illustrious visitors, including the Archduke Maximilian, came to the convent to see his pictures or to be portrayed by him, and Hugo was permitted to frequent the guest chamber and join in their feasts, at which he indulged too freely in wine. He was subject to frequent attacks of melancholy, particularly regarding his painting. While returning from a pilgrimage to Cologne made some time after taking the vow, he was stricken with a mental malady which caused him to imagine himself a son of perdition. He did not recover his reason until shortly before his death, in 1482.

By far the most important of his surviving works is the Portinari altarpiece, painted about 1476 for Tommaso Portinari, agent for the Medici at Bruges. The central panel represents the Madonna adoring the Christ Child, attended by wonderfully realistic shepherds and delightful angels; the left wing, Tommaso and his two sons under the protection of their patron saints, Anthony and Matthew; the right wing, his wife and daughter with Saints Margaret and Mary Magdalen. For 400 years the altarpiece hung in the hospital of Santa Maria Maggiore, Florence, until it was purchased in 1898 for 900,000 francs by the Italian government and placed in the Uffizi Gallery. It exercised a strong influence upon Italian painting of the later fifteenth century, particularly upon Ghirlandaio and Lorenzo de' Credi. Among the few other paintings which can with certainty be ascribed to Van der Goes is a small triptych the panels of which, now separated, are in the Imperial Gallery, Vienna. One of these represents the "Fall of Man," in which the nude is treated with greater freedom than had previously been done; the others are the "Bewailing of Christ" and "St. Genevieve." The "Death of the Virgin," in the Town Hall of Bruges, probably belongs to his later period. Hugo van der Goes was the most important painter of the generation following the Van Eycks. His works are characterized by ambitious design and by an attractive realism, less monumental but more intimate than that of the Van Eycks. His treatment of light and shade, as seen in the Portinari altarpiece, foreshadows that of the great Dutch masters of the sixteenth and seventeenth centuries, and his landscapes are particularly good. Consult: Wanters, *Hugues van der Goes* (Brussels, 1872); Voll, *Die altniederländische Malerei* (Leipzig, 1906); Fierens-Gevaert, *Les primitifs flamands*, vol. ii (Brussels, 1909).

HUGUENOTS, hū'gẽ-nŏts, *Fr. pron.* ụg'nŏ' (derivation unknown, possibly corrupted through *Ignots, Iguenots*, from Ger. *Eidgenossen*, confederates; according to others, a diminutive of *Hugo, Hugues*, Hugh, a patron saint of Tours). The name borne by the Protestants of France from about the year 1560 till their extinction as a political party in the seventeenth century; in a more general sense, the adherents of the Reformed religion before the French Revolution. Lutheran Protestantism invaded France probably between 1520 and 1523, and its principles were warmly embraced by large numbers of the learned classes and the nobility. The followers of the new religion enjoyed the special protection of Margaret of Angoulême, Queen of Navarre and sister of Francis I. The work of John Calvin (q.v.), himself a Frenchman, gave energy and cohesion to French Protestantism; but its strength always remained in the nobility and the middle classes, and it never appealed to the masses of the people, as in northern Germany.

Towards the end of his reign Francis I opposed the Huguenots with great severity and caused many to be burned. During the reign of Henry II the persecution assumed a still severer character, the *Chambre Ardente* (q.v.) being instituted in 1535 for the trial of heretics. Nevertheless the Protestants increased in numbers and strengthened their organization, although this year marks the beginning of their emigrations. John Calvin was the most famous *émigré*. The first national synod on May 23,

1559, adopted a Calvinistic code of 80 articles which became the constitution of French Protestantism. Fifteen churches were represented at that synod. Two years later there were over 2000. The influence of the Guise family, who began to come into power in the reign of Francis I, now showed itself in bitter warfare upon the Huguenots, whose cause was supported by the powerful Bourbon family, the great rivals of the Guises. In 1560 the extremists among the Huguenots, headed by La Rénaudie, a nobleman of Périgord, conceived the plan of seizing the person of the young King, Francis II, and placing him under the guardianship of the Bourbon princes. The plot, however, known as the Conspiracy of Amboise, was betrayed, the King was made secure in the castle of Amboise, and the Duke of Guise was appointed Governor-General. The Edict of Romorantin, in May, 1560, took the prosecution of heretics out of the hands of the parlements and put it into those of the bishops. By the Assembly of Notables in August it was resolved that the whole matter of religion should rest until the next assembly of the States-General. Francis II died on Dec. 5, 1560, and Charles IX, a boy of 10, ascended the throne. The Queen mother, Catharine de' Medici (q.v.), being determined to take the power into her own hands, was compelled to seek Huguenot support against the Guises. For the complete termination of strife the court caused a religious conference to be held at Poissy in September, 1561, between the representatives of the two religious parties. The chief disputants were the Cardinal of Lorraine on the one side and Theodore Beza (q.v.) on the other. The effect of the discussion was merely to widen the breach between the Catholics and the adherents of the new confession, but it served to unite and embolden the Huguenots, with whom the machinations of the Guises forced Catharine into closer alliance. On Jan. 17, 1562, appeared an edict giving noblemen the right of the free exercise of their religion on their own estates. This was followed by the recourse to arms on the part of the Guise faction.

Violence and reprisals were perpetrated on both sides. On March 1, 1562, a company of Protestants, meeting in a barn at Vassy for religious exercises, was attacked, and many of them were massacred by the followers of the Duke of Guise. Condé raised the Protestant standard at Orléans, protesting allegiance to the crown, but demanding freedom of conscience. The Guises seized the person of the King and proclaimed the Huguenots rebels. This was the beginning of the First Civil War. The Huguenots were at first successful, overran the southwestern part of the country, and were joined by 4000 soldiers from Germany. At Dreux, however, Dec. 19, 1562, the Protestants were defeated. The Duke of Guise was assassinated before Orléans, Feb. 18, 1563, and on March 19 the Queen mother concluded the Peace of Amboise, which granted a large measure of religious freedom to the nobles, but set aside one town only in every bailiwick as a place of worship for the Huguenots. The terms of the treaty were disadvantageous when compared with the provisions of the Edict of January, 1562, and were accepted by Condé against the vehement remonstrances of Coligny (q.v.). Catharine hated the new faith, and with the help of the Holy League (see the fifth Holy League) formed a close alliance with the Spaniards for the extirpation of heresy, retrenched the privileges of the Protestants, and made attempts upon the liberty and life of Condé and of Admiral Coligny. These leaders then determined to take possession of the King's person in September, 1567. The court took refuge in Paris, which Condé invested; on Nov. 10, 1567, a battle was fought at Saint-Denis between Condé and a much superior force under the Constable Montmorency (q.v.), and soon after Condé fell back into Lorraine, where he effected a junction with an auxiliary force of 10,000 men from Germany and again threatened Paris; upon which Catharine determined to conclude peace, and the Second Civil War was terminated by the Treaty of Longjumeau on March 23, 1568, which confirmed the terms of the Treaty of Amboise. Catharine, however, had consented to the treaty only to gain time and had no intention of acting up to its terms. Plots were formed against the lives of Condé and Coligny, who fled to La Rochelle, where they were joined by Jeanne d'Albret, Queen of Navarre, and her young son Henry. With reënforcements from Germany and England the Huguenots began the Third Civil War, but at Jarnac, March 13, 1569, they were defeated by the royal troops under the nominal command of the Duke of Anjou, afterward Henry III, and Condé was slain after he had rendered himself prisoner. Jeanne d'Albret endeavored to recoup these reverses in an assembly at Cognac and set up her son, then but 15 years of age, as the head of the Protestant cause. Coligny became their military leader and, having received a further accession of troops from Germany, laid siege to Poitiers, but was again defeated by the Duke of Anjou at Moncontour, October 3. French reënforcements from England, Switzerland, and Germany enabled Coligny to take Nîmes in 1569 and to relieve La Rochelle, while La Noue obtained a victory over the royal troops at Luçon. Catharine and her son now sought for peace, to which the Protestants, weary of the hard contest, consented. The treaty, concluded at Saint-Germain-en-Laye on Aug. 8, 1570, gave to the Protestants the free exercise of their religion everywhere except in Paris, and the possession of a number of strongholds.

Catharine, having failed to overthrow the Protestant cause in the open field, sought to accomplish her object by treachery. She entered into friendly relations with the Huguenots, partly, it is true, out of fear of the Guise family. After September, 1571, Admiral Coligny exercised great influence at court and was received with much show of affection by the young King and the Queen mother. The marriage of Henry of Navarre, who had just succeeded his mother in his little kingdom, to Margaret of Valois, sister of Charles IX, seemed to promise an end to the period of civil strife. Then came the Massacre of St. Bartholomew's Day, Aug. 24, 1572 (see Bartholomew, Massacre of Saint), when thousands of Huguenots, among them Coligny, perished. So far from effecting its intended purpose, this detestable deed only roused the Huguenots to take up arms again. They were forced to form a political party or else be completely subjugated. The Duke of Anjou lost his army before La Rochelle, and on June 24, 1573, concluded a peace at that place by which the Protestants obtained complete freedom in

the exercise of their religion in the three towns of Montauban, Nîmes, and La Rochelle, which were exempted also from the obligation of receiving a royal garrison. Everywhere else the Huguenots were promised freedom from molestation on condition that they should not hold assemblies of more than three persons at a time. A section of the Roman Catholic nobility, at whose head was the Duke of Alençon, the youngest son of Catharine, from purely political motives, united with the Huguenots, and their cause was strengthened by the support of the Politiques (q.v.), the party which put "France" before religion. The accession of Henry III, in 1574, was followed by the outbreak of the Fifth Civil War. Henry of Navarre, who since St. Bartholomew's Day had remained a virtual prisoner at the French court, succeeded in making his escape in February, 1576, and, placing himself at the head of the Huguenot forces in the south, achieved a number of successes in Guienne. This led to the conclusion of the Treaty of Beaulieu, called the Peace of Monsieur, May 6, 1576, by which the Huguenots were granted an increased number of places of security and partial representation in the Provincial parlements. This was regarded by the Catholics as a surrender to heretics and traitors who had not hesitated to call in foreign aid against their sovereign. The Duke of Alençon was won back to the support of the court, and under the auspices of Henry, Duke of Guise, the Catholic League was organized for the defense of the Church, the extirpation of heresy, and the maintenance of the honor and authority of the King. Although there were certain ulterior motives which made the League dangerous to the house of Valois, Henry III for the time put himself at the head of the movement and at the close of 1576 assembled the States-General at Blois. The severe measures enacted by this body against the Huguenots kindled the Sixth Civil War (1577), which was marked by no important engagement. Peace was concluded at Bergerac on Sept. 17, 1577, and confirmed by the Edict of Poitiers, which guaranteed the preservation of the *status quo*. The Seventh Civil War (the Guerre des Amoureux) broke out in November, 1579, with little cause and was terminated by the Peace of Fleix in November, 1580, with little result.

There was now a comparatively long interval of repose till 1584, when, by the death of the Duke of Anjou (formerly Alençon), Henry of Navarre became heir to the throne of France. Hereupon Henry, Duke of Guise, exerted himself for the revival of the League, entered into an alliance with Spain and the Pope for the extirpation of heresy, declared the Cardinal of Bourbon heir to the throne, and began hostilities against the Huguenots. The results of 25 years of warfare were destroyed by the Edict of Nemours (July 7, 1585), which annulled all previous edicts of toleration. This was followed by the outbreak of the Eighth Civil War, known as the War of the Three Henrys (Henry III of France, Henry of Navarre, Henry of Guise). The Catholic League and the King put no less than seven armies into the field, while the Huguenots received large reënforcements from Germany. At Coutras, Oct. 20, 1587, Henry of Navarre defeated the Catholic army, but this was offset by the victory of Guise over the German auxiliaries at Montargis. So contemptible had Henry III become in the eyes of the people of Paris that the entrance of the victorious Duke of Guise into the city on May 9, 1588, was followed by an insurrection in his favor. While the Duke was negotiating with the Queen mother, Henry III fled from Paris, but at Rouen in July, 1588, acceded to all the demands made by Guise, the extermination of heresy in the kingdom, the convocation of the States-General, and the appointment of Guise to the post of lieutenant general of France. At Blois, on Dec. 23, 1588, Henry III caused the Duke of Guise to be murdered and summoned to his aid Henry of Navarre. In less than a year the King himself was assassinated by Jacques Clément, and Henry of Navarre succeeded to the throne. The League, however, now under the leadership of the Duke of Mayenne, the brother of Henry of Guise, set up the Cardinal of Bourbon as a rival King and, with the aid of Spanish troops, held its own in Paris. Outside, however, it suffered two crushing defeats at Arques and Ivry. On July 25, 1593, Henry of Navarre formally embraced Catholicism and in the following year gained possession of the capital. The civil wars in France were brought to an end by the Peace of Vervins between Henry and the Spanish King, May 2, 1598. On April 13 of the same year the King, in the Edict of Nantes (see NANTES, EDICT OF), guaranteed the Huguenots full liberty of conscience and the preservation of their religious and civil condition. See HENRY IV.

Though Henry IV, convinced that the French were a Catholic people and would never accept a Protestant sovereign, abjured his faith on political grounds, his reign was one of broad toleration, and his great Minister, Sully, was a Huguenot. But when, during the minority of Louis XIII, Maria de' Medici, the Queen of Henry IV, assumed the reins of government, the many privileges enjoyed by the Huguenots were found to have created a strong party that stood in the way of absolutism. The King took an oath in 1614 to maintain the Edict of Nantes, but the marriage treaties with the Spanish court excited the apprehensions of the Huguenots to such a degree that, in November, 1615, they made common cause with the Prince of Condé, who had set up the standard of rebellion. This was contrary to the advice of the most sagacious of their own party. Although by the Treaty of Loudun, May 4, 1616, they obtained a new confirmation of their freedom of worship, the court now only waited for an opportunity of breaking at least their political power. In June, 1617, a royal edict commanded the entire suppression at once of the Protestant church and of political privileges in the Province of Béarn; but the Provincial court at Pau refused to register the edict, and the matter lay over until 1620, when, urged by his adviser that the time was opportune to strike decisively, the King carried the edict into full effect by force of arms. The Protestants throughout all France took alarm, and hostilities again broke out in May, 1621. At the head of the Protestants were the two brothers the Duke of Rohan and the Prince of Soubise. Their cause, however, was feebly maintained; almost all the Protestant towns fell into the hands of the King, force, stratagem, and bribery being equally employed. By the Treaty of Montpellier, Oct. 19, 1622, the Huguenots lost a number of their strongholds and the right of assembly without permission of the King. The court, however,

paid little attention to the stipulations of the treaty, and when the government was involved in difficulties in Italy, the Protestants took the opportunity again to rise in arms (1625). Soubise, with a fleet furnished by the town of La Rochelle, more than once defeated the weak royal navy. Cardinal Richelieu, who had assumed control of the affairs of state in 1624, was a believer in absolutism. He sought to overthrow the Huguenots as a political force and pursued this end relentlessly. He took charge himself of the siege of La Rochelle, the Huguenot stronghold, which was taken after an heroic resistance, Oct. 28, 1628. The fall of La Rochelle was speedily followed by that of Nîmes, Montauban, and all the other Protestant strongholds. The Peace of Alais, June 27, 1629, put an end once for all to the civil wars in France and to the Huguenots as a political party. Richelieu was a great statesman and politician, and when the political power of the Huguenots was broken, he endeavored by conciliation to attach to the state these people, of whom some were the best and most useful in France. This policy was not changed under Mazarin, and Colbert during his years of power restrained Louis XIV from persecution. After Colbert's death the King entered upon a rigorous policy of repression under the influence of religious conviction. Political motives, however, may have served to determine the policy of Louis XIV; for the presence of a powerful element in the country differing in belief and to some extent in political theory from the generally accepted doctrines must have clashed with the Grand Monarch's ideal of a nation dwelling in peaceful uniformity under the wing of a benevolent autocracy. The Huguenots were deprived of civil rights, and in the southern provinces, where Protestantism was strong, recourse was had to severer measures. To force them into the bosom of the Church, the people were handed over to the mercies of a licentious soldiery. Detachments of troops were quartered on the inhabitants, while bodies of cavalry patrolled the country, demolishing the places of worship and in some cases putting the Huguenot preachers to death. (See DRAGONNADES.) Hundreds of thousands of Protestants fled to Switzerland, the Netherlands, England, Germany, and the West Indies, as well as to South Carolina, New York, Massachusetts, and other North American colonies. The climax of this persecution was the revocation, Oct. 18, 1685, of the Edict of Nantes, which deprived the Huguenots of their last defense and gave a new impulse to the emigration which took the best blood of France to strengthen her rivals. Thousands betook themselves to the mountains of the Cévennes and continued the exercise of their religion in secret. Among these and the mountaineers of the Cévennes a remarkable fanatical enthusiasm displayed itself, and under the name of Camisards (q.v.) they maintained for a number of years a wonderfully successful opposition to the forces of the great monarchy. The War of the Cévennes, or Camisard War, began in 1702 and was not terminated until 1705, sporadic outbursts continuing until 1709 or 1710. The suppression of the local rebellion was attended with circumstances of great cruelty. France, after the revocation of the edict, lost more than 400,000 of her population, among them many of wealth and position, besides a number of the middle classes engaged in mechanical pursuits. The total emigration is variously estimated from 400,000 to 1,000,000; while, notwithstanding the many persecutions, about 1,000,000 Protestants remained.

The partial repose which the Protestants enjoyed for more than 10 years was attended by a revival of their worship, especially in Provence and Dauphiné. In 1724, therefore, Louis XV, influenced by political motives, issued a severe edict against them. The spirit of the age, however, now began to be opposed to persecution. An edict in 1752 declared marriages and baptisms by Huguenot ministers to be null and required the repetition of them by the Roman Catholic clergy. But when, upon this, many began again to flee from their country, the disgust of the Roman Catholics themselves was so much excited that the court recalled the edict (1787). Montesquieu and Voltaire successfully advocated the cause of toleration.

French Protestantism in the Nineteenth Century. The first movement towards toleration of Protestantism after the revocation of the Edict of Nantes was the edict of Louis XVI, in 1787, legalizing Protestant marriages. By the concordat concluded between Napoleon and Pope Pius VII, in 1801, Protestantism (Calvinist and Lutheran) and Judaism became, with Catholicism, established religions, with equal protection and a proportional measure of state support, but subject at the same time to the strictest governmental control. By the concordat religion became a part of government, and religious liberty was lost. No church was permitted to make converts from any other, though this law soon became a dead letter with regard to the Roman Catholic church. The Protestant General Synod was put down; particular synods could be convened only by government; undue ecclesiastical power was given to consistories (elected presbyterial committees), tending to the disintegration of the Church and opening the way for later divisions. The parishes were few in number, most of them very extensive, and more than half of them (100 out of 171) without pastors. Under these circumstances religion became a mere form, or simply the expression of a political idea. There were no schools, religious literature, or asylums of any description. The confirmation of the young, irrespective of religious experience, was a measure of self-preservation. Brilliant exponents of Protestantism at this time were Madame de Staël and Benjamin Constant.

A revival of French Protestantism from its depleted condition after the Revolutionary period and the subsequent political turmoil, during which it suffered greatly, took place under the Scottish Haldanes (see HALDANE, JAMES ALEXANDER, and ROBERT) and the English Methodist Cook (see COOK, CHARLES) in the early twenties. To the revival the formation of the Bible Society in 1819 and the Missionary Society in 1822 contributed. During this period Samuel Vincent introduced German Protestant theology into France and created a liberal movement against the narrow orthodoxy of the revival. Aggressive propaganda being forbidden by law, there was much suffering for conscience' sake. In 1826 the Catholic Prince de Salm was exiled for having embraced Protestantism. Debarred thus from normal activity, the awakened Church turned to benevolent work, and the second third of the century saw the rise of a great number of strong

benevolent and religious societies. The Evangelical Society was founded in 1833, the Central Society in 1847, for the building of churches. Orphanages, refuges for the blind, the deaf, for neglected, criminal, and crippled children, sprang up in great profusion. Educational interests took a prominent place. In 1829 the Society for the Encouragement of Primary Instruction among Protestants was founded. In 1833 the Protestant Guizot secured the passage of the common-school law. In 1840 there were 677 Protestant schools, from primary to normal. There are two theological faculties—at Montauban and in Paris.

From this period dates also the foreign-mission work of the Protestant church, a history of almost unparalleled zeal and self-sacrifice. The Society of Evangelical Missions was founded in 1822; the first missionaries went to South Africa in 1829. The mission fields are now seven in number—in Africa, the Society Islands, and Madagascar.

Protestant journalism also dates from the revival. *Le Semeur*, founded in 1831, enjoyed the collaboration of Vinet. *Le Lien* was founded in 1840 by the elder Athanase Coquerel (q.v.), to counteract the growing tendency to disintegration—a vain effort, as it proved. The narrow if profound evangelicalism of the revival produced a reaction, fostered by the liberal teachings of the theological school at Strassburg, which ended in the schism of 1848 between the orthodox and liberal wings of the Reformed church, still held together by the Concordat of 1802. The question of the relations between church and state became a capital one; Vinet wrote a book advocating separation and would have headed such a movement but for the powerful opposition of Guizot. The learned of that day strongly advocated it; in 1847 Lamartine declared that separation would not be too dearly purchased by a revolution. The next year (1848) the Count de Gasparin (see GASPARIN, AGENOR ETIENNE) and Frédéric Monod headed the Free church movement. In 1849 the Union of Free Evangelical Churches of France was formed, based quite as much upon individual religious experience, in opposition to the formalism of the Reformed church, as upon the separation of church and state. This movement, never numerically important, barely reaching the number of 50 churches in all France, has yet been notable for the ability of its leaders—Pressensé, Bersier, Hollard, the Monods—and for its support to the orthodox as against the liberal wing of the Reformed church.

The year 1852 saw a new impulse in the Church. The Sunday-School Union and the French Protestant Historical Society date from this year. In 1859 the celebration of the tercentenary of the first synod of the Reformed churches showed the deep attachment of the people to the traditions of the past.

During all this time the liberal ferment was working in the Church, a spirit not so much of *unorthodoxy* as of *freedom*. The attempt of the elder Coquerel to draw the two wings together proved sadly abortive when, in 1864, after a conflict of several years, the younger Athanase Coquerel was tried for heresy, under the leadership of Guizot, for having hailed Renan's *Life of Jesus* as a sign of revived interest in religious studies, while combating his views as to the person of Christ. Coquerel defended himself nobly, but was condemned, by 12 voices to 3, in the Consistory of Paris, and in spite of the protest of 8000 church members of that city he was deposed from the ministry, the state not interfering, as he was suffragan, not titular, pastor. He continued to preach, however, being supported by the Protestant Liberal Union (founded in 1860). Guizot's victory in this case nearly cost him his seat in the consistory. At the next election he was returned only by a majority of 8 in a vote of 2600.

In the Franco-Prussian War many Protestant pastors rendered distinguished service. At its close the Reformed church took up the question of reorganization, the Lutheran that of the inroads caused by the loss of Alsace, which robbed it of 38 consistories and 191 parishes, while the Reformed churches had lost 5 consistories and 26 parishes.

The twenty-ninth General Synod of the Reformed churches had been held in 1659. Six synods held in "the Desert" during the century of persecution had not been of national extent. The thirtieth synod was convoked by President Thiers in 1872, at the instance of Guizot. The synod memorialized President Thiers in favor of disestablishment, but in vain. A strong but vain effort was made to bring together the two wings of the Church. Since that time, no official synod of the whole Church being possible, the orthodox wing has met triennially in "official" synod, the liberal wing in fraternal assembly, both bodies electing representatives to the Permanent Committee, which alone is recognized by government.

Of late years, in view of the anti-Protestant movement of the ultramontane party in the Catholic church and of the rapid spread of atheistic Socialism, both wings of the Church have recognized the importance of union and have earnestly sought a common doctrinal basis. Failing in this effort, in 1899 delegates from both bodies met in Lyons and formed a practical union for work in the League for the Moral and Social Improvement of the Country. This League was immediately joined by the Free and Lutheran churches, and by the Methodist and Baptist missionary churches. At the officious synod at Anduze, in May, 1902, the serious effort to find a basis of doctrinal agreement again failed, but was prophetic of union in the near future. At this synod the unanimous adoption of a resolution asking for disestablishment placed the Reformed church in line with the advocates of Church disestablishment in France. In December, 1905, a law was passed which separated church and state. The Protestants look upon this as a great victory for their energetic movements for reform.

The establishment of the Third Republic had been the signal for a forward evangelistic movement, to which the founding of the Mission Populaire Evangélique in 1871 by the Rev. Robert McAll, of England, contributed much. (See MCALL MISSION.) The Law of 1878, giving full religious liberty, opened the door to an active home-mission work, already initiated in 1872 by the Interior Mission. Social questions have largely occupied the attention of Protestants. E. de Pressensé, pastor, historian, senator, led the movement for the purification of the press, a movement which in 1902 took on new life under the energetic action of Pastor Wilfred Monod, of Rouen. Charles Robert introduced and advocated profit sharing. Jules Siegfried headed the movement for im-

proved workingmen's dwellings; Gide and Boyer that for business coöperation; Léon Say that for Sunday rest; Richard Waddington that for labor unions. Dr. Legrain has been prominent in the temperance movement; Pastor Robin in that for prison reform and "assistance by work"; Pastor Arbourg in that for benefit associations; Pastor Fallot in that for public morality. Protestant pastors have a league for the study of social questions. A large proportion of the younger pastors, led by Elie Gounelle, of Roubaix, and Wilfred Monod, with many of the younger laymen, are actively promoting the movement for social Christianity, which seems better adapted than any other movement to make a stand against the rapidly growing antireligious Socialism. Among the activities of these Social Christians is the founding of "solidarities"—social settlements distinguished not only by their evangelistic character, but by the prominence given to "mutuality," to works of economic betterment, and "get-together" methods of bringing class into normal relations with class.

The career of French Protestantism has been very closely interwoven with the modern political development of the country. Though a small minority, it has always been aggressive and resolute in maintaining its position. Many distinguished men have appeared in its ranks throughout its history. In education, law, finance, and reform it has taken a prominent part. In the founding of savings banks, the abolition of the slave trade, the revival of various industries, French Protestants have ever been foremost, and to-day are a very influential element throughout France.

Bibliography. The standard history in English is the series of volumes by H. M. Baird, which are an admirable product of American scholarship: *History of the Rise of the Huguenots of France* (New York, 1879); *The Huguenots and Henry of Navarre* (ib., 1886); *The Huguenots and the Revocation of the Edict of Nantes* (ib., 1895). Consult also: Puaux, *Histoire de la réformation française* (Paris, 1859–64); Smiles, *Huguenots in England* (American ed., New York, 1868); Blackburn, *Admiral Coligny and the Rise of the Huguenots* (Philadelphia, 1869); Meaux, *Les luttes religieuses en France au XVIème siècle* (Paris, 1876); Kervyn de Lettenhove, *Les Huguenots et les Gueux, 1560–85* (Bruges, 1883–85); C. W. Baird, *History of the Huguenot Emigration to America* (New York, 1885); Willert, *Henry of Navarre and the Huguenots in France* (ib., 1893); Félice, *Les Protestants d'autrefois; Vie intérieure des églises, mœurs et usages* (4 vols., Paris, 1897–1902); Durand, *Histoire du Protestantisme français pendant la Révolution et l'Empire* (ib., 1902); Thompson, *The Wars of Religion in France* (Chicago, 1909).

HUGUENOTS, ụ'g'-nō', Les. An opera in five acts by Meyerbeer, with words by Scribe, first produced in Paris in 1836. It is the first of the historical, as distinguished from the purely romantic operas. The plot deals with the persecutions of the French Huguenots in the seventeenth century.

HUGUENOT SOCIETY OF AMERICA, The. An hereditary patriotic society, organized in New York City on April 12, 1883, and incorporated on June 12, 1885. Its objects are to perpetuate the memory and to foster and promote the principles and virtues of the Huguenots; to commemorate publicly at stated times the principal events in the history of the Huguenots; and to collect and preserve all existing documents, monuments, etc., relating to the genealogy or history of the Huguenots of America. Membership is extended to descendants of Huguenot families which emigrated to America or to other countries prior to the promulgation of the Edict of Toleration, Nov. 28, 1787, as well as to writers who have made the history of the Huguenots a special subject of study. The insignia of the society consist of a badge, pendent from a gold dove with spreading wings surmounted by a rising sun, and worn on a watered-silk ribbon of white, bordered with red, white, and blue. The badge itself is of gold, surrounded by a wavy, ornamental border, and bearing on the obverse the device of Marguerite de Valois, a marigold turning towards the sun, and a ribbon with the motto "Non Inferiora Secutus," while on the reverse is the name of the society as well as the name of the member and number of the badge. This society has its headquarters in New York City, where a valuable library, consisting of Huguenot books, manuscripts, etc., has been collected. There are branch societies in several States and cities, notably in Virginia, Pennsylvania, South Carolina, and New Jersey. Its publications are known as *Collections of the Huguenot Society of America.* In 1898 it celebrated the tercentenary anniversary of the promulgation of the Edict of Nantes, at which delegates from societies abroad were present. A memorial volume containing a full account of the exercises was published in 1900.

HUGUES CAPET. See Hugh Capet.

HUIA, hōō'yȧ (Maori name). A remarkable bird of New Zealand (*Heteralocha acutirostris*), now considered one of the starling family and approaching extinction, because it is

HEADS OF HUIA.
a, female; *b*, male.

confined to the limited forests of certain mountain ranges and is constantly pursued as a cage bird or as a curiosity and also by the natives, who regard its tail feathers as the emblem of rank. It is about the size of an American thrush, and both sexes are glossy green black, excepting a white terminal band upon the tail and the large rounded wattles at the gape, which are orange red. Their ivory-white bills, however, differ to a degree unknown elsewhere among birds. That of the female is long, slender, curved, and hoopoe-like; that of the male only half as long and much straighter and shorter. Sir William Buller has described the species very fully (*Birds of New Zealand*, 2d ed., London, 1888). He says its favorite food is the grub of a large, timber-boring beetle. The male

bird, with his short stout bill, attacks the more decayed portions of the wood and chisels out his prey, while the female, with her long slender bill, probes the holes in the sounder part, the hardness of which resists the male's weapon; and elsewhere she obtains for him grubs beyond his reach. The pairs are devoted companions, and when one has been captured the other is easily taken. These birds nest in hollow trees. The huia is protected by Act of Parliament, and strong efforts are being made to save it from extinction.

HUICHOL, wē-chōl′ (a corruption of the native name, signifying prophet, doctor). A wild tribe of the remote Nahuatlan stock, occupying six villages in the rough mountain region of northwestern Jalisco, Mexico. Despite former missionary efforts and long-continued contact with Spanish civilization, they are said to be living in the same state of barbarism as when Cortés first put foot on the Mexican soil. Their culture is that of the well-known Pueblo type, displaying a number of ceremonial rites, especially in connection with the Peyote (q.v.), which they call Hikuli. They number 4000. Consult Lumholtz, *Unknown Mexico* (New York, 1902).

HUILA, wē′lȧ. A department of Colombia, having an area of 8100 square miles. It lies between the central and eastern Cordilleras, which form its boundaries. The Magdalena River has its headwaters in the highlands of the south of the department and flows northward through its centre. The department is one of the most backward in the country, having no means of communication except a few trails and the Magdalena, which is navigable only at certain seasons. The chief industries are stock raising and agriculture. The principal products are cacao, rice, coffee, sugar cane, tobacco, and corn. Gold mining is carried on to some extent, and there are manufactures of Panama hats, cigarettes, and cotton and woolen goods. In the southern part near the village of San Agustin are found important ruins of an ancient civilization. Pop., 1912, 158,191. Capital, Neiva (q.v.).

HUI-SHEN, hwē′shĕn′. A Buddhist monk and traveler of the fifth century. See Hwei-sang.

HUISMAN, hois′mȧn, Roelof. See Agricola, Rodolphus.

HUITFELDT, hwēt′fĕlt, Arild (1546–1609). A Danish historian and statesman. After studying in Germany and France he entered the diplomatic service and finally became Chancellor of the kingdom. He published a long series of volumes on the history of the Kings of Denmark to the death of Christian III. These were afterward issued under the title *Denmarks Riges Krönike* (1650–52). The work is uncritical in its judgments, but preserves many valuable documents.

HUKAU. See Hokow.

HULAKU KHAN, hōō-lä′kōō kän. See Mongol Dynasties.

HUL′DA, or Holda. In the mythology of northern and central Germany, especially of Franconia, Hessen, and Thuringia, a spiritual being, usually benign, corresponding to the Berchta of southern Germany and Switzerland and the Frigga of Scandinavian mythology. She is supposed to frequent springs and lakes. To her the souls of dying children betake themselves. She flies through the air with her attendants, bringing fortune to the good and misfortune to the evil. She sometimes has witches among her followers. See Berchta; Freyja and Frigga.

HULEH, hōō′lĕ. See Merom, Waters of.

HULL. A city, the capital of Wright Co., Quebec, Canada, on the Ottawa River, opposite the Rideau Canal and the city of Ottawa, with which it is connected by two suspension bridges, and on the Canadian Pacific Railroad (Map: Quebec, C 5). The city is the seat of a Roman Catholic college and possesses a fine park. It is a manufacturing city; its products include pulp, paper, matches, sulphur and sulphite, wooden ware, Portland cement, pork packing, lumber, axes, biscuits, tents, awnings, and electric supplies. The value of its manufactured products in 1910 was $7,259,301, as compared with $3,182,050 in 1900. The city was almost totally destroyed by fire in 1900, 3000 buildings in all being burned. It has been rebuilt. Pop., 1901, 13,933; 1911, 18,222.

HULL, officially Kingston-upon-Hull. A seaport city and a parliamentary and county borough in the East Riding of Yorkshire, England, at the confluence of the Hull with the estuary of the Humber, about 20 miles from the North Sea and 41½ miles by rail east-southeast of York (Map: England, F 3). The town stands on a level plain amid uninteresting surroundings. The modern portion has spacious, regular, and well-paved streets, while the old quarter, which serves as the business section, has narrow, crooked lanes and is very crowded, forming an irregular peninsula. Among noteworthy public buildings are Holy Trinity Church, founded 1412, a Decorated and Perpendicular building, one of the finest parish churches in England; the town hall; the new exchange, corn exchange, and market hall. There are statues of William III, erected 1734, and of Bishop Wilberforce, who was born at Hull. The chief educational establishments are the grammar school, founded in 1486; the Trinity House nautical school, 1716; Cogan's charity school for girls, 1763; the Hull and East Riding College, Hymer's College, the Royal Institution, the literary and philosophical institute, mechanics' institute, technical school, and school of art. There are numerous charitable endowments. The city owns the markets, tramways, electric lighting, and a profitable water supply from springs, and maintains parks, free libraries, public baths and washhouses, a fire brigade, a crematorium, a sanitarium, cemeteries, a refuse destructor, and a disinfector.

Hull has an extensive coasting, fishing, and foreign trade. It has regular communication with Germany, Russia, Holland, Belgium, Scandinavia, Denmark, the United States, India, and Australia, and is the seat of a United States consul. It exports the woolen and cotton goods of the midland counties, coal, oil, machinery, and mill work, and imports cattle, grain, timber, wool, flax, hemp, tallow, pitch, etc. It has capacious docks covering about 200 acres. Since 1888 the ports of Hull and Goole have been administratively combined.

The net tonnage (excluding coasting vessels) entered in 1912 was 3,964,583, and cleared, 3,496,169; Hull is thus, in respect of tonnage, the sixth port in the United Kingdom, being exceeded by London, Liverpool, Cardiff, Newcastle, and Southampton. Imports at Hull in 1905 were valued at £32,545,886, and exports at £21,002,686; in 1912, £48,607,902 and £31,738,505; in the value of its foreign and colonial

trade it is exceeded only by London and Liverpool. Oil mills, shipbuilding yards, engineering works, iron foundries, rope and sail making, tanneries, breweries, chemical and color works, and the many industries of a large seaport, afford employment to thousands of workmen.

The city is governed by a mayor, 16 aldermen, 48 councilmen, a recorder, and a sheriff. As a parliamentary borough, it sends three members to Parliament. Consisting of Myton and Wyke, two villages, as Myton-Wyke it developed into an important port shortly after the Conquest. Struck with its advantages as a port, Edward I purchased it in 1298, renamed it Kingston-upon-Hull, and gave it the charter of a free borough. Its fisheries and trade prospered under the enterprise of its merchant princes, the De la Poles, and in 1339 it supplied Edward III with 16 ships and 466 seamen for his armament against France. In 1588 it furnished Elizabeth with £600 and 800 men against the Spanish Armada. During the Civil Wars Hull was garrisoned by the Parliamentarians, and the Governor, refusing to admit King Charles, precipitated hostilities; it successfully resisted two long sieges by the Royalists. In 1534 it was made the seat of a suffragan bishop and again in 1891. After the fifteenth century its commercial importance increased with its imports of fish from Iceland; it was one of the first ports to engage in, and until late in the nineteenth century was the headquarters of, the whale fishery. Pop., 1801, 29,500; 1851, 84,700; 1891, 200,473; 1901, 240,259; 1911, 278,024; in population the city is thus the fourteenth in the United Kingdom. Area, 9042 acres. Consult Symons, *Hullinia, or Selections from Local History* (Hull, 1872), and Freeman, *English Towns* (London, 1883).

HULL, Charles Henry (1864–). An American educator, born at Ithaca, N. Y. He graduated at Cornell University in 1886; until 1890 was in the Cornell Library; and studied at the universities of Göttingen, Halle, and Berlin. He returned to Cornell to be assistant professor of political economy (1893–1901), professor of American history (after 1901), and dean of the College of Arts and Sciences (1908–13). He edited *The Economic Writings of Sir William Petty*, which was brought out by the Cambridge University Press, England.

HULL, Cordell (1871–). An American legislator, born in Overton (now Pickett) Co., Tenn. He studied at the National Normal University at Lebanon, Ohio, in 1889–90, and he graduated from the Lebanon (Tenn.) Law School in 1891. He was admitted to the bar in 1891, was a member of the Tennessee House of Representatives in 1893–97, served as captain in the Fourth Tennessee Infantry during the Spanish-American War, and was judge of the Fifth Judicial Circuit of Tennessee in 1903–07. After 1907 he was Representative in Congress of the Fourth Tennessee District. A Democrat in politics, Hull was especially active in the legislation making effective the income tax.

HULL, Edward (1829–1917). A British geologist and physiographer, born in Antrim, Ireland, and educated at Trinity College, Dublin. He was appointed to the Geological Survey of the United Kingdom in 1850 and in 1869 became professor of geology in the Royal College of Science. In 1883–84 he led a scientific expedition to Palestine for the Palestine Exploration Fund, gathering material which he used in his *Mount Seir, Sinai, and Western Palestine* (1905) and in *Physical Geology of Arabia Petræa and Palestine* (1886). Among his published works are: *Building and Ornamental Stones* (1872); *The Coal Fields of Great Britain* (5th ed., 1905); *Physiology* (1888); *Physical Geology and Geography of Ireland* (2d ed., 1891); *Volcanoes, Past and Present* (1892); *Our Coal Resources* (1897); *Sub-Oceanic Physiography of the North Atlantic Ocean* (1912). Consult his *Reminiscences of a Strenuous Life* (London, 1910).

HULL, Isaac (1775–1843). An American naval officer. He was born at Derby, Conn., became a cabin boy on a merchant vessel at the age of 14, soon showed great aptitude for the handling of a ship, and before he was 21 was placed in command of a merchantman. In 1798 he entered the United States navy as lieutenant, serving for several years on the *Constitution* and becoming first lieutenant in 1801, and, after distinguishing himself against the French at Port Plate, Haiti, participated, as commander of the *Argus*, in the war with Tripoli. He became captain in 1806 and at the opening of the War of 1812 was in command of the *Constitution*. While on his way from Annapolis to New York in July, 1812, he escaped by masterly seamanship from a British squadron of five strong men-of-war, which pursued him for three days. On August 19 he fought his celebrated engagement with the *Guerrière*, a slightly weaker British frigate, which after a brief conflict was forced to surrender. (See Constitution, The.) The victory was the first obtained by the Americans over the British in this war and aroused the greatest enthusiasm throughout the United States. Subsequently he was a member of the Naval Board, was at the head of the Boston and New York navy yards, and, as commodore, was in command for a time of squadrons in the Pacific and the Mediterranean. He is regarded by naval critics as the ablest single-ship commander on either side during the War of 1812. Consult Barnes, *Naval Actions of the War of 1812* (New York, 1896). For a spirited account of the fight between the *Constitution* and the *Guerrière*, consult C. F. Adams, *American Historical Review* (ib., 1913).

HULL, William (1753–1825). An American soldier. He was born in Derby, Conn., graduated at Yale in 1772, studied law at Litchfield, Conn., and was admitted to the bar in 1775. In July, 1775, soon after the outbreak of the Revolutionary War, he entered the American army as a captain and served thereafter until the close of the war, taking part in the battles of Trenton, Princeton, Saratoga, and Monmouth, leading a column in the assault on Stony Point, and rising (August, 1779) to the rank of lieutenant colonel. After the war he removed to Newton, Mass., became major general of Massachusetts militia, and was elected to the State Senate. In 1805 he was appointed by President Jefferson to the governorship of the Territory of Michigan, which position he held until 1812, when he was raised to the rank of brigadier general and placed in command of the Northwestern Army. He joined his troops at Dayton on May 25 and led them through the wilderness to Detroit, where he arrived on July 5, having heard three days before of the declaration of war against England. On the 12th he took the offensive and crossed over to Sandwich, Canada, but wasted time in issuing futile proclamations

and, soon becoming alarmed, recrossed to Detroit. On Aug. 16, 1812, intimidated by the aggressive movements of the British General Brock, he surrendered without making any real attempt at resistance. A general outcry was raised against Hull, and finally, on March 26, 1814, a court-martial, assembled at Albany, N. Y., sentenced him to be shot. This sentence was approved by President Madison, who, however, remitted the punishment. There has since been much controversy over Hull's case, but it is now pretty generally agreed by historians that, though he surrendered with unsoldierly alacrity and might possibly have preserved Detroit and his army altogether, the blame for his surrender must rest fully as much with the administration as with himself. Consult: Hull, *Defense of Brigadier-General Hull, with an Address to the People of the United States* (Boston, 1814); Forbes, *Report of the Trial of Brigadier-General Hull* (New York, 1814); Maria Campbell, *Revolutionary Services and Civil Life of Gen. William Hull, together with the History of the Campaign of 1812, by James Freeman Clarke* (ib., 1848).

HUL'LAH, John Pyke (1812–84). An English musical composer, teacher, conductor, and lecturer. He studied the organ and piano under W. Horsley, and singing under Crivelli at the Royal Academy of Music. He was one of the most important factors in modern English musical life and accomplished more for the cause of music among the masses than any other English musician of the century. In 1840, while pursuing his studies in Paris, he was much impressed with the French system of tuition and upon his return to London in 1841 prevailed upon the National Education Committee to permit him to use a modification of it in his singing school for schoolmasters, which he inaugurated at Exeter Hall. His ideas and reforms met with determined opposition from the very beginning, but notwithstanding it is recorded that in the 20 years from 1840 to 1860 over 25,000 people availed themselves of the advantage of his classes. In 1847 his pupils and friends built and presented to him a building known as St. Martin's Hall, in which his pupils could give their public performances. He held appointments as professor of singing at King's, Queen's, and Bedford colleges, London, and succeeded Horsley, in 1858, as organist of Charter House. From 1870 to 1873 he led the Royal Academy concerts and for several years conducted the annual concert of the metropolitan school children, held at the Crystal Palace. In 1872 he was appointed government inspector of training schools. Besides three operas, which have but a local significance, he was the composer of many successful and widely known part songs, motets, anthems, and songs. His published writings cover every phase of musical art and æsthetics and include: *A Grammar of Vocal Music* (1843); *A Grammar of Musical Harmony* (1852); *A Grammar of Counterpoint* (1864); *The History of Modern Music* (1862); *The Third or Transition Period of Musical History* (1865); *The Cultivation of the Speaking Voice* (1870); *Music in the House* (1877). He received the degree of LL.D. from Edinburgh University, was elected member of the Cecilia Society of Rome and member of the Academy of Music in Florence. He died in London.

HULL HOUSE. One of the most famous of American social settlements, situated on South Halstead Street, Chicago. It takes its name from its original building, erected in 1852 by Charles J. Hull. In 1889 Miss Jane Addams (q.v.) and Miss Ellen Starr secured a lease of a part of the building, with the purpose of founding a social settlement after the pattern of Toynbee Hall (q.v.). Shortly afterward the owner of the building, Miss Helen Culver, gave a free leasehold on the entire building, which was remodeled and opened as a social settlement late in 1889. The earliest activities of Hull House were purely social. Readings were given before groups of young women from the neighborhood; an early volunteer conducted a kindergarten; the aged residents of the neighborhood were gathered together for New Year's festivities. Gradually the activities of the settlement were extended to the economic life of the district; attempts were made to introduce coöperative buying and to give instruction in the economical use of foods, etc. After the Pullman strike, when class lines were sharply drawn in Chicago, Hull House came to be identified with the labor movement. Active discussion of economic questions was carried on at Hull House by a "working people's social science club," organized in 1890. In the movement for factory laws and regulation of the labor of children and women Hull House played a conspicuous part. One of its early residents, Mrs. Florence Kelley (q.v.), conducted an investigation of the sweating system for the State Bureau of Labor—an investigation that was in large measure responsible for the enactment of the first factory law of Illinois. The trade-unions of the women shirt makers and the women cloak makers were organized at Hull House and for a time held their meetings in its parlors. Residents of Hull House investigated the padrone system and conducted an active campaign for the creation of State employment bureaus. Thoroughgoing investigations by Hull House of the sanitary conditions in the immediate vicinity led to improvements in the enforcement of the laws and eventually to active participation by Hull House in the struggle for the purification of city politics. The settlement has taken active part in the movement for the more humane treatment of the juvenile delinquent, for the suppression of the truancy evil, and, in fact, in all movements for civic and social reform. No other agency has been more successful in meeting sympathetically the problems of the shifting body of immigrants making up the population of the ward in which the settlement is situated.

The organization of Hull House is extremely simple. The residents are volunteers, each free to pursue such work as may seem to him most fruitful. Throughout its history, however, the institution has been dominated by the personality of Miss Addams, and its work in its broad outlines has taken its direction from her. Investigation of actual conditions, when possible in conjunction with other similar organizations or with the public authorities, is a characteristic feature of the work. The ultimate object of much of this work is the arousing of the public to the necessity of State action in behalf of the city population. Consult Jane Addams, *Twenty Years at Hull House* (New York, 1910). See Social Settlements.

HULLIN, ụ'lăn', Pierre Augustin, Count (1758–1841). A French general of the First

Empire, born in Geneva. He came to Paris (1787) as a watchmaker and was one of the leaders in the attack on the Bastille. He took part in all the great events of the early Revolution, but was too moderate for some of his fellows and was imprisoned during the Terror. On his release he entered the Italian army and in 1796 became Bonaparte's adjutant general and in 1802 a division general. He was appointed president of the military court which sentenced the Duke d'Enghien (1804), and he wrote, in the attempt to shift the blame on Talleyrand, *Explications offertes aux hommes impartiaux, etc.* (1824). He was made Count in 1809 and was one of Napoleon's most trusted servants. In 1812 he was Governor of Paris. When the Emperor was sent to Elba, Hullin tried to ingratiate himself with the new régime, but failed. In 1815, during the Hundred Days, he was again Governor of Paris, but afterward was banished to Brussels and lived for a time at Hamburg. He was pardoned in 1819 and returned to France.

HÜLLMANN, hŭl'mân, KARL DIETRICH (1765–1846). A German historian, born at Erdeborn and educated at Halle. He became in 1797 professor of history at Frankfort-on-the-Oder and in 1808 at Königsberg. Ten years afterward he was made the first rector of Bonn and began his important service to that university. His principal works are: *Deutsche Finanzgeschichte des Mittelalters* (1805); *Geschichte des Ursprungs der Regalien in Deutschland* (1806); *Geschichte des Ursprungs der Stände in Deutschland* (2d ed., 1830); *Geschichte des byzantinischen Handels* (1808); *Staatsrecht des Altertums* (1820); *Das Städtewesen des Mittelalters* (4 vols., 1825–29), his most valuable work; *Römische Grundverfassung* (1832); *Staatsverfassung der Israeliten* (1834); *Handelsgeschichte der Griechen* (1839); *Griechische Denkwürdigkeiten* (1840); *Geschichte des Ursprungs der deutschen Fürstenwürde* (1842). Consult Delbrück, in *Allgemeine Zeitschrift für Geschichte*, vol. vi, pp. 1–14 (Berlin, 1846).

HULLSHOFF, BARONESS VON DROSTE. See DROSTE-HÜLSHOFF.

HUL'SEAN LECTURES. A course of lectures given annually at Cambridge, founded by the Rev. John Hulse (1708–1790), of Elworth, in the County of Chester. He was educated at St. John's College, Cambridge, and at his death, Dec. 14, 1790, bequeathed the bulk of his property to his university. His will provided for the founding of two divinity scholarships in St. John's College, the Hulsean prize, the office of Christian advocate, and that of Hulsean lecturer or Christian preacher. By a statute confirmed by the Queen in council in 1860, the office of Christian advocate was changed into the Hulsean professorship of divinity. The office of Hulsean lecturer, or preacher, is an annual one; and the duty of the lecturer is to preach not fewer than four nor more than six sermons before the university in the course of the year. The first series was delivered by Rev. Christopher Benson. The list of Hulsean lectures, from their beginning in 1820 down to 1893, is given in Hurst, *Literature of Theology*, pp. 32–34; and to 1894 in Hunt, *Religious Thought in the Nineteenth Century*. The list from 1893–94 to 1908–09 inclusive is given in the *New Schaff-Herzog Encyclopedia of Religious Knowledge*, vol. v, p. 401 (New York, 1909). The name of the year's lecturer may be found in *Whitaker's Almanack* (London, annually), and the complete list of lecturers from 1820 is given every year in the Cambridge University *Calendar* (Cambridge, annually).

HULTSCH, hŭlch, FRIEDRICH (1833–1906). A German philologist, born in Dresden. He was educated at Leipzig, where he taught in the Nikolaischule. After several years at Zwickau he became professor in the Kreuzschule of Dresden, of which he was rector from 1868 to his retirement, in 1889. Hultsch's special study was ancient mathematics. He edited the *Scriptores Metrologici* (1864–66); *Heronis Geometrica et Stereometrica* (1864); *Polybii Historiæ* (1867–72); *Pappus* (1876–78), for a large part of the text an editio princeps; and *Autolyci de Sphæra quæ Movetur Liber* (1885). He wrote the very valuable *Griechische und römische Metrologie* (1862; 2d ed., 1882); *Die Elemente der ägyptischen Teilungsrechnung* (1895); *Die Gewichte des Altertums* (1898); *Die ptolomaïschen Münz- und Rechnungswerte* (1903).

HULTZSCH, hŭlch, EUGEN (1857–). A German Sanskritist. He was born in Dresden and was educated at Leipzig and Bonn. In 1882–86 he was lecturer at Vienna and then was government epigraphist of Madras until 1903, when he succeeded Pischel as professor of Sanskrit at the University of Halle. He edited *South Indian Inscriptions* (1890–1903), *Reports on Sanskrit Manuscripts in Southern India* (1895–1905), and *Epigraphia Indica* (1894–1906); and published several texts, including the *Baudhâyanadharmaçâstra* (1884), *Annambhatta's Tarkasaṁgraha* (1907), *Simharaja's Prakritarupavatara* (1909), and *Kalidasa's Meghadhuta* (1911).

HUMACAO, ōō'mä-kä'ô. A city of Porto Rico, the capital of the department of the same name, situated on Humacao River, about 6 miles from the coast (Map: Porto Rico, F 3). It lies in a beautiful valley, surrounded by mountains, and enjoys cool sea breezes, which give it an agreeable climate. It has a number of schools and a municipal library. Sugar cane and tobacco are produced in the surrounding lowlands, and coffee is grown on the slopes of the mountains. It was founded in 1793 and raised to the rank of a city in 1894. Population of the municipality in 1910, 26,678; urban population, 6541.

HUMAITÁ, ōō-mä'ê-tä'. A town and fort of Paraguay, situated at the southwest end of the country, on the river Paraguay, near its confluence with the Paraná. During the Paraguayan War (1865–70) it was besieged for over a year by the forces of Argentina and Brazil and finally surrendered in 1868. The fortifications were razed at the end of the war. The surrounding region yields rich crops of cotton, tobacco, coffee, and sugar. Pop., about 4000.

HUMANE ASSOCIATION, AMERICAN. A federation of societies of the United States for the prevention of cruelty to animals and children, formed at Cleveland, Ohio, in 1877, at a meeting held to consider the maltreatment of animals in transit between the East and West. It became a national organization, whose purpose was at first to deal with interstate traffic. It sent representatives to influence legislation at Washington, and its agents investigated the abuses which prevailed on lines of railways transporting cattle. It offered a prize of $5000

for the best model of a cattle car that would make possible the feeding, watering, and resting of cattle in transit, as the result of which many improved cars were brought into use. In 1884 it won a suit in Massachusetts against two leading railroads for violation of the law, thus establishing an important precedent. For many years its purpose has been that of a federation of all local humane societies. It carries on considerable work of an educational nature. It has instituted inquiries in the United States and abroad on the subject of vivisection in the schools and colleges. Prizes were offered, in 1900, to college and medical students, for essays on vivisection, its abuses and their remedy. In 1913, 310 societies having for their object the prevention of cruelty to animals or to children, or both, were represented in the association. The membership of these societies aggregated 141,000. The association has published, since 1913, the *National Humane Review*. See CRUELTY TO CHILDREN; CRUELTY TO ANIMALS, PREVENTION OF.

HUMANE SOCIETY, ROYAL. An organization for the recovery of persons apparently drowned, founded in England in 1774. It maintains receiving houses in appropriate places along the Thames and near canal banks and in various parts of London. The chief station is on the Serpentine, in Hyde Park, on ground given by George III, and was erected in 1794. The seal of the society bears the unique motto, *Lateat Scintillula Forsan* (A small spark may perhaps lie hid).

HU'MANISM (from *human*, OF., Fr. *humain*, from Lat. *humanus*, relating to man, from *homo*, OLat. *hemo*, man; connected with AS. *guma*, man, Gk. *χθών, chthōn*, Skt. *kṣam*, earth). A name applied to the literary movement at the close of the Middle Ages whose object was the revival of the pagan learning of classical antiquity. The humanists from the beginning divided into two divergent schools, one of which sought to ingraft the classical learning on the tree of Christianity, while the other endeavored to revive not merely the literature of classical antiquity, but, through this, the pagan spirit of the ancient heathen cults. The first humanistic movement began in the fourteenth century in Italy, where the political and social developments were preparing the way for a departure from mediæval traditions. The numerous small Italian states, despotic and republican alike, favored the development of individuality at a time when feudalism (q.v.), still in existence in other parts of Europe, gave less opportunity for the exercise of individual activities. The ferment of Italian politics gave the individual freer play, and the sense of personal independence was rapidly tending to looser social and political ideals. Paganism in Italy, though overpowered, had never been completely exterminated. It had lived on in popular legend and retrospective pride of race, and in countless associations connected with the Roman Forum, the Coliseum, and other historic monuments. But these survivals from ancient Rome were an insignificant moment in mediæval Italian culture; the pagan past did not seriously influence men's minds till new social and political conditions had prepared the way for the revival of classical ideals. (See RENAISSANCE.) The exile of the papal see from Rome for nearly three-quarters of a century (see AVIGNON) must also have acted as a removal of the great check against the recrudescence of paganism. In the fourteenth century all Italy was astir with the new life. Dante, as is shown in his homage to Vergil, felt the new impulse. Petrarch, who may be regarded as the first Christian humanist, threw himself into the van of the new movement. His passion for antiquity and his intolerance of certain forms of mediævalism were boundless. He devoted great energy to the discovery and rescue of Latin manuscripts, to the collection of old Roman coins and other antiquities, and to scathing denunciation of scholastic philosophy, jurisprudence, and medicine. But while the mediævalist had looked forward to an immortality beyond the grave, the pagan humanist would be satisfied with nothing less than an earthly immortality, achieved by poetry like Vergil's and prose like Cicero's. And as the literary style of the Augustan age (q.v.) became the sole model for the writer, so the spirit of antiquity, with its sensuous attitude towards life and nature, its unqualified secularity, its abandonment to the charm of things seen and temporal, controlled the humanists' thought and conduct.

Consult: Jakob Burckhardt, *Die Cultur der Renaissance in Italien* (Basel, 1860; 3d ed., 1877–78; Eng. trans. by Middlemore, London, 1878 and 1891); Georg Voigt, *Die Wiederbelebung des klassischen Altertums oder das erste Jahrhundert des Humanismus* (Berlin, 1859; 2d ed., 1880–81); L. Pastor, *History of the Popes* (2 vols., London, 1891); Symonds's (q.v.) works on the Renaissance, epitomized by Alfred Pearson in *A Short History of the Renaissance in Italy* (New York, 1893); John Owen, *Skeptics of the Italian Renaissance* (ib., 1893); F. A. Gasquet, *Eve of the Reformation* (London, 1898); R. C. Jebb, *Humanism in Education*, Romanes Lecture (New York, 1899); Lewis Einstein, *The Italian Renaissance in England* (ib., 1902); Ernst Borkowsky, *Aus der Zeit des Humanismus* (Jena, 1905).

A second humanistic movement—more properly called humanitarianism—came to its culmination in Comte's (q.v.) worship of humanity. It finds in man the highest and worthiest object of esteem and reverence and is hostile to any theory which places the divine outside of the human. It is differentiated from the pagan Renaissance attitude most markedly by its placing the golden age of man's development not in the past but in the future.

Still another humanistic movement is afoot in philosophical circles at the present day. This humanism is connected with pragmatism (q.v.) and is the theory that the working hypothesis of metaphysics should be the view that all nature is akin to man. Mechanism and the current presuppositions of natural science are discarded, and in their place a universal animism is assumed. F. C. S. Schiller (q.v.) goes so far as to attribute moral qualities to inanimate objects and accounts for the regularity of natural law by the analogy of statistical averages in human society and also by assimilating laws of nature to human habits. Consult: F. C. S. Schiller, *Humanism* (New York, 1903); id., *Studies in Humanism* (ib., 1907); William James, *Pragmatism* (ib., 1907); J. S. Mackenzie, *Lectures on Humanism* (ib., 1907).

HUMAN'ITA'RIANS (from Lat. *humanitas*, humanity, from *humanus*, human). 1. The name assigned to the several classes of anti-Trinitarians, who regard Christ as a mere man

and refuse to ascribe to Him a supernatural origin or nature. Theodotus of Byzantium, called the Tanner, a Monarchian (q.v.), is said to have been excluded from the Church by Victor, Roman pontiff (189–198), because, having denied Christ in time of persecution, he afterward defended himself by declaring that in so doing "he had denied not God, but man." A contemporary and probably an associate of Theodotus, Artemas, taught in like manner that Christ was a mere man. Theodotus and Artemas probably represent a school or sect at Rome and were the first to formulate the doctrine, so far as known. (See CHRISTOLOGY; SOCINUS; UNITARIANISM.) 2. The name "humanitarian" is also sometimes applied to the disciples of Saint-Simon (q.v.) and in general to those who look to the perfectibility of human nature as their great moral and social dogma and ignore dependence upon supernatural aid, believing that man can attain his highest development by his own power.

HUMAN'ITIES. A term now employed primarily to designate the study of the classical literatures of Greece and Rome, and the various sciences which deal with them, such as grammar, classical philology, etc.; but sometimes secondarily it includes all "culture studies" in contrast to professional studies. Cicero, Aulus Gellius, and other Latin writers used *humanitas* in the sense of culture becoming to a man and gained by the study of the great masterpieces, mostly of Greek literature, but not exclusive of Roman. The scholastics adopted the term especially in the form of *literæ humaniores* (the more humane letters), but gave it a different emphasis by placing it in contrast and in subordination to *divinitas* (divinity or theology). This contrast gave to humanity an enlarged meaning, including all forms of secular learning. The humanistic movement (see HUMANISM) restored the word to its Ciceronian significance. But when the narrowness of humanism in regarding the study of the ancient classics as the means par excellence of gaining humane culture came to be appreciated, and when other sciences of liberal character arose, the term "humanities" began gradually to take on a larger meaning, and it is now used by some authorities to include all philological study, together with history, philosophy, political science, economics, and all other sciences which concern themselves with human civilization. In the Scottish universities, however, the singular, "humanity," is used to designate the study of the Latin language and literature. Consult Irving Babbitt, *Literature and the American College* (Boston, 1908).

HUMANN, hōō'mân, KARL (1839–96). A German engineer and archæologist, born at Steele. In 1861 he gave up his studies, as he was ordered south because of his health. In Samos he made successful excavations of the famous temple of Hera. In 1862 he built for Sir Henry Bulwer, English Ambassador at Constantinople, an island palace; two years later was employed by the Turkish government to survey Palestine for a projected railroad from Jaffa to the Dead Sea by way of Jerusalem, of which only the part from the coast to Jerusalem was completed; and, after a trip to Egypt, mapped out the Eastern Balkans, after surveys ordered by Fuad Pasha. But besides the name he made for himself by these maps and by engineering in northern Asia, he got fame for his excavations at Pergamon (q.v.) (1878–86); was made honorary doctor by the University of Greifswald, director of the Museum of Berlin, and Privy Councilor (1894). His later excavations were at Zenjirli in northern Syria, at Tralles, and Magnesia. With Conze, Bohn, and others, he published *Die Ergebnisse der Ausgrabungen zu Pergamon* (1880–88) and, with Puchstein, *Reisen in Kleinasien und Nordsyrien* (1890, with maps).

HUMAYUN, hōō'mâ-yōōn' (1508–56). A Great Mogul of India, son of Baber and father of Akbar. He came to the throne in 1530, but after 10 years of warfare was defeated by the Afghan Sher Shah and driven from India. He took refuge at the court of Persia and with a Persian army returned and recovered control of Delhi and Agra in 1555. He died at Delhi, where a great mausoleum was built for him.

HUM'BER. The continuation and estuary of the rivers Ouse and Trent, between the English counties of York and Lincoln (Map: England, F 3). It is 38 miles long and from 1 to 7 miles broad, with Hull on its north shore and Great Grimsby on the south. Many shoals occur, and the sailing routes have been very carefully buoyed. Canals connect it with south Yorkshire and Trent. It was the entrance for the Norse invasions of the ninth and tenth centuries.

HUMBERT I (It. UMBERTO, ōōm-bĕr'tō) (1844–1900). King of Italy from 1878 to 1900. He was the eldest son of Victor Emmanuel II and Adelaide, Archduchess of Austria, and was born at Turin, March 14, 1844. At an early age he obtained an insight into political and military life under the guidance of his father during the War of 1859. He held the rank of captain, although he was then too young to take an active part in the struggle. He was more closely connected with the process of the unification of Italy which followed. In July, 1862, he visited Naples and Palermo, where he shared the popularity of Garibaldi. When the war between Prussia and Austria was imminent, Humbert was dispatched to Paris to ascertain the sentiments of the French government in reference to the alliance between Italy and Prussia. On the outbreak of hostilities he hastened to take the field, obtained the command of a division of General Cialdini's army with the rank of lieutenant general, and took a gallant part in the battle of Custozza, June 24, 1866, covering the retreat of the Italians by brave and skillful tactics. In 1868 he married his cousin, the Princess Marguerite of Savoy. He succeeded to the throne on the death of his father, Jan. 9, 1878. He showed great bravery and contributed generously towards the relief of suffering during the cholera epidemic in 1884 and gained in popular esteem by his visit to Naples at that time. In 1887 the foreign policy of the government resulted in the Triple Alliance between Italy, Austria-Hungary, and Germany, which was so hateful to Irredentism (q.v.). The colonial policy of the country was not so successful, however, as the Italian troops met with great reverses in Abyssinia in 1887 and again in 1895–96. In 1898 a commercial treaty was concluded with France, but throughout Humbert's reign the country suffered under financial depression and heavy taxation. Towards the end of his reign King Humbert lost some of his former popularity. An anarchist attempted to assassinate him before the gates

of Rome in 1897, but failed. Three years later, however (July 29, 1900), Humbert was shot at and mortally wounded by another Italian anarchist, Bresci, who had come from the United States intent on this act. The King died almost immediately. Humbert was succeeded by his only son, Victor Emmanuel III. His character is summed up in his popular title "Humbert the Good." Consult Fedele Lampertico, "Discorso in Memoria di S. M. Umberto I°, Re d' Italia," in R. Instituto Veneto, *Atti*, vol. lx, part i (Venice, 1900–01), and Pietro Vigo, *Annali d' Italia: Storia degli ultimi trent' anni del secolo 19* (5 vols., Milan, 1908–11). See ITALY.

HUMBERT, ŭn'bĕr', GUSTAVE AMÉDÉE (1822–94). A French jurist and politician, born at Metz. He studied law in Paris and gave private lessons both before and after he was underprefect of Diedenhofen (1848–51); was professor of Roman law at Toulouse and in 1871 was elected to the Chamber of Deputies. Humbert took a prominent part in debates on legal questions, became a leader of the Republican Left in 1875, was made a life senator, and in Freycinet's cabinet (1882) was Minister of Justice. In 1890 Humbert left his post as Vice President of the Senate and became president of the chief court of accounts. He wrote *Essai sur les finances et la compatibilité publique chez les Romains* (2 vols., 1887) and *Organisation de l'empire romain* (1892). His connection with the great Humbert swindle, carried through by his son, Frédéric, and his daughter-in-law, Frédéric's wife, is problematic.

HUMBERT, JACQUES FERDINAND (1842–). A French painter, born in Paris. He studied at the Beaux-Arts and with Picot, Cabanel, and Eugène Fromentin. His first appearance in the Salon was in 1865, with "The Flight of Nero." He was made an Officer of the Legion of Honor in 1885, a professor at the Beaux-Arts, and is regarded as one of the most authoritative exponents of modern classic style. Among his paintings are "The Christ," at Orléans; "Pro Patria," a decoration for the Panthéon; "John the Baptist," at Havre; "The Virgin with Jesus and John the Baptist," in the Luxembourg.

HUM'BLEBEE. See BUMBLEBEE.

HUM'BLEDON HILL. See HOMILDON.

HUMBOLDT, hŭm'bōlt. A city in Allen Co., Kans., 60 miles southeast of Emporia, on the Neosho River, and the Missouri, Kansas, and Texas and the Atchison, Topeka, and Santa Fe railroads (Map: Kansas, G 7). It is in a natural-gas and oil region, has farming interests and oil refineries, and manufactures flour, Portland cement, bricks, tile. The water works are owned by the city. Pop., 1900, 1402; 1910, 2548.

HUMBOLDT. A city in Gibson Co., Tenn., 85 miles east of Memphis, on the Forked Deer River, and on the Mobile and Ohio and the Louisville and Nashville railroads (Map: Tennessee, B 3). It is in a rich cotton and fruit growing region, the products of which are shipped in large quantities. The industrial establishments include marble and granite works, cotton mills, a large fruit-packing plant, flouring mill and elevator, brickyards, canning factory, cotton gins, etc. Humboldt owns its water works and electric-light plant. Pop., 1900, 2866; 1910, 3446.

HUMBOLDT, hŭm'bōlt, *Ger. pron.* hụm'bōlt, ALEXANDER, BARON VON (1769–1859). A German naturalist and traveler. He was born in Berlin, Sept. 14, 1769. His father, who died in 1779, was a chamberlain to the King of Prussia; his mother was of Burgundian descent, and his youthful life was spent in the old castle of Tegel, near Potsdam. He studied, in company with his brother Karl Wilhelm (q.v.), first under private tutors, then at the universities of Frankfort-on-the-Oder, Berlin, and Göttingen. His preference for scientific studies was strongly manifested in his early years and highly developed by the influence of Blumenbach and other university instructors. During his residence at Göttingen (1788 and 1789) he made geological examinations in the Harz Mountains and Rhine valley, which resulted in his first important publication, *Ueber die Basalte am Rhein, nebst Untersuchungen über Syenit und Basanit der Alten* (1790). In 1790 Humboldt made a tour through France, the Netherlands, and England, in company with Georg Forster, already eminent as a scientific traveler, whose influence was strong in shaping the younger man's career; and in 1791 he entered the Academy of Mining at Freiberg, Saxony, where Werner was then professor of geology. His eight months' residence at Freiberg gave him materials for several technical papers in chemistry and physics, and for some more elaborate essays, especially those upon the cryptogamous plants of the mines (*Flora subterranea fribergensis*, etc.). In consequence he was soon (1792) appointed superintendent of mines in the principalities of Bayreuth and Anspach and resided for the next three years at Bayreuth. The breadth of his interest and researches at this period is exemplified by his work and speculations on the nature of muscular and nervous force, entitled *Versuche über die gereizte Muskel- und Nervenfaser, nebst Vermutungen über den chemischen Prozess des Lebens in der Tier- und Pflanzenwelt* (1797).

The desire for larger freedom and especially for exploratory travel led Humboldt to resign his office in 1797. He had already in 1795 wandered about the Alps, studying geology, but further intended journeys to Sicily and up the Nile were prevented by political obstacles. The next three months were spent at Jena, in intimate association with Goethe, Schiller, and the men at the university, who then made an extraordinary circle of intellects; and here he began to plan for the great journey to Spanish America with which his fame is now most closely associated. In Paris he made the acquaintance of a talented young French botanist, Aimé Bonpland, who joined in his plans and was destined to be his principal colaborer. Meanwhile Humboldt was incessantly at work, and the years 1797–99 witnessed the publication of many notable contributions to science, among which those pertaining to the composition of the atmosphere were particularly notable. Many of these were brought together in his book *Versuche über die chemische Zerlegung des Luftkreises* (1799). At length, after spending some time in Spain and getting letters from the government, Humboldt and Bonpland sailed in a Spanish frigate from Coruña, in June, 1799. They visited Teneriffe, ascended the peak, and made valuable observations there as well as at sea during the voyage, which terminated at Cumana in Venezuela.

The travelers explored the region for upward of a year, crossing over to the upper waters of the Orinoco, and establishing the connection between that stream and the upper Amazon. The

year 1801 was spent in explorations in Cuba, the basin of the Magdalena River, and in the Andes of Quito, the famous ascent of Chimborazo, to an altitude of about 19,000 feet, being accomplished in June, 1802. The explorations were then extended to Peru, where Humboldt devoted himself largely to the electrical and astronomical studies favored by the climate, but also acquired a valuable knowledge of the cinchona (quinine) plant and its culture. From Peru the two savants took ship for Mexico, landing at Acapulco in February, 1803. There they traveled for a year, Humboldt paying special attention to the determination of positions on the map and to volcanic phenomena, and then returned to Europe by way of Cuba and the United States (where several weeks were spent), reaching Bordeaux in August, 1804.

Humboldt now went to Paris and occupied himself with Bonpland in the arrangement of their manuscripts and collections, a large part of which, however, had been lost by a shipwreck; at the same time he pursued continuous experiments in physical chemistry. Having visited his brother, then Prussian Ambassador at Rome, and returned to Berlin, he accompanied Prince Wilhelm of Prussia, in 1807, on a political mission to France, and obtained leave from the government of his own country to remain thenceforth in Paris for the publication of the account of his travels. He enlisted the coöperation of Gay-Lussac, Cuvier, and many others of the most eminent French specialists of the day in the elaboration of his materials, and began in 1807 to publish the results in magnificent volumes (20 in folio and 10 in quarto, illustrated by 1425 copperplates). The title was *Voyage aux régions équinoxiales du Nouveau Continent fait en 1799–1804 par Alexandre de Humboldt et Aimé Bonpland.* The first 14 volumes were devoted to botany and were actually prepared mainly by C. S. Kunth; vols. xv and xvi were an "atlas pittoresque"; vols. xvii, xviii, xix, xxi, and xxii were devoted to physical geography, geognosy, and astronomy; vol. xx contained a "geography of plants"; vols. xxiii and xxiv were zoölogical; vols. xxv and xxvi were devoted to a sociological account of the countries of Spanish America; and vols. xxviii, xxix, and xxx contained Humboldt's narrative of his journey, which was left unfinished. The original of this work contains the *Essai politique sur le royaume de la Nouvelle Espagne*, the *Essai politique sur l'île de Cuba*, and the *Vues des Cordillères.* Among the minor works of the great master, the *Ansichten der Natur* (1st ed., 1808) had an immediate and widespread welcome. It was translated into almost every European language and issued in English in both London and Philadelphia. The publication of the great *Voyage* continued at irregular intervals until 1827, and the volumes or groups of volumes appeared under individual titles, by which they are more usually known. The bibliography of Bruhns's biography of Humboldt disentangles the confusion of titles and editions which resulted, and to that the curious reader is referred. After Humboldt's death an octavo edition of his principal works was published in Paris (1864–66).

The favor of Frederick William III of Prussia, who had settled upon Humboldt a pension of 2500 thalers and later of 5000, required him to make frequent journeys with that monarch and at last he was summoned to reside at the court. In 1827, then, he took up his permanent residence in Berlin, and with much discontent endeavored to carry on his investigations amid uncongenial surroundings. One of the best results of his work at this period was his success in establishing for the first time international coöperation in furtherance of scientific observations. In 1827–28 he gave a series of remarkable lectures on physiography at Berlin, which formed the basis of his subsequent *Kosmos.* In 1829, under the patronage of the Russian government and accompanied by Ehrenberg and Gustav Rose, he made a rapid journey as far east as the Yenisei, one of the most striking results of which was the discovery of diamonds and other precious stones in the Ural Mountains, as Humboldt had predicted would be the case from his knowledge of their geology. Many geographical positions were astronomically determined, and erroneous views as to the physical geography of the northern interior of Russia were corrected. The record of this journey was first written by Humboldt as *Fragments de géologie et de climatologie asiatique* (1831) and afterward enlarged into *Asie centrale, recherches sur les chaines de montagnes et la climatologie comparée* (1843).

The subsequent years were spent in occasional diplomatic journeys and in the preparation of what he deemed the crowning monument of his intellectual life, his *Kosmos*, an encyclopædic account and explanation of the physical universe. Four volumes were written and published in Berlin, in 1845, 1847, 1850, and 1858. They were translated as fast as issued into many languages and created a profound impression.

He kept health and vitality and continued at work until the winter of 1858–59, when his strength declined. He died May 6, 1859, and was buried with royal honors at Tegel. After his death new editions of many of his works were issued, and several collections of his letters appeared.

Humboldt's influence upon scientific thought has been vast and far-reaching. "With him," says Agassiz, "ends a great period in the history of science—a period to which Cuvier, Laplace, Arago, Gay-Lussac, De Candolle, and Robert Brown belonged." His grasp of the universe as a whole was no less remarkable than his faculty of observing and explaining single phenomena. His scenic descriptions are strikingly picturesque. Humboldt has contributed to nearly every branch of science, either by direct investigation or by the accumulation of valuable material. He may be regarded as the founder of the modern science of physical geography, and he placed meteorology upon a firm basis. We can only allude to his observations on the cultivation of the soil in different climates and its effect upon civilization; his study of the languages, the architecture, and the customs of the ancient peoples of South and Central America; his discovery of the decrease in intensity of the earth's magnetic force from the poles to the equator; his fruitful labors in chemistry with Gay-Lussac; his experiments concerning the respiration of fishes; and his contributions to the science of geology (especially in the departments of petrography, vulcanology, and seismology).

Humboldt's published correspondence with some of the most distinguished men of his time, such as Goethe, Varnhagen, Pictet, Bunsen, Gauss, and Raumer, as well as with his brother Wilhelm, attests the almost unparalleled breadth of his intellectual interests. Consult: R. H. Stoddard, *Life, Travels, and Books of Alexander*

ALEXANDER VON HUMBOLDT

FROM AN ENGRAVING BY P. HABELMANN, AFTER A PAINTING BY EMMA F. CHARLES

von Humboldt (New York, 1860); P. F. H. Klencke, *Alexander von Humboldt's Leben und Wirken, Reisen und Wissen* (6th ed., Leipzig, 1870); C. C. Bruhns and others, *Eine wissenschaftliche Biographie* (3 vols., ib., 1872).

HUMBOLDT, Karl Wilhelm, Baron von (1767–1835). An eminent German philologist, author, and statesman, elder brother of the preceding, born at Potsdam, Prussia, June 22, 1767. He was educated at the universities of Frankfort-on-the-Oder, Göttingen, Jena, and Berlin, where he was especially trained in jurisprudence, but also studied æsthetics, antiquities, and the Kantian philosophy, then newly propounded. After continental travel he spent some time in 1789–90 at Erfurt and at Weimar, where he met Schiller (then professor extraordinarius at Jena), with whom he formed a lasting friendship. In 1790 he became referendary in the Supreme Court of Judicature at Berlin, with the title of Prussian Councilor of Legation, but in 1791 resigned his appointment, and in 1794–97 was at Jena, active in scientific and literary study, and one of the Schiller circle. His interesting correspondence with Schiller, extending from 1792 to 1805, was published by him in 1830 with a "Vorerinnerung" (2d ed., by Vollmer, 1876; in the *Cotta'sche Bibliothek*, ed. by Muncker, 1893). From 1801 to 1806 he was Prussian Resident Minister at the papal court and in 1806–08 Minister Plenipotentiary. At Rome he was a most liberal patron of artists, including Rauch and Thorvaldsen; made philosophical, æsthetic, philological, and archæological researches; and wrote the elegy *Rom*, his most ambitious poem. In 1809 he was appointed Privy Councilor of State, in charge of public worship and education. After a successful administration, which introduced many reforms and organized and obtained endowment for the Berlin University (decreed 1807, opened 1810), he resigned the post in 1810, to accept that of Envoy Extraordinary and Minister Plenipotentiary at Vienna, with rank of Minister of State. In the political affairs of the time he took a prominent part. He was present at the Peace Congress of Prague in 1813, where he, almost single-handed, brought about the alliance of Austria with Russia and Prussia against France. In 1814 he was at the Congress of Châtillon and signed, with Hardenberg, the first Paris Treaty, and in 1814–15 attended the Vienna Congress as Prussia's Second Plenipotentiary. Humboldt likewise took part in the negotiations attending the conclusion of the second Paris Treaty, and was a member of the Territorial Commission at Frankfort-on-the-Main in 1816–17. As a State Councilor, he strongly disagreed with Chancellor Hardenberg on certain matters of tax reform, and in consequence he was sent to London as Ambassador. He returned in 1818 to attend the Congress of Aix-la-Chapelle and in 1819 was appointed to the Ministry of the Interior (then divided into two branches), with the department of communal and municipal affairs. His liberal opinions soon involved him in difficulties with the government. He demanded a new Prussian constitution which should combine the autonomy of provinces and governmental districts with a parliament chosen by direct election; and he attacked the Carlsbad decrees, which among various provisions established a censorship of the press and contained measures hostile to the universities and schools. Dismissed in 1819, he was not recalled to the Council of State until 1830. In the last years of his life Humboldt devoted much attention to art matters and to the organization of the Berlin Museum. He died April 8, 1835, at Tegel.

As a statesman, Wilhelm von Humboldt was enlightened and industrious, but perhaps hardly constructive. As a critical essayist, he was of transient influence. Of his poetical works, besides the *Rom* above mentioned, only the translation of the *Agamemnon* is now much read (1816; 2d ed., 1857; in the *Universalbibliothek* of Reclam). But, as a philologist, he marks an epoch. It was he who first called the attention of scholars to the phenomenon of the Basque language, particularly in the volume *Prüfung der Untersuchungen über die Urbewohner Hispaniens vermittelst der baskischen Sprache* (1821). His chief publication, *Ueber die Kawisprache auf der Insel Java* (3 vols., 1836–40), with its noted introduction, "Ueber die Verschiedenheit des menschlichen Sprachbaues" (separately printed 1835; 3d ed. of Pott's revision, 1880), was the first on the subject. Important dissertations read before the Berlin Academy include those on the comparative study of language, the province of the historian, and the origin of grammatical forms. Humboldt was in these and other writings the first to associate the science of comparative philology with philosophy, history, and other collateral studies, and to give it a universal significance. His *Ideen zu einem Versuch, die Grenzen der Wirksamkeit des Staates zu bestimmen* (ed. by Cauer, 1851, in Reclam's *Universalbibliothek*), which Schiller vainly tried to get published, limits the authority of the state to the inferior task of protecting the life and property of its citizens. The collected works appeared at Berlin (7 vols.) in 1841–52. Consult: Robert Haym, *Wilhelm von Humboldt, Lebensbild und Charakterisk* (Berlin, 1856); Adler, *Wilhelm von Humboldt's Linguistical Studies* (New York, 1866); Gebhardt, *Wilhelm von Humboldt als Staatsmann* (2 vols., Stuttgart, 1896–99); Kittel, *Wilhelm von Humboldts geschichtliche Weltanschauung* (Leipzig, 1901).

HUMBOLDT BAY INDIANS. See Wiyat Stock.

HUMBOLDT RIVER. The longest river of Nevada. It rises in Elko County, in the northeast corner of the State, and flows 350 miles in a generally southwest direction, emptying into Humboldt Lake, or Sink, in Churchill County, 80 miles northeast of Carson City (Map: Nevada, C 2). This "lake" is simply an expansion of the river and is held by a great gravel bank which was thrown entirely across the valley by the currents of the lake which once occupied this region and was about 500 feet deep at this point. Now the water sometimes evaporates faster than the river can supply it; at times of high water it formerly overflowed into Carson Sink, but this is now prevented by a dam. The river is only a few yards wide and grows smaller by evaporation towards its mouth. Its water is saline, and it flows through an arid and barren region covered with sagebrush, with the exception of a few fertile alluvial plains and clumps of willows. The valley of the Humboldt is flanked by rugged peaks, some of which reach an altitude of 11,000 feet above sea level; it is the only east and west pass through the mountains of Nevada, and it is followed throughout its course by the Southern Pacific Railroad. See Great American Desert.

HUME, Alexander Hamilton (1797–1873).

An Australian explorer, born in Parramatta in New South Wales. At the age of 17, accompanied by a younger brother, he discovered the Berrima country. In 1817 he was one of the discoverers of Lake Bathurst. He is best known as leader with Hovell of the cross-country expedition of 1824, on which, when question arose as to the part he had taken in it, he wrote *A Brief Statement of Facts in Connexion with an Overland Expedition from Lake George to Fort Phillip, in the Year 1824* (3d ed., 1874), and, with Hovell, *Journey of Discovery to Fort Phillip* (1837). He accompanied Sturt (q.v.) in his first exploration. A county in New South Wales, a mountain range in Victoria, and the Murray River (as an alternative title) bear the name of Hume.

HUME, David (1711–76). An English philosopher and historian. He was born at Edinburgh on April 26 (O. S.), 1711. His father was the laird of Ninewells in Berwickshire; but David, being the youngest son, had to make his fortune with no other assistance than an education and the influence of his family. He appears to have studied in the University of Edinburgh when 12 years of age, but his education for the most part consisted in home reading. His family designed the law to be his profession, and he submitted to the initial steps of the proper practical training; but it was not a pursuit to his liking. Deserting it, he experimented in a mercantile house in Bristol; but commerce was not more congenial to him than jurisprudence, and he gave it a very short trial. To use his own words, "I now went over to France with a view of prosecuting my studies in a country retreat, and there I laid the plan of life which I have steadily and successfully pursued. I resolved to make a very rigid frugality supply my deficiency of fortune, to maintain unimpaired my independency, and to regard every object as contemptible except the improvement of my talent in literature." He spent much of the next three years at La Flèche in intercourse with the Jesuits, and then he wrote his *Treatise of Human Nature*, which, however, he did not publish till 1739–40. It consists of three books, "Of the Understanding," "Of the Passions," and "Of Morals." Now one of the three or four most famous philosophical productions of England, at the time of its appearance "it fell deadborn from the press without reaching such a distinction as even to excite a murmur among the zealots," as Hume himself acknowledged, much to his mortification. He now turned to political theory and published anonymously in 1741–42 two volumes of *Essays Moral and Political*. In 1744 he was a candidate for the chair of "ethics and pneumatic philosophy" in the University of Edinburgh, but his *Treatise* had given him a reputation for "heresy, deism, skepticism, atheism, etc.," and the university would have none of him. In 1746 he obtained a "very genteel" appointment as secretary to General Saint Clair on "10 shillings a day, perquisites, and no expenses." An expedition had been planned to Canada, but an unsuccessful attack on L'Orient in France led to a recall of the general. Two years after Hume accompanied General Saint Clair to the court of Turin, as secretary and aid-de-camp, and took notes of his impressions of Holland, Germany, and Italy.

In 1748, during his absence on the Continent, he published his *Enquiry Concerning Human Understanding*. The following year he returned to England; in 1751 he gave to the public the *Enquiry Concerning the Principles of Morals*, and in 1752 the *Political Discourses*, said to have been the "cradle of political economy." At the same time he also composed *Dialogues on Natural Religion*, which, however, were not published till after his death. By this time he had put by enough money to gain him an income of £50 a year. Besides he had "a hundred pounds' worth of books, great stores of linens and fine clothes, and near £100 in his pocket, along with order, frugality, a strong spirit of independency, good health, a contented humor, and an unabated love of study," as he himself relates. In 1751 he had removed to Edinburgh, and a year later he was elected librarian to the Faculty of Advocates at a salary of £40. In 1754 he published the first volume of the *History of Great Britain, Containing the Reign of James I and Charles I;* the second volume appeared two years afterward. Then he took up the Tudors and, working backward, finished his *History of England* in 1762. In 1757 he had published *Four Dissertations: the Natural History of Religion; of the Passions; of Tragedy; of the Standard of Taste.* In 1763 he was a member of the embassy to France under Lord Hertford and here found himself famous. He was lionized by the society ladies, fêted by the nobles, and taken by the men of letters into their friendship. After his return he was made Undersecretary of State (1767–69) and by 1769 had an income of £1000 a year. In 1770 he retired from public life and built a home in Edinburgh on a new street, which was jocularly called St. David's Street, after him. Here he wrote *My Own Life*, and here he died, Aug. 25, 1776. His *History of England* became a classic as soon as it appeared; his economic writings were a fitting prelude to those of his friend Adam Smith (q.v.), while his philosophical works roused Kant "from his dogmatic slumber," gave rise by reaction to Scottish philosophy, and are among the most important of modern philosophical works. His philosophy was but the consistent development of Berkeley's idealism. (See Berkeley.) Berkeley had denied the reality of matter and had accounted for what passed for matter by making it a complex of ideas; but he still held to the reality of mind as the percipient of ideas. Hume, claiming to find no empirical evidence for the existence of mind or spirit in Berkeley's sense of the term, dropped out mind as Berkeley had dropped out matter and thus left nothing to be known except "perception" (impressions and ideas), together with certain fictions of the imagination, of which he gives no satisfactory account that can be made consistent with his general position. "All the perceptions of the human mind resolve themselves into two distinct kinds which I shall call impressions and ideas." These differ not by reason of any differences in the manner in which they are produced, but merely in priority and liveliness. Ideas are simply those perceptions which, appearing later than similar perceptions, are less forceful and vivid. Ideas are of two sorts—ideas of the memory and ideas of the imagination. Of these the former are the more lively and retain in great measure the order and sequence of these original impressions, whereas ideas of the imagination are fainter and are "not restrained to the same order and form with the original impressions." Ideas are associated in accordance with certain principles, viz., "resemblance, contiguity in time or place, and cause

and effect." There are no abstract ideas. Ideas of space are complexes of *minima visibilia*, or colored points, disposed in a certain manner. These points are indivisible. Ideas of time are derived from the succession of our perceptions, and as these perceptions are in the last instance indivisible, time is not infinitely divisible. A perception and a thing perceived are one and the same thing. A cause is an object precedent and contiguous to another, and so united with it in the imagination that the idea of the one determines the mind to form the idea of the other, and the impression of the one to form a more lively idea of the other. "There is no substance, hence no mind except the bundle of perceptions. A true skeptic will be diffident of his philosophical doubts as well as of his philosophical convictions." Skepticism is inevitable on this theory, inasmuch as belief is the liveliness of one's ideas, and this varies from time to time. Hume himself admitted that when he left his study and entered upon practical affairs his philosophy made small appeal to him. Philosophical arguments control only when one is in a philosophical mood; at other times human nature prompts to the beliefs which philosophy shows to be without rational foundation. In ethics Hume was a utilitarian. (See UTILITARIANISM.) Self-love cannot be the sole basis of reasonable action. "Crucial experiments" render such a view impossible. Sympathy is a real principle in human nature, and reflections on public interest and utility are the sole sources of the moral approbation paid to fidelity, justice, veracity, integrity. Sympathy does the work it does because it is our pleasure in other persons' pleasures and our displeasure in their pains. Thus, our own pleasure and pain are the springs of action, but they are not the ends of action.

A complete edition of Hume's philosophical works was published by Green and Grose (4 vols., London, 1874–75); his *Treatise* and two *Enquiries* in two volumes by Selby-Bigge (Oxford, 1889–94); his *History* has appeared in almost innumerable editions; his autobiography was edited by Adam Smith (London, 1777). Consult also: J. H. Burton, *Life and Correspondence of David Hume* (Edinburgh, 1846); T. H. Huxley, *Hume*, "English Men of Letters Series" (New York, 1879). For treatment of Hume's philosophy, consult: Friedrich Jodl, *David Humes Lehre von der Erkenntnis* (Halle, 1871); Edmund Pfleiderer, *Empirismus und Skepsis in David Humes Philosophie* (Berlin, 1874); Meinong, *Hume-Studien* (Vienna, 1877–82); Georg von Gizycki, *Die Ethik David Humes* (Berlin, 1878); T. H. Green, *Introduction to Hume*, in Green and Grose's edition of Hume's works; also published as part of vol. ii of Green's *Works* (London, 1885); W. A. Knight, *Hume* (ib., 1886); T. H. Huxley, "Hume with Helps to the Study of Berkeley," in *Collected Essays*, vol. vi (New York, 1902); Otto Quast, *Der Begriff des Belief bei D. Hume* (Halle, 1903); Oster, *Grosse Denker*, vol. ii (1911); A. Seth, *English Philosophers and Schools of Philosophy* (London, 1912); and the various histories of modern philosophy by Ueberweg-Heinze, Falckenburg, Höffding, Windelband, and Thilly.

HUME, JOHN. See HOME, JOHN.

HUME, JOSEPH (1777–1855). A British political reformer, born Jan. 22, 1777, at Montrose, Scotland. He was educated in the local schools of Montrose and at the age of 13 was apprenticed to an apothecary. He studied medicine, was admitted in 1796 a member of the College of Surgeons, Edinburgh, and became assistant surgeon in the marine service of the East India Company. He applied himself to the native languages and during the Mahratta War, from 1802 to 1807, filled the office of Persian interpreter to the army. He also discharged duties connected with the prize agencies and the commissariat and arrived in England in 1808, with a fortune of £30,000 or £40,000. He spent some years in travel and study and published a blank-verse translation of Dante's *Inferno* in 1812. By purchase he entered the House of Commons in 1812 as a Tory for the Borough of Weymouth. In 1818 he was elected for the Aberdeen district of burghs, comprehending his native town of Montrose. In 1830 he had gained such distinction as a radical reformer that he was returned unopposed as one of the members for Middlesex, which he represented until 1837. In 1842 he was again chosen for his native burgh, Montrose, and remained until his death in the service of his fellow townsmen. As leader of the Radical party in the House of Commons, he usually found himself in active conflict with both Whig and Tory governments and at first was treated with contemptuous tolerance. He was particularly active for the retrenchment of public expenditures, the abolition of imprisonment for debt and of flogging in the army, and the repeal of laws which operated to the disadvantage of artisans. He discovered the widespread conspiracy of the Orange lodges to make the Duke of Cumberland King at William IV's death, and a tardy but sincere homage was paid to his integrity and public services by Sir Robert Peel and other political opponents. He held various public offices, was a prominent member and leader of several notable societies, was twice elected lord rector of Aberdeen University, and promoted the establishment of Lancasterian schools. He died Feb. 20, 1855.

HUME, MARTIN ANDREW SHARP (1847–1910). An English historian, long a resident of Spain. His own name was Martin Andrew Sharp, the "Hume" having been assumed as a condition of receiving a legacy from a Spanish-English relative, who was a Hume. He was born in London, was educated at Madrid, and became editor of the Spanish State Papers in the Public Record Office, London. He saw active service with the Turks in 1878–79, and traveled extensively in Central and South America. His writings, largely concerned with Spanish-English relations, literary and other, in spite of a style and methods occasionally journalistic, had real merits which academic historians and critics did not always recognize. Notable among them are: *Philip II of Spain* (1897); *Spain: Its Greatness and Decay, 1479–1789* (1898; revised by Armstrong, 1913); *Modern Spain, 1788–1898* (1899; new ed., 1906); *The Spanish People* (1901), a popular recasting of the two preceding works; *The Love Affairs of Mary Queen of Scots* (1903), in which his patient research and gift of picturesque narrative are in evidence; *Spanish Influence on English Literature* (1905), which has too many marks of hasty improvisation; *Queens of Old Spain* (1907); *The Court of Philip IV; Spain in Decadence* (1907); *Two English Queens and Philip* (1908); *Queen Elizabeth and her England* (1910); and a posthumous volume, *True Stories of the Past* (1910).

HUME, or **HOME,** SIR PATRICK (1641–1724) A Scottish statesman. Born at Polwarth, Berwickshire, he was brought up a strict Presbyte-

rian, and after a term of law study at Paris he represented his native county in Parliament, where he at once took a foremost place as defender of the Covenanters. He went so far as to bring imprisonment upon himself, and on being freed was suspected of complication in the Rye House Plot, so that he was forced to remain in hiding until he could escape in disguise to the Continent. There he joined the Duke of Argyll and embarked with him on the unsuccessful expedition to Scotland (1685). Hume became a refugee with a price set upon his head; but he once more escaped abroad and lived at Utrecht under the name of "Dr. Wallace," professing to be a Scottish surgeon. He returned with William of Orange at the revolution of 1688. With estates restored, he was now a Scottish peer, Lord Polwarth; was made Lord Chancellor in 1696 and Earl of Marchmont in 1697. He strenuously opposed in Parliament the claims of the Old Pretender to the crown and voted for the union of Scotland with England, though he was not above the suspicion of having received a reward for so doing. Too dogmatic to be popular, he did not hold office in the United Kingdom till the reign of George I, when he was given some minor charges, but shortly retired.

HU'MERAL VEIL (Lat. *humerale,* covering for the shoulders, from *humerus, umerus,* shoulder; connected with Gk. *ὦμος, ōmos,* Goth. *amsa,* Skt. *aṁsa,* shoulder). An oblong veil of silk, either white or of the color prescribed for the day, which is worn over the shoulders by the subdeacon in the mass, when he holds the paten from the offertory to the paternoster, and by the priest in giving benediction or carrying the Blessed Sacrament in procession. See COSTUME, ECCLESIASTICAL.

HU'MERUS (Lat., shoulder). The largest and longest bone of the upper extremity; the bone of the arm proper, extending from the shoulder to the elbow. It is divided anatomically into a shaft and two extremities. The upper extremity is rather the larger and has a semiglobular head which is partially received into the shallow glenoid cavity of the scapula, or shoulder blade, forming a ball-and-socket joint. Two processes or projections of the shoulder blade assist the glenoid cavity in completing the cavity or seat of the head of the humerus. There are three ligaments which hold the humerus to the scapula —the capsular, the coracohumeral, and the glenoid, the relations being somewhat similar to those of the hip joint (q.v.). The shaft of the humerus is nearly cylindrical in its upper part, but triangularly prismatic below, becoming flattened and broad at the lower extremity, where are placed the two condyles, with their articular surfaces, and the trochlea between them, which form, with the two bones of the forearm, the elbow joint. (See ARM; SKELETON.) The broad, flat lower extremity has two depressions on the anterior aspect of the bone—one slight one on the outer side called the radial depression, which is for the reception of the anterior border of the head of the radius, when the arm is strongly flexed; the other, called the coronoid depression, for the reception of the coronoid process of the ulna during flexion of the arm. Opposite the latter depression, on the posterior surface of the bone, is a deep triangular depression, called the olecranon fossa, for the reception of the olecranon process of the ulna when the forearm is extended. The humerus forms with the scapula, as above mentioned, a ball-and-socket joint, the shoulder joint (q.v.). The elbow joint is a hinge joint and to a certain extent, in its relation to the head of the radius, a ball-and-socket joint.

HUM'FREY, HUM'PHREY, or **HUM'PHRYS,** PELHAM (1647–74). A famous English musician and one of the founders of modern English music. He was born in London. He was one of the children of the Chapel Royal and while yet a boy composed considerable Church music, and in a book of *Divine Services and Anthems,* published by Clifford in 1664, there are five anthems ascribed to him. Upon the breaking of his voice he was sent by Charles II to France for instruction under Lully. Upon his return, in 1667, he was appointed to the Chapel Royal; he became master of the children in 1672 and composer in ordinary for the violins to his Majesty in 1673, and wrote many pieces for the King's band, an organization modeled after "Les Petits Violons" of Louis XIV. His compositions are still in use (many of them still in manuscript) in all the cathedrals and churches of England and America. They are remarkable for their expression and depth of sentiment as well as for bold innovations in harmony. He died at Windsor and was buried in the cloisters of Westminster Abbey near the southeast door.

HUMID'ITY (from Lat. *humiditas,* moisture, from *humidus, umidus,* moist, from *humere, umere,* to be moist; connected ultimately with Gk. *ὑγρός, hygros,* Icel. *vökr,* moist), ATMOSPHERIC. The moisture or aqueous vapor in the atmosphere. This vapor is really an invisible gas and is the most important component of the atmosphere as to quantity next after nitrogen and oxygen. When this invisible vapor becomes visible, it is called dew, fog, mist, haze, cloud, rain, hail, snow, frostwork, or frost, according to the size of the drops of water or the method in which the vapor condenses. Water and ice are not included under the term "atmospheric humidity," that term being strictly confined to the invisible vapor.

The aqueous vapor in the air is perpetually falling to the earth as rain or snow and is renewed by evaporation from the ocean, the lakes and rivers, vegetation, and the soil itself. The quantity of aqueous vapor in a cubic foot of air varies greatly with temperature and locality on the earth's surface. Thus, in the air of Arizona and New Mexico there is oftentimes only from 3 to 10 per cent of the amount that could be held in case the air were saturated. The quantity that can be held in a saturated space varies greatly with the temperature, but does not depend upon the barometric pressure and is also quite independent of the presence of air in that same space, since the aqueous vapor and the dry air coexist side by side. The elastic pressure of the dry air and the elastic pressure of the aqueous vapor added together produce what is ordinarily called barometric or atmospheric pressure. The weight of the moisture and the weight of the dry air added together determine the density of a cubic foot of atmosphere at any time. When a cubic foot of space contains as much aqueous vapor as it can possibly hold at any given temperature, it is said to be saturated with moisture. Such vapor will then exert a certain maximum pressure, known as the saturation pressure, which is the maximum for that temperature. Any effort to compress such vapor will cause condensation, but the pressure will remain the same. The saturation pressure is higher the higher the temperature. The accompanying table gives saturation

pressures for a number of different temperatures and shows, moreover, that there may be as much in an extreme case as 20 grains of invisible aqueous vapor in a cubic foot if the space is saturated at the temperature of 100° F., and this vapor will exert an elastic pressure of about one pound to the square inch, such as would be counterbalanced by a column of mercury of about 1.9 inches of the barometer. If, now, dry air is added to this cubic foot of space until a pressure of 30 inches is exerted in all directions, then the weight of the dry air at a temperature of 100° F. will be 465 grains per cubic foot, and the combined weight of the vapor and the air, or the so-called saturated air, will be 485 grains. The accompanying table gives these relations for saturation at a pressure of 30 inches and for temperatures between 0 and 100, computed according to the data adopted in the Psychrometric Tables of Prof. C. F. Marvin (United States Weather Bureau, 1900):

PRESSURE AND WEIGHT OF VAPOR AND AIR IN A CUBIC FOOT OF ATMOSPHERE AT A PRESSURE OF 30 INCHES WHEN SATURATED AT THE RESPECTIVE TEMPERATURES

TEMPERATURE	Vapor pressure	Dry air pressure	Vapor weight	Dry air weight	Total weight saturated air
Degrees Fahrenheit	Inches	Inches	Gr. per cu. ft.	Gr. per cu. ft.	Gr. per cu. ft.
0	0.038	29.962	0.48	605.32	605.80
10	0.063	29.937	0.78	591.93	592.71
20	0.103	29.897	1.24	578.79	580.03
30	0.164	29.836	1.94	565.79	567.73
40	0.247	29.753	2.85	552.89	555.74
50	0.360	29.640	4.08	539.93	544.01
60	0.517	29.483	5.74	526.75	532.49
70	0.732	29.268	7.98	513.00	520.98
80	1.022	28.978	10.93	498.48	509.41
90	1.408	28.592	14.79	482.65	497.64
100	1.916	28.084	19.77	465.77	485.54

This table shows that the capacity of the unit volume of space or air for aqueous vapor increases very rapidly with rising temperature. When the space is not saturated, the atmosphere is said to have a relative humidity expressed as a given percentage of complete saturation. Thus, if the air has a temperature of 100° and contains only 10 grains of vapor per cubic foot, it contains only 50 per cent of the maximum amount possible at that temperature.

Water vapor at a given pressure and temperature weighs less than two-thirds as much as the same volume of pure dry air under the same conditions; hence air heavily charged with moisture is relatively lighter than dry air. The coefficient of expansion of unsaturated vapor is commonly assumed to be the same as for air.

The humidity of the atmosphere is usually determined by either the dew-point apparatus or the psychrometric apparatus. In the former the air is cooled down without altering the quantity of moisture that it contains, and the temperature at which that moisture saturates the air is determined. This dew-point temperature is always lower than the temperature of the free air. In the psychrometric method the temperature of a thin layer of water that is evaporating under standard conditions in the open atmosphere is determined. From this temperature of evaporation the psychrometric formula gives us the vapor tension, the temperature of the dew point, and the quantity of moisture in the air. In general the temperature of the dew point is about as far below the temperature of evaporation as the latter is below the temperature of the air.

The rate of evaporation from a moist surface diminishes with increasing humidity of the air, so that the total evaporation under a given wind in any given unit of time indicates the average dryness of the air during that time.

Nearly all animal and vegetable substances, by reason of their cellular structure, absorb moisture from moist air, but give it up to very dry air. They are, therefore, perpetually expanding and contracting, curling and uncurling, and their changes may be utilized in the construction of hygrometers. When moist air cools by radiation at night to temperatures below the dew point, the vapor is precipitated, forming cloud, mist, fog, or dew. On the other hand, when air rises, thereby coming under less pressure, it expands, does work, and is cooled dynamically by reason of the work done. Ordinary air cools at the rate of 1° F. for 183 feet of ascent. In this way air that is forced over a mountain may be cooled below the dew point and form cloud or rain. The moisture in ordinary dry air is easily absorbed by many substances, such as sugar, flour, salt, and in very moist weather objects may become so damp that fungus germs floating in the air and settling on them take root and cover them with mold or set up fermentation within them.

The humidity of the atmosphere, although invisible, has a special and strong influence in absorbing radiant energy, whether from the sun or from the earth. See HYGROMETER.

HUMIL'IA'TI (Lat. nom. pl., humbled). A monastic order which originated in the eleventh or twelfth century and was confirmed by Innocent III in 1201. In the sixteenth century it had 94 houses, with about 170 monks, in Italy; but, as it was corrupt, Carlo Borromeo (q.v.) tried to reform it. This attempt led to a murderous assault on him, so Pius V in 1571 suppressed the order. Several of their houses were turned over to the Barnabites.—A female order of Benedictines, originating with the wives of the first Humiliati, known as humiliate nuns, or nuns of Blassoni, from their founder, Clara Blassoni, of Milan, served as nurses, etc. The order still exists in Italy, with five houses. Consult Maximilian Heimbucher, *Orden und Kongregationen* (Paderborn, 1908).

HU'MITE GROUP. A group which includes the three minerals chrondrodite, humite, and clinohumite, of which chrondrodite and clinohumite are monoclinic and humite is orthorhombic. They are basic fluosilicates and are closely related chemically. A vitreous to resinous lustre is common to the group, and the general color is

red, brownish red, brown to yellow. The humite group occurs mainly in ejected masses of limestone.

HUMMEL, hụm'mel, JOHANN NEPOMUK (1778–1837). A distinguished Austrian pianist and composer, born at Pressburg. When but eight years of age, he accompanied his father to Vienna on the appointment of the latter as kapellmeister of Schikaneder's Theatre. Here he came under the notice of Mozart, who became so interested in the boy that he admitted him to his own family and instructed him for two years. His début in 1787 was also under the auspices of Mozart. Next followed a number of very successful tours through Germany, Denmark, England, and Holland. His entire career was marked by success and the appreciation of the public—so much so that at one time he was considered to rival Beethoven. His principal appointments were as follows: from 1804 to 1811, deputy kapellmeister under Haydn in the service of Prince Esterházy; 1811–16, a successful teacher of composition in Vienna; kapellmeister to the court of Stuttgart 1816–19, when he resigned to take a similar position at Weimar. None of these appointments interfered with his concert activities. From about 1829 his health gradually failed, and after much suffering he died at Weimar. As a pianist he ranked with the most famous of his generation, and as a composer he was in great vogue even for many years after his death. His compositions number over 100, and include operas, cantatas, ballets, and considerable chamber music. He is of importance in the history of music chiefly as the originator of the present method of fingering in pianoforte study.

HUM'MELER (from *hummel*, variant of *humble*, *hamble*, to mutilate, from AS. *hamelian*, OHG. *hamalōn*, to maim, Ger. *hammeln*, *hämmeln*, to geld, from OHG. *hamal*, *ham*, mutilated; possibly connected with Skt. *śam*, to injure). An implement or machine used, especially in Scotland, for removing the awn from the grain of barley after it has been threshed. It consists essentially of a vertical shaft set at different heights with blunt knives or beaters and revolving rapidly in a cylindrical case so as to beat the grain as it falls through the cylinder and thus detach the awns. Some forms of the implement are operated by hand, while others are arranged as attachments to threshing machines.

HUM'MING BIRD (so called from the sound of its whirring wings). One of the diminutive birds of the order Coraciiformes and family Trochilidæ, closely related to the swifts. More than 600 species are known, exclusively American and mainly confined to the tropics, though a few species are summer visitors to colder latitudes, as far even as 61° N. A few, also, of the tropical species inhabit elevated mountainous tracts, even to the confines of perpetual snow. In the United States 18 species of humming birds are known, but only one of these is found east of the Mississippi and north of Florida. All of the others belong to the Southwestern States and the Pacific coast (see below).

Characteristics. The brilliancy of humming birds, the rapidity with which they dart through the air, their hovering above the flowers from which they obtain their food, with a humming sound of wings which move so quickly as to be indistinctly visible or "like a mist," have attracted universal admiration. The diminutive size of almost all of them—some are the smallest of birds and when stripped of their feathers not larger than a bumblebee—has still further contributed to render them objects of interest. Like the bumblebees, too, they perform a service in the cross-fertilization of flowers. Consult Belt, *Naturalist in Nicaragua* (London, 1888).

The largest-known species is *Patagona gigas* of the Andes, which reaches a length of 8½ inches; but this is really gigantic, few species exceeding 6 inches. The smallest-known species is *Calypte helenæ*, which is only 2¼ inches long; it is a native of Cuba.

The plumage of the different species exhibits an almost endless variety of form as well as of color, in crests, neck tufts, leg tufts, and many an extraordinary development of tail. The plumage of the males is usually far more varied and glittering than that of the females, and to the believers in the theory this group of birds furnishes an extensive and forcible example in support of the doctrine of sexual selection (q.v.). Much of the metallic brilliance of the plumage, which in the gorgets and elsewhere often exhibits a gemlike coruscation and iridescence, is due to the interference of light by the minute scales upon the surface of each feather and not to pigments. The young resemble their mothers until they reach maturity.

Food, etc. Humming birds have slender bills, which are also generally long, and in some extremely so, the form of the bill exhibiting adaptation to the kind of flowers from which the bird obtains its food—straight in some, curved in others. The bill of the swordbill (*Docimastes ensifer*) is 5 inches long, much longer than the head, body, and tail of the bird together, while in *Rhamphomicrum microrhynchum* the bill is only ¼ of an inch long. In the sickle-billed humming birds (see HERMIT HUMMING BIRD) the bill is notably curved so as to form almost one-third of a circle, while in *Avocettula* it is sharply and abruptly recurved at the tip. Humming birds do not, as was long supposed, feed on honey alone, but to a considerable extent, and many of them chiefly, on insects, not excepting spiders, while they often snatch away the insects which have become entangled in spiders' webs. The lower mandible fits into the upper, and the bill is thus adapted as a tube for sucking, in which, as well as in seizing small insects within the recesses of flowers, the tongue is also a very efficient organ. The tongue is very long, capable of being darted out to a considerable length; the bone of the tongue is much elongated, and its branches pass round the back of the skull to the forehead, where they meet in a point before the line of the eyes. The tongue itself consists of two filaments, joined together for the greater part of their length and separated at the tip. The wings of humming birds are very long and powerful, the first quill feather the longest, and the rest shorter in succession.

Nests, etc. These diminutive birds construct exquisite nests of shreds of bark, soft grass, or cottony substances. They are placed in a great variety of situations, from a mere saddling upon a branch to an attachment to the tip of a pendent and swaying leaf or tendril; and often the exterior is made almost invisible by having a coating of lichens or something else allying it closely to its background. The eggs are invariably two in number, and they are always plain white. The tiny owners are very bold in defense of their nests and young and are said to strike fearlessly with their needle-like bills at the eyes of birds of prey, which they far surpass in agil-

HUMMING-BIRDS

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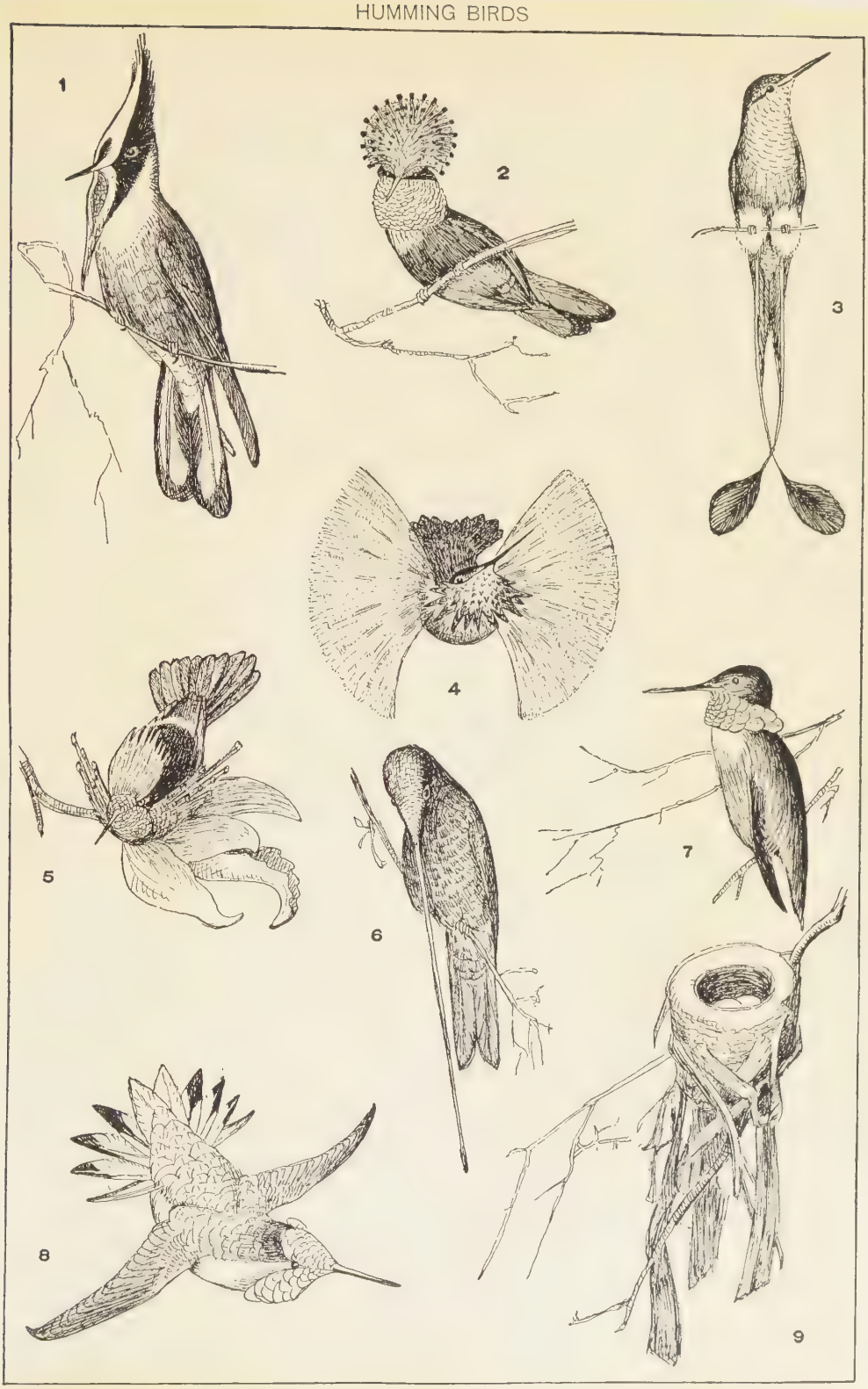
1 RUBY THROATED HUMMING-BIRD
ARCHILOCHUS COLUBRIS
2 CALLIOPE HUMMING-BIRD - STELLULA CALLIOPE
3 GOLDEN HUMMER - HELIOTHRIX AURITUS
4 LONG-TAILED HUMMING-BIRD
AITHURUS POLYTMUS

NATURAL SIZE

HUMMING BIRDS



1. HELMET-CREST (Oxypogon guerinli).
2. SPANGLED COQUETTE (Lophornis reginæ).
3. RACKET-TAIL (Steganura underwoodi).
4. CALLIOPE HUMMER (Stellula calliope).
5. TUFTED COQUETTE (Lophornis ornatus).
6. SWORDBILL (Docimastes ensiferus).
7. RUFOUS HUMMER (Selasphorus rufus).
8. FLORESIS HUMMER (Selasphorus floresii).
9. NEST OF RED-THROATED SAPPHIRE (Hylocharis sapphirina).

ity and rapidity of flight. They are very easily, however, imbued with confidence in a person with whom they are familiar and have been known to return again in spring, after a winter migration to a warmer climate, to the window from which they had been allowed to escape. Attempts to keep them in confinement have generally failed, and few have ever been carried alive across the Atlantic. Most of the hummers have no song, their only notes being querulous squeaks of wrath or fear. A few of the tropical forms, nevertheless, are said to be slightly musical. The skins of humming birds were employed for ornamental purposes by the more civilized American races before the discovery of America by Europeans, and were used by the Mexicans for making the pictures which excited the admiration of their Spanish conquerors.

Examples. The helmet crests (*Oxypogon*) are Andean and owe their name to their high-pointed head ornaments. The coquettes (*Lophornis*) are small, much ornamented hummers of the Amazon region and are easily recognized by their fanlike crests and by the spangled frills on each side of the neck. They are numerous and well scattered in South America, where one of the most beautiful is the "tufted" coquette of the island of Trinidad and the adjacent mainland. The racket-tailed hummer (*Steganura*), whose home is a limited region near the head of the Amazon, is among the smallest and most extraordinary of these birds, and is described as crossing, recrossing, and "snapping" in a marvelous way its long tail feathers in the air, as it darts about, especially when a rival male is near. The long-tailed species of the genus *Aithurus* are West Indian; the one figured is a denizen of Jamaica.

Rubythroat, etc. Of the several humming birds of the United States, the ruby-throated (*Trochilus*, or *Archilochus*, *colubris*) is most widespread and familiar. It extends far to the north in summer and may be found breeding from Florida to Hudson Bay. In winter it retires to subtropical regions and is found from southern Florida to Central America. It is less than 4 inches long, and the principal color is bright shining green. The throat of the male is a beautiful metallic ruby red. This exquisite bird arrives in the northern United States early in May, with the opening of the cherry blossoms, and goes south late in August or early in September. In the Rocky Mountain region of the United States the rubythroat is replaced by the broad-tailed hummer (*Selasphorus platycercus*), a somewhat larger bronze-green bird with rose-purple throat. On the Pacific coast the common hummer is the Nootka Sound, or rufous, humming bird (*Selasphorus rufus*), about the size of the rubythroat, but deep rufous above, with the throat brilliant scarlet. It is notable for its occurrence as far north as Nootka Sound, Alaska, but it winters in Mexico. The commonest species in California, where it is resident through the year, is Anna's humming bird (*Calypte anna*), a trifle smaller than the rubythroat and of more exquisite coloration. The male is bronze-green above, with the whole head and throat brilliant purplish or rose red.

Bibliography. The literature devoted to humming birds is very extensive, including several hundred titles, but the most important works are: John Gould, *Monograph of the Trochilidæ* (London, 1861), and D. G. Elliot, *Synopsis and Classification of the Trochilidæ* (Washington, 1879), while to the American reader Robert Ridgway, "The Humming Birds," in *Annual Report of the Smithsonian Institution for 1890* (Washington, 1892), is by far the best popular work. See Helmet Crest; Hermit Humming Bird; Hill Star; Sunbird.

HUMMING-BIRD MOTH. See Colored Plate of Moths, American.

HUMMOCK. See the first Hammock.

HUMOR, Aqueous. See Aqueous Humor.

HUMORESKE, hụ'mō-rĕs'ke (Ger., Dan., from *humor*, Lat. *humor*, humor, disposition, from *humere*, to be moist). Originally a short, humorous tale or sketch, but applied by Schumann to short compositions for the pianoforte in a rather free form and distinguished by originality in harmonic and rhythmic combinations rather than by any really humorous elements. Heller, Grieg, and Dvořák have adopted the title for similar compositions of their own.

HU'MORS. See Hippocrates; Medicine.

HUMP'BACK. A rorqual (family Balænopteridæ), or whalebone whale, of the genus *Megaptera*, in which the dorsal fin forms a lump upon the back. It is found in all seas, often reaches a length of 50 feet and sometimes much more, is thick and ungainly, and yields 50 or more barrels of oil. The baleen is short and of poor quality. This whale (*Megaptera longimana*) is recognizable at a long distance by its lolling, irregular manner of swimming, and at the mating season pairs indulge in antics highly amusing because of their size and uncouthness. They strike each other with their long flippers, and these love-pat caresses may be heard miles away. It is believed that in these performances originated the stories current about the attack on the whale by the thresher shark, which, as a matter of fact, could not injure such an opponent. See Rorqual; Whale, and Plate of Whales.

HUMP'BACKED' SALMON. One of the smallest and poorest of the Pacific salmon (*Oncorhynchus gorbuscha*). It weighs only three to six pounds and is distinguishable by the small size of the scales and by the oblong coarse markings on the tail. It is occasionally seen in California and in the Columbia River, but is common from Puget Sound northward, where it is the dog salmon, or gorbuscha, of Alaska; also called haddo and hay-ko by the Indians, who smoke-dry it and use it as winter food. See Salmon, and Plate of Salmon.

The term "humpbacked" is applied to other fishes having an elevated dorsal outline, especially an Alaskan whitefish (*Coregonus nelsoni*).

HUMPED CATTLE, or Zebu. The common domestic cattle of India and the East, known in books as zebu, or zubr, but not so called anywhere in the Orient. It seems to be a distinct species (*Bos indicus*), of which no wild examples remain. Certain bands of these cattle running wild have, however, ranged the forests of eastern India for hundreds of years and are large, long-horned, and shy. In addition to the enormous hump on the fore shoulders, these cattle show some convexity of the forehead, concavity of the upper border of the short horns, large drooping ears, and a very large dewlap. In size and color they vary considerably. The most common colors are ashy gray or creamy buff, but red, brown, black, and even white ones are seen. A certain number of white bulls are held sacred by the Hindus, whence the name Brahminy, often given to the entire race; and these wander about, dev-

astating crops and feeding upon the vegetables exposed for sale in the bazars without serious interference. The humped cattle are diffused over India, China, the Asiatic islands, Madagascar, and the east coast of Africa. There are many breeds, differing much in size; the largest are greater than any oxen of Europe, while the smallest are not much bigger than a large mastiff. The hump of the largest breeds is said to be sometimes 50 pounds in weight. English residents in India esteem the hump as delicious for the table. There are hornless breeds, and a breed with two fatty humps, one behind the other, is common in the vicinity of Surat. The voice resembles the grunting of the yak almost as nearly as the lowing of the ox. The zebu is used in India both as a beast of draft and of burden, is yoked in the plow, is occasionally used for riding, can travel from 20 to 30 miles a day, and is very gentle and docile. In recent years they have been introduced into Jamaica and some of the Central American republics in considerable numbers and are used on the large banana estates.

Galla Ox, or Sunga. A breed of humped cattle domesticated in East Africa, and most common in Abyssinia, remarkable for its massive horns, which sometimes form the figure of an upright lyre above its head. A sunga's horn may be 46 inches long and 15 inches around the base. This variety was known in ancient Egypt and has been regarded as the parent stock of the Indian breeds of humped cattle; while Blyth finds in it an affinity to the banteng. Consult *Proceedings of the Zoölogical Society of London* (London, 1898), and Richard Lydekker, *Wild Oxen, Sheep, and Goats* (ib., 1898).

HUMPERDINCK, hụm'pẽr-dĭnk, Engelbert (1854–1921). A German composer, born in Siegburg, near Bonn. He was studying to become an architect at Cologne, when he came under the influence of Hiller (q.v.) and was persuaded to devote himself to music. From 1874 to 1876 he studied at the Cologne Conservatory and from 1876 to 1879 at the Musikschule in Munich. Having won the Mendelssohn prize, he spent the next two years in Italy, where he met Wagner, who became greatly interested in him. For the last two years of the master's life Humperdinck was practically a member of his family, assisting in the preparation of *Parsifal*. Later he also became the teacher of Wagner's son Siegfried. After Wagner's death he went again to Italy and then to Spain, where he taught composition at the Conservatory of Barcelona (1885–86). After his return he lived for some years in Cologne and in 1890 accepted a position in the Hoch Conservatory in Frankfort. In 1900 he was called to Berlin as director of the Meisterschule. His fame as a composer dates from the phenomenal success of his fairy opera *Hänsel und Gretel* (1893), built almost entirely upon familiar folk tunes. In 1905 he visited the United States upon the invitation of the management of the Metropolitan Opera House, which induced him to remodel the incidental music to a fairy drama, *Die Königskinder*, written in 1896, into an opera. It was produced for the first time at the Metropolitan Opera House in 1910 and almost equaled the success of *Hänsel und Gretel*, but was received with much less enthusiasm in Germany. Humperdinck has little inventive power, but covers this deficiency by resorting to folk themes, which he treats in truly masterly style. His exquisite harmonization and orchestration also are important factors contributing to his well-deserved success. His other operas, none of which rise to the heights of either of the two mentioned, are: *Die sieben Geislein* (1897); *Dornröschen* (1902); *Die Heirat wider Willen* (1905); *Die Marketenderin* (1914). He also wrote incidental music to several fairy plays, to Aristophanes' *Lysistrata*, Shakespeare's *Tempest*, Maeterlinck's *Blue Bird*, and Vollmoeller's *Miracle* (staged by Reinhardt); two ballads for soli, chorus, and orchestra, *Das Glück von Edenhall* and *Wallfahrt nach Keevlaar;* a *Moorish Rhapsody* for orchestra; and many smaller choruses for male and mixed voices.

HUM'PHREY, Duke of Gloucester, known as The Good Duke (1391–1447). The youngest son of Henry IV, he was Regent of England under Henry V and Protector previous to the coronation of Henry VI. He married Jacqueline, heiress of Holland and Hainault, and in 1424 overran Hainault, which was recovered by the Duke of Brabant. Later he married Eleanor Cobham, who was imprisoned for life for treason, and at the time of his death Humphrey himself was under similar charge. Consult K. H. Vickers, *Humphrey, Duke of Gloucester* (London, 1907).

HUMPHREY, Heman (1779–1861). An American Congregational clergyman and educator. He was born at West Simsbury, Conn., graduated at Yale in 1805, and was pastor of the Congregational church in Fairfield, Conn., from 1807 to 1817, and of that in Pittsfield, Mass., from 1817 to 1823. He was president of Amherst College from 1823 to 1845, during the infancy of that institution. He was an early advocate of temperance, and a report of his on the subject made in 1813 is said to have been the first temperance tract. Among his publications there are, besides biographies, *The Sabbath* (1830); *Tour in France, Great Britain, and Belgium* (1838); and *Domestic Education* (1840). Consult W. S. Tyler, *History of Amherst College during 1821–71* (Springfield, 1873).

HUMPHREY, Pelham. See Humfrey, Pelham.

HUMPHREY CLINKER, The Expedition of. A novel in the form of letters, by Tobias Smollett. The work was published in 1771 and founded partly on Anstey's *New Bath Guide* and partly on the author's own life.

HUM'PHREYS, Alexander Crombie (1851–). An American gas engineer and educator, born in Edinburgh, Scotland. Having come to the United States in 1859, he was a member of the staff of a New York insurance company (1866–72) and was afterward secretary and superintendent of a Greenville (N. J.) gaslight company. In 1877–81 he studied at Stevens Institute of Technology (Hoboken, N. J.), from 1881 to 1885 he was chief engineer of the Pintsch Lighting Company of New York, and in 1885 he was appointed superintendent of construction of a gas-improvement company, of which he became general superintendent and ultimately commercial manager, with headquarters at Philadelphia, Pa. From 1892 to 1908 he was senior member of the Humphreys and Glasgow Gas Company of London, a branch of which he established in New York in 1894 (reorganized in 1910 as Humphreys and Miller, Inc.). During his connection with these various enterprises he greatly furthered the manufacture of water gas. In 1902 he was elected president of Stevens In-

stitute. In 1912 he served as president of the American Society of Mechanical Engineers. He published *Lecture Notes on Some of the Business Features of Engineering Practice* (1905; 2d ed., rev. and enlarged, 1912).

HUM'PHREYS, Andrew Atkinson (1810–83). An American soldier. He was born in Philadelphia, graduated at West Point in 1831, and was assigned to the artillery. He resigned in September, 1836, and for the next two years was a civil engineer employed on government work under Major Hartman Bache. In July, 1838, he reëntered the army as first lieutenant and was assigned to the corps of topographical engineers. From 1842 to 1849 he was assistant in charge of the Coast Survey Office. Later he was engaged in the surveys of the delta of the Mississippi and in those for various railroads. Soon after the outbreak of the Civil War he became a member of the staff of General McClellan, with the rank of major, and in the Peninsula campaign was chief topographical engineer of the Army of the Potomac. In April, 1862, he was promoted to be brigadier general of volunteers, and he was afterward in command of a division in the Fifth Corps of the Army of the Potomac, participating in the battles of Fredericksburg and Chancellorsville. In the battle of Gettysburg he commanded the Second Division of the Third Corps, and as such had an active share in the second day's fighting, earning promotion to a major-generalship in the volunteer service. From July 8, 1863, to November, 1864, he was chief of staff to General Meade and subsequently commanded the Second Corps of the Army of the Potomac in Grant's final campaign against Lee. He was brevetted major general in the regular army for services at Sailor's Creek, commanded the District of Pennsylvania for a time, and after being mustered out of the volunteer service was placed in command of the Engineer Corps with the regular rank of brigadier general. He was retired from active service in 1879. He published *The Virginia Campaigns of 1864 and 1865* (1882), *From Gettysburg to the Rapidan* (1882), and, with H. L. Abbott, a *Report on the Physics and Hydraulics of the Mississippi River* (1861).

HUMPHREYS, David (1752–1818). An American soldier, diplomat, and poet, born in Derby (now Ansonia), Conn., July 10, 1752, and educated at Yale College, where he graduated in 1771. He entered the army early in the Revolutionary War, was commissioned captain of the Sixth Connecticut on Jan. 1, 1777, two or three months later became major of a brigade under General Parsons, was made aid to General Putnam in 1778, and in 1780 became Washington's aid and military secretary. He conveyed to Congress the official reports of the surrender of Yorktown, was put in charge of the colors and standards captured from the British troops, was raised to the rank of lieutenant colonel, and for his services received from General Knox, in 1786, a sword voted by Congress five years before. In 1784 he acted as secretary of the commission, consisting of Adams, Jefferson, Franklin, and others, that went to Paris to arrange commercial treaties between foreign powers and the United States. He served in the Connecticut Legislature in 1786, participated in the suppression of Shays's Rebellion in 1787, and from 1788 to 1790 lived with Washington's family at Mount Vernon, where he wrote *An Essay upon the Life of Gen. Israel Putnam.* In 1789 he served on a commission appointed to treat with the Creek Indians. From 1791 to 1796 he served as United States Minister in Lisbon, being the first diplomatic representative of the United States ever sent to Portugal, and was then made Minister Plenipotentiary to Spain. In 1801 he returned, bringing with him the first merino sheep introduced into the United States. In the War of 1812 he served as brigadier general of the Connecticut militia. He was a fellow of the Royal Society of London and a prominent member of the literary coterie known as the Hartford Wits, with whom he wrote the *Anarchiad.* His other writings include: *The Widow of Malabar,* a translation of the French tragedy; *An Address to the Armies of the United States* (1782); *The Happiness of America; The Future Glory of the United States;* and many political papers and orations. He died in New Haven, Feb. 21, 1818.

HUMPHREYS, Joshua (1751–1838). An American shipbuilder of Revolutionary times. He was Welsh by descent, but was a native of Haverford, Pa. In 1794, when Congress decided to build up the navy, the most capable shipbuilders in the country were consulted. The designs of Humphreys were regarded as the best and were accepted. The ships laid down upon his designs were the *Constitution, President,* and *United States* of 44 guns, and the *Chesapeake, Constellation,* and *Congress* of 38 guns. These famous ships formed the nucleus of the navy which achieved such success in the War of 1812, and for this reason Humphreys was called by many people "the father of the American navy."

HUMPHREYS, Milton Wylie (1844–). A distinguished American classical scholar, born in Greenbrier Co., W. Va. He served in the Confederate army from 1862 to 1865, and from 1867 to 1875 he was associate and adjunct professor of the ancient languages at Washington and Lee University (A.M., 1869). In 1872–74, while absent on leave, he studied at Berlin and Leipzig and received the degree of Ph.D. at the latter university in 1874. Having held the chair of Greek at Vanderbilt University from 1875 to 1883, he was professor of ancient languages at the University of Texas from 1883 to 1887, and in the latter year became professor of Greek at the University of Virginia, where he remained until his retirement in 1912. In 1882–83 he was president of the American Philological Association, and for a number of years he was American editor of the *Revue des Revues.* His publications include excellent editions of *The Clouds* of Aristophanes (1885), the *Antigone* of Sophocles (1891), and the oration *On the Crown* of Demosthenes (1913). Besides his extraordinary mastery of Greek, Professor Humphreys had a wide knowledge of mathematics. In classics he was noted in part for his skill in interpretation, in part for his mastery of ancient Greek metres, displayed both in the introduction to his edition of the *Antigone* and in papers entitled "On Certain Influences of Accent in Latin Iambic Trimeters," "On Elision, especially in Greek," "The Influence of Accent in Latin Dactylic Hexameters," "On the Nature of Cæsura," in the *Transactions of the American Philological Association* (1876, 1878, 1879). These papers, on important topics, are of the first rank for scholarship and insight.

HUMPHREYS, William Jackson (1862–). An American physicist, born at Gap Mills, Monroe Co., W. Va. He was educated at

Washington and Lee University (A.B., 1886; C.E., 1888), at the University of Virginia (1888–89), and at Johns Hopkins University (Ph.D., 1897). He taught physics and mathematics at the Miller School (Va.) in 1889–93, physics and chemistry at Washington College (Md.) in 1893–94, and physics at the University of Virginia from 1897 to 1905. He was professor of meteorological physics at the United States Weather Bureau after 1905 and also at George Washington University after 1911. He participated in the United States eclipse expeditions to Georgia in 1900 and to Sumatra in 1901 and directed the Mount Weather Observatory in 1905–08. He is author of contributions on electric discharges, on flash spectra, on pressure effect on arc spectra, and on isothermal layers of the atmosphere.

HUMPHRYS, Pelham. See Humfrey, Pelham.

HUMPTU'LIP. See Salishan Stock.

HUMP YARD, Railway. A hump yard is a set of railroad tracks so arranged as to facilitate separating trains or drafts of cars according to prearranged plans for distributing the cars in groups according to destinations, routes, or traffic requirements. The hump yard, as distinguished from a classification yard operated in some other way, has a track raised over a natural or constructed hump from 6 to 15 feet high, with a grade on either side of from 0.4 to 3 per cent. Cars are pushed by a locomotive to the summit of this hump, are uncoupled there, and run down from the hump by gravity. The first hump yard built in the United States was at Huff's Station, south of Greenbush, Va., and was built in 1882 by the Pennsylvania Railroad. A large modern hump yard may have four tracks over the hump, two in each direction, with a classification yard on either side of the hump. In a yard such as this there would be from 20 to 30 classification tracks on either side of the hump, and each track would have a capacity of from 40 to 50 cars. The classification tracks branch off from the track running from the hump, and the switches from the hump track to the classification track are in a modern yard controlled by compressed air from a central station.

HU'MUS (Lat., ground). A generic term for the decomposed organic matter contained in soil. During decomposition of vegetable matter the carbon, nitrogen, oxygen, and hydrogen pass off in the form of water, carbon dioxide, ammonia, etc., or are carried down into the earth in solution, while the remainder of the constituents form compounds less easily removed, to which the name "humus" is properly applied. These compounds have been investigated chemically, but little is known as to their nature and relations; special names have been given to a few of them, as crenic acid, apocrenic acid, ulmic acid, and ulmin. They are of importance in relation to the fertility of the soil, increasing its power of absorbing and retaining water, lessening its tenacity, and causing more rapid absorption of heat from the sun's rays. They may also indirectly afford nutrition to plant life. See Soil; Compost.

HUMUS PLANTS. Plants which grow naturally in humus soil. Ordinarily in nature, where large amounts of humus are found, there is a rich development of forest trees. Associated very intimately with the humus, however, are a number of plants which depend not only upon the rich organic food found in the humus and in the shade furnished by the trees, but also upon the presence of fungi which permeate the humus. The significance of these fungi is discussed under the head Mycorrhiza. Until recently the plants dependent upon humus have been called saprophytes, but inasmuch as more close investigation has shown that the dependence is very rarely directly upon the humus, but rather upon the fungi spoken of above, such plants are now referred to as symbiotic saprophytes. Among these are found not only plants destitute of chlorophyll, like the Indian pipe, but also a large number of green plants, even forest trees, such as beech and pine. Another group of humus plants is found in the soils of peat bogs having an acid reaction. Plants of very xerophytic character are peculiar to these soils, and members of the heath family (Ericaceæ, q.v.) are particularly abundant (see Bog), the leatherleaf (*Chamædaphne calyculata*), the cranberry, and some of the blueberries being among the best known. Attempts to cultivate the blueberry, until recently, have been quite unsuccessful; but a few good patches have been grown upon acid humus, thus opening a new field in horticulture and at the same time utilizing areas that were productive only after the acid, naturally in the soil, had been neutralized by heavy applications of lime. See Forest; Saprophyte.

HUN, Henry (1854–). An American neurologist. He was born at Albany, N. Y., graduated in 1874 from Sheffield Scientific School (Yale), where he was an assistant in physics in 1874–75, and in 1879 graduated from Harvard Medical School. In 1885 he became professor of nervous diseases at the Albany Medical College (Union University). He served as secretary (1888–1909) and as president (1910) of the Association of American Physicians and as president of the American Neurological Association for the year 1913–14. His writings include *Guide for American Medical Students in Europe* (1883) and *Differential Diagnosis of the Diseases of the Nervous System* (1913).

HUNAN, hōō'nän' (Chin., south of the lake, i.e., the Tung-ting Lake). An inland province of China, bounded on the east by the mountains of Kiangsi, on the south and southwest by the Nan-shan Mountains, which separate it from the provinces of Kwangtung and Kwangsi, on the west by Kweichow and Szechwan, and on the north by Hupeh (Map: China, K 6). Area, 83,380 square miles. It is made up of the basins of four rivers, which discharge into the Tung-ting Lake and through it into the Yang-tse. The chief of these rivers are the Siang, which rises in the Nan-ling and flows north, receiving many tributary waters in its course; the Tsze; and the Yuen, which has its origin in the southeast of Kweichow, the latter furnishing the shortest and most satisfactory route to Kweichow, Yunnan, and Burma, being navigable by native boats as far as Chenyuanfu on the Kweichow frontier. The general slope of the province is towards the lake. Hills attaining in some places the height of mountains are found in the south, southeast, and along the Kweichow border on the west. The soil is fertile, and in many parts two crops a year are produced. The chief agricultural products are tea, rice, hemp, and tobacco. Hunan is one of the principal tea-producing regions of China, and immense quantities, over 300,000 piculs, are shipped every year to foreign countries from Hankow. The coarser varieties are

prepared in brick form and sent overland via Hankow to Siberia and Russia. Rafts of timber are floated annually down the Yuan River to Hankow, in value as high as 10,000,000 taels a year. Both bituminous and anthracite coal is found and mined. The anthracite is of good quality and is exported. Iron, copper, and tin are also found. Capital, Changsha (pop., 250,000). Changsha was opened to foreign trade in 1904. The population of Hunan is estimated at from 20,500,000 to 23,600,000. Hunan was for a long time a closed province to foreigners, and Changsha was noted for its antiforeign propagandas; but this hostile spirit has almost entirely disappeared. Changsha is noted at present for its learning, culture, wealth, and the independence and sturdiness of its people, the latter trait characteristic of the Hunanese in general. Other large cities are Changteh (pop., 150,000); the "treaty port" Yochow, opened in 1899 (pop., 20,000); and Siangtan (pop., about 350,000). The Changsha-Chuchow section, 33 miles in length, of the Canton-Hankow Railway was built entirely by the Chinese and has been in operation since September, 1911.

HUNCH'BACK', THE. The most successful comedy of J. Sheridan Knowles, produced in 1832.

HUN'DRED (AS. *hundred*, Ger. *hundert*, from AS., Goth. *hund*, OHG. *hunt*, Ger. *hund*, OIr. *cēt*, Lith. *szimtas*, Lett. *simts*, OChurch Slav. *sŭto*, Lat. *centum*, Gk. *ἑκατόν*, *hekaton*, Skt. *śata*, hundred + AS. *-red;* connected with OHG. *radia*, Ger. *Rede*, account, speech, Goth. *raþjō*, Lat. *ratio*, reckoning, *reri*, to think). An ancient territorial unit in England, less than a shire or county, and usually greater than a parish or town. The origin of the name is involved in obscurity, but it is supposed to be derived from a convenient grouping of 100 families for purposes of defense or for local administration. Hundreds varied greatly in size in different parts of England, from 2 square miles in the southern counties to 300 square miles in Lancashire; but they maintained considerable uniformity within the limits of a given county. They were not mere subdivisions of the county, being both historically and for various administrative purposes independent of the greater territorial division within which they were included. See WAPENTAKE.

Each hundred had a court of ancient and forgotten origin, which was known as the *Hundred Court*. This was held at frequent intervals and appears to have been of equal authority with the county courts, though its jurisdiction seems to have been more restricted, being apparently confined to civil causes, such as actions of debt and trespass. Like the other customary courts of the feudal period, such as the county courts, courts baron, and the like, the hundred courts were composed of the freeholders of the hundred, who were liable to do service as "suitors," i.e., triers of suits, as one of the obligations of their freehold tenure. Most of these courts have been abolished and their jurisdiction transferred to the county courts; but a few, which were courts of record, have been permitted to survive.

But the hundred was more than a political and administrative unit; it was also a communal unit. It was liable in damages for a false judgment given by the hundred court. As early as the reign of Edgar it was provided that the hundred should be responsible for the administration of justice and liable to punishment by fine or otherwise if thieves and other criminals were not brought to justice. The Statute of Winchester in 1285 (13 Edw. I, c. 2) made the hundred liable to respond in damages for robberies committed within its limits if the offender was allowed to escape punishment. At a still earlier period it was subject to the famous murder fine imposed by the laws of Canute upon any hundred in which any one not an Englishman was found slain. (See ENGLISHERY.) As lately as 1886 a hundred was held liable for damages resulting from rioting. Consult: William Stubbs, *Constitutional History of England* (3 vols., Oxford, 1880); Pollock and Maitland, *History of English Law* (Boston, 1899); W. S. Holdsworth, *A History of English Law*, vols. i–iii (ib., 1908–09). See CHILTERN HUNDREDS.

HUNDRED DAYS, THE (Fr. *les cent jours*). The term of Napoleon's second reign as French Emperor. The period extended from March 20, 1815, the date of his entry into Paris, to June 28, when Louis XVIII once more assumed power. At Elba Napoleon had been kept informed of the dissension prevailing among the allies at the Congress of Vienna and of the extreme unpopularity of the restored Bourbons in France. Seizing the opportunity, he left Elba, February 26, landed with 900 men near Cannes, and called upon the country to rise in his favor, March 1. The apathy of the Bourbons at Paris allowed Napoleon time to recruit his strength. When Louis at last bestirred himself, it was too late. The Napoleonic fever had spread, the soldiers of the Empire rallied around their old leader, and the troops sent out against him joined his standard. The final blow to the monarchy came when Ney, after great hesitation, went over to Napoleon, who entered Paris in triumph March 20, Louis having fled northward to Ghent. Napoleon immediately organized a government, issued writs for the election of an extraordinary assembly to draft a new constitution, abolished the existing Legislature, and began to raise troops. Meanwhile the allies at Vienna, on hearing of his landing, pledged themselves to hunt down the "bandit" and to put him out of power once for all. Eight hundred thousand men were sent out against him. At Paris there was a foreboding that this sudden restoration could not last; but though men had lost much of the fear and respect Napoleon had been wont to inspire, the work of organization nevertheless went on actively. On June 1, in the Champ de Mars, Napoleon solemnly swore to this new constitution, which was very liberal in character, and then set out with his army, for he had succeeded in raising 287,000 men, for the north. (See LIGNY; QUATRE-BRAS; WATERLOO.) Four days after Waterloo, June 22, he abdicated in favor of his son, attempted to escape to America, failed, gave himself up to the English, and ended his days at St. Helena. See FRANCE.

HUNDRED YEARS' WAR, THE. The name of the long series of contests waged by the English kings, between 1337 and 1453, to gain the French crown and French territory. It was by no means an uninterrupted war, but rather a succession of battles, truces, and peaces. The first great period of the war extends from 1337 to 1380. Philip VI (1328–50), of the house of Valois, had succeeded Charles IV, the last of the direct descendants of Hugh Capet, since, in accordance with the Salic Law (q.v.), the crown of France could be transmitted through the male line only, though Edward III of England was

a nearer relation to the late King, his mother, Isabella, being a sister of Charles. Edward's claim, however, was weak in this, that if females could transmit claims to the crown, then there were others who had even better claims than the English King. On June 6, 1330, and May 30, 1331, Edward by letters patent recognized Philip's claims, and, had the latter been a more capable man, war might not have resulted. The French King interfered in the affairs of the Flemish cities, with which England had intimate commercial relations. Moreover, Edward was influenced by the exiled Robert of Artois, who had been unable to obtain his inheritance from Philip VI. Edward declared war in 1337 and gradually made alliances with the Emperor Louis IV and John of Brittany, who was opposed by Charles of Blois, cousin of Philip VI, in his attempts to secure his inheritance. It is this war in Brittany which the great chronicler Froissart (q.v.) has especially described. On the other hand, Philip established that close alliance of France and Scotland which was to endure for centuries. There were many small skirmishes during the first years of the war, the most important of which was the naval battle of Sluys in 1340; but neither side gained decisive victories, and on Jan. 9, 1343, a truce was concluded for three years, each side retaining its possessions. Hostilities, however, were resumed in 1345. At this juncture the alliance of the Flemish cities was lost to England by the death of Jakob van Artevelde (q.v.), the leader of the Flemings, who perished in a popular tumult. On Aug. 26, 1346, the English, under the leadership of Edward himself, won their first great victory at Crécy (q.v.), which showed that the French knights could not stand against the well-disciplined yeoman archers of England. The victors took possession of Calais in 1347.

Meanwhile France was already experiencing the evils of war; the distress of the peasants was great; financial troubles set in, made worse by the tampering with the coin and the ever-increasing taxes. The second great defeat of the French took place at Poitiers (q.v.) in 1356, where the famous Black Prince led the English, and where King John, the successor of Philip VI, was taken prisoner. The States-General now for a time had control of the administration. Their leaders were Etienne Marcel, provost of the Merchants, Robert le Coq, Bishop of Laon, and Charles the Bad of Navarre; but the revolt of the peasants (see JACQUERIE) in 1358 caused the more conservative classes to rally to the aid of the Dauphin Charles, who had been appointed regent by the States-General during King John's captivity. A brief breathing spell was brought about in 1360 by the Peace of Bretigny (q.v.). John died in 1364, and his son Charles V (q.v.), who was to be known as "the Wise," succeeded him. Himself an unwarlike man, he had the help of a great soldier in Du Guesclin (q.v.). His object was to regain the lands his father had lost, and by interfering with the possessions of the English in France and attacking them in Spain he forced a new war in 1369. Du Guesclin did not attempt to meet the English in the open, but harassed them and cut off their supplies, and the English experienced a succession of misfortunes. Moreover, in 1376 the Black Prince died, and there was no one capable of taking his place; a year later Edward III also died and was succeeded by Richard II, a minor. When, in 1380, Charles VI (q.v.) succeeded his father, few possessions remained to the English in France. In 1396 a truce for 28 years was signed, which ended the first period of the war.

In France meanwhile Charles VI had become insane, civil war broke out between the factions of the Armagnacs (see ARMAGNAC) and the Burgundians, and Paris itself was distressed by the rising of the Cabochiens (q.v.) in 1413. In England Richard II was overthrown by Henry IV in 1399, and the latter was succeeded in 1413 by his son Henry V. But the house of Lancaster did not feel secure on the throne, and nothing would turn the attention of the people away from internal affairs as completely as a foreign war. So in 1415 the war began again with the invasion of France by Henry V. France disunited offered an easy prey to the English, and soon the country was almost entirely in their possession, especially as they were aided by Philip, Duke of Burgundy (q.v.), who was eager to revenge the murder of his father, John the Fearless (q.v.). To the first year of this period belongs the battle of Agincourt (q.v.), fought on Oct. 25, 1415, the last of the three great English victories. On May 20, 1420, the Treaty of Troyes was signed, by which Henry V was recognized as Regent of France and the heir of Charles VI, while the Dauphin was disowned by his own mother. The English held practically the whole of France.

In 1422 both Henry V and Charles VI died, and the former was succeeded by his son, Henry VI, a child of 10 months, who was crowned Henry of France at Paris, his uncle Bedford being Regent. Charles VII, the successor of Charles VI, gave no signs of ability, and it seemed as if Henry VI would really hold France permanently. But when affairs looked darkest, France was saved by Joan of Arc (q.v.), who came forward and raised the siege of Orléans in 1429, thus turning the tide of war. From that time on the English slowly but surely lost ground, and when, in 1453, their last great captain, Talbot, fell at Castillon, the war ceased. Of all the extensive English conquests in France, nothing remained except the city of Calais and a small adjoining district. This France did not regain until 1558.

Consult: William Longman, *Edward III* (London, 1869); Henri Wallon, *Jeanne d'Arc* (Paris, 1875); Edouard Hardy, *La guerre de cent ans* (ib., 1879); Lavisse and Rambaud, *Histoire générale*, vol. iii (ib., 1894); G. W. Kitchin, *History of France* (Oxford, 1896–1903); E. Deprez, *Les préliminaires de la guerre de cent ans* (Paris, 1902); J. Bouchier, *Chronicle of Froissart* (New York, 1903). See FRANCE; ENGLAND; BURGUNDY.

HUNEBOURG, ụn'bo͝or', COMTE DE. See CLARKE, H. J. G.

HUNEEUS, o͞o'nā-ā'o͝os, JORGE (1831–89). A Chilean statesman, born in Santiago. He was educated at the University of Santiago and after graduation taught mathematics in the institute. A fine speaker and a leader of the Liberal opposition, he was sent into exile by President Montt, but improved his time by studying the government and people of the United States. Recalled to his native land in 1861, he was elected to the House of Representatives and became its Speaker. He was made professor of administrative and constitutional law in the university the same year, professor of political economy in 1869, and rector in 1883. While lecturing at the university, he successively held the positions of secretary of the departments of Justice, Public Instruction, and Foreign Affairs, and senator from

the Province of Atacama. He published: *Historia política de Chile* (1862); *La administración Montt* (1863); *Historia de la guerra con España* (1866); *Historia de la guerra del Pacífico* (1883). His most important work is *La Constitución ante el Congreso* (1879). Consult J. Huneeus, *Obras* (4 vols., Santiago, 1890–91), edited by his sons and published by the government.

HUNEKER, hŭn'ĕ-kĕr, JAMES GIBBONS (1860–1921). An American musical writer and critic, born in Philadelphia, Pa. He was a pupil of Alfredo Barili, and of Ritter and Doutreleau for theory, in Paris. On the completion of his studies in the latter city he returned to New York, where he took up his permanent residence (1885). He was musical editor, and in 1902 became dramatic editor, of the New York *Sun*. His numerous contributions to the leading magazines and reviews contain vigorous and consistent presentations of his musical ideals. Much of his later work is in the nature of essays. His writings include: *Mezzotints in Modern Music* (1899); *Chopin as Man and Musician* (1900); *Melomaniacs* (1902); *Overtones* (1904); *Iconoclasts* (1905); *Visionaries* (1905); *Egoists: A Book of Supermen* (1909); *Franz Liszt* (1911); *The Pathos of Distance* (1913).

HUN'ERIC. See HUNNERIC.

HUNFALVY, hŭn'fŏl-vĕ, JÁNOS (1820–88). An Hungarian geographer and statistician. He was born in the County of Zips, Hungary, became professor of statistics in the Academy of Kesmark, took part in the political agitation preceding the revolution of 1848, and was professor of history in the polytechnic school at Buda (1866–70) and of geography in the University of Pest after 1870. He was elected a member of the Hungarian Academy in 1865 and died in Budapest. Hunfalvy wrote a *Universal History* (1850–51) and a *Universal Geography*. Of the latter only two volumes appeared during the author's lifetime; the third was published in Budapest in 1890. An excellent descriptive work on Hungary, entitled *A magyar birodalom természeti viszonyainak leirása*, appeared in 1863–66. He issued in German his *Ungarn und Siebenbürgen in Originalansichten* (1856), and in both German and Magyar his work on the *Travels of Ladislas Magyar* (1859).

HUNFALVY, PÁL, or PAUL (1810–91). An Hungarian philologist, ethnographer, and historian, brother of the preceding. He was born in the County of Zips, studied law at Pest, and from 1842 to 1848 was professor of law at Kesmark. Then he was elected to the Hungarian Diet, in which he sat until it was dissolved, when he went to Pest and in 1856 founded the philological review *Magyar Nyelvéazet*. Having been elected to the Hungarian Academy in 1859, he was for many years its librarian. He wrote: *Chrestomathia Fennica* (1861); *Utazás a Baltenger vidékein*, travels in the Baltic country (1871; Ger. trans., 1874); treatises on the dialects of the Voguls (1872) and the Ostiaks (1875); a Magyar ethnography (1876; Ger. trans. by Schwicker, 1877); in Prochaska's series on the peoples of Austria-Hungary, a volume entitled *Die Ungarn oder Magyaren* (1881); *Die Rumänen und ihre Ansprüche* (1883), in which he contends that the place of origin of the Rumanian nation must be sought south of the Danube: and *A Rumun nyelv*, a study of the Rumanian language (1878).

HUNGA'RIAN CONFESSION, THE. A confession of faith prepared by the Synod of Czenger and adopted by the Reformed church of Hungary, 1558. Its chief points were its emphatic rejection of the anti-Trinitarian views which had spread widely through Hungary, of the Roman Catholic and Lutheran doctrines of the Eucharist, and of Anabaptism. Upon the point of reprobation it is silent. The confession was superseded in 1567 by the Hungarian Synod's acceptance of the Second Helvetian Confession (1566). Consult Schaff, *Creeds of Christendom*, vol. i (New York, 1881), and Curtis, *History of Creeds and Confessions* (Edinburgh, 1911).

HUNGARIAN GRASS. See FOXTAIL GRASS.

HUNGARIAN LANGUAGE. Called by those who speak it, Magyar; one of the Ural-Altaic group of languages, and both politically and literally the most important representative of the group. With the exception of the closely allied Finnish (including the various Finnic dialects spoken in Russia, as well as the Lapp) and Turkish, and the problematic Basque in the Pyrenees, it is to-day the only European language that does not belong to the Indo-Germanic group. The Ural-Altaic languages are divided into: (1) the Finno-Ugric and (2) Samoyedic, forming the Ural branch; and (3) Turkic, (4) Mongolic, and (5) Tungusic, forming the Altaic branch. The linguistic position of Hungarian was for many years the subject of a heated controversy—one school, led by Vámbéry, claiming its close affiliation with Turkish, while the other, under Hunfalvy, placed it where it is now recognized as belonging, in the Finno-Ugric division.

Hungarian, like other Ural-Altaic tongues, is agglutinative in structure. It is built upon a basis of monosyllabic roots, through the addition of successive suffixes, which entail no inner change or structural modification in the original stem, but are merely set up in a row, one after another, like a row of bricks. The suffixes themselves, however, are modified in obedience to a law of so-called vowel harmony, which forms the most distinctive feature of this group of languages. The vowel sounds in Hungarian are divided into three classes: open vowels, a, á, o, ó, u, ú; close vowels, e, ö, ő, ü, u; middle or neutral vowels, é, í, i. These neutrals may be used indifferently in words containing vowels of either of the other classes; but suffixes containing open or close vowels may stand only after a root containing a vowel of the same class, e.g., *házban*, 'in the house'; *kertben*, 'in the garden'; *váratandanak*, 'they will be expected'; *kéretendenek*, 'they will be entreated.' The pronunciation of the consonants is similar to that of Latin, excepting the sibilants and a few others which are peculiar to the language. Thus, Eng. *s* is written *sz;* Eng. *sh* is represented by *s;* Eng. *ts* by *c* or *cz;* Eng. *ch* by *cs;* Eng. *j* by *ds;* and the sound of *z* found in *azure* by *zs*. Hungarian has no inflectional endings, in the strictest sense of the term. It has no grammatical gender, or even suffixes indicative of sex; ő means 'he' or 'she,' *neki*, 'to him' or 'to her,' and so on. In expressing case relations the bare stem is used regularly for the nominative and to some extent for the possessive; the other cases are represented by means of the various postpositive particles which in Hungarian take the place of prepositions: e.g., *ház*, 'house'; *házban*, 'in the house'; *házbol*, 'out of the house'; *házelött*, 'in front of the house'; *házhoz*, 'towards the house'; *házal*, 'with the house'; *házat*, 'house' (accusa-

tive); *házalatt*, 'under the house'; *hazfelett*, 'above the house'; etc. A noteworthy peculiarity is the system of possessive suffixes employed with substantives, closely analogous to the personal endings of the verbs: e.g., *házam*, 'my house'; *házad*, 'thy house'; *háza*, 'his (her) house'; *házunk*, 'our house'; *házatok*, 'your house'; *házuk*, 'their house.' In the absence of the auxiliary verb 'to have,' these possessive endings are used with the verb 'to be,' to denote ownership; *nekünk van házunk*, 'to us is house ours,' i.e., 'we have a house.' The verbal system in Hungarian is highly developed, giving the language a remarkable flexibility and a wide range of expression, though it offers to foreigners the chief difficulty in acquiring the language. There are two distinct forms of the active verb—a definite and an indefinite form, differing throughout in their terminations. Their respective uses are exceedingly idiomatic, but in general the distinction between them depends upon whether or not the object of the verb is a definite person or thing: *látok*, 'I see'; *a kutyát látom*, 'I see the dog.' Hungarian is especially rich in derivative verbs. Not only are there suffixes which, added to the simple verbal stem, form causative, frequentative, inceptive, intensive, diminutive, reciprocate, potential, and desiderative stems, but with the characteristic facility of agglutinative languages, two or more of these suffixes may be used in combination, resulting in such linguistic anomalies as reflexive-frequentative-potential, intransitive-diminutive-potential, and transitive-frequentative-causative-potential verbs. The following examples will give some idea of the formation of derivative verbs: *látni*, 'to see'; *látogatni*, 'to visit'; *beszélnek*, 'they talk'; *beszélgetnek*, 'they chatter'; *beszélkednek*, 'they talk with each other'; *ver*, 'he beats'; *verinthet*, 'he can beat gently.' Among the peculiarities of the language are: the two-person suffix, *lak*, used in place of the regular ending of the first person, when the subject of the verb is 'I,' and the object 'thee' or 'you'; the use of the singular number with ordinal numerals, e.g., *tíz ház*, 'ten house' (not 'houses'); and the inverted order of name and surname, e.g., Arany János = John Arany; Petofi Sándor = Alexander Petofi. The requirements of emphasis often allow the words in a short Hungarian sentence to be put in an order the reverse of that in English: e.g., *Pénzemet elvett szolgálom*, 'money-my away-took servant-my' ('my servant took (away) my money'). The extent to which agglutination may be carried in the Hungarian language will be illustrated by the fact that it is possible to perform the following operation of word building: *Magyar*, 'Hungarian'; *Magyarázni*, 'to render into Hungarian,' hence 'to explain,' 'to translate'; *megmagyarázni*, 'to translate,' with the added notion of the accomplishment of the action, the syllable *meg* having the force of the German prefixes *be* and *er*; *megmagyarázhat*, 'he may translate'; *megmagyarázhatatlan*, 'that cannot be translated,' 'untranslatable'; *megmagyarázhatatlanabb*, 'more untranslatable'; *legmegmagyarázhatatlanabb*, 'most untranslatable'; plural subs. *legmegmagyarázhatatlanabbak*, 'the most untranslatable'; *a legmegmagyarázhatatlanabbakal*, 'with the most untranslatable.' A large number of names of common things in the Hungarian language are borrowed from the Slavic and German.

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HUNGARIAN LITERATURE. Until modern times literature in the vernacular did not flourish to any very great extent in Hungary. Latin was the general medium of cultured expression during the Middle Ages, and even recently it has sometimes sought to supplant the popular tongue in official and literary use. There are, however, documents in Hungarian or Magyar that belong to the mediæval period, most of them being translations of legends and of books of the Bible. The earliest continuous monument of Magyar is a funeral ceremonial dating from about the beginning of the thirteenth century. From the middle of the fifteenth century until the second half of the sixteenth century there was some activity in the way of translating into Hungarian the lives and legends of the saints and the individual books of the Bible.

With the religious revolution ordinarily termed the Reformation there was inaugurated a more important era of literary production. Poetry was cultivated by Valkai, Tinódi, Rimai, Balassa; but no very great degree of originality marked the ensuing period, for from then until the closing years of the eighteenth century Magyar literature was chiefly one of imitation. Considerable attention, however, was shown to some of the more striking forms of literary art. Thus, during the sixteenth and seventeenth centuries lyric verse was cultivated; the drama was started by Karádi (1569); and much prominence was given in the seventeenth century to epic verse, by the poems of Zrinyi, Gyöngyösi, Liszti, and others. Before the commencement of the eighteenth century there also appeared many works of a polemical, legal, and philological nature.

During the eighteenth century an endeavor was made by the central authorities to subordinate Hungarian life and patriotic feelings to Germanic ideals. The attempt failed; but it resulted temporarily in an undue production of books in Latin and German, to the detriment of composition in Magyar.

Near the close of the century, and with the advent of the French Revolution, there was a reaction, and societies for the cultivation of the Magyar tongue were formed, and various periodicals (the first newspaper in Hungarian was started by Ráth at Pressburg in the eighth decade of the eighteenth century) founded in the same interest. The new movement, which coincided with the great national awakening in Hungary, bore rich fruit; and within the first quarter of the nineteenth century all foreign elements

gave way before it. The credit of this is largely due to Francis Kazinczy, the great linguistic reformer, and the poets Csokonai, Dajka, Verseghy, Alexander Kisfaludy, and Virág. The golden age of Hungarian literature was the 30 years preceding the revolution of 1848–49. Charles Kisfaludy, brother of Alexander, created the Hungarian drama by his tragedies and comedies, and his contemporary Katona won great fame as a writer of tragedy. Kölcsey, by his poems, ballads, prose writings, and orations, exerted a potent influence upon the patriotism of the nation. Fáy's fables and Czuczor's and Vörösmarty's popular epics also did much to evoke and foster a true national feeling. In the lyrics of Alexander Petőfi, one of the greatest and most original of modern poets, whose "Up Magyars!" became the war hymn of the revolution, and in the epic verses and ballads of Arany, Hungarian literature reached its culmination in the middle of the nineteenth century. Their contemporary, Bajza, was not only an eminent lyrical poet, but an historical writer and æsthetical critic. Jósika (a disciple of Scott's) and Eötvös, eminent in the field of fiction, exercised a large influence. In the domain of political literature and journalism Széchenyi, Kossuth, Eötvös, and Csengeri hold high rank. In the field of history Horváth, Jászay, and Szalay deserve mention. In 1848 the powerful national awakening culminating in revolution supplied a new inspiration. National consciousness prompted Tompa's *Folk-Tales* and *Folk-Sagas* (1846) and Erdélyi's *Hungarian Folk-Songs and Tales* (1846–48), with literary and æsthetic essays. Erdélyi's *Poems* (1844), lyric in the main, exercised a powerful influence over the famous trio, Petőfi, Arany, and Tompa. Arany (1817–82), the greatest ballad writer, surpassed him in formal perfection, and his greatest work also was a national epic, *Toldi*, in 12 cantos, celebrating the exploits of Toldi, the Hungarian Samson. Tompa (1819–68), unexcelled for sombre melancholy, struck the popular fancy with his *Poems* (1847). In drama Szigligeti (1814–78), with a wonderful mastery of dramatic development and situation, mostly based on intrigue, created a new genre with *The Deserter* (1843), which still holds the boards. His masterpiece, *Mamma* (1857), and other successful plays called forth a host of successors, with the results that the Viennese farces and vaudevilles were banished from the Hungarian stage.

However, the revolution of 1848–49 doomed many gifted writers to the dungeon, the scaffold, or exile. Lyric poetry was under the ban; the activity aroused sought new channels. Arany translated Shakespeare, Tasso, Goethe; Szász followed suit with masterly versions of Molière, Hugo, Dante, Shakespeare, Tennyson, Goethe, Schiller, and Heine. At this time the novel, with its opportunities for covert allusions, and the drama gained ascendancy. Jókai (1825–1904), novelist, poet, publicist, historian, and political champion, won his reputation, and Szász (1829–1905) proved his genius equally prominent in lyric poetry, fiction, and journalism. In 1860 the Austrian restraint was modified, and this gave a new impetus to literature. Tolnai's (1837–1902) *Ballads* (1861) were justly classed with Arany's; his *Lyric Poems* (1865) are strikingly original and tinged with melancholy, while the same brooding over life's problems characterizes his novels. Madách (1826–64) grappled with philosophical questions in *Man's Tragedy*, his best work. Rákosi (1842–) produced in *Æsop* (1866) a comedy remarkable for poetic language and deft character drawing, while his keen drama, *Magdalen*, and the æsthetic study of tragedy are among the best contributions to Hungarian drama.

The constitution of 1867 marked a new epoch: the fight for nationalism being over, the Hungarians could look more soberly upon themselves, the wider horizons of cosmopolitanism having opened new vistas. In short stories, novels, and especially in his comedies, *The Good Patriots* (1872) and *New Men* (1873), Toldy (1844–79) gave splendid satires of contemporary life. Csiky (1842–91), the most fertile playwright, elicited applause with his *Proletarians*. Hungarian literature has its realistic writers, its psychological fiction, the short stories of Gyulai (1826–1909), who fosters the highest literary ideals in his *Poems* (1882), his critical studies and university lectures. Kornél Abrányi (1849–), in the character play *The Infallible Man* and the novels *Who is Stronger?* and *The Philosophy of the Husband*, devoted himself to a study of the problems of marriage. Mikszáth (1849–1910), probably the most popular novelist of the day, champions the peasants in North Hungarian village stories, matchless in their style, language, and sympathetic tone. Herczeg (1863–) shows an extraordinary power of psychological analysis in his portraits of the higher classes of Hungarian society. Finally Sigismund Bródy (1840–), a wonderful complex of unusual powers and nonchalance in workmanship, represents symbolism hand in hand with the most uncompromising realism.

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HUNGARIAN MILLET. See FOXTAIL GRASS.

HUNGARIAN MUSIC. See MAGYAR MUSIC.

HUNGARIAN POLITICAL PARTIES. See POLITICAL PARTIES, *Hungary*.

HUNGARIAN VERSION. See BIBLE.

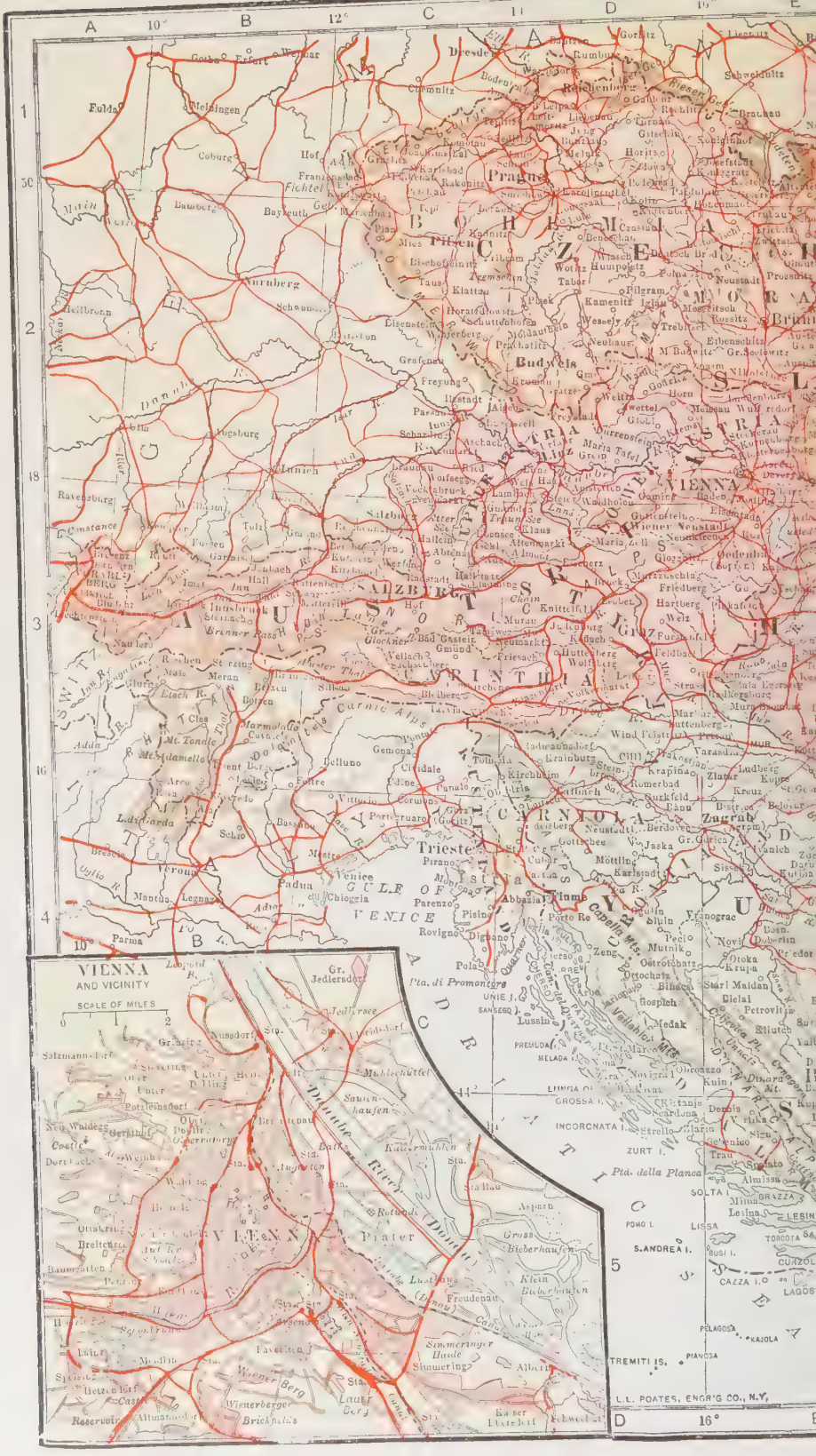
HUN'GARY, or, officially, THE LANDS OF THE HUNGARIAN CROWN. A kingdom of central Europe, constituting one of the units in the dual monarchy of Austria-Hungary. It occupies a compact area of 125,608 square miles, comprising Hungary proper, with Transylvania and the crownlands of Croatia and Slavonia and Fiume, which are united to Hungary, but have more or less independent administrations. The Lands of the Hungarian Crown are often designated as Transleithania, or the country beyond the Leitha, the Austrian half of the monarchy being called Cisleithania, or the country on this side of the Leitha, the Leitha being a small river which forms a part of the boundary between the two divisions. The Hungarian name of the country is Magyarország (pronounced möd'yŏr-ŏr'säg), the 'land of the Magyars' (Hungarians); the German name is Ungarn. The Kingdom of Hungary, exclusive of Croatia and Slavonia, has the form of an oval with its longest axis lying east and west along the parallel of 46° N. It is encompassed for two-thirds of its perimeter by the broad curve of the Carpathian Mountains, which, beginning at the Danube a short distance below the Austro-Hungarian capital, Vienna, extend northeast, then east, then southeast and south, and finally west, forming a great wall on the side of Moravia, Galicia, Bukowina, and Rumania. On the west Hungary proper borders on Lower Austria and Styria, and on the south, for a distance of about 100 miles, on Servia, from which it is separated by the Danube. Southwest of Hungary proper, and separated from it by the Drave and the Danube, is the dependent Kingdom of Croatia and Slavonia, a great part of whose boundary is formed by the Save, separating it from Bosnia and Servia. Croatia has a coast line on the Adriatic, and on an arm of this sea is Hungary's busy port of Fiume.

Topography. The two great orographic features of Hungary are the Carpathians and the vast plains which they inclose in their broad sweep of about 800 miles. Croatia and Slavonia are traversed by the eastern offshoots of the Alps. The Carpathians spread out laterally in minor ranges, and a large portion of Transylvania, in the extreme east of the kingdom, is covered by them. The loftiest portions of the Carpathians are the High Tâtra Range in the north and the Transylvanian Alps in the southeast, which rise in peaks over 8000 feet above sea level. The culminating point of the High Tâtra is the Gerlsdorferspitze, 8737 feet. The Carpathians, rising above their densely wooded lower slopes, present an imposing aspect, with their naked granite peaks, on whose summits but little snow rests through the winter. The great stretch of monotonously level land in the central and southern parts of Hungary proper is divided into the Little Hungarian and the Great Hungarian plains. The Little Hungarian Plain (Kis-Alföld) in the northwest, with an area of about 5000 square miles and a mean elevation of 450 feet, lies upon the islands and both sides of the Danube from Pozsony to Esztergom. A portion of its surface is swampy, but for the most part it is exceedingly fertile. The Great Hungarian Plain (Alföld), which is the basis of Hungary's agricultural wealth and the principal seat of the Magyar nationality, lies in the centre of the country between the Danube and the northeastern highlands. It covers an area of nearly 40,000 square miles and lies at an average elevation of 325 feet above sea level. Its surface has a very gradual slope from north to south. Low hills of loess and sand, with deep, swampy hollows, some impregnated with alkaline salts, lend the only appearance of relief. Trees rarely break the surface line except at villages, which are shaded generally by acacias. The soil, especially in the broad alluvial lands, is exceedingly fertile. In spite of its monotony, the Alföld, with its interminable expanse, its boundless fields and widespreading villages, its great herds of cattle and droves of horses, and its picturesque types of peasants, herdsmen, and fishermen, is a region replete with interest for the traveler and with poetical charm for its inhabitants.

Hydrography. The Danube receives the drainage of the entire country, except a small area in the north, which is drained into the Vistula. The course of the Danube from Pressburg to Orsova is nearly 600 miles, and the river is navigable throughout. The principal tributary from the north is the Theiss (Tisza), which traverses the Great Hungarian Plain, and the principal affluent of which is the Maros; from the west and south the Danube receives the Drave and the Save. In the Hungarian coat of arms four silver stripes represent the Danube, the Tisza, the Drave, and the Save. There are two large lakes in Hungary—the Balaton (Platten See), with an area of about 400 square miles (including submerged marshes), and the Neusiedler See or Fertö, 110 square miles, both lying in the western part, south of the Danube. In the Carpathians there are many beautiful little lakes of great depth, to which the Hungarians apply the name "tengerszem" (eye of the sea).

Climate. Hungary has a continental climate and may be divided into two main climatic belts —the highland belt forming the north, east, and southeast portions, and the lowlands occupying the great central and southwestern parts. The winter, however, is severe throughout the country, and in the highland region the temperature sometimes falls as low as —18° F., while in the lowlands it seldom falls below 5° F. The summers are oppressively hot in the central lowlands, the Alföld, where the mercury rises to 95° F. or even 105° F. The rainfall differs considerably between the highlands and the lowlands, the annual precipitation in the former being 47 inches and in the latter only half as much. The Alföld suffers frequently from prolonged droughts, but may at other times receive even excessive rains.

Geology and Mineral Resources. Hungary stands in marked contrast to Austria in that by far the greater part of its surface consists of geologically recent formations. The Great Plain, watered by the Danube and the Theiss, presents an almost unbroken surface of Quaternary and recent alluvial deposits, while the great northern and eastern mountain systems show a preponderance of Tertiary rocks on their surface. The Croatian and Slavonian highlands are of Jurassic and Triassic formation, and here also are the chief outcroppings of the coal measures. Archæan diabases and granites occur in west and east Transylvania, and along the entire south slope of the Carpathian Mountains runs an extensive belt of volcanic rocks. The nuclear mass of the Carpathians is largely con-


VIENNA
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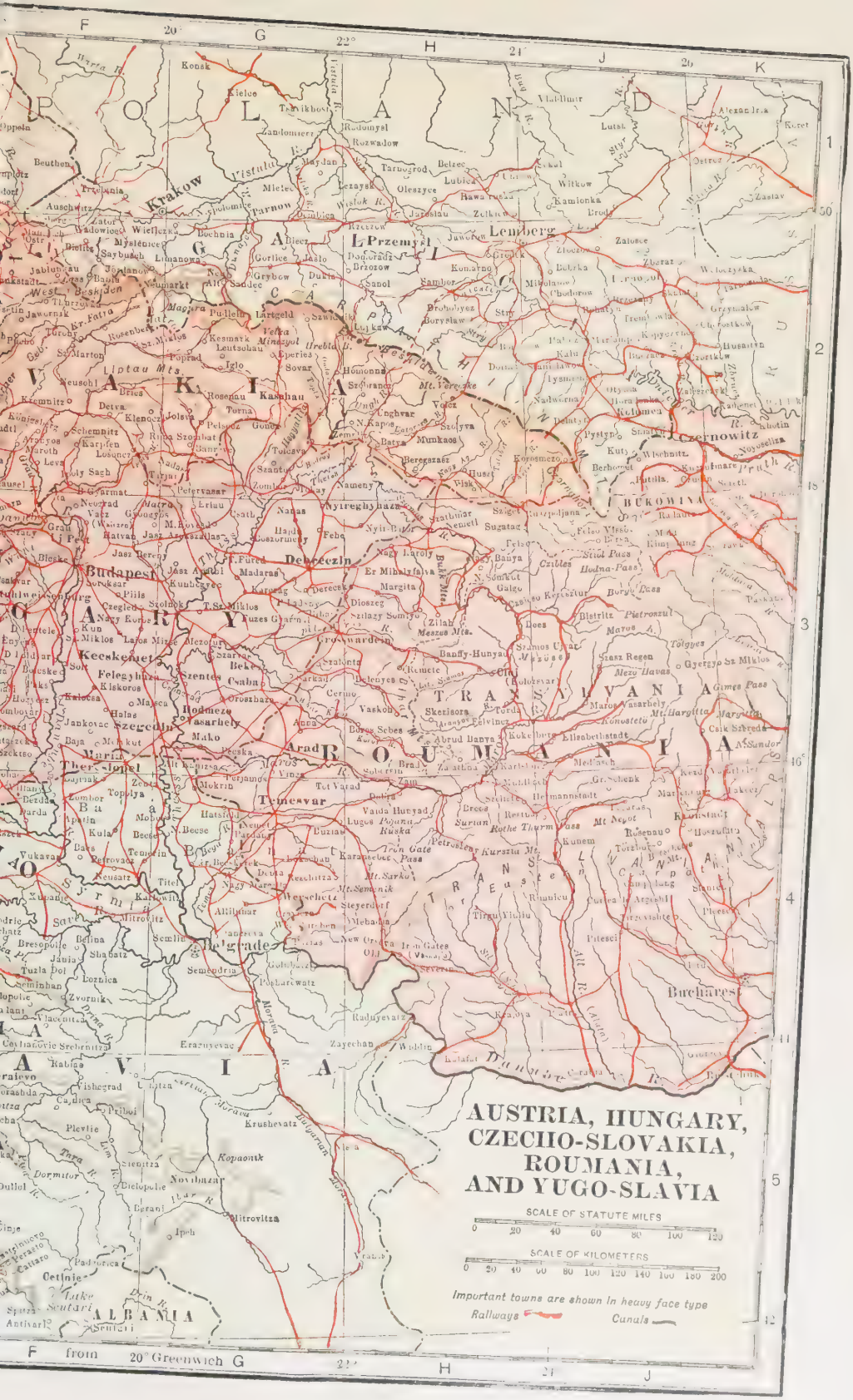
AUSTRIA, HUNGARY,
CZECHO-SLOVAKIA,
ROUMANIA,
AND YUGO-SLAVIA
SCALE OF STATUTE MILES
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SCALE OF KILOMETERS
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Important towns are shown in heavy face type
Railways
Canals
POLAND
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BUKOWINA
TRANSYLVANIA
ROUMANIA
SERVIA
ALBANIA
Cracow
Lemberg
Przemysl
Czernowitz
Budapest
Debreczin
Temesvar
Arad
Szegedin
Kecskemet
Belgrade
Bucharest
Krushevatz
Mitrovitza
Kopaonik
Novibazar
Scutari
Lake Scutari
Cattaro
Cettinje
Semlin
Zimony
Mt. Verecke
Mt. Harsyllta
Mt. Negot
Mt. Sarko
Mt. Semonik
Iron Gate
Rothe Thurm Pass
Gimes Pass
Bistritz
Pietronzul
Hodna-Pass
Stirul Pass
Kirlibaba
Kimpolung
Jassy
Galatz
Ibrail
Kustendje
Varna
Rustchuk
Silistria
Sistova
Plevna
Widdin
Orsova
Turnu Severin
Kalafat
Craiova
Rimnicu
Ploiesci
Targovishte
Giurgevo
Roustchuk
Danube R.
Theiss R.
Maros R.
Aluta R.
Jiul R.
Dniester R.
Pruth R.
Sereth R.
Save R.
Drave R.
Morava R.
Vistula R.
Bug R.
Narew R.
Warta R.
Oder R.
Elbe R.
Moldau R.
Inn R.
Lech R.
Isar R.
Danube R.
Carpathian Mts.
Transylvanian Alps
Julian Alps
Dinaric Alps
Balkan Mts.
Liptau Mts.
West Beskiden
Tatra Mts.
Hungarian Plain
Transylvanian Basin
Iron Gates
Danube Delta
Lake Balaton
Lake Neusiedl
Lake Platten
Lake Ochrida
Lake Prespa
Lake Dojran
Lake Ostrovo
Lake Kastoria
Lake Janina
Lake Presba
Lake Dorkon
Lake Tismana
Lake Ursu
Lake Bicaz
Lake Rosu
Lake Vidra
Lake Balta
Lake Brates
Lake Razelm
Lake Sinoe
Lake Yalpug
Lake Kagul
Lake Kahul
Lake Kuchurgan
Lake Sasik
Lake Tatarbunar
Lake Alibey
Lake Sasyk
Lake Kugurlui
Lake Shagani
Lake Kunduk
Lake Ajigol
Lake Tuzla
Lake Burnas
Lake Pomorie
Lake Mandra
Lake Derkos
Lake Buyuk
Lake Terkos
Lake Kutchuk
Lake Silivri
Lake Tchorlu
Lake Ergene
Lake Kara
Lake Ismid
Lake Apollonia
Lake Koyadasi
Lake Manyas
Lake Ulubad
Lake Abullionte
Lake Kus
Lake Dojran
Lake Ostrovo
Lake Kastoria
Lake Janina
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structed of granite. Hungary possesses a very considerable mineral wealth. There are great deposits of coal, iron, and salt; lead, copper, silver, and gold are found in various localities, the last mentioned chiefly along the rivers of Transylvania. Antimony, cobalt, nickel, mercury, and zinc also occur, and among the nonmetallic minerals there are precious stones, kaolin, marble, and porphyry. The Hungarian opal, found in the trachyte beds near Vörösvágás, is particularly worthy of mention. It is only within recent times that the wealth of coal and iron has begun to be exploited on a large scale. The deposits of salt in the County of Mármaros, in the eastern Carpathians, which are worked by the state, are practically inexhaustible. There are hundreds of mineral springs scattered throughout Hungary. Among the most celebrated are those at Tátra-Füred (Schmeks), in the northern Carpathians, Mehádia (Baths of Hercules), near Orsova and the Iron Gate of the Danube, and Füred, on Lake Balaton, and Harkány, near Fünfkirchen (Pécs).

Agriculture, Live Stock, Forests, etc. Hungary is preëminently an agricultural country, 68 per cent of the total population being included in the agricultural class. The country made marked progress, both in the extent of the industry and in respect to agricultural methods, during the last three decades. A large majority of the cultivators of the soil are independent landowners. There are, however, a great many large estates belonging to the state and to members of the nobility, upon which the prevailing system of agriculture is very similar to that in vogue upon the large English estates. The average size of these 3977 large holdings is 4630 acres, or 7¼ square miles. The smallest holdings, numbering 1,459,893, average somewhat under 2½ acres. The improvement in agriculture is largely indebted to the activity of agricultural societies. The natural conditions are generally favorable to the industry, the great fertility of the soil being especially a marked feature of the Hungarian plain. In some respects this plain is comparable to the Western prairies of the United States; but, like that region, it is subject to an uncertain rainfall, and it contains considerable stretches of sandy, arid land as well as marshy tracts, which have never been brought under cultivation. While the products of the country are characterized by their great variety, Hungary is best known for its production of wheat, live stock (including horses), and wine, the first two entering the European markets in competition with American products. The area devoted to wheat increased from a little less than 6,500,000 acres (on an average) during the period 1881 to 1885 to 9,153,688 acres in 1911, but decreased to 8,771,200 acres in 1913 and is now about equal to the combined acreage of rye, barley, and oats, which are about on a level with each other in importance. The increase in the area devoted to wheat was principally in the sandy and previously uncultivated tracts of central and south Hungary. Increased attention is also being given to corn, 7,189,219 acres having been devoted to its cultivation in 1911 and 7,212,404 acres in 1913. A large variety of root crops are grown, of which the potato leads in importance, followed by beets, much less than half of the latter crop being sugar beets. In 1913 nearly 450,000 acres were planted with sugar beets. The yield of the principal agricultural staples will be found in the table under AUSTRIA-HUNGARY. Vine culture is extensively carried on in the hilly districts, the Hungarian wines being the most excellent known to the market. The most famous Hungarian wines are those that bear the name of Tokay. During the latter part of the nineteenth century the phylloxera devastated the Hungarian vineyards, and their area greatly decreased. From an average of 367,360 hectares (907,763 acres) in the period 1881 to 1885 it decreased to 245,405 hectares (606,407 acres) in 1895, but had increased again in 1911 to 357,867 hectares (884,305 acres). Hungary has an extraordinary wealth of temperate-zone fruits. The grapes are unsurpassed in flavor, and the plums and watermelons are of an excellent quality. Apples, pears, cherries, etc., are very extensively raised, and some semitropical fruits are cultivated in the south. Nuts are found in great variety. There is a considerable production of tobacco, but this is under the monopoly of the crown.

The Hungarian horse, though not large, is in great demand in the European market, because of its endurance and swiftness. The superiority of the breed is due to the care of the government, which selects and owns most of the stallions kept in the country. The fondness of the Hungarian for horses is well expressed in the saying, "The Magyar was created on a horse." The number of horses in 1911 was 2,351,481. In the same year there were 7,319,121 head of cattle, 8,548,204 sheep, 7,580,446 hogs, and 426,981 goats. As compared with the figures of the 1895 census, there was a decided increase in all varieties of live stock. In some sections buffaloes are used in considerable numbers in tillage. The Hungarian oxen are characterized by the extraordinary spread of their horns. The principal forest area is in the Carpathian Mountains and consists of forests of beech, oak, and pine. The numerous rivers of the country are rich in fish, and thus contribute an important item to the food supply of the people.

Manufactures. Since no duties can be collected upon the imports from Austria, the Hungarian manufacturing industries must compete with the long-established and highly developed industries of the sister monarchy; but in spite of this much progress has been recently made. The government has sought to encourage industries by favorable legislation, such as exemption from taxation. Most of the industries are being thoroughly modernized—concentrated under large plants, with highly improved machinery. Those which draw their supplies from the abundant agricultural products of the country—flour milling, brewing and distilling, sugar and tobacco manufactures, etc.—have taken first rank in importance. Iron products, clothing, and many less important items are also included among the manufactures. Many of the large establishments are centred in Budapest.

Transportation and Commerce. In respect to railway mileage Hungary will compare favorably with other European countries. Including Croatia and Slavonia, there were, in 1911, 13,041 miles of railway lines, 5048 miles of which were owned by the state, while 5902 miles of the remainder were operated by the state. Hungary has the distinction of having first applied the "zone-tariff" system to its railroads. The Danube and its tributaries afford extensive facilities for water transportation. The navigation of some of the rivers, notably the Theiss, has been greatly improved through the shortening of the course

by means of numerous cuts. In 1911 the country had 2176 miles of rivers and canals navigable by steamers. In 45 years (1867–1911, inclusive) the government expended more than $60,000,000 on the maintenance and improvement of the waterways. The limited coast line tends to restrict the country's participation in the seagoing trade. The principal port, however, Fiume, is rapidly growing in importance, and a subvention is granted to Hungarian vessels registering in this port, the number of which has rapidly increased. About 70 per cent of the imports are from Austria, which takes about the same proportion of the exports. This arises from the fact that the two countries are mutually complementary in respect to their products, and that trade between them is free, whereas there is a tariff barrier to the trade with other countries. Grain, cattle, and other farm products pass from Hungary to Austria in return for manufactured products, principally textiles. Germany occupies a second place in the trade with Hungary. In 1913 the imports were valued at $406,400,000 and the exports at $375,500,000.

Government. The Emperor of Austria is King of Hungary. The foreign, military, and naval affairs of the Austro-Hungarian monarchy are conducted jointly by Austria (Cisleithania) and Hungary (Transleithania) through the medium of common ministries (including a ministry for the common finances) and the so-called delegations representing the separate halves of the monarchy. The Crownland of Croatia-Slavonia enjoys autonomy in local affairs, having its own Diet and its own ban or governor. It is, however, also represented in the Hungarian Diet. Since 1867 Transylvania has been an integral part of Hungary. In the national Hungarian Parliament the Magyar interests are predominant, and the Magyar language is official throughout Hungary proper, being obligatory in schools, etc. Croatia and Slavonia are allowed the official use of their native language. A full exposition of the government and the educational system, and a statement of finances, will be found in the article AUSTRIA-HUNGARY.

Defense. For army, see under AUSTRIA-HUNGARY, and for navy, under *Austria-Hungary* in article NAVIES.

Population. The population of the Lands of the Hungarian Crown in 1910 was 20,886,487, or 166 per square mile. This was somewhat more than two-fifths of the population of the Austro-Hungarian monarchy, exclusive of Bosnia and Herzegovina. There are a large number of racial elements represented in Hungary, and the bitterness of racial feeling is the occasion of much political and social friction. The Magyar-speaking population numbers 10,050,000, but this figure includes a large number of persons not of Magyar blood. The Rumans (Wallachs), mostly in Transylvania, number 2,949,000, and the southern Slavs (Croats and Serbs) about 2,940,000. The northern Slavs number 2,441,000, about four-fifths of them being Slovaks, and the remainder mainly Ruthenians. Hungary has a German-speaking population of 2,037,000. The Germans constitute an important element in many of the cities, and in Transylvania there is a German-speaking district known as the "Saxon Land." There are over 932,000 inhabitants of Jewish blood, most of whom are included in the Magyar-speaking population. Next to Rumania, Hungary contains a larger number of gypsies than any other European country. They form a picturesque element in the population, and their music is quite a feature in the charms of rural life in Hungary. There are a number of Armenians and Bulgarians in the kingdom. The population of Transylvania consists mostly of Rumans, and the Magyar element is but feebly represented in Croatia and Slavonia. The Magyars are, as a rule, the landowners of the country. Hungary is unique among progressive European countries in the extent to which the different races still retain their own peculiar and long-established costumes. The costume of an Hungarian peasant is made of a linen shirt with long sleeves, reaching to the knee; a bodice ornamented with metal buttons or cords; wide linen trousers or tight-fitting ones, made of black or blue cloth, and stuck into leather boots ornamented with cords; a black round hat with feathers, or a black fur cap for headdress, and a cloak made of close, coarse cloth and trimmed with fur, cords, etc., or a wide sleeveless sheepskin coat, worn also to some extent in summer. The costume of the Hungarian peasant woman is also very picturesque and is made usually of lighter materials. The population is very largely centred in villages, some of which contain several thousand inhabitants, but there are a few large towns. Budapest in 1910 had a population of 880,371, showing a gain of 20 per cent in the last decade. Szegedin, with a population in 1910 of 118,328, is the only other town containing over 100,000 inhabitants. Cities having between this and 50,000 inhabitants in the order of size, are: Szabadka (Maria-Theresiopel), Debreczin, Agram (Zágráb), the capital of Croatia and Slavonia, Pressburg (Pozsony), Temesvár, Kecskemét, Grosswardein (Nagy-Várad), Arad, Hódmezö-Vásárhely, Klausenburg (Kolozsvár), Ujpest, and Miskolcz. Other well-known towns are: Kronstadt and Hermannstadt in Transylvania; Fiume, Kaschau, Oedenburg, Stuhlweissenburg, Raab, Eszék, and Gran (Esztergom), the seat of the Roman Catholic Primate of Hungary. The population of the Kingdom of Hungary in 1910, according to religions, was as follows: Roman Catholics, 10,888,000; Orthodox Greeks, 2,987,000; Calvinists, 2,621,000; Lutherans, 1,340,000; United Greeks and Roman Catholic Armenians, 2,025,500; Israelites, 932,000; Unitarians, 74,300.

History. The Hungarians—or, as they call themselves, the Magyars—have been settled in their present abode somewhat more than 1000 years. They constitute a branch of the Finno-Ugric race (Ural-Altaic family), their nearest kin being the Finns. (See HUNGARIAN LANGUAGE.) They figure in the old writers as Ugri, Wengri, Ungri, Ungari, Hungari. They first entered the lands now known as Hungary under the leadership of the legendary Arpád, who by 906 is said to have conquered the Slavic inhabitants. The invaders were a barbarous horde, who for more than half a century were the terror of the nations to the west and the south. They broke up the Moravian realm, made incursions into Germany and Italy, everywhere pillaging, burning, and slaughtering, and awakening superstitious terrors in the minds of the inhabitants, and carrying their devastations far and wide. At last the German kings succeeded in putting an end to their onslaughts. They were defeated in 933 by Henry the Fowler on the Unstrut, and Otho the Great vanquished them on the Lech in 955. Forced to accommodate themselves to a settled existence, and in possession of a fruitful

domain, the Hungarians showed themselves amenable to the civilizing influences emanating from without, and among other things they developed a capacity for the adoption of political institutions based upon Western models. In 975 their ruler, Geyza, embraced Christianity, which had begun to take root in the nation. His son Stephen, the first King of Hungary, known as "the Saint," was crowned in the year 1000 (some years after he began his rule), with a crown sent him by Pope Sylvester II, who at the same time bestowed on him the title of "Apostolic Majesty." With St. Stephen, whose reign of over 40 years terminated in 1038, a new era began for Hungary; Christianity took the place of heathen superstitions; the royal authority was firmly established; new laws were made, and the people advanced rapidly in civilization. After Stephen's death there was a reaction, and his immediate successors had to contend against a pagan revival and a general tendency to disintegration. Ladislas I the Saint (1077–95), renowned for his wise legislation and for great personal valor, proved a worthy successor of Stephen; and under his rule Hungary again became a strong kingdom, with its boundaries increased by the acquisition of part of Croatia. Coloman (Kálmán) (1095–1114), known as "the Learned," was far in advance of his age, as many of his laws show. He gained possession of Dalmatia. Under King Geyza II (1141–61) German colonists settled in north Hungary and in Transylvania, in consequence of which mining and several branches of industry made rapid progress. Andrew II (1205–35) is known in connection with the Crusades. The Golden Bull, the Hungarian Magna Charta, was granted by him to his nobles in 1222. Béla IV (1235–70) showed great qualities in subduing the pride of the nobles and in healing the wounds of his people after the terrible invasion of the Mongols in 1241. Andrew III was the last male scion in the Arpád line, dying without issue in 1301.

The succeeding period of Hungarian history, terminating with the battle of Mohács in 1526, witnessed the culmination and decline of the independent monarchy. Louis I, called "the Great" (1342–82), was the second king of the house of Anjou, which obtained the throne in 1308, being by his great-grandmother connected with the Arpád dynasty. He reëstablished the authority of law, which under his predecessors had been openly violated by the powerful nobles. He promoted science, industry, and commerce. He had long and difficult struggles against the Turks and against the buffer colonies of Hungary, such as Moldavia, Servia, Bosnia, etc. The latter either became practically independent or else paid tribute to the Turks. Sigismund (1387–1437), the son-in-law of Louis, succeeded him as King, but he is better known as Holy Roman Emperor. In the person of Sigismund's son-in-law, Albert V of Austria (1438–39), the Hapsburgs first came into possession of the Hungarian throne. After his death the country was for a few years under the rule of King Ladislas of Poland, who was overwhelmed and slain by the Turks at Varna in 1444. He was succeeded by Ladislas the Posthumous, the son of Albert of Hapsburg, under whom the government was administered by John Hunyadi, an heroic figure in the wars between Christendom and the Turks. Hunyadi's son, Matthias I, ascended the throne in 1458. Matthias I—better known as Matthias Corvinus—has been called not only the greatest King of Hungary, but also the greatest sovereign of his age. By his military successes, sagacity, and love of learning he raised his nation to a high pitch of splendor. From the death of Matthias (1490) to the fatal day of Mohács Hungary exhibited the fiercest strife of factions —a protracted agony, preceding the loss of national independence. Among the many calamities during the reign of Ladislas of Bohemia (1490–1516), the peasant war occupies a prominent place. Dózsa (q.v.) and his insurgent bands, after having committed great havoc, were exterminated by the famous John Zápolya, or Szapolyai, Voivode of Transylvania. Louis II (1516–26), who was also King of Bohemia, was but 10 years old at the death of his father, Ladislas. The Turks, who had been making incursions into the kingdom since the early part of the fifteenth century, took advantage of the anarchy under the young Louis to attempt the conquest of Hungary. In 1521 they captured Belgrade, and on Aug. 29, 1526, an army of 100,000 men under Solyman the Magnificent crushed the forces of the Hungarians at Mohács, where the King and more than 20,000 of his men perished. The national party in Hungary chose John Zápolya, Voivode of Transylvania, to be Louis's successor, while a part of the nobles offered the royal crown to Ferdinand of Austria (brother of the Emperor Charles V), between whom and Louis a double marriage connection had existed. After a struggle between the rivals and fresh invasions by Solyman the Magnificent (who had given his support to John Zápolya), Hungary, after 1541, remained rent into three parts. The central part of the kingdom, with the capital, Buda, came into the immediate possession of the Turks.

The Austrian power for a long time was confined to the western part of the country. The religious policy of the Hapsburg emperors and the activity of the Jesuits excited the fierce opposition of the Protestants, which culminated in 1604 in a great rising, headed by Stephen Bocskay (q.v.), who in the Peace of Vienna, in 1606, forced the Emperor Rudolph II to grant religious freedom to his Protestant subjects in Hungary. At the beginning of the Thirty Years' War (1618–48) and towards its close, the princes of Transylvania were in arms for the Protestant cause against the Hapsburgs. Ferdinand III (1637–57) was compelled to concede a large measure of self-government and religious freedom to the Hungarians; but his successor, Leopold I, initiated a policy of repression which led to a formidable uprising under Tökölyi (1678), who summoned the Turks to his aid. In 1683 Vienna, the capital of the Hapsburgs, after a heroic defense, was on the point of falling into the hands of the Moslems, when the victory achieved before the city by John Sobieski and the German princes turned the tide of war, and the power of Turkey collapsed. Buda was recovered by the Christians in 1686. After sanguinary vengeance had been wreaked on the leaders of the rebellion Leopold I forced the Hungarians in 1687 to declare the crown of Hungary forever hereditary in the house of Hapsburg. The dominion of the Turks rapidly disappeared from Hungary; the Treaty of Karlowitz (1699) left only the Banat in their hands, and that, too, was acquired by the Treaty of Passarowitz (1718) as a result of the victories of Prince Eugene. The Treaty of Karlowitz also secured Transylvania to the Hapsburgs. In 1703 Francis Rákóczy excited the

Hungarians to rise in defense of their liberties against the Austrian house, and a struggle ensued which was not terminated until 1711, when Charles VI immediately after his accession found it necessary to come to terms with his Hungarian subjects. Charles VI succeeded in gaining the approval of the Hungarians for his Pragmatic Sanction by the grant of extensive privileges; and after the Emperor's death, when the onslaught of Frederick the Great, the Saxons, the Bavarians, and the French threatened the dismemberment of the Austrian realm (1741), the nation rallied to the support of the young Queen, Maria Theresa, who had appealed to the National Diet, assembled at Pressburg. During her reign Hungary enjoyed an era of progress and prosperity. The reforms of Joseph II, her son and successor (1780–90), were received with violent opposition, because of their attack on the local liberties of the people through the institution of a strongly centralized administration. Bitter dissatisfaction was also aroused by the Emperor's attempts to make German the official language of the country. In 1790 Joseph II saw himself driven to repeal his measures of reform, except those dealing with the abolition of serfdom and the establishment of freedom of worship. Under Leopold II (1790–92) the old constitution was restored; but his successor, Francis I (1792–1835), ruled in an arbitrary fashion and seldom troubled himself to assemble the Diet. In his reign a great political upheaval began to manifest itself in Hungary. The period after 1815 witnessed the rapid development of an intense national (Magyar) consciousness, which evinced itself in the demand for a strictly constitutional government and the enactment of widespread reforms. The strife of parties was carried from the legislative hall to the press, and the Liberals grew in strength as their support among the mass of the people increased. This great national and reform movement, which was headed by such men as Széchenyi, Batthyányi, Eötvös, Deák, and Kossuth, and which was accompanied by remarkable activity in the field of literature, constitutes a brilliant and stirring episode in the annals of Europe in the second quarter of the nineteenth century. Notable gains were the Law of 1843, which made men not of noble blood eligible for office, and the enactment of measures for making the Magyar tongue the official language of Hungary. The revolutionary movement of 1848, which, emanating from France, convulsed a great part of Europe, brought upon Hungary a sudden and terrible catastrophe. In March of that year, immediately after the downfall of Metternich, who had so long guided the reactionary policy of Austria, the Hungarians were accorded an independent ministry. Under its guidance the progress of Liberal reform continued. But the hostile attitude of the Austrian court towards the new order, and the encouragement which it gave to the Croats and Wallachs, who rose in revolt against the Magyar rule, resulted in an open war between the house of Hapsburg and Hungary, which under the lead of Kossuth declared its independence in April, 1849. After an heroic struggle (the details of which will be found in the article AUSTRIA-HUNGARY), Hungary succumbed to the combined forces of Austria and Russia and was deprived of its constitutional liberties and treated as a conquered country. Before many years, however, the Emperor Francis Joseph was forced to recognize the necessity of some kind of reconciliation with his Hungarian subjects, and the blow sustained by Austria at the hands of Prussia in 1866 brought about the reërection of Hungary as a constitutional kingdom. The demands of the Hungarian people, as set forth by their great spokesman, Francis Deák, were acceded to in the Ausgleich of 1867, by which the present dualistic frame of the Austro-Hungarian monarchy was established. The settlement was sealed by the coronation of Francis Joseph as King of Hungary on June 8, 1867, the ceremony taking place at Buda with extraordinary pomp. The revivified Magyar people now set itself with ardor to the task of the strengthening of its nationality, the introduction of political and ecclesiastical reforms, the extension of public education, and the development of the economic resources of the country. The nation enthusiastically followed the lead of the great Francis Deák, who at his death, in 1876, had an able successor in Tisza. The patriotic zeal of the Magyars has at times transgressed the bounds of moderation, and the measures taken to extend the use of the Magyar tongue have excited fierce opposition, especially in Croatia. The economic progress of Hungary in the last three decades of the nineteenth century resulted in a more aggressive attitude towards Austria.

The expiration of the commercial Ausgleich in 1897 was followed by prolonged negotiations with Austria; but though a new alliance was formulated in 1902, it failed to receive the approval of the respective parliaments. The contributions of the two halves of the monarchy to the common expenditure were determined provisionally from year to year by the Emperor. In 1903 the opposition began a violent campaign for the complete nationalization of the Hungarian army. In the contest the powerful Liberal party was overthrown early in 1905, and as the Independent majority led by Francis Kossuth declined to take office, an extraparliamentary condition ensued. The crisis, which was regarded in Austria as arising from the real desire of the Hungarian majority to transform the monarchy into a personal union, was averted by compromise in 1906.

The problems of Hungary concern not only Austria, but the subject races, mainly Slavonic, who constitute more than half of the population of the Kingdom of Hungary. The ruling race of Magyars, who form the overwhelming majority of the electors, have done everything in their power to Magyarize the country, but so far their efforts have not been successful.

In 1906 the Coalition ministry came into power pledged to universal manhood suffrage, but it did nothing to carry out this pledge for fear of losing Magyar ascendancy. On the contrary, the subject Slavs were persecuted more than ever. As a result of great demonstrations in favor of electoral reform, in 1908, Count Andrássy introduced a franchise bill which, while extending the suffrage, was so drawn as to insure Magyar hegemony. The bill aroused so much opposition that it was dropped.

The relations between Austria and Hungary, always contentious, became acute over the demand of Hungary for a separate national bank. The ministry divided on this matter; Count Andrássy opposed it, but the extremely nationalist Independence party, led by Ferencz Kossuth, the son of the great revolutionist, strongly favored the scheme. Realizing the threat to the dual monarchy contained in the project, Austria declared its opposition to it and started an agita-

tion among the non-Magyar population. The conflict over the bank became serious, as the Hungarian Parliament refused to vote the estimates. A new cabinet was formed in 1910 under Count Khuen Hedérváry, a Moderate, which immediately went to the country in the issue of universal suffrage and conciliatory relations with Austria. The ministry was returned by an overwhelming majority, and the bank matter was dropped.

Another question which came to trouble Austro-Hungarian relations was that of a separate Hungarian army. Kossuth and his Independence party had put this demand in the forefront of their programme and in 1912 compelled the resignation of the Hedérváry ministry because it refused to indorse it. The Emperor-King Francis Joseph then threatened to abdicate if such a law were enacted, and for this reason the matter was dropped.

The unceasing agitation for universal suffrage among the lower classes and subject races of Hungary finally compelled the Premier, Ladislaus von Lukács, to introduce a franchise bill (Jan. 2, 1912). This measure to some extent was democratic, as its provisions would have resulted in doubling the electorate. But the special electoral privileges given to age, class, property, and education so disappointed the Radicals and Socialists that they organized great demonstrations against the bill and threatened to call a general strike. Scenes of violence were enacted in the Hungarian Parliament. Count Stephen Tisza, the conservative President of the Chamber, became the subject of violent abuse on the part of the Radicals. The cabinet was forced to resign, and Count Tisza became Prime Minister. A new opposition party committed to democratic franchise reform was then organized by Count Andrássy. The Great European War of 1914 brought Hungary enthusiastically to the side of Austria. The Magyars in Hungary fear the Slavic propaganda of Russia almost as much as Austria, as a Russian victory would endanger the loyalty of the subject Slavs in Hungary as well as in Austria (see WAR IN EUROPE).

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HUNGARY, JACOB OF. See PASTORELS.

HUN'GER. See DIGESTION, ORGANS OF.

HUNGERFORD, hŭn'gẽr-fẽrd, MRS. MARGARET WOLFE (c.1855–97). An Irish novelist, known by her pseudonym The Duchess, though the majority of her books were published anonymously. She was born at Ross Carbery, County Cork, where her father, Fitzjohn Stannus Hamilton, was rector and vicar choral of Ross Cathedral. She was twice married—to Edward Argles and to Thomas H. Hungerford. The Duchess began to write in 1877—*Phyllis* appearing in that year and her most successful novel, *Molly Bawn*, in 1878—and from that time to her death she published nearly 30 volumes of short stories and novels, which attained a remarkable popularity, and among which *Mrs. Geoffrey* (1881), *April's Lady* (1891), and *A Conquering Heroine* (1892) were favorites. They are sentimental and melodramatic, the plot conventional, but the reproduction of the general air and small chatter of society very truly done.

HUNG-SIU-TS'EUEN, hụng'sẽ-o͞o'chwĕn, or **HUNG-HSIU-CHUAN** (1812–64). A Hakka schoolmaster who originated and was the leader of the Taiping Rebellion (1850–64). He was born in a small village, about 30 miles from the city of Canton, in 1812, attended school from 7 to 16, became village schoolmaster, continued his own studies and passed all the examinations preliminary to that for the first degree, but failed again and again in the competition for the degree. He was subject to frequent illnesses and in one attack, in 1837, is said to have lain in a trance for nearly 40 days, during which he had a religious vision which profoundly impressed him. A few years later a friend found in Hung's bookcase some Christian books and tracts which Hung had obtained in Canton in 1833. The two began to study them, and Hung found in them the key to his visions and was thereby inspired to destroy idols. They became converted, baptized each other, and began to preach. Hung set out for Kwangsi to convert the aborigines there, but lack of acquaintance with their language made the work difficult. He met others, however, who gladly accepted his teaching and themselves became zealous propagandists. About this time he joined a society of "God worshipers," which had been formed in 1836, and soon became supreme in it. In 1845 he returned to his own province, made many converts, and in 1846 visited a Protestant missionary in Canton and studied the Scriptures with him for two months, but was refused baptism, because the request was accompanied with an application for a monthly stipend. He returned to Kwangsi, and his disciples, mostly persons disaffected to the reigning dynasty, began to destroy temples and to demolish idols. In July, 1850, Hung and his followers, who were now numerous, broke out into open rebellion. The civil war which followed was more of a revolt against the Manchu monarchy than a religious crusade. At first Hung had styled himself the "Brother of Christ"; he now became the "Heavenly King" (T'ien Wang) and adopted the style of "Heavenly Kingdom of Great Peace" (Taiping Kwoh) as that of the empire he was about to establish. He made Nanking his headquarters until 1864, writing Christian books, issuing edicts to his followers, attending to the printing and circulation of the Bible and other works, and directing the movements of his numerous generals and their immense armies.

The great Taiping Rebellion for a while swept all before it. At one time Europe and the United States seriously considered recognizing the rebels, but the lawlessness and excesses of the latter ruined their cause. Finally, the American Ward, and later the English Gordon with his "Ever Victorious Army," succeeded in winning back the lost ground for the monarchy. June 30, 1864, realizing the coming collapse of

the rebellion, Hung poisoned himself. His body was later found and burned. Consult: Meadows, *The Chinese and their Rebellions* (London, 1856); Brine, *The Taiping Rebellion* (ib., 1862); Lin-Li, *Ti-ping Tien-Kwoh: History of the Ti-ping Revolution* (2 vols., ib., 1866); W. F. Mayer, *Chinese Readers' Manual* (Shanghai, 1874); Samuel Mossman, *The Great Taiping Rebellion* (London, n. d.). See CHINA.

HUNG-WU, hụng'wōō'. The name given to the period of years (1368–98) during which Chu Yuan-chang, the founder of the Chinese dynasty of Ming (1368–1644), reigned, and commonly transferred by Europeans to the Emperor himself. He was a native of the Province of Anhui and was born in 1328, the second son of a poor laborer. At 17 Chu entered a monastery as a novice, but in the troubles of the times this was burned down by rebels under the command of a maternal uncle of his, whose forces he joined. He was given a small command and scored victory after victory. In 1355, on the death of his uncle, he was offered the post of assistant generalissimo. Declining this offer, he recovered from the Mongols, then the ruling dynasty, the whole left bank of the Yang-tse and proclaimed himself Prince of Wu. Within two years he had become master of Kiangsi and part of Chekiang, sent his generals north in 1367, in 1368 mounted the throne as Hung-wu, called his dynasty the Ming, or "Illustrious," and made his capital at the city which has since been known as Nanking, "the southern capital." In the same year he recovered the provinces of Fukien, the two Kwang, and Shansi, and brought Shensi under his sway in 1369. In the following year the last Mongol Emperor died, the dynasty founded by Kublai Khan came to an inglorious end, and China was once more free from the yoke of aliens. In 1371 Szechwan and Liaotung fell before him, and Yunnan in 1381.

Hung-wu proved an able administrator, although the success of his government is attributed largely to the excellent counsels of his wife, and became a liberal patron of education and of literature. He organized the present system of literary examinations, established a new penal code, abolished mutilation as a punishment, regulated taxes and placed the coinage on a proper basis, made Buddhism and Taoism state religions, and prohibited eunuchs from holding office. He also reëstablished the customs of the T'ang dynasty (618–907), restored the literati to high offices of state, from which they had been excluded since the time of Kublai Khan, and labored for the welfare of his people. He had 24 sons, all of whom became princes, and set nine of them as governors over as many provinces. He died in 1398 and is known in history as Tai-tsu, his temple name. He is popularly known, however, as the "Beggar King," in allusion to his early poverty. See J. P. A. Rémusat, *Nouveaux mélanges asiatiques* (2 vols., Paris, 1829).

HUN'KERS (perhaps from Dutch *honk*, station, home). In American political history, the name applied for some years after 1843 to that part of the Democratic party in the State of New York which stood for conservatism and was arrayed against the radical faction of the same party, known as the Barnburners (q.v.). Factional differences had arisen in the party prior to 1843, but open and avowed antagonism may be said to date from that year. The Hunkers adhered to the regular Democratic party in the presidential contest of 1848, while their opponents united with the Free Soilers and with them nominated Van Buren. After 1852 the two factions acted more or less in harmony in both State and national politics. Among the leaders of the Hunkers were Horatio Seymour, William L. Marcy, Samuel Beardsley, Edwin Croswell, and Daniel S. Dickinson. The name Hunkers was also applied at times to the conservative element of the Democratic party in other States.

HUN'NERIC, or HUNERIC. King of the Vandals in Africa (?–484). He was the son of Genseric, whom he succeeded in 477. In 435 he had been sent to Italy as a hostage for his father's fidelity. One of his wives was a daughter of Theodoric, King of the Visigoths. Suspecting her of a plot against him, Genseric had her nose and ears cut off and sent her home. Another and later wife was Eudocia, the daughter of the Roman Emperor Valentinian III. See VANDALS.

HUNOLD, hōō'nôlt, CHRISTIAN FRIEDRICH (1680–1721). A German author, known by his pseudonym Menantes. He was born at Wandersleben and studied law at Jena. Means to carry on his studies failed him, however, and in 1700 he went to Hamburg, then the literary centre of Germany. Here the success of his novel, *Die verliebte und galante Welt* (2 vols., 1700), put an end to his precarious teaching and writing. This was quickly followed by *Der europäischen Höfe Liebes- und Heldengeschichte* (1704) and by *Satirischer Roman* (1705 and 1732), which told so plainly the scandal of Hamburg—which Hunold knew only too well—that he was forced to leave the city (1706). He went to Thuringia, published *Die allerneueste Art zur reinen und galanten Poesie zu gelangen* (1706), besides textbooks in rhetoric and style, and after many wanderings settled in Halle, where he became an instructor in literature, poetry, and jurisprudence, and where his works lost the earlier freedom and obscenity. Consult Wedel, *Geheime Nachrichten und Briefe von Herrn Menantes Leben und Schriften* (Cologne, 1731), and Vogel, *Christian Friedrich Hunold* (Leipzig, 1898).

HUNS (Lat. *Hunni, Chunni*, Gk. Οὖννοι, *Ounnoi*, Χοῦννοι, *Chounnoi*, probably from Chin. *Hiong-nu*, name of a powerful Tatar tribe). The name of a nation of antiquity which made repeated incursions upon the Roman dominions, and under Attila (q.v.), the most renowned of its leaders, brought the empires of both the East and the West to the verge of destruction.

The Huns are generally considered to have been a collection of tribes of Turko-Tatar affinities, descendants perhaps of the Hiong-Nu, who figure in Chinese annals as making incursions and founding states in Central Asia as early as the second century B.C. Some authorities think that the bulk of Attila's hordes were of Turkic stock, and Theophanes in the eighth century writes of "the Huns whom we commonly call Turks." The distinction between "white" and "black" Huns, made by the mediæval writers, led Bloch (1901) to put forward the view that we have here a dark race in process of transformation into a white one, but the uncertainty of the connotation of these epithets makes such a startling view even less probable. Like the modern Magyars, Osmanli Turks, etc., the ancient Huns no doubt assimilated themselves to the populations of their environment, and in Europe lost more and more of the distinctly

Asiatic character. The "white" Huns were probably not a little mixed with Asiatic Aryan blood (Iranian, etc.) before they entered upon their career in Europe. About 200 B.C. the Huns overran the Chinese Empire, defeated the Chinese armies in numerous engagements, and drove the Emperor Kao-ti himself to a capitulation and a treaty. During the reign of Wu-ti (141–87 B.C.) the power of the Huns was much broken. Eventually they separated into two distinct camps, one of which, amounting to about 50,000 families, went southward, while the other endeavored to maintain itself in its original seat; but finally the most warlike went west and northwest in search of new homes. Of those that went northwest a large number established themselves for a while on the banks of the Volga. They then, under a leader named Balamir, or Balamber, advanced into the territories of the Alani (q.v.), a powerful people dwelling between the Volga and the Don. At what period this took place is uncertain, but probably it was early in the fourth century. The Alani resisted the incursions of the Huns until at length a battle was fought on the banks of the Don, in which the King of the Alani was slain and his army utterly routed; the vast majority of the survivors joined the invaders.

The Huns now invaded the country of the Ostrogoths, whose aged King, Hermannrich, roused himself to meet the invaders, but in vain. His successor, Withimir, encountered the Huns in a pitched battle, in which he was himself slain and his countrymen utterly routed. The Ostrogoths now threw themselves upon the protection of the Emperor Valens, who in 376 A.D. gave permission to a great number of them to cross the Danube and settle in the countries on the south side of the river as auxiliaries to the Roman arms against further invasion. The Huns now occupied all the territories that had been abandoned by the Goths; and when the latter not long afterward revolted against Valens, the Huns also crossed the Danube and joined their arms to those of the Goths in hostilities against the Empire of the East. In the wars that followed the Huns were not so conspicuous as the Goths, their former enemies, and but little is known of them during the remainder of the fourth century. It is supposed, however, that early in the following century they were joined by fresh hordes. In the reign of Theodosius the Younger they had increased so considerably in power that to their sovereign Rugilas, or Roas, was paid an annual tribute of about $70,000 to secure the Empire of the East from further injury.

Rugilas, dying in the year 434, was succeeded in the sovereignty of the Huns by his nephews Attila and Bleda. The latter was put to death by his brother about 444. Attila (q.v.) carried his arms as far west as Gaul, where the Romans and the Visigoths successfully encountered him in the Catalaunian Plain. In the following year he ravaged Italy, and Rome itself was saved, it is said, only through the awe which its Bishop, Leo I, inspired in the barbarian conqueror. With Attila's death, about 454, the power of the Huns was broken. A few feeble sovereigns succeeded him, but there was strife now everywhere among the nations that had submitted to Attila, and the Huns never regained their power. Many of them took service in the armies of the Romans, and others joined fresh hordes of invaders from the north and the east, aiding them in their repeated attacks upon the Empire. Consult: J. B. Bury, *History of the Later Roman Empire* (2 vols., New York, 1889); Thomas Hodgkin, *Italy and her Invaders* (8 vols., Oxford, 1892); Parker, *A Thousand Years of the Tartars* (1905). See GOTHS.

HUNT, ARTHUR SURRIDGE (1871–). An English paleographer, born in Romford, Essex. He was educated at Queen's College, Oxford, of which he became fellow, and was demy of Magdalen in 1896–1900 and fellow of Lincoln in 1901–06. In 1895 he began his important research in Egypt which resulted in the discovery of many important Greek papyri. These he edited mostly with B. P. Grenfell (q.v.). Hunt received honorary degrees from the universities of Königsberg, Graz, Athens, Dublin, and Glasgow, and was made professor of papyrology at Oxford.

HUNT, CHARLES WALLACE (1841–1911). An American engineer, born at Candor, Tioga Co., N. Y. In 1864 he was a special agent of the United States War Department to care for the freedmen. Later he engaged in engineering and manufacturing and became vice president of the Richmond County (N. Y.) Savings Bank. He served as president of the American Society of Mechanical Engineers in 1898 and of the United Engineering Society in 1909 and was a member of other engineering and scientific societies.

HUNT, GAILLARD (1862–). An American writer on history and government, son of W. H. Hunt (1824–84) and brother of W. H. Hunt (1857–). Born at New Orleans, La., and educated at the Emerson Institute, Washington, he represented the State Department at the World's Fair, Chicago (1893), served as chief of the Bureau of Citizenship (1900–09), and was chief of the division of manuscripts in the Library of Congress after 1909. In 1913 he lectured at Johns Hopkins University. Besides editing *Fragments of Revolutionary History* (1892), *The Writings of James Madison* (8 vols., 1900–10), and *The Journals of the Continental Congress,* vols. xvi–xviii (1909), he is author of *History of the Seal of the United States* (1892; 2d ed., 1909); *The Department of State of the United States: Its History and its Functions* (1892; 2d ed., rev., 1914); *The American Passport* (1898); *Life of James Madison* (1902); *Disunion Sentiment in Congress in 1794* (1905); *John C. Calhoun* (1908); *Life in America One Hundred Years Ago* (1914).

HUNT, HELEN. See JACKSON, HELEN (FISKE HUNT).

HUNT, HENRY (1773–1835). An English politician, born at Widdington Farm, Wiltshire, and educated by tutors and in private schools. Though educated for the ministry, he turned to farming, which he followed intermittently until within a few years of his death. He was imprisoned in 1800 for challenging to a duel the commanding officer of the Marlborough Troop, in 1810 for an assault upon a gamekeeper, and again in 1819 for two years for his part in the Peterloo massacre. In politics he was a Radical, and allied himself with Sir Francis Burdett, Horne Tooke, William Cobbett, and others of the same party, though he later published a pamphlet in which Burdett was charged with wavering loyalty to the reform, and was alienated from Cobbett through his own overzealousness and political mistakes. He was often a candidate for Parliament and contested many elections. In 1830, through the retirement of

the successful candidate, he obtained a seat from Preston and advocated strenuously women's rights, universal suffrage, and the repeal of the Corn-Laws. He managed to exercise considerable influence upon local politics, and his public speeches, though positive and demagogic, were always impressive; but his disagreeable personality found him few followers in Parliament, and in 1833, having failed of reëlection, he retired to private life. Consult *Memoirs of Henry Hunt, written by himself in His Majesty's Jail* (London, 1820).

HUNT, Henry Jackson (1819–89). An American soldier, born in Detroit, Mich. His father, Samuel W. Hunt, was an army officer, and after his death the son was appointed to West Point, where he graduated in 1839. He was immediately assigned to the artillery arm of the service. His first active service was on the Canadian frontier in 1839, during the disturbances arising from the Canadian Rebellion, after which he continued in garrison duty until the Mexican War. He served with the Second Artillery in Scott's advance from Vera Cruz to the city of Mexico, distinguishing himself particularly at Contreras and Churubusco, and being twice wounded at the battle of Molino del Rey (Sept. 8, 1847). He was brevetted captain and major for his services. He afterward served on the frontier for some years and in 1856 was appointed a member of the board to revise the system of light-artillery tactics. He was promoted captain in 1852, and at the outbreak of the Civil War was stationed at Fort Pickens, Fla., from April to June, 1861. Promoted major in May of that year, he commanded the artillery on the extreme left at the battle of Bull Run. He was in command of artillery in the defenses of Washington in the summer of 1861, and in the September following was promoted colonel, attached to General McClellan's staff, and assigned to organize and command the artillery reserve of the Army of the Potomac. He served throughout the Peninsular campaign, his disposition of the artillery at the battle of Malvern Hill (July 1, 1862) being especially praiseworthy, and in September became chief of artillery of the Army of the Potomac, a position which he held until the end of the war. He participated in the battle of South Mountain on Sept. 14, 1862, and on the following day was appointed brigadier general of United States volunteers. He served thereafter at Antietam, at Fredericksburg, where his artillery fire rendered possible the crossing of the Rappahannock, at Chancellorsville, and at Gettysburg, where the withering fire from his batteries rendered impossible the success of Pickett's brilliant charge and turned the tide of battle in favor of the Federal arms. After serving in the Wilderness campaign with distinction he continued on Grant's staff until the close of hostilities, receiving the brevet ranks of major general of volunteers and brigadier general in the United States army. In the winter of 1865–66 he was in command of the military district of Arkansas. In 1866 he was made colonel in the reorganized army, placed in command of the Fifth Artillery, and appointed president of the permanent Artillery Board. He commanded the Department of the South from 1880 to 1883, when he retired and became governor of the National Soldiers' Home at Washington. He published *Instruction for Field Artillery* (1860) and three articles on the battle of Gettysburg in the *Century* (New York, 1886), later republished in *Battles and Leaders of the Civil War* (ib., 1887).

HUNT, (William) Holman (1827–1910). An English religious painter, born in London. He was intended for commercial life, and worked in an office in London for four years, devoting his leisure to reading, drawing, and painting. In his seventeenth year he gave up business and hired a studio, which he paid for with difficulty by painting family portraits and making copies and restorations. In 1844, on his third attempt, he was admitted as a probationer to the schools of the Royal Academy, and in 1845 became a regular student. In 1846 he exhibited at the Academy "Hark," a picture of his little sister holding a watch to her ear. Together with Rossetti and Millais, Hunt founded the Pre-Raphaelite Brotherhood (q.v.). His first painting that was an exponent of its principles was "The Flight of Madeline and Porphyro," a subject taken from Keats's *Eve of St. Agnes.* The most constant follower of Pre-Raphaelitism, he remained unaffected by later art movements. He devoted himself principally to religious subjects, for which he was peculiarly adapted, and became one of the greatest modern exponents of Christianity. His works are full of strong religious feeling and are characterized by an absolute fidelity to nature, to the extent of a hard realism. Every detail, even the leaves and blades of grass, is painted with the utmost minuteness. His works are the triumph of industry. He went to Palestine to study the figures and landscapes of his religious subjects, spending four years there in preparation for his picture "Finding of Christ in the Temple." His industry was richly rewarded by the public, which bought the latter picture for £5000 and "The Shadow of Death" for £10,000. In 1905 he received the Order of Merit, and on his death in 1910 was buried in St. Paul's Cathedral with national honors.

The best known of Hunt's works is his "Light of the World," now in Keble College, Oxford (a life-size version is in St. Paul's Cathedral, London). It represents Christ, the crown of thorns on His brow and a lantern in His hand, standing before a closed door; it is executed with great detail and realism. Among Hunt's earlier works are a "Converted Christian Family Sheltering Christian Missionaries from the Druids," in the Taylor Museum, Oxford; "Rienzi Vowing to Avenge his Brother's Death"; the "Hireling Shepherd"; and the "Awakened Conscience." The "Scapegoat" is a strange religious production, representing a goat perishing among the miasmas of the Dead Sea. In the Gallery of Birmingham is the "Finding of Christ in the Temple"; at Manchester, the "Shadow of Death," also called "Christ, the Carpenter," and "Valentine and Silvia"; at Liverpool, the "Triumph of the Innocents." Among his latest works were: "Isabella and the Pot of Basil"; "May Morning in Magdalen Tower"; "Holy Fire in the Church of the Sepulchre of Jerusalem." Consult: G. C. Williamson, *Holman Hunt* (New York, 1902); W. H. Hunt, *Pre-Raphaelitism and the Pre-Raphaelite Brotherhood* (2 vols., ib., 1906); M. E. Coleridge, *Holman Hunt* (ib., 1908); T. L. Hare, *Leaders of English Pre-Raphaelites* (ib., 1909).

HUNT, Isaac (1751–1809). An English lawyer and Loyalist in the American Revolutionary era, father of Leigh Hunt the poet. He was born in Barbados, West Indies, was sent to school

in Philadelphia and studied law there; but the college declined to grant him an M.A. degree on account of his anonymous literary productions, which were highly displeasing to the popular sentiment of the time. When the Revolution was actually in progress, he was mobbed and imprisoned for his activity in the royal cause, but fled to England, where he entered the Church. After preaching in London for a time he became a private tutor and wrote *The Political Family, or a Discourse Pointing out the Reciprocal Advantages which Flow from an Uninterrupted Union between Great Britain and her American Colonies* (1775), and *Right of Englishmen, an Antidote to the Poison of Thomas Paine* (1791).

HUNT, John (1812–48). An English Wesleyan clergyman and missionary, born at Balderton, Nottinghamshire. For nearly three years he studied at the Wesleyan Theological Institution at Hoxton. In 1838 he went as a missionary to the cannibals of the Fiji Islands and labored among them until his death, achieving marvelous results. He was the author of the following volumes, all published posthumously: *Entire Sanctification: Its Nature, the Way of Attainment and Motives for its Pursuit* (1853); *Memoir of Rev. W. Cross, Missionary to the Friendly and Feejee Islands* (1848; 2d ed., 1858); *Wesley and Wesleyanism* (London, 1858). Consult G. S. Rowe, *The Life of John Hunt, Missionary to the Cannibals* (London and New York, 1859), and Joseph Nettleton, *John Hunt, Pioneer Missionary and Saint* (London, n. d.).

HUNT, (James Henry) Leigh (1784–1859). An English poet and essayist, born at Southgate, Middlesex, Oct. 19, 1784. He was a son of Isaac Hunt (q.v.). His mother was of Quaker descent. The boy was educated at Christ's Hospital, London. While at school he wrote verse in imitation of Collins, Gray, and others. A selection of these juvenile poems his father helped him to publish in 1801, under the title *Juvenalia.* In 1805 Leigh attracted some notice by his theatrical and literary criticism in the *News,* a short-lived paper started by his elder brother, John. Two years later he made out of these contributions a book entitled *Critical Essays on Performers of the London Theatres.* He also served as clerk in the office of his brother Stephen, who was an attorney, and for a short time he occupied a minor post in the War Office. In 1808 he joined with his brother John in founding a newspaper called the *Examiner,* of which he was editor for 13 years. In this paper, in 1816, he presented Keats and Shelley to the public. Hunt was a Liberal in politics before Liberalism had become fashionable; and for one of his articles, reflecting on the obesity of the Prince Regent—"a fat Adonis of fifty," Hunt had called him—he was sentenced to pay a fine of £500 and to undergo two years' imprisonment. Hunt was happy enough in his confinement; he hid the prison bars with flowers and received visits from Byron, Shelley, and Keats. Released in 1815, he published the next year *The Story of Rimini,* a verse narrative based on Dante's episode of Paolo and Francesca.

In 1818 appeared a volume of original poems and translations entitled *Foliage.* The next year he started another journal, the *Indicator* (continued for 76 weeks), in which first appeared some of his best essays. In 1821, having severed his London literary connections, he went to Italy to assume the editorship of a journal projected by Byron and Shelley. There were annoying delays; Shelley died; Byron and Hunt quarreled; and of this journal, called the *Liberal,* only four numbers appeared (1822–23). Returning to London, Hunt gave his version of the enterprise in *Lord Byron and Some of his Contemporaries* (1828). In the same year he began the *Companion* (28 numbers), a sequel to the *Indicator.* In 1834 he started the *Leigh Hunt's Journal,* which he edited for about two years. His principal works, besides those already mentioned, are: *Captain Sword and Captain Pen* (1835), a poem; *Legend of Florence* (1840), a fine play; *The Seer* (1840), a selection from his essays in various magazines; some remarkable prefaces to an edition of the Restoration dramatists (1840); *Palfrey: A Love Story of Old Times* (1842); *One Hundred Romances of Real Life* (1843), made up from contributions to his *Journal* in 1834–35; *Imagination or Fancy,* containing the well-known essay on *What Is Poetry?* (1844); a volume of his collected poems (1844); *Wit and Humour,* selections from the English poets, with comments (1846); *Stories from the Italian Poets, with Lives* (1846); *Men, Women, and Books,* a delightful collection of miscellanies (1847); *A Jar of Honey from Mount Hybla* (1848), made up mostly of contributions to *Ainsworth's Magazine* in 1844; the *Autobiography* (1850; enlarged, 1860); *Table Talk* (1851); *The Old Court Suburb* (1855). In spite of his industry, Hunt was always poor. In 1844 Sir Percy Shelley settled upon him a pension of £120, which was augmented in 1847 by a government pension of £200. He died at Putney, Aug. 28, 1859.

Hunt undoubtedly wrote too much, but the best of his poems and essays render his reputation secure. *The Story of Rimini* is one of the finest narrative poems since Dryden; his *Palfrey* is delightful from its good spirits and bright, sunny glimpses of landscape and character; and *Abou-ben-Adhem* is a charming fable. As an essayist he is always cheerful and fanciful, and as a critic he is subtle and appreciative. His style is graceful.

Bibliography. *Autobiography,* ed. by his son, T. Hunt (London, 1860); *Poetical Works* (ib., 1860) and *Correspondence* (ib., 1862); Ireland, *List of Writings of Hazlitt and Hunt* (ib., 1868); *Recollections of Charles and Mary Cowden Clarke* (ib., 1878); Monkhouse, *Life of Hunt,* in "Great Writers Series" (ib., 1893); Johnson, *Leigh Hunt* (ib., 1896); selections from works by Ollier (ib., 1869; new ed., 1890), Symons (ib., 1887), Kent (ib., 1889); *Tales,* with memoir, by Knight (ib., 1890); *Classical Tales* (ib., 1894); *Dramatic Essays,* selected by Archer and Lowe (ib., 1894), Johnson (ib., 1900–02); reprint of *The Months,* edition of 1821, with introduction by Andrews (ib., 1897); B. Miller, *Leigh Hunt's Relations with Byron, Shelley, and Keats* (New York, 1910); C. T. Winchester, *A Group of English Essayists* (ib., 1910).

HUNT, Reid (1870–). An American pharmacologist, born at Martinsville, Ohio. He was educated at Johns Hopkins University (A.B., 1891; Ph.D., 1896), at the University of Bonn, and at the College of Physicians and Surgeons, Baltimore (M.D., 1896). He taught physiology at the College of Physicians and Surgeons (Columbia) in 1896–98, was associate and associate professor of pharmacology at Johns Hopkins from 1898 to 1903, served as chief of

division and professor of pharmacology in the United States Public Health Service from 1904 to 1913, and thereafter was professor of pharmacology in Harvard Medical School. He is author of *Studies in Experimental Alcoholism* (1907); *Studies on the Thyroid* (1909), with Atherton Seidell; *Effects of Various Diets upon Resistance of Animals to Poisons* (1910); *Effects of Derivatives of Choline and Analogous Compounds on the Blood Pressure* (1911), with R. de M. Taveau. He also contributed to Heffter's *Handbuch der Experimental-Pharmakologie* (1914).

HUNT, Richard Morris (1828–95). An American architect, born at Brattleboro, Vt., the brother of William Morris Hunt. At 15 he began the study of architecture in Geneva, Switzerland, and five years later entered the Ecole des Beaux-Arts in Paris, the first of American students there. After travel in Europe, Asia, and Egypt, he was employed as inspector of works on the Louvre, and, under his old master Lefuel, who had succeeded Visconti, he had charge of the details of the Pavillon de la Bibliothèque. In 1855 he returned to his own country, worked under Walter on the Capitol extension at Washington, and later established in New York the earliest American atelier, or studio, of architecture, which became a nursery of great architects and the pioneer of all American training schools of architecture. He was the designer of the Lenox Library, the Tribune Building, New York, the United States Naval Observatory at Washington, the Divinity Building at Yale, the Administration Building for the World's Fair, Chicago, the Yorktown Monument, the earlier buildings of Hampton Institute (Virginia), the pedestal of the statue of Liberty in New York harbor, and the Fogg Museum of Harvard University. Among private houses by him are those of H. G. Marquand, W. K. Vanderbilt, New York; the country house of George Vanderbilt, Biltmore, N. C.; and several beautiful summer houses at Newport, R. I., including Mrs. O. H. P. Belmont's "Marble House," and "The Breakers." Mr. Hunt exercised a powerful influence on the architecture of America—less, perhaps, by the intrinsic merit of his designs, though they were often of a high order, than by the inspiring force of his personality. He was one of the founders and in 1888 became president of the Institute of Architects. He was Chevalier of the Legion of Honor and a foreign associate of the Institute of France. In 1898 the associated architectural and art societies of New York City erected a beautiful memorial to him, including a bust; inserted in the Central Park wall, it faces Fifth Avenue at Seventieth Street. Consult "Richard Morris Hunt: His Art and Work," in *Architecture and Building, 1895* (New York, 1895).

HUNT, Robert Woolston (1838–). An American metallurgical engineer, born in Fallsington, Bucks Co., Pa., and educated at Covington, Ky. He worked in a rolling mill at Pottsville, Pa., studied chemistry at Philadelphia (1859–60), and served as superintendent of steel and iron works at Wyandotte, Mich., at Troy, N. Y., and elsewhere until 1888, when he became head of Robert W. Hunt & Co., consulting engineers and inspectors of steel. He was president of the American Institute of Mining Engineers (1883 and 1906), of the American Society of Mechanical Engineers (1891), and of the Western Society of Engineers (1893).

HUNT, Thomas Sterry (1826–92). An American scientist, born at Norwich, Conn. He studied chemistry and acted as laboratory assistant at Yale College. In 1847 he was made chemist and mineralogist to the Geological Survey of Canada and, while holding this position, was also for several years professor of chemistry at Laval and McGill universities. In 1872 he resigned his position on the Geological Survey to become professor of geology at Massachusetts Institute of Technology, and six years later he retired from official service. His extensive and fruitful researches in general and economic geology, in pure and applied chemistry, and in mineralogy, won for him a place of eminence in the scientific world, and universities and learned societies the world over conferred upon him their honors. He was made a fellow of the Royal Society of London, Chevalier of the Legion of Honor in France, and an honorary doctor of laws of the University of Cambridge, and served as president of the American Association for the Advancement of Science (1870), the American Institute of Mining Engineers (1876), the American Chemical Society (1879 and 1888), and the Royal Society of Canada (1884). Besides a very large number of papers on special scientific topics, his publications include the following works: *Chemical and Geological Essays* (1874); *Azoic Rocks* (1878); *The Domain of Physiology* (2d ed., 1882); *Mineral Physiology and Physiography* (1886); *A New Basis for Chemistry* (1887); *Systematic Mineralogy* (1891).

HUNT, Ward (1810–86). An American jurist, born in Utica, N. Y. He was educated at Union College, prepared himself for his legal career in Litchfield, Conn., and after following his profession for many years in his native town, of which he was mayor in 1844, he was raised to the Court of Appeals in New York (1865) and seven years later to the bench of the United States Supreme Court. This position he occupied for 10 years and then retired with a pension.

HUNT, William (1842–). An English clergyman and historian. He was educated at Harrow and at Trinity College, Oxford, was vicar of Congresbury, Somerset, in 1867–82, and then went to London as a reviewer and contributor to the *Dictionary of National Biography*. He was president of the Royal Historical Society in 1905–09 and wrote: *The English Church in the Middle Ages* (1888); *The English Church, 597–1066* (1899), the first volume in a series of which he was editor; the tenth volume of the *Political History of England* (1905–07), of which he was joint editor with R. Lane-Poole: *The Irish Parliament of 1775* (1907), edited from a contemporary manuscript.

HUNT, William Henry (1790–1864). An English water-color painter of still life, genre, and landscapes. He was born in London, the son of a tin-plate worker, and was a cripple from childhood; but he early became the apprentice pupil of John Varley (q.v.) and one of the protégés of Dr. Thomas Munro, of Adelphi Terrace. In 1807 he exhibited at the Royal Academy and the next year, on the advice of William Mulready, entered the schools of the Academy. His early work was largely in oil, but after 1824, when he became an associate of the Water-Color Society (member, 1826), he devoted himself almost exclusively to water colors and between 1824 and 1831 exhibited 153 drawings, of which 8 were candlelight scenes, and 60 were figures of fisher folk at Hastings. From

1831 to 1851 he exhibited on an average 25 drawings a year. At his death, in 1864, he left a fortune of £20,000. After 1826 still life, flowers, fruit, vegetables, game, and poultry, began to predominate in his drawings over figures and landscapes. Because of his lameness he painted many of his landscapes from the windows of his house at Hastings, where he spent part of each year for 30 years. Though a man of little general culture, he had a strong vein of humor, as illustrated by drawings that chromolithography has popularized, such as "Massa Sambo," "Too Hot," "The Card Players," "The Young Shaver," "The Attack," and "The Defeat." In the Tate Gallery there are five of his drawings; in the Victoria and Albert Museum, 36. Important private collections were made by Louis Huth and James Orrock. While Hunt's subjects are simple, his treatment of them is unexcelled, and technically he possessed all the resources of water color. Ruskin said of him: "He was, take him for all in all, the finest painter of still life that ever existed." Consult: Ruskin, *Notes on Samuel Prout and William Hunt* (London, 1879); Richard and Samuel Redgrave, *Century of Painters of the English School* (2d ed., ib., 1890); J. L. Roget, *History of the Old Water Color Society* (2 vols., ib., 1891).

HUNT, William Henry (1824–84). An American lawyer and public official, born in Charleston, S. C. After studying for two years at Yale College in the class of 1843, he removed to Louisiana, studied law, and was admitted to the bar in 1844. During the next 30 years he lived in New Orleans, practicing law and serving as professor in a law school. Throughout the Civil War he favored the Union cause and ever afterward remained a stanch Republican. In 1876 he was appointed Attorney-General of Louisiana to fill a vacancy and was regularly nominated for that position in the same year; but the vote was contested and largely through the agency of President Hayes the Democratic candidates were placed in office. Hunt was made a judge of the United States Court of Claims in 1878, was prominently mentioned two years later as a successor to Justice Strong on the Supreme Court bench, and in 1881 was appointed by Garfield Secretary of the Navy, after he had declined the judgeship of the United States Circuit Court of the Fifth District. He retired when Arthur reorganized Garfield's cabinet and in 1882 was made Minister to Russia.

HUNT, William Henry (1857–). An American judge, son of the preceding and brother of Gaillard Hunt. He was born in New Orleans, La., and was educated at Yale University. He served as collector of customs for Montana and Idaho (1881–85) and in Montana as Attorney-General (1885–87), member of the Legislature (1889), district judge of the First Judicial District (1889–94), and justice of the Supreme Court (1894–1900). For a year after this he was Secretary of Porto Rico, and from 1901 to 1904 he was Governor. He returned to the bench as United States district judge for the District of Montana, in 1910–11 was associate judge of the United States Court of Customs Appeal, and from 1911 to 1914 served as associate judge of the United States Commerce Court.

HUNT, William Morris (1824–79). An American landscape, figure, and portrait painter. He was born at Brattleboro, Vt., March 31, 1824, the son of a member of Congress and brother of the architect R. M. Hunt. He entered Harvard College in 1840, but, compelled to leave on account of his health, he traveled in Europe. He studied sculpture for a short time at Rome with H. K. Brown and in Paris under Barye, but in 1846 took up painting at the Academy of Düsseldorf. Dissatisfied with the methods there, he worked five years as the favorite pupil of Couture in Paris. Attracted to Barbizon, he became a friend and follower of Millet, who exercised the strongest influence on his art. In 1855 Hunt returned to the United States and soon afterward established himself in Boston. There he became a very successful teacher of painting and exercised a marked influence upon American art. He taught his pupils the new art methods of Paris and influenced large classes, not only by the superiority of his aims, but by his own work. His criticisms and sayings in his studio were compiled and edited by his pupil Helen M. Knowlton and published under the title *Talks on Art* (3 vols., Boston, 1875–82). Under sudden derangement he committed suicide at the Isles of Shoals, Sept. 8, 1879. His work is fine in color and masterly in execution. At first he showed a preference for figure subjects—peasants, children, flower girls, and Parisian types. In portrait painting his aim was to represent the character of the person, even at the expense of finish in the accessories. His later subjects were principally landscapes, in which he showed largeness of style and vigor of execution.

Among his most important figure subjects are: "Head of a Jewess," "Sheep Shearing at Barbizon," "The Farmers' Return," "The Fortune Teller," "The Prodigal Son." The Boston Museum contains a number of his works: "Girl with the Kitten," "Girl Reading," "Peasant Girl at Barbizon," "Marguerite," "Hurdy-Gurdy Boy," and a portrait of the artist. In the Metropolitan Museum of Art are seven examples, including an excellent "Landscape" in the Barbizon style, "Girl at a Fountain," and "The Bathers." His portraits include those of Chief Justice Shaw (Court House, Salem), one of the best portraits painted in America; Mrs. F. G. Ward, Mrs. Charles Francis Adams, Mrs. G. W. Long, William H. Gardiner, and William M. Evarts. Among his landscapes are: "Gloucester Harbor," "Newton Lower Falls," "Coast Scene at Magnolia, Mass.," and "Dead in the Snow." His most ambitious works, the "Flight of Night" and "Discovery," colossal decorations in the Capitol at Albany, were executed in 1878, not long before his death. They were hopelessly damaged by the cracking of the stone on which they were directly painted, and were concealed by later additions to the ceiling; but the sketches show them of lofty conception and magnificent movement. Two of these studies are in the Metropolitan Museum, New York. Consult: Hinton, in *American Art Review* (New York, 1880); H. M. Knowlton, *The Art Life of William Morris Hunt* (Boston, 1899); Samuel Isham, *History of American Painting* (New York, 1903); Hunt, in *Masters in Art* (Boston, 1908).

HUNT'ER, David (1802–86). An American soldier, born in Washington, D. C. He graduated at West Point in 1822 and from 1833 to 1836 served as captain of dragoons in the Far West. He held the rank of major throughout the Mexican War, entered the Civil War as colonel of the Sixth Cavalry, and headed the

Second Division of the Army of the Potomac at the first battle of Bull Run, where he was severely wounded. He was afterward promoted to be a major general of volunteers (1861); commanded the Western Department and the Department of Kansas; was then appointed head of the Southern Department, and was the first to enlist colored troops. He gave a premature order in 1862 for the manumission of slaves in Georgia, Florida, and South Carolina, which President Lincoln countermanded; but the Confederate Congress outlawed the author. In 1864 Hunter was head of the Department of West Virginia and led 18,000 men to an unsuccessful attack upon Lynchburg, leaving the valley of Virginia exposed by his retreat. General Grant defended his reputation when it was attacked. Hunter presided at the court which tried the conspirators in the assassination of Lincoln. At the close of the war he was brevetted brigadier and major general in the regular army. He was retired from active service July 31, 1866.

HUNTER, Edward (1839–). An American soldier, born at Gardiner, Me. He graduated at West Point in 1865, was commissioned in the army as second lieutenant of the Twelfth Infantry, U. S. A. In 1867–69 he was aid-de-camp to General Getty at Santa Fe, N. Mex., and participated in the battle of Dec. 25, 1868, against the Arapahoe and Cheyenne Indians. Transferred to the First Cavalry, U. S. A., in 1870, until 1886 he served in California, Nevada, Washington, and Montana, and in 1879 was promoted to be captain. In 1888 he became major and judge advocate and as such served in the Division of the Pacific and the Department of California from 1889 to 1895. He was made lieutenant colonel in 1895 and served as deputy judge advocate in the Department of Dakota until 1898 and in that year went with General Brooke to Porto Rico as judge advocate. Later he was judge advocate of the Department of the East. He retired in 1903.

HUNTER, George Leland (1867–). An American authority on decorative art. He was born at Bellingham, Mass., and was educated at Phillips Exeter Academy and at Harvard University (A.B., 1889). After teaching privately for a decade in Chicago he removed to New York, devoting his attention to the decorative arts, particularly to textiles and furniture. The fruits of his wide studies in European and American collections, both public and private, were published in many magazine articles and in several books. His *Tapestries, their Origin, History, and Renaissance* (1912) is the best book in English on the subject. He published also *Home Furnishing* (1913) and *The House that Jack Built* (1914); organized important loan exhibitions of tapestries in connection with lecture promenades, in museums and elsewhere; and had charge of the department of decorative arts in the second edition of the New International Encyclopædia.

HUNTER, Gordon (1863–). A Canadian jurist. He was born at Beamsville, Ontario, and was educated at the Brantford Collegiate Institute and at Toronto University, where he graduated in 1885. He studied law and was called to the Ontario bar in 1888, but went to British Columbia and was called to the bar of that province in 1892. He was first official law reporter to the British Columbia Supreme Court, but resigned in 1894 and engaged successfully in the practice of his profession. In 1902 he was appointed Chief Justice of British Columbia. In the following year he also became a royal commissioner for the purpose of investigating strikes and lockouts between mine owners and their employees throughout British Columbia. In 1908 he was administrator of the Provincial government.

HUNTER, Herne the. See Herne the Hunter.

HUNTER, John (1728–93). A celebrated English physiologist and surgeon, born at Long Calderwood, Glasgow, Scotland, the youngest of 10 children. After a deficient primary education he was apprenticed to a cabinetmaker; but in 1748 he began to make up deficiencies in his education and applied himself to anatomy under his brother's tuition. During this period he demonstrated the manner of the descent of the testis to the scrotum in fœtal life, studied the placental circulation, traced the distribution of the olfactory nerve in the nose, and, with his brother William, elucidated the function of the lymphatic system. He studied under Cheselden at Chelsea Hospital and under Pott between 1749 and 1753 and at Oxford from 1753 to 1754, became a hospital pupil in surgery in 1754, and was made house surgeon at St. George's Hospital in 1756. He joined the army as staff surgeon, serving in France and Portugal from 1761 to 1763; practiced surgery in London from 1763; was made a fellow of the Royal Society in 1767; became surgeon to St. George's Hospital in 1768, surgeon extraordinary to the King in 1776, and deputy surgeon-general to the army in 1786. He received the Copley medal from the Royal Society in 1787. Hunter was an indefatigable student of comparative anatomy, physiology, and botany. At his house at Earl's Court, from 1772 until his death, he kept and studied creatures from all quarters of the globe. Fishes, birds, lizards, hedgehogs, silkworms, leopards, hornets, and wasps are mentioned among the objects of his study and observation. He lodged shot in the leg bones of young pigs at definite distances and then fed them with madder, which stains living and growing tissues, and demonstrated the manner in which bones grow. He first discovered the principle of compensatory development of blood vessels under the "stimulus of necessity." He tied the common carotid artery of a buck and noted that cutting off its main blood supply did not materially interfere with its growth and development. Dissection of the animal later showed that small branches above and below the place of tying had enlarged sufficiently to meet the physiological demand. This discovery emboldened him to ligate the great arterial trunks in cases of aneurism, relying on the establishment of collateral circulation to prevent death of the limb. His first operation on this theory was a ligation of the femoral artery, for aneurism, in the fibrous sheath (still known as Hunter's canal) where it passes through the muscles of the thigh. He is said to have dissected over 500 different species of animals, many of them repeatedly. Hunter died in his sixty-fifth year, of a spasmodic heart attack brought on by a somewhat acrimonious discussion at a board meeting, over the admission of pupils to St. George's Hospital. He was of a warm temperament and was subject in his later years to such attacks. He was a man of great industry, the boldest and best operative surgeon of his day as well as the greatest anatomist known and a marvelous zoölogist. His museum

contained at the time of his death 10,563 specimens and preparations illustrative of human and comparative anatomy, physiology, pathology, and natural history. He died in comparative poverty, and his collection was purchased, two years after his death, by the government for £15,000 and was presented to the Royal College of Surgeons. In addition to numerous papers contributed to the *Transactions* of the Royal and other learned societies, he published the following independent works: *A Treatise on the Natural History of the Human Teeth* (part i, 1771; part ii, 1778); *A Treatise on the Venereal Disease* (1786); *Observations on Certain Parts of the Animal Economy* (1786); *A Treatise on the Blood, Inflammation, and Gunshot Wounds* (1794). Consult Palmer, *The Works of John Hunter, F.R.S., with Notes* (4 vols., London, 1838). To this is prefixed *The Life of John Hunter, F.R.S.*, by Otley.

HUNTER, John Dunn (c.1798–1827). An American adventurer from a Southern settlement who claimed that he had been captured and reared by Western Indians. His account of explorations with them and of their manners and customs was ultimately discredited, but it is certain that when he came to New Orleans in 1817 he knew no English, and that he studied it there and in Kentucky. He was lionized while visiting England, but on his return to America did nothing but make trouble among the Mexicans and Indians and was finally killed by one of the latter. The work by which he is known was published in London and Philadelphia and translated into German and Swedish. The English edition is called *Memoirs of a Captivity among the Indians of North America from Childhood to the Age of Nineteen* (1823).

HUNTER, Joseph (1783–1861). An English literary antiquary, born at Sheffield. He studied for the Presbyterian ministry, in 1809 was appointed to a congregation in Bath, and in 1833 removed to London, where he became subcommissioner of the public records and assistant keeper (1838). His researches began in early life and extended over his entire career. He edited various volumes of records, made discoveries in regard to the first settlements in America, and illustrated the text of Shakespeare's plays by investigations in many directions. His voluminous notes are now in the British Museum. Among his publications are: *Hallamshire* (1819; enlarged, 1869); *Disquisitions on Shakespeare's Tempest* (1839); *New Illustrations of the Life, Studies, and Writings of Shakespeare* (1845); *Milton* (1850); *Robin Hood* (1852); *The Founders of New Plymouth* (1854); and the *Church and Congregation of Protestant Separatists at Scrooby* (1854).

HUNTER, Mrs. Leo. See Pickwick Club.

HUNTER, Peter (1746–1805). A Canadian administrator and soldier, born in Scotland. He chose the army as his profession and in 1799 had risen by hard service in the Revolutionary War to the rank of lieutenant general and commander in chief of the forces in British North America. In the same year he was appointed Lieutenant Governor of Upper Canada, succeeding Gen. John Graves Simcoe. He remained in office six years. He gave his military duties precedence over the civil, and in the early part of his term intrusted the government to a commission while he was absent in Quebec. On his return he aided the passage through Parliament of measures providing more equal representation and improving trade between Upper Canada and the United States. Responsible government was not yet established, and Hunter was charged with trusting too much to the advice of an irresponsible executive; yet he strove to be just and, though occasionally misled, was, on the whole, a fair-minded and successful administrator. He died at Quebec.

HUNTER, Robert (?–1734). A British Colonial Governor of New York and Jamaica. He belonged to an Ayreshire family. He served on the Continent, fought at Blenheim, and rose to be a colonel of dragoons before he was made Lieutenant Governor of Virginia in 1707. The vessel in which he had sailed to the Colony was taken by the French, and he was held a prisoner, but soon was exchanged for the Bishop of Quebec. In 1710 he came to America again, this time with a shipload of persecuted German Protestants who had sought an asylum in England, and Colonel Hunter, being now Governor of New York, was able to establish them comfortably along the Hudson, though the settlement was an unending care to himself. Difficulties between royal governors and Colonial assemblies were rife even in his day and he doubtless rejoiced to return to England in 1719; but he was sent out again 10 years afterward to be Governor of Jamaica and major general of the local troops, positions which he filled most creditably until his death.

HUNTER, Robert Mercer Taliaferro (1809–87). An American politician, born in Essex Co., Va. He graduated at the University of Virginia in 1829 and after studying law at the Winchester (Va.) Law School began practicing in his native county the following year. His political career began in 1833 with his election to the State Legislature, and in 1837 he took his seat in the national House of Representatives, to which he had been elected as a Democrat. From the beginning he attracted attention by his earnest opposition to Clay's protective policy and the United States bank scheme. Reëlected to the next Congress, the Twenty-sixth, he was, although only 30 years old, chosen Speaker of the House. He was reelected to the Twenty-seventh Congress and was defeated for the Twenty-eighth (1843–45), but was reëlected to the Twenty-ninth and served until his elevation to the United States Senate in 1847. He served as Senator until the outbreak of the Civil War, withdrew after the secession of Virginia, and was expelled in July, 1861. He was a radical States-Rights Democrat and a champion of Texas annexation, the Fugitive Slave Law, and all other legislation favorable to the slave power. As chairman of the Senate Committee on Finance for many years, he was a prominent figure in financial legislation, was the author of the low tariff of 1857, the originator of the bonded warehouse system, and one of the first to advocate civil-service reform. In 1860 he was a prominent candidate for the Democratic nomination for President before the Charleston Convention, receiving, next to Douglas, the highest number of votes. He was a member of the first provisional Confederate Congress, was Secretary of State in the Confederate cabinet for a few months in 1862, and was then chosen from Virginia a Senator in the Confederate Senate, where he served throughout the war, leading the opposition to the Davis administration in that body. In 1865 he was one of the Confederate commissioners with Alex-

ander Stephens and J. A. Campbell to confer with President Lincoln and Secretary Seward at Hampton Roads. (See HAMPTON ROADS CONFERENCE.) After the war he was Treasurer of the State of Virginia from 1874 to 1880, and from 1885 until his death collector of the port of Tappahannock, Va.; but he took no part in national politics. Consult M. T. Hunter, *A Memoir of Robert M. T. Hunter* (Washington, 1903), and Anderson, "Robert Mercer Taliaferro Hunter," in the *John P. Branch Historical Papers*, of Randolph-Macon College, vol. ii, no. 2 (Ashland, Va., 1906).

HUNTER, WILLIAM (1718–83). A Scottish anatomist, the elder brother of John Hunter. He was born at Long Calderwood, Lanarkshire. He took up the study of theology at the University of Glasgow, but decided to devote himself to the study and practice of medicine. In 1746 he was invited by a society of naval surgeons to deliver a course of lectures on operative surgery. After 1748 he confined himself almost exclusively to obstetrics and became connected with the Middlesex and the British lying-in hospitals. In 1764 he became physician extraordinary to Queen Charlotte and in 1768 was appointed professor of anatomy in the Royal Academy. His principal work is an *Anatomical Description of the Human Gravid Uterus and its Contents* (1783).

HUNTER, WILLIAM ALEXANDER (1844–98). A Scottish lawyer and politician. He was born at Aberdeen, where he was educated in the grammar school and in the university, graduating from the latter (M.A.) in 1864. He was called to the English bar at the Middle Temple in 1867 and was professor of Roman law (1869–78) and of jurisprudence (1878–82) at University College, London. Thereafter he devoted himself to politics and from 1885 to 1896 was a Liberal member of Parliament, where he was a persistent advocate of old-age pensions, and where he obtained a measure establishing free elementary education in Scotland. He published two well-known texts, *A Systematic and Historical Exposition of Roman Law in the Order of a Code* (1876; 2d ed., 1885) and *Introduction to Roman Law* (1880; 3d ed., 1885).

HUNTER, SIR WILLIAM WILSON (1840–1900). A British Indian administrator, scholar, and statistician, born in Glasgow. Educated at Glasgow, Paris, and Bonn, he entered the Indian civil service in 1861. Eight years afterward he was transferred from Orissa and put on special duty to plan an Imperial gazetteer of British India; in 1871 he was appointed director general of statistics. Ten years later, after the appearance of the first edition of the *Imperial Gazetteer of India* (condensed to 9 vols. in 1881), which was edited by Hunter and is one of the greatest works of reference on India, he was made a member of the Governor-General's council and in 1882 acted as president of the educational commission. He retired from the service in 1887, settled at Oxford, and became a regular correspondent of the London *Times* on affairs in India. He wrote in a vigorous and picturesque style and for the most part with great scientific accuracy: *Annals of Rural Bengal* (1868; 5th ed., 1872); *Comparative Dictionary of the Non-Aryan Languages of India and High Asia* (1868), which has more valuable material than original induction, as Hunter himself saw afterward; a *Statistical Account of Bengal* (1875–77); *Statistical Account of Assam* (1879); *A Brief History of the Indian Peoples* (1880; and, in more expanded form, 1895, under the title *The Indian Empire*); *Life of the Earl of Mayo* and *Life of the Marquis of Dalhousie* (1890); *The Old Missionary* (1895), a story; a biography of his friend Brian Houghton Hodgson (1896); *The Thackerays in India* (1897); and the incomplete but valuable *History of British India* (1899–1900). Consult Skrine, *Life of Sir William Wilson Hunter* (London, 1901), and W. W. Hunter, *The India of the Queen and Other Essays* (New York, 1903).

HUNTER COLLEGE. See NORMAL COLLEGE.

HUNTER'S MOON. The full moon immediately following the harvest moon (q.v.).

HUNTING (AS. *huntung*, from *huntian*, to hunt; connected with Goth. *hinþan*, to seize, and probably with Eng. *hand*). The pursuit of game, especially as a recreation or sport. The true sportsman is a strong supporter of every law designed for the protection of game (see GAME LAWS; WILD LIFE, CONSERVATION OF) and rarely kills game for any other purpose than for eating, unless it is a dangerous creature or a nuisance. Thus, an animal like the fox is hunted partly on account of its destructiveness and partly for the enjoyment to be obtained in its pursuit. Hunting is a very ancient amusement, and the pursuit of game, either as a pastime or for the necessities of subsistence, has from the earliest times been one of the characteristic occupations of the human race. According to tradition, Alexander the Great paid a large sum for a treatise on this subject by Aristotle, and the chase has been described by Appianus, Nemesianus, and many other classic authors.

Firearms. The improvement in firearms may be said to have simplified hunting to some extent; but, on the other hand, it has caused most of the hunted animals to be more wary and has made more necessary than ever the study of natural history and woodcraft by the hunter. It is impossible to prescribe hard and fast rules about the choice of hunting weapons, whether for large or small game, but an inexperienced person may well consult an expert as to the "fit" of the gun he intends to buy, i.e., the length of stock, "drop," weight, etc. For a more detailed description of the various types of shotgun and rifle for every variety of game, the reader is referred to SHOTGUN; RIFLE, HUNTING.

Dogs. A description of the various varieties of dogs used in the hunting or pursuit of game will be found under FIELD DOGS. Other closely related articles are GAME PRESERVE; HORSE; HORSEMANSHIP.

There are many methods of hunting, and some animals necessitate a pursuit in special ways; but the killing of game by shooting is by far the most common method and the one to which this article is largely devoted. In consequence of improved methods of agriculture, shooting of birds over dogs in England and parts of Scotland and Ireland has become practically a thing of the past, and the "drive," or *battue*, wherein the game is driven past the hunter, is the common method. In America dogs may be regarded as a necessity in the hunting of most game birds, excepting waterfowl. Many rules have developed for the guidance of sportsmen when shooting together in the field, some of the more important of which may be mentioned. Where two persons are shooting together, it is the rule

for one not to shoot at a bird which is flying towards his companion. It is very necessary to condemn the firing across a comrade's face; and good-fellowship demands that a bird should never be fired at if it is flying so that it must cross before a companion until he has failed with both barrels of his gun. Where the birds fly directly away from the sportsmen, shots are taken at them alternately unless several should rise at once, when it is permissible for each man to fire at the birds on his own side.

Kinds of Game. *Snipe* first appear in spring and are usually found in meadows and salt marshes. Windy weather, if the wind is not too high, is a favorable time. Among expert gunners the jacksnipe (Wilson's snipe) is a great favorite, owing to its swift and erratic flight. *Woodcock.*—During the day these birds may be found seeking for food in marshy thickets. When flushed, they fly in a rising straight line as far as the top of the bushes, and then, after making some little distance horizontally, they settle down by means of a number of quick zigzag movements. *Grouse.*—The two most important varieties are the ruffed grouse (generally called partridge in the Northern States, though locally known as the pheasant) and the pinnated grouse, or prairie chicken, now nearly extinct. In common with the Canada grouse (spruce partridge) and the blue and sharp-tailed grouse of the West, they have stout bills, short feathered legs, and dark plumage. The partridge is found in thick woods and is greatly protected by its color, which is so much like that of the ground that the bird is frequently overlooked. It is very shy and wild and frequently will run far ahead of the dogs and eventually rise completely out of range. Sometimes they are hunted with dogs and shot after they have taken refuge in a tree, but the keen sportsman never shoots unless he can secure them on the wing. The ruffed grouse is the most cunning game bird to be found in the Northern States. The *Quail* is often called partridge in the Southern States and is popularly known as the bobwhite. There are many species and subspecies of the bird, all of about the same size, though the plumage of the Eastern and Western forms differs greatly. They are found in the Eastern and Middle States, but are more abundant in the South and Southwest. They afford good sport and are more easily got at than grouse or woodcock. They are usually hunted with dogs and make a very swift flight. *Wild Fowl* (in which general description are included swans and geese, and among the ducks canvasbacks, black ducks, redheads, mallards, teals, pintail, and wood duck) abound especially along the New Jersey coast, Delaware and Chesapeake bays, Currituck Sound, the Mississippi valley, Puget Sound, the Willamette and Columbia rivers. They are very fond of wild rice and wild celery and are frequently lured to waters in which they have no natural food by hunters who plant wild rice. They are hunted in a variety of ways, among which may be enumerated the following: The hunter may station himself concealed near a point over which they fly and shoot them as they pass, or he may put out decoys (see DECOY), or he may steal upon them while they are feeding or resting. In the Chesapeake Bay particularly, and occasionally elsewhere, sink boats are used, in which the gunners lie and shoot the birds as they fly over. Another method is to sink a box in the sand or shallow water in which the hunter lies as in a sink boat. Another very successful way is to employ the trained Chesapeake Bay dog, which will run up and down the shore and by its actions excite the curiosity of the birds, which, if they approach to satisfy their curiosity, are within easy range of the gun. This method is known as tolling. *Wild Turkeys* are hunted with or without a decoy call or whistle. They are easily tracked by their trail on the ground and may be shot at their roosts if surprised at break of day. The *Rail* is usually hunted from boats at flood tide—a method which demands considerable skill and experience on the part of the man who manipulates the boat. *Hunting the hare* with beagles is a very popular sport in England, partly for the exercise it affords and partly for its economy, in that horses are not required.

Ammunition. For a discussion of rifle ammunition, see the articles RIFLE, HUNTING; SMALL ARMS. In the article SHOTGUN the modern tendency to discard large-bore guns for those of smaller bore is noted, and the following suggestions are made with due regard for that tendency. Many sportsmen make the mistake of using too small shot whatever the game they are hunting. This is done under the generally mistaken impression that a thick cloud of small shot is more likely to prove deadly than a thinner cloud of larger shot. It should be borne in mind, however, that small shot has several distinct disadvantages. In the first place, at comparatively short ranges the body of the bird or animal may be struck by from six to a dozen of the smaller pellets, which are likely to interfere seriously with the pleasure of eating the creature, whereas two or three of the larger pellets would have brought down the game, and in at least some instances would have passed clear through the body. Again, small shot necessarily loses its momentum much sooner than a larger size, so that at comparatively long ranges it might fail to inflict wounds which kill or cripple at once, with the result that the game may escape to die of its wounds. Many experienced gunners therefore advocate the use of the largest shot that will make a cloud which at the normal range will be dense enough to make it impossible for the animal to escape being hit at least two or three times, if the gun be held true.

From this point of view the following suggestions are made as to the size of shot to be used for certain game: partridge (grouse), No. 4 or 5; woodcock, No. 7 or 8; quail, No. 6 or 7; rail, No. 6 or 7; snipe, No. 7 or 8; teal and other small ducks, No. 5 or 6; mallard, black duck, and others of similar size, No. 2 or 3 (or even No. 1); geese and brant, No. 1 or BB; turkey, BB; squirrel, No. 4 or 5; rabbits, No. 4 or 5; hare, No. 1 or 2; etc. Three and a half drams of smokeless powder to an ounce and an eighth of shot is an adequate normal load for a gun of 12 bore, though this may well be increased slightly if geese, brant, turkey, or other large and hardy birds are the game. The great bulk of the shotgun ammunition now used is "factory loaded," in paper shells which are not reloadable, and the product is usually quite reliable.

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HUNTING BIG GAME. The term "big game" is an elastic one, but may generally be understood to include all wild mammals larger than the common fox. The establishment of game preserves (see GAME PRESERVE) in Africa and America and the enforcing of stringent game laws, especially such as protect female animals at all times, have done much to conserve these species; but even with such protection rigidly enforced, the only large wild mammal not in danger of extermination is the polar bear, whose habitat in the Arctic is unlikely to be invaded by hunters in numbers sufficient to menace its existence.

Africa. The characteristic big game animals of Africa are the lion, leopard, and cheeta of the cat tribe; the elephant, rhinoceros, and hippopotamus among the pachyderms; the buffalo of the Bovidæ; some 30-odd large species of antelope, and the zebras.

There is no unanimous agreement among sportsmen as to what big game (including, for the moment, the tiger) is most dangerous to hunt. As to the African animals, Frederick Courteney Selous, one of the most skillful and successful of contemporary hunters (and an accurate observer as well), places the lion first, the buffalo and the elephant about on a par, and the rhinoceros last. Sir Samuel Baker put the elephant first, followed by the rhinoceros, buffalo, and lion. Many hunters insist that the buffalo is the most determined and vicious of all the mammals, once he has really begun to fight. Col. Theodore Roosevelt says: " . . . on the whole it seems to me that the weight of opinion among those best fitted to judge is that the lion is the most formidable opponent of the hunter, under ordinary conditions. This is my own view" (*African Game Trails*, p. 64). As to the tiger, though there can be no difference of intelligent opinion concerning the animal's great ferocity, courage, and vitality, experienced hunters say that it is rather less likely, than is the lion, to break cover and make a determined charge in plain sight. Colonel Roosevelt and other hunters are agreed, however, that the leopard, though naturally less dangerous than the lion or the tiger because of its smaller size, shows all of the ferocious courage of its larger relatives, and even more extraordinary vitality.

There are various methods of hunting the lion. One is to lie in wait for the beast near one of its fresh, but only partly devoured, kills in the hope that it will return for another meal; or the hunter may attempt to bait the lion by means of a dead animal or a living one tethered; or he may lie in wait at a water hole known to be frequented by lions. All of these are unsatisfactory, since each is likely to involve a long wait, with the probability that the lion will detect danger and make off; also on account of the difficulty of shooting in the dark. The most common method is to hunt for the spoor of the beast and drive him from his hiding place.

Though naturally a nocturnal animal, lions are frequently found on the plains in daylight, usually when returning to their cover in the early morning or starting out, in the late afternoon, for their night hunt. Under these circumstances a lion will generally shuffle away, even if he sees he is being pursued; but when pressed close or angered by shots he is almost certain to come to bay and charge with the utmost determination and ferocity. The hunter must stand his ground and shoot accurately and rapidly as long as the animal shows the slightest sign of being able to advance. This shooting is not likely to be very difficult, since a charging lion usually does not come on at a bound, but at a very rapid gliding pace, with its body quite close to the earth. If the hunter attempts to escape, it is practically certain that the lion will overtake and kill him outright or inflict wounds with its teeth and claws from which violent and usually fatal septic poisoning ensues.

Paul J. Rainey (q.v.), the American sportsman, made a remarkable demonstration in 1911 of the efficiency of trained dogs in lion hunting. He took with him to Africa about 30 tracking

and fighting dogs. There he trained the tracking dogs to follow the trail of a lion until the animal was at bay, when the fighting dogs would come up and worry the beast, keeping out of its reach meanwhile, until the hunters arrived. Tracking and actually stalking the animal in the jungle or other thick cover, and killing it at close quarters, is sometimes accomplished, but this method is regarded as generally little less than foolhardy.

Any modern repeating rifle, using ammunition loaded with high-power smokeless powder and an expansive or soft-nosed bullet, of from about 0.35 to about 0.40 calibre, will be found effective in shooting soft-skinned animals like the lion, leopard, or tiger.

Elephant hunting is considered little, if any, less dangerous than the pursuit of the lion, and even more difficult, because of the necessity generally of following the great beasts into jungle growths. So dense are such growths that the hunter frequently cannot see clearly for 20 feet in any direction excepting along the trail he is following. As the animal's hearing and sense of smell are very acute, it is necessary to approach cautiously upwind, and not infrequently to within 25 or 30 yards, before a fair shot can be obtained. The only shot which is certain to kill the animal outright is one which penetrates the brain, and if the elephant's head is seen from the side—the more favorable position—the mark presented is a space only about seven inches long by three inches wide, lying roughly between the eye and the ear. Any shot not instantly fatal is very likely to provoke a charge by the wounded animal. It is dangerous to attempt a frontal head shot at an African elephant, as the brain cavity is protected to some extent by the tusks, which are set much more deeply into the skull than are those of the Indian elephant; and a heart shot is not likely to stop one of these great beasts when he charges at close quarters. A bullet through the brain from a small calibre rifle will kill an elephant instantly, but because of the difficulty of hitting that organ unless the animal's head is fully exposed, elephant hunters generally use a rifle of comparatively large calibre (0.40 or more), and always a full metal-jacketed bullet, the soft-nosed bullet being ineffective against all of the pachyderms. Many elephant hunters prefer the double-barrel rifle to the repeater, because with it a second shot may be fired much more quickly than with any single-barrel magazine weapon which must be loaded after each shot.

Rhinoceros hunting is usually much less difficult than is elephant hunting, because the animal is likely to be found in the open, and on account of its poor eyesight may generally be approached (unless it is warned by the tick birds) upwind to within easy shooting distance. The rhinoceros is naturally an aggressive and exceedingly truculent animal, and is very likely to charge the hunter most savagely once it discovers him. Despite the beast's great bulk, it gets under full headway—which is no mean pace—with astonishing celerity, and must be hit very hard in a fatal spot before it can be stopped. The animal's brain is so small, and so well protected by the formation of the skull and from the front by its horns, that the hunter usually is obliged to depend upon the fore shoulder or the heart shot.

Apparently all hunters are agreed as to the vicious disposition of the African buffalo and the blind courage and persistence of the animal's charges. The danger of hunting the animal is increased by its great bulk and strength, which enable it to move very rapidly in the dense and deep papyrus swamps which it frequents, and by its thick horns, which often join in great bosses over its forehead, giving protection to its brain. Many hunters have been killed by charging buffalo, and in some districts they become so aggressive that they attack both natives and white men without provocation. Powerful rifles, like those employed in elephant hunting, must be used in the pursuit of the buffalo.

Hippopotamus hunting is comparatively dull sport, as the animals are usually shot through the head while they are floating on the surface of still water. Occasionally an animal will charge the boat bearing the hunters or dive and rise under it, but as a rule the animal is killed with little peril to its pursuers.

Little need be said about the hunting of the various African antelope, most of which are very timid. The larger species, like the roan and the sable, when wounded or at bay, will sometimes turn on the hunter and become dangerous because of the skill with which they can use their long and rapier-like horns. Even the big and somewhat stupid giraffe must be approached with caution if it is crippled or shows fight, for it is very quick and expert at kicking with both its fore and its hind legs. The hunting of these animals usually involves mere skill in stalking, with the element of danger generally absent.

Asia. The characteristic big game animals of Asia are the tiger, leopard, elephant, rhinoceros, buffalo, several species of bears, and numerous species of goats and deer. A few lions occur in certain districts of Persia, Mesopotamia, and Guzerat. Tiger hunting is the distinctive big-game pursuit of the continent. In India usually one of two methods is employed: either the animal, having been discovered in the jungle, is driven to the hunters by native beaters, or is dislodged by a line of elephants specially trained for this purpose and carrying the sportsmen. When native beaters are used, the hunters usually occupy platforms built in trees at a safe distance from the ground. The attempt to bait a tiger to within shooting distance by means of a tethered animal is no more likely to be successful than is the same method when employed in hunting lions.

Leopards are commoner than tigers in Asia, but they are even more difficult to hunt, because they are much harder to drive out of their cover.

The Indian elephant is not so large as the African species and is more easily killed, because its tusks do not protect the brain cavity in the manner peculiar to the African animal, and therefore it may be shot from the front as well as from the side. The three species of rhinoceros in Asia are widely distributed, occurring in Assam, Burma, Siam, Sumatra, and Borneo. As the animal is usually found in marshes covered by heavy and tall grass, it is commonly hunted from elephants. More exciting is the hunting of buffalo in the forests of Burma and India. The animal is apparently less aggressive than its African relative, but when wounded it has a trick of lying in wait for the pursuing

hunter and dashing out on him in an attempt to take him unawares. The pursuit of wild goats and sheep which frequent the high mountain ranges requires great exertion and skill in mountain climbing, while the shooting is often done at long range.

America. The big-game animals of North America are the bears; the musk ox; many representatives of the deer family; the mountain sheep and goats; the pronghorned antelope (now fast disappearing); the jaguar, the puma or mountain lion, and the lynx of the cat family; and the wolves.

Of the carnivores the bears are the most hunted, excepting the polar bear, which, for reasons already mentioned, is comparatively free from molestation. Polars are usually taken on ice floes or islands to which they resort for their food. When angered by pursuit or when wounded, this bear is quite likely to turn on the hunter, and then becomes a dangerous antagonist.

The Alaskan brown bear group includes the great Kodiak bear, which is by far the largest of the existing carnivores and probably often exceeds a weight of 1200 pounds. These bears live chiefly in the mountain fastnesses and are most frequently seen and shot along the streams to which they resort in the spring to catch salmon. Thus engaged they are likely to become much absorbed, and may sometimes be approached within shooting distance. Powerful rifles (though not necessarily of very large calibre) firing soft-nosed bullets should be used in hunting this huge beast.

There can be no doubt that the grizzly bear's temper has undergone a great change since he first came into contact with civilized man. The early explorers and frontiersmen have left records which show that in their day the grizzly was naturally ferocious and quite disposed to take the aggressive upon slight or no provocation. To-day the animal seems inclined to make off at full speed the instant it suspects the presence of man. It does this so promptly that even in a bear country probably 10 will make a complete and unseen escape where one will be seen. A she bear with cubs is likely to become aggressive if she sees a hunter near by, and any grizzly, if wounded or at bay, is likely to make a stand or even to charge. But even in the latter event two animals may act in a totally different manner, one turning back if shot, or stopping to whine and bite at the wound; while the other may come on with the most determined ferocity, and though badly wounded, may continue to charge until it is killed or succeeds in knocking down the hunter. In the charge one may simply bowl a man over by a single blow and then retreat; another may be satisfied by giving the hunter two or three bites when he is down; and a third may lie on its victim and deliberately bite him to death.

The black bear is a much smaller animal than the grizzly and correspondingly less dangerous, though it could easily overpower and kill a man. It is a comparatively timid beast and seldom shows fight if it can see a way of escape. Unlike the grizzly, which does not climb trees, the black bear is a skillful climber and is apt to adopt that method of escaping from dogs, thereby making it easy prey for the hunter.

The jaguar, which rarely occurs north of Mexico, is not only the largest and most powerful of the cat family in the Western Hemisphere, but ranks next to the tiger in size and strength. It is lacking in the aggressiveness and courage of its Asiatic and African relatives, and when pursued by dogs usually soon takes to a tree, where it is easily shot. The puma or cougar, also called mountain lion, is the most widely known of the cat tribe in North America and is also common in Central and South America. It is an active and handsome animal, but an arrant coward, and like the jaguar promptly takes to a tree when it is chased by dogs.

Of the Cervidæ family in America, the moose is probably the most interesting from the hunter's point of view. It is taken commonly by calling, by still-hunting, or by tracking. In the first-named method the bull is attracted (during the breeding season) by imitating the call of the cow, on a megaphone-like horn, usually made of birch bark. Upon hearing this call the bull usually answers—sometimes from a distance of a mile or more—by a short, deep grunt, and then comes on, as a rule very slowly and quietly, making détours in an endeavor to get the scent of the hunter; for apparently the animal always suspects that he is being deceived. Despite its huge bulk and weight and its widespreading antlers, it frequently makes this advance, even through a dense forest, so noiselessly that it may approach to within 40 or 50 yards before its presence is discovered. An old and pugnacious bull will sometimes challenge as he draws near, and if the cow's call is then repeated, the animal may come on at a run, roaring and battering its antlers against the tree trunks, apparently for the purpose of intimidating any other bull which may be in the vicinity. Still-hunting the moose involves stealthy walking and watching in the forests which the moose are known to frequent, while tracking is usually practiced after a fall of snow. The animal is also frequently shot from a canoe, when it comes to a river or lake to drink or feed. The moose seldom turns on a hunter, but a wounded animal should always be approached very cautiously.

Elk hunting offers considerably less variety than the pursuit of the moose and is a less difficult operation, especially during the breeding season, when the bulls frequently betray their whereabouts by their loud and repeated challenging. This animal is protected in nearly all parts of its natural range within the United States. The caribou is a rather dull animal, which usually may be approached upwind quite easily, so that its hunting rarely requires much skill or manœuvring.

The hunting of mountain sheep probably puts to a severer test the hunter's skill than does the pursuit of any other American game. The animal is apt to be found high up in lofty mountains, and to get within shooting distance is likely to involve much hard and dangerous climbing. The mountain goats are found in the same sort of places and are thought by some hunters to be even more sure-footed than the sheep, but they are much less alert and intelligent.

The methods of hunting the various smaller deer require no special description. All are taken chiefly by still-hunting in the daytime. The white-tailed deer is the most numerous and the most widely distributed; it is very intelligent, always alert, and exceedingly swift of foot, so that still-hunting it successfully requires stealth, patience, knowledge of the animal's

habits, and quick and accurate shooting. That the animal is still to be found in practically every State in the United States, despite the fact that it is hunted virtually everywhere during an open season, is sufficient proof of its cleverness in eluding its chief enemy.

For a list of works on hunting big game, see the bibliography appended to HUNTING. See also RIFLE, HUNTING; LASSO.

HUNTING CAT, or HUNTING LEOPARD. See CHEETA.

HUNTING DOG. This interesting animal (*Lycaon pictus*), which inhabits all the more open parts of Africa south of the Sahara and Abyssinia, is an aberrant species of dog, distinguished from the typical *Canis* by having four toes on each foot and other structural peculiarities. It is about as tall as a greyhound, its legs being relatively long and slender and adapted to the swift and enduring speed upon which it must depend for a livelihood. The head is broad and flat, with a short muzzle armed with massive teeth, rather large upstanding furry ears, and a suggestion of the hyena in the physiognomy; hence it is sometimes called hyena dog, though the likeness (even to the spotted hyena) is wholly superficial. (See Plate of WOLVES AND WILD DOGS with WOLF.) The fur is short, thick, and smooth, and grows more shaggy about the cheeks and throat; and the tail is long and wolflike. In general color this dog is yellowish gray, but it is marked most irregularly with a variety of colors, such as a combination of red, white, yellow, and black spots, so that the hyena dog may be regarded as the most parti-colored of all mammalia. In the southern Sudan, where the animals are plentiful, Schweinfurth saw one specimen that was perfectly tame, required no other restraint than a cord, and yielded to its master with all the docility of an ordinary dog. This fact appears to corroborate the assertion of Livingstone that the natives of the Kalahari Desert are accustomed to break in this animal and train it for the chase.

To the Africans generally, however, both white and black, the hyena dog was one of the most truly wild and dangerous animals of the country, taking the place of the wolves of the northern part of the world. They gathered into packs and astonished and terrified the early settlers and explorers by their numbers, audacity, and strange cries. They frequented mostly plains and scantily forested or brushy regions, where the small antelopes abound, which were their principal prey, and which they would pursue in concert, often only two working together, until the baffled victim (often of the larger species) was cornered or exhausted and might be pulled down. They were a terrible scourge to the sheep and goats of the early frontier farmers and killed or mangled many more of the flock in one of their nocturnal forays than they could possibly eat. The war waged against them in consequence and the diminution of the wild game have caused a great decrease in their numbers; but numerous bands still range the wilds of East and Central Africa and the deserts west and north of Cape Colony. Consult, for early history of the animal, the books of Livingstone, Gordon-Cumming, Moffat, Harris, and their contemporaries; and for later facts, G. Schweinfurth, *Heart of Africa* (trans., 2 vols., London, 1878); F. C. Selous, *A Hunter's Wanderings in Africa* (ib., 1890; New York, 1911); Richard Lydekker, *The Game Animals of Africa* (London, 1908); and especially Roosevelt and Heller, *Life-Histories of African Game Animals* (New York, 1914). See DOG.

HUNTINGDON. A municipal borough, capital of Huntingdonshire, England, on the Ouse, 59 miles north of London (Map: England, F 4). It is celebrated as the birthplace of Oliver Cromwell, the entry of whose birth is to be seen in the register of St. John's Church under the year 1599. The grammar school, founded in 1260, where he and Samuel Pepys were educated, has been restored. The town has a race course at which meetings are held each August. Of Saxon origin, the town was the seat of a royal castle built in 919. Huntingdon received its charter of incorporation in 1189. A fine bridge erected in the thirteenth century connects it with Godmanchester. It is presided over by a mayor, 4 aldermen, and 12 councilors. Pop., 1901, 4261; 1911, 4003.

HUNTINGDON. A borough and the county seat of Huntingdon Co., Pa., on the Juniata River, 98 miles west of Harrisburg, on the Pennsylvania and the Huntingdon and Broad Top Mountain railroads (Map: Pennsylvania, F 6). It is the seat of Juniata College (Church of the Brethren), opened in 1876, and of the State Industrial Reformatory, and it contains a hospital. The city is in an agricultural and fruit-growing region, with valuable forests and deposits of iron, coal, fire clay, and limestone, and has manufactures of flour, machinery, radiators, furniture, stationery, woolen goods, lumber, etc. Huntingdon was settled about 1760 on the site of a famous Indian council ground, now marked by a "Standing Stone Monument," erected at the borough centennial. The government is administered under the original charter of incorporation, adopted in 1796, which provides for a chief burgess, chosen every three years, and a council elected at large. Pop., 1900, 6053; 1910, 6861.

HUNTINGDON, HENRY HASTINGS, third EARL OF (1535–95). An English noble, leader of the Protestant party, son of Francis Hastings, the second Earl, whom he succeeded in 1561. He was an intimate of Edward VI, who knighted him in 1548; and, through his mother's descent from George, brother of Edward IV, he claimed after Elizabeth the succession to the crown. Especially in 1562, during her severe illness, he was considered as her probable successor. He hotly opposed the scheme to marry Mary Stuart to Norfolk and was intrusted by Elizabeth to see that the Scottish Queen did not escape at the time of the threatened uprising in 1569. In the same year he was one of the council which considered the evidence against Mary, helped try Norfolk in 1573, and was prominent and active in the preparations of 1588 for the Spanish invasion. Huntingdon was a zealous Puritan in sympathies, possibly for political reasons. He was succeeded by his brother George.

HUNTINGDON, HENRY OF. See HENRY OF HUNTINGDON.

HUNTINGDON, SELINA HASTINGS, COUNTESS OF (1707–91). One of the most influential promoters of the early Methodist movement. She was the second of three daughters of Washington Shirley, second Earl Ferrers, and was born at Stanton-Harold, Leicestershire, Aug. 24, 1707. She married, in 1728, Theophilus, ninth Earl of Huntingdon. She adopted the principles of the Methodists, much to the dismay of her friends, and gave her life with increasing zeal,

especially after the death of her husband, in 1746, to the interests of the new sect, introducing its ideas into aristocratic circles, to which its other adherents had no access. She was an intimate friend of both Wesleys, of Whitefield, and of many other clergymen prominent in her time. In the dispute between the Wesleys and Whitefield she sided with the latter and assumed a leadership among the Calvinistic Methodists, who came to be known as "The Countess of Huntingdon's Connection." For the education of ministers she established and maintained a college at Trevecca in Wales (removed, in 1792, to Cheshunt, Hertfordshire, and in 1905 to Cambridge), and built, or became possessed of, over 60 chapels in different parts of the country, the principal one being at Bath. She likewise expended large sums in the support of young men trained to itinerant preaching as well as in private charity. She died in London, June 17, 1791. By her will she created a trust bequeathing her chapels to four persons for their care and management after her death. Consult: *Selina, Countess of Huntingdon,* by a member of the houses of Shirley and Hastings (2 vols., London, 1839–40); A. H. New, *The Coronet and the Cross, or, Memorials of Selina, Countess of Huntingdon* (ib., 1857); Abel Stevens, *Women of Methodism* (New York, 1866); Sarah Tytler (pseud.), *Countess of Huntingdon and her Circle* (ib., 1907).

HUNTINGDONSHIRE. An east-midland county of England, bounded on the east by Cambridgeshire, on the south by Bedfordshire, and on the west and north by Northamptonshire. Area, 365 square miles, almost the whole of which is in arable or pasture lands (Map: England, F 4). Pop., 1901, 54,125; 1911, 55,577. It is watered chiefly by the Ouse, the Nene, which skirts its northern boundary, and the Kym. The northern portion of Huntingdonshire is included in the great fen country called Bedford Levels. The soil is various; clay, however, predominates generally. Grain, beans, peas, mangold, cabbage, rape, and clover are the chief crops. Its dairy products are well known, bee farming is engaged in, and cattle are raised. There are manufactures of paper, parchment, brick, and tile. Capital, Huntingdon. Consult W. M. Noble, *Huntingdonshire* (New York, 1911), with maps, diagrams, and illustrations.

Huntingdonshire was traversed by two Roman roads, and Roman remains, as coins, pottery, etc., have been found. In early Anglo-Saxon times it belonged to East Anglia, afterward to Mercia.

HUNTING LEOPARD. See CHEETA.

HUNTINGTON. A city and the county seat of Huntington Co., Ind., on Little River, 24 miles southwest of Fort Wayne, on the Wabash, the Cincinnati, Bluffton, and Chicago, and the Erie railroads (Map: Indiana, G 3). It has a United Brethren college, a business college, county hospital, courthouse (costing $350,000), fine city hall, and a public library, which contains a fine collection of Indian relics. There are railroad shops of the Chicago and Erie, numerous limekilns and woodworking establishments, and manufactures of boots and shoes, pianos, gloves, railroad cranes, clamshell buckets, cedar chests, furnaces, etc. The city has no trolleys and is one of the first cities in the world to operate an extensive system of automobile transit cars. Settled in 1834, Huntington was incorporated as a town in 1848 and in 1873 was chartered as a city. Under a statute of 1905 the government is vested in a mayor, elected quadrennially, and a city council. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 9491; 1910, 10,272; 1914 (U. S. est.), 10,479; 1920, 14,000. Huntington was the scene of important activities in connection with the Knights of the Golden Circle (q.v.).

HUNTINGTON. A town, including several villages in Suffolk Co., N. Y., on Long Island Sound, 35 miles east by north of New York City, on the Long Island Railroad. It is in a fertile agricultural district and is primarily a residential suburb of New York and a popular summer resort. There is a public library, and a monument marks the spot where Nathan Hale the patriot spy was captured. A State fish hatchery and a biological school are situated here. The government is administered by town meetings, which are held biennially. Pop., 1900, 9483; 1910, 12,004. Consult: H. C. Platt, *Old Times in Huntington* (New York, 1876); Silas Wood, *Sketch of the Town of Huntington* (ib., 1898); Peter Ross, *History of Long Island* (ib., 1903); B. F. Thompson, *History of Long Island* (2 vols., ib., 1909).

HUNTINGTON. A city and the county seat of Cabell Co., W. Va., on the Ohio River, 20 miles east of Ironton, Ohio, on the Chesapeake and Ohio and the Baltimore and Ohio railroads (Map: West Virginia, B 3). It is picturesquely situated and well laid out and has Marshall College (State normal school), the West Virginia Asylum for Incurables, a fine high-school building, and a Carnegie library. The city controls an important commerce, carries on a trade in coal, iron, and lumber, and has several wholesale establishments, shops of the Chesapeake and Ohio Railroad, large car works and foundry, a steel plant, machine shops, light-rail mill, a brewery, and manufactures of glass and china, furniture, picture frames, stoves, etc. Settled and incorporated in 1871, Huntington has adopted the commission form of government. The growth of the city has been rapid. Pop., 1900, 11,923; 1910, 31,161; 1914 (U. S. est.), 41,515; 1920, 50,177

HUNTINGTON, ARCHER MILTON (1870–). An American Hispanic scholar, adopted son of Collis P. Huntington. Born in New York City, he was educated there and in Spain. In 1898, for the Spanish government, he conducted important excavations on the site of the old Roman city of Italica, near Seville. The American Geographical Society and the American Numismatic Society chose him their honorary president. To the Hispanic Society of America, which he founded in 1904 and of which he became president, he gave a home in New York, an endowment, and rich collections; and in 1915 he gave jointly to the Academy and the Institute of Arts and Letters a site near the Hispanic, Numismatic, and Geographical societies. He received honorary degrees from Yale, Harvard, and Columbia. He edited *The Poem of the Cid* (3 vols., 1897), *Lady Aulnoy's Travels into Spain* (1899), with introduction, and several other Spanish texts; contributed to magazines; and is author of *A Note Book in Northern Spain* (1898) and *Sonnets* (1908).

HUNTINGTON, COLLIS POTTER (1821–1900). A pioneer American railroad builder, born at Harwinton, Conn., Oct. 22, 1821. Of a noted New England family, Collis P. Huntington early gave evidence of business initiative

—at 15 he started life peddling clocks in the South and West. In 1848 he went out to California and set up as a hardware merchant in Sacramento. With Charles Crocker, Mark Hopkins, and Leland Stanford he laid plans in 1859 for building the Central Pacific Railway, and credit for the completion of this work (1869) is due largely to Huntington's enterprise as fiscal agent for the group. Later, with his associates, Huntington built the Southern Pacific (completed 1881) and the Chesapeake and Ohio railroads, and in time he came to operate 44 branches or connecting railroads along continuous lines from Portland, Ore., via San Francisco and New Orleans to Newport News, Va. The Southern Pacific, of whose board of managers Huntington was president, also acquired large interests in steamship lines. (See RAILWAYS, *History.*) Especially interested in Indian and negro education, he gave liberally to Hampton and Tuskegee institutes; as a memorial to his mother he built a Congregational church in his native town; and to Westchester, N. Y., he presented a library. At the time of his death (which occurred at his camp in the Adirondacks, Aug. 13, 1900) Mr. Huntington possessed a fortune estimates of which ranged from $35,000,000 to $80,000,000. By bequest he left to the Metropolitan Museum, New York, Peale's portrait of Washington, and his $3,000,000 collection of paintings as a whole he also bequeathed to this museum, the bequest to take effect after the death of his widow and his adopted son, Archer M. Huntington (q.v.). Besides other large benefactions, Mrs. Huntington in 1909 made a gift of $750,000 to the American Geographical Society.

HUNTINGTON, DANIEL (1816–1906). An American historical, genre, and portrait painter. He was born in New York, Oct. 14, 1816, and was educated at Hamilton College. In 1835 he studied with Professor Morse and later with Inman; in 1839 he visited Italy, studying with Ferrero in Rome. He was elected member of the National Academy in 1840 and held the office of president from 1862 to 1869 and from 1877 to 1891. He was talented, of fine mind, and industrious, but unfortunate in his early environment and in his epoch—artistic taste in the United States was then at its lowest ebb.

His color is subdued but good, his style is unaffected, and, as the years passed, his technique improved greatly, showing that he was in touch and sympathy with new movements in art. He was chiefly engaged in portrait painting, but also produced historical and genre works of note. Two of his largest canvases are "Lady Washington's Reception Day" and the "Atlantic Cable Projectors," in the Chamber of Commerce, New York. Other works are: "Florentine Girl" (1839); "Henry VIII and Catharine Parr" (1850); "Venice," owned by J. P. Morgan, New York; "Study in the Woods," owned by Mrs. C. P. Huntington, New York; "The Sibyl," Historical Society, New York; "Republican Court" (1876), Stuart collection, New York. Among his portraits are those of President Lincoln, Union League Club, New York; Gov. E. D. Morgan, New York University; Bishop Potter; Judge Blatchford (1879), United States District Court, New York; Rev. Dr. Adams (1883), Union Theological Seminary, New York; Hon. R. C. Winthrop, United States Congress. In the Metropolitan Museum, New York, are his "Mercy's Dream" and portraits of John David Wolfe, Cyrus W. Field, William C. Prime, and Mrs. Elizabeth U. Coles. Consult S. G. W. Benjamin, "Daniel Huntington," in *American Art Review*, vol. ii (Boston, 1881).

HUNTINGTON, ELLSWORTH (1876–). An American geographer and explorer, born at Galesburg, Ill. Educated at Beloit College and at Harvard and Yale, he taught (1897–1901) in Turkey, became a research assistant in the Carnegie Institution, Washington, and after 1907 was instructor and then assistant professor at Yale. He participated in the Pumpelly expedition to Russian Turkestan (1903–04), in the Barrett expedition to Chinese Turkestan (1905–06), and in an expedition to Asia Minor (1909). Honors came to him from foreign geographical societies. His writings include: *Explorations in Turkestan* (1905); *The Pulse of Asia* (1907); *Palestine and its Transformation* (1911); *Asia —A Geography Reader* (1912); *The Climatic Factor as Illustrated in Arid America* (1914).

HUNTINGTON, FREDERIC DAN (1819–1904). An American clergyman, the first Protestant Episcopal Bishop of central New York. He was born at Hadley, Mass., graduated at Amherst in 1839 and at Harvard Divinity School in 1842, and was pastor of the South Congregational (Unitarian) Church, Boston. In 1855 he became preacher at Harvard and Plummer professor of Christian morals there. In 1860 he left the Unitarian church to become an Episcopalian. Resigning his professorship, he organized a parish in Boston and was its rector until 1869, when he was consecrated Bishop of the newly created diocese of central New York. He then settled in Syracuse, where he remained until his death. Among his numerous works are: *Lectures on Human Society* (1860); *Christ in the Christian Year* (2 vols., 1877–81); *The Golden Rule Applied to Business and Social Life* (1892). Consult Arria S. Huntington (his daughter), *Memoir and Letters of Frederic Dan Huntington* (Boston, 1906) and *Doctor Huntington: Being Editorials from the Living Church, Sept. 4–11, 1909* (New York, 1909).

HUNTINGTON, HENRY OF. See HENRY OF HUNTINGTON.

HUNTINGTON, JEDEDIAH (1743–1818). An American general in the Army of the Revolution, born in Norwich, Conn., the son of Jabez Huntington (1719–86). He graduated at Harvard in 1763, joined the American army at Cambridge, became a brigadier general in 1777, and took part in many important engagements until the close of the war, when he was brevetted major general in 1783. He was one of the organizers of the Society of the Cincinnati. He became collector of the port of New London in 1789 and held the office 26 years. In 1778 he was a member of the court-martial that tried Gen. Charles Lee and in 1780 of the one that condemned Major André.

HUNTINGTON, LUCIUS SETH (1827–86). A Canadian statesman. Born at Compton, Quebec, he studied law at Sherbrooke and was called to the bar in 1853. He was a Liberal member of the Canada Legislative Assembly (1861–66), Solicitor-General for Lower Canada (1863–64), and member of the House of Commons (1867–82). The charges which he made in the House, for the Liberals, of a corrupt political bargain between Sir John A. Macdonald and Sir Hugh Allan (qq.v.) in regard to the Cana-

dian Pacific Railway charter, aroused angry debate and country-wide party strife and effected a return of the Liberals to power in 1873. Huntington served as President of the Council in 1874–75 and as Postmaster-General in 1875–78. He published a political novel, *Professor Conant* (1884).

HUNTINGTON, SAMUEL (1732–96). An American lawyer and signer of the Declaration of Independence. He was born at Wyndham, Conn., on a farm; educated himself for the law; practiced at Norwich, represented that constituency in the General Assembly from 1765 to 1774, and became associate justice of the Superior Court (1774), of which, 10 years later, he became Chief Justice. From 1776 to 1784 he was a member of the Continental Congress, of which he was President, as the successor of John Jay, in 1779–80. From 1786 to his death Huntington was Governor of Connecticut.—His nephew and adopted son, SAMUEL HUNTINGTON (1765–1817), graduated at Yale in 1785, was admitted to the bar in 1793, and in 1801 removed to Cleveland, Ohio. He passed the rest of his life in that State and held the offices of judge of the Superior Court, Chief Justice of the Supreme Court, State Senator, and Governor of the State from 1808 to 1810.

HUNTINGTON, WILLIAM EDWARDS (1844–). An American university dean and president. He was born at Hillsboro, Ill., served as private and first lieutenant in the Wisconsin Infantry in 1864–65, and was educated at the University of Wisconsin (A.B., 1870) and at Boston University (B.D., 1873; Ph.D., 1881), where he was dean of the College of Liberal Arts from 1884 to 1904, president of the university in 1904–11, and dean of the graduate department after 1911. In early life he was a Methodist minister, having been ordained in 1868, and he held pastorates in Massachusetts at Nahant (1870–71), Roslindale (1872–74), Newton (1875–76), Cambridge (1877–79), and Boston (1880–82).

HUNTINGTON, WILLIAM HENRY (1820–85). An American journalist, born at Norwich, Conn. He was in Paris as correspondent of the New York *Tribune* for 20 years, from 1858. His philanthropic work during the siege of Paris (1870–71) was important. He bequeathed his collection of medals, bronzes, porcelains, miniatures, engravings, and prints relating to Washington, Lafayette, and Franklin, to the Metropolitan Museum, New York.

HUNTINGTON, WILLIAM REED (1838–1909). An American Protestant Episcopal clergyman and author, born in Lowell, Mass. He graduated at Harvard in 1859 and in 1859–60 was an instructor in chemistry there. Entering the Episcopal ministry, he was rector of All Saints Church, Worcester, Mass., in 1862–83 and of Grace Church, New York, from 1883 until his death. Dr. Huntington always took a prominent part in public affairs. He was active in the movement for liturgical revisions and was long chairman of the Prayer-Book Revision Committee, and editor with Dr. Samuel Hart of the *Standard Prayer-Book* of 1892. He wrote: *The Church Idea, an Essay toward Unity* (1870); *Conditional Immortality* (1878); *The Book Annexed: Its Critics and its Prospects* (1886); *Short History of the Book of Common Prayer* (1893); *A National Church* (1898); *Sonnets and a Dream* (1904); *A Good Shepherd and Other Sermons* (1906).

HUNT'LY, GEORGE GORDON, fifth EARL OF (?–1576). A Scottish statesman. He was educated for the Church, but gave up the idea of entering it upon the death of his elder brother and became sheriff of Inverness and the keeper of its castle (1556). Entering into the political plots of his time, he was more than once imprisoned and condemned to death. Mary, Queen of Scots, released him and restored his estates and title, with a view to gaining his adherence; but he refused to turn Catholic to please her, though he sided with his brother-in-law, Bothwell, in the troubles that followed. Huntly tried to rescue Rizzio and was a main mover in the murder of Darnley as well as in the Queen's subsequent marriage to Bothwell, to which he was a witness. He conspired to rescue his royal mistress from Lochleven (1568) and raised troops in her service; but his lifelong enemy, the Earl of Murray, vanquished him at last, and Huntly's resolve to give up her cause as hopeless was Mary's chief reason for surrendering to Elizabeth. Consult J. H. Burton, *The History of Scotland* (Edinburgh, 1867–70).

HUNTOON, hŭn-tōōn′, LOUIS DOREMUS (1869–). An American mining engineer. He was born at Paterson, N. J., and graduated from the New York College of Pharmacy in 1890 and from the School of Mines (Columbia) in 1895. He was a chemist and assayer in Colorado (1895–96) and mining and metallurgical engineer in New York (1896–1903), served as assistant professor (1904–08) and professor (1908–11) of mining and metallurgy at Sheffield Scientific School (Yale), and was consulting engineer in New York City after 1911. He became a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA.

HUNTS'MAN (BENJAMIN) **PROCESS.** See IRON AND STEEL, METALLURGY OF, under *Crucible Process.*

HUNTS'VILLE. A town in Muskoka Co., Ontario, Canada, on the Grand Trunk Railway (Map: Ontario, E 3), 145 miles north of Toronto. Its manufacturing establishments include several lumber mills, a tannery, leather factory, and machine shop. The town owns its lighting system and water works. It is a summer resort. Pop., 1901, 2152; 1911, 2358.

HUNTSVILLE. A city and the county seat of Madison Co., Ala., 111 miles by rail north of Birmingham, on the Southern and the Nashville, Chattanooga, and St. Louis railroads (Map: Alabama, C 1). It is in the fertile valley of the Tennessee River and has important farming, cotton-growing, and stock-raising interests. There are cotton mills, a foundry, machine shops, saw mills, sash and blind factories, oil and fertilizer mills, a fibre factory, etc. Among the educational institutions are a State normal and industrial school and the Goodrich Training School. Other features are the high school, famous Big Spring, and Monte Sano. Huntsville has adopted the commission form of government. The city owns its water works. Settled in 1775, Huntsville was first incorporated in 1800. At one time it was the capital of the State. Pop., 1900, 8068; 1910, 7611, the decrease being due to the narrowing of the city's corporate limits.

HUNTSVILLE. A city and the county seat of Randolph Co., Mo., 122 miles east of Kansas City, on the Wabash Railroad (Map: Missouri, D 2). It has coal mines, manufactures agricultural implements, and trades in coal, farm

produce, live stock, etc. The water works are owned by the city. Pop., 1900, 1805; 1910, 2247.

HUNTSVILLE. A city and the county seat of Walker Co., Tex., 74 miles north of Houston, on the International and Great Northern Railroad (Map: Texas, E 4). It is an important cotton market, has trucking and live-stock interests, and manufactures cotton goods, cottonseed-oil, lumber, wagons, furniture, steam engines, boilers, cigars, etc. The city has the Sam Houston Normal School (State), the State penitentiary, and, of historic interest, the old home and grave of Gen. Sam Houston and the grave of H. Yokum, the first historian of Texas. Huntsville was first settled about 1836. The government is administered by a mayor, elected every two years, and a unicameral council. Huntsville owns its water works. Pop., 1900, 2484; 1910, 2072.

HUNYADY, hụn'yŏ-dĭ, JÁNOS (John Hunniades) (c.1387–1456). The national hero of Hungary. His origin is shrouded in obscurity. He saw his first military service under King Sigismund. Under Sigismund's successor, Albert II (1438–39), he became known as a brilliant soldier and was ban of a district on the borders of Transylvania, exposed to the Turkish attacks. It was the period when the Turkish power was at its height, and it seemed within the range of possibility that the Mohammedans would obtain possession of the greater part of the Danube valley and seriously menace Western civilization. To Hunyady, more than to any other one man, Europe owes it that the danger was averted. Albert died in 1439, and as there was no male heir, the nobles elected King Ladislas, of Poland, to the Hungarian throne. Meanwhile the wife of Albert gave birth to a son, Ladislas Posthumus, and a civil war resulted, of which the Turks took advantage. Hunyady, however, defeated them in several battles, and in 1443 an advantageous peace was made. Nevertheless King Ladislas, incited by the papal legate, Julian Cesarini, began war again, and on Nov. 10, 1444, the Hungarian army under Ladislas and Hunyady was overwhelmed at Varna. Ladislas was among the slain, whereupon Ladislas Posthumus was recognized by all parties as King, and Hunyady was made Regent during the minority. War was actively carried on both against the Turks and Frederick III. In 1448 Hunyady was completely defeated by the Turks at Kossovo, after which he was held prisoner for a short time by the Servians. His most splendid achievement was the defense of Belgrade in 1456 against the army of Mohammed II, the conqueror of Constantinople, in which he was aided by the celebrated Giovanni da Capistrano (q.v.). The Turkish attack began about June 15, 1456, and on July 14 Hunyady forced his way into the city, while Szilágyi, the commander of the town, made a sortie, and finally, on July 21, the Turks were decisively repulsed and raised the siege, having lost 80,000 men. A few days after this glorious victory the plague broke out in the army, and Hunyady, the great Christian hero, after a short illness fell a victim to the disease. He left two sons, Ladislas and Matthias Corvinus. The former was treacherously imprisoned and beheaded at Buda by Ladislas Posthumus. Matthias, generally known as Matthias Corvinus, became King of Hungary in 1458. Consult: Bain, "The Siege of Belgrade," in the *English Historical Review*, vol. vii (London, 1892); László Szalay, *Geschichte Ungarns*, vol. iii (Budapest, 1874); Armin Vâmbéry, *Story of Hungary* (New York, 1894).

HUNZAS, hoon'zäz. One of the Aryan tribes of Dardistan, inhabiting the district about Hunza.

HUON DE BORDEAUX, ụ'ôN' de bôr'dō'. A French *chanson de geste*, probably belonging to the thirteenth century and then somewhat altered when rewritten for Charles Seigneur de Rochefort, early in 1454. The oldest printed edition is in folio and without date; the second, in quarto, bears the date 1516. The English translation was made by Lord Berners, in Henry VIII's time. The subject has proved a tempting one for poets, the famous *Oberon* of Wieland and Weber's opera of the same name being among the poems founded upon it, while Shakespeare drew from it in the *Midsummer Night's Dream*. A prose adaptation has been issued by Gaston Paris (1899). Consult: Gaston Paris, *Poèmes et légendes du moyen-âge* (Paris, 1899); Charles Voretzsch, *Epische Studien*, vol. i (Halle, 1900); Gustav Gröber, *Grundriss der romanischen Philologie* (Strassburg, 1902); Albert Counson, *La légende d'Obéron* (Brussels, 1903); J. Bedier, *Les légendes épiques* (Paris, 1908).

HU'ON PINE. See DACRYDIUM.

HUPA, hoo'pä. A tribe of Athabascan stock, originally occupying a number of small villages on the lower Trinity River, Cal., and now gathered on the Hupa Valley Reservation in the same region. In their pristine condition they subsisted chiefly upon salmon, dried and smoked, and acorns made into flour and porridge. They were noted for the variety and beauty of their basketry. They now number 639, not including some remote tribes. Our knowledge of the ethnology of this tribe is derived entirely from P. E. Goddard's *Life and Culture of the Hupa*, in the publications of the University of California, vol. i (1903).

HUPEH, hụ'pĕ (Chin., north of the Lake). One of the 18 provinces of China proper, situated in the very centre of the country and surrounded by the populous and important provinces of Hunan on the south, Szechwan on the west, Shensi and Honan on the north, and Anhui on the east (Map: China, K 5). The Yang-tse from west to east runs through its southern part, while the Han, in its tortuous course from the northwest, irrigates its fields and provides a splendid waterway for its commerce. The province is mountainous in the north, being penetrated with spurs and outlines from the Ta-pa-shan and Fu-niu mountains. Towards the centre and southwest it is low-lying, forming an extensive triangular plain, admirably suited to the growth of cotton, and covered with many marshes, shallow lakes, and lagoons, the remains of that portion of the Tung-ting Lake which formerly spread much farther north than it does now. These sheets of water have been connected by navigable ditches and serve as a safe short cut for the smaller class of native junks from Shashi (on the Yang-tse opposite the entrance to the Tung-ting) to Hankow, or to towns farther up the Han.

The area of the province is estimated at 71,400 square miles, and the population at 24,900,000 according to the Chinese census of 1910 and 34,000,000 according to the customs estimate. The capital is Wuchang, on the Yang-tse, oppo-

site Hankow. The great iron and steel works are at Hanyang, on the Han, across from Hankow. The combined population of these three cities is estimated at 870,000. There are three treaty ports in Hupeh—Hankow, Ichang (pop., 55,000), and Shasi (95,000). Hupeh is a favored province for modern industries because of its extensive coal fields. Both coal and iron are actively mined by modern methods. There is at present a little opium grown in the province, but the laws are being drastically enforced, and all opium cultivation will doubtless soon disappear.

HUPFELD, hōōp'fĕlt, HERMANN (1796–1866). A German theologian and Orientalist. He was born in Marburg, studied at the university there, was professor of theology and Oriental languages from 1825 to 1843. In the latter year he succeeded Gesenius at Halle. His most important work is the *Uebersetzung und Auslegung der Psalmen* (3d ed., 1888), characterized by sound scholarship. His further publications include: *Exercitationes Æthiopicæ* (1825); *Die Quellen der Genesis* (1853); *Die heutige theosophische und mythologische Theologie und Schrifterklärung* (1861). Consult Riehm, *Dr. Hermann Hupfeld* (Halle, 1867).

HURA, hū'rȧ (Neo-Lat., from the native name). A genus of euphorbiaceous plants. *Hura crepitans,* a native of the West Indies and tropical America, is a tree which abounds in a very acrid milky juice and has stalked, heart-shaped, acuminate, leathery leaves. The fruit is a woody capsule, of the size of a large apple, very much flattened, formed of 12 to 15 carpels, each containing a large seed. These carpels surround a common axis and separate with great elastic force. The tree is called sandbox tree, because, before the use of blotting paper became general, the capsule was generally used in the West Indies as a sandbox for powdering letters with fine sand. The seeds are a violent drastic purgative.

HURALT, hū'rȧlt, PHILIPPE. See CHEVERNY, COUNT DE.

HU'RAM. See HIRAM.

HURD, HENRY MILLS (1843–). An American psychiatrist, born at Union City, Mich., and educated at the University of Michigan (A.B., 1863; M.D., 1866). He was superintendent of the Eastern Michigan Asylum at Pontiac in 1878–89 and thereafter served as professor and professor emeritus (1906) of psychiatry at Johns Hopkins University, and until 1911 as superintendent of the Johns Hopkins Hospital. He was president of the American Academy of Medicine (1896), of the American Medico-Psychological Association (1898–99), and of the American Hospital Association (1912). He edited the Johns Hopkins bulletins and reports (1890–1911); was coeditor of the *American Journal of Insanity* after 1897 and of the *Modern Hospital* after 1913; and with John S. Billings he is author of *Hints to Hospital Visitors* (1895), and editor of *Hospitals, Dispensaries, and Nursing* (1893).

HURD, RICHARD (1720–1808). An English prelate. He was born at Congreve in Staffordshire, Jan. 13, 1720; studied at Cambridge University, and became fellow of Emmanuel College in 1742. In 1749 appeared anonymously his first notable production, *Commentary on Horace's Ars Poetica,* in which he advocated the now discredited theory that the poem was a systematic criticism of the drama of the Romans. In 1750, on Warburton's recommendation, he was appointed one of the Whitehall preachers. He became Bishop of Lichfield and Coventry (1775) and in 1783 declined the archbishopric of Canterbury. He died at Hartlebury Castle, May 28, 1808. His principal works are: *Moral and Political Dialogues,* in which historic characters are introduced as interlocutors on such themes as sincerity, retirement, the golden age of Elizabeth, and the constitution of the English government (1759); *Letters on Chivalry and Romance* (1762); and *An Introduction to the Study of the Prophecies Concerning the Christian Church, and Particularly Concerning the Church of Papal Rome* (1772). He edited the *Works* of Warburton and of Cowley. His complete works with life appeared in eight volumes (London, 1811). Consult his life by F. Kilvert (London, 1860).

HURDWAR, hĕrd-wär'. See HARDWAR.

HURDY-GURDY (of onomatopoetic origin). A very old musical instrument of the stringed kind, which, under the name of leyer, or Bauernleier, spread from its native country Germany, over a great part of Europe. The hurdy-gurdy consists of a flat, oval-shaped sounding board, over which the strings are stretched, with a back or bottom of the same size and shape. These are bound together by tolerably deep sides, or ribs. On one side are from 10 to 12 finger keys, for shortening the sounding lengths of the strings when required. There are four strings of gut which are put into a state of vibration by being rubbed by the edge of a small wooden wheel charged with rosin and turned by a handle. Two of the strings are tuned in unison as a keynote, or one of them a fifth above; they are placed out of reach of the keys and form a sort of drone bass. The other two strings are acted on by the keys and produce a diatonic scale of from 10 to 12 notes. The hurdy-gurdy is suited only to simple music and was used for such as had many repetitions. From the tenth to the twelfth century it was one of the most popular instruments, but was then superseded until the eighteenth, when it again, and especially in France, became very popular. It is now nearly obsolete. The name is also—colloquially—applied to a large street or barrel organ (q.v.). For illustration, see MUSICAL INSTRUMENTS. Consult H. Lapaire, *Vielles et cornemuses* (Paris, 1901).

HURGRONJE, CHRISTIAN SNOUCK. See SNOUCK HURGRONJE.

HURL'BUT, JESSE LYMAN (1843–). An American Methodist Episcopal clergyman. He was born in New York City, graduated at Wesleyan University in 1864, and held pastorates at Newark, Montclair, Paterson, Plainfield, Hoboken, Morristown, Orange, and Bloomfield, N. J. After 1879 he was connected with the Sunday-school and tract work of his denomination. He was secretary of the Epworth League in 1889–92 and for some time was associated with Dr. J. H. Vincent in the direction of the Chautauqua Literary and Scientific Circle. From 1909 until his retirement in 1914 he was district superintendent of the Newark District. Among his works are: *Manual of Biblical Geography* (1882); *Outlines in Old Testament History* (1890); *Our Church* (1902); *Story of the Bible* (1905); *Outline Studies in the New Testament* (1906); *Teacher Training Lessons* (1908); *Organizing and Building up the Sunday School* (1909); *Traveling in the Holy Land*

through the Stereoscope (1913); *The Superintendent's Helper* (1915).

HURLBUT, STEPHEN AUGUSTUS (1815–82). An American soldier and diplomat, born in Charleston, S. C. He studied law, was admitted to the bar in 1837, and practiced in Charleston until 1845, when he removed to Belvidere, Ill. He was a Whig member of the Illinois State Constitutional Convention in 1847, served as a Whig presidential elector in 1848, was in the State Legislature from 1859 to 1861, and in May, 1861, became a brigadier general of volunteers. He commanded a division at Fort Donelson, after its capture, and at Shiloh; was promoted to be major general of volunteers in 1862; commanded the Sixteenth Army Corps during Sherman's Mississippi campaign of 1864 and succeeded General Banks as head of the Department of the Gulf. He was returned to the Illinois Legislature in 1867 and was a Republican presidential elector in 1868. From 1869 to 1872 he served as United States Minister to Colombia, was a member of Congress from 1873 to 1877, and in May, 1881, he was appointed United States Minister to Peru, where he died the following year.

HUR'LEY. A village and the county seat of Iron Co., Wis., on the Montreal River, opposite Ironwood, Mich., 39 miles east by south of Ashland, on the Chicago and Northwestern, and the Minneapolis, St. Paul, and Sault Sainte Marie railroads (Map: Wisconsin, C 2). It is in the productive Gogebic iron-mining district, several large mines being in the vicinity, and is engaged to some extent also in lumbering, farming, and stock raising. Pop., 1914 (local est.), 3000.

HURL'ING. A field sport, formerly much played in Ireland, akin to the more modern game of hockey (q.v.). It is played to-day on a field 150 × 84 yards, with goals at each end, having posts 21 feet apart and a crossbar 8 feet high, and two point posts 16 feet high, 21 feet on each side of the goal posts. The field is lined across, parallel with the goals, at 21 and 50 yards, and halfway down. The hurley stick approximates to the ice-hockey stick in shape, but is held with the left hand below the right. The ball, or slitter, is of cork, wound round with woolen threads and covered with leather. It is 5 inches in diameter and weighs 7 ounces. Play is begun by the 17 or 20 players on each side facing each other in the centre of the field. The referee then throws the ball between the two lines of players, who thereupon scatter to their respective positions in the field. The object of the players is to drive the ball through the space between their opponents' goal posts. If the ball passes over the side line, previously appointed sidesmen throw it back into play. The ball may be caught with the hand, but must be at once played with the hurley. In a scrimmage, when the hurleys are locked, the ball may be moved with the foot. There are some very pretty strokes made with the hurley, notably that where the ball is raised in the air with the point and hit forward as it falls.

HUR'LOTHRUM'BO. An operatic burlesque, written by one Samuel Johnson, a Cheshire dancing master, in 1723, and produced at the Haymarket, April, 1729.

HURON, hū'rŏn. A city and the county seat of Beadle Co., S. Dak., 120 miles east of Pierre, on the Chicago and Northwestern and the Great Northern railroads (Map: South Dakota, F 3). It is in a fertile agricultural and stock-raising region; is a division headquarters of the Chicago and Northwestern Railroad, with machine shops, roundhouses, etc.; and has flour mills and grain elevators, carriage and wagon shops, a brickyard, a creamery and other industries. Huron is the seat of Huron College (Presbyterian) and contains fine high-school and government buildings. The city adopted the commission form of government in 1910. It owns its water works. Pop., 1900, 2793; 1910, 5791.

HURON. An Indian tribe. See WYANDOT.

HURON, hōō-rōn'. The name of certain animals of the family Mustelidæ. See GRISON.

HURON, hū'rŏn, LAKE. One of the five Great Lakes on the north frontier of the United States, between Lake Superior on the northwest and Lake Erie on the southeast, connected with Lake Michigan on the west, and bounded on the southwest by Michigan and on the north, east, and south by the Province of Ontario (Map: United States, K 2). It is the second in size of the Great Lakes, having a total area of 23,200 square miles and being 235 miles long from the St. Clair River to the Straits of Mackinac and 98 miles wide along the forty-fifth parallel. A large arm of the lake in the east, extending far into Ontario and known as Georgian Bay, is 125 miles long and 60 miles in maximum width. Lake Huron receives the waters of Lake Superior through the St. Mary's River and those of Lake Michigan through Mackinaw Straits. Its outlet is the St. Clair River, flowing into Lake St. Clair, which is connected by Detroit River with Lake Erie. A slight current follows the west shore from inlet to outlet. The general direction of the lake lengthwise is from north-northwest to south-southeast. The surface is 9 feet above the level of Lake Erie, 335 feet above Lake Ontario, and 581 feet above the sea, with occasional fluctuations as in the other lakes. Its maximum depth is 802 feet in the main body, while that of Georgian Bay is somewhat more than 300 feet near its western shore. The waters are very clear and cold, especially in the northern part, and abound in fish, of which the whitefish is the most important.

There are few harbors on the west side, but vessels find shelter in Saginaw Bay (50 miles long by 26 miles wide at its mouth), about 70 miles north of the outlet, and also in Thunder Bay, as much farther north and about 78 square miles in area. Presque Isle is also a fair harbor, and there is good shelter under the south side of the island of Mackinaw. The lake is subject to violent storms, but navigation is safe from May 1 to December 1. Mackinaw has long been an important post for fur trade with the Indians. Bay City, at the head of Saginaw Bay, is an important lumber depot, and copper mines have been opened in the upper portions of Manitoulin Bay. Excellent grindstones are cut from the sandstone near Thunder Bay. The main body of water is unbroken by islands, but there is a group of islands in the north, most of them belonging to Canada, the largest of which is Grand Manitoulin. There is much geological evidence to the effect that Lake Huron was formerly deeper and more extensive than at present. Consult E. P. Morton, *Lake Huron and the Country of the Algonquins* (Chicago, 1913). See GREAT LAKES.

HURO'NIAN SERIES. See PRE-CAMBRIAN FORMATIONS.

HUR'RICANE. See STORM; WIND.

HURRUR, hŭr-rŭr. See HARRAR.

HURST, JOHN FLETCHER (1834–1903). An American Methodist Episcopal theologian, bishop, and educator. He was born near Salem, in Dorchester Co., Md., graduated at Dickinson College in 1854, and studied theology at the universities of Halle and Heidelberg. After his return to America he held a pastorate in New Jersey from 1858 until 1866. Again going to Germany, for three years he taught theology at the Mission Institute in Bremen and at Frankfort-on-the-Main, and then traveled extensively in Europe, Syria, and Egypt. In 1871 he was chosen professor of historical theology in the Drew Theological Seminary, Madison, N. J., becoming its president two years later. In 1880 he was elected Bishop, and spent much time visiting missions and conferences in Europe and India. In 1891 he was chosen chancellor of the American University, Washington, which he had helped to found. He wrote and translated numerous works on Church history, including a *History of Rationalism* (1865); *Martyrs to the Tract Cause* (1873); *Our Theological Century* (1876); *Bibliotheca Theologica* (1883); *The Literature of Theology* (1896); a *History of the Christian Church* (2 vols., 1897–1900); *History of Methodism* (7 vols., 1904). Consult Albert Osborn, *John Fletcher Hurst* (New York, 1905).

HURTADO DE MENDOZA, o͝or-tä′dō dā mān-dō′thä, GARCIA, MARQUIS OF CAÑETE (1535–1609). A Spanish administrator, born at Cuenca. He fought in Italy and Germany, but by 1557 was Governor of Chile, where he took part in the local wars. Returning to Spain in 1561, he held numerous diplomatic posts and fought in the war against Portugal. From 1590 to 1596 he was Viceroy of Peru. Consult M. de Mendiburu, *Diccionario histórico-biográfico del Perú*, vol. iv (Lima, 1880).

HURTADO DE TOLEDO, dā tō-lā′dō, LUIS (c.1530–?1591). A Spanish poet, born at Toledo, who in recent years gained an ephemeral celebrity by being credited with the authorship of the famous romance of chivalry (second only to the *Amadis de Gaula*), *Palmerín de Inglaterra*. This attribution has been abandoned, and Luis Hurtado turns out to have been, with regard to this work, only a very poor translator of a Portuguese original; and even this assignment is disputed. It seems safe to credit him only with the authorship of several minor works and with the completion of others. Consult Perálvarez de Ayllón y Luis Hurtado de Toledo, *Comedia Tibalda* (ed. Bonilla y San Martín, *Biblioteca Hispanica*, vol. xiii, Madrid, 1903), and the searching study by W. E. Purser, *Palmerin of England* (Dublin and London, 1904).

HURTER, hu͝r′tēr, FRIEDRICH EMANUEL VON (1787–1865). A Swiss historiographer. He was born at Schaffhausen and educated there and at Göttingen. He was pastor at Beggingen (1808) and at Löhningen and in 1835 was made dean and antistes of the Reformed synod. After the publication of his *Geschichte des Papstes Innozenz III. und seiner Zeitgenossen* (1834–42), he became a Roman Catholic (1844). At about the same time he published *Die Befeindung der katholischen Kirche in der Schweiz seit 1831* (1842–43) and *Geburt und Wiedergeburt* (1845), an apologia for his conversion. In 1846 he settled at Vienna and was made historiographer to the Emperor of Austria. Under the liberal rule of Pillersdorf he resigned this position, but was reappointed in 1851. His other historical works include: *Geschichte des ostgothischen Königs Theodorich* (1807); *Denkwürdigkeiten aus dem letzten Decennium des 18. Jahrhunderts* (1840); *Philipp Lang, Kammerdiener Rudolfs II.* (1851); *Zur Geschichte Wallensteins* (1855); *Wallensteins vier letzte Lebensjahre* (1862). Consult Heinrich von Hurter, *Friedrich von Hurter und seine Zeit* (2 vols., Gratz, 1876–77).

HUS. See HUSS.

HUSAIN. See HASAN.

HUS'BAND AND WIFE. A man and a woman married to each other. As marriage is a status recognized by law, it is obvious that it will alter the legal relations of the parties to it, not only as between themselves but also with respect to other persons. The new relation creates new rights and duties of a reciprocal nature, and at the same time new responsibilities with respect to the state, the community, and the individuals who come into relation with it. It is not so obvious, however, that the rights and obligations so arising should be unequal, that one member of the new relationship should come under dominion of the other and at the same time lose his or her legal identity, or the rights and responsibilities of a member of the community—in other words, cease in greater or less degree to be what legal philosophers call a "juristic person." Yet this has, in all legal systems of which we have any knowledge, at least in the earlier stages of their development, been the consequence of marriage to the woman.

Roman Law. In the early period of the Roman law the power of the husband over his wife and her property was absolute, as the *patria potestas*. Whatever property the wife acquired, both before and after marriage, became the property of the husband; but in case the wife survived the husband she was entitled to share her husband's property equally with the children. At a later period, but before the time of Justinian, owing possibly to the lack of any formal marriage, we find a fully developed system of law relating to married women which, unlike the common law, was based upon the theory that husband and wife were in law distinct persons having independent rights and liabilities. The wife remained responsible for her own debts. She could sue and be sued independently of her husband, and her husband could not subject her property to any disability. While there were some restrictions upon the power of women to contract, there was no distinction in this respect between married women and unmarried women. The husband, as at common law, was bound to support the wife; but as compensation for this liability his wife or her family was required at the time of the marriage to provide the husband with the *dos*, or dowry. The increase from the *dos* was the husband's property. He could also dispose of the *dos* so far as it was personal property, but not if it were real estate; and in the case of termination of the marriage by death or divorce, the *dos* was required to be returned to the wife. Corresponding to the *dos* was the *donatio ante nuptiam* or the *donatio propter nuptiam*, a gift made by the husband to the wife before the marriage. Not much is known of these, but it seems probable that the *donatio* was not required to be equal to the *dos*, but was given as a provision for the wife after her husband's death, she having lost the right to share equally in her husband's property with the chil-

dren of the marriage. These rules of law might, however, be freely modified by antenuptial contracts, which were enforced much as courts of equity enforced antenuptial contracts entered into at common law.

Common Law. In the common-law system of England and the United States the effects of marriage may be considered in two aspects: first, as regards the persons and the personal rights of the husband and wife; and, second, as regards their property relations.

1. *Personal Relations.*—By marriage at common law the husband became legally bound to support the wife in a manner consistent with his resources and social position. He also became bound to pay all debts contracted by her before the marriage, and when sued with the wife became responsible for her torts committed either before or during coverture. In all other respects he remained in precisely the same position as before marriage. Independently of his wife he could sue and be sued, enter into contracts with others, bind himself as fully after as before marriage, and he could make a will bequeathing all his property to strangers subject only to the wife's right of dower in his legal estates of inheritance. As regards the person and personal rights of the wife, however, there was a material difference. Her person was said to be merged in that of her husband, and for many purposes they were treated as one person in the eye of the law. The wife could neither sue nor be sued independently of the husband. Her contracts were wholly void, even when made with her husband. Even the personal property she had before marriage became her husband's absolutely, and he could dispose of it at will. She had no power to make a will of real estate, and her will disposing of personal property owned by her before her marriage could be effective only when authorized or consented to by the husband at her death. As the husband, however, was bound to support the wife, she had authority in law without his consent to pledge his credit for necessaries supplied by third persons. Necessaries are any articles of personal use, as food or wearing apparel, which are suited to the rank and position in life of the husband, and with which the wife is not provided. Therefore, if goods were ordered by the wife which were not necessary, the husband was under no legal liability to pay for them unless he expressly or impliedly ratified his wife's act in purchasing them. Though the husband was bound to maintain his wife, there was no direct means of enforcing this duty. The wife could not sue the husband herself, but, as she had an implied authority to order necessaries, the tradesman so supplying them could sue the husband for the price. The wife also might impose liability on the husband by contract for articles not necessaries by virtue of an implied authority as agent of the husband to purchase such articles; thus, a husband was liable to pay for articles such as he had regularly permitted his wife to purchase on his credit before, although he knew nothing of the particular purchase in question. See AGENT.

The husband, being entire master of his own actions, has the power to decide where to live, and the duty of the wife is to live with him in the same house. So long, then, as the husband and wife continue to live together, the domicile of the wife is determined by the domicile of the husband. If she ceases to live with her husband, she may then acquire an independent domicile. If the wife lives apart from the husband without just cause, he is not bound to support her even with necessaries. If, however, she separates from him for just cause, the liability of the husband for necessaries continues. There are, at common law, several just causes for her living apart from her husband. If the husband, e.g., treats her with what is deemed cruelty in the eye of the law, as keeping a mistress in the house, or starving her, or assaulting her, she is entitled to leave him and can order necessaries at his expense from any tradesman willing to supply her. There are, however, many degrees of cruelty and ill usage for which the wife has practically no remedy, and of which the law can take no cognizance. The statement frequently found in the early treatises that the husband has at common law the right reasonably to chastise the wife was probably without authority and certainly has no support in modern law. The husband can enforce the wife's antenuptial contracts and can recover for torts committed towards her either before or after the marriage by joining her with himself as plaintiff in an action. For torts resulting in loss of her services to him or requiring him to provide medical attendance or other necessaries he can recover in his own name and right. He may also recover damages from a third person for unlawful intercourse with his wife, and either husband or wife might recover damages from a third person for alienating the affections of the other. As regards crimes committed by a wife, she is in general liable to be punished for them in the same way as if she were unmarried. But there is a peculiarity as regards crimes committed by the husband and wife jointly in the husband's presence. If the crime be treason or murder, both are punished precisely as if they were unmarried. But in all the lesser crimes the theory, as well as the practice, is that if the wife was a party to the crime, and committed it in her husband's presence, she is presumed by the law to have so acted under the compulsion or coercion of her husband and is acquitted as a matter of course. The presumption may, however, be rebutted by showing that in fact the wife was not coerced by the husband; but in the absence of any direct evidence one way or the other it is presumed that the wife acted under this marital coercion, and so she escapes punishment. Another curious anomaly arising from the doctrine that husband and wife are in law one person is that the wife cannot be convicted of stealing her husband's goods. If she absconds with his property, however valuable, she cannot be punished. But this rule is qualified by the circumstance that if she commits adultery and afterward absconds with the adulterer, both taking away the husband's goods, the adulterer may be convicted of the larceny, though it is doubtful if she is in that case liable to any punishment.

At the common law, also, husbands and wives may be witnesses for or against other parties in all civil cases, i.e., actions and suits relating to debts, contracts, and wrongs which are not crimes, and in all inquiries of a civil nature. But neither can testify for the other in an action to which the other is a party, though either can be compelled by the opposite party to be a witness. In no case can husband or wife be compelled to disclose any confidential communication made to him or her by the other during

coverture. As regards all criminal proceedings instituted against either husband or wife, the other spouse is neither competent nor can be compelled to be a witness; but where the husband and wife are not the accused, but are the prosecuting parties, then, inasmuch as the state is presumed to be the prosecutor, and the husband and wife are not, strictly speaking, parties to the action, they may both be witnesses, subject to the qualification as to not being bound to disclose confidential communications made by and to each other during marriage. There is an exception also to the rule that neither can be a witness against the other in criminal proceedings—viz., where the wife charges her husband with an assault or other crime of greater degree upon her person. She is in that case a competent witness against him, for otherwise the crime might go unpunished. Moreover, in all proceedings instituted in consequence of adultery of the husband or wife, neither of the married parties is competent or can be compelled to be a witness against the other.

2. *Property Relations.*—As regards the husband, he not only remains sole owner of his property and, subject to the wife's right of dower, can do what he likes with it, but he becomes absolute owner of her personal property of every kind which is capable of being reduced to possession. As will be hereafter explained, he also becomes a qualified owner of her choses in action (q.v.) and her chattels real. The legal title of the wife's real estate remains in the wife, but she cannot convey it without the husband joining in the conveyance, and the rents, issues, and profits of her real estate belong absolutely to her husband. As a consequence of the common-law rule that the husband is entitled to the services of the wife, he becomes entitled to her earnings acquired by rendering service to others. It will thus be seen that during coverture the wife cannot, at common law, acquire any personal property in her own right, and her title to real property acquired before or after her marriage is subject to the rights of the husband, as stated. The old rule as to the wife's personal property becoming the husband's absolutely after marriage suffered qualification when such property consisted not of money or chattels, but of what are called chattels real, such as leases and mortgages. (See CHATTEL.) In such a case they become so far the property of the husband that he can sell them during his life, but he cannot bequeath them by will; and on his death they remain hers, while on her death they become his. Again, where the wife's personal estate before marriage includes rights of action, or debts due to her, these become so far his that he can at any time sue for them and so reduce them into possession and make them his own absolutely; but he cannot bequeath them by will, and if he does not sue for them in his lifetime they survive to the wife after his death. As regards the wife's real estate—i.e., her lands and houses held in freehold—the husband acquires a qualified legal interest (he is said to be jointly seised with his wife), which, as has been pointed out, entitled him to the rents, issues, and profits, and consequently to lease the real estate during the coverture; and if the wife bear him a living child, upon her death he becomes entitled to a life interest in her real estate, known as tenancy by the curtesy (q.v.). Upon marriage the wife also acquires an inchoate right to dower in any and all estates of inheritance of which the husband may be or become seised during coverture—i.e., a life estate in one-third of all such real estate. This right becomes complete only upon death of the husband before the wife, but it cannot be impaired by any act of the husband during the coverture or by the wife herself except by joining with her husband in a conveyance to a third party. (See DOWER.) All real estate conveyed to husband and wife together, unless otherwise defined by the instrument of conveyance, is deemed to be an estate known as an *estate by the entirety.* Its peculiarity is that while the husband is entitled to the rents, issues, and profits during coverture, neither can convey the title, nor his or her interest therein, without the other, and upon the death of either the survivor becomes entitled to the property absolutely. On the death of the husband, the wife surviving, she becomes entitled only to her paraphernalia, so called, which consists of her personal apparel and jewels; but even these may be taken by her husband's creditors if there be a deficiency of assets. When the wife dies before the husband, he becomes entitled to all her personal estate, of whatever description, even though she leave children of the marriage; and it must be recollected that she can at the common law, generally speaking, make no will which has any effect if the husband chooses to repudiate it. The wife's real estate passes to her heirs subject only to the husband's right, as tenant in curtesy, to hold it for his life. The English courts of chancery, by application of the doctrine of uses and trusts (q.v.), mitigated to some extent the harshness of the common-law rules relating to the property rights of married women. By an antenuptial agreement between the parties to the marriage, called a marriage settlement, or by other means, not only all the property she may have had before marriage, but property to which she may afterward become entitled, may be given to trustees to hold for her separate use. The settlement may give her a practically unlimited right of control over the property thus settled upon her which equity would enforce, and she may thus receive regularly the income of the trust and use of it for her own purposes. She may bind this separate estate by contract and even dispose of it by will. Courts of equity will also in a proper case enforce agreements made between husband and wife, and in certain cases will enforce a conveyance made by the husband to the wife when made for the purpose of providing for the wife. The various rights thus created and enforced by the courts of equity are known as married women's separate estates.

Statutory Changes. The preceding statement is an outline of the rights and obligations of the husband and wife as developed in the courts of common law and equity. Half a century ago public attention was first directed towards the essential injustice of the prevailing law to the married woman. The agitation which followed took fast hold upon the public conscience and ultimately found expression, both in England and the United States, in a series of statutes known as married women's enabling acts. New York was the first State to adopt this reform, by an Act passed in 1848, and its example was followed by other States in rapid succession. The various statutes relating to the subject have been repeatedly revised, and their scope widened by amendment, until at the pres-

ent time in most jurisdictions, though the statutes differ in minor particulars, married women are on a substantial equality with their husbands with reference to both personal rights and rights of property, and each is practically independent of the other with reference to all matters outside the marriage relation itself. In all jurisdictions the husband is still under the common-law obligation to support his wife and to provide her with necessaries, and the wife, by acting as his agent, may still bind the husband by contract. As the husband no longer acquires any interest in the wife's personal property or choses in action, he is not subject to the corresponding obligation to answer for her torts and contracts, they being an obligation of the wife alone, for which she may be separately sued. Either may sue or be sued independently of the other. While the husband may no longer take the wife's earnings, he is in a general sense still entitled to her services, so long as she continues to give them to him; and he may sue in his own right to recover for torts causing loss of her services, and either may sue for alienation of the affections of the other. The law of domicile of the husband and wife remains unchanged, the husband's domicile being deemed that of his wife. The wife still has dower in the husband's real estate, except in some States in which she has been given the right of inheritance in lieu thereof, and in some of the Southern and Western States she has by statute a homestead in the husband's lands. In most States the husband may acquire curtesy in the wife's real estate, but in some, like New York, the wife may defeat his right by conveyance or will. In some States, as New Jersey, the wife cannot convey her real estate as freely as the husband may, but must be examined apart from her husband by a notary, commissioner, or judge before making the conveyance, who must ascertain whether the conveyance is freely made without coercion by the husband. Estates by the entirety are now generally obsolete, the husband and wife taking as tenants in common where a conveyance is made to them together, but tenancy by entirety is still favored in several of the States. In nearly all jurisdictions statutes of distribution (q.v.) have been enacted, by which either party to the marriage becomes entitled to a part of the personal property of the other in case of his or her death without having disposed of it by will. In other particulars these statutes follow closely the analogy of the law of inheritance. Provision has also been made by statute in most jurisdictions for directly compelling the husband to support the wife by means of a quasi-criminal proceeding brought at her instance. The same result may be obtained by the various statutory forms of judicial separation (see DIVORCE), by which the husband may be compelled to pay the wife certain sums of money as alimony (q.v.).

The criminal law relating to husband and wife as well as the rules relating to their competency to testify for or against one another in criminal proceedings, remain substantially unchanged. The husband and wife are now generally competent witnesses in all civil actions with the exception of an action for divorce brought by one against the other, in which case neither is allowed in most jurisdictions to testify against the other or to acts of adultery committed by the other; and in no case is either allowed to testify as to any confidential communication made to or received from the other during coverture. See MARRIAGE; COVERTURE; DIVORCE; DOMESTIC RELATIONS.

Scots Law. The law of husband and wife in Scotland as regards their personal rights and disabilities, and the property during the marriage, does not substantially differ from the law of England, but the following points may be noticed: As regards their persons and personal rights and crimes the law is the same. It is often said that in Scotland the movable property of both husband and wife becomes a kind of joint-stock property, called *goods in communion;* but this phrase has no meaning except with reference to the division of the property after the death of one of the parties or upon the dissolution of the marriage. The husband is, as in England, entire master, except that he cannot bequeath the entire property away from the wife. The wife's movable property becomes the husband's, and her heritable property remains subject to the husband's life rent. When she disposes of her heritable property, she must ratify the deed by going before a magistrate and acknowledging that she acts of her own free will. When the husband deserts her, she may, as in England, obtain a judge's order to protect her earnings and moneys, and she has a preferable right to a reasonable provision out of any property to which she may succeed (Conjugal Rights Amendment Acts, 1861 and 1874). By the Married Women's Property (Scotland) Act, 1877, the produce of a wife's industry or skill is excluded from the rights of her husband, and his liability for her antenuptial debts is restricted to the amount she brought into the marriage. A wife has in Scotland the power to bind her husband for necessaries; but the husband can, by a process of inhibition, give notice to tradesmen not to supply her at his expense, and this notice will be binding on all the King's subjects.

Community Property. Occupying an intermediate ground between the common law and the civil law relating to the husband and wife is the law of community property. The notion of a community of interests by husband and wife in all property acquired during the coverture seems to have been derived from the civil law and the mediæval customary law and is now incorporated into the Code Napoléon and most of the other European codes as fixing the rights of husband and wife in the absence of contract. The most important peculiarity of community property is the partnership of husband and wife in all property acquired by them during the coverture, and under some systems in property acquired before the marriage. The husband is the *curator* of the wife, who has no power to contract independently of his authority; but she retains her joint interest in the community property and, after her husband's death, is entitled to one-half the community property, the other half passing to the heirs. The husband has the same right in case of the wife's death. See COMMUNITY OF PROPERTY.

For the particular doctrine of community property belonging to the Spanish law and adopted in New Mexico and to some extent in Arizona, California, Nevada, Idaho, Texas, and Washington, see GANANCIAL SYSTEM. Consult: The *Commentaries* of Kent and Blackstone; Hammick, *Marriage Laws of England* (2d ed., London, 1887); Macqueen, *Rights and Liabilities of Husband and Wife* (4th ed., ib., 1905);

Schouler, *Domestic Relations;* the statutes of the various States in the United States; and the authorities referred to under DOMESTIC RELATIONS.

HUSBANDRY, PATRONS OF. See GRANGE.

HUSBANDS, hŭz'bandz, HERMAN (?–1795). An American Revolutionary agitator. He was born in Pennsylvania, but settled in North Carolina and was a member of the Legislature of that Colony. In 1768 he became one of the leaders of the Regulators (q.v.), an organization formed to redress grievances. After several times coming into conflict with Governor Tryon, at last, in 1771, his force of 2000 Regulators was defeated, and Husbands fled from the Colony, settling near Pittsburgh. He was a member of the Pennsylvania Legislature in 1778 and at the time of the Whisky Insurrection (q.v.) of 1794 was a member of the Committee of Safety with Albert Gallatin and others.

HUSCHKE, hŭsh'ke, GEORG PHILLIP EDUARD (1801–86). A Prussian jurist, born at Münden and educated at the universities of Göttingen and Berlin. At Göttingen he was made instructor in Roman law (1821). Afterward he was professor of law at Rostock (1824) and at Breslau (1827). He took a prominent part in ecclesiastical politics and was so strong a partisan of the Lutheran communion that his opponents brought an unsuccessful criminal suit against him for inciting an insurrection (1835). In 1838 he was at the head of the court of arbitration at Breslau. Later he held high ecclesiastical offices in the gift of the state and was made Privy Councilor. As a jurist, he combined the historical and philological methods. His more important works are: *Studien des römischen Rechts* (1830); *Die Verfassung des Königs Servius Tullius* (1838); *Ueber den Census und die Steuerverfassung der frühern römischen Kaiserzeit* (1847); *Gaius, Beiträge zur Kritik und zum Verständnis seiner Institutionen* (1855); *Jurisprudentiæ Antejustinianæ quæ Supersunt* (5th ed., 1886); and the valuable works on the Italian dialects: *Die oskischen und sabellischen Sprachdenkmäler* (1856); *Die Iguvischen Tafeln nebst den kleinern umbrischen Inschriften* (1859); *Zu den altitalienischen Dialekten* (1872); *Die neue oskische Bleitafel* (1880).

HUSEMANN, hōō'ze-mân, THEODOR (1833–1901). A German pharmacologist, born in Detmold and educated at Göttingen, Würzburg, Berlin, and Prague. He practiced medicine for five years and in 1860 went to Göttingen, where he became docent (1865) and professor (1873) of pharmacology and toxicology. From 1881 to 1883 he was a member of the German Pharmacopœic Commission. He wrote: *Handbuch der Toxikologie* (1862–67) and *Die Pflanzenstoffe in chemischer, physiologischer, pharmakologischer und toxikologischer Hinsicht* (1871), both with his cousin AUGUST (1833–77), who was professor at Chur; contributed to Maschka's *Handbuch der gerichtlichen Medizin* (1882) and to the Penzold Stintzing *Handbuch der speciellen Therapie* (1895); and wrote a *Handbuch der gesamten Arzneimittellehre* (3d ed., 1872) and a study on the pharmacopœias of the sixteenth century, *Die kölnischen Pharmakopöen und ihre Verfasser* (1899).

HUSH, hŭsh. See HUSI.

HUSH MONEY. In English law, money or other property given or offered to another for the purpose of inducing the latter to refrain from prosecuting a criminal offense or from giving evidence against a person accused of crime. The giving or offering of hush money is not a penal offense at common law, unless it amounts to subornation of perjury, but the transaction is illegal as being contrary to public policy and morality, and no contract based on an agreement or promise to suppress a criminal prosecution or to conceal crime is enforceable at law or equity. However, a person agreeing for a consideration not to prosecute a felony is guilty of the crime of compounding a felony and may be punished by penal servitude. See COMPOUNDING OF FELONY.

HUSI, hōō'sĕ, *Rum. pron.* hōōsh, or **HUSH.** The capital of the Rumanian District of Falciu, Moldavia, situated a short distance west of the Pruth and 38 miles south-southeast of Jassy (Map: Balkan Peninsula, G 1). It has a fifteenth-century cathedral and a theological seminary. Pop., 1889, 12,660; 1899, 15,484.

HUS'KISSON, WILLIAM (1770–1830). An English statesman and financier. He was born at Birch Moreton, Worcestershire, March 11, 1770, and in 1783 was sent to Paris to study medicine. He took part in the storming of the Bastille and as a member of the Club of 1789 delivered before his associates a speech on the currency. After his return to England in 1792 he received a subordinate appointment under the Tory government and formed an intimate acquaintance with Pitt and Canning. As Undersecretary of State for War (1795–1801), he did most of the work of that office. In 1796 he entered Parliament for Morpeth and, with the exception of two years, remained a member for various constituencies to his death. He held several offices under Pitt, with whom he retired in 1801. In 1804 he was appointed Secretary of the Treasury in the new Pitt cabinet, and on Pitt's death in 1806 he lost his office, but was restored to it by Mr. Perceval in 1807. In 1814 he was made Chief Commissioner of the Woods and Forests, in 1823 President of the Board of Trade, and in 1827 Secretary of State for the Colonies. Through his exertions the old restrictions on the trade of the Colonies with foreign countries were removed. He also obtained the removal or reduction of many import duties, considerable relaxation of the navigation laws, and is in fact mentioned as the great pioneer of free trade. His death (Sept. 15, 1830) was caused by injuries received that day at the opening of the Liverpool and Manchester Railway. Consult: *Speeches,* with biographical memoir (3 vols., London, 1831)—from the comprehensive views which they exhibit, as well as from their full and accurate details, these speeches are valuable to students of political economy; Hansard, *Parliamentary Debates* (ib., 1821–28); J. Wright, *Life* (ib., 1831); F. C. Greville, *Memoirs: A Journal of the Reigns of George IV and William IV* (1st series, New York, 1875).

HUSS, HENRY HOLDEN (1862–). An American composer, born in Newark, N. J. He studied first with his father, George J. Huss, and in 1882 entered the Munich Conservatory, Germany, taking up the study of counterpoint, composition, and instrumentation, and the organ under Rheinberger. During his stay in Germany he studied the pianoforte under Giehrl and conducting under Abel. In 1885 he became a resident of New York and subsequently became well known throughout the country as a

composer, pianist, and teacher. His compositions include a scena for soprano and orchestra (*Cleopatra's Death*), a concerto for piano, a concerto for violin, songs, part songs, and chamber music.

HUSS, or **HUS,** JOHN (c.1370–1415). A Bohemian religious reformer. He was born at Husinetz (or Husinec), Bohemia, northwest of Budweis. His baptismal name was Jan; from his birthplace he was called Johannes de Hussynecz, or, in English, John Huss. The day and year of his birth are unknown. His parents were Czech peasants. He studied at the University of Prague, where he soon made a reputation for scholarship, became M.A. (1396), university lecturer (1398), dean of the philosophical faculty (1401), and was rector in 1402 and 1403. In philosophy he was a realist. He became a priest in 1401. Owing to the marriage in 1382 of Anna, sister of King Wenceslas, to King Richard II of England, there was much intercourse between Bohemia and England. So the writings of the great English theologian, Wiclif (died 1384), came into Bohemia. Huss read them eagerly and availed himself of permission to lecture upon them in the university. He went further and translated them into Bohemian, and the world has given Huss credit for writings which were merely translations from Wiclif. He also defended Wiclif's opinions, not only in the lecture room, but from the pulpit. As he was a very popular preacher in the Bethlehem Chapel in Prague, and confessor to the Queen and a scholar of high repute, this stand attracted wide attention.

Wiclif had, however, not escaped the charge of heresy, and so in 1403 Huss was forbidden by the university authorities to discuss 45 sentences or theses which he had derived mostly from Wiclif; and in 1409, when the Pope, Alexander V, had issued his bull against the teachings of Wiclif and the Archbishop of Prague had burned Wiclif's writings, Huss felt the effect of the opposition he had stirred up on the part of the hierarchy, the priests, and the monks by denouncing, in imitation of Wiclif, the corruption of the Church. In 1410 he and his followers were excommunicated, and in the following year the decree was confirmed by the Pope. Undeterred, he kept on preaching as before. In 1411 Pope John XXIII proclaimed a crusade against King Ladislas of Naples and promised indulgences to the volunteers. Huss the next year gave out a university debate upon the question of indulgences, which only widened the breach between himself and the university authorities and the clergy. In 1412 a papal interdict was issued against him. In reply he wrote his book *On the Church,* again drawing heavily from Wiclif, and appealed from the Pope to a general council and to Christ; and then, feeling no longer safe in Prague, he withdrew to the castles of certain friendly noblemen. In 1414, obedient to a summons, but under the protection of King Wenceslas, who had continually befriended him, and with a safe-conduct to go to Constance, given by the Emperor Sigismund, he went to the general council which had been convened in Constance.

His journey thither was a triumph, and he entered the city (November 3) in great state. At first he was a free man, but on November 28 he was apprehended and charged with having made an attempt to leave the city, and cast into prison, in spite of the indignant protests of the Bohemian and Polish nobles. He may have fancied that he would have opportunity to defend his views in open debate, but he quickly learned that the council intended to try him as a heretic. He was, however, long kept in suspense, for it was not till June 5, 1415, that he was first formally accused. On June 8, 39 charges were exhibited against him, some of which he acknowledged as fairly based upon his teachings, while others he declared to be misrepresentations. Being required to recant his alleged errors, he refused to do so until they should be proved to be errors and claimed that he had not departed from Catholic doctrine, though he expressed admiration for Wiclif. On June 18 the articles of his condemnation were prepared; on June 24 his books were burned; on July 1 his attempts to come to an understanding with his prosecutors failed, and on Saturday, July 6, he was condemned to be burned at the stake for heresy. The same day the sentence was executed, and the martyr's ashes were thrown into the Rhine. The Emperor, though present, did not interfere, since heretics had no claim to protection. The death of Huss caused sorrow and indignation throughout Bohemia and led to the so-called Hussite War. See HUSSITES.

A critical edition of Huss's writings, distinguishing between his own works and his translations from Wiclif, is lacking. The best we have is F. Palacky's *Documenta Magistri Joannis Hus* (Prague, 1869). The works of Huss in Bohemian were published by K. J. Erben (Prague, 1865–68). E. de Bonnechose published a French translation of his letters (Paris, 1846), from which an English translation was made (London, 1846); F. B. Mikowec prepared one in German (Leipzig, 1869). Nowotny began a German translation of his sermons (Görlitz, 1855). For his biography, consult: E. H. Gillett (Boston, 1863–64); A. H. Wratislaw (London, 1882); F. H. H. Lützow, *Life and Times of Master John Hus* (New York, 1909); for his relations to Wiclif, Loserth, *Wiclif and Huss* (trans., ib., 1884); H. C. Lea, *History of the Inquisition,* vol. viii (ib., 1888). See references of CONSTANCE, COUNCIL OF.

HUSSARS, hŭz-zärz′. Light cavalry. Originally a distinct type of Hungarian mounted troops, receiving their name, it is said, from the circumstance of their origin, Matthias Corvinus having in 1458 raised a body of cavalry to operate against the Turks by taking one man out of every 20 inhabitants; hence the use of the word "husz-ár," in Hungarian, *the twentieth.* The demand for cavalry possessing greater mobility than the dragoons, as yet the only type, led to the formation of light-cavalry regiments on the hussar model. Nearly two-thirds of the entire cavalry strength of Great Britain consists of hussar and lancer regiments, the general proportion throughout Europe being almost as great. The original Hungarian hussars had several peculiarities of dress and equipment, the most conspicuous of the former being a loose jacket suspended in part from the shoulders—a feature still preserved in several countries. See CAVALRY.

HUSSEIN AVNI PASHA, hụs-sān′ äv′nē pä-shä′ (1819–76). A Turkish general and statesman, born at Dost-Köj, near Isparta, in western Asia Minor, and educated after his sixteenth year in Constantinople. In 1853 he entered the general staff under Omar Pasha, with the rank of lieutenant colonel, and with him di-

rected the fortification of the Balkan passes. He commanded a division in the war with Montenegro (1859–60), became general in chief of the guard (1864), and in 1867–69 put down the rising in Crete. As a reward for this service, he was made Minister of War, from which post he was retired in 1871, after the death of Ali Pasha, his protector. In 1872, on the accession of Midhat Pasha to the grand-viziership, he returned to Constantinople from his exile at Isparta, became Grand Vizier in 1874, and Governor of Smyrna in 1875. In the same year, after a journey through France and England, he was again Minister of War for six weeks, and in May, 1876, was a leader in the plot which deposed Abdul Aziz and put Amurath V on the throne. Less than a month later he was assassinated by an officer, Hassan Bey, at a ministerial meeting.

HUSSEIN KEMAL (kĕ-mäl′) **PASHA,** Prince (c.1850–1917). The first Sultan of Egypt after the declaration (December, 1914) of a British protectorate over that country. A son of Ismail Pasha (q.v.), Viceroy from 1863 to 1879, and eldest living prince of the family of Mehemet Ali (q.v.), he succeeded his nephew, Abbas Hilmi, who was deposed by the British because he had sided with Turkey in the European War. (See War in Europe.) Hussein Kemal was unusually well educated, in Egypt and in Paris, where he was intimate in Napoleon III's family. He left the capital upon the overthrow of the monarchy (1870) and afterward held a number of posts in Egypt—Inspector of Upper and Lower Egypt, Minister of Public Instruction, of Public Works, of the Interior, of War, and of Finance. Thus especially fitted by varied service, he was installed as Khedive, with the title of Sultan, Dec. 19, 1914.

HUSSEIN NAZIM PASHA, hus-sān′ nä′-zĕm pä-shä′ (1848–1913). A Turkish soldier and public official, born at Constantinople. He completed his military education at Saint-Cyr, Paris, and during the Russo-Turkish War rose to chief of staff. While in prison for a five-year term because of his political activities, he continued his studies of military science, and when he finally escaped he hastened to join the Young Turks in the revolution of 1908. He was appointed to the command of the Second Army Corps at Adrianople, where he greatly strengthened the fortifications. In 1909 he became Minister of War under Kiamil Pasha, but, having antagonized the Young Turks, soon gave up the office. Later, as Governor-General (vali) at Bagdad, he accomplished important reforms and improved public property. In 1911 he was appointed president of the army council and in 1912 Minister of War in the cabinet of Mukhtar Pasha. After the defeat of Lule Burgas he commanded the Turkish forces in person, conducting the defense along the Tchatalja lines with great energy. (See Balkan War.) He was assassinated by the Young Turk conspirators in the coup d'état of 1913.

HUS'SITES. The followers of John Huss (q.v.). Honoring him as a martyr, about 450 Bohemian nobles formed a league, protesting against the action of the Council of Constance which had condemned Huss to be burned and bidding defiance to decrees of bishops and the Pope. The symbol of their confederacy was the cup, the use of which in the Lord's Supper they extended to the laity, as had already been done with the approbation of Huss. King Wenceslas of Bohemia was constrained to grant them the use of many churches. After his death (August, 1419) the majority refused to recognize as King his brother, the Emperor Sigismund (q.v.), who had broken his safe-conduct given to Huss. The so-called Hussite wars followed. For eight years (1420–27) the Hussites, led by their generals Ziska (q.v.) and Procopius (q.v.), were victorious against the forces sent against them by the Emperor and the Pope, and in 1429 and 1430 they carried terror into the countries of Germany bordering on Bohemia. Convents and churches were reduced to ashes, and priests and monks were slain. From the beginning the Hussites had included two parties—the more conservative, called Calixtines (q.v.), or Utraquists, from their use of the cup in the Lord's Supper, who were more in sympathy with the Church and hoped for an ultimate reconciliation; and the radical, called Taborites (q.v.), who went much further in rejecting doctrines and practices of the Church. A third faction, intermediate between the two, called Orphans, also developed. In 1431 the Council of Basel (q.v.) undertook to conciliate the Hussites and succeeded in coming to an agreement with the Calixtines by the "Compactata of Prague," signed in 1436, after which the latter acknowledged Sigismund as King and made peace with the Church. The Taborites and Orphans were completely defeated in a battle near Böhmischbrod, May 30, 1434, and soon disappeared as a political power, but continued to exist as the Bohemian Brethren (q.v.). Consult Ernest Denis, *Huss et la guerre des Hussites* (Paris, 1878), and Lützow, *Bohemia* (London, 1896).

HUST'INGS (AS. *hūsting*, from Icel. *hūsþing*, council place, from *hūs*, AS., OHG. *hūs*, Ger. *Haus*, house + *þing*, thing, assembly, OHG. *ding*, Ger. *Ding*, thing; connected with Goth. *þeihs*, Lat. *tempus*, time). An English term applied to the place or platform where, before 1872, members of Parliament were nominated for election, or from which a candidate addressed his constituents. The term is still applied to any electioneering platform. A court of hustings formerly existed in many English cities for the trial of suits brought for the recovery of land situated within the city limits. Such a court still survives in London; but its authority, which at one time extended to all actions between citizens, has now practically disappeared. The hustings court existed in the towns of Virginia founded during the eighteenth century. Thus, the charter of Norfolk Borough, incorporated in 1736, established a hustings court to be held once a month, with jurisdiction over actions of ejectment, trespass, and writs of dower, as well as all other actions, personal and mixed, involving not more than £20. A hustings court is still one of the municipal tribunals of Richmond. It is held by a judge elected in the same manner as the circuit judges and has original and exclusive jurisdiction of most criminal offenses committed within the city limits.

HUTCH'ESON, Francis (1694–1746). A moralist of the eighteenth century, born Aug. 8, 1694, in County Down, Ireland. His father was a Presbyterian minister. He studied for the Church at the University of Glasgow, but after a short term of preaching he was induced, in 1719, to open a private academy in the city of Dublin, which proved highly successful. In 1725 he published his *Inquiry into the Original of our Ideas of Beauty and Virtue, etc.*,

which was the means of introducing him to the notice of many influential personages, such as Archbishops King and Boulter, and Lord Granville, then Lord Lieutenant of Ireland. This work was followed, in 1728, by his *Essay on the Nature and Conduct of the Passions and Affections*, and in the year after he was appointed professor of moral philosophy in the University of Glasgow. Here he died, in 1746. His largest and most important work, *A System of Moral Philosophy*, was published at Glasgow in 1755 by his son, Francis Hutcheson. From the period of Hutcheson's lectures, according to Dugald Stewart, may be dated the metaphysical philosophy of Scotland. But it is as a moral philosopher, rather than as a metaphysician, that Hutcheson is noteworthy. His system is, to a large extent, that of Shaftesbury, but it is more complete, coherent, and clearly illustrated. Hutcheson emphasized the importance of "calm benevolence" and was a strong opponent of the doctrine that it has a selfish origin. Equally important with benevolence in his system is the moral sense, "which does not impel towards good actions, but merely judges the moral quality of actions and gives its approval to benevolence"; the latter is the mainspring of good conduct. All action prompted by benevolence is formally good; but to be materially good it must be an action which "procures the greatest happiness for the greatest numbers." In this respect he was a forerunner of the English utilitarians. Consult: Thomas Fowler, *Shaftesbury and Hutcheson* (London, 1882); James Martineau, *Types of Ethical Theory* (Oxford, 1886); W. R. Scott, *Francis Hutcheson* (New York, 1901); Ernest Albee, *History of English Utilitarianism* (ib., 1902).

HUTCHINS, Harry Burns (1847–). An American university president, born at Lisbon, N. H. In 1871 he graduated from the University of Michigan, where he was instructor and assistant professor of history and rhetoric (1872–76), Jay professor of law (1884–87), professor of law and dean of the department of law (1895–1910), acting president (1897–98 and 1909–10), and president after 1910. He served as professor of law at Cornell University in 1887–94. In 1882–83 he revised and annotated the *Michigan Supreme Court Reports* (5 vols.), edited the American edition of *Williams on Real Property*, and is author of a biography of Thomas M. Cooley in the *Great American Lawyers Series*.

HUTCHINS, Thomas (1730–89). An American geographer. He was born in Monmouth Co., N. J., entered the British army at an early age, and participated in the French and Indian War. Being in London in 1779, he was imprisoned on suspicion of favoring American independence; but he escaped by way of France, went to Charleston, S. C., entered the Continental army, and was appointed geographer general by General Greene. He was the author of several geographical works, including the important *Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina* (1778; reprint, with biographical and bibliographical matter by F. C. Hicks, Cleveland, 1904) and *History, Narrative and Topographical Description of Louisiana and West Florida* (1784). He lived for several years in Louisiana, and this latter volume is valuable for the reports of the last years of Spanish régime in the vicinity.

HUTCHINSON. A city and the county seat of Reno Co., Kans., 219 miles by rail west of Kansas City, Mo., on the Arkansas River, and on the Atchison, Topeka, and Santa Fe, the Chicago, Rock Island, and Pacific, and the Missouri Pacific railroads (Map: Kansas, D 6). It is in the fertile Arkansas valley, has an extensive trade in grain, and is a jobbing centre for a wide territory, having several wholesale houses. There are important manufactures of salt, soda ash, and straw board, and large flouring mills. Hutchinson is a popular city for conventions, is the home of the Kansas State Fair, and among the features of the city are Convention Hall, Glendale and Northside parks, the State Industrial Reformatory, the grounds of which cover 640 acres, and the courthouse and public-library buildings. Founded in 1871, Hutchinson was incorporated two years later, and in 1909 adopted the commission form of government. Pop., 1900, 9379; 1910, 16,364; 1914 (U. S. est.), 19,339; 1920, 23,298.

HUTCHINSON, Anne (c.1590–1643). A religious enthusiast, of American celebrity, born in Lincolnshire, England, 1590 or 1591. She was a daughter of Rev. Francis Marbury, married William Hutchinson, 1612, and emigrated to Boston, Mass., in 1634. Living in a community prone to religious excitement, she claimed to be a medium of divine revelation and held meetings for women and later for both sexes, in which she set forth the doctrine that those who were in the covenant of grace were not under the covenant of works. This was considered as Antinomian by the state clergy and likely to have sad practical consequences. Great controversies arose, and a synod was called, in which her teachings were condemned, and she was banished from the Colony. She and her friends now obtained from the chief of the Narraganset Indians liberty to reside in Rhode Island, where they purchased the island of Aquidneck and set up a community on the highly commendable principle that no one was to be "accounted a delinquent for doctrine" (1638), calling the name of the town Portsmouth. After the death of her husband (who shared her opinions), in 1642, she removed to the west of Stamford, Conn., which was then Dutch territory, and there in September, 1643, she and her whole family of 15 persons were taken prisoners by the Indians, and all but one daughter murdered. She seems to have been a woman of extraordinary ability and independence of thought, against whom the most serious charge was that her teachings might produce harm in others. Consult Jared Sparks, "Anne Hutchinson," in *Library of American Biography*, vol. xvi (2d series, Boston, 1845), and C. F. Adams, *Three Episodes in Massachusetts History* (2 vols., Boston, 1893).

HUTCHINSON, John Hely- and Sir Walter F. Hely-. See Hely-Hutchinson.

HUTCHINSON, John (1615–64). An English regicide, born in Nottingham and educated at Cambridge. After a short study of the law at Lincoln's Inn, he identified himself with the Parliamentary side in the struggle against the King, became a member of the committee for Nottinghamshire, and throughout 1644 and 1645 acted as Governor of both Nottingham and Nottingham Castle, successfully holding them against repeated Royalist attacks, attempted bribery, and internal dissensions. In 1646 he succeeded his father, Sir Thomas Hutchinson, as a member of the Long Parliament, and two years afterward he sat as one of the King's judges and

signed the royal death warrant. He served under Cromwell in the Council of State until 1653, when he retired from politics and refused further office under the Protector. He seems to have worked for a restoration of the Long Parliament, and during its short session, from May to October, 1659, he returned to his seat. He was a member from Nottingham to the Convention Parliament in 1660, but was immediately expelled as a regicide, though his life was spared through the intercession of relatives. In 1663 he was arrested as an accessory to the Yorkshire Plot and, despite meagreness of evidence against him, was imprisoned in the Tower. In May, 1664, he was removed to Sandown Castle in Kent, where he died from fever in the following September. Hutchinson represented the nobler type of Puritanism. His wife LUCY (1620–c.1680) was very influential in saving his life when the Restoration took place, and after his death wrote his life. Consult: Lucy Hutchinson, *Memoirs of the Life of Colonel Hutchinson, to which are Added the Letters and Other Papers*, revised by C. H. Firth (2 vols., London, 1885), and C. H. Firth, in *Dictionary of National Biography*, vol. xxviii (ib., 1891).

HUTCHINSON, JOHN (1674–1737). An English theological writer. He was born at Spennithorne, near Middleham, in Yorkshire. For some time he was steward of the household of the Duke of Somerset and left his service to devote himself to religious studies, the Duke procuring for him a sinecure appointment from the government. In 1724 he published the first part of a work called *Moses' Principia*, in which he defended what he regarded as the Mosaic cosmogony and assailed Newton's theory of gravitation. He continued to publish a succession of works till his death, in London, Aug. 28, 1737. The leading principle of his system is that the Holy Scriptures contain the elements not only of true religion but of all rational philosophy, which, however, was to be derived only from the original unpointed Hebrew text, which he subjected to strange fanciful processes. His works at one time exercised a considerable influence, and his followers, called Hutchinsonians, included some persons of considerable learning and celebrity. His works appeared in 12 volumes (London, 1748), with life by Spearman in supplement (ib., 1765).

HUTCHINSON, JOHN IRWIN (1867–). An American mathematician, born at Bangor, Me. He was educated at Bates College, Lewiston, Me. (A.B., 1889), at Clark University (1890–92), and at the University of Chicago (Ph.D., 1896). At Cornell University he was instructor in mathematics from 1894 to 1902, assistant professor in 1903–09, and professor after 1910. He is coauthor with Virgil Synder of *Differential and Integral Calculus* (1902) and *Elementary Treatise on the Calculus* (1912). He published also reviews chiefly on hyperelliptic, theta, and automorphic functions, on algebraic surfaces, and on birational transformations.

HUTCHINSON, SIR JONATHAN (1828–1913). An English surgeon, born at Selby, Yorkshire. He received his training at St. Bartholomew's Hospital (1850–54). At the Royal College of Surgeons he was professor of surgery and pathology in 1877–82 and president in 1889–90, and he was president of the Hunterian (1869–70), Pathological (1879–80), Ophthalmological (1883), Neurological (1887), Medical (1890), and Royal Medical and Chirurgical (1894–96) societies, and was a member of royal commissions on smallpox hospitals (1884) and vaccination (1890–96). He announced in 1862 his discovery that a certain form of eye disease in children was due to hereditary syphilis. He is also known for his researches on leprosy and for his association of that disease with the eating of salt fish. He edited the *Archives of Surgery* and published *Syphilis* (1887; new ed., 1910) and *On Leprosy and Fish-Eating* (1906).

HUTCHINSON, THOMAS (1711–80). An American Loyalist, the last royal Governor of the Province of Massachusetts Bay. He was born Sept. 9, 1711, in Boston, where his father, the great-grandson of Anne Hutchinson (q.v.), was a wealthy merchant and shipowner. He graduated at Harvard in 1727, entered his father's countingroom, early showed remarkable aptitude for business, and by the time he was 24 had accumulated considerable property in trading ventures on his own account. The social prominence of his family, as well as his own position in the business world, made him, while still a young man, a person of considerable importance in the community. In 1737 he was elected a member of the Boston board of selectmen. Later in the same year he was chosen a representative to the General Court of the Colony and at once took a strong stand in opposition to the views of the majority with regard to a proper currency. His proposal to borrow silver in England to redeem the outstanding bills of credit and his opposition to the revival of the land bank made him unpopular with the people and impelled his constituents in town meeting to draw up "instructions," disregard of which led to his retirement in 1740. In that year he went to England as a commissioner to represent Massachusetts in a boundary dispute with New Hampshire. In 1742 he was reëlected to the General Court and was thereafter chosen annually until 1749, serving as Speaker from 1746 to 1749. He continued his advocacy of a sound currency, and when the British Parliament reimbursed Massachusetts in 1749 for the expenses incurred in the Louisburg expedition, he proposed the abolition of the bills of credit, and the utilization of the parliamentary repayment as the basis for a new Colonial currency. The proposal was finally adopted by the Assembly, and its good effect on the trade of the Colony at once established Hutchinson's reputation as a financier. On leaving the General Court he was appointed at once to the Governor's Council, in 1750 he was chairman of a commission to arrange a treaty with the Indians in the District of Maine, and he served on boundary commissions to settle disputes with Connecticut and Rhode Island. In 1752 he was appointed judge of probate and a justice of the Common Pleas. In 1754, as a delegate from Massachusetts to the Albany Convention (q.v.), he took a leading part in the discussions, and favored Franklin's plan for Colonial union, although doubting its practicability. In 1758 he was appointed Lieutenant Governor, and in 1760 Chief Justice, of the Province. In the following year, by issuing writs of assistance (q.v.), he brought upon himself a storm of protest and criticism. His distrust of popular government as exemplified in the New England town meeting increased. Although he opposed the principle of the Stamp Act (q.v.), considered it impolitic, and later advised its repeal, he accepted its legality, and, as a result of his stand, his city house was

sacked by a mob in August, 1765, and his valuable collection of books and manuscripts destroyed. In 1769, upon the resignation of Governor Bernard, he became acting Governor, serving in that capacity at the time of the Boston Massacre (q.v.), March 5, 1770, when popular clamor compelled him to order the removal of the troops from the city. In March, 1771, he received his commission as Governor. His administration, controlled completely by the British ministry, increased the friction with the patriots. The publication, in 1773, of some letters on Colonial affairs written by Hutchinson, and obtained by Franklin in England, still further aroused public indignation, and led the ministry to see the necessity for stronger measures. The temporary suspension of the civil government followed, and General Gage was appointed military governor in April, 1774. Driven from the country by threats in the following May and broken in health and spirit, Hutchinson spent the remainder of his life an exile in England. There, still nominally Governor, he was consulted by Lord North in regard to American affairs; but his advice that a moderate policy be adopted, and his opposition to the Boston Port Bill, and the suspension of the Massachusetts constitution, were not heeded. His American estates were confiscated, and he was compelled to refuse a baronetcy on account of lack of means. He died at Brompton, now a part of London, June 3, 1780. He wrote a *History of Massachusetts Bay* (vol. i, 1764; vol. ii, 1767; vol. iii, 1828), a work of great historical value, calm, and judicious in the main, but entirely unphilosophical and lacking in style. His *Diary and Letters* was published in 1884–86. Consult: J. K. Hosmer, *Life of Thomas Hutchinson* (Boston, 1896), and the chapter "Thomas Hutchinson, the Last Royal Governor of Massachusetts," in John Fiske, *Essays, Historical and Literary*, vol. i (New York, 1902).

HUTCHINSON, Thomas Joseph (1820–85). A British explorer, born at Stonyford, Ireland. He studied medicine and, after a trip to West Africa in 1851, was chief surgeon on the Niger expedition (1854–55). After two years as English Consul at the Bight of Biafra and Fernando Po, he became Governor of the latter place (1857) and in 1861 was transferred to the consulate at Rosario in Argentina, where a year later he took part in the Salado expedition. In 1870 he was appointed Consul at Callao and three years later retired to his Irish property. He wrote: *Narrative of the Niger Tshadda Binuë Exploration* (1855); *Impressions of Western Africa* (1858); *Ten Years' Wandering among the Ethiopians* (1861); *Buenos Ayres and Argentine Gleanings* (1865); *Parana and South American Recollections* (1868); *Two Years in Peru* (1874); *Summer Rambles in Brittany* (1876).

HUTCHINSON, Woods (1862–). An American physician, born at Selby, Yorkshire, England. He graduated from Penn College, Oskaloosa, Iowa, in 1880 and (M.D.) from the University of Michigan in 1884; was professor of anatomy at the State University of Iowa (1891–96), professor of comparative pathology at the University of Buffalo (1896–1900), and State health officer of Oregon (1903–05); and lectured at the London Medical Graduates' College and the University of London in 1899–1900. In 1905 he became professor of clinical medicine at the New York Polyclinic. He edited *Vis Medicatrix* (1890–91) and *The Polyclinic* (1899–1900), and is author of *The Gospel According to Darwin* (1898); *Studies in Human and Comparative Pathology* (1901); *Instinct and Health* (1908); *Preventable Diseases* (1909); *Conquest of Consumption* (1910); *Exercise and Health* (1911); *The Child's Day* (1912); *Common Diseases* (1913); *Civilization and Health* (1914).

HUTCH'INSO'NIANS. See Hutchinson, John (1674–1737).

HUTCH'ISON, John (1832–1910). A Scottish sculptor, born in Edinburgh. He began there as a wood carver, but attended the art school at the same time, and in 1860 and 1863 studied at Rome. He first exhibited in 1856 at the Royal Scottish Academy, of which he became member in 1867, librarian in 1877, and treasurer in 1886. Apart from ideal subjects in marble and bronze, such as "Hamlet," "Don Quixote," and "Dante," he modeled statues of Robert Bruce, John Knox (a colossal bronze in Edinburgh), George Buchanan, Regent Murray, "Hal-o'-the-Wynd," "Elora Mac Ivor" for the Scott monument in Edinburgh; and busts of Harold Hardrada, Norman McLeod, Queen Victoria (by command), the Prince Consort, and many other distinguished personages. In the National Gallery at Edinburgh are the busts of Robert Scott Lauder, R.A., "Pasquecia, a Roman Contadina," and "Marietta, a Roman Girl."

HUTH, hūth, Henry (1815–78). An English merchant and bibliophile, born in London. He was educated in the classics and also in Persian, Arabic, and Hindustani. He entered his father's business in 1833, but later traveled in Germany, France, the United States, and Mexico, and in 1849 rejoined his father's firm. He collected a large library, containing very many rare books, of which a catalogue was published in 1880.—His son, Alfred Henry Huth (1850–1910), inherited his father's library, to which he added largely. He also wrote a biography of his father's friend, Henry Thomas Buckle, and *Marriage of Near Kin* (1875). The library was sold at auction after A. H. Huth's death.

HUTIA, o͞o-tē'ä (Sp., from the native name). A West Indian rodent or hog rat, of the family Octodontidæ, differing from rats in having four grinders on each side in each jaw, with flat crowns. The tail is round and slightly hairy and is used for support in sitting erect, as by kangaroos, and for aid in climbing trees. They make much use of their forepaws as hands. They are closely allied to the coypu (q.v.), but are not aquatic and make their home in the woods. The best-known species is the hutia-couga (*Capromys pilorides*), of Cuba, which is about 22 inches long to the root of the tail. The fur is long, coarse, and yellowish brown, with the paws and ears blackish. Another Cuban species is the hutia-carabali (*Capromys prehensilis*), the tip of whose tail is prehensile. The hutia-couga is a skillful climber and lives in dense forests. Its food is chiefly fruits, leaves, and bark; but it also eats the flesh of small animals, particularly that of a kind of lizard. It is easily tamed, and the Cubans consider its flesh a delicacy, for which reason it is much hunted by the natives. The smaller hutia-carabali is said to live chiefly in the tops of trees.

Jamaica has a short-tailed hutia (*Capromys brachyurus*) (see Plate of Cavies, etc.), locally called coney, which has become rare; and Ingraham's hutia (*Capromys ingrahami*) inhabits

the Bahamas. Consult Poey, *Memorias* (Havana, 1860–62).

HUTSCHENRUIJTER, hŭts'*en*-rī'tĕr, Wouter (1859–). A Dutch composer and conductor, born in Rotterdam. Having completed his musical education entirely under local teachers, he began his career as conductor of a choral society, at the same time teaching also at the conservatory. In 1890 he was called to Amsterdam as second conductor of the famous Concertgebouw Orchestra. This post he soon resigned to accept the conductorship of the Utrecht Orchestra. By encouraging the younger Dutch composers in producing their works he exercised a strong and wide-felt influence on the musical life of Holland. His own works for orchestra and chamber music are highly esteemed by his compatriots. He also made a reputation as a writer through his biographies of R. Strauss (1898) and Weingartner (1906) and through an authoritative history of the orchestra, *Orkest en Orkestspel na 1600* (1903).

HUTTEN, hụt'*ten*, Philip von (c.1515–46). A German adventurer and relative of Ulrich von Hutten (q.v.). He was one of the 600 adventurers collected from all parts of Europe who went out under George Hohermuth (better known as George of Speyer) to conquer the Province of Venezuela, which had been granted by Emperor Charles V to the great Augsburg family of Welser (q.v.). When Hohermuth died, in 1540, Hutten became captain general, and the next year, in company with young Bartholomäus Welser, eldest son of the head of the family, left Coro with a well-equipped force to seek the mythical El Dorado (q.v.). After wandering about for five years, the remnant of the expedition returned to Venezuela to find a new Governor in power. Juan de Caravajal had been appointed by the Audiencia of Santo Domingo to preserve order in Venezuela, but, as the years went by with no news of Hutten and his followers, he began to feel secure in his position. Consequently the return of the adventurers was anything but welcome to him. When he saw how diminished they were in number, he thought to force from them an acknowledgment of his authority. In this, however, he was unsuccessful, as he also was in an attempt to seize them. In fact, this last effort was well-nigh disastrous to himself, for he was wounded by Welser and forced to pledge the Germans safe passage to the coast. Relying upon Caravajal's word of honor, the adventurers took no precautions against attack and were easily captured by the treacherous Spaniard, who, after keeping Hutten and Welser in chains for a time, had them beheaded. Hutten seems to have been a man of higher character than most of those with whom he was associated. He left a narrative of his adventures entitled *Zeitung aus Indien* (1785).

HUTTEN, hụt'*en*, Ulrich von (1488–1523). A scholar, poet, and reformer of the German Renaissance, one of the most celebrated of the humanists. He was descended from an ancient and noble family and was born at the castle of Steckelberg in Hesse, April 21, 1488. At the age of 10 he was placed in the neighboring monastery of Fulda, but, disliking this mode of life, fled in 1505 to Cologne, where he met Hoogstraten Johannes Rhegius, and other scholars of the day. In 1506 he came to Erfurt, but soon after rejoined Rhegius at Frankfort-on-the Oder, when the new university was opened there. There he took his master's degree and published his first poem. In 1507 he followed Rhegius to Leipzig. He was stricken down with the pestilence in the following year, but recovered, and at Wittenberg in 1511 published his *Ars Versificatoria*. During these years he led the life of a wandering poet, subsisting on the bounty of those who admired his talents or feared his mordant wit. In 1512 he went to Pavia to study law. He had been there only a short time when the city was plundered by the Swiss, and Hutten was deprived of all he possessed. For a short time he served as a soldier in the Imperial army, but soon returned to Germany, where he boldly entered into a quarrel with the Duke of Württemberg, who had murdered a kinsman of Ulrich's, and brought about the Duke's punishment. In the dispute between Reuchlin (q.v.) and the Dominicans Hutten came to the support of the former and displayed no small learning and great power of satire. He went again to Italy in 1515, to take the degree of LL.D., and returned to his native country in 1517. He was crowned with the poet's laurel crown at Augsburg by the Emperor Maximilian, who conferred on him the honor of knighthood in this same year. While in Italy, Hutten had become imbued with a fierce hatred for the papacy, which he bitterly attacked in his preface to an edition of Laurentius Valla's *De Donatione Constantini*, published in 1517. In the following year he accompanied his patron, Albert, Archbishop of Mainz, to the Diet of Augsburg, where Luther had his famous conference with Cajetan. Subsequently he established a small printing press of his own and employed himself in putting forth pamphlets written in the German language violently attacking the Pope and the Roman clergy. The Archbishop Albert denounced him at Rome, whereupon Hutten took sides with Luther, whom he had hitherto affected to despise. Persecuted by his enemies, he availed himself of the protection of Franz von Sickingen, but was forced to flee from the latter's castle after a two years' residence (1520–22). Going to Basel, he was coldly received by Erasmus, who did not approve of his extreme measures, and a breach took place between the two men, culminating in a great literary quarrel which marred their subsequent lives. From this time Hutten was compelled to adopt a wandering life. He died Aug. 23, 1523, on the island of Ufnau in the Lake of Zurich, where Zwingli had secured a living for him. Hutten was more open in the expression of his opinions than any other man, probably, of his age. He did much to prepare the way for the Reformation and to promote it. He was a master of the Latin language and excelled in satirical and passionate invective. His literary life is generally divided into three periods: (1) period of Latin poems (1509–16); (2) period of letters and orations (1515–17); (3) period of dialogues and letters in Latin and German (1517–23). In all he published some 45 different works, but his most noteworthy contribution to literature was his portion of the second part of the immortal *Epistolæ Obscurorum Virorum* (q.v.). Hutten's collected works, *Opera Omnia*, were published at Leipzig in seven volumes (1859–70) under the editorship of Böcking.

Bibliography. Among several biographies by German authors that by D. F. Strauss (6th ed., Bonn, 1895), abridged in English by Sturge (London, 1874), is especially to be recommended. Consult monographs by Reichenbach (Leipzig,

1877); Schall (Halle, 1890); Szamatólski, *Ulrich von Hutten's deutsche Schriften* (Strassburg, 1891). A good brief sketch in English is D. S. Jordan, *Ulrich von Hutten, Knight of the Order of Poets* (Boston, 1910).

HUTTEN ZUM STOLZENBERG, tsum shtōl'tsen-bĕrk, Baroness von (Bettina von Hutten) (1874–). An American novelist, daughter of John Riddle, of Erie, Pa. In 1897 she married Baron von Hutten, chamberlain of the King of Bavaria, but was divorced in 1909. She resided much abroad and traveled widely. *Pam* (1905), with the other novels in which the heroine of this book reappears, has perhaps most strongly commended Baroness von Hutten as a writer. In addition to *Pam*, her novels include: *Violett* (1904); *Araley* (1904); *Pam Decides* (1906); *The One Way Out* (1906); *The Halo* (1907); *Beechy, or the Lordship of Love* (1909); *Kingsmead* (1909); *The Green Patch* (1910); *Sharrow* (1912); *Maria* (1914).

HUTTER, hut'tĕr, Leonhard (1563–1616). A German Lutheran theologian, born at Nellingen, near Ulm. He studied at the universities of Strassburg, Leipzig, Heidelberg, and Jena, and after lecturing at Jena for several years went to Wittenberg. He was one of the most resolute and influential representatives of the Lutheran faith and was known as Redonatus Lutherus. He attacked the Calvinist doctrines in his *Concordia Concors* (1614), which he wrote as an answer to Hospinian's *Concordia Discors* (1607).

HUTTON, hŭt'n, Arthur Wollaston (1848–1912). An English clergyman, born at Spridlington and educated at Cheltenham College and at Exeter College, Oxford. He was rector in his native town in 1873–76, was then received into the Roman Catholic church by Cardinal Newman, but in 1898 returned to the Anglican church. He was a member of Newman's Oratorian Community in 1883 and from 1887 to 1899 was librarian of the National Liberal Club. He visited the United States and Canada in 1907–08. His writings include: *Our Position as Catholics in the Church of England* (1872); a life of *Cardinal Manning* (1892); *Letters to Mr. Asquith and Mr. Balfour* (1894–95); *Ecclesia Discens* (1904).

HUTTON, Charles (1737–1823). A self-educated English mathematician, born at Newcastle-on-Tyne, of humble parentage. He received most of his education in a school at Jesmond, where at the age of 18 he became master. The number of pupils having increased, he in 1760 opened a mathematical school in Newcastle and also taught mathematics at the Head School of the city. Among his pupils was John Scott, afterward Lord Eldon, Chancellor of England. Hutton also worked as a surveyor, and in 1770 he was engaged by the city of Newcastle to draw up an accurate map of the city and the suburbs. He became professor of mathematics in the Royal Military Academy at Woolwich (1773) and the following year was made a fellow of the Royal Society. He made important contributions to the *Philosophical Transactions*, and in 1778 gained the Copley medal for his papers on "Force of Exploded Gunpowder" and "Velocities of Balls." He was appointed by the Royal Society to determine the mean density and mass of the earth. His report appeared in the *Philosophical Transactions* for 1778. In 1779 he was made foreign secretary of the Royal Society, but resigned in 1783. Owing to failing health, he resigned his professorship in 1807 and was granted a pension of £500 a year. He was editor of the *Ladies' Diary* from 1774 to 1817. The most important of his works are, besides those mentioned above: *The Diarian Miscellany* (1775); *Mathematical Tables* (1785); *Mathematical and Philosophical Dictionary* (1795); *A Course of Mathematics* (1798 and subsequent editions); *Recreations in Mathematics and Natural Philosophy* (4 vols., 1803), from the French of Montucla; "On Cubic Equations and Infinite Series," in the *Philosophical Transactions* for 1780.

HUTTON, Edward (1875–). An English writer, especially on Italy. He was born in London and was educated at Highgate School and at Blundell's. He early devoted himself to Italian literature, history, and art, and traveled on foot in Italy and Spain. Hutton edited Dennistoun's *Dukes of Urbino* (1908) and Crowe and Cavalcaselle's *Painting in Italy* (1908–09). Among his own valuable writings are: *The Cities of Umbria* (1905); *The Cities of Spain* (1906); *Sigismondo Malatesta* (1906); *Florence and Northern Tuscany* (1907); *In Unknown Tuscany* (1909); *Boccaccio* (1909); *Rome* (1909); *Siena and Southern Tuscany* (1910); *Perugino* (1911); *Venice and Venetia* (1911); *The Cities of Lombardy* (1912); *Highways and Byways in Somerset* (1913); *Ravenna* (1913); *The Cities of Romagna and the Marches* (1913); *England of my Heart* (4 vols.; vol. i, *Spring*, 1914).

HUTTON, Frederick Remsen (1853–1918). An American mechanical engineer, born in New York City. He graduated from Columbia College in 1873 and in 1876 from the Columbia School of Mines, where he became assistant and where he was professor of mechanical engineering from 1891 until his retirement in 1907. From 1899 to 1906 he was dean of the faculty of applied science. In 1892 he became associate editor of the *Engineering Magazine*, in 1893 an editor of *Johnson's Cyclopædia*, and in 1913 a contributor to the New International Encyclopædia. From 1883 to 1906 he was secretary, and in 1907 president, of the American Society of Mechanical Engineers. Columbia University gave him the honorary degree of Sc.D. in 1904, and Rutgers College similarly honored him in 1913. In 1911 he was consulting engineer for the department of water, gas, and electricity of New York City, and has been chairman of the technical committee of the Automobile Club of America for many terms. He wrote reports on machine tools for the census of 1880; *Mechanical Engineering of Power Plants* (1897; 3d ed., 1909); *Heat and Heat Engines* (1899); *The Gas-Engine* (1903; 3d ed., 1908).

HUTTON, James (1726–97). An eminent British geologist. He was born in Edinburgh and educated at the university in that city. After serving a year's apprenticeship in a law office he relinquished his plan of joining the legal profession and entered upon the study of medicine, taking courses at Edinburgh, Paris, and Leyden. In 1750 he returned to Scotland and for several years was engaged in agricultural pursuits. Upon removing to Edinburgh in 1768 he came in contact with Ferguson, Black, and other savants, who encouraged and directed his scientific investigations. The results of a long and careful research into geological processes were formulated in a paper entitled "Theory of the Earth," which he read before the Royal Society in 1785 and afterward amplified and pub-

lished as *The Theory of the Earth, with Proofs and Illustrations* (1795). This work, although attracting little notice at the time, established a place for its author among the foremost thinkers in the realm of geological science. One of the fundamental principles of Hutton's theory was based on the internal heat of the earth, which has shown itself in past ages by the intrusion of molten rocks into the crust and by upheaval of the superficial strata. This view was combated by the followers of Werner, but it is now generally accepted as correct. He further developed the principle that the study of geological phenomena should be based upon observation of changes going on at the present time and thus in a way originated the doctrine of uniformitarianism (q.v.), afterward elaborated and expounded by Lyell. He also realized very fully the enormous lapse of time which the changes involve: in his view nature affords "no vestige of a beginning, no prospect of an end." Such doctrine was out of harmony with the scientific teachings of his age, but finds general acceptance with the leading geologists of the present day. The great value of Hutton's work was not fully appreciated until several years after his death, when Playfair brought out the "Illustrations of the Huttonian Theory." Hutton contributed frequently to the "Transactions of the Royal Society of Edinburgh" and also published several extended works, among the most important of which are: *Dissertations on Different Subjects in Natural Philosophy* (1792); *Investigation of the Principles of Knowledge* (1794); *A Dissertation upon the Philosophy of Heat, Light, and Fire* (1794).

HUTTON, Laurence (1843–1904). An American essayist and critic, born in New York City and educated privately there. He was an inveterate traveler and for 20 years spent his summers abroad. From about 1870 he contributed continually, as dramatic critic and miscellanist, to periodicals; from 1872 to 1874 he was dramatic editor of the New York *Evening Mail*, and from 1886 to 1898 he was the literary editor of *Harper's Magazine*. He was one of the organizers of the Authors Club and of the International Copyright League. An ardent collector of literary curiosities, his collections were of remarkable interest. In 1892 he received the degree of A.M. from Yale and in 1897 from Princeton. His writings on dramatic subjects include: *Plays and Players* (1875); *Curiosities of the American Stage* (1887); *Memoir of Edwin Booth* (1893); and, with Brander Matthews, *Actors and Actresses of Great Britain and of the United States* (1886–87). He edited the *American Actor Series* (1881–82) and published a group of delightful literary guidebooks, including *Literary Landmarks of London* (1887), *Edinburgh* (1892), *Jerusalem* (1895), *Venice* (1896), *Florence* (1897), *Rome* (1897), and *Literary Landmarks of the Scottish Universities* (1904). Consult M. E. Wood (comp.), *Laurence and Eleanor Hutton: Their Books of Association* (New York, 1905), and J. Moore, *Talks in a Library with Laurence Hutton* (ib., 1905).

HUTTON, Maurice (1856–). A Canadian educator. He was born in Manchester, England, and was educated at Magdalen and Worcester colleges, Oxford, graduating with high honors in classics. In 1880 he was appointed lecturer on classics and ancient history at Firth College, Sheffield. He went to Ontario in the same year and was appointed professor of classics in University College, Toronto. In 1887 he became professor of Greek in, and in 1901 principal of, University College. In 1906–07 he was acting president of Toronto University. He was made a member of the Ontario Educational Advisory Council in 1906 and in 1913 was elected a fellow of the Royal Society of Canada, to whose *Transactions* he contributed.

HUTTON, Richard Holt (1826–97). An English journalist and critic. He was the son of a Unitarian minister and was born June 22, 1826, in Leeds, Yorkshire. The family removed to London in 1835. Hutton was educated at University College School and subsequently at the college itself, with a view to the Unitarian ministry. After two semesters in Germany he returned to London and, finding no adequate sphere in the ministry, he became principal of University Hall. Resigning on account of ill health, which necessitated a trip to the West Indies, he studied law. Under the influence of F. D. Maurice he entered the Church of England. In 1861 Meredith Townsend bought the *Spectator* and called in Hutton to aid him in conducting it. As editor of this paper for 25 years, Hutton exerted great influence. Liberal but not radical in tone, it became in his hands the organ of the very best contemporary thought. As a critic, Hutton came to speak with much authority. His best work is represented by *Essays, Theological and Literary* (1871), containing under the second division essays on Goethe, Wordsworth, Shelley, Byron, Browning, George Eliot, and Clough, and *Essays on Some Modern Guides of English Thought* (1887), treating of Carlyle, Newman, Matthew Arnold, George Eliot, and F. D. Maurice. Two posthumously published volumes of Hutton's are *Aspects of Religious and Scientific Thought* (selections from the *Spectator*, ed. by E. M. Roscoe, 1899) and *Brief Literary Criticisms* (ed. by E. M. Roscoe, 1906). He also wrote a life of Scott (1878) and edited the *Biographical Studies of W. Bagehot* (1881). Hutton died Sept. 9, 1897, at Crossdepe. Consult J. Hogben, *R. H. Hutton of the Spectator: A Monograph* (2d ed., Edinburgh, 1900).

HUX'LEY, Thomas Henry (1825–95). An English naturalist and comparative anatomist. He was born at Ealing, now a suburb of London, May 4, 1825. He studied in the Medical School of Charing Cross Hospital, and in 1845 was graduated as M.B. and medalist at the University of London. In 1846 he was appointed assistant surgeon on the *Rattlesnake* of the royal navy, commanded by Capt. Owen Stanley, which was to survey the region of the Great Barrier Reef, east and north of Australia. Imbued with a passion for natural history, Huxley devoted himself to the study of the marine animals seen and collected during the four years of this survey service. His most important research, "On the Anatomy and the Affinity of . . . the Medusæ," was published during his absence and placed its author in the front rank of biologists. He demonstrated that the body of the medusa is essentially built up of an inner and an outer membrane, which he asserted were the homologues of the two primary germinal layers in the vertebrate embryo. (See Embryology.) This discovery stands at the basis of modern philosophical zoölogy and of a true conception of the affinity of animals.

In 1850, on his return to England, Huxley

THOMAS HENRY HUXLEY

FROM THE PORTRAIT BY A. LEGROS

began a hard struggle against adversity and discouragement. Disappointed in the hope that the Admiralty would provide for the publication of his notes and drawings, he published the more important in the *Philosophical Transactions* (1851) and in the same year was elected a fellow of the Royal Society, which in 1852 gave him its medal. In 1854 he succeeded Edward Forbes as professor of natural history and paleontology at the Royal School of Mines. This was in the line of direct advancement, for his great ability as an educator and administrator as well as in original research brought him to many posts of honor, such as, in 1855, the Fullerian professorship of comparative anatomy at the Royal Institution; in 1863, the Hunterian professorship at the Royal College of Surgeons; in 1868, the presidency of the Ethnological Society; in 1869, the presidency of the Geological Society; in 1870, the presidency of the British Association for the Advancement of Science and a seat on the first school board of London; in 1871, the secretaryship of the Royal Society, of which he became president in 1883; in 1872, the lord rectorship of Aberdeen University; in 1881, the professorship of biology in the Royal College of Science (an expansion of the earlier chair in the Royal School of Mines); in 1892, Privy Councilor. He served on no fewer than 10 royal commissions, of which the most important were that of Inquiry into the Sea Fisheries (1864–65) and that on Scientific Instruction and the Advancement of Science (1870–75).

Huxley's gifts of exposition were as remarkable as his powers of research. His scientific lectures, like his papers, were models of clearness as well as accuracy, and he was both cogent and eager in debate, and fascinating in popular address. In 1858 he delivered the Croonian lecture on the "Origin of the Vertebrate Skull," in which he disposed forever of the hypothesis that the skull is, homologically, an expanded section of the vertebral column. The very next year *The Origin of Species* was published. Convinced by its arguments, Huxley threw himself heart and soul into their support, adducing much telling corroboration from his own investigations. His series of lectures to London workingmen in 1860 had this for their theme and did much to further the acceptance of the new doctrines. They were the basis of the powerful book *Man's Place in Nature* and were succeeded by many addresses, essays, and debates, influential in informing the public and overcoming both scientific objections and religious alarm. It may fairly be said that science as contained in the doctrines of organic evolution, and especially in the views of Darwin, is almost as much indebted to the lucid exposition and bold championship by Huxley as to the originators of the theories. Nevertheless Huxley accepted Darwin's hypothesis of natural selection with a qualification. He pointed out the lack of evidence that any group of animals has, by variation and selective breeding, given rise to another group in the least degree infertile with the first; but he believed this objection might disappear under prolonged observation and experiment. As to Lamarck's theory of use inheritance (q.v.), he declared, in 1890, his absolute disbelief, as the evidence then stood.

Huxley came to America in 1876 and delivered in New York three lectures on Evolution, taking as his texts the series of fossil horses. During that visit he delivered the opening address at Johns Hopkins University. Huxley's contributions to science were of the widest range and embraced every department of biology. His exposition of the relations of protoplasm as the physical basis of life is particularly masterful. He was not only a man of science, but a publicist. His services were always at command for the promotion of political, social, and moral reform—first and chiefly for the cause of national education. His devotion to labors thus entailed, added to professional toil, did much to undermine his health, which for some years towards the end of his life was very poor. He died at Eastbourne, June 29, 1895.

Professor Huxley bore an honorable part in creating the knowledge which will make the nineteenth century memorable; and a great part of it was made permanent in a series of books, of which the following is a complete list: *Oceanic Hydrozoa* (1859); *Evidence as to Man's Place in Nature* (1863); *Elementary Physiology* (1866; 4th ed., 1885); *Lay Sermons, Addresses, and Reviews* (1870; 3d ed., 1887); *Anatomy of Vertebrated Animals* (1871); *Critiques and Addresses* (1873); *Elementary Biology*, with Dr. H. N. Martin (1875; 2d ed., 1876; 3d ed., ed. by G. B. Howes and D. H. Scott, 1877); *American Addresses* (1877); *Physiography* (1877); *Hume* (1878); *The Crayfish: An Introduction to the Study of Zoölogy* (1880); *Collected Essays* (9 vols., 1893–94). These contained some reprinted material as follows: *Method and Results; Darwiniana; Science and Education; Science and Hebrew Tradition; Science and Christian Tradition; Hume; Man's place in Nature; Discourses, Biological and Geological; Evolution and Ethics;* and other essays. Four volumes of Huxley's *Scientific Memoirs*, edited by Sir Michael Foster and Prof. E. Ray Lankester, were published between 1898 and 1902. An authorized collection of his minor writings appeared in eight duodecimo volumes (New York, 1897–1900).

His *Elements of Biology* became the model for a large number of laboratory manuals, and his *Crayfish* is a classic of the methods of the investigator and the instructor combined. Whatever his theme, the weight and honesty of his thought and the distinction of his style make his works part and parcel of the best books of his time.

Consult: Leonard Huxley, *Life and Letters of Thomas Henry Huxley* (2 vols., London, 1900), which contains a complete list of his writings and of the honors awarded him; P. C. Mitchell, *Thomas Henry Huxley: A Sketch of His Life and Work* (ib., 1900); Edward Clodd, *Thomas Henry Huxley* (New York, 1902); J. R. A. Davis, *Thomas H. Huxley* (ib., 1907); John Fiske, "Reminiscences of Huxley," in *Essays, Historical and Literary*, vol. ii (ib., 1907); H. F. Osborn, *Huxley and Education* (ib., 1910); S. P. Cadman, "Huxley," in *Charles Darwin and Other English Thinkers* (Boston, 1911).

HUY, ụ'ē'. A strongly fortified town of Belgium, in the Province of Liége, situated amid lofty rocks on both banks of the Meuse, 18 miles from Liége (Map: Belgium, D 4). Its summit-crowning citadel, dating from 1822, is partly excavated in the solid rock and commands the passage of the river. The church of Notre Dame, a graceful Gothic edifice, was

begun in 1311 and restored after having been partially destroyed by fire in the sixteenth century. Its many institutions include an athenæum, boys' and girls' school, an industrial school, a theological seminary, and a teachers' institute. The town, in a rich vine-growing district, contains distilleries and paper and cloth mills, and in the vicinity are ironworks, coal, zinc, and tin mines. Pop., 1900, 15,061; 1910, 14,545. In one of the suburbs of Huy was formerly situated the abbey of Neufmoustier, founded by Peter the Hermit, who was interred within it. Huy was taken repeatedly by the Dutch and French in the many wars which swept over this region, and was last captured by Marlborough and Coehoorn in 1703. It was occupied by the Germans during the European War of 1914. For further details, see WAR IN EUROPE.

HUYDECOPER, hoi'de-kō'pĕr, BALTHASAR (1695–1778). A Dutch poet and critic, born at Amsterdam. One of his first books, *Proeve van taal- en dichtkunde op Vondel's Herscheppingen van Ovidius* (1730), or annotations to Vondel's translation of Ovid's *Metamorphoses*, is an important contribution to classical study. So is his edition of the chronicle of *Melis Stoke* (1772). He was the most notable of those who attempted to purify the Dutch language and to render it more flexible. His collected poems were published in 1788. As a dramatist, he was not so successful. Among his plays are a translation of Corneille's *Œdipe* (1720) and *Achilles* (1719), an original drama, for some time very popular. He also made a verse translation of the *Satires* and *Epistles* of Horace (1737).

HUYGENS, hī'gĕnz, *Dutch pron.* hoi'gĕns, CHRISTIAN (1629–95). A Dutch mathematician, physicist, and astronomer. He was born at The Hague, a son of Constantijn Huygens. He studied at Leyden and Breda, devoting himself at first to law and then pursuing the study of mathematics. At the invitation of Minister Solbert of France, he settled in Paris, being given rooms in the Royal Library and made a member of the Academy. After the revocation of the Edict of Nantes he returned to Holland, where he lived the rest of his life. His early work, *Theoremata de Quadratura Hyperbolis, Ellipsis, et Circuli, ex Dato Portionum Gravitatis Centro* (1651), is an example of the talent which lay at the foundation of all his scientific achievements. This was followed by his *De Circuli Magnitudine Inventa* (Leyden, 1654), reprinted in Rudio, *Archimedes, Huygens, Lambert, Legendre* (Leipzig, 1892), the object of each work being to expose the fallacies of Gregoire de Saint-Vincent. He also worked on the doctrine of probabilities already founded by Pascal and Fermat and published *De Ratiocinatione in Ludo Aleæ* (1656). Huygens was the first to apply the pendulum to clocks and to use the device to determine the acceleration of gravity. A complete description of Huygens's apparatus is contained in his great work, *Horologium Oscillatorium, sive de Motu Pendulorum* (1673). He also developed and gave precision to the investigations of Galileo upon accelerated motion under the action of gravity; and there is no doubt that to his studies and discoveries his great successor, Newton, in preparing his magnificent development of the principle of accelerating force, was largely indebted. Newton was a student and admirer of his works and assigns to him, along with Sir Christopher Wren and Wallis, the distinguished epithet of *hujus ætatis geometrarum facile principes.*

Huygens was the first to construct powerful telescopes and in 1655 discovered the ring of Saturn and the fourth satellite of that planet. In 1659 he published an account of these discoveries in a work entitled *Systema Saturnium.* In the end of this work is described an invention of great importance in astronomy, viz., the micrometer (q.v.), by which small angles between objects viewed by a telescope are accurately measured.

In 1660 Huygens visited England, where he was admitted a member of the Royal Society. Huygens was the originator of the wave theory of light; and his theory, now accepted, was first stated by him in 1678, in his *Traité de la lumière* (first printed in 1690; modern German translation in *Ostwald's Klassiker No. 20,* Leipzig). In this theory light is conceived to be a form of motion in the medium through which it passes. (See LIGHT.) Later (1690) he was able to explain both reflection and refraction by wave motion in the ether and was also able to account for double refraction. To Huygens is due the discovery of polarization—a phenomenon which could not then be explained by the undulatory theory and led Newton to adopt the emission theory. Huygens was in error, however, in believing that the vibrations were longitudinal rather than transverse. The undulatory theory, however, did not gain general acceptance until the nineteenth century, when the experiments of Young and Fresnel placed it on a firm basis.

A new edition of Huygens's collected works has been published by the Holland Academy of Sciences in 10 volumes (The Hague, 1888–1905). For his biography, consult P. Harting, *Christian Huygens in zijn Leven en Werken geschetzt* (Groningen, 1868), and Bosscha, *Christian Huygens,* German translation by Engelmann (Leipzig, 1895).

HUYGENS, CONSTANTIJN (1596–1687). One of the greatest writers in Dutch literary history. He was born at The Hague. His father was secretary to the State Council, and from childhood he was trained to diplomacy and in every polite art. Intellect in him was joined to beauty and strength. He studied at Leyden, London, and Oxford, and became a warm friend of Dr. Donne. Returning to Holland in 1620, he was sent on a diplomatic mission to Venice and twice to London (1621–23), where he was knighted by James I (1622). Meantime he had published *Batava Tempe,* a versified series of local legends and scenes, and a volume of satires, *Costelick Mal.* Then followed (1625) a large volume of miscellaneous poems, *Otia, Ledige uren.* That year he was made private secretary to the stadholder and in 1630 member of the Privy Council, wherein he long used political power with vigor and wisdom. In 1634 he translated Donne's poems and on the death of his wife (1637) composed *Daghwerck,* a sort of didactic elegy suggesting the manner of Tennyson's *In Memoriam. Hofwijck,* a poem on moral life, appeared in 1654. A collected edition of his poems appeared as *Korenbloemen* in 1658; his solitary drama, *Tryntje Cornelis,* in 1659. Although Huygens was not the greatest of Dutch poets or of Dutch statesmen, he was, in the combination of his qualities, one of the

most dignified and brilliant figures of the days of Holland's greatness. As a poet, he had more feeling for form and mastery of language, more ease and facility, than any other in his language. His complete works appeared in three parts in Groningen (1892–93). Consult his two practical autobiographies: *De Vita Propria* (Amsterdam, 1817) and *Cluyswerck* (ib., 1841); A. D. Schinkel, *Bejdrage tot de kennis van het Karakter van Constantijn Huygens* ('s-Gravenhage, 1842); A. J. Dumesnil, *Histoire des plus célèbres amateurs étrangers* (Paris, 1860); Jorissen, *Constantijn Huygens* (Amsterdam, 1871).

HUYGENS'S PRINCIPLE. See LIGHT.

HUYSMANS, hīs'mȧns, CORNELIS (1648–1727). A Flemish landscape painter, born at Antwerp. He was a pupil of Gaspar de Wit in Antwerp and of Jacob van Artois in Brussels, and because he lived a large part of his life in Malines (Mechlin) old catalogues sometimes mistakenly call him Michiel. There are pictures by him in the Louvre, the Hermitage, Hampton Court, the London National Gallery. Van der Meulen, for whom he painted some backgrounds, among them that of "The Investment of Luxembourg" (Nantes), tried to persuade him to come to Paris; but Huysmans refused, because he did not know French. His coloration is even stronger than Poussin's, whom he most resembles, but whose tediousness he does not share. He composed several large sacred pieces, among them the "Christ on the Road to Emmaus," which for many years adorned the choir of Notre Dame of Malines.

HUYSMANS, ụ'ēs'mäN', JORIS-KARL (1848–1907). A French novelist, born in Paris, of a Flemish family, some members of which had achieved distinction as painters at Antwerp in the seventeenth century. He began literary life as a disciple of the crassest realism, as one may see by the fact of his contribution to *Les Soirées de Médan*. His novels present every stage of an evolution from sensual materialism, through spiritualism and Satanism, to Christian mysticism, in which there is indeed a curious strain of the sensual and material still. *Marthe* (1876) is a study of sordid prostitution, coinciding significantly in date with Goncourt's *Fille Eliza* and Zola's *L'Assommoir*. In *Les sœurs Vatard* (1879) Huysmans shows himself still a dilettante of moral anguish, sordid wretchedness, and contemptible vice. *En ménage* (1881) is a cynical commendation of marriage, and *A vau-l'eau* (1882) is a *tour de force* in nauseating description. Then in *A rebours* (1884) Huysmans turns as it were in a fierce desperation from materialism to a frenzied spiritualism. "All that transfigures or transforms reality enchants him," he makes his hero say. After this there are some barren years save for the insignificant *En rade* (1887) and *Un dilemme* (1887). Then *Làbas* (1891) carries the psychic evolution a step further in the morbid treatment of astrology and Satanism. This recrudescence of the occult and reassertion of the extranatural suggests a fascinated contemplation of religious mysticism, and in *En route* (1895) we find Huysmans indeed "on the road" towards such Christianity as may be consistent with pessimism. From this point the progress is steady and the course plain. *La cathédrale* (1898) carries the reader to the door of a Benedictine retreat, and *L'Oblat* (1902) ushers him within. All this latter work is full of "fingering spiritual muscles to see if they are growing"; it is thoroughly morbid, but thoroughly characteristic, too, of a French generation weary of material progress and of all problems save those that defy solution. Yet, in spite of glaring errors of taste, in spite of a recondite vocabulary and of a studied absence of structural unity, these novels are perhaps the frankest and subtlest analyses of the progress of a pilgrim soul since Bunyan's Christian allegory. And they are essentially autobiographic; for Huysmans, like his hero, retreated for some time to a Trappist monastery and became an unprofessed member of the Benedictine community at Ligugé, "too much a man of letters to be a monk, too much a monk to stay among men of letters," as is said of Durtal in the conclusion of *En route*, which is to English readers the most attractive of all his works and "one of the most characteristic novels of our quarter century." He wrote *Les foules de Lourdes* (1906). Consult G. Coquiot, *Le vrai J. K. Huysmans* (Paris, 1912).

HUYSUM, hoi'sụm, JAN VAN (1682–1749). A celebrated Dutch painter of flowers and fruits. He was born at Amsterdam, April 15, 1682, and acquired the rudiments of his art from his father, JUSTUS (1659–1716), a landscape painter of considerable talent. Jan at first devoted himself to landscapes, in the classic style, smooth and lifeless, and only later in life began to paint fruits and flowers, studying especially the works of De Heem and Abraham Mignon (q.v.). His work differed from that of his predecessors in that he preferred to paint upon a light background. He surpassed in mellowness, purity, and delicacy of coloring, and in the exquisite disposition of his lights and shadows. He was fond of introducing birds' nests with eggs, dewdrops, insects, butterflies, and like motifs, rendered with such realism as almost to produce an illusion. The tissue of his flowers and the soft down of his fruit are incomparable in delicacy. His works were very popular and commanded the highest prices. He died at Amsterdam, Feb. 7, 1749. Huysum's masterpieces are in the chief German and Dutch galleries, especially those of Berlin and Amsterdam; also at St. Petersburg and Vienna; the Louvre is the richest of all, having 10 pieces, and there are excellent examples in the English private collections.

HUZVARESH, hōōsh-vä'rĕsh. See PAHLAVI LANGUAGE AND LITERATURE.

HWANG-HAI, hwäng'hī'. See YELLOW SEA.

HWANG-HO, hwäng'hō'. See HOANG-HO.

HWANG-HSING. See HUANG-HSING.

HWANG-TI, hwäng'tē' (Chin., Yellow Emperor, or Ruler). The third of the *Wu Ti* (or Five Sovereigns), who are reputed to have governed China in its legendary period, prior to 2356 B.C. Like Fu-hi (q.v.) and many more of the great leaders of Chinese primitive times, his birth was miraculous, and many wonderful things are attributed to him. As an infant, he was said to have had a full command of language. The year 2697 B.C. is given as the first of his reign, and as he ruled under the influence of the element *earth*, he became known as the Yellow Emperor—a circumstance which, if he ever lived, might point to the region now known as Shensi (q.v.) as the location of his realm. There the earth is yellow, the atmosphere is tinted with yellow, and trees, houses,

etc., are covered with the yellow dust from the mantle of loess (q.v.) which covers half the province. Yellow is still the favorite Chinese color. He extended his Empire east to the Sea of Shantung, west beyond the modern Province of Kansu, south to the Yang-tse-kiang. In the north he drove back the Hun-yü, the traditional foes of the Chinese. He is said by the Chinese to have regulated the calendar and to have introduced in the sixty-first year of his reign the sexagenary cycle by which successive days have ever since been designated, the application of the cycle of years dating only from the Han dynasty (which began in 206 B.C.). He is also credited with having introduced a decimal system, the arts of wood, pottery, and metals, boats and wheeled vehicles, and many other beneficent things. To Hwang-ti's wife is due the credit of having been the first to instruct the people in the rearing of silkworms. Hwang-ti was a virtuous ruler, and his reign was prosperous, though he ruled with an iron hand. He was merciless to rebels, but kind to his loyal subjects. He died at the age of 111 and was succeeded by his eldest son, Shau-hau (2597 B.C.). Consult the *Chinese Repository*, vol. xi (Canton, 1843); W. F. Mayers, *Chinese Reader's Manual* (Shanghai, 1874); De la Couperie, *The Western Origin of Chinese Civilization* (London, 1884); Dyer Ball, *Things Chinese* (New York, 1893); Friedrich Hirth, *The Ancient History of China* (ib., 1911).

HWEI-SANG, hwā'säng' (c.420–c.505). A Buddhist monk, who traveled to the land Fusang, which has been identified by some with Mexico. In 499 Hwei-sang came to King Chow, the Imperial city of the dynasty of Tsi, and in 502 told the Emperor the story of his travels in Fusang, a country to the east, so called from a plant, the *fusang*. His story was taken down in writing; its principal point was that Fusang had been converted to Buddhism by monks from Cabul in 458. The identification of Fusang with Mexico was first made by De Guignes in 1761, in the *Mémoires de l'Académie des Inscriptions et Belles-Lettres*, vol. xxviii, and was laughed at. In later times (1862–63) Gustav d'Eichtal upheld the theory, and (1875) so did Charles G. Leland. (Consult his *Fusang, or the Discovery of America.*) But the strongest impetus given to this belief was by Vining, *An Inglorious Columbus* (1885), and by John Fryer (1901), in *Harper's Magazine* (vol. ciii, pp. 251 et seq.), and in *Harper's Encyclopædia of United States History*, "Hui Shen," which should be consulted. He finds traces of Buddhist art in the idols of the Aztecs; of *lama* in the Aztec *tlama;* of *Gautama*, in *Guatemala, Huatomo, Guatemotzin;* of *Sakhya* in *Oaxaca, Zacatecas, Sacalepec, Zácatlan, Sacapulas*, and *Taysacca;* of a correspondence between *Fusang* from *fusang*, and *Mexico* from *maguey* (or agave); while he explains away all difficulties by mistakes in the report of Hwei-sang's story due to his imperfect knowledge of Chinese and by the changes wrought in Mexico by the invasions of the Spanish.

HWLFFORDD, hụl'fôrth. See HAVERFORDWEST.

HYACINTH, hī'ă-sĭnth (from OF. *hyacinthe*, from Lat. *hyacinthus*, from Gk. *ὑάκινθος, hyakinthos*, hyacinth; of doubtful etymology, hardly connected with Lat. *juvenis*, Skt. *yuvan*, Eng. *young*), *Hyacinthus*. A genus of bulbous plants of the family Liliaceæ, with linear radical leaves and many flowers on leafless scapes. The blossoms are either erect, spreading, or drooping, and arranged in loose or dense racemes. The genus comprises about 30 species, of which three are natives of southern and tropical Africa and the rest of Asia Minor, Syria, and Persia. The few cultivated species are native to the region east of the Mediterranean Sea, and among them *Hyacinthus orientalis*, which has become naturalized in southern Europe, is by far the most important. The numerous varieties have single and double flowers of many different colors. The hyacinth has long been in cultivation, and about the beginning of the eighteenth century it stood almost first in popularity among florists' flowers, and many new varieties were produced. Then, as now, Holland, owing to its favorable climatic and soil conditions, was the principal hyacinth-growing country. Hyacinths are grown in the open, under glass, and as house plants. For outdoor growth a good, well-drained garden soil is required. Well-rotted cow manure is the best fertilizer for hyacinth beds, and horse manure should never be used. Neither should the bulbs be brought in direct contact with freshly applied manure. The bulbs, planted from September to November, are usually placed from 6 to 8 inches apart, and about 5 inches deep in beds spaded to the depth of 20 inches. The main root growth is made during the fall. In winter the beds are protected with litter, leaves, or well-rotted manure. The plants flower early in the spring. In the summer, when the leaves have withered, the bulbs are taken up and stored in dry soil or sand until planting time. For winter flowering the bulbs are started in the dark, and later on the plants are brought to bloom in the forcing house. As house plants, they are grown in hyacinth glasses with water only. Roman hyacinths are a form of *Hyacinthus orientalis* which produce three or four small flower spikes instead of a single large one. Two other species, *Hyacinthus amethystinus*, or Spanish hyacinth, and *Hyacinthus ciliatus*, are also cultivated to a small extent. There are a number of other plants, commonly called hyacinths, which belong to other genera of Liliaceæ. Among these are the grape (or globe) hyacinth and the musk hyacinth of the genus *Muscari;* the *Hyacinthus candicans* of gardeners, which is *Galtonia candicans;* the wild (or wood) hyacinth of Great Britain (also called bluebell) is *Scilla festalis*. The water hyacinth (*Eichhornia speciosa*), which occurs in American tropical and subtropical streams, often constitutes a hindrance to navigation. It belongs to the family Pontederiaceæ. See Colored Plate of AQUATIC PLANTS.

DUTCH HYACINTH.

HYACINTH. The brownish or reddish transparent variety of zircon, especially that found in Ceylon, frequently used as a gem. The name is also applied to similarly colored transparent

minerals, chiefly to the hessonite variety of garnet. See GEMS; GARNET.

HYACINTHE, ē'ä'săNt', PÈRE. See LOYSON, CHARLES JEAN MARIE.

HY'ACIN'THUS (Lat., from Gk. Ὑάκινθος). In Greek mythology, according to the usual story, the son of the Spartan King Amyclas, who reigned at Amyclæ. He was beloved by Apollo, who, while teaching the boy to throw the discus, accidentally struck and killed him. Later writers said that Zephyrus, also a lover of Hyacinthus, in jealousy by his blast turned the discus from its course against Hyacinthus. His grave was shown at Amyclæ, and on the throne of the image of Apollo, which stood over the grave, was represented the reception of Hyacinthus and his sister Polybœa into Olympus. The Hyacinthia, celebrated in his honor for three days each spring, were among the greatest Laconian solemnities, and Amyclæ the most sacred place in Laconia. (See GREEK FESTIVALS, in the paragraph devoted to the festivals at Sparta.) From the blood of Hyacinthus sprang the hyacinth, with the lament AI (*Ai*, Alas) on each petal. This flower is almost certainly not our hyacinth, but a species of iris. Consult L. R. Farnell, *Cults of the Greek States*, vol. iv (Oxford, 1907), and J. G. Frazer, "Adonis, Attis, and Osiris," book ii, chap. 7, in his *Golden Bough*, part iv (3d ed., London, 1914).

HYADES, hī'ä-dēz (Lat. nom. pl., from Gk. Ὑάδες, the rainy ones). In Greek mythology, nymphs of Dodona (q.v.), associated with the fructifying effect of moisture. They were the nurses of the newborn Bacchus and were rewarded by Zeus by being placed among the stars near the head of the Bull. According to another account they were daughters of Atlas and Æthra or Pleione, and sisters of the Pleiades, and were changed into stars after their death from grief at the loss of their brother Hyas, who was killed by a snake. The rising of these stars in spring (April) and their setting in the autumn (November) were looked on by the Greeks and the Romans as signs of wet weather. The name was sometimes rendered by the Romans *Suculæ*, 'little pigs,' because they derived Ὑάς from ὗς, 'sow'—rightly, in the opinion of some modern scholars. Consult Homer, *Iliad*, edited with English notes and introduction by Walter Leaf, book xviii, 486 (2d ed., London, 1902).

HYÆNODON, hī-ĕn'ō-dŏn (Neo-Lat., from Gk. *ὕαινα, hyaina*, hyena + *ὀδούς, odous*, tooth). An extinct doglike creodont mammal. Fossil skeletons have been found in the late Eocene and early Miocene terrestrial deposits of North America and Europe. It was the latest and most specialized member of the Creodonta. Its head is very elongate with a strong posterior crest, the lower jaw is long and slender, and the canine teeth of both jaws are prominent. The body was of slender build, the legs rather short, the feet semiplantigrade, each foot with five clawed toes.

HY'ALITE. A transparent, colorless variety of opal, occurring in rounded masses resembling drops of water.

HY'ATT, ALPHEUS (1838–1902). An American naturalist. He was born at Washington, D. C., and was educated at the Maryland Military Academy, at Yale College, and the Lawrence Scientific School, Cambridge, from which he graduated in 1862. He served as a volunteer throughout the Civil War, rising to the rank of captain. He afterward renewed his studies, becoming curator of Essex Institute, Salem, Mass., in 1867. He was the principal founder of the American Society of Naturalists and its president in 1883–84; organized a seaside laboratory at Annisquam, Mass.; took part in the organization of the Marine Biological Laboratory at Woods Hole, Mass.; and assisted in the founding of the Peabody Academy of Sciences, and became its curator in 1869. He was also one of the founders of the *American Naturalist*. In 1870 he became custodian, and in 1881 curator, of the Boston Society of Natural History, and in 1881 was appointed professor of zoölogy and paleontology at Massachusetts Institute of Technology and at Boston University.

He was elected a member of the National Academy of Sciences in 1875, was a corresponding member of the Geological Society of London, in 1898 received the degree of LL.D. from Brown University, and was a vice president of the American Academy of Arts and Sciences, Boston. His work as a paleontologist was masterly; besides making many innovations in the classification of the nautiloids and ammonites (q.v.), the final results form the most valuable contribution to the philosophy of biology. He was the founder of the new school of invertebrate paleontology. In systematic zoölogy he will be remembered for being next to the first one to refer the sponges to a distinct phylum. He also proposed many new genera, families, and numerous suborders of fossil cephalopods. He discovered the law of acceleration in the evolution of Cephalopoda and the mechanical causes of their evolution; of his work on the fossil pond snails of Steinheim and the origin of their various forms, Sir R. Owen wrote that it was "a model of the way and aim in and by which such researches should be conducted."

Hyatt wrote, besides many shorter articles: *Observations on Freshwater Polyzoa* (1866); *Revision of North American Porifera* (1875–77); "The Genesis of the Tertiary Species of Planorbis at Steinheim," in *Memoirs of the Boston Society of Natural History* (1880); *Genera of Fossil Cephalopods* (1883); *Larval Theory of the Origin of Cellular Tissue* (1884); *The Genesis of the Arietidæ* (1889). He has edited *Guides to Science Teaching* and revised the part of the Zittel-Eastman *Text-Book of Paleontology* on Nautiloids and Ammonoids. These works make him prominent among the new school of American zoölogists, led by Cope and Packard, which called itself Neo-Lamarckian. Professor Hyatt died at Cambridge in 1902. Consult: A. S. Packard, "Alpheus Hyatt," in *Proceedings of the American Academy of Arts and Sciences*, vol. xxxviii (Boston, 1903); W. K. Brooks, "Biographical Memoir of Alpheus Hyatt," in *Biographical Memoirs of the National Academy of Sciences*, vol. vi (Washington, 1909).

HYATT, ANNA VAUGHN (1876–). An American sculptor, born at Cambridge, Mass. She studied at the Art Students' League in New York City and was a pupil of H. H. Kitson, H. A. McNeil, and Gutzon Borglum. Her work, shown at the exhibitions of the Society of American Artists and of the Philadelphia Academy and at the Buffalo Exposition (1901) and the St. Louis Exposition (1904), consists largely of small bronzes of animals. Notable examples are in the Metropolitan Museum of Art, New York. Among larger sculptures by

her are a fox, at Lancaster, N. H., and a colossal lion (1908), at Dayton, Ohio. Miss Hyatt's plaster cast of a life-size equestrian statue of Jeanne d'Arc won an honorable mention at the Paris Salon in 1910, and in 1914 the city of New York decided to place in one of its parks a bronze statue resembling the cast.

HYATT, JOHN WESLEY (1837–1920). An American inventor, born at Starkey, N. Y. His education was very meagre, and while yet in his teens Hyatt started upon his career as an inventor. His first important invention (1865) was that of a composition billiard ball which, by reason of the scarcity of ivory, became very popular. Four years later, by his discovery of a means of dissolving pyroxylin under pressure, he laid the foundations for the present immense celluloid industry. (See CELLULOID.) Undoubtedly Hyatt's greatest contribution to science, however, was the scheme he devised in 1881 for the purifying of large bodies of water. The success of his method has been attested by the general use made of it both in the United States and abroad. In 1900 he invented a lock-stitch sewing machine with 50 needles, for sewing belting, and later he patented a method of solidifying hard woods.

HY'BLA (Lat., from Gk. *Ὕβλη*). The name of two towns in ancient Sicily, of uncertain sites. According to one view, Hybla Maior (or Hybla Megara) was situated on the seacoast, not far from Syracuse, and Hybla Minor (Hybla Geleatis) at the foot of Etna, on the site now occupied by the town of Paterno. Both were originally cities of the native inhabitants and were afterward Hellenized. From Hybla Maior came the Hyblæan honey, rendered so famous by the Roman poets. Consult Karl Baedeker, *Southern Italy and Sicily*, pp. 414, 432 (16th Eng. ed., Leipzig, 1912).

HYBODUS, hĭb'ō-dŭs (Neo-Lat., from Gk. *ὕβος, hybos,* hump + *ὀδούς, odous,* tooth). An extinct genus of cestraciont sharks found fossil in the Triassic and Jurassic rocks. Finely preserved skeletons of this shark have been found in the Liassic deposits of England. These fish had blunt heads, jaws armed with 9 to 10 rows of sharp, conical teeth, fins armed with long, sharp, anterior spines, and the skin was covered with shagreen, consisting of small pointed plates. Two sharp curved spines on each side of the head behind the eyes were present on the males only and perhaps served as offensive organs. The species varied from 3 to 6 feet in length. See SHARK.

HY'BRID (from Lat. *hybrida, hibrida, ibrida,* hybrid), in plants. The progeny of parents which belong to different species or races. See HYBRIDITY.

HYBRID'ITY. The phenomenon of the sexual crossing of two individuals belonging to distinct species. A hybrid is the product of this crossing and is contrasted with a mongrel, or the product of individuals belonging to distinct races or subspecies of the same species. The importance of hybridity is threefold:

1. *A Test of Species.*—Hybridity has been used by Cuvier and others as a test of species, as contrasted with varieties. It has been asserted that hybrids are sterile, whereas mongrels are fertile. So long as infertility of descendants is used as a criterion of species, this tenet is unassailable; the difficulty arises from the fact that the strict application of the criterion leads us to deny specific distinctions to animals that are commonly regarded as such —e.g., the dog and wolf, dog and jackal, the hare and rabbit, various species of Bovidæ (or oxen), sheep and goat, and, among plants, various forms of rhododendron, gladiolus, dianthus, nicotiana, etc. Focke says concerning plants: "Many hybrids, especially those between unlike lines of descent, are infertile, most show a diminished fertility, some a *nearly normal fertility.*" It may be concluded, therefore, that the Cuverian definition of species will not hold. While fertile hybrids are thus not common, the capacity for hybridization in the first generation is widespread.

The question arises, Why are hybrids so often sterile? Various hypotheses have been proposed, but none can be said to be proved. Darwin's hypothesis is thus summarized: "The sterility of first crosses and of their hybrid progeny has not been acquired through natural selection. In the case of first crosses it seems to depend on several circumstances; in some instances on the early death of the embryo. In the case of hybrids it apparently depends on their whole organization having been disturbed by being compounded from two distinct forms, the sterility being closely allied to that which so frequently affects pure species when exposed to new and unnatural conditions of life. He who will explain these latter cases will be able to explain the sterility of hybrids." Wallace has a somewhat different view. A new species arises in connection with some slightly varying conditions of environment. If these are sufficient to create a change in coloration or form, they will, by virtue of correlation, affect also the germ cells and may give rise to a certain amount of infertility. Now, the infertility will be beneficial whenever new species arise in the same area with the parent form, because it would result in a preservation of both of the adapted forms. Consequently, whenever two species which are at the same time adapted and infertile arise, they will retain their respective adapted conditions and will survive. Finally, Catchpool and Romanes have independently suggested an explanation that is worthy of consideration—it is that the sterility of species is not something acquired, but is primary. Whenever from any cause two lots of individuals of one species become partly infertile inter se, those lots are, as it were, segregated. Each of them can develop its own way and give rise to a distinct species. If the species were not thus sterile at the beginning, differentiation would be difficult.

2. *Relation to Inheritance.*—Hybridity is important for the study of the laws of inheritance. Since the parents are more unlike, the nature of their combinations is still more interesting than in the case of ordinary sexual reproduction. Hybrids are particularly apt to show a reversion to an ancestral condition, especially when opposing characters are intermingled. The following rules concerning hybrids have been formulated by Focke: (*a*) "All the individuals formed by the crossing of two pure species or races are, if they have been produced and grown under the same conditions, exactly like each other, as a rule, or they differ hardly more than specimens of one and the same species are apt to do." This proposition is subject to many exceptions. In certain crosses the female element is predominant in the progeny; in others the male. Especially in cases of alternative

heritage (see HEREDITY) the hybrids may be of two types—the one resembling more the one parent, the other type the other parent. (*b*) "The characteristics of the two crosses may be different from those of the parent species. They differ most from both parent species in size and luxuriance as well as in fertility." In the case of alternative heritage an interesting rule was worked out by Mendel. In each pair of opposed characters one is dominant ("d"), one recessive ("r"). The first generation of hybrids show only *d* characters. If these breed together, 25 per cent of the offspring show *r* characters, and these are pure *r;* 75 per cent show *d* characters, but only one-third of these are pure *d,* the others being hybrid. These latter, when inbred, break up in the same proportion as before. The consequence of Mendel's "law of dichotomy" in hybrids is that the proportion of the pure races is constantly increasing in the successive generations descended from a hybrid. "Malformations and curious forms are much more common, especially in the flower parts of hybrids, than in individuals of a pure descent." Double flowers appear to be formed especially easily in hybrids. Hybrids are frequently infertile, because the pollen is imperfectly formed.

3. *Utility.*—Hybridity has great practical utility in agriculture. Many varieties of our domesticated plants have arisen from artificial hybrids. The first generation of hybrids usually gives few results, but great variations continue to appear in subsequent generations. Thus, when two species of hybrid foliaceous plants are crossed, the leaves of the second or third generation are often highly variable. This great variability, on the other hand, renders any favorable variation liable to be lost unless great pains are taken to fix the desired quality by in-and-in breeding, or unless the quality can be reproduced vegetatively, i.e., by cuttings and grafts. The diminished fertility of some hybrids is agriculturally advantageous in the case of plants that can be reproduced vegetatively. Some of the advantageous results of hybridization are as follows: (*a*) Increased Size and Vigor. The hybrid between the English walnut and the California black walnut is of exceptional value, "for it grows twice as fast as the combined growth of both parents. The wood is very compact, with lustrous silky grain," etc. Another hybrid of the black walnut and the California black walnut produces fruit of much larger size than that of either parent. These are illustrations of a common result of hybridization—increased size and vigor. (*b*) Increased Hardiness. The production of hardy races of plants is very important, because it carries farther north the limits of agriculture and increases the area of cultivation. Every few years the orange and lemon trees of the Gulf States and California are greatly damaged by freezing weather. The Japanese trifoliate orange is hardy, but has fruit of small size. It is hoped that a hybrid may be obtained between it and the ordinary orange which shall have increased hardiness without loss of size or flavor in the fruit. (*c*) Adaptation to Warmer Climate. The Kieffer and LeConte pears, which have revolutionized pear agriculture by extending the range of profitable pear growing hundreds of miles southward, are said to be hybrids between the common pear and the Chinese sand pear. (*d*) Increased Resistance to Disease. When the vast grape industry of France was threatened with destruction on account of the ravages of the bug *Phylloxera,* immune American species were crossed with the French species, and immunity was gained by them. Similarly the black-rot disease in grapes has been fought by introducing the blood of immune races. (*e*) Increased Percentage of Starch, Sugar, etc. By hybridization the production per acre of the potato has been doubled, and the starch percentage increased from 15 to 26. While the percentage of sugar in the sugar beet has been hitherto chiefly increased by selection, there seems to be a chance for improvement by hybridization. A hybrid cinchona produces three to four times the ordinary percentage of quinine. (*f*) Change of Season and Duration of Life. By hybridization plants have arisen fruiting at unusual times, like Burbank's blackberry and raspberry hybrids. A fairly successful attempt to make the pansy perennial resulted from crossing the garden pansy with the perennial *Viola cornuta.* (*g*) Acquisition of Odor. The fragrance of the pansy has been improved by crossing with odoriferous Alpine species. (*h*) Improvement of Quality and Flavor. This result is illustrated by the case of smoking tobaccos, in which the superior-flavored Havana race has been crossed with other races having larger leaves, so that a greater quality of well-flavored leaf has been produced. Altogether, many breeders conclude that by systematic hybridization most species of plants will be found capable of almost indefinite improvement.

In connection with the artificial production of hybrids the phenomenon of "xenia" has recently attracted much attention. This term is applied to cases in which characters of the pollinating parent appear directly in the fruit or seed. It was once thought that only the embryo could show hybrid characters, which would become evident, therefore, only upon the germination of the seed. In cases of xenia, however, the regions of the seed outside of the embryo show hybrid characters, so that it is evident that they too have been influenced by the pollinating parent. The crossing of the races of maize has proved to be most favorable for studying this phenomenon. If a race of maize normally producing white grains be pollinated by one producing red grains, the resulting grains will show the red coloration in various ways. The same result is also obtained in crossing races of sweet and dent corn. This phenomenon was inexplicable until the recent discovery of "double fertilization" among flowering plants. This phrase means that both of the male cells were brought by the pollen tube to the ovule function—one fertilizing the egg, which then produces the embryo; the other uniting with the "endosperm nucleus," which then produces the endosperm or food substance of the seed about the embryo. It is evident, therefore, that where double fertilization occurs in connection with hybridizing the endosperm as well as the embryo is a hybrid, and that the resulting seed may show characters of the pollinating parent. See ANGIOSPERMS; FERTILIZATION; PLANT BREEDING.

Methods of Hybridizing. The methods of hybridizing plants are simple. If the flower is hermaphroditic, its stamens must be cut away before they are ripe—usually before the corolla opens—and the flower must be tied up in a paper bag. When the stigma is ripe, the pollen

is placed on it, and the bag tied over the flower again and not removed until the seed begins to form. If the flower bears no stamens, it requires, of course, no operation except the tying up while in the bud to prevent the access of foreign pollen. Among animals much less experimentation in producing hybrids for commercial purposes has been done.

HYBRIDITY IN ANIMALS

The number of animal hybrids known to have been produced or actually to exist is not large. The only special work on hybrids is that of Suchetet, the first volume (1001 pages) being devoted to birds alone.

Of hybrids produced by nature we have on record comparatively few examples, but the number is probably quite considerable. It is known that fish, especially the Salmonidæ, readily hybridize. There are on record over 100 cases of hybrids among insects, and the number probably runs into the thousands. Of amphibians, species of diverse frogs have been seen mating, but it is not definitely known that such unions have given rise to hybrids. Natural hybrids among birds have been described, e.g., between the flicker of the eastern United States and the Mexican flicker, between two species of warblers of the genus *Helminthophila*, between species of geese, various European grouse, and certain Asiatic pheasants.

The hybridism which has taken place among the wild pheasants of the genus *Gennæus* in Burma is perhaps the most remarkable instance known. Three species—the black-breasted (*horsfieldi*), the lineated (*lineatus*), and the silver (*nycthemerus*) kallege pheasants—meet in this country, and from along the borders of their haunts a score of forms have been described and named as legitimate species, whereas they are merely hybrids, exceedingly variable even in the same brood and of interest only as examples of hybridism in nature.

Hybrids Produced Artificially. By artificial fertilization of the ova of different species, and even genera and families, of sea urchins, the early larval stages have been reared, but never carried to maturity; the resulting pluteus stages are more or less monstrous. In one case early larval hybrids between species of two different classes of echinoderms, starfish and sea urchins, were produced. The cases of fertile hybrids of birds and mammals mentioned below were produced in captivity; besides these there have been instances of hybrids between the brown and polar bear, the leopard and jaguar, the lion and tiger, the sea lion and fur seal, between the zebra and horse, the horse and ass, and the common ass and varieties of the kiang.

Hybrids are also known to occur between the dog and fox (Darwin), but this case is doubted by Ewart.

Variations of Hybrids. Darwin has shown that hybrids are more variable and have a greater tendency to vary than the products of pure race of both parents. He also has shown that the products of hybrids are much more variable than the hybrids themselves.

Results of Recent Experiments. Experiments by Standfuss on thousands of specimens of the higher Lepidoptera have shown:

1. The intercrossing of two species may result in anything, from complete sterility to the production of the normal number of fertile eggs. These extremes may even occur as the result of crossing different individuals of the same two species. Hence a cross must not be pronounced infertile on the evidence of a single failure.

2. Individual differences in the structure of the genital apparatus may prevent effective crossing between some members of two given species, though other members of the same two species may pair freely.

3. Some crossings have resulted entirely in male, others entirely in female, offspring. A third class has given both sexes in various proportions.

As regards the fertility of hybrids, in no case observed by Standfuss or known to him has the female of a true hybrid been shown to be fertile. But the occurrence of undoubted cases of fertility in male hybrids has been proved by crossing the male hybrids with the females of both parent species, and in one case with the female of a third species.

The silk-moth hybrids of *Philosamia cynthia* and *Philosamia ricina*, the arrhindy moth, two closely allied species, are also said to have been fertile for eight generations.

Fertility of the Hybrids. It is well known that the mule is infertile, and, though there are reported to be three cases where a mule has produced young, they are doubtful. Ewart, in referring to the instance of the Paris Jardin de l'Acclimatation mule, doubts whether these animals are mules, quoting Ayrault's opinion that the Paris mule was an ordinary mare. Darwin states that he knows of no thoroughly well-authenticated cases of perfectly fertile hybrid animals, though he adds: "I have reason to believe that the hybrids from *Cervulus vaginalis* and *Reevesii* and from *Phasianus colchicus* with *Phasianus torquatus* are perfectly fertile." The hare and rabbit are supposed to have fertile offspring; the hybrids of the common and Chinese geese (*Cygnopsis cygnoides*) are fertile, as are hybrids between the common duck and the pintail duck. The crossed offspring from the Indian humped and common cattle interbreed. Caton has hybridized the Virginia deer with the Ceylon deer and the Acapulco deer and says that the hybrids seem perfectly healthy and prolific. The Indian dog and coyote are said by Coues to interbreed, and on the upper Missouri dogs have been seen having every appearance of being such hybrids. Hybrids of hares and rabbits have continued fruitful for generations; the same is true, says Hertwig, of hybrids obtained from the wild buck and the domesticated she-goat. The American bison is known to breed with the domestic cattle, and it seems to be a well-established fact that the hybrids are fertile. Ewart states that the Indian buffalo and the American bison produce fertile hybrids with the wild ox of Europe. Among fishes fertile hybrids have been obtained from the carp and goldfish and from the charr and the brook trout.

Relative Strength of Hereditary Influences. The three following conclusions rest on an elaborate series of experiments by Standfuss with three European species of Saturnia moths:

1. The freshly hatched hybrid larva closely resembles that of the female parent, but with the process of growth a resemblance to that of the male parent gradually increases.

2. The extent of approximation towards the male parent depends on the relative phylogenetic age of the two species—the older being able to

transmit its properties, whether of structure or habit, better than the younger.

3. In reciprocal pairing the male is able to transmit the characters of the species in a higher degree than the female. This influence, however, is less regular and potent than that spoken of in the preceding paragraph.

The result of crossing a parent species with a local race, or with an aberration of the same species, is as follows:

1. When the normal form of a species (*Grundart*) is crossed with a gradually formed local race of the same species, the result is a series of intermediate forms. 2. On the other hand, when the normal form is crossed with a sporadic aberration, the result in many cases is that the issue divides itself sharply between the normal form and the sport, intermediate forms being absent.

In commenting on these results, Dr. F. A. Dixey remarks: 1. The experiments afford fresh illustrations of the manner in which the physiological isolation of an incipient species may be brought about. 2. They show that the statement of Focke as to the great variability of the offspring resulting from the crossing of a plant hybrid with one of the parent species holds good in the case of insects. 3. What Standfuss speaks of as the prepotency of the phylogenetically older of the parent species is probably only another expression of the principle established by Darwin that in many cases crossing causes reversion to a remote ancestor. 4. The general conclusion as to the prepotency of the male parent accords so far with one result of Galton's investigation of the late Sir E. Millais's breed of basset hounds. 5. The result of crossing a parent species with a gradually formed local race, though less in degree, is much the same in kind as that of crossing two distinct species. 6. The result of crossing the normal form of a species with a sporadic aberration of the same species appears to show that the latter stand biologically on an entirely different footing from the regularly developed variety, even though it may indicate (as alleged by Eimer and by Jordan) the direction in which variation for that species is possible. With Standfuss's instances may be compared the well-known case of the otter sheep, which similarly, when crossed with a sheep of ordinary breed, gave no true intermediates. 7. Certain experiments with aberrations of this kind, of which exact numerical records have been kept for several generations, are of special interest in connection with Galton's law of heredity. See Galton, *Natural Inheritance*, p. 134 (London, 1889).

In still later experiments by Standfuss (1898) he shows that the crossing of two distinct species gives rise to a *Zwischenform*, but not to a *Mittelform*. The latter may, however, exist as a temporary stage in larval growth. This depends on the following principles: (1) the freshly hatched larva closely resembles the female parent; (2) with the process of growth a resemblance to the male parent gradually increases; (3) the final extent of approximation towards the male parent depends on the relative phylogenetic age of the two species, the older being able to transmit its properties, whether of structure or habit, better than the younger; (4) in reciprocal pairing the male is able to transmit the characters of the species in a higher degree than the female; (5) when the normal form of a species (*Grundart*) is crossed with a gradually formed local race of the same species, the result is a series of intermediate forms; (6) when the normal form is crossed with a sporadic aberration, the result in many cases is that the issue divides itself sharply between the normal form and the sport, intermediate forms being absent.

Hence, according to Standfuss, adds Dixey, "the process of species formation must be gradual; for when two distinct species are crossed the issue does not split up into two parental forms, as in the case when one parent is a suddenly formed aberration. On the contrary, the behavior of the issue of two distinct species is very similar in kind to that of a species crossed with a local race or variety which is being gradually established by the accumulation of slight changes. It would seem, therefore, that although an aberration or sport may be perpetuated by inheritance, it can never acquire distinct specific rank. No doubt, however, it may, if selected, eventually replace the original form of the species."

Dixey also makes the interesting suggestion that these sporadic color aberrations "seem to have many points of resemblance with the color varieties in domestic animals, such as the 'lemon and white' and 'tricolor' of the basset hounds, or the well-known tortoise-shell, tabby, and black of cats. The fact that these domestic varieties exist side by side in the same race and even in the same litter, and that true intermediates are rare or absent, seems to suggest that they originally appeared as sports, and that their perpetuation has been insured or favored by artificial selection."

Zebra Hybrids. In his *Penycuik Experiments* (1899) Ewart states that he bred nine zebra hybrids by crossing mares of various sizes and breeds with a Burchell zebra stallion, Matopo. The hybrids are interesting because of the curious blending of characters, derived apparently partly from their actual and partly from their remote ancestors, and because they shed new light on many questions of general interest, such as the origin of stripes, reversion, interbreeding, and prepotency.

Reversion. He concludes that "some of the hybrids in make and disposition strongly suggest their zebra sire, others their respective dams; but even the most zebra-like in form are utterly unlike their sire in their markings. It is not a matter of taking after a grandparent, but after an ancestor in all probability thousands of generations removed, an ancestor probably far more like the Somali than any of the Burchell zebras." (This confirms Standfuss's conclusion stated above.) Ewart adds (p. 21): "The reversion may be to recent, remote, or intermediate ancestors, and the tendency will in most cases be to revert to sports that here and there mark the route along which the development has proceeded."

He also, by breeding pigeons, restored the rock pigeon, or primitive form. "In the case of my most typical bird there is, as far as an external examination can show, practically complete reversion." Reversion, he says, "seems to lead to a form of rejuvenescence." He regards polydactylism in the horse as in part due to reversion to the Hipparion, or the three-toed fossil horse. As he well puts it, the cases of reversion that he cites "must be more or less accurate restorations of their comparatively re-

mote ancestors." Reversion also indicates that in some cases "varieties and breeds which have, through interbreeding, undergone senile degeneration, may be regenerated without the loss of their best and most prized characteristics."

Prepotency. It is generally assumed that an old species or variety is prepotent over a more recent species or variety. It is impossible to say whether zebra hybrids in their markings take after a remote zebra ancestor, or after an ancestor common to both zebras and horses, or after a hypothetical midparent combining the characters of the less remote ancestors of both zebras and horses. There is, however, no difficulty in seeing that while some zebra hybrids, apart from their stripes, closely resemble the zebra parent, others take after their horse parent, thus showing that the wild sire is not necessarily the most prepotent. "But even when the hybrids are distinctly horselike they never repeat recently acquired peculiarities, such as a blaze, or short ears, high withers, or a small head and long neck."

Ewart believes that sports and certain marked variations are often prepotent, and also that inbreeding (see POLLINATION) is "common among wild animals, and that by inducing prepotency it plays an important part in the origin of species." It may be here observed that Ewart's experiments lead him to reject telegony (q.v.) and to explain such occurrences by cases of reversion. The zebra hybrids are also interesting as being "in some respects almost intermediate between their parents." Each parent, he says, hands on its most fixed individual characters. His zebra hybrids are neither new creations nor yet intermediate forms.

Sterility in Hybrids.—Ewart concludes that, as there is no hard and fast line between species and varieties, there can be "no fundamental difference between a hybrid and a cross, nor yet any a priori reason why any given hybrid should be sterile, or any given cross fertile. . . . Sterility has doubtless been acquired in some cases slowly, in others abruptly, but how it has been acquired it is impossible in most cases even to guess."

Mendel's Law. Great interest has been excited among biologists by Mendel's law, and his discovery of certain principles of heredity which will prove of much practical value to breeders of plants and animals and lend a new phase to the theory of heredity and also of evolution, since the results thus far obtained point to discontinuing evolution and the absence of intermediate forms. Mendel's original paper was published at Brünn, Austria, in 1865, but was overlooked until De Vries in 1900 published an exact counterpart of Mendel's theory, while Correns and also Bateson hit upon the same law. As stated briefly by Spillman, it is as follows: In the second and later generations of a hybrid every possible combination of the parent character occurs, and each combination appears in a definite proportion of the individuals. A parent character which is fully developed in the hybrid is said to be "dominant"; if it is apparently absent, it is said to be "recessive." A case in illustration is thus stated by Bateson: "In breeding crested canaries the kind of crest desired for exhibition can, according to canary fanciers, be produced most easily by mating crested birds with noncrested, or 'plain heads,' as they are called. If it be supposed that the crested character is usually dominant, we have a simple explanation. When crested birds are bred together, a number of birds are produced whose crests are coarse and stand up, and others without crests. The latter are the recessives; the former we may suppose to be the pure dominants." The fact that the hornless breeds of goats will give off some horned offspring is probably due to the fact that they are what Bateson terms "heterozygotes," under what is usually called "reversion." From the analogy of cattle, it may be anticipated that the hornless form is dominant. Consult Bateson, *Mendel's Principles of Heredity*, with a translation of Mendel's original papers on hybridization (London, 1902).

Mendel's more important discoveries are also thus stated by Castle: "1. His law of dominance; when, for example, the offspring of two parents differing in respect of one character all resemble one parent and possess therefore the dominant character, that of the other parent being latent or recessive. 2. In place of simple dominance there may be manifest in the immediate hybrid offspring an intensification of character, or a condition intermediate between the two parents; or the offspring may have a peculiar character of their own (heterozygotes). 3. A segregation of characters united in the hybrid takes place in their offspring, so that a certain per cent of these offspring possess the dominant character alone, a certain per cent the recessive character alone, while a certain per cent are again hybrid in nature."

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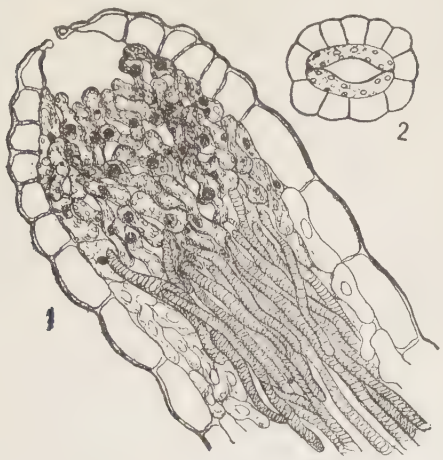
HY'BRIDIZ'ING. See PLANT BREEDING; GRAFT HYBRIDS.

HYDAS'PES. The ancient name of the river Jhelam in northwest India. See JHELAM.

HYDATHODE, hī'dăth-ōd (from Gk. *ὕδωρ, hydōr*, water + *ὁδός, hodos*, way). In botany, an organ that exudes water. Usually hydathodes occur at the tips of the main veins or branch veins of leaves and commonly appear to the unaided eye as leaf teeth. At the apex

of the organ is a pore which has been variously called water pore and water stoma. These pores differ from ordinary stomata in the absence of turgor movements, often in size and in their function; they are passageways for liquid



1, longitudinal section through leaf tooth of Chinese primrose (*Primula sinensis*), showing the divergent tracheids, terminating the vascular bundle, the loose epithem, and the terminal pore.
2, surface view of a water stoma (terminal pore of a leaf tooth).

water rather than for water vapor. Hydathodes commonly occur in connection with the vascular system and may be regarded as a sort of safety apparatus to prevent injection of the air space with water at times when root pressure is high and transpiration low.

HY'DATID (Gk. *ὑδατίς, hydatis,* water vesicle, hydatid, from *ὕδωρ, hydōr,* water; connected with OChurch Slav. *voda,* Skt. *udan,* water, and ultimately with Goth. *watō,* OHG. *wazzor,* Ger. *Wasser,* AS. *wæter,* Eng. *water;* AS. *wæt,* Eng. *wet;* OHG. *ottar,* Ger. *Otter,* AS. *otor,* Eng. *otter*). The bladder worm. It is allied to the tapeworm, but is smaller, containing only three or four proglottids, besides the head, and its "cysticercus" stage is large and bladder-like with numerous heads. These develop on secondary "daughter" cysts, attached to the wall of the cysticercus. About 5000 eggs are developed in a single segment (proglottis). The six-hooked embryos develop, are expelled from the dog, the first host, and find their way in drinking water or in food into the human intestines, whence they bore into the liver, their favorite habitat, or are carried along the blood vessels into some other organ, where they develop into bladder-like bodies, or "hydatids" (*Tænia echinococcus*). By the fourth week the young is ½ millimeter ($\frac{1}{50}$ inch) in length, and it is probably many months before the echinococcus heads are entirely developed. If transported to a dog, the worms become sexually mature in from seven to nine weeks, when the milk-white worms may usually be found embedded in the mucus of the duodenum and upper part of the small intestines, with their heads attached to the villous surface of the intestine. The parent vesicle may grow as large as a man's head. The cyst in which the bladder worm lies, and which is caused by it, is called a "hydatid cyst."

There are two forms of this hydatid—one (*Tænia hominis*) living in man, and the other (*Tænia veterinorum*) in domestic animals. When these echinococcus cysts remain sterile, as they frequently do, they are called "acephalocysts." "Another, and indeed pathological form," says Sedgwick, "is the so-called 'multilocular' echinococcus, which was for a long time taken for a colloid cancer. It is also found in mammalia (in cattle), and here presents a confusing resemblance to a mass of tubercles. The echinococcus disease (*hydatid plague*) was widely spread in Iceland. This disease, likewise, seems endemic in many places in Australia."

HYDATID CYST. See HYDATID.

HYDE. A manufacturing town in Cheshire, England, on the river Tame, 7 miles east-southeast of Manchester (Map: England, D 3). Since the extension of the cotton trade it has rapidly increased in size. Besides numerous cotton factories, print and iron works, there are considerable manufactures of machinery, hats, and margarine. Coal abounds in the neighborhood. The district is densely peopled. Hyde has had its entire growth within the last century. It is mentioned as a village in the reign of King John; was incorporated as a municipal borough in 1881, with a mayor, 6 aldermen, and 18 councilors. It owns its water, markets, and cemetery, and maintains free baths, a library, hospital, and fire brigade. Its sewage is chemically treated for fertilizing purposes. Pop., 1901, 32,766; 1911, 33,444.

HYDE, ANNE, DUCHESS OF YORK (1637–71). The first wife of James II of England and the eldest daughter of the Duke of Clarendon. When she was 12 years old, she went to Holland with her mother and sisters and in 1654 was appointed maid of honor to the Princess of Orange at whose court she was a great favorite. It was while accompanying the Princess on a visit to Paris in 1656 that she first met James, then Duke of York. She became engaged to him about a year before his return to England in the spring of 1660 and, in spite of the most vehement opposition from all quarters, was privately married to him in September. Her father disapproved of the affair with great ostentation and afterward, with more sincerity perhaps, attributed his downfall to the match. At first the royal family would not recognize her, and fruitless attempts were made, by attacking her character, to influence the Prince to put her aside. She was an accomplished and attractive woman, though not handsome, and she maintained her position with regal dignity. She joined the Roman Catholic church soon after 1667 and converted her husband to that faith. Her daughters, however, were educated as Protestants. Anne and Mary, who became queens of England, were her only children that survived infancy.

HYDE, DOUGLAS (1860–). An Irish scholar and writer, born at Frenchpark, County Roscommon. He was educated at Trinity College, Dublin. In 1891 he was interim professor of modern languages in the State University of New Brunswick, and he was afterward made examiner in Celtic to the Royal University of Ireland. In 1906 he received the honorary degree of Litt.D. from the Royal University of Ireland, and in 1909 he was elected member of the senate and professor of modern Irish in the National University of Ireland.

Hyde early took up the study of Irish literature, and in particular the collection and publi-

cation of Gaelic songs and folk tales, and his labors in the preservation of native folklore constitute his most valuable services to Celtic scholarship. His *Literary History of Ireland* is the first attempt to write a comprehensive and systematic history of Gaelic literature. His translations of modern Gaelic lyrics are often particularly happy in rendering at once the simple feeling and the complicated metrical structure of the native poetry. He took a prominent part in the organization of the popular movement for the preservation of the Irish language and in 1906 visited the United States in its interests. He was made president of the Gaelic League (q.v.) at its foundation, in 1893, and also of the Irish Texts Society. In 1894–95 he was president of the Irish National Literary Society. He wrote: *Leabhar Sgeuluighcachta* (1889); *Cois na Teinsadh; or, Beside the Fire* (1890–91); *Love Songs of Connaught* (1894); *The Three Sorrows of Story-Telling* (1895); *The Story of the Early Irish Literature* (1897); *An Sgeuluidhe Gaodhalach* (3 parts, 1898–1901; Fr. trans., 1901); *A Literary History of Ireland* (1899; 4th ed., New York, 1906); *The Lad of the Ferule, etc.* (vol. i of the publications of the Irish Texts Society, Dublin, 1899); *Ubhla de'n Chraoibh* (1900), a volume of poems; and *Sgéaluidhe Fior na Seachtmhaine* (1909). Part of his *Songs of Connaught* were contributed to the Dublin *Nation* (1906). In the same way his edition of the *Poems of Raftery* was published in the Dublin *Weekly Freeman* (1904).

HYDE, Edward. See Clarendon, Edward Hyde, Earl of.

HYDE, Edward. See Cornbury, Edward Hyde, Lord.

HYDE, Edward (c.1650–1712). A Colonial Governor of North Carolina. He was appointed by the proprietors to be Governor of the Albemarle District in the Province of North Carolina, but on his arrival in August, 1710, found that the Governor of the province, from whom he was to receive his commission, had died, and that a former Deputy Governor, Thomas Carey, was leading an insurrection, a movement on the part of the dissenters against the establishment of the Church of England. A number of the more respectable residents requested Hyde to assume the office of Governor, which he did, and with the aid of Governor Spotswood of Virginia succeeded in putting down Carey's rebellion. Soon after, however, the North Carolina Indians, led by the Tuscaroras, went on the warpath and massacred many of the settlers. Hyde called on South Carolina and Virginia for aid, and on Jan. 28, 1712, a body of South Carolina and North Carolina militia under Colonel Barnwell defeated the Indians on the Neuse River. The greater part of the tribe removed to New York and became the sixth nation of the Iroquois Confederacy.

HYDE, Helen (?–). An American etcher and engraver. She was born at Lima, N. Y., graduated from the Wellesley School, Philadelphia, and studied art at the San Francisco Art Institute under Emil Carlsen, in Berlin under Frank Skarbina, in Paris under Raphael Collin, and in Tokyo under Kano Tomonobu. She is noted especially for her etchings in color and her woodcuts of women and children. She first attracted general attention by her etchings of the Chinese children of San Francisco; she then made a series of woodcuts Mexican in subject; and she spent 14 years in Japan making etchings, water colors, and woodcuts of Japanese children and women. Complete series of her work are to be found in the Congressional Library, Washington; and examples are in the New York Public Library and the San Francisco Art Museum.

HYDE, Henry Baldwin (1834–99). An American life-insurance promoter, founder, and president of the Equitable Life Assurance Society. He was born in Catskill, N. Y., and before he was 20 years old entered the employ of the Mutual Life Insurance Company of New York as clerk, becoming cashier in 1856. In 1859 he founded the Equitable Life Assurance Society in competition with the Mutual Life Insurance Company, and until his death he was its master spirit and dictator. His aim to make it the largest life insurance company in the world led to a fierce contest for business. He attempted to transmit his control to his son, James Hazen Hyde (q.v.).

HYDE, James Hazen (1876–). An American insurance official, son of Henry Baldwin Hyde. He was born in New York City and graduated from Harvard University in 1898. In 1899, upon his father's death, he became vice president of the Equitable Life Assurance Society of the United States. His disagreement with James W. Alexander, the president of this company, led in 1905 to an investigation of the company's affairs, with the result that both factions retired. (See Life Insurance.) Hyde was chosen vice president and trustee of the Equitable Trust Company and a director in a large number of banks, railroads, and other corporations. After his break with the Equitable he removed to Paris, was made Officer of the Legion of Honor, and in 1913 married a daughter of John G. A. Leishman (q.v.), the widow of Count Louis de Gontaut-Biron.

HYDE, Laurence. See Rochester, Earl of.

HYDE, Thomas (1636–1703). A famous English Orientalist, born at Billingsley in Shropshire. Educated at Cambridge, he was an assistant to Walton in an edition of his *Polyglot Bible*. Besides correcting the Arabic, Syriac, and Persian texts, he transcribed in Persian characters the Persian translation of the Pentateuch which had been printed in Hebrew letters at Constantinople and appended a Latin version of his own. In 1658 Hyde entered Queen's College, Oxford, to which he was shortly after made Hebrew reader. In the following year, after graduating as M.A., he was chosen underkeeper and finally librarian in chief of the Bodleian Library. In 1660 he was made a canon of Salisbury; in 1678, Archdeacon of Gloucester. He succeeded Pococke in 1691 as Laudian professor of Arabic and soon after, on the deprivation of Altham, became regius professor of Hebrew and canon of Christ Church. Hyde's most important work was the *Historia Religionis Veterum Persarum eorumque Magorum* (1700; 2d ed., 1760). His other works were collected by G. Sharpe, *Syntagma Dissertationum* (1767). They include a history of the game of chess, a translation into Malayan of the Gospel and the Acts, a treatise on the weights and measures of the Chinese, etc.

HYDE, William DeWitt (1858–1917). An American college president, born at Winchendon, Mass. He graduated from Harvard University in 1879 and from Andover Theological Seminary in 1882. Ordained to the Congregational min-

istry in 1883, he was a pastor at Newark, N. J., in 1883–85, and thereafter was president of Bowdoin College, also holding the chair of mental and moral philosophy. He is author of *Practical Ethics* (1892); *Social Theology* (1895); *Practical Idealism* (1897); *God's Education of Man* (1899); *The Art of Optimism* (1900); *The Cardinal Virtues* (1901); *Jesus' Way* (1902); *The New Ethics* (1903); *The College Man and the College Woman* (1906); *Abba, Father* (1908); *Self-Measurement* (1908); *Sin and its Forgiveness* (1909); *The Teacher's Philosophy in and out of School* (1910); *The Five Great Philosophies of Life* (1911); *The Quest of the Best* (1913).

HYDE DE NEUVILLE, J. G., Baron. See Neuville, Jean Guillaume, Baron Hyde de.

HYDE PARK. An inclosure of 364 acres in London, England, about 2¼ miles west of St. Paul's Cathedral (Map: London, E 6). It derives its name from Hyde Manor, which belonged to the abbey of Westminster. It became the property of the crown on the dissolution of the monasteries, in the reign of Henry VIII. After this monarch it became famous as the scene of duels, deer hunts, and horse races. Charles II laid out drives and promenades which became fashionable and have ever since continued to be. It also serves as the place of large popular meetings. It has nine carriage entrances, and among its prominent features are the Serpentine (an artificial sheet of water constructed by order of Queen Caroline in 1730), Rotten Row, the Ladies' Mile, the Marble Arch, the Hyde Park Corner gateway, the statue of Lord Byron, and Westmacott's colossal statue of Achilles, erected in honor of the Duke of Wellington and cast from cannon captured at Waterloo.

HYDE PARK. Formerly a town in Norfolk Co., Mass., annexed to Boston in 1912 (Map: Boston and Vicinity, D 7). It has a public library and extensive manufactures of cotton, woolen, and rubber goods, paper, dyestuffs, looms, morocco, tools and machinery, cars, engines, motors, and curled hair.

HYDERABAD, or **HAIDARABAD,** hī'dĕr-ä-bäd'. A large native state of India, called also the Dominions of his Highness the Nizam. It occupies the central part of the Indian peninsula, being bounded on the north by Berar and northeast by the Central Provinces, on the southeast by Madras, and on the west by Bombay (Map: India, C 5). Area, 82,698 square miles. The surface is an extensive plateau, with an average elevation of about 1250 feet, diversified by mountain, valley, and plain, and watered by the Godavari with its affluents the Dudna, the Manjra, and Pranhita; the Kistna with its affluents the Bhima and Tungabhadra; and the Wardha with its affluent the Penganga. The climate is fairly healthful; the annual precipitation registers 28 to 32 inches. The geological formation is a base of granite, gneiss, and talc slate, superimposed by clay, limestone, sandstone, hornblende, feldspar, and in some districts columnar basalt. Iron and coal are mined, and gold, garnet, and diamond beds, which formerly supplied the Golconda treasury, still exist, although modern mining operations for the precious minerals have hitherto been unremunerative. The soil is comparatively fertile; over 35 per cent of the area is under cultivation, and over 45 per cent of the population is supported by agriculture. Millet is the largest agricultural product; others of importance are cotton, rice, sesamum, wheat, castor seed, grain, and linseed. Fruit culture, market gardening, pasturage of cattle and of sheep, and horse breeding are other agricultural branches. Bad seasons, notably in 1899–1900, have resulted in famine. There are domestic manufactures of silk, woolen, and cotton fabrics, carpets, and leather. Raw silk, cotton, hides, dyestuffs, gums, and resins are exported, and cereals, cloth goods, hardware, salt, and timber are imported. Good military roads traverse the state, and in 1901 there were 858 miles of railroad open. The ruler, the Nizam, is a Mohammedan, as are also the government officials, although the subjects are chiefly Hindus. There is a British Resident and adviser at Hyderabad, the capital. The annual revenue is over 45,000,000 rupees. The population in 1891 was 11,537,040; in 1901, 11,141,142 (the decrease being 3.4 per cent); in 1911, 13,374,676 (increase, 20 per cent); of the latter number, 6,797,118 were males and 6,577,558 were females. According to the 1911 census Hindus numbered 11,626,355; Mohammedans, 1,380,990; Animists, 285,722; Christians, 54,296 (of whom, 18,473 Roman Catholics, 13,929 Anglicans, 8998 Baptists, and 8524 Methodists); Jains, 21,026; Sikhs, 4726; Parsis, 1529. Education made considerable progress during the latter part of the nineteenth century, but only a small proportion of the children attend school: of the total population of 13,374,676 in 1911, 13,006,510 were illiterate. Literates numbered 368,166 (344,089 males, 24,077 females); literates in English, 26,526 (22,965 males, 3561 females).

Hyderabad, formerly attached to the dominions of the rajahs of Telingana and Vijayanagar, in 1512 became a separate kingdom, but in 1687 lapsed into a province of the Mogul Empire. In 1713 Asaf Jah, one of Aurangzeb's warriors, was appointed viceroy of the Deccan, with the title Nizam-ul-Mulk (regulator of the state), and eventually made himself independent. After his death, in 1748, the throne was contested by his son, Nazir Jang, supported by the English East India Company, and his grandson, Muzaffar Jang, whose cause was espoused by the French under Dupleix. The latter triumphed until Muzaffar Jang was murdered by Patan chiefs. Anarchy reigned until Nizam Ali, who ascended the throne in 1761, was defeated by the British and signed the Treaty of 1766, which ceded the northern Circars to the East India Company. The misrule of Nizam Ali's successors increased the territorial debt, which was liquidated by a further cession of land to the East India Company, with the stipulation that part of the revenues should maintain the Nizam's contingent, a subsidiary force of 8000 men for the protection of his dominions. During the mutiny of 1857 an unsuccessful attack was made on the British Residency at Hyderabad; the Nizam and his troops, however, remained faithful to the British, and the state has since been distinguished for its loyalty to the Imperial power. Usman Ali Khan, the present Nizam, came to the throne in 1911. The most important work of his reign has been the construction of the Musi Reservoir at a cost of $2,000,000. Consult A. Gribble, *History of the Deccan* (London, 1896), and R. P. MacAuliffe, *Nizam, the Origin and Future of the Hyderabad State* (New York, 1904).

HYDERABAD, or **HAIDARABAD.** The

capital of the Nizam's Dominions, India. It stands on the right bank of the Musi River, in lat. 17° 22′ N. and long. 78° 27′ E., 1800 feet above the sea (Map: India, D 6). It is the fourth largest city in India, is an important railroad and commercial centre, and its well-stocked and extensive bazars are particularly picturesque. The splendid building of the British Residency stands on the opposite side of the river, the stream being here bridged by nine spacious arches of squared granite connecting the Residency with the Nizam's palace; three other bridges span the river. The city is surrounded by a fortified wall 6 miles in circuit. The most conspicuous building is the principal mosque, fashioned after the model of the Kaaba at Mecca and capable of accommodating 10,000 worshipers; while at the meeting of the four principal streets of the city rises another remarkable edifice, the Char Minar, or College with four minarets, 180 feet high, resting on connected arches, through which run the four converging thoroughfares. Water is supplied from huge tanks, one of which, close to the British cantonment of Secunderabad, measures 3 miles by 2; another is said to be 20 miles round. The city owns its water works and maintains schools, a hospital, and pleasure grounds with a zoölogical section. Pop. (including Secunderabad, Bolaram, and the Residency Bazars), 1891, 415,039; 1901, 448,466 (the increase being 8.1 per cent); 1911, 500,623 (11.6 per cent). In 1901 there were 243,241 Hindus, 189,152 Mohammedans, and 13,923 Christians. The city was founded in 1589 and was first named Bhagnagar. It fell into the hands of the Mughals in 1687 after the storming of Golconda, where it remained until 1724, when the first Nizam declared his independence and established the city as his capital.

HYDERABAD, or **HAIDERABAD.** The chief city of a district of the same name in the Sindh Division, Bombay, British India, 4 miles east of the left bank of the Indus (Map: India, A 4). The ancient capital of the Sindh Kingdom, its manufactures, including arms of various kinds, lacquered ware, gold and silver articles, and silks, have always been famous. There are three cotton gins. It is an important railway junction and commercial centre. The chief object of interest is the fort commanding the town. It covers an area of 36 acres. A modern section of the town has fine wide streets, public buildings, and a market place. There is a training college for men, one for women, an engineering school, a medical school, and an agricultural school. The cantonments containing model barracks are to the northwest of the town. Pop., 1901, 69,378; 1911, 75,952.

HYDER ALI, hī′dēr ä′lē (more accurately, *Haidar 'Alī*) (c.1720–82). Ruler of Mysore and one of the greatest Mohammedan princes of India. Of humble origin, he is said to have been originally a sepoy in the French army, which may explain the friendship which he always felt for the French. He won the favor of the minister of the Rajah of Mysore by the valor which he displayed at the siege of Trichinopoly in 1749 and, by a rapid rise not infrequent in the East, soon became the power behind the throne. Hyder Ali in 1759 dispossessed his master, allowing him, however, to retain his title, while he himself took that of *daïva,* or regent. He then conquered Calicut, Bednor, Kananur, and other neighboring states, and in 1766 his dominions included more than 84,000 square miles. He waged two wars against the British—in the first of which (1767–69) he was completely successful, although deserted by his confederate Nizam Ali, a former friend of the English—and a treaty of peace was signed under the walls of Madras. According to the terms of this treaty, as he claimed, Hyder Ali asked the English in 1772 to help him against his old foes, the Mahrattas, who had already defeated him in 1764, but his request was refused. When a conflict broke out between the English and the French in 1778, he sought his revenge. With his son, Tippu Sahib, he entered the Carnatic in 1780 and proceeded to devastate it. After inflicting two severe defeats on the English, he was routed by Eyre Coote at Porto Novo. Two years later he died very suddenly. Consult: Le Maître de la Tour, *Histoire d'Hayder-Ali Khan* (Paris, 1783); Husein Ali Khan Kirmani, *History of Hydur Naik* (trans. by Miles, London, 1842); L. B. Bowring, *Haidar Alí and Tipú Sultán* (Rulers of India Series, Oxford, 1893).

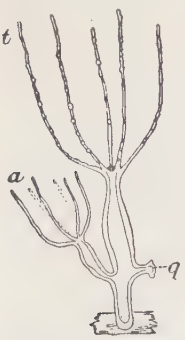
HYD′NUM. A genus of fleshy fungi which gives name to the family Hydnaceæ, or "tooth fungi." They are so named because the hymenium (q.v.) covers toothlike or spinelike processes rather than gill-like plates, as in the ordinary mushrooms.

HYDRA, hē′drȧ *or* ē′drȧ (Lat. *Hydrea,* Gk. Ὑδρέα). An island of Greece, situated 5 miles off the east coast of Morea (Map: Greece, D 6). It is about 11 miles long and 3 miles broad and has an area of 22 square miles. The shores are rocky and steep, and the interior rises to a height of 1950 feet. On the north coast is the town and seaport of Hydra, the white, flat-roofed houses of which are ranged on the side of a hill. The streets are steep and uneven, but remarkably clean. It is the seat of a bishop, manufactures cotton and silk goods, leather, ships, and has a good trade. In ancient times the island of Hydra was a dependency of the city of Hermione and was later ceded to the Trœzenians. During the fifteenth and sixteenth centuries it was settled by fugitives from Albania, Argolis, and Attica. In the Grecian War of Independence the Hydriotes took a most active part, and none were more liberal in their contributions to the patriotic cause. At the time of the outbreak of the Revolutionary War (1821–29) the islanders were considered the richest in the archipelago, holding the carrying trade of the Black Sea and shipping to England, the Baltic, and even to America. Since the Revolution, however, more accessible ports have risen to be the centres of Greek commerce, and Hydra has greatly declined. Pop., 1907, 5695, almost all concentrated in the town of Hydra.

HYDRA, hī′drȧ (Lat., from Gk. Ὕδρα, water snake). A fabulous monster, offspring of Typhon and Echidna, dwelling on a hill near the spring Amymone in the marshes of Lerna, near Argos. The hydra had many heads, of which the central one was immortal. The number of heads varies in the stories from 9 to 50, or even 100. In works of art she is shown with from 3 to 12 heads, except in Hellenistic times, when the hydra is often represented as a serpent with a woman's head. Hercules (q.v.) cut off the heads, while his companion, Iolaus, seared the stumps with a brand, as otherwise two

heads grew wherever one was cut off. The immortal head was buried beneath a huge rock. The hero dipped his arrows in the blood of the hydra and thereby made the wounds which they inflicted incurable. The hydra with its poisonous breath seems a personification of the malarial vapors arising from the swamps of Lerna, with their many springs.

HYDRA (Lat., from Gk. *ὕδρα*, water snake, Skt., Lith. *udra*, OChurch Slav. *vydra*, OHG. *ottar*, Ger. *Otter*, Eng. *otter*, with Gk. *ὕδωρ*, *hydōr*, water). A minute polyp or hydrozoan, common in still, fresh waters. It possesses a gelatinous, subcylindrical body, which from its contractility undergoes various alterations of form. One end expands into a disk or foot, which adheres to a leaf or twig; while a mouth surrounded by a circlet of tentacles, varying from 5 to 12 or more in number, is at the opposite end. These tentacles are exceedingly contractile; at one moment they are thrown out as long, delicate threads, at the next, drawn up into minute wartlike knobs. Numerous nematocysts are in the surface layer of the body, each one of these containing a long, coiled, barbed thread which is quickly protruded if the animal is irritated. The mouth leads into a capacious cavity, excavated throughout the entire length of the animal, which, exclusive of its tentacles, seldom exceeds three-fourths of an inch. The food of the hydra consists of such minute living organisms as come within the reach of its tentacles, and by these apparently fragile threads, which the animal projects like a lasso, crustaceans, worms, and the like are seized, which would be deemed at first sight superior to their captor in strength and activity. The tentacles, however, exert through the action of the thread cells a powerful benumbing or paralyzing influence. The prey when mastered, but often when still alive, is thrust into the internal cavity, where the nutritive parts are absorbed by the hydra, while the indigestible parts are expelled through the mouth.



HYDRA VIRIDIS.
t, tentacles; *q*, a bud; *a*, young hydra, developed from a bud.

Although the hydra is usually found adhering to submerged supports, it is not permanently fixed. It often moves on surfaces under water somewhat after the manner of a leech, and occasionally the disk is protruded above the water and thus acts as a float. Sometimes, especially in the autumn, true reproductive organs may be observed, both male and female organs being usually situated on the same animal. Propagation by gemmation is, however, the most common mode of increase. Minute tubercles appear on the body of the parent animal, which, as they increase in size, gradually become perforated at their free extremity and acquire tentacles. The pedicel by which they originate by degrees becomes thinner and finally gives way, leaving the young hydra perfectly independent. One of the most remarkable points in the history of this animal is its power of being multiplied by mechanical division. If a hydra be cut into two or even more pieces, every one will in time assume the form and functions of the original animal. Several species of hydra have been described, which differ in size, color, and other respects. Two species are common in America, in still water in nearly all parts of the country. One of these (*Hydra viridis*) is bright green in color, while the other (*Hydra fusca*) is grayish brown. The green hydra is notable because its color is due to the presence of chlorophyll, the coloring matter characteristic of plants. Both may easily be reared in aquariums.

HY'DRAGOGUES (from Lat. *hydragogus*, Gk. *ὑδραγωγός*, water carrier, from *ὕδωρ*, *hydōr*, water + *ἀγωγός*, *agōgos*, carrying, from *ἄγειν*, *agein*, to lead). Active purgatives which give rise to large, watery stools. The most important are colocynth, elaterium, gamboge, jalap, croton oil, and scammony. These are all powerful drugs, and their administration requires caution. They are used in general dropsy and serous inflammations.

HYDRANGEA, hī-drăn'jē-ȧ (Neo-Lat., from Gk. *ὕδωρ*, *hydōr*, water + *ἀγγεῖον*, *angeion*, pail). A genus of about 25 species of ornamental deciduous shrubs of the family Saxifragaceæ, natives of North and South America, China, and Japan. The flowers are white, pink, or bluish, and small, but are borne in large, showy corymbs or panicles, the exterior flowers of which are sterile. The pink varieties, when grown on some soils, produce bluish flowers. The hardier cultivated hydrangeas are *Hydrangea paniculata*, used as specimens or in

HYDRANGEA.

borders, *Hydrangea arborescens*, and *Hydrangea radiata*. *Hydrangea hortensia otaska* is a rather dwarf variety, which is extensively grown in greenhouses, especially for the Easter trade. This variety is also frequently grown outdoors, but the plants should be lifted with a clump of earth before freezing weather and stored in a frost-proof pit or cellar until spring. Hydrangeas require a rather heavy, rich soil, well manured and well watered. They are propagated for the most part by cuttings and division, but sometimes by seed.

HY'DRANT. See Water Works.

HYDRARGYRUM, hī-drär'jī-rŭm. See Mercury.

HY'DRARTHRO'SIS. See Dropsy.

HYDRAS'TINE. See Alkaloids.

HYDRAS'TININE. See Alkaloids.

HYDRAS'TIS (Neo-Lat., from Gk. *ὕδωρ, hydōr*, water + *δρᾶν, drān*, to act). A genus of plants of the family Ranunculaceæ, allied to Anemone, the members of which have flowers destitute of petals and succulent or baccate fruit collected into a head. The only known species, *Hydrastis canadensis*, a perennial herbaceous plant, with tuberous roots, and head of fruit resembling a raspberry, is common in rich moist woods in Canada and among the Alleghanies as far south as the Carolinas. Its root is used for dyeing yellow and also in medicine as a tonic. Yellowroot, orange-root, yellow puccoon, and goldenseal are its American names.

HY'DRATE (from Gk. *ὕδωρ, hydōr*, water). A name applied to substances whose molecules contain either one or more entire molecules of water; or, synonymously with the term "hydroxide," to metallic compounds whose molecules contain one or more hydroxyl groups (OH). The question has been discussed, whether substances exist in aqueous solution in the form of "hydrates" or not, i.e., whether the dissolved molecules are associated into definite groups with those of the solvent; and at the present time it seems almost certain that at least the ions of dissociated acids, bases, and salts are "hydrated" in aqueous solution. Some chemists are inclined to believe that the molecules of even a substance like common sugar are hydrated in solution. The subject is, however, still quite obscure. (See SOLUTION.) A substance containing water of crystallization is sometimes spoken of as a hydrate, and its crystals as hydrated crystals, particularly when they are to be distinguished from the anhydrous crystals of the same substance. On the other hand, chemists often use such terms as potassium hydrate and calcium hydrate in the same sense as they use the terms potassium hydroxide and calcium hydroxide. The hydrates, or hydroxides, of the metals are true chemical compounds. The assumption that substances are *chemically* combined with their water of crystallization, while corroborated by many facts, has not yet been brought into harmony with the doctrine of valency (q.v.); but this only indicates that the doctrine of valency needs modification and extension.

HYDRAU'LIC CEMENT. See CEMENT.

HYDRAULIC ELEVATORS. See ELEVATORS.

HYDRAULIC ENGINE. See HYDRAULIC PRESSURE ENGINE.

HYDRAULIC FORGING. See FORGE, FORGING.

HYDRAULIC JACK. See JACK.

HYDRAULIC MACHINERY. See ACCUMULATORS.

HYDRAULIC MINING. See GOLD.

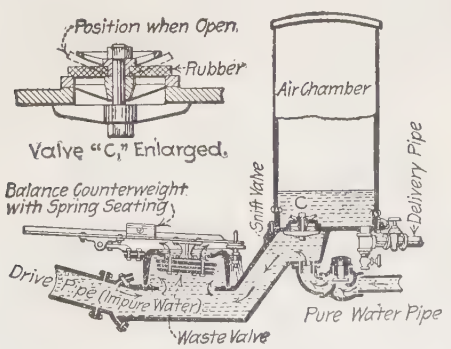
HYDRAULIC PRESS (from Lat. *hydraulicus*, Gk. *ὑδραυλικός, hydraulikos*, pertaining to the water organ, from *ὕδραυλις, hydraulis*, water organ, from *ὕδωρ, hydōr*, water + *αὐλός, aulos*, pipe). An apparatus for obtaining a heavy pressure for compacting fibrous substances, raising heavy weights, etc., by means of water under pressure. The first design of a working hydraulic press is credited to Joseph Bramah, and for this reason such machines are sometimes called Bramah presses. The operation of the hydraulic press is based upon the principle of hydrostatics that a pressure exerted on any part of the surface of a liquid is transmitted undiminished to all parts of the mass and in all directions. Thus, if there is a cylinder filled with water in one end of which works a plunger 1 inch square, and in the other end of which works a plunger 12 inches square, and a pressure of one pound be exerted on the smaller plunger, this pressure will be transmitted undiminished by the water, and will exert a total pressure of $1 \times 12 \times 12 = 144$ pounds.

The essentials of a hydraulic press are, therefore, a cylinder containing a small plunger, to which a force is applied, connected by pipe with a cylinder containing a large plunger, which transmits the multiplied pressure to the object to be pressed or lifted. It is evident, furthermore, that the two cylinders may be located any desired distance apart, the only limit being that at which the pipe and cylinder friction reduces the available pressure for performing work below practicable amounts. In modern practice the pressure pump commonly feeds into a hydraulic accumulator (see ACCUMULATOR), and the press cylinder is operated from the accumulator and not directly from the pump. The construction of hydraulic presses varies with the purposes for which they are employed. Hydraulic presses for baling hay and cotton and expressing the oil from seeds, etc., are built substantially as follows: Four iron pillars are erected at the corners of a horizontal square and carry a cast-iron cap rigidly fastened to their tops. The under face of this cap forms the surface against which the material is pressed. At the bottom of the four pillars there is a similar casting which has a circular hole in the centre down through which passes the cylinder casting for the plunger. The plunger has an upward motion in the act of pressing and carries on its top a head or platen consisting of a square casting. The material to be pressed is placed between the lower face of the top casting and the upper face of the platen. Often a boxing is placed around the four sides of the space in which the head moves to prevent the material being pressed from squeezing out laterally. The construction of a press for hydraulic forging differs from the above as follows: The cylinders and plungers are carried by the top casting or column cap, and the plungers work downward in the act of pressing; the bottom casting carries the anvil; the plungers carry a die for the head; and two or more cylinders are provided for raising the plunger and die for a fresh stroke. Generally, also, two pressure plungers and cylinders are employed instead of one. Forging presses are made of all sizes, from that required in pressing out articles like revolver cartridge cases to those used in forging steamship shafts and armor plates. Armor-plate presses having a capacity of 14,000 tons are in use.

HYDRAULIC-PRESSURE ENGINE. A motor in which water is made to do work by means of its pressure only, acting on a piston or plunger reciprocating in a cylinder, or, in some cases, on a revolving piston similar to those employed in a rotary steam engine. In the case of a turbine the pressure of a column of water is, in the first instance, employed in giving motion to the fluid itself, and after this motion has been produced the energy due to it is utilized in doing work. In the case of the pressure engine the only pressure expended in giving motion to the fluid is that needed to make the water follow the piston and escape from the motor, and to secure efficiency this piston should

be as small as practicable. This end is most nearly secured when the pressure is great and the speed of the engine is low. The first pressure engine was designed by Sir William Armstrong (q.v.) and was of the rotary type. This engine was never actually used and was replaced by a reciprocating engine designed by the same engineer. Since Sir William Armstrong's invention a great variety of hydraulic-pressure engines have been invented, the majority of which are of the reciprocating type. Hydraulic-pressure engines are particularly adapted to the use of high-pressure water in comparatively small quantities, and where these conditions prevail they have a considerable field of usefulness, particularly as secondary motors for operating mechanical contrivances, such as the opening machinery for swing bridges, cranes, hoists, etc. Consult: G. R. Bodmer, *Hydraulic Motors, Turbines, and Pressure Engines* (3d ed., New York, 1889); I. P. Church, *Hydraulic Motors with Related Subjects* (ib., 1905); Turneaure and Black, *Hydraulic Engineering* (Chicago, 1908). See TURBINE; WATER POWER; WATER WHEEL.

HYDRAULIC RAM. Primarily a device by which the momentum of water flowing by gravity in a pipe is utilized to lift a portion of itself through another pipe to an elevation greater than the source of supply. The flow of water in the main or drive pipe is automatically checked by the closing of a valve at its foot. When the valve is open, the water escapes freely and flows to waste, but very soon a sufficient momentum is attained to close the valve. The confined water then lifts another valve, opening



HYDRAULIC RAM.

into an air chamber mounted over the foot of the drivepipe. The water partially fills this chamber and in so doing compresses the air therein until the pressure in the chamber just balances that of the column of water in the drivepipe. The valve at the foot of the drivepipe then opens, and the process is repeated. The pressure of the compressed air in the air chamber forces the water in the bottom of the chamber out through a small supply pipe to the desired elevation. A snifting valve is provided to supply air to the chambers to make good the losses due to absorption of air by the water. Theoretically 100 gallons of water falling 15 feet would raise 15 gallons 100 feet, and other quantities and heights in like proportion; but some water is wasted during each cycle, and there is more or less friction to be overcome, depending on the design of the ram and the length and diameter of the pipes. An efficiency of 75 per cent would be high. With the increase in the ratio of the fall of the driving water to the elevation to be overcome, the efficiency decreases, particularly when the ratio exceeds 1 to 12 (i.e., 1 foot fall for 12 feet raised). Where the fall is great, the wear and tear on the ram is excessive. Some authorities give the desirable working limit for a hydraulic ram as 1½ to 10 feet fall of drive water and a lift of not over 250 feet, but with so great a lift a large proportion of the water will be wasted. The ram, as described, was invented by Joseph Michael de Montgolfier, of France in 1796; but in 1772 an Englishman named John Whitehurst built a machine embodying the same principle, except that the valve at the foot of the drivepipe had to be closed by hand. His device was described in the *Philosophical Transactions* for 1775. Many improvements have been made in the machine of Montgolfier, the most important of which, perhaps, aim to lessen the shock of the operation of the valves. Springs have been used to that end; the drivepipe valve has been counterweighted, and a portion of the air compressed in the chamber has been used to drive a small air motor, so connected as to aid in the gentle closing of the valve at each cycle. Another improvement is the equipment of rams so that a supply of dirty water may be used to lift clean water, either when the supply of the latter is scanty or is not available under a sufficient head. Finally, hydraulic rams are used to drive pumps, when they are properly classed under pumping engines. See PUMPS AND PUMPING MACHINERY.

HYDRAU'LICS. See HYDRODYNAMICS; HYDROSTATICS.

HY'DRAZINE, or AMIDOGEN, $H_2N = NH_2$. A basic compound of nitrogen and hydrogen, which may be obtained by heating triazo-acetic acid with water. In 1909 Chattaway obtained it from dichloro-urea, which, in turn, may be readily prepared by the action of chlorine upon urea in aqueous solution at low temperatures. Hydrazine hydrate, $N_2H_4H_2O$, is a strong reducing agent precipitating metallic silver and platinum from solutions of their salts. Under a pressure of 740 millimeters it boils at 118.5° C. (245.3° F.). It attacks rubber, cork, and even glass. With acids it forms crystalline salts, such as the hydrochlorides, $N_2H_4.HCl$, and N_2H_42HCl, the sulphate, $N_2H_4.H_2SO_4$, etc. The hydrogen of hydrazine may be partly replaced by either hydrocarbon groups, such as methyl (CH_3), ethyl (C_2H_5), phenyl (C_6H_5), etc., or organic acid radicals, such as acetyl (CH_3CO), benzoyl (C_6H_5CO), etc. The most important of these organic derivatives of hydrazine is phenylhydrazine, $C_6H_5HN = NH_2$. It is prepared by dissolving aniline in strong hydrochloric acid, adding (in the cold) an aqueous solution of sodium nitrite, then further adding a solution of stannous chloride in concentrated hydrochloric acid, allowing to stand for some time, and filtering off the solid phenylhydrazine hydrochloride formed; phenylhydrazine itself is freed from this salt by treatment with caustic potash, extraction with ether, and distillation under reduced pressure. The benzoyl compounds include benzoyl-hydrazine, $C_6H_5CO.HN = NH_2$, and symmetrical dibenzoyl-hydrazine, $C_6H_5CO.HN = NH.COC_6H_5$. The presence of hydrazine in aqueous solutions may be readily detected by the use of a few drops of benzaldehyde, with which it forms a yellow crystalline precipitate of benzalazine, $C_6H_5CH.N = NH_2$. Compounds of simi-

lar constitution are formed by the action of hydrazine on other aldehydes. In general the oxygen of the carbonyl group (CO) of an aldehyde or a ketone combines with two hydrogen atoms of many hydrazine derivatives, forming water, while the remaining parts of the reacting substances form what are known as *hydrazones*. For instance, ordinary glucose (an aldehyde) and phenylhydrazine give phenylhydrazone. See DIAZO COMPOUNDS.

HY'DRAZONE. See HYDRAZINE.

HYDRIA, hī'drī-ȧ *or* hĭd'rī-ȧ. See VASE.

HY'DRIDE. A name applied, in chemistry, to the compounds of the metals with hydrogen. Notable hydrides are those of palladium, sodium, potassium, calcium, strontium, barium, and magnesium. The hydrides have, at least as yet, no practical value. The term "hydride" was formerly employed in connection with certain hydrocarbons. See HYDROGEN; CALCIUM; ETC.

HY'DRIOD'IC ACID (from *hydr*-ogen + *iod*-ine), HI. An acid compound of hydrogen and iodine, analogous to hydrochloric acid. It may be prepared by the action of phosphoric acid on potassium iodide. More usually it is made by the action of water upon a mixture of iodine and red phosphorus. A pure aqueous solution of hydriodic acid may best be prepared by dissolving a quantity of iodine in carbon disulphide, covering the solution with a layer of water, and introducing a stream of sulphureted hydrogen gas. When the iodine is entirely transformed into hydriodic acid, the aqueous layer is removed and boiled for a few minutes to remove the excess of sulphureted hydrogen. In the presence of catalytic agents, particularly platinum black, hydrogen and iodine unite into hydriodic acid gas directly, and at higher temperatures even the catalytic agent is not necessary, the union of the elements proceeding rapidly enough without it. However, whether a catalyzer is present or not, the union of hydrogen and iodine is never complete, a state of chemical equilibrium being established when a certain proportion of the elements has entered into combination. (See REACTION, CHEMICAL.) In its isolated state hydriodic acid is a colorless gas with an odor resembling that of hydrochloric acid. Usually it is kept in aqueous solution and is thus employed in a number of chemical processes. It decomposes somewhat easily into its components, hydrogen and iodine, and by giving up its hydrogen acts as a reducing agent. The salts of hydriodic acid are termed *iodides* (q.v.). Hydriodic acid is sometimes used medicinally instead of its salts.

HY'DRIOTAPH'IA, or URN BURIAL. A quasi-scientific, quasi-religious treatise by Sir Thomas Browne (1658). Its explanatory subtitle is *A Discourse of the Sepulchral Urns Lately Found in Norfolk.*

HYDROAËROPLANE, hī'drō-ā'ĕr-ō-plān. See AËRONAUTICS.

HY'DROBRO'MIC ACID (from *hydro*-gen + *brom*-ine), HBr. An acid compound of hydrogen and bromine, analogous to hydrochloric acid. It may be prepared by the action of bromine upon red phosphorus placed in water; or by covering a mass of bromine with a layer of water and passing a stream of sulphur dioxide into the aqueous layer; when the bromine has disappeared, the aqueous solution is purified by distillation. In the practice of the organic laboratory hydrobromic acid is obtained as a by-product in the bromination of aromatic hydrocarbons; e.g., in making bromobenzene by the action of bromine upon benzene in the presence of iron or some similar catalyzer. In the isolated state it is a colorless gas with an odor resembling that of hydrochloric acid. Like the latter, it is very soluble in water, the solution being sometimes used in synthetic chemistry. The salts of hydrobromic acid are termed *bromides* (q.v.).

HY'DROCAR'BONS (from *hydro*-gen + *carbon*). A class of chemical compounds containing only carbon and hydrogen. Their commercial value is very considerable, inasmuch as they form the principal ingredients of petroleum, illuminating gas, caoutchouc, gutta percha, essence of turpentine, etc. They are the simplest of the compounds of carbon, and the fundamental ideas of organic chemistry have been derived largely from a careful study of their properties and reactions. They are obtained when various organic substances are subjected to a process of destructive distillation and are subdivided principally into *aliphatic,* or fatty, *aromatic,* and *hydroaromatic* hydrocarbons.

Fatty Hydrocarbons. These form an important class and are subdivided into the paraffin, olefin, and acetylene series.

1. *The Paraffins,* or saturated hydrocarbons of the methane series, are very stable compounds and do not react even with the strongest acids and alkalies; hence their name, "paraffins," derived from the Latin *parum affinis,* which means 'having little affinity.' Large quantities of them occur in nature as petroleum, natural gas, ozokerite, etc. They are also obtained by the destructive distillation of coal, cannel, shale, etc. When they are arranged in the order of their molecular weights, the following "homologous series" is obtained:

Methane,	CH_4,	molecular weight 16.
Ethane,	C_2H_6,	molecular weight 30.
Propane,	C_3H_8,	molecular weight 44.
Butanes,	C_4H_{10},	molecular weight 58.
Pentanes,	C_5H_{12},	molecular weight 72.
Hexanes,	C_6H_{14},	molecular weight 86.
Heptanes,	C_7H_{16},	molecular weight 100, etc.

The difference in molecular weight between any two consecutive members of the series is evidently the same. It amounts to 14, the sum of the "weights" of one carbon atom (which is 12) and two hydrogen atoms (which is 2). To obtain the formula of any member, we may substitute a methyl group, CH_3, in place of a hydrogen atom in the member immediately preceding it. Thus, by substituting CH_3 in place of one H in ethane, C_2H_6, we get propane, $C_2H_5CH_3$ or C_3H_8. The transformation of ethane into propane may be actually effected as follows: First, mono-iodo-ethane (C_2H_5I) is obtained by substituting one iodine atom in lieu of one atom of hydrogen in ethane (C_2H_6); then mono-iodo-ethane is treated with methyl iodide (CH_3I) and metallic sodium. The iodine is thus all removed, and the remaining C_2H_5 group unites with the CH_3 group to form the compound propane ($C_2H_5CH_3$ or C_3H_8).

The first four members of the above homologous series are liquefiable gases, and each member is more easily liquefied than the one preceding it; the next 11 members are ordinarily liquids, each having a higher *boiling point* than the one preceding it; finally, the higher members are ordinarily solids, each having a higher *melting point* than the one preceding it. The

lower members burn with a pale, scarcely luminous flame; the higher members give a bright light, and paraffin wax, which is a mixture of solid paraffin hydrocarbons, is used for the manufacture of candles. The paraffins are all colorless, chemically inert, and insoluble in water.

The composition of any single paraffin hydrocarbon is expressed, of course, by its own molecular formula. Thus, the formula C_2H_6 shows the chemical composition of ethane; the formula C_3H_8 shows the composition of propane; etc. On the other hand, the composition of the paraffin hydrocarbons in general is expressed by a *typical formula*, in which algebraic symbols stand for the numbers of atoms of the component elements. This typical (general) formula is C_nH_{2n+2}. The formula permits us to calculate the number of hydrogen atoms in any one of the members of the above homologous series, if the number of its carbon atoms is given. Thus, if $n = 1$, then $2n + 2 = 4$, and C_nH_{2n+2} becomes CH_4 (the formula of methane). The highest member of the series that is actually known to chemists contains 60 carbon atoms, and hence, the typical formula tells us, the number of hydrogen atoms in the molecule of that hydrocarbon (called *hexacontane*) is $2n + 2 = 2 \times 60 + 2 = 122$, and its molecular formula is therefore $C_{60}H_{122}$. It is a well-known fact that compounds exist which have the same chemical composition and yet differ in their physical and chemical properties. Such compounds are termed isomeric, and their mutual relations are explained on the assumption that the atoms in their molecules, though the same in kind and number, are differently *grouped*. In the above homologous series the first three members have no such isomers, i.e., only one variety of each could be obtained; the fourth member, butane, has two isomers (called butane and isobutane); the fifth member, pentane, has three isomers; the sixth, hexane, has five isomers; etc. The higher the molecular weight, the greater the number of isomeric formulas which could be constructed according to the structural theory. Not all of these theoretically possible hydrocarbons have been actually prepared in the laboratory. Most of them have no practical value and are interesting only inasmuch as they go to prove the validity of the "structural theory" of compounds; but the number of cases of isomerism in which the theory has been found to hold true is so great that chemists are no longer desirous of obtaining new proofs by artificially producing all of the possible isomeric compounds. See CARBON COMPOUNDS.

2. *The Olefins*, or hydrocarbons of the ethylene series, have the characteristic property of directly taking on bromine and other elements to form *additive* products. This shows that the combining capacity of the carbon contained in them is not completely satisfied by their hydrogen; so they are said to be "unsaturated compounds."

When arranged in order of their molecular weights, they form the following homologous series:

Ethylene, C_2H_4, molecular weight 28.
Propylene, C_3H_6, molecular weight 42.
Butylenes, C_4H_8, molecular weight 56.
Amylenes, C_5H_{10}, molecular weight 70.
Hexylenes, C_6H_{12}, molecular weight 84, etc.

In this series, again, each member contains one carbon and two hydrogen atoms more than the member immediately preceding it; i.e., the difference in molecular weight between any two consecutive members of the series amounts to 14. Here, too, as in the paraffin series, a certain regularity is found in the variation of the physical properties of the compounds on passing up the series. The first four members are gases, and each one is more easily liquefied than the one preceding it. Hexylene and the following 13 members are liquids, each one boiling at a higher temperature than the one preceding it. The higher members are solids, and each one has a higher melting temperature than the one preceding it. The olefins are colorless and insoluble in water. They contain a high percentage of carbon and burn with a luminous flame.

The composition of *all* the olefins is expressed by the typical formula of the series, C_nH_{2n}. The ratio of the numbers of hydrogen and carbon atoms is the same throughout the series, showing that the different members of the series have all the same percentage composition. They are, however, not isomeric, in the ordinary sense of the term; for their molecules evidently contain different numbers of atoms. Thus, ethylene (C_2H_4) contains two carbons and four hydrogens; propylene (C_3H_6), three carbons and six hydrogens; etc. But, beginning with butylene, each single member represents several compounds which must be considered as isomeric, since they have precisely the same molecular composition and yet differ in their properties. The structural theory lets us foresee the existence of three isomeric butylenes, five amylenes, 13 hexylenes, etc. Again, as in the paraffin series, the higher the molecular weight, the greater the number of isomers possible, according to both theory and experience.

Hydrogen, particularly in the presence of a catalyzer, like platinum black, adds itself to the olefins (unsaturated), yielding hydrocarbons of the paraffin series (saturated).

Another interesting group of unsaturated hydrocarbons have come into prominence in recent years. The best-known examples of these are triphenylmethyl and tribiphenylmethyl. In these the atom of carbon is not quadrivalent, as usual, but *trivalent*. See VALENCY.

3. *The Acetylene Hydrocarbons*, when arranged in the order of their molecular weights, form the following homologous series:

Acetylene, C_2H_2, molecular weight 26.
Allylene, C_3H_4, molecular weight 40.
Crotonylene, C_4H_6, molecular weight 54, etc.

Like any other homologous series, the acetylene series presents a certain amount of regularity in the variation of the physical properties of the compounds with increase of their molecular weight.

The acetylenes are unsaturated; in fact, they are *doubly* unsaturated compounds (see ACETYLENE), as is shown by their capacity for taking on bromine and other elements to form additive products. The acetylene hydrocarbons burn with a very smoky flame, unless by some method enough oxygen is supplied to burn up completely the large amount of carbon they contain. The general formula of the series is C_nH_{2n-2}. Nascent hydrogen adds itself to the acetylene hydrocarbons, yielding still unsaturated hydrocarbons of the ethylene series.

Aromatic Hydrocarbons. The principal groups into which these hydrocarbons are subdivided include the *Benzene series*, the *Naphthalene series*, and the *Anthracene series*. The

typical formulas representing these three series are, respectively, C_nH_{2n-6}, C_nH_{2n-12}, and C_nH_{2n-18}. Other hydrocarbons, not included in these series, are represented by the formulas C_nH_{2n-8}, C_nH_{2n-16}, C_nH_{2n-22}, etc.; but these are not important enough to be discussed here. The most important members of the benzene series are benzene (C_6H_6), toluene (C_7H_8), and xylene (C_8H_{10}). The most important substance of the naphthalene series is naphthalene itself ($C_{10}H_8$); that of the anthracene series, anthracene ($C_{14}H_{10}$). All these are described in special articles. Suffice it to mention here that the chief source of aromatic hydrocarbons is the coal tar (q.v.) obtained as a by-product in the manufacture of coal gas, and that it is principally from these hydrocarbons that innumerable artificial dyestuffs, drugs, etc., are now made on an industrial scale.

Hydroaromatic Hydrocarbons. These bear the same relation to the aromatic hydrocarbons as the paraffins bear to the olefins (see above); in other words, they may be considered as derived from the aromatic hydrocarbons by the addition of hydrogen. As a matter of fact, they are in most cases most readily prepared by treating the corresponding aromatic hydrocarbons with hydrogen gas in the presence of finely divided metallic nickel, a catalyzer introduced by Sabatier and Senderens. They are mobile, colorless liquids, volatile, and having an odor resembling that of printer's benzine on the one hand and that of camphor or peppermint oil on the other hand. They are much more stable than the aromatic hydrocarbons and are altogether similar to the fatty hydrocarbons in chemical behavior. Thus, strong nitric acid has no effect on them under conditions where an aromatic hydrocarbon would be readily nitrated. On the other hand, *dilute* nitric acid attacks them, according to Konovaloff, at the boiling temperature of water. One of the best-known members of the series is cyclohexane, or hexahydrobenzene, C_6H_{12}. The derivatives of the hydroaromatic hydrocarbons include such important substances as the terpenes (q.v.) and the camphors.

The hydrocarbons should not be confounded with the carbohydrates, like sugar, starch, or cellulose, which contain, besides carbon and hydrogen, also oxygen. See CARBON COMPOUNDS; GRIGNARD REACTION; VALENCY.

HY'DROCELE (Lat., from Gk. *ὑδρωκήλη, hydrōkēlē,* from *ὕδωρ, hydōr,* water + *κήλη, kēlē,* tumor). The medical term for dropsy of the tunica vaginalis, a serous membrane or sac investing the testes. Hydrocele occurs as a smooth, pear-shaped swelling, fluctuating when pressed, devoid of pain or tenderness, but sometimes causing a slight uneasiness from its weight. The quantity of serous fluid in the sac is usually from 6 to 20 ounces, but it occasionally exceeds 100 ounces. Hydrocele may occur as a result of acute inflammation, but it most commonly comes on without any apparent local cause. It is most frequently met with about or beyond the middle period of life, and generally in persons of feeble power or with a tendency to gout; sometimes, however, it occurs in young children, either in the same form as in adults, or as what is termed *congenital hydrocele,* when the communication between the tunica vaginalis and the abdominal peritoneum is not obliterated, as it normally should be. Palliative treatment consists in the use of suspensory bandages, strapping, and tapping with a fine trocar. Tapping seldom gives more than temporary relief, the swelling usually regaining its former bulk in three or four months. A cure is sometimes effected after tapping by the injecting of irritating substances, such as tincture of iodine and carbolic acid. The only certain method of cure, however, consists in excision of the tunica vaginalis.

HY'DROCEPH'ALUS (Neo-Lat., from Gk. *ὑδροκέφαλον, hydrokephalon,* water in the head, from *ὕδωρ, hydōr,* water + *κεφαλή, kephalē,* head). A collection of serous fluid in the cranium. If it is within the ventricles of the brain, the condition is known as *internal hydrocephalus;* if beneath the arachnoid membrane, *external hydrocephalus.* The disease may be *primary,* being then usually tuberculous in origin, or it may follow some other disease, in which case it is termed *secondary.* Three types—the *acute,* the *chronic,* and the *congenital*—are described. Hydrocephalus may occur in children or in adults as a secondary lesion resulting from meningitis. In such cases, the bones of the skull having united, there is much less opportunity for distention.

Acute Hydrocephalus. This is usually a sudden disease, marked by an acute collection of fluid within the skull, internal or external to the brain ventricles. It may be primary or secondary to such diseases as whooping cough, heart disease, rachitis, tumors within the skull cavity, or acute fevers, such as pneumonia or typhoid. The symptoms are various, much depending on its cause. The most characteristic symptoms are those due to the pressure on the brain. In addition to the enlargement of the head there may be much restlessness, inability to sleep, nausea and vomiting, paralysis or convulsions. The pupils are apt to be unequal and sluggish. In the severer cases pressure upon the brain causes death. See MENINGITIS.

Chronic Hydrocephalus. This may follow an acute attack, or the disease may begin very insidiously. The symptoms again are those due to pressure. The fontanels in the skull are apt to bulge, the eyeballs protrude somewhat, the blood vessels on the outside of the head are apt to be swollen and prominent. Headache is common. A peculiar sidewise shifting movement of the eye, termed nystagmus, is very constant, and crossed eyes are not uncommon. There is usually much restlessness, and if the patients live they are apt to be dull mentally or idiotic. Some of these patients live to middle age, but most of them die young. The treatment requires the greatest medical and surgical skill.

Congenital Hydrocephalus. The distention may be so slight at birth as to be scarcely evident, or the distention may be considerable or so advanced as to preclude the birth of a living child. After birth the progress of the disease may be gradual or rapid. The lateral ventricles usually show the greatest distention, although all the ventricles may be involved as well as the central canal of the cord. The condition of the brain tissue depends entirely upon the amount of pressure. It may be little different from normal, or the convolutions may be flattened, or the hemispheres may be reduced to a thin layer under the dura mater. The brain tissue itself is apt to be soft and flabby, and the base of the brain is usually less affected than the hemispheres. The openings between the bones of the skull are large in size, the bones thin and tend-

ing to bulge forward, making the forehead prominent.

A few rare cases of spontaneous cure of hydrocephalus have been reported, following the accidental discharge of the cerebrospinal fluid. Surgical measures are occasionally successful in arresting or curing the affection. In young children having internal hydrocephalus a fine aspirating needle may be thrust through the coronal suture into one of the ventricles, and the cerebrospinal fluid evacuated. The latest surgical procedure is to trephine at the vertex of the skull and insert a specially devised trocar between the hemispheres of the brain, through the corpus callosum and so into the lateral ventricle. By this method a free communication is established between the internal and external cerebrospinal cavities, and pressure equalized.

HY'DROCHAR'ITA'CEÆ. A family of aquatic monocotyledonous plants. It is known as the "frog's bit" family and includes not only the frog's bit (*Limnobium*), but also "water weed" (*Elodea*) and "tape grass," or "eel grass" (*Vallisneria*, q.v.).

HY'DROCHLO'RIC ACID (from *hydro*-gen + *chlor*-ine), or Muriatic Acid, HCl. A gaseous compound of hydrogen and chlorine, the aqueous solution of which is extensively used in the arts. It was known to the alchemists, who refer to it as *spiritus salis;* Glauber isolated it in the form of a pure aqueous solution about the middle of the seventeenth century by treating common salt with sulphuric acid. Priestley obtained it in the gaseous state and called it *marine acid air.* Lavoisier introduced the view that all acids necessarily contain oxygen, and hence hydrochloric acid was for years believed to contain oxygen. About 1810 Davy had established the elementary nature of chlorine, and hence the true nature of its hydrogen compound—hydrochloric acid; and within 10 years the correctness of his results became generally recognized. (See Chemistry.) Hydrochloric acid occurs in the exhalations from active volcanoes, especially from Vesuvius and the fumaroles of Hecla. It is also a constituent of the waters of certain South American rivers that have their source in the volcanic districts of the Andes. Also it is a constituent of the gastric juices of man and animals and plays an important part in the digestive process. When sodium chloride (common salt) is decomposed by heating with sulphuric acid, as in the Le Blanc process for making soda, sodium sulphate ("salt cake") remains behind, while gaseous hydrochloric acid is evolved. The acid was formerly allowed to pass off into the air, and naturally had an injurious effect on vegetation in the vicinity of the manufacturing establishments. At present the acid vapors are carefully collected, and hydrochloric acid constitutes an important by-product of the manufacture of soda.

Hydrochloric acid is a colorless gas with a pungent odor and taste, and fuming strongly in the air. It is extremely soluble in water. On the application of pressure and cold the gas can be condensed to a colorless liquid; but the commercial product is usually dissolved in water. It is the strongest acid known, and accordingly its aqueous solution is an excellent conductor of electricity. The commercial acid is generally colored by the presence of some iron; it also usually contains arsenic and sulphuric acid, from all of which impurities it may be freed by distillation. The acid is used in preparing the chlorides of various metals, for extracting phosphates from bones, in dyeing and tissue printing, and in the manufacture of coal-tar colors. For works on hydrochloric acid, consult the various books on the manufacture of soda.

Chlorides. The salts of hydrochloric acid are termed chlorides. By far the most important of these is the chloride of sodium, or common salt, which is described in a special article. Very similar to it is the chloride of potassium, KCl, which occurs extensively (combined with magnesium chloride) in the mineral carnallite, at Stassfurt in Germany, and in smaller quantities in sea water. It is manufactured from carnallite and is purified by recrystallization from water. The chloride of aluminium, Al_2Cl_6, is obtained by treating aluminium oxide with charcoal in a current of chlorine, or by passing a stream of chlorine gas over heated metallic aluminium. It is readily soluble in water, alcohol, and ether, but in aqueous solution it is hydrolyzed to a considerable extent, and the free hydrochloric acid in its solution may be driven off, leaving behind aluminium hydroxide. Aluminium chloride is largely used in organic chemistry in the so-called Friedel and Crafts reaction. See Friedel. For other chlorides, see Barium; Calomel; Gold; Manganese; Mercuric Chloride; Sal Ammoniac. See also Bleaching Powder.

HY'DROCOR'ALLI'NA (Neo-Lat., from Lat. *hydra,* water snake + *corallinus,* coral red, from *coralium,* coral). An order of Hydromedusæ, including the important Paleozoic family Stromatoporidæ. See Cœlenterata; Hydrozoa.

HY'DROCYAN'IC ACID (from *hydro*-gen + *cyan*-ogen), HCN. A chemical compound, often called *prussic acid* from its having been first obtained by Scheele in 1782 from the substance known as Prussian or Berlin blue. Hydrocyanic acid is of equal interest to the chemist, the physician, and the toxicologist. The pure anhydrous acid is a limpid volatile liquid of a strong, penetrating odor resembling that of peach blossoms or oil of bitter almonds. At low temperatures it solidifies to a crystalline mass that melts at −15° C.; at 18° C. it has a specific gravity of 0.697, and it boils at 26° C. (78.8° F.). Its volatility is so great that if a drop be allowed to fall on a piece of glass part of the acid becomes frozen through the cold produced by its own evaporation. It burns with a pale-blue flame, reddens litmus paper slightly (its acid properties being feeble), and is very soluble in water and in alcohol. In the anhydrous state it is not affected either by the action of air or by that of light. In the presence of moisture, however, it is decomposed, with formation of a brown substance known as azulmic acid. If its aqueous solution is exposed to light, decomposition rapidly takes place, with formation of a number of different substances, including ammonia, formic and oxalic acids, etc.

Hydrocyanic acid is made by heating yellow prussiate of potash (potassium ferrocyanide) with dilute sulphuric acid, the reaction taking place according to the following chemical equation:

$$\underset{\text{Potassium ferrocyanide}}{2K_4Fe(CN)_6} + \underset{\text{Sulphuric acid}}{3H_2SO_4} = \underset{\text{Hydrocyanic acid}}{6HCN} + \underset{\text{Potassium-iron ferrocyanide}}{FeK_2Fe(CN)_6} + \underset{\text{Potassium sulphate}}{3K_2SO_4}$$

In this manner a more or less dilute solution of hydrocyanic acid is obtained, and by fractional distillation and drying over calcium chloride the anhydrous acid may be prepared. An aqueous solution of hydrocyanic acid may also be obtained by shaking silver cyanide with dilute hydrochloric acid. Hydrocyanic acid occurs, both free and in combination, in various plants, and it is readily produced by macerating bitter almonds or cherry kernels with water. Bitter almonds, as well as many other vegetable products, contain a glucoside called *amygdalin* and a peculiar unorganized ferment, or enzyme, called *emulsin*. When brought into contact with water, the amygdalin is acted on by the emulsin, hydrocyanic acid being formed along with other substances, according to the following equation:

$$\underset{\text{Amygdalin}}{C_{20}H_{27}NO_{11}} + 2H_2O = \underset{\text{Hydrocyanic acid}}{HCN} + \underset{\text{Benzaldehyde}}{C_7H_6O} + \underset{\text{Glucose}}{2C_6H_{12}O_6}$$

The dilute acid of the United States Pharmacopœia contains 2 per cent by weight of anhydrous hydrocyanic acid; while what is known as "Scheele's Prussic Acid" contains from 4 to 5 per cent of the absolute acid. The presence of hydrocyanic acid in solutions may be best proved by one of the following methods:

1. To the solution in which the presence of hydrocyanic acid is suspected, caustic potash is added to strongly alkaline reaction, then a few drops of ferrous sulphate are added, and heat is applied; the solution is now acidified with hydrochloric acid, and some ferric chloride is added. If hydrocyanic acid was present in the original solution, a precipitate of Prussian blue, or at least a blue coloration, is produced.

2. A few drops of ammonium sulphide are added to the suspected liquid, and the mixture is evaporated on the water bath; the dry residue is moistened with ferric chloride, when, if hydrocyanic acid was present in the original solution, an intense red coloration is produced.

The quantity of hydrocyanic acid in a solution may be determined by adding to the latter a solution of silver nitrate, separating the precipitated cyanide of silver by filtration, washing, drying, and weighing. The amount of hydrocyanic acid may be readily calculated from the weight of silver cyanide found.

We are indebted to the Italians for the introduction of hydrocyanic acid in the materia medica. There are no cases in which it is so serviceable as in those affections of the stomach in which pain is a leading symptom, as in gastrodynia, water brash, and in cases of intense vomiting. It is also useful in allaying spasmodic cough and has been employed with advantage in chronic skin diseases, to allay pain and irritation, no matter what the cause. A mixture of one part of the dilute acid (of 2 per cent strength) with about 48 parts of water forms a good lotion.

Hydrocyanic acid is one of the most energetic poisons known. A single drop of the pure acid causes instant death if placed inside the eye. When a small poisonous dose (about half a dram of the 2 per cent acid) has been taken, the first symptoms are weight and pain in the head, with confusion of thought, giddiness, nausea (and sometimes vomiting), a quick pulse, and loss of muscular power. If death result, this is preceded by tetanic spasms and involuntary evacuations. When a large dose has been taken (as from half an ounce to an ounce of the 2 per cent acid), the symptoms may commence instantaneously, and it is seldom that their appearance is delayed beyond one or two minutes. The patient is insensible; his eyes are fixed, the pupils are dilated and unaffected by light; the limbs are flaccid, and the skin is cold and clammy; the respiration is slow and convulsive, and the pulse is imperceptible.

Hydrocyanic acid causes paralysis of the heart, of the respiratory centre, and of the vasomotor centre in the medulla. The spinal cord, too, is paralyzed shortly before death. The immediate cause of death is in most cases obstruction of the respiration; but in some cases it lies in stoppage of the heart's action.

Where the fatal action is so rapid, antidotes are of comparatively little value. Chlorine, ammonia, peroxide of hydrogen, cold affusion, and artificial respiration are the most important agents in the treatment. Cold affusion on the head, neck, and down the spine is a valuable remedy, and it is asserted that its efficacy is almost certain when it is employed before the convulsive stage of poisoning is over, and that it is often successful even in the stages of insensibility and paralysis. One-fiftieth grain of atropine should be injected subcutaneously. Artificial respiration should never be omitted.

Among the compounds of hydrocyanic acid may be mentioned the cyanides of potassium and mercury. The more important ferrocyanides and ferricyanides are described in the articles on hydroferrocyanic and hydroferricyanic acids (qq.v.).

Potassium cyanide is an extremely poisonous white crystalline substance, soluble in water, but insoluble in absolute alcohol. It may be melted without undergoing chemical decomposition; its aqueous solutions, however, readily decompose on boiling. It is made on a large scale by heating yellow prussiate of potash (potassium ferrocyanide), the decomposition of the latter taking place according to the following equation:

$$\underset{\text{Potassium ferrocyanide}}{K_4Fe(CN)_6} = \underset{\text{Potassium cyanide}}{4KCN} + \underset{\text{Iron carbide}}{FeC_2} + N_2$$

The cyanide is separated from the carbide of iron formed along with it, by filtering through hot porous crucibles. Potassium cyanide is largely employed in extracting gold and in electroplating. In the molten state it acts as a powerful reducing agent, readily setting free metals from their oxides; e.g., lead oxide is reduced by it according to the following equation:

$$PbO + KCN = Pb + KCNO$$

A double cyanide of potassium and sodium, $K_2Na(CN)_3$, is made by melting potassium ferrocyanide with metallic sodium and, after cooling, extracting the product with water and evaporating the aqueous solution.

Mercuric cyanide, $Hg(CN)_2$, may be obtained by heating potassium ferrocyanide with mercuric sulphate in water, or by dissolving mercuric oxide in aqueous hydrocyanic acid. It is a colorless substance of a bitter metallic taste and is moderately soluble in water and in alcohol. When heated, it decomposes into metallic mercury and cyanogen gas. It is very poisonous, but is, in highly dilute solution, sometimes useful in syphilis and in diphtheria.

HYDRODICTYON, hī′drō-dīk′tĭ-ŏn. A genus of green algæ (Chlorophyceæ, q.v.), whose species are called "water nets." The hollow

"net" constitutes one of the most remarkable of plant colonies, floating freely, and sometimes attaining a length of a foot or more. It is formed by an end-to-end union of long cylindrical cells (each of which is an independent one-celled plant) in such a way as to form polygonal meshes, three or four cells abutting at each junction.

HY'DRODYNAM'ICS (from Gk. *ὕδωρ, hydōr*, water + *δύναμις, dynamis*, power, from *δύνασθαι, dynasthai*, to be able). Strictly speaking, that branch of mechanics which is the application of dynamics to liquids; it should therefore include both the statics and the kinetics of liquids, i.e., a study of their properties both when they are in equilibrium and when not. In general, however, the former phenomena are treated separately under hydrostatics (q.v.), leaving for hydrodynamics simply the phenomena of kinetics. Further, although gases are easily compressed, while liquids are not, yet, if a gas is flowing slowly and without great fluctuations, it will have properties closely resembling those of a flowing liquid. Consequently hydrodynamics also includes most of the phenomena of the kinetics of gases. If a liquid is flowing regularly through a tube of an irregular cross section, or if a gas is flowing slowly and regularly through such a tube, the mass of the fluid which passes each point in the tube in a given time must be the same; otherwise there would be a state of compression or rarefaction somewhere in the tube; it follows, then, that where the tube is narrow the velocity must be large, and conversely, like a river flowing first through a lake and then through a narrow channel. If the velocity at any point in the tube is greater than at another, it shows that there must be a force acting in the direction from the second point towards the first, so as to increase the velocity of the moving fluid; but the force must always be produced by a *fall* in pressure, and so the pressure at the second point is greater than at the first. It follows, then, that in a fluid flowing *in a steady state* where the velocity is small the pressure is large, and conversely *if friction is supposed to be excluded.* This general principle is illustrated by the "ball nozzle," the injector of a boiler, the common atomizer, the "ball in the fountain" experiment, and many others. If a fluid is flowing through a long pipe, e.g., water or gas in city mains, there is of course always a great amount of friction between the moving fluid and the layer that sticks to the tube. Owing to this, the pressure decreases along the pipe, and the velocity of flow is decreased also.

If an opening is made in the side of a vessel containing a liquid, the latter will make a jet out into air. If the opening is a small one in a *thin* wall, it may be observed that the cross section of the jet a short distance from the wall is less than that of the opening itself: this place of smallest cross section is called the "vena contracta." If a quantity of liquid of mass m escapes, having a velocity v, its kinetic energy is $\frac{1}{2}mv^2$. This energy is evidently due to the fact that the effect inside the vessel is just as if these m grams had been taken off from the free surface; and so, if the centre of the opening is at a depth h below the free surface, the m grams have lost an amount of potential energy mgh. Therefore

$$mgh = \tfrac{1}{2}mv^2, \text{ or } v^2 = 2gh.$$

This value of the velocity of efflux was first deduced by Torricelli, the pupil of Galileo. This theorem may be stated in a slightly different way. The liquid is forced out owing to a difference of pressure on the two sides of the opening equal to ρgh. (See HYDROSTATICS.) Calling this difference of pressure P, the formula for v^2 becomes

$$v^2 = 2\frac{P}{\rho}.$$

In this form it may be applied to the rate of escape of a gas from a vessel through a small opening in a thin wall. It is seen that the square of the velocity of efflux varies inversely as the density of the gas and directly as the pressure forcing the gas out, i.e., as the difference of the *partial* pressures of that particular gas on the two sides of the opening, regardless of what other gases are present or what their pressures are. (See EFFUSION.) If the escape of the fluid takes place through a thick wall or through a tube, the phenomena are entirely different, owing to friction. It is observed that the rate of escape is independent—within certain limits—of the material of the tube, showing that there is a layer of the fluid adhering to the inner walls of the tube, thus forming a tube of the fluid through which the flow takes place. The following formula has been found by experiment to hold approximately for capillary tubes:

$$v = \frac{Pr^2}{6\eta l},$$

where r is the internal radius of the tube, l is its length, and η is a constant.

If an obstacle is placed in a stream of liquid or of gas, it experiences certain forces. One of the most interesting cases is that of an oblong solid in a fluid stream; it will tend to place itself with its length at right angles to the current. This is illustrated by the fact that when a small piece of paper falls it does not do so edge down, but face down; if a coin is dropped in water, it falls face down, "wabbling" as it sinks. (See PROJECTILE.) Other cases of fluid motion are too difficult for discussion here. It should be noted, however, that there are two great divisions of such motions, irrotational and rotational. The former is such that, if a small portion of the fluid were suddenly solidified and freed from the rest of the fluid, it would have simply motion of translation, no rotation. The latter is such that, if a small portion of the fluid were suddenly solidified and freed from the rest of the fluid, it would be spinning round a definite axis. It was proved theoretically by Lagrange that, if a certain portion of a perfect fluid free from viscosity were set in irrotational motion, it would never have its character changed (if certain conditions are satisfied, as they would be in general). Helmholtz has proved, further, that, if a portion of a perfect fluid is moving rotationally, it will always do so; and that it is as impossible to produce this motion in a perfect fluid as it is to destroy it. He showed, too, how lines can be imagined drawn in the fluid so that at each of their points they coincide with the axis of rotation of the portion of fluid at that point. Such a line is called a vortex line; and a "solid" tube made up of such lines is called a vortex. A vortex once existing in a perfect fluid moves through it, keeping its identity, i.e., always being made up of the same particles and preserving certain

other properties. If two vortices were to collide, they would rebound, being perfectly elastic. Many of the properties of vortices can be imitated by smoke rings; but the air is, of course, not a perfect fluid, and so the vortices do not persist. Consult: Basset, *Treatise on Hydrodynamics* (Cambridge, 1888); G. G. Stokes, *Mathematical and Physical Papers* (5 vols., New York, 1880–1905); A. G. Webster, *Dynamics of Particles and of Rigid, Elastic, and Fluid Bodies* (ib., 1904); Horace Lamb, *Hydrodynamics* (3d ed., ib., 1906).

HYDROELECTRIC DEVELOPMENT. See WATER POWER AND WATER DEVELOPMENT.

HYDROELECTRIC PLANTS. See WATER-POWER PLANTS.

HY'DROFER'RICYAN'IC ACID (from *hydro*-gen + *ferricyanic*), $H_3Fe(CN)_6$. A brown crystalline substance obtained by decomposing potassium ferricyanide with dilute mineral acids in aqueous solution.

Potassium ferricyanide, or red prussiate of potash, $K_3Fe(CN)_6$, is a dark-red soluble crystalline salt obtained by passing chlorine gas into solutions of potassium ferrocyanide (see HYDROFERROCYANIC ACID), the transformation of the latter taking place according to the following chemical equation:

$$\underset{\text{Potassium ferrocyanide}}{K_4Fe(CN)_6} + Cl = \underset{\text{Potassium ferricyanide}}{K_3Fe(CN)_6} + KCl$$

Potassium ferricyanide is used principally for making *Turnbull's blue*, or ferrous ferricyanide, $Fe_3[Fe(CN)_6]_2$, which is prepared by mixing potassium ferricyanide with ferrous salts in aqueous solution.

HYDROFERROCYANIC ACID (from *hydro*-gen + *ferrocyanic*), $H_4Fe(CN)_6$. A white crystalline substance readily soluble in water and in alcohol. If exposed to the air, it soon assumes a blue coloration. It may be obtained in the free state by decomposing an aqueous solution of its potassium salt with dilute mineral acids.

The *ferrocyanide of potassium*, $K_4Fe(CN)_6 + 3H_2O$, often called yellow prussiate of potash, is a yellow crystalline substance produced when a solution of potassium cyanide is boiled with ferrous hydroxide, the reaction taking place according to the following chemical equation:

$$\underset{\text{Cyanide of potassium}}{6KCN} + \underset{\text{Ferrous hydroxide}}{Fe(OH)_2} = \underset{\text{Potassium ferrocyanide}}{K_4Fe(CN)_6} + \underset{\text{Caustic potash}}{2KOH}$$

On a large scale potassium ferrocyanide was formerly made from animal refuse, such as dried blood, hair, horn shavings, etc. These products were charred and then heated to a high temperature with scrap iron and crude potash. By this process the potassium carbonate contained in crude potashes combined with the carbon and nitrogen of the refuse, yielding potassium cyanide; on the other hand, the scrap iron combined with the sulphur likewise contained in crude potash, forming sulphide of iron; and when potassium cyanide combines with iron sulphide, potassium ferrocyanide is produced. The chemical transformation taking place during this manufacturing process may therefore be represented by the following equations:

$$(1)\quad \underset{\text{Potassium carbonate}}{K_2CO_3} + \underset{\text{Carbon}}{4C} + \underset{\text{Nitrogen}}{2N} = \underset{\text{Cyanide of potassium}}{2KCN} + \underset{\text{Carbon monoxide}}{3CO}$$

$$(2)\quad \underset{\text{Cyanide of potassium}}{6KCN} + \underset{\text{Sulphide of iron}}{FeS} = \underset{\text{Potassium ferrocyanide}}{K_4Fe(CN)_6} + \underset{\text{Potassium sulphide}}{K_2S}$$

Large quantities of potassium ferrocyanide are at present made also from one of the by-products of the manufacture of coal gas. When coal is heated out of contact with air, part of its nitrogen is obtained in the form of ammonium cyanide. In the manufacture of illuminating gas the cyanogen thus produced is for the most part retained by the iron oxide used in purifying the gas, and when the iron oxide has become useless for the latter purpose, it is employed in making potassium ferrocyanide after another valuable product, ammonium sulphocyanate, has been extracted from it with warm water. The mass remaining behind is mixed with lime and heated with steam; the calcium ferrocyanide thus produced is first transformed into potassium-calcium ferrocyanide $K_2CaFe(CN)_6$, by boiling with potassium chloride; finally, potassium ferrocyanide is obtained by heating the potassium-calcium salt with caustic potash.

Potassium ferrocyanide is extensively used for the manufacture of potassium cyanide and of Prussian blue as well as for a variety of other purposes.

Prussian blue, or Berlin blue, ferric ferrocyanide, $Fe_4[Fe(CN)_6]_3$, is obtained by mixing potassium ferrocyanide with ferric salts in aqueous solution.

HY'DROFLUOR'IC ACID (from *hydro*-gen + *fluor*-ine), HF. An acid compound of hydrogen and fluorine, analogous to hydrochloric, hydrobromic, and hydriodic acids, and first obtained by Scheele in 1771. It may be prepared by the action of sulphuric acid upon cryolite (q.v.) in an appropriate apparatus made of lead or of platinum. It may thus be readily obtained in liquid form, or rather in the form of an aqueous solution. The anhydrous acid may be obtained by heating acid potassium fluoride. As thus prepared, hydrofluoric acid is a colorless liquid, boiling at 19.5° C. (67.1° F.). Its vapors are exceedingly poisonous, and the liquid itself, even when mixed with more or less water, causes swellings on the skin that heal with extreme difficulty. Great care must therefore be taken in working with the acid. The density of the vapor is at ordinary temperatures abnormally high, showing the presence of a large proportion of double molecules H_2F_2 in the vapor. As the temperature rises, these gradually break down, and at 88° C. (190.4° F.) the density attains the normal value corresponding to the simple formula HF. Solutions of hydrofluoric acid are used in analytical chemistry for breaking up minerals that are insoluble in strong hydrochloric and sulphuric acid. Another way of breaking up such minerals consists in fusing them with the carbonates of sodium and potassium, but then, of course, the amounts of these metals in the mineral cannot be determined, and hence it is usually necessary to treat a separate portion of the mineral with hydrofluoric acid. Hydrofluoric acid dissolves glass, forming hydrofluosilicic acid (H_2SiF_6) with its silica; hence its use for making etchings on glass, the acid being for this purpose often replaced by its ammonium and certain other salts. (See ETCHING.) The acid is now often kept in bottles made of a waxlike substance called "ceresin."

Among the salts of hydrofluoric acid, or fluorides (see FLUORINE), may be mentioned

those of the alkalies, which form an interesting series of double salts with the fluorides of other metals. The double fluoride of potassium and hydrogen (acid potassium fluoride) has been already mentioned as a source of pure hydrofluoric acid.

HY'DROFLU'OSILIC'IC ACID. See HYDROFLUORIC ACID.

HY'DROGEN (from Gk. ὕδωρ, *hydōr*, water, + *-γενής*, *-genēs*, producing, from *γίγνεσθαι*, *gignesthai*, to become). A gaseous element, discovered in 1766 by Cavendish, who called it "inflammable air." Paracelsus had already obtained hydrogen by treating iron with dilute mineral acids. But the existence of gases essentially different from air was not generally recognized until about the middle of the eighteenth century, and the properties of hydrogen gas were not definitely known before the researches of Cavendish. Lavoisier recognized its elementary nature and gave it its present name. In the free state hydrogen is found in the exhalations from volcanoes, in the gases issuing from the salt beds at Stassfurt and Wieliczka, in gases given off by oil wells, in the intestinal gases of animals, etc. The spectroscope reveals its existence in the atmosphere of the sun and of many stars, and it has been found "occluded" in meteorites and in various minerals. In combination it occurs as water, of which it forms nearly one-ninth by weight, and as a constituent of almost all organic matter. It may be obtained by the electrolysis of acidulated water; by the action of sodium, potassium, calcium, and certain other metals (e.g., superficially amalgamated aluminium) on water; by passing steam over red-hot iron wire; etc. One of the most convenient methods consists in allowing dilute hydrochloric acid, or preferably dilute sulphuric acid, to act on metallic zinc. Owing, however, to the impurities ordinarily present in zinc as well as in mineral acids, the hydrogen thus obtained is impure and has a disagreeable odor. Another convenient and economic method consists in electrolyzing a weak solution of sulphuric acid between lead electrodes, or a solution of caustic soda between electrodes of iron. Still another excellent method consists in decomposing the hydride of calcium with water. Various methods have also been employed for purifying the hydrogen first obtained. In 1909 Kammerlingh Onnes succeeded in obtaining a quantity of exquisitely pure hydrogen by freezing out the impurities with the aid of liquid air, the hydrogen itself, of course, refusing to condense. A large percentage of hydrogen is contained in ordinary coal gas, in which it is formed as a product of the destructive distillation of coal (organic matter). Much hydrogen is also contained in ordinary water gas, in which it is formed by the action of red-hot coal on water vapor.

Hydrogen (symbol H; atomic weight, either 1, the standard of atomic weights, or 1.008 when the figure 16 for oxygen is adopted as the standard; see ATOMIC WEIGHTS) is a colorless, tasteless, and odorless gas, whose critical temperature is — 242° C., the critical pressure being 15 atmospheres (about 225 pounds to the square inch). It was first solidified in 1899 by causing it rapidly to evaporate when in the liquid state. In the gaseous state it is the lightest substance known, being 14½ times lighter than atmospheric air and about 256,000 times lighter than the mineral platiniridium. One liter, at 0° C. and under normal atmospheric pressure (760 millimeters of mercury), weighs 0.089873 gram. In accordance with the atomic and molecular theory, the molecule of ordinary gaseous hydrogen is assumed to consist of two atoms and is therefore usually represented by the formula H_2. The gas burns in the air with a nonluminous flame of very high temperature, combining with the oxygen to form water. When pure, though it cannot support animal life, hydrogen is not poisonous, and, when mixed with a sufficient quantity of oxygen or atmospheric air, may be inhaled for some time without inconvenience; but it weakens the voice and renders it high-pitched. Hydrogen gas is capable of being absorbed by certain metals, such as iron, platinum, and especially palladium. Graham, who studied this phenomenon, maintained that when thus "occluded" hydrogen assumed a true metallic form, and named that form of the element *hydrogenium*. Troost and Hautefeuille, too, believed that hydrogen is capable of forming *alloys* with metals, and some of the alloys obtained by them were found to have the composition of true chemical compounds; e.g., the hydride of sodium, NaH, the hydride of potassium, KH, the hydride of calcium, CaH_2, etc. Hydrogen is also taken up in large quantities by colloidal solutions of platinum and palladium. (See COLLOIDS.) At ordinary temperatures hydrogen is chemically inert towards most of the other elements; with chlorine, however, it combines gradually in diffused, and with explosive violence in direct, sunlight. Its mixture with double its volume of oxygen explodes violently if ignited; the explosion is somewhat less violent if instead of two volumes of oxygen, about two and a half volumes of air are mixed with one volume of hydrogen. However, Baker showed, in 1902, that, if the mixture of hydrogen and oxygen is perfectly dry, the two gases refuse to combine, no matter how high the temperature to which they are exposed—a remarkable fact, indicating that the mechanism of the reaction is by no means so simple as may be inferred from its chemical equation as usually written. At elevated temperatures, or when in the nascent state (i.e., while being formed, say, by the action of dilute acid on zinc), hydrogen is a powerful reducing agent, i.e., it readily abstracts oxygen from compounds or adds itself to them. Nascent hydrogen is thus often employed in the preparation of organic compounds from given materials. With oxygen hydrogen forms two different compounds—water, H_2O, and hydrogen peroxide, H_2O_2. With sulphur it combines directly, at the boiling temperature of the latter, forming sulphureted hydrogen, H_2S. The ordinary compound of hydrogen with nitrogen is ammonia, NH_3; another compound of hydrogen and nitrogen, termed hydrazine, has the formula N_2H_4. Hydrochloric acid, HCl, is the compound of hydrogen with chlorine, the two elements combining, as stated above, under the influence of sunlight at ordinary temperatures. At somewhat elevated temperatures hydrogen similarly combines with the vapors of bromine and iodine, forming respectively hydrobromic acid, HBr, and hydriodic acid, HI. For the compounds of hydrogen with phosphorus, see PHOSPHORUS. For its compounds with carbon, see HYDROCARBONS.

Among the ordinary uses of hydrogen may be mentioned its use for the production of high temperatures, as in the oxyhydrogen flame. In

illuminating gas hydrogen acts as a diluent for the light-giving constituents, and its combustion yields much of the heat upon which the luminosity of the flame depends. On account of its great lightness hydrogen is used to give buoyancy to balloons.

HYDROGEN, SULPHURETED. See SULPHURETED HYDROGEN.

HYDROGEN DIOXIDE, PEROXIDE OF HYDROGEN, or OXYGENATED WATER, H_2O_2. A colorless compound of hydrogen and oxygen containing, for the same amount of hydrogen, twice as much oxygen as is contained in water. It was discovered in 1818 by the French chemist Thénard. Minute quantities of it occur in the air, in rain water and in snow, and, according to some, in the juices of certain plants. In 1908 Keiser and McMaster demonstrated its presence in the water produced by burning hydrogen in oxygen; and, similarly, minute quantities of it are produced in the combustion of various organic substances, like alcohol, ether, etc. It may be prepared by the action of cold diluted hydrochloric, sulphuric, or nitric acid on hydrated barium peroxide. It can also be prepared by the action of hydrofluoric, hydrofluosilicic, or phosphoric acid on barium peroxide; or by slowly adding barium peroxide to distilled water through which is passed a rapid stream of pure carbon dioxide; and it has been prepared on a somewhat large scale by the action of acids on the peroxide of sodium. By any of these methods the peroxide is obtained in the form of a dilute aqueous solution. This may be concentrated by allowing the water to freeze out, or by passing a current of dry air through the solution kept at ordinary temperatures, or by allowing it to evaporate in a vacuum over sulphuric acid. The anhydrous peroxide thus obtained is a colorless, odorless, oily liquid with a harsh, bitter, metallic taste. It remains unfrozen at — 20° C., but crystallizes at the temperature of a mixture of solid carbon dioxide and ether. The crystals melt at — 2° C. When heated to the boiling point of water, it decomposes with violence into oxygen and water. When brought in contact with the skin, it causes a white blister, which after a time produces an irritating, itching sensation. It is a powerful bleaching agent and is largely used to remove color; it is particularly valuable for bleaching ostrich feathers, bones, ivory, silver, wood, silk, cotton, etc. Dilute solutions of it under special trade names are employed to produce a light color in hair. It has also been used to restore paintings that have become darkened by age. The peroxide is very useful in medicine and surgery as an antiseptic, rapidly destroying pus and similar discharges, in consequence of which it has been employed in diphtheria. Hydrogen dioxide has the power of freeing water from microörganisms, which has led to its use in brewing. It also destroys the acid and mold ferments in the wort. If taken internally, it has the effect of improving digestion and has therefore been used in certain forms of dyspepsia. Ordinarily the peroxide acts as a strong oxidizing agent, owing to the ease with which it parts with half of its oxygen. In certain cases, however, the same property has the effect of causing reduction. This happens, viz., whenever the peroxide is brought into contact with substances like oxide of mercury and especially potassium permanganate, which readily undergo decomposition. The reduction of such substances is accompanied by the evolution of much heat, great volumes of oxygen being given off by the peroxide itself as well as by the substances undergoing reduction. The peroxide itself is readily decomposed into water and free oxygen by mere contact with certain substances, e.g., gold, platinum, and especially silver, without the metals undergoing any change; the action is particularly violent if the metals are in colloidal suspension. Among the substances that have this effect on the peroxide are most alkalies, and hence the peroxide can only be preserved in slightly acid solution, although, as Allain showed in 1906, common salt is a better and more desirable preservative of hydrogen peroxide than acids. According to Bredig, the decomposition of hydrogen peroxide by colloidal platinum is prevented by the presence of a little iodine. Before using such a solution a few drops of ammonia may be employed to neutralize the acid.

HYDROGEN SULPHIDE. See SULPHURETED HYDROGEN.

HY'DROGRAPH'IC OFFICE. A government institution for the preparation, publication, and distribution of charts and nautical information. In nearly all countries it is a bureau, or branch of a bureau, in the department of the navy or marine. The principal hydrographic offices of the world are the British, French, United States, Russian, German, Italian, Japanese, Netherlands, and Spanish, but several other nations have such establishments. The United States office is third in the number of different charts published. It was formally established by Act of Congress approved June 21, 1866, but had been in the course of development under the name of the Depot of Charts and Instruments since 1830. In 1842 the present bureau system of the navy was established, and the Depot of Charts and Instruments was attached to the Bureau of Ordnance and Hydrography as the hydrographic branch of that bureau, and embraced the United States Naval Observatory and the Hydrographic Office. From 1844 to 1861 Lieutenant (afterward Commander) M. F. Maury was in charge of the depot, and during this time he greatly developed —almost created—the science of marine meteorology and oceanography.

Previous to 1866 only a comparatively small number of charts of ordinary navigational type were published; but Maury compiled a vast amount of data derived from the log books and reports of men-of-war and merchant vessels, and, after drawing from the data the proper conclusions, he published the results in the form of "Wind and Current Charts," which included track charts, trade-wind charts, whale-feeding-ground charts, storm and rain charts, and thermal charts.

The present Hydrographic Office is a branch of the Bureau of Navigation of the Navy Department. It is composed of the divisions of Chart and Book Supply, Chart Construction, Sailing Directions, and Pilot Chart and branch offices. The head of the office, who has the title of hydrographer, is a naval officer, usually a commander or captain, and he has another naval officer as his assistant.

The office publishes charts of the oceans and of foreign coasts and harbors, also charts of the Great Lakes and general sailing charts of the United States coast and insular possessions. The detail charts of United States territory are

published by the Coast and Geodetic Survey (q.v.). Pilot charts are published covering the north Atlantic, south Atlantic, north Pacific, south Pacific, and Indian oceans. These charts show the probable direction and force of winds, position of derelicts or other dangers to navigation, storm tracks, areas of fog or icebergs, best tracks for vessels to follow, ocean currents, and a great mass of other matter useful to mariners. About 150,000 of these charts are printed annually, nearly half the number being of the north Atlantic. The north Atlantic, north Pacific, and Indian Ocean pilot charts are published monthly; the others, quarterly. A pilot chart of the Great Lakes is issued at intervals. The information given by the pilot charts is supplemented by a weekly publication called the *Hydrographic Bulletin*, of which 250,000 are issued annually.

The office publishes weekly a pamphlet of several pages, called *Notices to Mariners*, which gives a definite account of all newly discovered rocks, shoals, and other dangers to navigation; also changes in the character or position of lighthouses, buoys, and other navigational aids. It publishes from time to time revised lists of lighthouses, buoys, etc., throughout the world, and volumes, entitled *Sailing Directions*, which contain full information in regard to ocean currents, the weather, and the character of the seacoasts in the different parts of the world, descriptions of harbors, of aids to navigation, and of other matters of interest to navigators and mariners generally. The office also publishes *Bowditch's Practical Navigator* (q.v.), *Azimuth Tables*, *Projection Tables*, and similar works. There are printed annually 10,000 to 15,000 copies of books.

On July 1, 1914, the number of different engraved charts was about 1300 and of lithographed charts about 700.

For the purpose of gathering and disseminating information of interest to mariners and to assist them as much as possible, branch hydrographic offices have been established in the ports of Boston, New York, Philadelphia, Baltimore, Norfolk, Savannah, New Orleans, Galveston, San Francisco, Portland, Port Townsend, Duluth, Sault Sainte Marie, Chicago, Cleveland, and Buffalo. Others will probably be established at Colon, Honolulu, and Manila if Congress grants sufficient money for the purpose.

Three to five small vessels of the navy are engaged, under the direction of the Hydrographic Office, in surveying in various parts of the world, chiefly in the West Indies and on the coasts of Central and South America. Additional surveys are frequently made by naval vessels in regular service. A number of small vessels of the British navy are engaged in hydrographic surveying in parts of the world under British jurisdiction or belonging to countries that make no surveys. Similar work, on a smaller scale, is done by several other governments. Each national hydrographic office reproduces the charts of the others as far as its requirements are supposed to make necessary.

For further information, consult: Hughes, *Founding and Development of the Hydrographic Office* (Washington, 1887); The *Origin and Mission of the Hydrographic Office* (Hydrographic Office Pamphlet, 1910); *Annual Reports* of the hydrographer to the Bureau of Navigation (Washington). See HYDROGRAPHY; CHART; MAP; and section on *Navy* under UNITED STATES.

HYDROG'RAPHY (from Gk. *ὕδωρ, hydōr*, water + *-γραφία, -graphia*, writing, from *γράφειν, graphein*, to write). That branch of the science of physical geography which treats of the surface waters of the earth particularly with reference to their bearing on navigation. Practically every civilized nation, and particularly all maritime nations, have special governmental departments whose duty it is to survey and chart the navigable waters belonging to the nation and also the waters of the oceans wherever navigation extends.

The first step in the modern science of hydrography was made in the fifteenth century by Prince Henry, "the Navigator," who was the first to make a sea chart worthy of the name. But little was done in the way of hydrographic work until Capt. James Cook of the British navy began his famous career of exploration and surveying in 1759. His first work was the survey and mapping of the St. Lawrence River from Quebec to the ocean. In 1763 he was appointed "marine surveyor of the coast of Newfoundland and Labrador," and he held this office until 1767. During this time he both made charts and wrote volumes of sailing directions and also began to make a name for himself as a mathematician and astronomer. Until his death, in 1779, he continued to explore and survey in the Indian Ocean and the Pacific. While Cook was collecting data and charting them, Alexander Dalrymple wrote an essay on marine surveying, which was published in 1771. Upon the founding of the British Hydrographic Office, in 1795, Dalrymple became its first chief. Cook was followed by La Pérouse, who was sent out by the French government in 1785. After some years of work La Pérouse was wrecked near Australia, and all hands are believed to have been lost. In 1791 another French exploring expedition was sent out under the command of D'Entrecasteaux and did much work in the great Eastern Archipelago. Beautemps-Beaupré, the navigating officer of this expedition, wrote a work on marine surveying which was published in an appendix to the narrative of the voyage (1808). Beautemps-Beaupré was afterward placed in charge of the survey of the French coast.

The British Hydrographic Office was established in 1795. Up to this time very few charts were duplicated, and still fewer were based on regular surveys. Charts of the oceans and coasts were very indefinite as to depths and exact positions of coast lines. When near the coast, most vessels depended upon the lead or upon local pilots. The French Bureau of Hydrographic Surveys, which was organized in 1781, led the way in chart production, but its work was greatly checked by the financial condition of the country and nearly destroyed by the French Revolution.

The British Hydrographic Office was established at a fortunate time, as its development was continuous. It is to-day the greatest of the national hydrographic offices and publishes charts of every part of the world. The French office is second, and that of the United States (see HYDROGRAPHIC OFFICE) third. In addition to the Naval Hydrographic Office, the United States has a Coast and Geodetic Survey, which prepares and publishes charts of the coast both of the United States and its insular and territorial possessions.

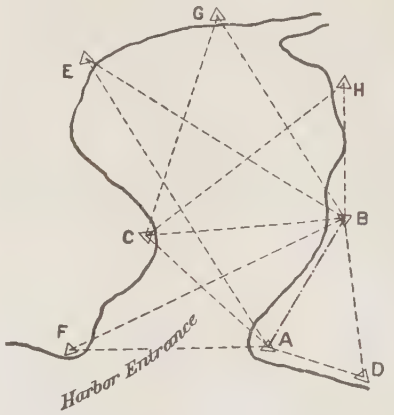
The first records we have of charts in which

there was an attempt to locate places by latitude and longitude appear in the maps of Claudius Ptolemy, of Alexandria, in the second century A.D. The charts of Columbus were not much more definite. It was therefore the province of the newly established hydrographic offices to collect and prepare all existing data and publish them. Up to this time the few existing charts had been put out by private publishers.

During the latter part of the eighteenth century and early part of the nineteenth much was gained. By the middle of the nineteenth century the many exploring expeditions had covered the navigable world, and their work had been charted. The next step was a greater accuracy in the determination of geographic positions and a more careful survey of coasts, especially of the coast of countries which did not make their own surveys. The work is yet far from completed, but practicable charts have been issued of nearly all coasts and harbors in the world. The constant changes due to the erosion of the sea and deposit of the rivers and tides necessitate frequent resurvey in many places to make the charts safe to navigate by. Parts of the United States coast and many of its harbors have to be resurveyed every 10 years. Some harbors with shifting sand bars at the entrance have to be examined and the buoys shifted two or three times a year.

The method of conducting the hydrographic survey of a harbor, bay, inlet, or other small body of water, is as follows: Two points, whose exact location has been determined by some general survey of that portion of the country, are selected to form the base. (See GEODESY.) If the exact locations of two points and the distance between are known, this distance is assumed as the base. If the distance is not known, it is measured by base apparatus (copper bars incased in wood and supported on trestles) or by a steel or invar tape, the tape being kept carefully taut and at a constant and determined tension, level, and in a straight line between the points. The base having been established, various other points about the harbor are located by triangulation. If the existing objects are not well spaced about the harbor, additional tripod or pole structures must be erected. For ordinary work sextant angles suffice, but for larger or more exact triangulation theodolites are used and great care taken with the observations and computations. The first triangles are formed with the base as one of the sides and the point to be located as the vertex of the opposite angle. All three angles are measured, and the sum should not be less than 180° nor more than 180° 1′, unless the distances are short and the survey a small one. Angles of less than 30° are to be avoided unless observed with great care and exactitude. After several points have been located from the base line other triangles are formed, using these points for vertices, and so on until the requisite number of stations—or "signals," as they are called—is reached.

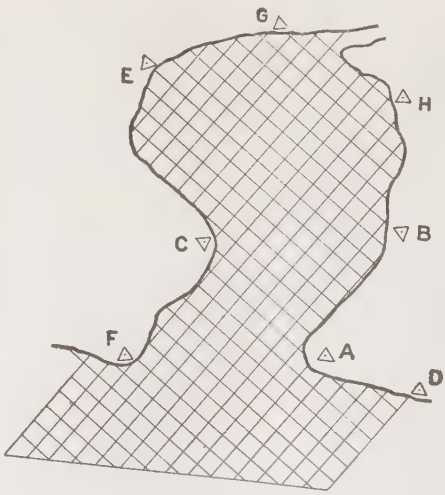
The next step is to prepare a plan of the harbor (or area to be surveyed) on a suitable scale for the work—1 to 2500 (i.e., 1 foot on the chart represents 2500 feet) is a common one, but in important harbors and channels 1 to 500 is sometimes necessary. The base line is laid down upon the chart, and then the other points which have been determined by the triangulation survey. The shore line and topographical features are next obtained by a topographic survey with a plane table or other instrument. For determining the shore line only, a fairly accurate method consists in running from point to point along the shore, measuring changes of direction by a theodolite and



TRIANGULATION FOR SURVEY OF A HARBOR.
A B, base. Triangles, *ABC*, *ABD*, *ABE*, *ABF*, *BCG*, *BCH*.

distances with a surveyor's chain or steel tape. At such frequent intervals as may be necessary the distance to the water's edge is measured at right angles to the direction in which the lines are run from point to point.

Having determined the shore line, the plan for sounding is prepared. The lines on which the soundings are desired (and on which the boat is to run) are then placed on the plan (or boat sheet, as it is called). There are usually two sets of these lines, one set intersecting the other at right angles, but this arrangement is



PLAN OF HARBOR (BOAT SHEET).
Showing lines on which soundings are to be taken.

frequently varied. Sometimes the lines intersect at 60° or 45°, and sometimes three sets are requisite. The lines of each set are from 100 to 1000 feet apart, depending upon the character of the survey.

Small steam launches are commonly used in hydrographic work. The leadsman stands in

a convenient framework near the bow. Two observers, each with a sextant, are aft; also a recorder with a watch and a notebook to record angles and soundings. The boat proceeds at constant speed and is kept on as straight a course as possible by means of a range of any two objects on shore or by frequent determinations of its position. Every 10, 20, or 30 seconds (depending upon the depth and speed) a sounding is taken, the recorder giving the signal to sound. At intervals of one minute or more (usually two to four minutes) the position of the boat is determined by sextant angles. The observers use any three of the "signals" located by the triangulation. One measures the angle from the right object to the centre one; the other measures the angle from the centre to the left. These two angles determine the position very exactly, and it is quickly plotted on the sheet by means of an instrument called a three-arm protractor. If this position shows the boat is drifting away from the desired line, the necessary change in course is made.

While this is going on, the heights of the surface of the water on a near-by tide gauge must be observed or taken by a recording instrument. If the plane of mean low water is not known, it must be determined from gauge observations (preferably for at least two months) of low waters. The average height of all the low waters for the observation interval is taken as mean low water. All soundings taken are reduced to this plane before being placed on the finished chart. They are spaced in by time between the positions determined by sextant angles.

Offshore soundings are usually made from a surveying ship of 100 tons or more. The ship determines her position by angles as long as she can see the shore and then spaces her soundings by time. Deep-sea soundings are taken by large vessels especially fitted with a deep-sea sounding machine. This consists of a wire, a shot or sinker, a tube for obtaining temperatures and character of the bottom, and a machine which controls a reel for letting out or hauling in the wire. The shot or sinker is usually released and left behind when it strikes the bottom. This relieves the strain on the wire in reeling in, and this relief is necessary in very deep sounding.

In addition to determining the depths and tidal rise and fall in a harbor it is desirable also to ascertain the speed and direction of the current. This may be done by means of the old-fashioned chip log, the observations being taken at suitable intervals. An easier and more satisfactory method to ascertain the speed is to employ a recording current meter. Direction meters for determining the direction of the current at any depth below the surface have been devised and are used to some extent. To determine the volume of water passing at any time, the current observations must be made at several depths and at points located at intervals all the way across the stream. Such observations show that the current on the surface of a tidal harbor is frequently in the opposite direction to that near the bottom, the conditions depending upon the state of the tide.

The finished chart (q.v.) is supposed to embody all the available data of use to navigators. After the soundings are entered on the plotting sheet, curves of equal depth are drawn, and only characteristic soundings placed on the final chart. Charts are engraved or etched on copper or lithographed. Lithographic work is cheaper, but less satisfactory.

The greater part of hydrographic surveying is done in the vicinity of coasts, shoals, and islands, since it is there where lie the dangers to navigation. Deep-sea sounding is of scientific interest only, the principal commercial use being the determination of suitable routes for submarine cables. See Deep-Sea Exploration; Dredge; Hydrographic Office; Coast and Geodetic Survey; Chart; Map.

HY'DROID (from Gk. *ὑδροειδής, hydroeidēs*, like water, from *ὕδωρ, hydōr*, water + *εἶδος, eidos*, form). One of a class of cœlenterate animals, notable for their delicacy and beauty and receiving their name from their structural resemblance to Hydra (q.v.). The name is now generally restricted to the polyp forms of the Hydromedusæ. (See Hydrozoa.) They exist in compound colonies—one kind having the office of feeding the community, another of protecting it, and another of reproduction. The feeding hydroids are usually fixed, or attached to some object, and proceed from eggs of the reproductive hydroids, or medusæ, the latter in turn growing from buds produced by the former. The medusæ sometimes remain attached to the stem or become free-swimming. The body of the nutritive hydroid is usually supported by a stem of variable length, but may rest immediately upon the bottom. From one individual buds appear and produce branching colonies of hundreds or thousands, often having a height of 15 or 20 inches, and the giant hydroid of Japan is more than 3 feet high. The reproductive hydroids are sometimes developed into perfect medusæ, before leaving the parent stem, but they usually break away before attaining their perfect state. Some buds never become much developed and are called gonophores. These usually remain attached, but attain sexuality and reproductive power. Most hydroids are covered with a chitinous envelope, which is continuous over the branching stem of the entire colony; but some species are naked and soft. In tubularian hydroids the chitinous envelope, when present, simply incloses the stem and branches, but is not expanded around the individual polyps (*hydranths*) in the form of a cup. In campanularian hydroids, however, each hydranth is surrounded by a cup, a continuation of the chitinous envelope, into which it can withdraw itself. Hydroids abound in the ocean in various parts of the world, notably the northwest coast of America, the Caribbean Sea, and around Australia. Their colors are usually not brilliant, brown, flesh color, and white being the most common. A familiar and beautiful example is the Portuguese man-of-war (q.v.). Consult Alexander Agassiz, *North American Acalephæ* (Museum of Comparative Zoölogy, Cambridge, 1875). See Siphonophora; Alternation of Generations, and the accompanying Illustration.

HY'DROMAN'CY. See Divination.

HYDROM'ETER (Gk. *ὑδρομέτριον, hydrometrion*, vessel for hydrostatic measurement, from *ὕδωρ, hydōr*, water + *μέτρον, metron*, measure), also known as Areometer. An instrument used in determining the specific gravity of liquids and in some instances of solid bodies.

Specific gravity, for determining which the hydrometer is used, is the ratio between the weight of a given quantity of a substance and

that of an equal volume of water at its temperature of maximum density, 4° C.; so it follows that the specific gravity of two substances must be directly proportional to their weights when the volumes are the same, or inversely as their volumes when the weights are equal. The hydrometer, which usually is a hollow instrument of glass or metal designed to float upright in a liquid, makes use of the principle of Archimedes that the weight of the volume of liquid displaced by a body is equal to the weight of the body itself. In its simplest form a hydrometer might consist of a graduated scale floating vertically in a liquid, and on which the level of the surface of the liquid it displaces could be measured. For example, an ordinary ruler if allowed to float upright in water would sink until a certain division on the scale is reached. This reading multiplied by the area of the cross section of the ruler will give the volume of a mass of water equal to that displaced by the ruler and equivalent to the weight of the ruler itself. Immersing the ruler in a liquid of different specific gravity, it will sink until the surface touches some other division on the scale, and, as before, the volume of a mass equivalent to the weight of the ruler will be obtained. A ratio made with these two quantities representing the volumes of the two liquids would give the specific gravity; but, as the cross section of the ruler is a constant quantity, it is only necessary to compare the two readings on the scale.

The ordinary hydrometer consists of a smooth, transparent glass circular tube of uniform cross section and thoroughly annealed, usually terminating in one or more bulbs, the lower of which may be filled with mercury or shot in order to keep the instrument steady with its axis in a vertical position when immersed in a liquid. Such a hydrometer is extensively used in scientific and commercial work, as it can be graduated to furnish direct readings of the specific gravity of a liquid. The mark to which the instrument would sink when placed in water is usually marked 1.000, and the weight of water displaced is equal to the total weight of the hydrometer. If the instrument be placed in a liquid that has a less specific gravity than water—alcohol, e.g.—it will sink until the surface of the liquid touches some point higher up on the stem, as in this case it takes a greater volume of the lighter liquid to be equivalent to the weight of the hydrometer. The scale on which the readings are made is on a piece of paper contained inside of the stem, and the method of graduation forms the chief distinction between the different instruments. In the instrument of Gay-Lussac, which is known as a volumeter, the water point was marked 100, and the division was carried along the stem both above and below this mark on the basis that the amount of the stem between any two scale divisions should equal $\frac{1}{100}$ of the volume of the part immersed in water. With an instrument graduated in this manner the specific gravity is obtained by dividing the reading into 100. In practice it is more convenient to use a hydrometer whose scale is graduated to read specific gravity direct; but in this event the scale is irregular, and great care must be exercised in the construction and testing of the instrument, for all accurate work a certificate from some competent authority or institution, such as the United States Bureau of Standards that the instrument has been tested and approved, being essential. The accuracy of a hydrometer is greatly increased by making its stem as slender as possible and consequently increasing the space between the divisions; so it is customary to construct a number of instruments, each having a limited range and designed for liquids of different densities. The hydrometer, when used for a special purpose or substance, frequently undergoes modifications. The alcoholmeter, e.g., is so graduated as to give at once the strength of mixtures of ethyl alcohol and water according to either per cent by weight or per cent by volume. The urinometer, lactometer, sacharometer, and other instruments are all hydrometers used for special purposes, as is also the hydrometer for determining the strength of sulphuric acid or the strength of the acid solution of a storage battery. Elaborate tables have been worked out for use in connection with various forms of special hydrometers, and some of these will be found in *Circular No. 19, United States Bureau of Standards* (Washington, 1913). Hydrometers with arbitrary scales also play an important part in scientific work, though the present tendency is towards the exclusive use of specific-gravity values. In the Baumé scale, which is encountered frequently in chemical processes, a second fixed point on the hydrometer stem is determined in addition to that given by water. This is obtained by dissolving one part by weight of common salt in nine parts of water, and then the space between these two points is divided into 10 equal parts, which are called degrees. The water point is marked 10 on the scale, and the division is carried beyond for 40°. For liquids heavier than water the second fixed point is determined by immersion in a solution of 15 parts of salt in 85 parts of water, and the space between it and the water point, which is marked 0, is divided into 15 equal divisions. Exact tables for comparison with specific gravity will be found in *Circular No. 19*, cited above. The scales of Cartier and Beck are occasionally found, though less frequently than that of Baumé.

The accompanying tables afford a comparison of the Baumé degrees (American standard) scale with the true values of specific gravity:

LIQUIDS LIGHTER THAN WATER

SPECIFIC GRAVITY	Baumé
.75	56.7°
.80	46.3
.85	34.7
.90	26.1
.95	17.7
1.00	10.0

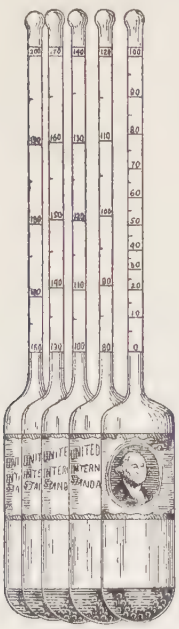
LIQUIDS HEAVIER THAN WATER

SPECIFIC GRAVITY	Baumé
1.0	.0°
1.1	13.2
1.2	24.3
1.3	33.7
1.4	41.8
1.5	48.8
1.6	54.9
1.7	60.0
1.8	65.0
1.9	69.0
2.0	73.0

The specific gravity of liquids changes with the temperature, so that it is of the utmost importance to have the liquid at uniform and at standard temperature. It is necessary to use a thermometer and, if necessary, apply suitable

corrections to reduce the specific gravity of the liquid to the standard temperature. For this purpose many of the finer hydrometers contain within their stems a thermometer tube whose bulb is placed in the lower portion of the instrument, and the instrument is known as a thermohydrometer.

In the United States Internal Revenue Service the hydrometers furnished to the inspectors are so graduated as to indicate the number of parts by volume of proof spirit equivalent to the volume of the liquor at the standard temperature, which is 60° F. They are constructed so as to read 100 for proof spirit and 200 for absolute alcohol. Proof spirit in the United States is defined by law to be that mixture of alcohol and water which contains one-half of its volume of alcohol, the alcohol when at a temperature of 60° F. being of specific gravity 0.7939 referred to water at its maximum density. Proof spirit has at 60° F. a specific gravity of 0.93353, 100 parts by volume of the same consisting of 50 parts of absolute alcohol, and 53–71 parts of water.



SET OF UNITED STATES STANDARD HYDROMETERS AS USED BY THE INTERNAL REVENUE OFFICE.

A hydrometer of a different type from those described above is the weight hydrometer, where the submerged volume remains constant; but, as the specific gravity of the liquids changes, the weight of the instrument must be varied in order to immerse it to a given point. The Nicholson hydrometer is representative of this class and consists of a brass tube with conical ends, which floats upright and carries above a thin stem the carrying pan in which may be placed a substance whose specific gravity is to be found. When used to determine the specific gravity of a liquid, the weight of the apparatus is first ascertained, and then it is placed in water and weights added until a marked point on the stem is at the surface of the water. If the instrument is placed in a liquid of greater specific gravity, then additional weights must be placed on the pan in order to sink the stem to the mark, while, if the liquid is less dense, the number of the weights must be diminished. The weight of the instrument increased by the amount of the weights added when the instrument was placed in the liquid under test divided by the weight of the instrument and the weights added when the instrument was in water, will give the specific gravity. This hydrometer can also be used to determine the specific gravity of a solid, in which case the latter is first placed in the upper pan, while the instrument is in water, and the number of weights which must be removed is noted. The substance is then placed in the lower pan, and the amount of weight which must be removed to restore it to its former position ascertained. The difference in the two amounts represents the weight of the water displaced by the substance, and, if divided into the sum of the weights removed when the body was placed in the upper pan, will give the specific gravity. The hydrometer of Fahrenheit is based on a similar principle, but is made of glass instead of metal and has a bulb filled with mercury at its lower end instead of a weighted cup. It can only be used for liquids. These instruments are not so reliable as the ordinary hydrometers and are not so widely used. In the most accurate determinations of specific gravity a chemical balance is employed, and equal volumes of the liquid actually weighed, or, if the substance is a solid, it is weighed both in the air and in distilled water, suitable corrections being applied for temperature and other disturbing influences.

NICHOLSON HYDROMETER

Historical. The hydrometer is without doubt one of the earliest pieces of physical apparatus, its invention being generally ascribed to Archimedes, to whom is due the principle on which it is based. The instrument is mentioned by Priscian, who died about 500 A.D., and it is also described by Synesius of Ptolemais in a letter to Hypatia of Alexandria, under the name of hydroscopium, as follows: "It is a cylindrical tube the size of a reed or pipe, a line drawn along it lengthwise which is intersected by others, and these point out the weight of water. At the end of the tube is a cone the base of which is joined to that of the tube so that both have but one base. This part of the instrument is called *baryllion*. If it be placed in water, it remains in perpendicular direction so that one can readily discover the weight of the fluid." The date of this letter can be approximately fixed by the fact that Hypatia was murdered in 415 A.D. The use of the hydrometer was known to the Saracens of the tenth and eleventh centuries, and one of their writers, Al-Khâzinî, attributes its invention to a Greek philosopher named Poppius, a contemporary of Theodosius the Great. In this connection this same writer refers to the fundamental discovery of Archimedes. Consult any of the larger manuals of physics, but, for special information on the hydrometer, *The Testing of Hydrometers* (Circular No. 16, United States Bureau of Standards, 3d ed., Washington, 1914); also *Standard Density and Volumetric Tables* (Circular No. 19, 3d ed., ib., 1913). The United States Treasury Department publishes, for the use of the internal revenue service, manuals for using the hydrometer in alcoholometry. See Illustration in article SPECIFIC GRAVITY.

HY'DRONI'TRITES. See HYDRONITROUS ACID.

HY'DRONI'TROUS ACID, HN_3. An acid gaseous compound of hydrogen and nitrogen, first obtained by Curtius in 1890. An easy method of preparing this acid was subsequently worked out by Angeli and consists in adding hydrazine hydrate (see HYDRAZINE) to a concentrated solution of silver nitrate, the result being a precipitate of silver hydronitrite, AgN_3, from which free hydronitrous acid may be obtained by decomposing with sulphuric acid. The salts of hydronitrous acid, or *hydronitrites*,

are violently explosive compounds, and their preparation should not be undertaken by inexperienced persons.

HYDROP'ATHY (from Gk. *ὕδωρ, hydōr*, water + *πάθος, pathos*, feeling). Water cure or water treatment. A system of treatment of diseases with water to the exclusion of other agencies. A word of incorrect composition, formerly applied to a method now obsolete. See HYDROTHERAPY.

HY'DROPHANE (from Gk. *ὕδωρ, hydōr*, water + *φανός, phanos*, clear, from *φαίνειν, phainein*, to appear). A translucent variety of opal (q.v.) that is either whitish or light-colored, and becomes more transparent or translucent in water.

HYDROPH'IDÆ. See SEA SNAKE.

HY'DROPHIL'IDÆ (Neo-Lat. nom. pl., from Gk. *ὕδωρ, hydōr*, water + *φίλος, philos*, loving). A family of scavenger beetles, most of which swim in the water or crawl on the submerged parts of plants in quiet pools. They are elliptical black beetles with club-shaped antennæ. Because of the fact that they carry a film of air on the ventral surface of the body, this part has a silvery appearance. The larvæ are carnivorous, but the adult beetles live chiefly on decaying vegetation. There are 150 species of this family in the United States. One of the most common species is *Hydrophilus triangularis*. A few forms live in moist earth or dung and subsist upon maggots which inhabit such places.

HYDROPH'ILOUS. A term which has been applied particularly to plants which are pollinated through the agency of water. It has also been applied by some authors to hydrophytic plants, but should be entirely discarded there, both because of its previous use in another sense and because it is an undesirable word in all senses. The term "water-pollinated" is preferable in the first sense. See POLLINATION.

HY'DROPHO'BIA (Lat., from Gk. *ὑδροφοβία*, hydrophobia, from *ὑδροφόβος, hydrophobos*, dreading water, from *ὕδωρ, hydōr*, water + *φόβος, phobos*, fear), or RABIES, also called LYSSA. An acute infectious disease of warm-blooded animals produced in man by the implantation of a specific virus through the bite of an animal sick with the disease. This disease has been known since the earliest historical times. Democritus of Abdera gave an account of it in the fifth century B.C. Aristotle in the fourth century B.C. described it in animals, but denied its existence in man. Celsus (21 B.C.) detailed some of its symptoms and advised suction and the actual cautery in the treatment. Xenophon, Ovid, Vergil, Horace, Plutarch, all referred to rabies in their works. Boerhaave (q.v.) and Van Swieten (1771) described the disease intelligently and recognized the paralytic type in man. John Hunter (q.v.), Magendie (q.v.), Marochetti, Morgagni, Trousseau, and Dupuy all wrote of it. Youatt (1850), the celebrated veterinarian, considered rabies at length in his books and relied on early cauterization with nitrate of silver to obviate infection. Yet, after being bitten seven times with impunity, he is reported to have died of rabies at the last. Virchow and Von Ziemssen propagated the disease by the hypodermic injection of saliva of a rabid animal. After many others had added to our knowledge of hydrophobia Pasteur (q.v.), in 1882, began to treat the disease with scientific accuracy.

The geographic distribution of the disease is wide. It has been found in Greenland, where it was epidemic in 1860; in Constantinople, where it prevailed in 1839; in Egypt, in London, in Hamburg, in Saxony, in Bavaria, and in many parts of the United States, the prevalence of the disease in Washington, D. C., in 1899–1900 raising grave apprehension. During 1914 there were several outbreaks of canine rabies in various States, but few persons were bitten. In Russia and Siberia very many instances of rabid wolves have been recorded. The disease is found most frequently in the dog, the wolf, the cat, and the cow. The skunk, also, seems to be peculiarly liable to hydrophobia, and the disease in this animal has been considered distinct and worthy its own name of *rabies mephitica*. A careful consideration of all the known facts, however, leads to the conclusion that the disease is one to which all the lower animals, and man also, are liable; that it is protean in its manifestations, chiefly because of the thousand and one concomitant circumstances and elements; and that the collected statistics are mostly so tainted, from manifold sources of error, that they need to be sifted with the utmost care. It is, however, safer to treat every skunk bite as though certainly by a rabid animal, since in most cases the facts cannot be known. (The curious will find the question most interestingly discussed in a candid manner in Coues's *Fur Bearing Animals*.) The nature of the infecting virus is as yet unknown. It is found in the saliva, particularly that of the parotid gland. In man there is a variable incubation from three weeks to six months, the period depending largely on the site of the infection. Wounds about the neck and face are especially unfavorable in prognosis; next are those of the hands. Punctured wounds, because of the difficulty of cauterizing them, are most dangerous. Three stages are described. In the *premonitory stage* there is pain, numbness, or irritation about the bite. Irritability, nervousness, and depression are common. In the *stage of excitement* there is great hyperæsthesia. Almost any slight stimulus will cause intense reflex excitability and convulsions. The muscles of deglutition are extremely rigid or even paralyzed, and any attempt at swallowing may cause spasms of the throat and general convulsions; these may even follow the thought of swallowing. The name "hydrophobia" is erroneous and based upon false inferences from these facts. The sufferer from rabies does not fear water—he intensely desires it, as he is devoured with thirst, but he cannot swallow it, nor even "go through the motions" of swallowing. There is also a secretion in the throat and mouth of a thick, viscid mucus, with thickened saliva, and the effort to get rid of this with muscles refusing to act, causes the bark-like cough and hawk so often described as "barking like a dog." The patient does not bark, and it is doubtful if he bites. The temperature rises, and the patient may become maniacal. This stage may last from one to four days, and then the *paralytic stage* supervenes. In this stage the spasms stop, unconsciousness supervenes for the first time, the action of the heart ceases, and the patient dies.

The gross pathological changes found after death from hydrophobia are not characteristic. The most constant are found in the nervous system, especially in the region of the medulla

oblongata and pons. The changes consist in a varying degree of inflammation, marked by small round-cell infiltration of the blood-vessel walls, exudation into the pericellular lymph spaces, small hemorrhages, and sometimes thrombosis of the small blood vessels. More recently microscopical study has demonstrated extensive degenerative changes in the nerve cells. Lesions have also been noted in the sympathetic, consisting in degeneration of the nerve cells and increase in the thickness of their endothelial capsules. In 1903 Negri announced the discovery of certain bodies in the nerve cells of rabid animals. These, the so-called Negri bodies, are found very constantly and are described as consisting of a homogeneous, nongranular substance, resembling coagulated albumin. They are from 1 to 23 micromillimeters in diameter, oval, round, or triangular in shape, and within them are clear shining areas. The nature of these bodies is unknown. Negri believes them to be protozoa and considers them the causative agents of the disease. Williams, in 1906, was convinced that these cell inclusions were of animal nature and called them *Neuroryctes hydrophobiæ*. All attempts to cultivate this alleged organism, however, were unsuccessful, and the late "complement fixation test" is likewise negative. In addition to the changes in the nervous system there is usually congestion of the mucous membrane of the gastrointestinal tract and of the pharynx, larynx, and bronchi. Despite the fact that innumerable attempts to discover the cause of the disease have been made without success, it still seems probable that hydrophobia is due to an ultramicroscopic microörganism. This organism is not apparently widely distributed throughout the body, but confined mainly to the saliva and the central nervous system. An emulsion made of the medulla of a rabid animal, injected into dogs, cats, rabbits, guinea pigs, etc., produces symptoms characteristic of the disease, although in rodents there is little or none of the stage of excitement.

Although we have no knowledge as to the specific germ of the disease, hydrophobia furnishes our most remarkable example of the success of artificial immunization by means of protective inoculation. To Pasteur (q.v.) is due the credit not only of the discovery of the preventive treatment of hydrophobia, but of demonstrating through it a principle in therapeutics which is of constantly widening application. Pasteur found that he could induce the disease in rabbits by inoculations with portions of the spinal cords of rabid animals, and that the spinal cords of these rabbits possessed a high degree of virulence. Drying in air reduced the virulence in direct proportion to the length of the drying. It was found that, while inoculation of man or animals from the fresh rabbit cords was invariably fatal, if the man or animal was first inoculated from one of the cords the virulence of which had been greatly reduced by the drying, and then from cords of gradually increasing virulence, he could become so accustomed to the virus that injection of the fresh cord would no longer be fatal, and such a series of inoculations made sufficiently soon after the bite of a rabid animal was found to prevent entirely the development of the hydrophobia. Advantage is taken of the long period usually elapsing between the bite and the onset of the disease to practice these preventive inoculations, and the result has been a marked decrease in the mortality from the bites of rabid animals. In view of the uniformly fatal results of untreated hydrophobia and the success of the Pasteur treatment, the importance of determining at the earliest possible moment whether the animal by whom a person has been bitten had rabies can be readily appreciated. The animal should not be killed, for, as rabies is invariably fatal to canines, the recovery of a sick animal definitely disproves rabies. On the contrary, the animal should be carefully watched and, if it dies, should be sent to a laboratory where examination can be made and the question of rabies definitely settled by inoculation experiments on animals or microscopical examination of the brain and cord. The treatment should be cauterization in every case, less than one hour after the bite, by means of the actual cautery, strong acid, or acid nitrate of mercury. Wounds must be opened by the surgeon, and even amputation may be necessary. Washing and syringing wounds with water at 130° F. is desirable. Sucking the wound to draw out the poison has been practiced and may be safely done if there are no breaks of the membrane of the lips or mouth. A method recommended by Keirle is as follows. The wound is washed with bichloride solution and dried; a strong solution of carbolic acid is then applied to the depths of the wound or wounds with a suitable applicator; this is followed immediately by pure nitric acid, and this again by alcohol. A surgical dressing is then applied. Under thorough cauterization rabies develops in 33 per cent of cases bitten; without cauterization, in 83 per cent. Administration of morphine or alcohol does harm. Immunizing by the Pasteur method should be practiced in all cases. By this method the patient is inoculated with attenuated virus by the injection hypodermically of emulsion made from the brain of a rabid animal repeated in stronger and stronger concentration during 21 days. The results of the Pasteur method are now indisputable, but it is of the utmost importance to begin the treatment as soon as possible after the injury, as the prospect of success grows less and less day by day of delay. Following are the results of the antirabic treatment at the Institut Pasteur, Paris, from 1886 to 1908 inclusive: 31,330 cases were treated with 238 deaths, a mortality rate of 0.759 per cent. During treatment 50 deaths occurred, or 0.159 per cent; within a short time after treatment 188 died, or 0.601 per cent. Reinlinger found a mortality rate of 0.41 per cent in 131,579 cases. The treatment is not entirely harmless. Besides the local and constitutional reaction there sometimes occurs paralysis or paraplegias, which occasionally prove fatal. Pasteur institutes are distributed well over the civilized world, most large cities having one. In New York City the virus is now made and distributed by the department of health. The New York State Department of Health was the first to send out treatment packets by mail. The practice of State treatment and distribution, as well as the examination of dogs, is now well organized throughout the United States.

Pseudorabies, or **Lyssophobia**, is a hysterical condition, in which the patient, who imagines that he has rabies, in his morbid condition of mind enacts some of the symptoms and may even be frightened to death.

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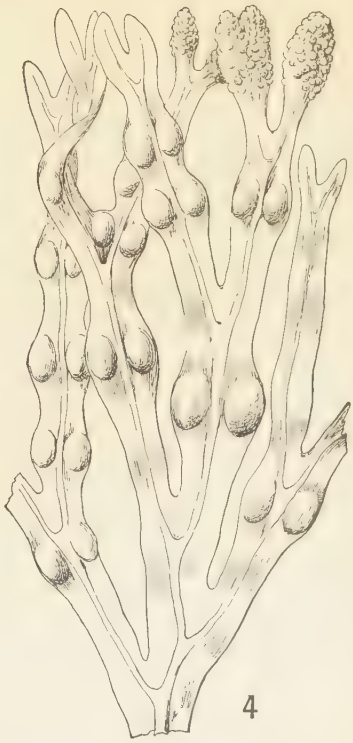
HY'DROPHYTES (from Gk. *ὕδωρ, hydōr*, water + *φυτόν, phyton*, plant). Plants which grow naturally either in water or in very wet soil. This term is contrasted with "mesophytes" and "xerophytes" (qq.v.). Common illustrations of hydrophytic plant societies are swamps of all kinds, pond societies, and ocean plants. Various classes of hydrophytes are taken up under separate heads, where the main features of the various hydrophytic societies will be discussed. It will be desirable, however, to give a short account of the characteristic hydrophytic structures. The roots of hydrophytic plants are in most cases very greatly reduced and in some cases altogether lost, as in some of the duckweeds. Root hairs are also commonly lacking in water plants. The stems and leaves are not, as a whole, conspicuously reduced in water plants, but they show peculiarities of structure that are quite interesting. The leaves of hydrophytes are frequently finely divided, as in the water milfoil and mermaid weed. In many cases where the leaves are not finely divided, they are very thin, consisting of one or two layers of cells only; e.g., in tape grass. An examination of the structure of the leaves shows the entire absence of stomata in the submerged parts, an absence of air spaces in most of the ribbon-like forms, complete or almost complete absence of palisade cells, and a very thin epidermis which contains chlorophyll. In contrast with submerged leaves those floating upon the surface of the water usually have well-developed palisade cells, many stomata upon the upper side, and an abundance of intercellular air spaces. The stems suffer a noteworthy reduction in the size and development of the water-conducting vessels and mechanical tissues and a great increase in air spaces. The structures just described are found in their highest development in submerged water plants. Hydrophytes whose leaves are aërial show no conspicuous differences from ordinary land plants in most respects. One class of hydrophytes, which may perhaps be called amphibious plants, shows some remarkable variations, especially in structure. Leaves which are developed under the water show the characteristic structures outlined above, including the fine leaf division, whereas leaves of the same plant developed in the air show typical aërial leaves without these divisions and with palisade cells, stomata, and a thick cuticle. The stimulus or stimuli which cause these wide variations are not certainly known, but they are discussed to some extent in the article Leaf. Common American plants, which show variations to a high degree, are the aquatic buttercups, the mermaid weed, some of the cresses, and water hemlocks.

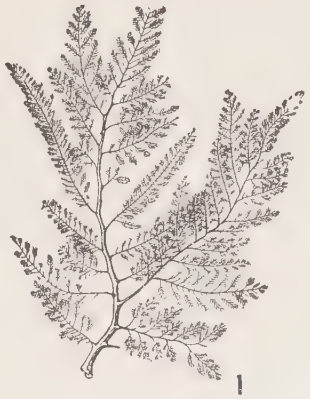
However the hydrophytic structures that have been described in the preceding paragraph may have arisen, certain advantages can be clearly seen, at least in some cases. The thin walls of the epidermis, which are in striking contrast to the thick cutinized walls of many aërial leaves, permit the easy entrance of water and substances dissolved in the water. On this account many submerged plants are practically independent of soil relations; they take in most of their material directly from the water. It is easily possible to grow cultures of many of these plants without having any root connection whatsoever. While certain forms, such as the water milfoil and the water weed (*Elodea*), develop roots in ordinary aquarium cultures, other forms, such as hornwort (*Ceratophyllum*), never develop roots and yet grow quite as vigorously as in their natural rooted condition. A few forms, such as the bladderwort (*Utricularia*) and some of the duckweeds, have no roots in nature. Of course, in such cases the entire absorption of nutriment must take place through the leaf epidermis. The fact that the leaf epidermis contains chlorophyll is also a matter of advantage, since water very soon destroys the efficiency of rays of light. At a comparatively shallow depth there is a cessation of the development of green plants. A reduction in the water-conducting tissues, while not necessarily an advantage, is, nevertheless, not harmful, inasmuch as the absorption is so largely through the leaf, instead of the root as in land plants. The reduction in root development is not so easy to understand, since it would seem that holdfast organs would ordinarily be of advantage; then, again, any absorption which the roots might make would so much the more increase the capacity of the plant. A high development of air cavities is a distinct advantage, not only to help float the plant, but probably to a much higher degree to act as a sort of air storage. It can readily be seen that the conditions for obtaining air underneath the water are not of the best, and that any additional means for obtaining or for storing air would increase the plant's efficiency. The reduction in the development of mechanical tissues, of palisade cells, and of stomata is not necessarily an advantage to water plants; but since these tissues are not actually needed, the plant loses nothing by its failure to develop these structures. The peculiar leaf forms that have been noted above are, perhaps, not necessarily of any exceptional advantage. It must not be supposed that everything in a plant can be explained in accordance with the need of the plant. It is much more likely that the explanations should be referred to definite chemical and physical causes. However, in the case of finely divided leaves, it can be seen that a much larger proportion of cells comes in contact with the material than is true with the more compact air leaves. Thus, the absorption capacity of the leaf is increased. Finely divided leaves are also doubtless more able to escape the dangers coming from currents of water than leaves which are more compact.

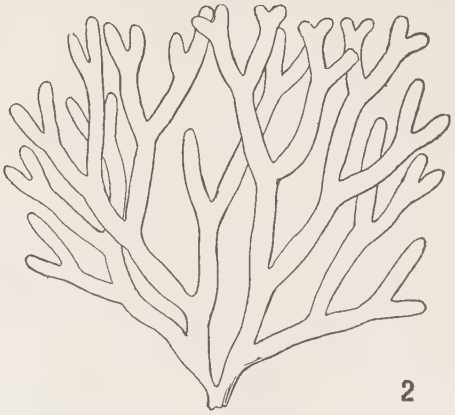
The hydrophytic plant societies are essentially all edaphic, i.e., they are conditioned by local causes. In this respect there is a wide contrast as compared with the xerophytic plant societies. Perhaps some of the ocean formations may be conditioned by climatic causes to some extent, but the ordinary hydrophytic societies of swamps and ponds are due to essentially local conditions. Perhaps no plants have such a wide distribution as certain of the hydrophytes. This is particularly true of ocean plants, where it can easily be accounted for by the almost universal distribution of the oceans themselves. It is true, to a striking degree, as well of the pond and swamp plants. Such plants as the pond weeds, cat-tails, and bulrushes are found almost throughout the world where the habitats are favorable. Perhaps

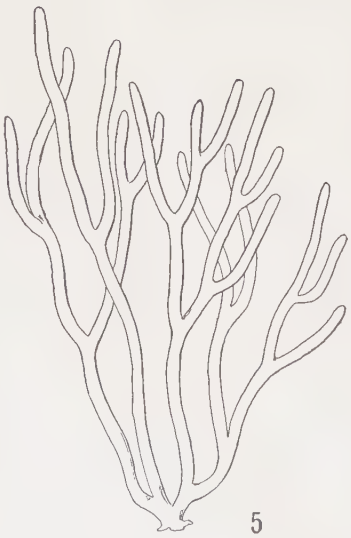


BROWN ALGÆ

1. Postelsia palmæformis
2. Sargassum bacciferum
3. Laminaria digitata
4. Fucus vesiculosus







RED ALGÆ

1. Ptilota californica
2. Scinaia furcellata
3. Delesseria sanguinea
4. Polysiphonia Brodiaei
5. Nemalion multifidum
6. Porphyra laciniata

the chief reason for the wide distribution of hydrophytic species is the great ease of dispersal by means of the water itself; but a reason, almost if not quite as important, is furnished by the wide degree of uniformity of hydrophytic conditions. Since water is colder in summer and warmer in winter than adjoining portions of the land, it is obvious that water plants can, for reasons of temperature, have a much wider distribution than land plants.

The hydrophytic plant societies may be roughly subdivided into those associated with salt water and those with fresh water. The former are treated under the heads PLANKTON, BENTHOS, MANGROVE SWAMP, and HALOPHYTE; the latter under the head of SWAMP, where it will be convenient, not only to treat the swamps proper, but also to some extent the development of the swamps from ponds and lakes. See AËRATION; DISTRIBUTION OF PLANTS.

HY'DROPLANE. See MOTOR BOATING.

HYDROSPHERE. See GEOGRAPHY.

HYDROSTAT'IC PRESS. See HYDRAULIC PRESS.

HYDROSTAT'ICS (from Gk. *ὕδωρ, hydōr*, water + *στατικός, statikos*, causing to stand, from *ἱστάναι, histanai*, to stand). That branch of mechanics which treats of the properties of liquids in equilibrium and of solids either totally or in part immersed in liquids. Many of the laws and phenomena of hydrostatics apply equally well to both liquids and gases, i.e., to fluids. A fluid may be defined to be such a form of matter that it yields to any force, however small, which acts to make one layer of the substance move over another; thus, the shape of a liquid or gas depends entirely on the forces acting on it, however small, and not on the body itself, as in the case of a solid. A portion of liquid left to itself—as a falling drop—assumes a spherical shape owing to the contraction of the surface layer. (See CAPILLARITY.) Under the action of gravity a liquid contained in an open vessel takes the shape of the vessel so far as all the surface is concerned, except that portion in contact with the air and the portions near the edges of this "free surface." This surface is horizontal, being perpendicular to the vertical force of gravity if the liquid is at rest; because, if it were inclined to this, there would be a component of gravity tending to make the higher portion of the liquid slide down. When a fluid is said to be at rest, it is not implied that there is no motion of the molecules, but simply that there is no *flowing*, i.e., no currents, no wind. In the case of the open vessel there is a force pressing down on the free surface due to the weight of the atmosphere, and, since the liquid presses against the solid walls, they have a force of reaction against the liquid; thus, it is exactly as if the liquid were contained in a vessel and a tight-fitting piston were pressing down on its top surface. If a gas is contained in a balloon or in a room, it expands and is uniformly distributed throughout the space open to it; it presses against the containing walls, and they have an equal reaction on the gas. If a small quantity of a certain liquid is poured into a tall cylindrical vessel, then another liquid with which the first does not mix is poured carefully on top of this, etc.; the equilibrium—if there is any—will be stable only if the density of any one liquid is less than that of the liquid below it and greater than that of the one above it. For, if the density of any layer is greater than that of the one below it, the potential energy of the two will be decreased if the heavier liquid gets to the bottom and so comes closer to the earth.

Fluid Pressure. As a result of the reaction of the containing walls on a liquid or a gas, there is always a "pressure" at each point throughout the fluid, i.e., there is a force acting over any surface immersed in the fluid; the numerical value of the pressure over any area is by definition the force per square centimeter, and the "pressure at a point" is the limiting value of the force acting on any surface at that point divided by the area of the surface, as the area is supposed to be taken smaller and smaller until it becomes practically a point. This pressure due to the reaction of the walls is the same for all points in the fluid. There is also an additional pressure at each point of a fluid on the surface of the earth owing to the fact that any horizontal plane passing through that point has to support the *weight* of the column of fluid vertically above it. If the area of this plane is A; the vertical height above it to the top of the fluid, h; the average density of the fluid, ρ; the acceleration due to gravity of a falling body g; the upward force will be ρhgA, and therefore the pressure is ρgh. These two pressures are the only ones which affect our senses or produce mechanical effects in general; but there is also, of course, at any point in a liquid what may be called "cohesion," or pressure due to the action of the molecules on each other. Some idea of the magnitude of this may be obtained by separating the molecules, e.g., by boiling the liquid. It is greatly affected by dissolving substances in the liquid. The pressure against any surface immersed in a fluid at rest is always at right angles to it, otherwise there would be produced a flowing owing to the component of the pressure along the surface. Further, the pressure at any point in a fluid at rest is the same in all directions, because, if it were greater in one direction than in another, the fluid would flow. Therefore the pressure at any point in a fluid at rest is the sum of the pressure due to the reaction of the walls, P, and that due to gravity, ρgh. As noted above, the former is the same for all points in the fluid. As a consequence, if a fluid is inclosed in a cylinder into which fit two pistons of different areas, A_1 and A_2, the forces which must be applied to these pistons from without to prevent the fluid from pressing them outward are PA_1 and PA_2, omitting any action of gravity. Therefore, if A_1 is small compared with A_2, the force on the former piston is small compared with the balancing force on the latter; so a small force may produce a large one. In a liquid which is almost incompressible, P may be very great, and so the force produced may be enormous; but in a gas, which is easily compressed, P is never very large, and so the force produced is small. This principle is that of the hydrostatic press. See HYDRAULIC PRESS.

The total pressure, i.e., $P + \rho gh$, at all points in the same horizontal level in any one fluid, regardless of the shape or size of the containing vessel, is the same; for imagine a vessel with a horizontal bottom, all points of the fluid along this must have the same pressure, otherwise the fluid would flow; the pressure at any point at a level h centimeters above this bottom plane is less than that at the bottom by an amount ρgh—the same for all points in the plane. If, now, portions of the vessel are imagined removed so as to leave a vessel of any shape, the pressure at

the various points remains unaffected. The pressure on any portion of the containing walls varies with the depth; so the thrust outward on this portion is the resultant of a series of parallel forces, increasing from top to bottom; the point of application of this resultant is called the "centre of pressure" (q.v.). If the wall is a vertical rectangle, the centre of the pressure, due to gravity, for a liquid, is at a distance one-third the height from the bottom, etc.

Archimedes' Principle. If a solid is completely immersed in a fluid, the latter exerts on it pressures from all directions perpendicular to the elementary portions of the surface of the solid. These pressures will produce an upward force on the solid equal to the weight of the fluid displaced by it, because, if the space occupied by the solid were to be filled with the fluid, there would be equilibrium; and, as this substitution has not changed the pressures at the boundary surface of the volume formerly occupied by the solid, the resultant of these surface pressures must just balance the weight downward of the fluid. This buoyant force acting on the solid must then equal the weight of the fluid displaced by the solid and must have a vertical line of action passing through the centre of gravity of the displaced fluid. This is called "Archimedes' principle." The apparent loss in weight of a body immersed in water, the suspension of a balloon, etc., are illustrations of it. It evidently gives a method for comparing the density of a solid with that of a liquid; for the weight of a solid in a vacuum is $\rho g v$, if ρ is the density of the solid and v its volume; and its apparent loss in weight when weighed suspended in the liquid is $\rho^1 g v$, if ρ^1 is the density of the liquid; both the weight and the loss in weight may be measured, and thus the ratio of ρ and ρ^1 determined.

Free Surface Waves. Liquids differ from gases in having definite volumes; consequently, as noted before, if a liquid is poured into an open vessel, it will have a surface in contact with the atmosphere. This is called the "free surface." If the liquid is in equilibrium, this surface must be at right angles to the forces acting on it. Thus, a liquid at rest in an open vessel has a horizontal surface owing to the earth's force of gravity. If this surface is disturbed, e.g., by dropping in a stone, the displaced portion will return to its previous level owing to the action of gravity, but its inertia will cause it to continue its motion, making a displacement in the opposite direction; then it will return, etc., thus vibrating up and down and producing waves out over the surface. These gravitational surface waves on a liquid advance with a velocity which depends upon the depth of the liquid and the wave length of the waves. Thus, if the liquid is shallow compared with the wave length, the velocity is given by the formula $v = \sqrt{hg}$, where h is the depth of the liquid and g is the acceleration of a falling body. If the liquid is deep compared with the wave length, the velocity of the waves is

$$v = \sqrt{\frac{g\lambda}{2\pi}},$$

where λ is the wave length of any train of waves and $\pi = 3.1416$. If the waves are extremely short—i.e., ripples—their motion is not due to gravitation, but to capillarity (q.v.), because the surface is increased in area by the ripples; and the capillary forces are in this case large compared with the gravitation ones, the surface being so slightly elevated or depressed. The velocity of these capillary waves is

$$v = \sqrt{\frac{2\pi T}{\lambda \rho}},$$

where T is the "surface tension" of the liquid. (See CAPILLARITY.) If the vessel containing the liquid is cylindrical, and if this is set rotating rapidly about its axis, the free surface will no longer be horizontal, because now the surface is acted upon by both gravity and "centrifugal force." The shape of the surface will be such as to be at right angles to their resultant, and will actually be a paraboloid of revolution.

If a liquid is poured into a vessel which consists of several parts, the liquid will stand at the same height in all parts provided they are wide and open to the atmosphere; for, as has been proved, all points at the same horizontal level in a fluid are at the same pressure, and conversely; and the points in the free surfaces are at the same pressure, viz., that of the atmosphere. If, however, a liquid is poured into a U-tube which stands erect, and then a lighter fluid, which does not mix with the first, is poured into one arm, the level of the surfaces of the liquids in the two arms is not the same. The pressure at points which lie in the horizontal plane passing through the surface of separation of the two liquids must be the same, because they are all connected by one liquid. The pressure at the points in one arm in this level is $\rho_1 g h_1 + P$, where ρ_1 is the density of the liquid in that arm, h_1 is the vertical height of its free surface above the level plane, and P is the pressure of the atmosphere on the free surface; similarly the pressure at this level in the other arm is $\rho_2 g h_2 + P$, where ρ_2 is the density of the liquid whose vertical height from the level to the free surface is h_2. Therefore

$$\rho_1 g h_1 + P = \rho_2 g h_2 + P,$$

or

$$\rho_1 h_1 = \rho_2 h_2.$$

This principle evidently furnishes a method for the comparison of the densities of two liquids which do not mix.

Flotation. If a body less dense than a liquid is immersed in the liquid and allowed to come to equilibrium, it will rise to the surface and "float" with only part of its volume below the surface. By Archimedes' principle the upward force equals the weight of the liquid displaced; and, since the body does not move in a vertical direction, this force must equal the weight of the body itself. Therefore a floating body displaces a volume of the liquid of weight equal to its own. The upward force acts through the centre of gravity of the space formerly occupied by the liquid displaced, while the downward force acts through the centre of gravity of the floating body. If the body is in equilibrium, these two forces must have the same line of action, i.e., the two centres of gravity must lie in the same vertical line. In most cases this equilibrium is stable, but it may be unstable, e.g., an oblong block set floating with its long direction vertical. The test of stability is to give the floating body a small displacement, i.e., tip it slightly, and to see if the forces acting on it tend to restore it to its previous position or to make it tip still further. See METACENTRE.

Capillarity. Where the free surface of the

liquid meets the wall it is not horizontal, and when a tube of fine bore dips into a liquid the free surface inside the tube is at a different level from that outside. These variations are said to be due to capillary action, and they may all be shown to be due to the fact that a liquid surface contracts so as to have the smallest area compatible with existing conditions. See CAPILLARITY.

The principle of Archimedes, discussed above, is attributed correctly to the philosopher of Syracuse; and many facts in regard to liquids were known to him and other scientists of antiquity. Galileo first stated the law of connecting tubes, and Pascal was the first to recognize the fact that the reaction of the walls produced a pressure which was the same at all points throughout the fluid. The ordinary statements and proofs of hydrostatics are given to-day exactly as they were by Stevinus (1548–1620). For further information, consult: Greenhill, *Hydrostatics* (London, 1894); S. L. Loney, *Elements of Hydrostatics* (2d ed., New York, 1900); E. S. Gould, *Practical Hydrostatics and Hydrostatic Formulas* (ib., 1903); G. M. Minchin, *Treatise on Hydrostatics* (2d ed., Oxford, 1912).

HY'DROSULPHU'RIC ACID. See SULPHURETED HYDROGEN.

HY'DROTHER'APY (from Gk. *ὕδωρ, hydōr*, water + *θεραπεία, therapeia*, cure, from *θεραπεύειν, therapeuein*, to cure, from *θεράπων, therapōn*, attendant). The use of water as a remedial agent. The efficacy of water in the cure of numerous forms of disease has long been recognized. Water was largely employed by Hippocrates in the treatment of many kinds of disease. Horace speaks of Antonius Musa, the hydropathic physician of the Emperor Augustus (*Epist.*, i, 15). Both Celsus and Galen speak favorably in their writings of the use of water in the cure of disease, regarding it as of high value in the treatment of acute complaints, particularly of fevers. Throughout the Middle Ages, likewise, many physicians, including Aëtius, Paulus Ægineta, and Paracelsus, were advocates of the remedial virtues of water; all of them, however, having faith in its uses in the treatment rather of acute than of chronic disorders. In 1723 Niccolò Lanzani, a Neapolitan physician, published a learned treatise on the subject. In England, about the beginning of the eighteenth century, Sir John Floyer and Dr. Baynard made large use of water. Their conjoint work, denominated *Psychrolousia*, or the "History of Cold Bathing, both Ancient and Modern," is replete with quaint learning and practical shrewdness and sagacity. But the most able and scientific among the older treatises that have appeared in England on the subject of the water treatment is the work of Dr. Currie, published in 1797, entitled *Medical Reports on the Effects of Water, Cold and Warm, etc.* In this work Currie recommends the cold affusion in typhus and other fevers and gives practical directions in regard to the cases and the times when it may be used with advantage, although he appears to have limited his use of water to acute ailments exclusively.

We have thus seen that up to the beginning of the nineteenth century, by some of those who employed it as a curative agent, water was used in the treatment of acute, and by others of chronic, diseases; by some as an internal agent alone; by others as an external application in the various forms of the bath; but never in all the manners combined. This combination was first effected by the original genius of Vincent Priessnitz, a Silesian farmer, with whom began a new era for the water cure. It was owing, we are told, to his successful treatment of more than one bodily injury which he had sustained in his own person that, about the year 1820, Priessnitz became so convinced of the curative powers of water as to employ it medically in the cure of others. Beginning with the external application of water for trifling diseases among the poor of his neighborhood, he gradually undertook an extended range of cases and multiplied the modes of administration, introducing the wet compress, the douche bath, partial baths of all kinds, the sweating process, the wet sheet, together with copious drinking of pure water. In addition to water in all these forms, he insisted on the value of exercise, diet, fresh air, and mental repose in the cure of disease, thus practically calling to his aid the entire resources of hygiene, and establishing, by a simple yet thoroughly original combination, nothing less than a new system of medical treatment. As to the success which attended Priessnitz's practice, it is an historical fact that of 7500 patients who had gone to Gräfenberg for advice and treatment up to the year 1841, or within the space of about 20 years, there had been only 39 deaths. It is to be regretted, however, that the founder of the new system was not an educated physician, so that he could have understood better the philosophy of his own practice and explained it more correctly. He would not have called his system the "water cure," a name scientifically one-sided and incomplete and therefore misleading.

The undoubted merits of hydrotherapy at length called to its defense many men of standing in the profession, who, allowing for some of its early extravagances, explained it scientifically, and from their advocacy has sprung up a school of hydropathic physicians. Dr. Winternitz, of Germany, in 1883 laid down the scientific principles of modern hydrotherapy. The fundamental principles of hydrotherapy are very simple. The art of applying these principles requires much teaching, but any one with even moderate sense and intellect can grasp the essential features. Water may be used either internally or externally. Internally it may be used simply to wash out a cavity—the nose, the mouth, the stomach, the bladder, or the rectum. In addition, it may be taken internally hot or cold and passed into the blood. It may be used hot in the rectum, as a simple enema, or for purposes of stimulation. Externally water may be used in many conceivable ways, but essentially the use of water means with it the use of two very necessary aids, heat and cold. Hydrotherapy, apart from the use of heat and cold, is of secondary importance. The action of water in the treatment of disease is therefore largely mechanical. The psychical side is not unimportant. It has been used by enlightened physicians ever since the dawn of medicine, and its effects taught in all medical schools. Only the quack and the charlatan will claim that hydrotherapy is a cure-all. Eccentricities, like the Kneipp cure and others, are to be avoided by the sensible. Water acts physically and mechanically. It is capable of readily taking up heat and of giving it up; it thus lends itself most readily to the use of thermal agents. It may be used in gaseous form (steam), liquid form, or solid form (ice). The action of heat and cold is essentially important. Smooth muscle fibre expands under the action of

moderate heat and contracts under the influence of cold. Its contracting power may be destroyed by an excess of either. Cold and heat therefore act as irritants to the nervous system, and through their agency we can act upon all of the organs, to stimulate or depress their activities. The heart, lungs, kidneys, liver, spleen, skin, etc., may all be influenced; the body heat and the output of moisture and secretions may be regulated. Thus, by the use of heat or cold to certain portions of the skin or internally, almost every organ in the body can be influenced through its blood vessels, and the skilled physician can, by guiding and directing these effects, bring about changes in vascular states; can remove excess of blood from one part of the body and bring it to another; can impart tone to a flagging organ, as the heart, or to the muscles or to the spinal cord; can increase the secretions from organs, such as the skin or the kidneys, and thus assist in excreting poisonous products from the body.

Chief among the eminent exponents of hydrotherapy in Europe are Kisch, professor in the University of Prague, Strasser and Buxbaum of Vienna—the former of the University of Vienna, the latter chief of the Hydrotherapeutic Institute. In the United States, besides Baruch of New York, Eshner of Philadelphia, Hinsdale of Hot Springs, Va., and Kellogg of Battle Creek, Mich., are well known.

The applications of water to disease are well systematized by Baruch as *ablution, affusion, sheet bath, drip sheet, compresses, wet pack, tub bath*, and *douche*.

Ablution. Simple application of water by the hand or moist cloth over the body. In fevers the abdomen, the back, the chest, the lower extremities as far as the knees, are bathed successively every two or three hours. A temperature of 75° F. should be used at first and gradually reduced to 60° F. Chilling is to be avoided. Reaction is to be gained, the superficial capillaries becoming suffused and the body assuming a pinkish hue. Rubbing should always be used in ablutions.

Affusion. The patient, with a cold wet cloth about the head, sits or stands in a tub containing about a foot of water at 100° F. A broad stream of water from a bucket or pitcher is poured with force directly over the body. The stimulation will depend upon the temperature of the water and its force of delivery. This is often used in states of profound prostration, in coma, and in stuporous, delirious states.

Sheet Bath. A rubber sheet is laid down over one-half of the bed. This is covered by a blanket. Then a linen sheet is dipped in water at a temperature of from 60° to 70° F., and while still wet is wrapped about the patient while he lies upon the blanket. The face is bathed in ice water and the head covered with a wet towel. The nurse or attendant rubs the patient energetically over the body. As the body reacts and becomes warm, water at still lower temperatures may be sprayed over the sheet. Afterward the patient may lie wrapped up in the blanket. This is an excellent method for reducing temperature in fevers and is applicable in practically all acute diseases accompanied by high temperature.

Drip Sheet. The patient, standing in a tub of water at 100° F., has a wet sheet, wrung out, wrapped about him. He is then firmly rubbed until a reaction occurs. He may be slapped gently instead of being rubbed. This procedure forms an excellent tonic in nervous exhaustion, in the early stages of tuberculosis, and in chlorosis or anæmia.

Compresses. These consist of bands or squares of old linen to which flannel is attached and strings made to fasten the appliance about a part. The linen piece is usually wrung out of hot or cold water and applied to the part and wrapped about by the flannel to prevent evaporation. These compresses are valuable in sore throat, tonsillitis, rheumatism, pneumonia, sprains, etc. They should be renewed hourly in acute processes.

Wet Pack. This is similar to the sheet bath, save that the sheet covering the body is wrung dry and then the patient is rolled up completely in thick blankets. The air should be kept out by fixing the blanket very securely about the feet and neck. The wet pack is more useful in chronic cases. Friction is essential in the acute cases, in order to bring about quicker reaction; hence in these the sheet bath is usually preferred to the wet pack.

Tub Bath. A trained nurse should give this bath. See TYPHOID FEVER.

Hammock Bath, or Continuous Bath. This is a device by which the patient is suspended for periods of time, varying from hours to months, in a bathtub filled with water at a temperature from 95° to 100° F. The procedure is applicable to cases of cerebral excitement, acute mania, delirium tremens, and chronic organic diseases of the central nervous system, as well as extensive burns and suppurating wounds. Dr. A. Rose, of New York, has advocated the continuous bath for the treatment of tuberculosis, both of the lungs and bones.

Neuro-vascular Training (Baruch). This consists of the hot-air-cabinet treatment, employed till the skin is relaxed and perspiration is free, being followed by a douching of the body at 95° F., 20 pounds' pressure for one minute. On each successive day the temperature is lowered two or three degrees till 70° F. is reached, after several days.

Douche. This apparatus throws a jet of water against the body from a hose and is best given in a special institution devised for this work. Arrangement is made in the apparatus whereby the force of the jet and its temperature can be regulated.

Marienbad, Franzenbad, Ems, Kissingen, Homburg, Brückenau, Aix-les-Bains, Vichy, Harrogate, Bath, and many other European spas present varying water treatments. In this country Mount Clemens, Battle Creek, Hot Springs, Ark., Hot Springs, Va., Colorado Springs, Saratoga Springs, and several other towns provide balneologic possibilities. One of the best known of the hydrotherapeutic procedures is the "Nauheim bath," elaborated by Beneke and the late August Scholt at the German town which bears its name, and administered to many thousands annually. The water used contains in solution various salts and carbonic-oxide gas. The "Nauheim system" consists of a series of graduated baths of decreasing temperatures, besides exact diet, exercise, and rest. In Nauheim salts and gas are added to the later series of baths. Incipient arteriosclerosis, certain kidney disorders, rheumatism, lumbago, neuritis, arthritis, neurasthenia, exhaustion, and especially certain heart disorders are treated with success in very many instances by this system of baths. In Saratoga Springs, N. Y., the natural mineral waters contain a larger gas content than any

others east of the Rocky Mountains, and Saratoga is the only locality in the United States where the Nauheim baths are given with natural radioactive saline water without admixture of gas, under the control of the government of New York State, through a special reservation commission. See SARATOGA SPRINGS.

Bibliography. Baruch, *Principles and Practice of Hydrotherapy* (New York, 1908); Winternitz and Kisch, in Cohen's *System of Physiologic Therapeutics*, vol. ix (Philadelphia, 1902); Baruch and Shrady, "Hydrotherapy," in Hare's *Modern Treatment* (New York, 1910); Hinsdale, *Hydrotherapy* (Philadelphia and London, 1910); Maloney, "Hydrotherapy," in Forchheimer's *Therapeusis of Internal Diseases* (New York, 1913).

See BATH; TYPHOID FEVER.

HY'DROTHO'RAX (Neo-Lat., from Gk. *ὕδωρ, hydōr*, water + *θῶραξ, thōrax*, chest). The term applied to dropsical collections in the pleura (q.v.), a closed serous sac enveloping the lung on either side. When it exists to any extent, the pressure which it exerts on the lungs impedes the passage of the blood through them, occasions difficulty of breathing, and lividity of countenance soon appears. The physical signs by which the disease can be detected by the physician are changes in the condition of the chest, as ascertained by auscultation, percussion, and succussion.

Hydrothorax may depend upon inflammation of the secreting membrane, or it may be a consequence of organic disease of the heart or lungs, liver, or kidneys. With regard to treatment, when the disease seems to depend upon inflammation of the pleura, great advantage may often be derived from occasional cupping and repeated blistering, hydragogue catharsis, and withdrawing the fluid from the chest (tapping) by means of a hollow needle.

HYDROT'ROPISM (from Gk. *ὕδωρ, hydōr*, water + *τροπή, tropē*, a turning, from *τρέπειν, trepein*, to turn). The sensitiveness of certain plant organs to the presence of unequally distributed water vapor, which causes them to turn towards or away from the region of greater

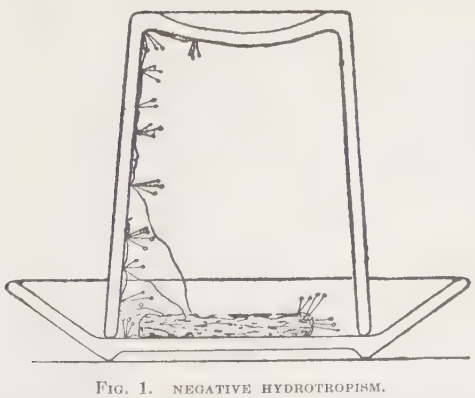


FIG. 1. NEGATIVE HYDROTROPISM.

Culture of the black mold on bread in a moist chamber. The hyphæ carrying the beadlike sporangia grown in such directions as to be as far as possible from the surfaces of bread and glass from which moisture is diffusing. Diagrammatic.

density. Among the fungi hydrotropism is shown particularly by those filaments (hyphæ) which bear the sporangia. While most of the hyphæ ramify through the moist substance on which the fungus grows, the sporangial hyphæ rise at right angles to it. If they start from a salient angle on the substratum (e.g., the edge of a slice of bread), they may take the position shown at Fig. 1, growing equidistant from the two moist surfaces. If they arise from a reentrant angle, they place themselves likewise so

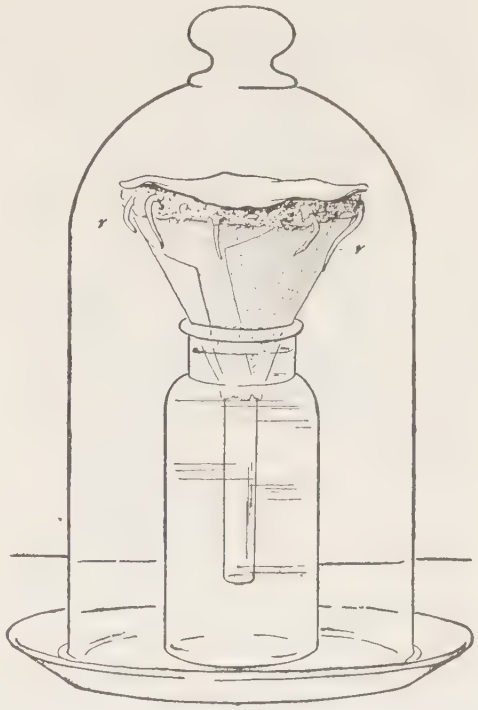


FIG. 2. POSITIVE HYDROTROPISM.

Grains of corn, planted in wet sand in a funnel whose outer surface is covered with wet blotting-paper, have germinated. The roots, *r*, instead of growing straight down, as they would do in saturated air, have applied themselves to the wet paper. Hydrotropism under these conditions overpowers geotropism.

as to be as far away from each moist surface as possible. The roots of higher plants are also sensitive to moisture, the stimulus of which may exceed that of gravity, as shown in Fig. 2. Here roots of corn planted in the heaped-up sand have come over the edge of the glass funnel and have started to grow downward in the moist air. As they get farther from the surface of the wet paper covering the outside of the funnel they find drier and drier air. A stream of water particles, however, is reaching them from one side. At a certain point the stimulus of the diffusing moisture overcomes the geotropism (q.v.), and the root, growing more rapidly on one side, is directed towards the moist surface. When it comes into the neighborhood of the moist paper again, the sides are less unequally stimulated, the stimulus of gravity reasserts itself, and the tip again grows downward. The alternating prevalence of hydrotropism and geotropism is shown in the wavy course of the longer roots. It will be observed that the more rapid growth which directs the tip towards the moist surface is not due merely to the absorption of water, for it occurs on the drier side of the root. It is an induced process involving growth. Hydrotropism is a form of chemotropism (q.v.).

For hydrotropism in animals, see TROPISM.

HY'DROZO'A (Neo-Lat. nom. pl., from Gk. *ὕδωρ, hydōr*, water + *ζῷον, zōon*, animal). A class of Cœlenterata in which the simplest form of the body, as in the polyps, is a sac attached by its posterior end, and with a digestive cavity communicating with the exterior by a mouth only. The mouth is surrounded by hollow tentacles. The body is composed of two cellular layers, the ectoderm and endoderm, separated by a gelatinous, noncellular "mesoglœa." The body is usually differentiated into two sorts of zooids, i.e., "polyps," or nutritive zooids, which are usually sexless, and "medusæ," or reproductive zooids. The latter produce medusa buds, which on being set free are called medusæ and are bisexual. In these medusæ the body is greatly more complicated than in the polyps, being bell or umbrella shaped, with a well-developed nervous system, composed of a thread ring around the eye of the disk and with ganglia near the "eyes," or sense organs. The digestive cavity is differentiated into a central and a peripheral portion, the latter forming radial and circular canals. The eggs and sperm are discharged externally, and fertilization of the egg takes place in the sea. Nettling organs (see NEMATOCYST) are usually present; they arise from some of the interstitial cells and are most abundant in the tentacles. Many Hydrozoa (*Hydra* excepted) exhibit the phenomenon of alternation of generations (q.v.). The asexual polyps give rise to buds which develop into medusæ, and the latter lay the eggs from which are hatched the polyps. The medusæ are more or less phosphorescent. They abound in all seas, while *Hydra* is a minute fresh-water form. Very primitive fresh-water forms are *Protohydra* and *Microhydra*, which are without tentacles.

The Hydrozoa are grouped in five orders: (1) Leptolinæ, having a fixed zoöphyte or polyp stage, and the sense organs exclusively ectodermal (Anthomedusæ and Leptomedusæ); (2) Trachylinæ, having no fixed zoöphyte stage, all being locomotive medusæ (Trachymedusæ and Narcomedusæ); (3) Hydrocorallina, coral-making polyps (*Millepora* and *Stylaster*); (4) Siphonophora, pelagic hydrozoans in polymorphic colonies; (5) Graptolithoidea, which are an extinct Paleozoic group.

The term Hydromedusa is often used as synonymous with orders one and two above. In some species only the free living, in others only the fixed, stage occurs. In the majority there is an alternation of the one stage with the other in the life history. The Scyphomedusæ are larger and more complicated in their structure than the Hydromedusæ and belong in class Scyphozoa.

Of the orders above mentioned, the Hydrocorallina and Graptolithoidea are of importance to the geologist, for they contain fossils of considerable interest. See STROMATOPORA; GRAPTOLITE.

Consult: T. H. Huxley, *Oceanic Hydrozoa* (London, 1859); Parker and Haswell, *Text-Book of Zoölogy* (New York, 1897); Fowler, "The Hydromedusidæ and the Scyphomedusidæ," in Lankester's *Treatise on Zoölogy*, part ii (London, 1900); S. J. Hickson, "Cœlenterata and Ctenophora," in *Cambridge Natural History*, vol. i (ib., 1906). See CORAL; CTENOPHORA; HYDRA; HYDROID; JELLYFISH; MEDUSA; POLYP; SIPHONOPHORA; ETC.

HYENA, hī-ē'nȧ (Lat. *hyæna*, from Gk. *ὕαινα, hyaina*, hyena, from *ὗς, hys*, hog, Lat. *sus*, AS., OHG. *sū*, Ger. *Sau*, Eng. *sow*, Av. *hu*, pig; connected either with Skt. *sū*, to bear, or with Skt. *sūkara*, swine, *sū*, maker, so called from the grunt). One of a family (Hyænidæ) of carnivorous animals remarkable for their generalized structure, which unites features characteristic of the cats, the civets, and the dogs. Their den-

DENTITION OF HYENA.

i, incisors; *c*, canine; *p*, premolars; *m*, molars.

tition is calculated for great tearing and crushing power and includes six incisors and two canine teeth in each jaw, five molars on each side of the upper jaw, and four in the under. This dentition and other features place them between the dogs and the civets, with the latter of which they are connected by *Proteles*. (See AARD-WOLF.) They seize an object with so firm a hold that among Arabs they are proverbial for obstinacy. The vertebræ of the neck sometimes become anchylosed in old hyenas. In size they equal the largest dogs. The hind quarters are lower and weaker than the fore quarters of the body, so that hyenas move with a shambling gait. The body is covered with long coarse hair, forming a mane along the neck and back. The feet have each four toes. The claws are strong, fit for digging, and not retractile. The tail is short. Beneath the anus is a deep glandular pouch, contributing much to the offensive odor which is one of their many disagreeable characteristics. Hyenas eat carrion as well as newly killed prey and are of much use, like vultures, as scavengers, clearing away the last remnants of carcasses. They sometimes attack cattle, especially if they flee, but rarely man, though they sometimes seize children. Selous gives surprising instances of their boldness and strength in East Africa. During the day they hide themselves in caves, old rock tombs, and ruined edifices; by night they roam singly or in packs. They prowl about towns and villages, and often dig up corpses that have not been deeply buried. This habit, together with their aspect, has caused them to be generally regarded with horror, and very exaggerated accounts of their fierceness have been prevalent. Instead of being untamable, as was long the popular belief, they are capable of being completely tamed and show an attachment to man similar to that of the dog; they have even been used as watchdogs. Hyenas are found only in Africa and in south Asia.

The most typical and at the same time familiar form is the striped hyena (*Hyæna hyæna*, or *striata*), which ranges from Abyssinia and the Libyan Desert eastward to India, where it is common throughout all the more open country, roaming widely at night in search of carrion or living sheep and dogs. It is dirty gray, with narrow tawny or zebra-like stripes, a coarse mane along the back, and a bushy tail. It is cowardly, silent, and both hated and feared by the rural people. Two other species are exclusively African and differ much from the striped, so that some naturalists put them in another genus (*Crocuta*). The spotted hyena (*Hyæna*, or *Crocuta, crocuta*) is larger than either the striped or the brown and is yellowish, thickly spotted with black, with nose and feet dark. It inhabits nearly all Africa south of the Sahara, hunts in packs, is courageous, and really does

HYENAS AND PROTELES

1. AARD WOLF (Proteles lalandi).
2. STRIPED HYENA (Hyæna hyæna).
3. BROWN HYENA (Hyæna brunnea).
4. SPOTTED HYENA (Crocuta crocuta).

most of the ravaging it is accused of. Its unearthly coughing cry is one of the most terrifying of animal utterances. Owing to the peculiar arrangement of the reproductive organs in this species, it is extremely difficult, except by careful examination, to distinguish the sexes by external characters, and from this fact the old myth that hyenas are hermaphrodites has doubtless arisen.

Median in size stands the brown hyena (*Hyæna brunnea*), found on both sides of southern Africa near the coast and often on the mountains. It is a less repulsive-looking animal than the others, has a doglike mantle of long brown hair which half conceals its barred legs, and becomes white on the sides of the head and chest, giving a quaint appearance to the front view, since the face itself is black, while the tall ears are gray.

The hyena family, of comparatively recent origin, appears to have evolved from the Viverridæ, through such an intermediate genus as *Ictitherium* of the Lower Pliocene of southern Europe. That *Ictitherium* ate bones in the same manner as do the modern hyenas has been proved by the nature of the coprolites found associated with their skeletons. True hyenas are common fossils in the Pliocene and Pleistocene deposits of Europe, during which periods they roamed in abundance as far north as France and England, as is exhibited by their remains in cave floors; and they are known in deposits of similar age in Asia. None have been found in America.

Consult: W. T. Blanford, *Geology and Zoölogy of Abyssinia in 1867–68* (London, 1870); id., *Fauna of British India: Mammals* (ib., 1888–91); Richard Lydekker, *The Game Animals of Africa* (ib., 1908); Roosevelt and Heller, *Life-Histories of African Game Animals* (New York, 1914); and the writings of sportsmen travelers in Africa and India. See Plate of HYENAS.

HYENA DOG. See HUNTING DOG.

HYÈRES, ē'âr'. A town in the Department of Var, France, 3 miles from the Mediterranean and 8 miles east of Toulon (Map: France, S., L 5). It is a fashionable winter resort, picturesquely situated on the south slope of a castle-crowned hill 670 feet high, in a district noted for its mild climate and luxuriant vegetation. Its chief buildings are the restored twelfth-century cathedral church of St. Louis, the hôtel de ville, public library, theatre, zoölogical garden, and museum. There is a considerable export trade in flowers, fruits, cork, and salt. The extensive salt marshes in the vicinity employ 300 people and yield more than 40,000 tons annually. In mediæval times, as Hiedera, Hyères was a favored port of call for Oriental pilgrims and as late as the fourteenth century was of greater importance than Toulon. Pop., 1901, 17,659; 1911, 21,339.

HYGEIA, hī-gē'yȧ, or **HYGIEIA**, hī-gī-ē'yȧ (Lat., from Gk. Ὑγεία, *Hygeia*, Ὑγιεια, *Hygieia*, health, from ὑγιής, *hygiēs*, healthful). In the ordinary Greek tradition, which does not antedate the fifth century B.C., the goddess of health, daughter of Asclepius (see ÆSCULAPIUS), and honored with him at Athens, Epidaurus (after 420 B.C.), Sicyon, Corinth, Titane (in the territory of Sicyon), and elsewhere. She was joined with the god of healing, Amphiaraus, at Oropus. On the Acropolis at Athens there was an ancient cult of Athena Hygeia, to whom a statue and altar were erected after the great plague (430 B.C.) and before the introduction of the worship of Asclepius in Athens. In the art of the fifth and fourth centuries B.C. Hygeia is represented as a maiden, but of the fully developed and vigorous type, while later her form is more youthful and girlish. She is represented in company with her father, or sometimes alone, with the snake by her side or drinking from the patera in her hand. Hygeia seems to have been originally an abstraction, later converted into an independent divinity, who came into connection with various deities associated with the cure of disease. In 293 B.C. her cult was introduced into Rome along with that of Æsculapius; at Rome she was known also as Valetudo (health) or Salus (safety). Consult the article "Hygiea," in Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. i (Leipzig, 1884–90).

HYGIENE, hī'jī-ēn (from Fr. *hygiène*, from Gk. ὑγιαινειν, *hygiainein*, to be healthy, from ὑγιής, *hygiēs*, healthy). The branch of medical science which deals with the preservation of health. Within its scope are all measures taken for the acquisition and preservation of health, except those involving purely medical and surgical means. Hygienic measures were a part of religious observance among the Jews as well as among the people of Assyria and India, and their enforcement lay with the priests. Among the Greeks these duties were transferred to the physicians. Hippocrates' work on *Air, Water, and Places* was largely responsible for this change. (See HIPPOCRATES.) In the twenty-second book of Homer's *Odyssey* there is an account of the sanitary precautions taken by Ulysses after the killing of the wooers. The place of slaughter was cleansed and disinfected by scraping and washing and by burning sulphur. Little attention appears to have been paid to the infected individual in the olden time, when the panic ensuing upon a plague caused expulsion or expatriation of the sufferers. Laws were framed to protect the public from lepers, e.g., by expelling them and burning their houses. In 1423 Venice established its first lazaretto, and in 1485 a permanent health magistracy was created in that city. In 1532 an Act of Parliament authorized in England the issue of commissions of sewers for "the overlooking of sea banks and sea walls, and the cleansing of rivers, public streams, and ditches." In 1552 Shakespeare's father was fined for throwing filth into the street and again in 1558 for not keeping his gutter clean.

Roman law provided no protection for the individual. Greek and Latin writers treated of diet and exercise for the patrons of literature, for princes, and for the wealthy. From the school of Salernum, about the twelfth century, issued the *Code of Health*, which was printed in 1480 and for two centuries thereafter remained the standard work on personal hygiene. Despite the stringent laws seeking to prevent plague which were enacted by James I, and the establishment of lazarettos into which ships discharged their cargoes for detention and airing, serious outbreaks of the dread disease occurred in 1625 and 1629–31. In 1665, according to Macaulay's estimate, the number of deaths from plague during one period of six months reached more than 100,000.

At the close of the eighteenth century little advance had been made in hygienic knowledge beyond the discovery by Woodhall, in 1617, that scurvy was prevented by the use of lemon juice;

the discovery by Morton, in 1697, that foul air produced disease in some way; and the introduction from Turkey into England in 1717 of inoculation with smallpox virus by Lady Mary Wortley Montagu. Differentiation of fevers began early in the nineteenth century. Following the cholera epidemic in London of 1831–32, newly awakened interest resulted in the formation in 1838 of a system of registration of deaths in that city. The establishment of the fact of waterborne diseases was made by the investigations of Dr. John Snow into the cholera outbreak in London in 1848–49. From this date investigation has been systematically pursued into the causes of death; the causes of disease, its spread, and the agencies that produce it; and into the conditions that promote health. The use of the microscope, the study of bacteriology, of pathology, of the chemistry of food, of climate, and of exercise, have all added to the knowledge that has increased the useful application of hygienic principles in our day. Sanitary laws have been enacted which control unhealthful agencies and aim to safeguard and regulate commercial as well as domestic relations.

Hygiene may be variously classified, according to its relations and the objects in view. There is the hygiene of the individual, of the family, and of the municipality or state; which may be denominated personal, domestic, and public hygiene.

Personal Hygiene. This includes the study of (1) *Food*, including water and beverages. Food should be adapted to the season of the year, the age, occupation, and the condition of health of the individual. An increase in the quantity of fruit and of water, a greater proportion of vegetables, and smaller meals are desirable in hot weather, while an increase in meat and in cereals is desirable in cold weather. Infants require principally milk, with the proportions of proteids, fats, and sugar graded according to age and digestive capacity. Older children require small quantities of meats, cereals, fruits, and vegetables. In regard to occupation, it may be said in general that active laboring men, like carpenters, blacksmiths, and farmers, may partake of food which takes a considerable time to digest, with more advantage than sedentary men may. Pork and corn cake or bread is a nutritious and sustaining diet to an active laborer, but should not form the habitual diet of a sedentary person. (See DIET, paragraph *Diet in Disease;* see also FOOD.) The investigation of water supply, examination for noxious ingredients or medicinal properties in drinking water, as well as directions for its use, come within the province of hygiene, as does also the use of coffee and tea, which are both stimulating drugs, causing in some persons overaction of the heart, cerebral activity resulting in insomnia, and indigestion; of cocoa, which is slightly stimulating, but contains food; of wine, beer, and distilled liquors, all of which are drugs in the eyes of the physician and the sanitarian, to be used with accurate calculation of their nutrient and stimulant properties. (See ALCOHOL, PHARMACOLOGY, TOXICOLOGY, AND THERAPEUTIC USE.) (2) *Clothing* should be suited to the temperature, age, and occupation. Ventilation as well as materials—wool, cotton, linen, and silk—must be considered. (3) *Work and Exercise* are necessary for every one. Regular physical activity is essential to proper development and to the maintenance of normal action of the vital organs and the repair of tissue. Even those who are confined to bed by disease need exercise, which is secured by passive motion or massage. (See GYMNASTICS; EXERCISE; MASSAGE.) To work must be joined the consideration of rest and sleep, which should be enjoyed at regular intervals and in quantities proportioned to individual conditions and occupations. (See SLEEP.) (4) *Personal Cleanliness* includes regular evacuations of the bowels daily; daily bathing, securing constant removal of perspiration; care of the hair and scalp, and care of the nostrils, of the cavity of the mouth and teeth, of the genitals, and of the anal orifice. (5) *Special Habits* which tend to undermine health should be controlled; the use of tobacco, of other narcotics, and of stimulants should receive consideration. Tobacco should never be used before the age of 21 or 22 years has been reached and should rarely be used by neurasthenics. In certain diseases, as Bright's disease and syphilis, and certain conditions of the heart, tobacco is pernicious. All other narcotics are distinctly deleterious and should be forbidden. (6) *Control of Sexual and Other Passions* has much to do with personal health. Indulgence in masturbation by the young delays development and in many cases causes mental enfeeblement. Excessive sexual intercourse has a similar effect, with greater disaster to the male. Perhaps the most undermining of normal mental activities are anger and grief, and these should be avoided or limited. The thoughts should be calm, and mental exercise, as well as physical, should be regularly taken. Mental indolence leads more often to mental disorder than does mental overwork.

Domestic Hygiene. This includes the study of (1) the *Management of Infancy*, (2) *Preparation of Food*, with regulation of meals, as well as supervision of cooking, and (3) the *Hygiene of the Sick Room*, including removal of dust-catching furnishings, regulation of heat, light, and ventilation, provision of utensils which may be sterilized, care of bedding and bed linen, and arrangements for proper bathing and nursing. Besides these subdivisions, others might be made which would duplicate some of the titles more properly assigned to personal or public hygiene; such as *air*, and *hygiene of the school*. The latter topic will be treated under SCHOOLS, MEDICAL INSPECTION OF.

Public Hygiene. This comprises care of the surroundings of man, as well as prevention of disease, and disposal of the dead; and therefore includes a consideration of: (1) *Climate*, as one of the agencies active in man's environment, is used as an elastic term to embrace the range of temperature of a locality, the prevailing winds, the rainfall, the vegetation, and the soil. (2) The *Soil under Dwellings*, with reference to possibilities of drainage, proximity to underground water, etc. (3) The *Character of Dwellings*, especially tenements, as to ventilation, and air space, position, and materials used in construction, and provision for regulating temperature, water supply, and drainage. (4) *Cleansing of Dwellings* and *Disposal of Refuse*. (5) *Cleansing of Streets* in towns. One of the most important questions of public hygiene is the cleaning of streets, and matters connected therewith. Not only are filthy streets productive of disease by the generation of poisonous gases, but also the dust which results from the long-continued trituration of excrementitious and decaying substances is extremely injurious to the mucous

membrane of the air passages, and productive of contamination to blood and tissue. The habit of casting the sweepings of houses and stores upon the sidewalks, especially during the hours in which pedestrians are passing, is a greater evil than many suppose. The dust of these places is often of the most objectionable character, containing the germs of contagion, and there is no doubt that many "filth diseases" (q.v.) are propagated in this manner. (6) *Regulation of Public Conveyances.* Public conveyances are frequent causes of disease from various sources. The dust which is allowed to collect in street cars, and also ordinary steam-railway cars, is of itself a frequent cause of diseases of the air passages; but compared to the evils which result from overcrowding and bad ventilation, it is of minor importance. Pneumonia, pleurisy, bronchitis, and laryngitis are common results of street-car exposure. But one of their greatest evils, and one not yet sufficiently recognized by the public, although well known to the medical profession, is the want of attention paid to the smoothness of the track and the springs of the cars. On street cars undue jarring should not be permitted. When they are properly supplied with springs, and when wheels that are flattened are promptly replaced, all injurious vibrations will be avoided. (7) *Control of Air Spaces in Public Buildings*, such as hospitals, asylums, orphanages, lecture rooms, theatres, schoolhouses, etc. The vitiation of air due to impurities added to it by respiration is a subject of great moment. Following are figures showing the difference in the proportion of the constituents of the percentages of expired air and of ordinary air:

	Ordinary air	Expired air
Oxygen	20.96	16.40
Nitrogen	79.00	79.19
Carbon dioxide	0.04	4.41

From these figures it is seen that expired air contains over 100 times more carbon dioxide and nearly 5 per cent less oxygen than ordinary atmospheric air. Experiments have shown that the average adult emits with each expiration 22 cubic inches of air; or, assuming 18 respirations a minute, 570,240 cubic inches, or 330 cubic feet, of air in 24 hours. In this total of expired air there are 14.52 cubic feet of carbon dioxide. This amount is increased with increase of physical activity. The figures of De Chaumont, which are generally accepted, show that there is 0.6 part of carbon dioxide per 1000 in the air of a closed and occupied space, or 0.2 part in excess of that in ordinary atmosphere. Burning of coal or illuminating gas adds to the impurity, and hence ventilation is essential. In public buildings, such as those named, there should be 3 cubic feet of space per person in each room, after deducting from the total room space the amount occupied by furniture and the bodies of the persons. (8) *Prevention of Disease.* This is a very large topic, and necessarily bears close relation with personal as well as domestic hygiene. It includes notification of diseases to a health officer; most of the activities of municipal departments of health (see HEALTH, BOARDS OF; SCHOOLS, MEDICAL INSPECTION OF); control of streets and houses and disposal of refuse (see DISINFECTANTS); control of disease entering seaports (see QUARANTINE); prophylaxis of special kinds against spread of disease (see ANTITOXIN; SERUM THERAPY; VACCINATION); cleansing of public vehicles, to which reference has been made; etc. Overcrowded and dark tenements are the most frequent causes of the spread of disease in a community. They keep alive the diseases of childhood—measles, scarlet fever, diphtheria, etc.—and are the most frequent hiding places for the germs of tuberculosis. (9) *Disposal of the Dead* is regulated by sanitary laws, which provide, in cities, that undertakers shall obtain permits for removal of dead bodies, and proper disposition shall be made of them by burial or cremation. Public funerals in the case of contagious diseases are often forbidden, and hermetically sealed caskets are enjoined in such cases by many municipalities.

Mental and Physical Hygiene. To regard the matter from another view point, hygiene may be also divided into mental and physical. The former will necessarily include many questions that belong to the latter, for the healthy action of the mind depends to a great extent upon the health of the body. A sufficient amount of sleep ought to be taken to refresh the powers of the mind as well as those of the body, and that sleep ought not to be much disturbed by dreams. Of course there are those whose occupation demands varied, sometimes excessive, exertion, and who must be "a law unto themselves." The great time for practically applying the laws of mental hygiene is during the years of childhood and youth. The method of teaching the child should be of the simplest as well as of the most comprehensive character, and the periods should be frequent during which its mind is completely relieved of all serious study and allowed to come to a perfectly natural and passive condition by mirthful and affectionate enjoyment. The schoolrooms should be commodious and well ventilated, and they should not be overcrowded. Too many studies should not be required, so that hours which should be given to recreation or sleep will not be occupied with laborious efforts of study, which often do little more than produce a disturbed and unrefreshing sleep and pervert or destroy the appetite for wholesome food. In the matter of school hygiene great importance is attached to the amount, arrangement, and distribution of light in the classrooms, the construction of the seats and desks, the type and paper used in making the textbooks, etc. Carelessness in these matters is known to be one of the most fruitful sources of imperfect sight, such as myopia, as well as of various deformities, especially spinal curvature. See SCHOOLS, MEDICAL INSPECTION OF.

Military Hygiene is a system of principles for the preservation and promotion of the health of the soldier. The application of these principles is called military sanitation, which has for its object the prevention of disease. As almost all of the activities designed to preserve the health of the soldier are directed towards the prevention of disease, the term most applicable to the system is "military sanitation." In other armies than the American the administration to which is confided the preservation of health by the prevention of disease and the treatment of sick and wounded is called the "sanitary service"; in the United States medical officers and hospital corps soldiers, in the organization of the army, are designated as "sanitary troops."

The direct relation which is so well known to exist between the health of an army and its efficiency as a fighting organization gives vast importance to this subject. The increase of knowl-

edge of the cause of disease has led to the many recent applications in preventive methods. When it is considered that healthy men of military age are subject only to preventable diseases which come from without, it can be readily appreciated that the efforts for military efficiency must be directed continually against the enemy within the ranks, which is far more dangerous and destructive than the enemy without. The study of medicosanitary statistics, of all armies, reveals the overwhelming part the so-called preventable diseases have played in rendering an army noneffective. In the three years' campaign of the British army in South Africa, one-sixth of all the admissions to hospital for disease were due to typhoid fever and dysentery, and these two diseases caused two-thirds of all the deaths from disease and one-half the total losses by death from all causes during the war.

Armies in extended and inactive campaigns rest their fate on sanitary conditions, and more deaths result from disease than from wounds. In short and decisive campaigns the deaths from wounds are greater. In the Mexican War (1846–47) there were 6 deaths from disease to 1 from wounds; in the Crimean War (1854–56) the French ratio of loss was 10 from disease to 1 from wounds; in the American Civil War (1861–65) the ratio was 2 to 1; in the German army (1870–71) it was 12 from disease to 1 from wounds; in the Chino-Japanese War the Japanese ratio was 12 to 1, and in the Spanish-American War the American losses were 12.5 to 1. In the Russo-Japanese War, for the first time in history, the loss from disease was less than from wounds, viz., 1 to 2. It is evident that the efficiency of the sanitary department cannot be determined directly from the ratios of deaths from wounds without a study of the conditions of campaign.

In no other art in late years has there been greater progress than in military sanitation. It has, by its discoveries, inventions, and practices, demonstrated to the civilized world methods for the prevention of disease which could have been developed only under a system of military organization and discipline. The two most important sanitary innovations have followed the demonstration, by Reed of the American army, that yellow fever was transmitted by a mosquito's bite, and the preparation of a vaccine, by Wright of the British army, that protects against typhoid fever. By the first discovery yellow fever was driven out of Cuba and the Isthmus of Panama, and it can be totally suppressed wherever proper sanitary methods can be effectually enforced. Surgeon-General Gorgas, of the American army, made the Panama Canal possible by his military sanitary measures, directed largely towards the extermination of mosquitoes by the destruction of their breeding places and towards the protection of the person against the bites of mosquitoes. General Gorgas says, "The disappearance of malaria from Havana was due *solely* to mosquito work."

The efficiency of the typhoid vaccination of Wright was first demonstrated in the English army, and since 1911 it has been employed in the American army, where typhoid fever practically no longer exists. This disease was pronounced by Kean in 1905 to be "the most formidable infectious disease with which we have to contend in military life." The incidence of typhoid fever is never an alarming factor in a garrison, but it has been known as a scourge in camp. After the compulsory vaccination against typhoid fever, in 1911, of every soldier in the United States army, 20,000 men were in camp along the Mexican border with only two cases of typhoid fever infecting satisfactorily vaccinated soldiers. In four large camps in the United States, with a total strength of 55,829 soldiers, during the Spanish-American War, there were 7745 cases of typhoid fever. In the 250,000 volunteer troops assembled shortly after the declaration of war there were 20,000 cases, or 80 cases to each 1000 troops.

Malaria has been brought under control by military sanitation through the discovery, by the French military surgeon Lavaran, of the blood parasite which causes the disease, and the demonstration, by Ross of the Indian army, of the manner of transmission by the passage of the parasite from the proboscis of a mosquito of the Anopheles species to the patient by the "bite" of the mosquito, and the subsequent introduction of measures to destroy breeding places of mosquitoes. Not a single death from malaria occurred in the United States army between 1906 and 1914; in 1907 there were three cases per thousand admitted to hospital in September, while in 1885 the rate was 31 per thousand.

The two types of dysentery which cause much sickness of the soldier in the tropics are caused, one by an animal parasite (an amœba) and the other by a vegetable organism (a bacillus). Vedder of the American army, in 1912, discovered the specific effect of emetine (a derivative of ipecac) on the amœbic form of dysentery, which cures the disease when administered hypodermatically.

Typhus fever, while it disappeared largely from the armies of the West through their general sanitary progress, remained a great scourge in the armies of the East until the mystery of its transmission was recently solved. It is now no longer feared, because it is known to be transmitted by the bite of the body louse, and means of prevention can be easily adopted.

Cholera is another disease which always threatens armies in the near and far East, but in America and Europe it is of little concern in time of peace, and in time of war it could only arise as a formidable epidemic during a campaign of great privation. It is a disease of Asia and tropical centres, where people live in close quarters and unsanitary surroundings which permit the ready passing of the germ from one to another by personal contact, excreta, food, clothing, and utensils, as the germ must pass into the alimentary tract to cause the disease. The heavy mortality which has given its name such terror is due to the disorder, privation, or poverty under which it always arises. Water is not a very important means of transmission. The death rate in cholera is 50 per cent and in typhoid fever 10 per cent, but with the same sanitary surroundings and treatment it is almost certain that cholera would become a disease no more fatal than typhoid fever. Cholera frequently occurs in epidemic form adjacent to military posts without infection of the troops, because they are wholly protected by sanitary measures.

In the American army, in 1911, the highest admission rate of all diseases, expressed in numbers for each 1000 men, was, for venereal disease, 163.85, followed next by tonsillitis, 57.14. The highest death rate was, for tuberculosis, 0.52, followed by measles, 0.45. The most frequent

cause for discharge was tuberculosis, 2.85, followed by insanity, 1.37. The highest noneffective rate was charged to venereal disease, 8.82, followed by tuberculosis, 1.63.

Another of the great sanitary advances has been made in the control of venereal disease, which has been preëminent in the American and English armies, as compared with others. In 1912 venereal personal prophylaxis was imposed by order upon the American army, and since that time the rate of admission for American troops in the United States proper has been reduced from 163.85 in 1911, to 87.02 for the first six months in 1914, per thousand; but the real reduction has been, perhaps, twice as much as indicated by these figures, because, since compulsory methods of detecting the disease have been enforced by means of regular physical examinations and education, it is probable that twice as many cases have been admitted to record as before. In a command of 1000 men in the United States army the loss of days in one year from this disease would be 1652 before the enforcement of the order and 542 after, or a gain of 1110 days' service in one year. The application of the Wassermann blood test, by which syphilis, in either active or inactive states, can be accurately determined, and the invention of Salvarsan as a specific agent in treatment, has led to renewed energy and efficiency in the treatment of syphilis in the army and with more favorable results, because of the military control, than can be attained in civil life.

The three cardinal principles upon which military sanitation is conducted are: (1) The protection of the soldier against himself as the chief transmitter of the diseases from which he suffers. (2) The purification of water and the protection of food. (3) The destruction of all disease-transmitting animals which attack him from without, such as mites, which cause scabies and "the seven-year itch"; ticks carrying Texas fever and Rocky Mountain spotted fever; bedbugs, conveying relapsing fever; typhoid fever and probably kala-azar and leprosy; lice, transmitting typhus fever and recurrent fever; fleas, carrying bubonic plague; cockroaches, conveying all sorts of germs which infect food and milk, and also the germ of tuberculosis, diphtheria, typhoid fever, and tonsillitis; mosquitoes and flies, which, of all the animal transmitters of disease next to mosquitoes, must be considered the most dangerous. After the tsetse fly, which carries the African sleeping sickness, we find the greatest pest and health menace in the common house fly (q.v.).

The water supply of an army is one of the deepest concerns of the sanitary department, and it involves a care ranging from driving wells to secure a water supply to its purification by heat, filtration, chemical treatment, or the ultra-violet mercury lamp. Many satisfactory processes of water treatment require apparatus of such weight and complication that it is impracticable to carry the apparatus with an army in the field. Heat requires fuel and vessels which are not always at hand. Filtration and violet light require apparatus; but the recent application of a chemical method which uses chlorine has been made in the American army and marks another great advance in military sanitation.

Darnall introduces a pure, dry, liquid chlorine gas, contained under pressure in a steel drum, into a reservoir or pipe of running water. The chlorine's rabid affinity for hydrogen takes the hydrogen atom from the oxygen atom in the water molecule and leaves the nascent oxygen to destroy quickly and positively all pathogenic organisms. This method, however, is not applicable to the needs of troops in the field on account of the somewhat complicated and heavy apparatus.

Lyster has made the most practicable application of the chlorine agency by using the chlorine-bearing powder, chlorinated lime, which, when added to water in the proportion of 1 to 500,000, effects sterilization in a few minutes. The great advantage of this method is the very little weight of required apparatus, which consists of a bag made of canvas, 38 gallons' capacity and 5 pounds in weight, with six stopcocks around the bottom for drawing off the water. Sealed glass tubes of chlorinated lime, 15 grains each, containing 30 per cent available chlorine, are carried with the water bag. The simple mixing of the contents of one tube with the water filling the bag sterilizes enough water to fill the canteens of one company of infantry, at war strength, numbering 157 men. The Lyster water bag, adopted by the United States army in 1914, requires no special transportation facilities, as it is carried on the back of the company trumpeter, who, being without a rifle, still carries less than the equipment load of the armed soldier.

The close contact of soldiers living in barracks and camp, under conditions designed to reduce domestic system to minimum limits, favors the transmission of disease, through contact of person, clothing, bedding, and equipment, and the use of common utensils. The sanitary measures directed against this disposition of the soldier to spread his own diseases are based upon the disposal of excreta, protecting of food, and personal hygiene.

The purity, quality, and quantity of the soldier's ration, which contributes so directly to his efficiency, are maintained by the constant vigilance of sanitary examinations and inspections. The American soldier's ration is especially adapted to his needs by the variety and sufficient quantity of its components, which are more liberal than that of any other soldier. The normal fuel value is 3536 calories, which can be ranged from 2500 to 5674 calories by varying the components. Fresh meat, and usually beef of best quality, is issued 7 days in 10.

Military sanitation is inseparable from military discipline. The widely heralded success of Japanese sanitation in Manchuria was not due to any new hygienic discoveries, but only and solely to the severe discipline with which the principles taught by the armies of the Western world were applied. The notoriously strict discipline in the German army, carried out also in its sanitary administration, has reduced its sickness and death rate to the lowest of all armies in the world, and this result has contributed no small part to the incomparable economic advance which the German Empire has made from the time of her War of 1870 to her War of 1914.

The topics included in military hygiene and sanitation are: (1) *Sanitary Organization.* (2) *Physical Condition and Selection of the Recruit:* his physical training, general development and moral education. (3) *Marching:* care of feet, halts, forced marches, adjustment of equipment and clothing, weather conditions, and general physiological applications. (4) *The Ration:* composition, value, and preparation; garrison,

travel (cooked), and emergency rations. (5) *Clothing, Uniform, and Equipment:* material, quality, nonactinic property, distribution of weight, garrison and field clothing. (6) *Water Supply:* examination, protection, and purification. (7) *Posts, Barracks, Quarters, and Hospitals:* construction, ventilation, heating, and lighting; disposal of wastes. (8) *Camp Sites and Camps:* temporary and permanent; soil, vegetation, area, tents, varieties of shelter, portable buildings, disposal of wastes and excreta, bathing and washing, prevention of flies, protection against mosquitoes, sanitary rules. (9) *Personal Hygiene of the Soldier:* daily toilet, bathing, care of bowels, change of clothing, habits, and morality. (10) *Prevention of Infectious Disease,* venereal prophylaxis, vaccination against typhoid fever and smallpox. (11) *Service in Tropical Countries:* characteristics of climate, effects on body and mind; food, beverages, solar rays, actinic rays, sunstroke, clothing, shelter, tropical-disease prevention. (12) *Service in Cold Climates.* (13) *Disinfection:* methods and materials. (14) *Sanitation of Troop Ships.* (15) *Sanitation of the Battlefield.* (16) *Quarantine.* Many of the above topics in special or other connections find discussion elsewhere in the ENCYCLOPÆDIA, and to such articles the reader is referred.

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HYGIENE OF FOOD. See FOOD.

HYGI'NUS, GAIUS JULIUS. A Latin author. He is generally supposed to have been a native of Spain, though some writers assert that he was born in Alexandria, Egypt, and that he came to Rome with Julius Cæsar when a mere child. He is known to have been a favorite with Augustus, who made him chief librarian in the new Palatine Library. He was a voluminous writer on many subjects, including biography, agriculture, bee keeping, and military arts, as well as comments on the poems of Vergil and Cinna. These have all been lost. There are also two works still in existence that are assigned to him—one, a textbook on mythology, entitled *Fabularum Liber,* consisting of 277 mythological legends, valuable chiefly because of the use made of Greek tragedies, in many cases now lost; the other, an astronomical treatise entitled *Poeticon Astronomicon Libri IV,* an elementary treatise on astronomy, including the myths connected with the stars, of little value now. This astronomical treatise is based mainly on the Καταστερισμοί of Eratosthenes (q.v.). On stylistic grounds it is held that these extant works, clearly the work of one man, cannot have been written by the Hyginus of the Augustan age; the Latin is defective, and there are serious errors in translation from the Greek. They may be an abridgment, however, of works by Hyginus. The *Fabulæ* were edited by Schmidt (Jena, 1872) and the *Astronomica* by Bunte (Leipzig, 1875). Another Hyginus, known as *Gromaticus,* lived probably in the second century and wrote a work on surveying, edited by Gemoll (ib., 1879). Consult: Teuffel, *Geschichte der römischen Literatur,* vol. ii, § 262 (6th ed., ib., 1910), and Schanz, *Geschichte der römischen Litteratur,* §§ 342–350 (3d ed., Munich, 1911).

HYGINUS, SAINT. Pope, or Bishop of Rome, about the middle of the second century, possibly 137–141. Very little is known about him.

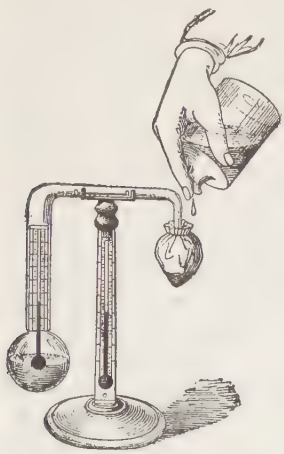
HYGINUS GROMAT'ICUS. See HYGINUS.

HYGROM'ETER (from Gk. ὑγρός, *hygros,* moist + μέτρον, *metron,* measure). An instrument for measuring the quantity of moisture in the atmosphere. In addition to the gases of which it is composed, the air contains the vapor of water, which is invisible except when it is condensed in the form of fog or cloud. The amount of this aqueous vapor varies greatly and depends chiefly on the temperature, being at a minimum on cold days and on warm days forming as much as one-fiftieth part of the air. This vapor exerts a certain pressure depending upon the quantity present and the temperature, and when the latter is sufficiently reduced condensation takes place and fog or dew is formed. When the moisture present in a given case is the maximum possible, the temperature is called the temperature of saturation, and if the temperature is reduced below this point condensation takes place. The temperature at which condensation occurs is known as the dew-point temperature. (See DEW.) The less moisture the air contains the lower will be the dew point; and when this is ascertained experimentally, we can use it to determine the pressure of the vapor at that temperature, as the pressure of water vapor and its relation to temperature has formed the subject of extensive and elaborate experimental researches that are now embodied in carefully prepared tables. It is known that the quantity of water contained in the air varies directly (or nearly) as the vapor pressure; consequently a ratio between the vapor pressures at an observed temperature and the saturation pressure for the atmospheric condition at the time of observation gives the relative humidity. The amount of moisture in the atmosphere is often expressed in terms of relative humidity in the daily meteorological observations, and the chief function of the hygrometer is to afford such data as will enable us to determine this quantity.

Hygrometers can be divided into several classes. There are those in which use is made of the property of certain substances of altering their dimensions or weight upon absorbing moisture from the air. Of this class the most reliable are those in which a hair expands and contracts according as the air is more or less moist, and moves a pointer or index over a scale, and indicates relative humidity direct. This form was invented by Saussure, the Swiss physicist, and a somewhat similar instrument was devised by Deluc in which a strip of whalebone was employed. The instruments are known as hygroscopes and are used where other forms of apparatus cannot be employed. Their indications, however, are not highly exact. Another class of hygrometers is based on the principle that certain chemicals will absorb moisture, and the amount thus abstracted from a given volume

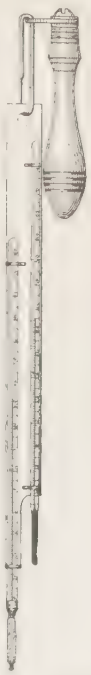
of air will give the quantity present in the atmosphere. The apparatus consists of a series of drying tubes containing some hygroscopic material, as substances which readily absorb moisture are termed, through which air is drawn by means of an aspirator or other device. The substances which may be used for this purpose are strong sulphuric acid in pumice stone, calcium chloride, phosphoric acid, and potassium or sodium oxide. The amount of moisture is determined by the increase in weight. The class of hygrometer very generally employed for accurate work includes apparatus where the temperature is reduced until condensation takes place, or this temperature can be determined from the temperature of evaporation. Knowing the dew point for a given condition of the atmosphere, the other data can be readily ascertained.

The Daniell hygrometer, which figures extensively in the earlier works on physics and meteorology, consists of two bulbs connected by a bent tube, as represented in the figure, and inclosing a thermometer together with some ether and vapor of ether, the air having been expelled before the tube was sealed. One bulb is either blackened or coated with metal, while the other is covered with muslin. The observer's hand is placed for a short time on the muslin-covered bulb to drive the ether into the opposite bulb, leaving the first bulb and the tube filled with the vapor of ether. A little ether is then dropped from the bottle on the muslin-covered bulb; evaporation instantly takes place, and the temperature is reduced, thus condensing the vapor inside; a fresh evaporation from the other bulb fills the vacuum, and the vapor is again condensed by dropping more ether on the muslin covering, the process being repeated until the temperature of the bulb containing the thermometer is so reduced by successive evaporations (see EVAPORATION) that *dew* begins to be formed on the outside of the bulb. At the instant this occurs the height of the mercury in the two thermometers is accurately noted—the one giving the dew-point temperature, and the other the temperature of the air. There are other forms of dew-point apparatus, all depending upon this same principle, and the hygrometer of Regnault was devised to remedy some of the defects of the Daniell apparatus. In this instrument a current of air is used to increase the evaporation of the ether, and instead of a glass tube and bulb there is a brightly polished thimble of silver at the base of one of the thermometers, which contains the ether. The air bubbles through the liquid, and the rate of evaporation becomes much more rapid. Knowing the dew point, a reference to the table will furnish the pressure of aqueous vapor at that temperature, and other tables or the application of a formula will give the amount of moisture in a given quantity of air.



DANIELL HYGROMETER.

Instead of the dew-point apparatus, the wet and dry bulb thermometers, or psychrometer, is now generally employed in making ordinary observations, especially by meteorologists. The instrument consists of two ordinary thermometers—one has its bulb bare, and thus shows the temperature of the air, while the other has its bulb covered with muslin which is kept wet with water. The thermometers are often so united that they can be rapidly revolved in order that the wet bulb may be exposed to a constant current of air. In the illustration is shown the sling psychrometer issued by the United States Weather Bureau, where the thermometers are mounted in such a manner that they can be whirled about the hand of the observer. The evaporation from the muslin and the consequent cooling of the bulb being proportional to the dryness of the air, the difference between the readings of the two thermometers is greatest when the air is driest, and zero when it is completely saturated. The readings of the psychrometer and the dew-point apparatus at the same time have been carefully compared, and it has been ascertained that the vapor pressure at the dew point of air is equal to the vapor pressure corresponding to the temperature of the wet-bulb thermometer minus the number 0.011, multiplied by the difference in degrees between the dry and wet bulb thermometers. This rule is stated as applying when the psychrometer is whirled, and when the pressure of the barometer is equal to 30 inches. From the difference in readings between the thermometers the vapor pressure can be calculated by formulas which, with certain modifications, are based on those used by Regnault.



U. S. WEATHER BUREAU SLING PSYCHROMETER.

Ferrel's formula, used by the United States Weather Bureau in calculating its tables, is as follows:

Let p = vapor pressure of saturation at dew-point temperature.
p' = vapor pressure of saturation at wet-bulb temperature.
P = barometric pressure.
t = reading of dry thermometer.
t' = reading of wet thermometer.

$$p = p' - .000367\,P\,(t - t')\left(1 + \frac{t - t'}{1571}\right).$$

In practice it is customary merely to take the difference between the wet and dry bulb thermometers and refer at once to the tables, which will give the relative humidity, the amount of moisture in a given quantity of air, and other desired data. These tables and full directions for practical hygrometry are contained in the publications of the United States Weather Bureau, to which the reader is referred for further information, while nearly all the larger treatises on physics contain satisfactory treatment of the subject. Consult Preston, *Theory of Heat* (London, 1904), and M. T. Edelmann, "Neues Absorptions—Hygrometer," in *K. Bayerischen Aka-*

demie der Wissenschaften, Sitzungsbericht, vol. xxxvii (Munich, 1907). See HUMIDITY.

HY'GROPHYTES (from Gk. *ὑγρός, hygros*, moist + *φυτόν, phyton*, plant). Plants which grow naturally in regions where the atmosphere is moist. Hygrophytes differ from hydrophytes in that they are not necessarily associated with water in the liquid state. Hygrophytic leaves show a number of peculiarities in contrast with xerophytic leaves. For example, hygrophytic leaves do not suffer, but rather thrive, in very moist atmospheric conditions. The leaves themselves are also easily moistened. This type of leaf is very characteristic of the tropical rainy forests, but also is often found in deep narrow cañons and heavily forested ravines. Xerophytic leaves, in contrast with hygrophytic leaves, are not readily moistened and commonly die if subjected to a moist atmosphere. See HYDROPHYTES.

HY'GROSCOPE. See HYGROMETER.

HYKSOS, hĭk'sŏz. The name of a dynasty of Egyptian kings, who are known also as the Shepherd kings. Manetho, of whose annals an excerpt is preserved in Josephus, narrates that foreign conquerors from Asia, who were called Hykussos, took possession of Egypt. This name, according to Breasted (*A History of the Ancient Egyptians*, p. 178), in all probability is composed of the word "Hyk" (or ruler) and the word meaning "countries." The latter by slight and very common phonetic changes might become "sos." The explanation, based on the mutilated form Hyksos and the interpretation *sos* as Egyptian *shôs* (shepherd), although attributed to Manetho, seems to have originated at a later time. Consequently we have in this no basis for determining the nationality of those foreigners, "of unknown race," as Manetho says. Usually historians, following this later etymology and the insertion in Manetho ("they are said to have been Phœnicians or Arabs"), consider them as nomadic Semites, either Arabs or Canaanites, recently settled in Palestine. Others have supposed them to be Turanians, thinking that they found Mongolian features on statues which were for a long time attributed to the Hyk(us)sos, but are now generally recognized as belonging to an earlier period. Nothing positive can be said as to the origin of this people; it is only known that the conquerors had first founded an empire in Syria (coming from the north from Asia Minor?) before conquering Egypt. This explains why many Semites came thither along with them and, later, under their rule. The date of their conquest is doubtful. From the confused extracts from Manetho, they would seem to have formed the fifteenth and sixteenth dynasties, lasting 259 and 251 years respectively, and would thus have begun about 2100 B.C. But the sixteenth dynasty seems to be an erroneous repetition, so that only the fifteenth dynasty with six (?) kings remains, and for these 250 years are certainly too much. Taking into consideration the recently discovered Sothiac date for the twelfth dynasty, not much more than a century would remain for them, and therefore the invasion of the foreigners ought to be placed at about 1657 B.C. (Breasted). The reports of the cruelties and devastations which, according to Egyptian tradition, accompanied the conquest are untrustworthy. In one point, however, the traditional account has been confirmed: the invaders built a strong fortress on the northeastern frontier of the Delta, in the Sethroite nome, called Avaris (Egyptian, *Hatwarct*), and placed in it a strong garrison to secure the connection between the Syrian and Egyptian provinces. The conquerors soon adapted themselves to Egyptian manners, leaving probably the old administration untouched, and the kings assumed Egyptian names. Three or four of these royal names have been found on the monuments. Contemporary monuments give the names of three Apophises and Khian, besides possibly Khenger and Jacob-her (Breasted, op. cit. p. 182). An alabaster vase cover bearing the cartouche of King Khian was found at Cnosus in Crete (*Year Book*, 1901, p. 45; cf. *Annual of the British School in Athens*, vii, p. 65). The second Apophis reigned for at least 33 years, as the mathematical papyrus of London written in his reign attests. These kings resided in Memphis, Avaris, and Heliopolis (?), having the Delta under their direct administration and leaving the country above Memphis to tributary princes of the old nobility. This proved fatal to their dominion, for the vassal Prince of Thebes soon felt strong enough to rebel against his sovereign. A popular tale (Papyrus Sallier I) gives a fanciful narrative of the beginning of this war in stating that Apophis complained to King Sekeneure in Thebes that the noise of the hippopotami disturbed his slumbers in Avaris; but the mutilated condition of the manuscript renders it difficult to decide whether the foolish arrogance of Apophis or his exaggerated zeal for his god Set is represented as the cause of the struggle. The popular idea that the Hyk(us)sos brought along their own native god of war, Sutekh, and tried to force his exclusive worship upon the Egyptians, is incorrect; this god was merely the Egyptian divinity Set, an "Egyptianized form of some Syrian Baal" (playfully written Sutekh), the local god of the capital, Avaris, who became, of course, the official patron of the kings, but did not dispossess any other cults. The revolt against Apophis (II?) was started by Sekeneure, the Prince of Thebes (which of the three princes of that name is doubtful), and lasted for long years, extending through the reigns of two short-lived Theban princes (Kames and Snekhten-rê).

The princes of the nomes north of Thebes were annihilated in the war of independence, as they do not seem to have joined the national cause. When Amasis I (Ahmose, c.1580 B.C.) ascended the throne, the Pharaohs of the foreign dynasty seem to have been almost completely expelled; but they sustained a long siege in their last stronghold, Avaris. This city fell in the third or fourth year of Amasis Ahmose, and the surviving inhabitants were distributed as slaves. The strange statement in Manetho that Misphragmuthosis (i.e., Thothmes III, c.1500 B.C.) took Avaris and allowed the remainder of the Hyk(us)sos to retire to Syria, is, of course, erroneous. No remarkable buildings of the Hyk(us)sos kings have survived; only traces of temple restorations in Bubastis and the modern Gebelên. Possibly their constructions were destroyed after the expulsion. A considerable part of Syria seems to have been tributary to them; but the small stone lion bearing the name of Apopi (I?), found at Bagdad on the Tigris, cannot be considered to prove that these monarchs ruled as far as Babylonia. The whole of this interesting portion of Egyptian history is very obscure. Consult: Koch, *De Regibus Pastoribus* (Marburg, 1844); Chabas, *Les pasteurs en Egypte* (Amsterdam, 1868); W. M. Müller,

in *Mittcilungen der vorderasiatischen Gesellschaft* (Berlin, 1898); W. M. F. Petrie, *Hyksos and Israelite Cities* (London, 1906); Breasted, *A History of the Ancient Egyptians*, pp. 173–189 (New York, 1908).

HY'LA (Neo-Lat., from Gk. ὕλη, *hylē*, wood). The typical genus of the tree-frog family, Hylidæ; hence the word is often used as a name for tree frogs in general, especially the common variable one (*Hyla versicolor*) of North America. See TREE FROG.

HYLÆ'US (Lat., from Gk. Ὑλαῖος, *Hylaios*, woodman). In Greek mythology, an Arcadian centaur who pursued Atalanta (see ATALANTA, 2) and was slain by her. In other legends he falls in the fight against the Lapithæ or is slain by Hercules.

HYLAS, hī'las (Lat., from Gk. Ὕλας). In Greek legend, son of Theodamas or Theiomenes, favorite of Hercules, who took him on the Argonautic expedition. In Mysia, near the mouth of the Cios, while drawing water from a spring, he was made captive by the nymph of the place. Hercules returned in sorrow to Greece, taking with him hostages of the Mysians and requiring that they should continue the search for his beloved. The story was developed by the later Greek writers and seems to have arisen from a Mysian religious festival, where a priest thrice called the name of Hylas. Consult: Mannhardt, *Mythologische Forschungen* (Strassburg, 1884); Von Müller, *Handbuch der klassischen Altertums-Wissenschaft*, vol. v, 2 (Munich, 1906); Fairbanks, *The Mythology of Greece and Rome*, pp. 193, 354 (New York, 1907).

HYLLESTED, hul'le-stĕd, AUGUST (1858–). A Swedish pianist and composer, born of Danish parents at Stockholm, Sweden. He showed great musical precocity, playing in public when only five years old. He studied under Holger Dahl in Copenhagen, until 1869, and then, after making a concert tour in Scandinavia, entered the Royal Conservatory of Copenhagen. In 1876 he was appointed organist of the cathedral there and director of the Nykjøbing Falster, a musical society. Three years later he studied with Kullak and Kiel in Berlin, leaving there to become a pupil of Liszt. He made many notable concert tours in Europe and America and was the recipient of numerous honors. He was assistant director of the Chicago Music College (1886–91) and director of the piano department in the Gottschalk Lyric School (1891–94). In the latter year he went to Europe for an extended concert tour and upon his return, in 1897, settled in Chicago. His compositions, the most popular of which are his songs and piano pieces, include the symphonic poem, *Elizabeth*, for full orchestra and double chorus; *Suite romantique; Marche triomphale; etc.*

HYL'LUS (Lat., from Gk. Ὕλλος). The son of Hercules (q.v.) and Deianira (q.v.), married at his father's command to Iole. When Eurystheus was repulsed by the Heraclidæ (q.v.) with the aid of the Athenians, Hyllus slew him as he fled. Adopted by the Dorian Ægimius in Thessaly, Hyllus gained the leadership of the Dorians (q.v.) for himself and his descendants. Having invaded the Peloponnesus in obedience to a command of the Delphic oracle to seize the Kingdom of Eurystheus "after the third fruit," he was unsuccessful and was killed in combat by King Echemus of Tegea. The oracle was fulfilled in the persons of his great-grandsons Temenus, Cresphontes, and Aristodemus, who after the third generation conquered the Peloponnesus. See HERACLIDÆ.

HY'LOBAT'IDÆ (Neo-Lat., from Gk. ὑλοβάτης, *hylobatēs*, one that walks the woods, from ὕλη, *hylē*, wood + βαίνειν, *bainein*, to go). A family of Primates comprising the gibbons (see GIBBON). This name, meaning tree walkers, is well bestowed, for their entire lives are passed upon trees, through whose branches they move with the ease of a creature of flight. On the ground they are almost helpless, running with quick, unsteady steps, and holding both arms over their heads to balance themselves. Elliot admits two genera: *Hylobates*, with 12 species, and *Symphalangus*, with one species. They are the lowest, most generalized of the anthropoid apes.

HYLO'DES. A genus of cystignathine frogs, of which over 50 species are known in tropical America, all small and like tree frogs, with the fingers free and provided with undivided disks. A typical and familiar species of the West Indies (*Hylodes martinicensis*) has some remarkable traits, described under COQUI.

HY'LOGLYPHS. See EASTER ISLAND.

HY'LOPHYTES (from Gk. ὕλη, *hylē*, forest, matter + φυτόν, *phyton*, plant). Plants which grow in the woods; forest plants. The hylophytes are contrasted with the poöphytes, i.e., the plants of grasslands.

HY'LOZO'ISM (from Gk. ὕλη, *hylē*, matter, wood + ζῷον, *zōon*, animal). The assumption that the principle of all change is to be found in material substance, and that all matter is instinct with life. The term is applied to the Ionic school (see GREEK PHILOSOPHY), which sought the explanation of the universe in terms of water, air, fire, etc., and thus assumed, without further investigation, that matter in one form or another had in it "the promise and potency" of all change, including vital processes.

HYMANS, ē'mäN', SALOMON LOUIS (1829–84). A Belgian historian, poet, and publicist, born at Rotterdam, known simply as Louis Hymans. He was editor of various papers and director of the *Echo du Parlement*, a Liberal journal. He was elected a member of the Belgian Chamber of Representatives for the city of Brussels (1859), held that post for 11 years, and showed himself an upright and conscientious politician. He was the author of several novels; of *Lettres moscovites* (1857); *Histoire parlementaire de la Belgique* (18th ed., 1880); *Histoire populaire du règne de Léopold I* (1864); *Histoire politique et parlementaire de la Belgique* (1869–70); *Notes et souvenirs* (1876); *Types et silhouettes* (1877), reminiscences; *Bruxelles à travers les âges* (1883–89).

HY'MEN, or **HY'MENÆ'US** (Lat., from Gk. Ὑμήν). Originally the Greek name of the marriage song; later the Greek god of marriage, of whom many varying legends were told. The myths usually represent him as son of Apollo and a Muse, more rarely of Dionysus and Aphrodite. In art he is usually represented as a youth of delicate, almost feminine beauty, with a crown of flowers, a bridal veil, and a bridal torch; more rarely with wings. As the marriage procession waited before the house of the bride, and later, as it conducted her from the house of her father to that of her new-made husband, Hymen was invoked. Consult: Schmidt, *De Hymenæo et Talasio* (Kiel, 1886); Usener, *Götternamen* (Bonn, 1896); Darem-

berg and Saglio, *Dictionnaire des antiquités* (Paris, 1873–1914); Catullus, lxi–lxii, with comments of the editors.

HYME'NIUM. In plants, a layer of spore-producing cells. The term is used chiefly among the Ascomycetes (q.v.) and Basidiomycetes (q.v.) to designate a layer of asci in the one case and a layer of basidia in the other. For example, the scarlet lining of the scarlet-cup fungus is a hymenium (sometimes called hymenial layer) composed of asci; while in the common mushrooms the gills are covered by a hymenial layer composed of basidia.

HY'MENOCEPH'ALUS (Neo-Lat., from Gk. *ὑμήν, hymēn,* membrane + *κεφαλή, kephalē,* head). A genus of small pelagic fishes of the tropics, of the family Macruridæ (see GRENADIER), noted for the papery nature of the bones of the cranium. The only known species (*Hymenocephalus cavernœus*) is gray, with silvery tints on the sides, and was taken from deep water in the Gulf of Mexico. See Plate of CODFISH AND ALLIES.

HYMENOMYCETES, hī'men-ō-mī-sē'tēz. A great division of Basidiomycetes (q.v.), distinguished by the fact that the hymenium (q.v.) is freely exposed, as in the ordinary mushrooms. The contrasting group is the Gasteromycetes, in which the hymenium is inclosed, as in the puffballs.

HYMENOPHYLLITES, hī-men'ō-fil-lī'tēz, AND **HYMEN'OPHYL'LUM** (Neo-Lat. nom. pl., from Gk. *ὑμήν, hymēn,* membrane + *φύλλον, phyllon,* leaf). A genus of ferns, usually called "filmy" ferns on account of their delicate leaves. *Hymenophyllum* and *Trichomanes* are the two genera which characterize the family Hymenophyllaceæ, a family including approximately 250 known species and displayed chiefly in the tropics. One or two species of *Trichomanes* occur in temperate North America, but filmy ferns are an attractive feature of almost every large greenhouse. The sori (fruit dots) are borne in an unusual way among ferns. Instead of being distributed over the under surface of the leaf, they occur on the margin, at the ends of veinlets, each sorus being invested by a cup-like indusium. It was once supposed that the representatives of this family lived in very ancient times, but there is no satisfactory evidence of the existence of the family even as early as the Mesozoic. It is evidently one of the more modern fern families rather than the most ancient family, as was formerly supposed. See FERN.

HY'MENOP'TERA (Lat. nom. pl., from Gk. *ὑμενόπτερος, hymenopteros,* membrane-winged, from *ὑμήν, hymēn,* membrane + *πτερόν, pteron,* wing). An order of insects, containing the ants, bees, wasps, ichneumon flies, sawflies, gall-flies, and related insects, elsewhere described under their names. The order includes a very great number of species, estimated at about one-fourth of the whole class, of which some, as ants and bees, are singularly interesting and important. They have the mouth furnished with mandibles for cutting and tearing, but the other parts of the mouth are adapted for suction, and are generally narrow and elongated, often united into a kind of proboscis, as in bees. (See BEE.) The antennæ are generally slender, but often exhibit differences in the sexes of the same species. The wings are four in number, the first pair larger than the second, the wings of the same side united in flight by little hooks. When at rest, they are laid over one another horizontally over the body. The wings are entirely membranous, not reticulated as in the Neuroptera, but with comparatively few nervures, the arrangement of which is so constant in the whole order that particular names have been given to them and to the space between them, and their diversities have been made use of in classification. The wings are wanting in the imperfectly developed females ("neuters") of some. Besides the ordinary eyes, all the Hymenoptera have three small, simple eyes (ocelli), on the top of the head. The abdomen is generally united to the thorax by a slender pedicel. The abdomen of the females is generally furnished with an organ capable of being protruded, but for different purposes in different sections of the order, it being in some of the groups an ovipositor or borer, and in others a sting.

The Hymenoptera in their perfect state generally feed on honey; but some of them prey on other insects, which are the food of the larvæ of a greater number, while the larvæ of some feed on various vegetable substances. The metamorphoses of the insects of this order are perfect; the larvæ are generally—although not in all the families—destitute of feet; the pupæ take no food. The Hymenoptera are remarkable for the dilatation of the tracheæ, or air tubes, into vesicles and the general perfection of the respiratory system. The instincts and even apparent intelligence displayed by some of them—particularly the social kinds, which live in communities—have excited admiration from the earliest times. See INSECT, *Social Insects.*

Fossil Hymenoptera. These appear in the Mesozoic formations in small numbers. Only about a dozen species are known, mainly from the Jurassic limestones of Solenhofen, Bavaria. The oldest hymenopterans are ancestral to the modern ants. In the Tertiary deposits are found representatives of all the important families in fossil forms very close to the modern species. In America the best examples are found at Florissant in Colorado; and in Europe the freshwater shales of Aix, Œningen, and Radoboj, and, best of all, the amber of the Baltic Provinces, are noted localities. Consult Scudder, "Systematic Review of our Present Knowledge of Insects," in *United States Geological Survey Bulletin, No. 31* (Washington, 1886).

Classification. The order Hymenoptera is divided into two suborders, each containing several superfamilies, as follows:

Suborder *Heterophaga.*—Superfamilies; Apoidea, true bees; Iphecoidea, solitary wasps; Proctotrypoidea, proctotrypoid parasites; Vespoidea, social wasps; Formicoidea, ants; Ichneumonoidea, ichneumon flies; Cynipoidea, gall-flies; Chalcidoidea, chalcis flies.

Suborder *Phytophaga.*—Superfamilies: Siricoidea, horntails; Tenthredinoidea, sawflies.

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HYMET'TUS (Lat., from Gk. Ὑμηττός). A mountain range in Attica, about 3400 feet high, now called Trelo-Vouni, between 4 and 5 miles east and southeast of Athens, famous to-day, as well as anciently, for its honey of excellent flavor. There was also quarried at Hymettus a bluish-gray marble, much prized in antiquity, though less highly than that of Pentelicon (q.v.).

HYMNOL'OGY (Gk. *ὑμνολογία, hymnologia*, from *ὑμνολόγος, hymnologos*, singing hymns, from *ὕμνος, hymnos*, hymn; connected with Skt. *syūman*, bond, Lat. *suere*, to sew, Gk. *κασσύειν, kassyein*, to make shoes, OChurch Slav. *šiti*, to sew, Goth. *siujan*, OHG. *siuwan*, AS. *seowian*, Eng. *sew* + Gk. *-λογία, logia*, account, from *λέγειν, legein*, to say). The science of hymns, or the collective body of hymns used at a particular time or place. In the most general sense a hymn is a religious ode or poem; more specifically it is a metrical composition divided into stanzas or verses, intended to be used in worship. In some variety or form the hymn has been thus employed throughout the ages. The use of hymns grows out of the use of music in worship. Rhythm early began to be used both to produce and to express emotion. Wherever religion became emotional, it used rhythm in both dance and music. When the worship became in any degree formal, the rhythm expressed in poetry tended to become a part of a traditional ritual and produced the typical hymn. Two ancient collections of hymns of especial interest have come down—the Babylonian and the Vedic. The Babylonian were closely connected with incantations, but sometimes were appeals to the gods for aid in sickness or trouble—the so-called "penitential hymns." (Consult Jastrow, *Religious Belief in Babylonia and Assyria*, New York, 1911.) The Vedic hymns were part of the ritual of sacrifice, primarily to designate the particular god for whom the sacrifice was intended (*Sacred Books of the East*, vols. xxxii, xlvi). In Persia the Avesta had a collection of hymns, some of which, the Gathas, were ascribed to Zoroaster (*Sacred Books of the East*, vol. xxxi). The religion of ancient Egypt produced hymns sung at the processions of worship. (Consult Wiedemann, *Religion of the Ancient Egyptians*, New York, 1897.) Confucius made a collection of poetry, the *Shih King*, 40 pieces of which are called "praise songs" or "songs of the temple and altar" (*Sacred Books of the East*, vol. iii). Greece was the land of song, and there was heard a song on every occasion by every class to celebrate every event. The so-called Homeric hymns consist of poems of praise to the gods. Callinus, the father of elegy (c.700 B.C.), and Archilochus, a contemporary, wrote hymns, but none of them have reached us.

The Hebrew race produced the highest development of worship poetry before the Christian era, and it is a generally conceded fact that the Hebrew Psalter has never been equaled as a whole. The Psalter was the hymn book of the second temple, built after the exile. It consists of 150 Psalms, presenting a wide variety of religious experience and literary quality. (See PSALMS.) Habakkuk iii is also taken from a collection of hymns.

There is abundant evidence showing that the early Church made use of singing in its services of worship. Thus, Pliny in his letter to Trajan (103 A.D.) states: "They [the Christians] had been accustomed to come together on a fixed day before daylight and to sing responsively a song to Christ as God." What songs were used in these early days is not definitely known. We have one hymn entire appended to *The Instructor* of Clement of Alexandria (c.200 A.D.). It is the earliest Christian hymn extant and may be Clement's, though by some supposed to be earlier than his time. It is entitled *A Hymn to Christ the Saviour*. The best translation is by Dean Plumptre, but the most common one is by Henry M. Dexter, beginning "Shepherd of tender youth."

Both the Eastern and the Western churches after their separation produced many hymns—some strongly dogmatic, but others purely devotional. Numbers of these have come down to us and either in translations or free adaptations have been used more or less constantly by various branches of the Church. Prominent among the hymn writers of the Eastern church were Gregory Nazianzen (died 390); Anatolius (died 458), author of the hymn translated "Fierce was the wild billow"; Romanus (died c.720); St. Andrew of Crete (660–732), one of whose hymns is in common use in Dr. Neale's translation, "Christian, dost thou see them"; Cosmas (died 780); John of Damascus (died c.787), author of the hymn, "The day of resurrection" (Dr. Neale's translation); Stephen of St. Sabas (died 794), author of "Art thou weary, art thou languid?" (Dr. Neale's translation); and the poets of the Stadium—Theodore (died 826), Joseph (died c.830), author of "Safe home, safe home in port" (Neale's translation), and Theoctistus (died c.890), whose best-known hymn is translated "Jesu, name all names above."

A considerable list of hymn writers is associated with the Western church. Attention can here be called to but few. Both Hilary of Poitiers (died 366), who gained much of his inspiration from his enforced exile to Asia Minor, and Ambrose, Bishop of Milan (died 397), did much for the music of the Church. Ambrose in particular developed the music of the service of public worship, until the singing of his congregation, led by his trained choir, became widely known and of far-reaching influence. It is feelingly mentioned by Augustine. Over 90 of the hymns of the Ambrosian school are still in existence, a number of which are attributed directly to Ambrose. *Te Deum Laudamus*, "the most famous nonbiblical hymn of the Western church," has been credited to Ambrose; but critical scholarship now places it as late as the middle of the fifth century, author unknown. Prudentius of Spain (died early in the fifth century) and Sedulius (also of the fifth century), who was born in the British Isles, produced excellent hymns. With Gregory "the Great," Bishop of Rome (died 604), and Fortunatus, Bishop of Poitiers (died 609), author of *Vexilla regis*, "The royal banner is unfurled," and of "Welcome, happy morning" as translated by Ellerton, begins the mediæval period of Latin hymnody. In the development of the "Gregorian" system of Church music the office of song was restricted to trained choirs. Many hymns of the Middle Ages are still in use in the Catholic church, and many have been translated or adapted into English and other languages. Among the best known of these hymns are the following: *Veni, Sancte Spiritus* (Come, Holy Spirit), attributed to Robert II

of France (died 1031), and *Salve, Caput cruentatum*, by Bernard of Clairvaux (died 1153), from which several familiar English hymns are derived, including "Jesus, the very thought of Thee" and "Jesus, Thou joy of loving hearts." Bernard of Cluny (died 1156) was the author of a long poem, styled by Dr. Neale "Rhythm on the Celestial Country," from which are taken "Brief life is here our portion," "For thee, O dear, dear country," "Jerusalem, the golden," "Jerusalem, the glorious," and other English hymns. One of the grandest hymns of all times is the judgment hymn of Thomas of Calano (died c.1250), *Dies iræ* (Day of wrath). One of the most tender of all hymns is the *Stabat mater* by Jacopone da Todi or Jacobus de Benedictis (died 1306).

Nearly all great religious movements have been accompanied by the use of hymns written directly to aid such movements or because of the phases of religious thought awakened by them. The leaders of these movements from Luther to Moody have found the hymn singing in their public services to be one of the most potent forces in interesting and impressing their followers. A marked illustration is found in the history of the Wesleyan movement, and at the present time may be noted the efforts towards an appropriate hymnody in the Christian Science movement and on the part of those leading the American church in its activities for social welfare.

Among the great results of the Reformation were the use of the vernacular in public worship and a greater participation of the congregation in the services. Whereas to the choirs exclusively had been assigned the musical features of the service, under the Reformation the congregational singing of hymns became of importance.

Luther was the first hymn writer of the German church, enriching its worship with no less than 37 hymns. The best known is *Ein' feste Burg ist unser Gott* (A mighty fortress is our God). The first evangelical hymn book of 1524 contained eight hymns. Subsequent editions contained more and more until that of 1553 contains 131. Coworkers with Luther added much to the hymnology of the Church. Jonas, Eber, Alber, Spengler, Hans Sachs, Speratus, and others among the early Reformers published hymns of value. The Bohemian Brethren, notably Michael Weisse (died 1534), furnished a number of hymns in this period. Their hymns breathed a deep spiritual atmosphere. The French Reformation produced the poetical translation of the Psalms by Clément Marot (died 1544) and Theodore Beza (died 1605); the German Reformed hymn book of 1540, published at Zurich; and the Genevan Psalter of Calvin of 1562. In England the Reformers issued Miles Coverdale's *Goostly Psalmes and Spiritualle Songes* (London, 1539); Robert Crowley's versification of the Psalter and Litany (1549); and, last and most famous of all, the rendering of the Psalms by Thomas Sternhold and John Hopkins (1560).

The time of the Thirty Years' War was marked by the production of many fine German hymns of a more or less martial character. Writers of hymns prior to 1650 were Opitz; Heermann; Altenburg, who composed part of the battle hymn of Gustavus Adolphus, "Fear not, O little flock, the foe"; Fleming, author of the "Pilgrim Hymn," beginning "In all my deeds"; and Rinkart, who composed the German Te Deum *Nun danket alle Gott* (Now thank we all our God).

Germany continued to produce great hymns and hymn writers after this period. Paul Gerhardt (1607–76) wrote 123 hymns. Many have been translated into English, and some are in common use. Probably the most familiar is "O sacred head, now wounded," adapted from Bernard of Clairvaux and translated from Gerhardt by J. W. Alexander and others. Johann Franck (1618–77), burgomaster of Guben, anticipated the Pietists in his mysticism as shown in his hymns. Johann Rist (1607–77) produced 610 hymns, a few having merit. Johann Scheffler, known as "Angelus Silesius" (1624–77), was a writer of force, and some of his hymns are yet used. All the hymns of the period are somewhat mystical in their teachings.

Pietism was a reaction against Protestant Scholasticism and swung to the other extreme of Mysticism. The leaders of the movement, Philipp Jacob Spener (1635–1705) and August Hermann Francke (1663–1727), wrote a few hymns. Christian Friedrich Richter (1676–1711) wrote 33 hymns. Johann Anastasius Freylinghausen (1670–1739) wrote a few hymns, and published the first hymn book of the movement at Halle in 1704. Gottfried Arnold (1666–1714), the Church historian, wrote several hymns of value. Joachim Lange (1670–1744), a friend of Francke, wrote the morning hymn, *O Jesu, süsses Licht* (O Jesus, sweet light). Johann Friedrich Starck (1680–1756), of Frankfort, wrote 939 hymns. Karl Heinrich Bogatzsky (1690–1774) wrote hymns as well as devotional works; and Philipp Friedrich Hiller (1699–1769), of Württemberg, among others who might be mentioned, wrote many hymns. The Moravian church has developed a beautiful ritual and has produced many fine hymns, numbers of which have been translated by John Wesley, Miss Catherine Winkworth, and others. Count Nicolaus Ludwig Zinzendorf (1700–60) produced more than 2000 hymns, over 200 of which appear in the English Moravian hymn book. "Jesus, Thy blood and righteousness" and "I thirst, thou wounded lamb of God," have been favorite translations from his hymns. Bishop August Gottlieb Spangenberg (1704–92) wrote 10 hymns. That on Christian simplicity, beginning "Holy simplicity, miracle of grace," written as a birthday hymn for his sister, is considered his best. The inspiration of the hymnology of the Evangelical Revival in England can be traced directly to the Moravian Brethren. To this period belong a few other hymn writers of note, such as Joachim Neander (1650–80), sometimes called the "Psalmist of the New Covenant," and Friedrich Adolph Lampe (1683–1729), the author of 30 hymns. Gerhard Tersteegen (1697–1769), a ribbon weaver, produced 111 hymns, some of which are worthy to be placed in the first rank. From Tersteegen we have several hymns by translation, including "Thou hidden love of God" and "God calling yet, shall I not hear?" From this school we have the first introspective hymns of value.

The nineteenth century saw renewed interest in German hymnody, led by Schleiermacher, Harms, and Arndt, resulting not only in new hymns but in the restoration and careful editing of the old. To writers already mentioned should be added the names of Spitta (died 1859); Albert Knapp (died 1864), author and compiler; and Karl Gerok (died 1890).

The French church has produced comparatively few hymn writers, the one notable name in recent times being César Malan (died 1864), author of a great number of hymns, one of which is *Non, ce n'est pas mourir* (No, no, it is not dying).

The hymns of the Evangelical Revival are not by any means the first great hymns produced in England. The Elizabethan period produced the hymns by F. B. P. (the initials may stand for Francis Baker, pater, i.e., priest), "Jerusalem, my happy home" and "O mother dear, Jerusalem," translated from the Latin and variously revised; also the first English hymn book. This was by George Wither and was published in London in 1623. To the next half century belong Robert Herrick (1591–1674), John Milton (1608–74), Henry Vaughan (1622–95), and Jeremy Taylor (1613–67). In the Restoration period Samuel Crossman published *The Young Man's Meditation* (1664), which contains several hymns, a good specimen of which can be seen in Lord Selborne's (Sir Roundell Palmer) *Book of Praise* (1863). Henry More in his *Divine Dialogues* (1668) published seven long hymns on the festivals of the Church. But the greatest lyric poet of the period was Thomas Ken (1637–1711), the good Bishop of Bath and Wells. His evening, morning, and midnight hymns stand at the head of all worship poetry of the English language. The first two—"All praise to Thee, my God, this night," concluding with the "long-metre Doxology," "Praise God from whom all blessings flow," and "Awake, my soul, and with the sun"—have never been surpassed and hardly approached. Joseph Addison, his contemporary, furnished a few hymns of an exalted character, including "The spacious firmament above." In 1683 John Mason published *Songs of Praise*, a hymn book which went through many editions. Benjamin Keach published *Spiritual Melody* (1691), the first Baptist hymn book. Among Independents the first hymn book used was *A Collection of Divine Hymns* (1690). The metrical version of the Psalms by Sternhold and Hopkins was followed by that of Francis Rouse (1646), and that in turn by Nahum Tate and Nicholas Brady (1696), which exerted a great influence. The favorite Easter hymn, "Jesus Christ is risen to-day," is a translation by Tate and Brady from the Latin. The tendency, however, came to be less and less to base hymns on the Hebrew Psalter for a whole hymn book. A preparation for the work of Isaac Watts (1674–1748), sometimes called the "father of English hymnody," was thus made. His hymns have been more widely sung than those of any other English writer, with the possible exception of Charles Wesley. His first work, *Horæ Lyricæ*, appeared in 1706; *Hymns and Spiritual Songs* in 1707. Besides these he published *Divine and Moral Songs for Children* (1720), long extremely popular. While many of Watts's hymns are commonplace and contain unmusical lines, others are alive with finely poetical conceptions and expressions. Among the many still in common use are: "O God, our help in ages past," "The heavens declare Thy glory, Lord," and "When I survey the wondrous cross." To the school of Watts belongs Philip Doddridge (1702–51), author of "Awake, my soul, stretch every nerve." His hymns were almost all written to follow sermons, reënforcing the truth which had been preached. The Wesley family, and the men who gathered about them, both in and out of the Church of England, were prolific writers and produced some of the best hymns in the history of the Church. Samuel Wesley (1662–1735) was no mean poet. His son John (1703–91) translated several hymns and mended many more. Samuel, Jr. (1691–1739), wrote some hymns. To Charles (1707–88), however, we must turn as the leader of the lyrical forces of the Evangelical Revival. He wrote over 6000 hymns. Out of 325 standard hymns James King assigns 22 to Charles Wesley, a larger number than is ascribed to any other writer. At the present time not far from 400 of his hymns are in common use, including "Come, thou Almighty King," "Love divine, all love excelling," "Jesus, lover of my soul," and many other favorites. Charles Wesley's hymns include a wider range of subjects than those of any other hymnist. They chronicle the events of the time as well as the devotional experiences of the writer. Some were impromptu. Many have bits of personal history as a background. Around some hymns have grown beautiful stories, the historical data for which are exceedingly slight. The original hymn books of the Wesleys were issued in 13 volumes under the direction of George Osborn (London, 1868–72). Thomas Olivers (1725–99), John Cennick (1718–55), Edward Perronet (1721–92), author of "All hail the power of Jesus' name," and John Bakewell (born 1721), were of the Wesleyan party; while John Gambold, the Moravian (1711–71), Joseph Hart (c.1712–68), Miss Anne Steele (1717–78), author of "Father, whate'er of earthly bliss," John Newton (1725–1807), author of "Glorious things of thee are spoken," William Cowper (1731–1800), author of "O for a closer walk with God," Robert Robinson (1735–90), John Fawcett (1740–1817), Augustus Montagu Toplady (1740–78), author of "Rock of ages, cleft for me," Joseph Swain (1761–96), William Williams (1717–91), and still others were more or less affected by the movement. The hymns of the movement are characterized by greater breadth of view than any previously issued. They include hymns of all kinds, but very few didactic hymns.

Hymns of modern days seem to have been produced by small groups of men representing some movement or belief. (*a*) The missionary movement produced James Montgomery (1771–1854) as its first hymn writer and Reginald Heber (1783–1826) as its ablest. Both produced many hymns other than missionary. One of Montgomery's best hymns is "Angels from the realms of glory." Among Heber's hymns are "Holy, holy, holy, Lord God almighty," "The Son of God goes forth to war," and, foremost of missionary hymns, "From Greenland's icy mountains," the musical setting of which turned Lowell Mason from banking to music. (*b*) The Oxford movement was characterized by its hymnological productions as well as its works of devotion and argument. John Keble (1792–1866), author of "Sun of my soul, Thou Saviour dear," with his *Christian Year;* Frederick William Faber (1814–63), the favorite Catholic poet, many of whose hymns are still gaining in popular use, such as "Hark, hark, my soul! angelic songs are swelling," "O Paradise, O Paradise," and "Souls of men, why will ye scatter," sometimes beginning "There's a wideness in God's mercy"; Edward Caswall (1814–

78); John Henry Newman (1801–90), author of "Lead, kindly light," and Isaac Williams (1802–65) were the singers of this group. Their work evinced not only a deep piety but an unsurpassed scholarly finish. (*c*) The Sunday-school movement has originated a vast number of hymns. It has also borrowed freely from the Church hymnals. Many of its hymns have been worthy, while others have been lacking in poetry and dignity. Certain of its hymns with their musical settings foreshadowed the hymns and music of the evangelistic movement. Recent tendencies in the Sunday-school movement have been steadily towards improvement in both hymns and music. In America the publication of Sunday-school hymnals, with words and music printed together, considerably antedated similar Church hymnals. (*d*) The evangelistic movement of Moody and Sankey brought into the Church a class of hymns widely differing from the greater part of those produced by any other movement. Many were not of high order—in fact, were quite the contrary—while others have had value, though more or less transient. Few hymns of any kind have attained a more instant popularity than Miss Claphane's "There were ninety and nine." Beginning with *Select Hymns*, *The Gospel Hymns* in six numbers (1875–95) were followed by hymn books whose name is legion and whose copies are millions. The most voluminous writer of this movement has been "Fanny Crosby" (Mrs. Frances Jane [Crosby] Van Alstine), many of whose hymns have merit, and some of which have attained great popularity, as, e.g., "Safe in the arms of Jesus." It should be said that many of the countless imitators of the earlier evangelists have come far from the standards originally set. (*e*) The Salvation Army has not added much to the hymnology of the Church; it has, however, changed the class of music used and not for the better. (*f*) The Christian Science movement has produced numerous original hymns and has altered others to suit its peculiar tenets. (*g*) The most recent movement in hymnody is that of social workers. The hymns collected by the *Survey* and first published Jan. 3, 1914, are deserving of mention.

Four women have written hymns any one of which is worth a lifetime to produce. Mrs. Sarah Flower Adams (1805–48), "Nearer, my God, to Thee"; Miss Charlotte Elliot (1789–1871), "Just as I am without one plea"; Miss Phœbe Cary (1824–71), "One sweetly solemn thought"; and Mrs. Phœbe H. Brown (1783–1861), "I love to steal awhile away."

In America, the Unitarians have produced some remarkable hymn writers, such as John Pierpont (1785–1866), the Longfellows, Henry Wadsworth and Samuel—the latter a leader in Church music, compiler of hymn books, and author of a number of fine hymns, including "Holy Spirit, Truth divine" and "O life, that maketh all things new"; Edmund Hamilton Sears, author of "It came upon the midnight clear"; Theodore Parker, author of "O Thou great friend to all the sons of men"; and Oliver Wendell Holmes, author of "O love divine, that stooped to share" and "Lord of all being, throned afar." The Protestant Episcopal church has to offer the names of Bishop George W. Doane (1799–1859), author of "Softly now the light of day" and "Fling out the banner"; the Rev. William A. Muhlenberg (1796–1879); Bishop George Burgess (1819–66); and Bishop Phillips Brooks, author of "O little town of Bethlehem." The Presbyterian church has, among others, Thomas Hastings (1784–1872), early worker for improvement in Church music; George Duffield, author of "Stand up, stand up for Jesus"; the Alexanders, James W. and Joseph A.; Mrs. Elizabeth Prentiss; and Charles S. Robinson, compiler of many hymn books, excellent for their time. The Congregationalists have the names Timothy Dwight (1752–1817), author of "I love Thy kingdom, Lord"; Leonard Bacon, author of the hymn for Forefathers' Day, "O God, beneath Thy guiding hand"; Ray Palmer, author of "My faith looks up to Thee"; Harriet Beecher Stowe, author of "Still, still with Thee, when purple morning breaketh"; and Washington Gladden, author of "O Master, let me walk with Thee." The Baptists furnish a long list, including the names of Oliver Holden (1765–1844), better known as the composer of "Coronation"; Adoniram Judson, Mrs. Sigourney, Robert Lowrie, William Howard Doane, and Samuel Francis Smith (1808–95), author of "My country, 'tis of thee" and "The morning light is breaking." The Methodists produced the first hymnologist of America, David Creamer, whose *Methodist Hymnology* appeared in New York in 1848. Other Methodist hymn writers are Miss Hannah F. Gould, Thomas Stockton, President William F. Warren, and Prof. Caleb T. Winchester. Among many other American hymn writers who might be mentioned are John Greenleaf Whittier, the Quaker poet, author of "Immortal love, forever full," sometimes beginning "We may not climb the heavenly steeps"; Daniel C. Roberts, author of "God of our fathers, whose almighty hand"; and Katharine Lee Bates, author of another excellent national hymn, entitled "America, the beautiful."

England has produced a great number of fine hymns in recent years. From many names of writers and from countless hymns a few selections will be made. From the Church of England, Christopher Wordsworth, "O day of rest and gladness" and "The day is gently sinking to a close"; Henry Alford, "Ten thousand times ten thousand"; J. S. B. Monsell, "Sweet is Thy mercy, Lord"; John Mason Neale, many of whose translations have here been quoted, author also of many hymns; Sir Henry W. Baker, "The King of Love my shepherd is"; John Ellerton, "Saviour, again to Thy dear name we raise"; William W. How, "O Jesu, Thou art standing" and "For all the saints, who from their labours rest"; Samuel John Stone, "The Church's one foundation" and "Weary of earth." Among other English writers of note are Horatius Bonar, "I heard the voice of Jesus say" and "Upward, where the stars are burning"; Frances Ridley Havergal, whose hymns of consecration are especially well known; Henry Francis Lyte, whose hymn, "Abide with me, fast falls the eventide," is hardly excelled; S. Baring-Gould, whose "Onward, Christian soldiers" has earned enormous popularity.

Hymns, Ancient and Modern, originally compiled by a committee of which Sir H. W. Baker was secretary, and published in London in 1861, with supplemental hymns published in 1889; *The Congregational Psalmist* (1858), edited by Henry Allon; and *Church Hymns* (1871), edited by Canon John Ellerton, are the greatest hymn books of England. *The Plymouth Collection* (1855), by Henry Ward Beecher, an early ad-

vocate of congregational singing; the Protestant Episcopal *Hymnal* (1871) and subsequent revisions; the Baptist *Praise Book* (1871) and its successors; the *Methodist Hymnal* (1878), recently revised; *Church Song*, by M. W. Stryker; the *Evangelical Hymnal* (1880), by Hall and Lasar; *Laudes Domini* (1884), one of a notable series by Dr. Robinson; *In Excelsis; Hymns of the Faith*, by Harris and Tucker; the *Presbyterian Hymnal* (1895); *Church Hymns and Tunes* (1906), by Turner and Biddle; the very recent *Pilgrim Hymnal;* and the *American Hymnal* (1913)—are noteworthy hymnals of America. They show striking progress in quality of hymns and music as well as in the art of bookmaking. There are several notable hymnological collections in this country. The Lowell Mason library is in Yale University. The Creamer collection is at Drew Theological Seminary, Madison, N. J. Hubert P. Main has a collection of great value, and Hartford Theological Seminary possesses a large, unique, and most valuable collection.

Bibliography. It has been estimated that there are at least 400,000 hymns in all languages, of which the greatest number are in German and the next greatest number are in English. The literature on the subject is consequently becoming quite large. The great thesaurus of information is J. Julian's *Dictionary of Hymnology* (London and New York, 1892; rev. ed., 1907), the labor of many years and of many hymnologists. It covers the entire field and contains separate articles upon the hymnology of the different periods and lands. A. F. W. Fischer's *Kirchenlieder-Lexicon* (Gotha, 1878–79) is also very good. For the study of early Greek and Latin hymns the standard work is H. A. Daniel's *Thesaurus Hymnologicus* (Leipzig, 1855), which gives the text of many hymns; for the Latin mediæval hymns, a work of similar rank is F. J. Mone's *Lateinische Hymnen des Mittelalters* (Freiburg, 1853). For German Protestant hymnology to the seventeenth century, the great work is P. Wackernagel, *Das deutsche Kirchenlied von der ältesten Zeit bis zu Anfang des XVII. Jahrhunderts* (Leipzig, 1864–77). J. M. Neale, by his *Mediæval Hymns and Sequences* (London, 1851), *Hymns of the Eastern Church* (ib., 1862), and other similar works, contributed much to a knowledge of the hymnology of the Eastern and Western churches of the Middle Ages. A fairly creditable book on Latin hymns is S. W. Duffield's *Latin Hymn-Writers and their Hymns* (New York, 1889). A recent book is D. J. Donahue's *Early Christian Hymns* (1st and 2d series, Middletown, 1908, 1911).

Consult: Josiah Miller, *Singers and Songs of the Church* (New York, 1869); J. E. Prescott, *Christian Hymns and Hymn-Writers* (London, 1883); W. G. Horder, *The Hymn Lover* (ib., 1889); Duncan Morrison, *The Great Hymns of the Church: Their Origin and Authorship* (ib., 1890); A. E. C., *Hymns and their Stories* (New York, 1894); R. E. Welsh and F. G. Edwards, *Romances of Psalter and Hymnal* (ib., 1896); W. T. Stead, *Hymns that Have Helped* (ib., 1897); Duncan Campbell, *Hymns and Hymn-Makers* (London, 1898); Butterworth and Brown, *Stories of the Hymns and Tunes* (New York, 1907); L. F. Benson, *Studies of Familiar Hymns* (ib., 1908). For the biography of a hymnologist, consult H. Housman, *John Ellerton: A Collection of his Writings on Hymnology, with a Sketch of his Life* (London, 1896). On German hymnology, consult: Winkworth, *Lyra Germanica* (London, 1855) and *Christian Singers of Germany* (ib., 1869); and for the hymns of Luther especially, Bacon, *Hymns of Martin Luther* (New York, 1883). There are several commentaries on hymns that are very well done. Hyde, *Hymnal Sermon Pictures* (ib., 1899), does what is done nowhere else and is most complete in the analysis of the hymns he discusses. Commentaries on denominational collections are: Biggs, *Hymns, Ancient and Modern* (London, 1867), giving annotations on the hymns of the Church of England; Nutter, *Hymn Studies* (New York, 1884; 3d ed., 1902), based on the American *Methodist Hymnal;* Burrage, *Baptist Hymn Writers and their Hymns* (Portland, Me., 1888); Tillet, *Our Hymns and their Authors* (Nashville, Tenn., 1889); the annotated edition of the *Hymnal* of the Methodist Episcopal Church South; Robinson, *Annotations upon Popular Hymns* (New York, 1893), based on his *Laudes Domini;* Stevenson, *The* [British] *Methodist Hymn-Book*, illustrated (London, 1883), from which S. W. Duffield drew many of the facts and anecdotes given in his *English Hymns* (New York, 1886), intended as a commentary on Robinson's *Laudes Domini;* Price, *Music and Hymnody of the Methodist Hymnal* (ib., 1911); *Hymns and Hymn Writers of the Church* (ib., 1911). The best anthologies of religious lyric poetry are *The Book of Praise* (London, 1862; many subsequent editions), by Sir Roundell Palmer (Lord Selborne), and F. T. Palgrave, *The Treasury of Sacred Song* (ib., 1889). See Hymn Tunes.

HYMNS. See Hymnology.

HYMNS, National. See National Hymns.

HYMN TUNES. The authentic history of hymn tunes begins with Hilary of Poitiers, who died in 368. His music was simpler than that of the ordinary jubilations, each syllable of the text being given but one or, at the most, two musical tones. St. Ambrose (died 397) and, later, Pope Gregory the Great (died 604) introduced radical reforms in the style and singing of hymns (see Ambrosian Chant; Gregorian Chant), and the impetus given by them to the plain chant (q.v.) carried that form along for centuries. It is noteworthy that even so early in many cases the author of the words also wrote the accompanying melodies. With the growth of polyphonic music these old chants were used as *canti fermi* upon which the more elaborate forms of masses and motets were constructed. Under Palestrina (q.v., died 1594) the polyphonic hymn reached its highest development. Around the historic plain chants he embroidered a wealth of contrapuntal devices, yet preserving throughout their original smoothness and beauty. The difficulty of the music is the one objection against their more general use.

Meanwhile a reaction had arisen against the heavy, sombre music which had heretofore been the sole style of hymn tunes. Between the acts of Mystery Plays, and especially at those given at Christmas time, it was customary to sing songs whose general trend was religious, but whose music was light and popular. The Reformation was imminent, and Luther appreciated and seized the opportunity for an innovation in Church music. He adapted some of these popular tunes to German translations of Latin hymns, wrote some original words, and

the whole was set for four, five, or six voices by Johannes Walther. Most important in this connection is the fact that for the first time in the history of hymn tunes the music was rhythmic. This was the beginning of the chorale (q.v.), which became immediately and widely popular. The next great period in Germany begins with Johann Sebastian Bach (1685–1750), who, while emphasizing the rhythmic element, at the same time developed the structural side of the music. After him the decline was rapid.

In France Clément Marot (died 1544) and Theodore Beza (died 1605) wrote metrical psalms which were set to popular music. Goudimel (1505–72), the earliest national composer, wrote many hymn tunes; but their difficulty rendered negative their excellence, and they were supplanted by the simpler arrangements of Claudin le Jeune (died 1600). Of the later French hymn writers the most important was César Malan, of Geneva (1787–1864), who composed melodies to his own words. In England the history of hymn tunes follows much the same line as on the Continent. There were no hymns proper until the eighteenth century; before that time Tallis (died 1585), Byrd (died 1623), Parsons (died 1570), etc., set psalms to revised forms of old Continental tunes, and in 1621 "the Whole Booke of Psalmes" was published. The music of this edition was arranged largely by Thomas Ravenscroft, the tunes having been set by Bennet, Morley, Tallis, etc. With Orlando Gibbons (1583–1625) the polyphonic school in England came to an end, and the later compositions of Carey (died 1743), Wainwright (1792–1854), and their successors were poor in comparison. The reforms of the Commonwealth did nothing for Church music, and it was not until Purcell (1658–95), the greatest native English composer, that a lighter, more varied note was introduced into hymn tunes. The hymns of Watts (1674–1748) marked the beginning of the popular epoch, and those of Charles Wesley (1707–88) its high-water mark. In recent years choral music and hymn tunes have drawn more closely together, to the immeasurable advantage of the latter. In England especially, Dykes (1823–76), Barnby (1838–96), Stainer (1840–), and others have all written excellent music. At the same time, however, many hymns have been written in England and the United States whose music depends wholly for its success on its catchy, not to say vulgar, character. Most representative of this class are the hymns of Moody and Sankey. Of the many collections of tunes compiled since the middle of the nineteenth century, especially in England, the most notable is that published in 1861 by the Rev. Sir Henry Baker under the title *Hymns Ancient and Modern*. Revised and enlarged editions appeared in 1868, 1875, 1889, 1904, and 1910. For a more detailed account of hymn tunes, consult: Butterworth, *Story of the Tunes* (New York, 1890); Love, *Scottish Church Music* (London, 1891); Curwen, *Studies in Worship Music* (ib., 1894); Cowan and Love, *Music of the Church, Hymnary and Psalter in Metre, its Sources and Composers* (ib., 1901); Mees, *Choirs and Choral Music* (New York, 1901); Dickinson, *Music in the History of the Western Church* (ib., 1902); E. S. Lorenz, *Practical Church Music* (ib., 1909); P. C. Lutkin, *Music in the Church* (Milwaukee, 1910). See also HYMNOLOGY.

HYND'MAN, HENRY MAYERS (1842–1921). An English journalist and Socialist leader, born in London. He graduated at Trinity College, Cambridge, and began to study law in 1863, but three years later, as correspondent for the *Pall Mall Gazette*, went to the war in progress between Austria and Italy, where he became the friend of Mazzini, Garibaldi, and other patriots. Between 1869 and 1871 he traveled in Australia, New Zealand, and Polynesia, and while in Melbourne wrote articles for the *Argus* in the cause of free education. He founded the Social Democratic Federation in 1881 and from that time was a conspicuous reform agitator. He was chairman at the International Socialist Congress held in London in 1896 and assisted at the formation of the new International at Paris in 1900. He was an Irish land leaguer and a pro-Boer during the second Boer War. From 1900 to 1910 he was a member of the International Socialist Bureau, and he contested Burnley in 1895, 1906, and 1910. From 1874 he used his pen diligently in the Socialistic cause. His books include: *Indian Policy and English Justice* (1874); *Bankruptcy of India* (1886); *England for All* (1881); *Historical Basis of Socialism* (1883); *A Commune for London* (1888); *Commercial Crisis of the Nineteenth Century* (1892; 3d ed., 1908); *Economics of Socialism* (1896); *The Record of an Adventurous Life* (1911); *Further Reminiscences* (1912).

HYOGO, hyō'gō. A part of the Japanese town of Kobe (q.v.).

HY'OID BONE (from Gk. *ὑοειδής, hyoeidēs*, shaped like the Greek letter upsilon, from *ὑ, y*, upsilon + *εἶδος, eidos*, shape). The tongue bone, or V-shaped bone. It is sometimes spoken of as unimportant in man, compared with the so-called hyoid bone in many of the lower animals, in which, on account of its being a support for bronchial apparatus, it is often developed to a great size. But its importance is no less in man, because of its connection with many muscles; the perfection of its form and its exact location at the base of the tongue being a considerable element in the apparatus for the formation of articulate and musical sounds.

HYOLITHES, hī-ōl'ī-thēz (Neo-Lat. nom. pl., from Gk. *ὑ, y*, upsilon + *λίθος, lithos*, stone). An important and common fossil of the Cambrian rocks, and found also, though less commonly, in the higher rocks up to and including those of the Permian system. The shells of this mollusk are slender, conical tubes, often curved, and with triangular or flattened cross sections. Some are provided with a lid to close the aperture. The old genus *Hyolithes* has been elevated to a family rank, and the numerous species have been distributed among several new genera. The hyolithids are very common in many of the Lower Cambrian rocks, and they are indeed among the very oldest fossils known. They have been classed as pteropods, and more recently as worm tubes, with the probabilities in favor of the latter relation. Some authors have also considered the hyolithids to represent quite nearly the most primitive form of gastropod. Consult: Novak, "Revision der palæozoischen Hyolithiden Böhmens," in *Abhandlungen der böhmischen Gesellschaft der Wissenschaften*, series 7, vol. iv (Prague, 1891); Holm, "Sveriges Kambrisk-Siluriska Hyolithidæ och Conulariidæ," in *Afhandligar Sveriges Geologiska Undersökning*, series C, no.

112 (Stockholm, 1893); Walcott, "Fauna of the Lower Cambrian or Olenellus Zone," in *Annual Report of the United States Geological Survey*, vol. x (Washington, 1893); Matthew, "Illustrations of the Fauna of the St. John Group," in *Transactions of the Royal Society of Canada*, vols. i to v (Montreal, 1883–91).

HYOSCYAMINE, hī'ō-sī'ă-mĭn. See ALKALOIDS.

HY'OSCY'AMUS. See HENBANE; BELLADONNA.

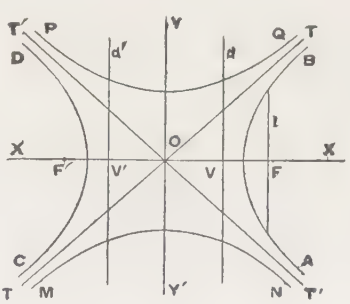
HYPÆTHRAL, hĭp-ē'thral, **HYPÆTHROS,** hĭp-ē'thrŏs (open to the sky; a structure open to the sky). A term applied by Vitruvius (iii, 1) to a temple with a central unroofed space. See TEMPLE.

HYPATIA, hī-pā'shī-ă (Lat., from Gk. Ὑπατία). Daughter of Theon, an astronomer and mathematician of Alexandria and head of the Neoplatonic school in that city, early in the fifth century. She is famed alike for her beauty, her purity, her wisdom, and her tragic fate. Her father gave her the best training the philosophy of the time could furnish, and she succeeded him as lecturer at Alexandria; her fame drew students from all parts of the East, where the influence of Greek thought and knowledge was felt. The citizens of Alexandria were proud of her, and such reliance was placed upon her judgment and sagacity that the magistrates used to consult her on important cases. Among those who were most intimate with her was Orestes, prefect of the city. At this time the Bishop of Alexandria was Cyril (q.v.), between whom and Orestes there had arisen a dissension on the question of jurisdiction. "It was commonly reported among the Christians," says Socrates, the Church historian, "that it was by her influence he [Orestes] was prevented from being reconciled with Cyril. Some of them, therefore, whose ringleader was a reader named Peter, hurried away by a fierce and bigoted zeal, entered into a conspiracy against her; and observing her as she returned home in a carriage, they dragged her from it and carried her to a church called Cæsareum, where they completely stripped her and then murdered her with shells. After tearing her body to pieces, they took her mangled limbs to a place called Cinaron, and there burned them." This occurred in March, 415. As at the time Synesius (q.v.) met her (about 395) she had been for 20 years a famous lecturer, and as she lived 20 years after that, she must have been at least 60 years old when murdered, but in legend and fiction she is represented as of unfaded physical charm. She is the heroine of Charles Kingsley's *Hypatia, or New Foes with an Old Face* (1853). Synesius has preserved a few of her letters. Consult Meyer, *Hypatia von Alexandria, ein Beitrag zur Geschichte des Neuplatonismus* (Heidelberg, 1886), and J. B. Bury, *History of the Later Roman Empire*, vol. i (New York, 1889).

HYPERÆMIA. See BIER'S HYPERÆMIA; MEGRIMS.

HY'PERÆSTHE'SIA (Neo-Lat., from Gk. *ὑπέρ, hyper*, over + *αἴσθησις, aisthēsis*, sensibility, from *αἰσθάνεσθαι, aisthanesthai*, to perceive through the senses) and HYPERALGESIA. "Hyperæsthesia" is a term commonly though less correctly used to designate increased sensibility to pain, the proper term being "hyperalgesia." It is believed that there is no increase of sensibility to touch or to heat and cold over the normal, though tactile and thermal sensibility may be diminished under various conditions. Unpleasant sensation or actual pain may be caused by a light touch on the surface and is due to irritation of oversensitive end organs of common sensibility (i.e., pain) and not to increased perception of touch. Hyperalgesia is due to peripheral, spinal, or cerebral irritation of sensory nerve fibres. Increased cutaneous sensibility occurs in meningitis, cerebral or spinal; tetanus, hysteria, traumatic neuroses, hydrophobia, in neuritis and multiple neuritis, and in some fevers. Local hyperalgesia occurs in inflamed areas, as around carbuncles, burns, or rheumatic joints. See ANÆSTHESIA.

HYPER'BOLA (Gk. *ὑπερβολή, hyperbolē*, hyperbola, excess, from *ὑπερβάλλειν, hyperballein*, to exceed, from *ὑπέρ, hyper*, over + *βάλλειν, ballein*, to throw). One of the conic sections (q.v.). Analytically the hyperbola is the locus of a point which moves so that its distance from a fixed point, called the focus, bears a constant ratio greater than unity to its distance from a fixed straight line, called the directrix. In the figure F is the focus and d the directrix for the branch on the right, F' is the focus and d' the directrix for the branch on the left, XX' is the transverse axis, YY' the conjugate axis, and l is the latus rectum. The equation of the hyperbola referred to the rectangular axes XX', YY' is $\frac{x^2}{a^2} + \frac{y^2}{a^2(1-e^2)} = 1$, in which $a = OV$, and e is the given ratio. Since $e > 1$, $a^2(1-e^2)$ is negative. Putting $-b^2$ for this negative quantity, the standard form of the equation is $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. The curve MN, PQ is the *conjugate hyperbola* with respect to the hyperbola AB, CD. (See CONJUGATE.) The hyperbola is



HYPERBOLA.

the only conic section having real asymptotes. These are the lines TT, $T'T'$ in the figure. The equation of the hyperbola referred to its asymptotes is $xy = ab$. A hyperbola whose asymptotes are perpendicular to each other is called a *rectangular* or *equilateral hyperbola*. These asymptotes have the following remarkable property: If, starting from O, the asymptotes are divided in continued proportion, and from the points of section lines are drawn parallel to the other asymptote, the areas contained by two adjacent parallels and the corresponding parts of the asymptote and curve are equal.

HYPERBOLE, hī-pĕr'bŏ-lē. The name given to a figure of rhetoric by which expressions are employed that, taken literally, signify more than is really meant. The use of the figure is to arrest the attention. Hyperbole is the basis

of many metaphors. Thus, we call Nero a monster, Tamerlane a tiger, and so on. See RHETORIC, FIGURES OF.

HYPERBOL'IC LOG'ARITHMS. See LOGARITHM.

HY'PERBO'REANS (Gk. Ὑπερβόρεοι, *Hyperboreoi*, beyond the north wind, from *ὑπέρ, hyper*, above, beyond + *βορέας, boreas*, north wind). A name given by the ancients to a mythical people dwelling in the distant north, beyond the Rhipæan Mountains, where it was everlasting day and perpetual spring, and where sorrow and old age were never found. The name was often applied to any people who lived in the Far North. The Hyperboreans may have been originally those who brought to Apollo gifts and sacrifice. Consult: Crusius, "Hyperboreer," in Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. i (Leipzig, 1884–90); Mannhardt, *Wald- und Feldkulte* (1905); Farnell, *Cults of the Greek States*, vol. iv, 100 ff. (London, 1907). For an ancient discussion, skeptical in tone, of the myth of the Hyperboreans, consult Herodotus, iv, 32 ff., and the notes on the passage in the edition of Herodotus by How and Wells (Oxford, 1912).

HY'PERCAL'VINISM. That form of Calvinism which carries the system to its extreme logical conclusions, holding, e.g., to a double predestination (to evil as well as good), as in the Canons of Dort; and atonement only for the elect, as in the Second Helvetic Confession. Consult Schaff, *Creeds of Christendom* (New York, 1881).

HYPERCHIMÆRA, hī'pĕr-kī-mē'rȧ. A term applied to a plant produced by the union of two others by grafting in such a manner that portions of each are aggregated into a sort of patchwork or mosaic. As it is a sort of graft hybrid, it is discussed under GRAFT HYBRIDS and CHIMÆRA, IN PLANTS (qq.v.).

HY'PERE'MIA. See HYPERÆMIA.

HYPERGEOMETRY. See GEOMETRY, *Hypergeometry*.

HY'PERI'DES (Lat., from Gk. Ὑπερείδης, *Hypereidēs*). An Athenian orator of the fourth century B.C., one of the 10 comprised in the Alexandrian canon. (See CANON ALEXANDRINUS.) After studying philosophy under Plato and oratory under Isocrates, he began his public career as an advocate in the Athenian courts of justice and joined the patriotic party, at that time led by Demosthenes and Lycurgus. He fitted out two triremes at his own expense for the Eubœan expedition of 358 B.C. In 338 B.C., when the disastrous fight of Chæronea (q.v.) laid Greece at the mercy of Philip of Macedon, Hyperides proposed that the citizens should send their wives and children to places of security and fight it out to the last. Though this desperate advice was not taken, its genuine patriotism was appreciated and rewarded by his countrymen. When the death of Philip revived the hopes of the anti-Macedonian faction, Hyperides promoted the alliance with Thebes, and after the destruction of that city by Alexander was one of the orators demanded of the Athenians by the Macedonian King. Alexander, however, did not press his demand, and Hyperides continued to oppose the Macedonian influence as strongly as ever. The arrival in Athens of Harpalus (q.v.), the runaway treasurer of Alexander, then absent on his Eastern conquests, disturbed the friendly relation that had hitherto existed between Hyperides and Demosthenes, for in this celebrated case Hyperides, as one of the few anti-Macedonians who were above suspicion, was chosen to prosecute his friend. (See DEMOSTHENES.) In the Lamian War (q.v.), which followed the death of Alexander, Hyperides took a leading part, and he spoke the funeral oration over his countrymen who had perished in battle. The year 322 B.C. saw the hopes of Athens finally crushed at the battle of Crannon. The chiefs of the patriotic party sought safety in flight. Hyperides was overtaken at Ægina by the agents of Antipater and put to death. Tradition says that his tongue was torn out by his captors, or that he bit it out to avoid betraying his friends. As an orator, Hyperides was ranked high by the ancients; it is said that some critics preferred him to Demosthenes. The "grace" of his speeches was especially praised. The writer of the *Lives of the Ten Orators* enumerates 75 speeches, of which 52 were considered genuine. Until recently these were known only in scanty fragments, but in the last century a number of papyri were discovered in Egypt which contain six speeches in a fairly complete state, including the famous funeral oration mentioned above. This fully justifies the praise of the ancient critics and may be ranked as one of the finest products of Greek oratory. A complete edition of the speeches and fragments, with bibliography, has been published by Blass (Leipzig, 1894). The orations *Against Athenogenes* and *Against Philippides* have been edited, with an English translation, by Kenyon (London, 1893). Consult: Jebb, *Attic Orators*, vol. ii (London, 1880); Blass, *Attische Beredsamkeit*, vol. iii (Leipzig, 1898); Wright, *A Short History of Greek Literature* (New York, 1907); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (5th ed., Munich, 1908).

HYPE'RION. See TITANS.

HYPERION. 1. A poetic fragment by John Keats (1820). 2. A romance by Longfellow, published in 1839.

HYPE'RIUS, ANDREAS GERHARD (1511–64). A Protestant theologian and reformer, born at Ypres, whence his learned name Hyperius, Gerhard being his family name. He was educated at the University of Paris and traveled in the Netherlands and in Germany. Driven from England (where he lived four years with William Mountjoy, Erasmus' friend) by the persecutions of 1540, he went to Germany, was converted to Protestantism, and became professor of theology at Marburg. A deep scholar and a liberal theologian, he was accused of Zwinglian views on the Lord's Supper. He wrote: *Methodi Theologiæ Libri III* (1566); *De Formandis Concionibus Sacris* (1553); *De Recte Formando Theologiæ Studio* (1556), the first scientific dictionary of theology.

HY'PERMET'AMOR'PHOSIS. Set METAMORPHOSIS.

HY'PERMETRO'PIA. See SIGHT, DEFECTS OF.

HY'PERMNES'TRA (Lat., from Gk. Ὑπερμνήστρα). One of the Danaids. She alone of the daughters of Danaüs (q.v.) disobeyed his command; she did not slay her husband, Lynceus, but was eventually pardoned by her father.

HY'PERO'PIA (from Gk. *ὑπέρ, hyper*, above + *ὤψ, ōps*, sight). A congenital or acquired error of refraction of the eye. Owing to too little convexity of the refracting surfaces, parallel rays of light do not converge to a focus on the retina, as in the normal eye, but to a

point somewhere behind the same. It is usually called hypermetropia, long-sightedness, and is the opposite of myopia.

HY'PERSPACE. See GEOMETRY.

HY'PERSTHENE (from Gk. *ὑπέρ, hyper,* over + *σθένος, sthenos,* strength). An iron-magnesium silicate, classed in the orthorhombic section of the pyroxine group. With a decreasing proportion of iron hypersthene grades into enstatite (q.v.). It crystallizes in orthorhombic forms, but is also found in granular masses. Associated with labradorite and other basic feldspars, it is an important constituent of certain eruptive rocks, such as gabbro and norite, and is widely distributed. When cherry red in color, it may be cut and polished and used as an ornamental stone.

HYPERSTHENE GAB'BRO. See GABBRO.

HYPER'TROPHY (from Gk. *ὑπέρ, hyper,* over + *τροφή, trophē,* nourishment, from *τρέφειν, trephein,* to nourish). The term applied in medicine to the abnormal and disproportionate enlargement of any part of the body. Examples of this change are seen in the muscular system, where it may occur altogether independently of disease. The huge bosses of flesh that stand prominently forward in the arm of a blacksmith or of a pugilist and in the leg of a ballet dancer are illustrations of hypertrophy from increased use, where the general health may be perfect. In double organs, such as the kidneys and lungs, if the organ on one side degenerates through disease, the organ on the opposite side is often found to enlarge and carry on double work. In these cases hypertrophy is an effect of disease, but is at the same time a preservative of life. It is called compensatory hypertrophy.

There are, however, cases in which the hypertrophy has a hurtful instead of a conservative effect, as, e.g., hypertrophy of the thyroid gland, constituting the disease known as goitre, or bronchocele, hypertrophy of the prostate gland, of the spleen, etc. The following are the etiological factors of hypertrophy: 1. It may be congenital. 2. A local increase in the supply of blood to a part, whether due to increased exercise, or irritation by mechanical or chemical agents, etc. 3. It may be due to old age—the so-called senile hypertrophy, the commonest example of which is the enlargement of the prostate gland in old men, which is said to occur in about 40 per cent of all men after the age of 50 years. 4. Syphilis and chronic inflammations are also very common causes of hypertrophy. See HEART, DISEASES OF THE.

HY'PHA (Neo-Lat. nom. pl., from Gk. *ὕφη, hyphē,* web). An individual filament of the body of a true fungus. The vegetative body of a true fungus is called a mycelium, which consists of a web of filaments (usually colorless) which is of various textures, dependent upon the closeness of the weaving. A mycelium may be as delicate as a cobweb, or it may be as compact as a piece of felt. Each individual thread or filament of this woven body is a hypha. Hyphæ constitute not merely the units of structure of the fungus body, but they also arise from the mycelium to bear spores, and they also enter the substratum to secure nutrition. See FUNGI.

HYP'NAL (from Gk. *ὑπναλέος, hypnaleos,* causing sleep, from *ὕπνος, hypnos,* sleep; connected with Lat. *somnus, sopor,* AS. *swefen,* Skt. *svapna,* sleep, from *svap,* to sleep). A hypnotic of value, combining the effects of chloral hydrate and antipyrine, of which it is composed. Its chief use is found in cases of sleeplessness due to pain.

HYP'NOS (Lat., from Gk. *Ὕπνος*). The Greek god of sleep, the son of Erebus and Night, and twin brother of Death. He is represented as a youth with wings, bearing a poppy branch and the horn of slumber.

HYP'NOSCOPE (from Gk. *ὕπνος, hypnos,* sleep + *σκοπεῖν, skopein,* to view). A magnet devised to measure hypnotic sensitiveness. The magnet is a slit tube 3.4 centimeters in diameter by 5.5 in length and weighs 169 grams. It is very powerful, lifting 25 times its own weight. The instrument is applied by removing the armature and inserting the forefinger of the person to be tested into the magnet so as to touch both poles at once. After two minutes sensitive or objective effects will be noticed in 30 per cent of persons tested. It is not an instrument of any value whatever. Hypnotic influences cannot be measured by any known mode at the present time.

HYPNOT'ICS (from Lat. *hypnoticus,* Gk. *ὑπνοτικός, hypnotikos,* relating to sleep, from *ὕπνος, hypnos,* sleep). Agents which are used to induce sleep. During the state of slumber, especially if deep, the functional activity of the cerebral centres is largely suspended. Medullary centres remain active, but are less alert. The brain and spinal cord are anæmic, reflex action is diminished, and the senses are dulled. The ordinary precautions of one about to sleep —the recumbent position, the darkened and quiet room, the absence of previous excitement —are simply evidences of physiological necessity. Hypnotics act ordinarily by diminishing the functional activity of the brain or by causing an anæmia of it, occasionally by both methods. They may be divided into four classes: (A) *Mental,* acting by diminishing the functional activity of the cerebrum. This class includes the constant repetition of prayers, etc., the counting up into the hundreds or thousands, the counting imaginary sheep as they jump an imaginary wall, and many similar expedients. These are only of value in light grades of insomnia. (B) *Dietetic.* This class causes a congestion of the abdominal viscera by increasing their functional activity and thus leads indirectly to cerebral anæmia. A light supper of crackers and cheese, or oysters, or soup, or beef tea, is often of great value for inducing sleep. Frequently the addition of a little alcohol as a weak toddy, or a bottle of beer, will help. (C) *Mechanical,* including: 1. *Hot-Water Bag* or *Brick* to the feet, of value when the extremities are cold. It acts by indirectly causing cerebral anæmia. 2. *Moist warmth* to abdomen by a poultice or hot compress covered with oil silk. This is frequently of value. It acts by dilating the abdominal vessels, and this causes cerebral anæmia. 3. *Hot Bath.* This acts by dilating the cutaneous vessels and thus causing cerebral anæmia. Certain precautions should be observed: The bed should be well warmed, and the room moderately cool. The bath should be hot, and the individual should stay in it for several minutes. He should be dried as quickly as possible, and in passing from the bath to the bed he should be well wrapped up and wear warm slippers. This method is often of great value when properly applied. It should be used with caution in cases of heart disease. 4.

Chapman's Method. This consists in the application of cold to the spine. It indirectly causes dilatation of the abdominal vessels and thus cerebral anæmia. 5. *Massage.* This should be general and thorough, especially to the abdomen. It acts by dilating the vessels of the body and also by lessening the irritability of the sensory cutaneous nerves. If the ordinary precautions of quiet and darkness are observed after the massage, this method frequently acts very well. All the preceding measures are of little value in case any acute disease is present. In such cases, and many others, we have to resort to drugs. These should not be used for ordinary insomnia until a thorough trial has been given to the dietetic and mechanical hypnotics. None should be given except under the advice of a physician who has examined the patient. They are, of course, grouped under the class (D) *Medicinal.* 1. *Opium* and its derivatives. As simple hypnotics, these are all objectionable, for they produce other marked effects than sleep. The danger of a habit forming must also be considered. In acute diseases, especially when accompanied by pain or delirium, they are of great value. Codein is the least objectionable, but it is also the most expensive and the least efficacious. 2. *Hyoscyamus* and its derivatives. These are not of so much value as are ordinary hypnotics, for they cause other marked effects. In cases of mania they are of great value. Hyoscine hydrobromate has the most decided hypnotic action. 3. *Cannabis Indica.* Feeble in hypnotic power. The sleep produced by it is apt to be preceded by delusions often unpleasant. 4. *Chloral Hydrate.* This is a very valuable hypnotic. It has some objections. A very important one is the tendency to the formation of a habit. Another is the difference in susceptibility to its action. Chloral hydrate is a powerful cardiac depressant, and in cases of heart disease or heart weakness from any cause is should be used with great caution, if at all. A small dose has caused death, although 50 and 60 grains have been given in other cases without harm. 5. *Bromides.* These are not very powerful hypnotics, but are still very efficacious and comparatively harmless. Potassium bromide is the most useful, but sodium bromide, though less active, is not so depressing to the circulation. 6. *Monobromated Camphor.* A feeble hypnotic. 7. *Paraldehyde,* a polymeric modification of acetic aldehyde. This is an efficient hypnotic, producing sleep, as a rule, in half an hour. As regards its nervous effects, it is almost a pure hypnotic, and it causes but slight depression of the heart and respiration. It leaves no after effects except the odor of the breath, which is often very marked, and it may cause nausea or vomiting if the stomach is very irritable. Like all hypnotics, it sometimes fails. 8. *Sulfonal.* This is an efficient but slow-acting hypnotic. The dose is given one or two hours before the expected sleeping time. 9, 10. *Trional* and *Tetronal* are similar drugs, with more rapid and powerful action. The three last named may produce poisoning if used for any length of time or in too large doses. 11. *Urethane,* ethyl carbonate, $C_2H_5CO_2NH_2$, has a bitter, disagreeable taste. This is an efficient hypnotic, leaving no disagreeable after effects. In large doses it may cause vomiting, but is otherwise a pure hypnotic. It has no depressing action on the heart or respiration. 12. *Amylene Hydrate.* A colorless fluid with a sharp taste and smell. This is an efficient hypnotic, causing sleep in 15 to 45 minutes. The sleep is natural, and there are no bad after effects. It has no depressing effects on the heart or respiration. It has caused in a few cases a delirium resembling that of alcoholic intoxication, but followed by refreshing sleep. 13. *Amylene Chloral,* or dormiol, is similar in action. 14. *Veronal,* a later production, has in a large measure superseded many of the older hypnotics. It is claimed to be the safest and least apt to induce a habit; but not a few cases of poisoning have been reported, as well as of habit formation. Most of the drugs named are considered in special articles under their names.

HYP'NOTISM, HYPNO'SIS (from Gk. *ὕπνος, hypnos,* sleep). The general names for a group of abnormal phenomena, physical and psychical, which show a close outward resemblance to the phenomena of normal sleep and of sleep walking. The symptoms of the hypnotic state differ considerably among different subjects, and the marking off of distinct stages within this state is rather a matter of theory than of actual observation. The artificial sleep is continuous and progressive, beginning with a languor and drowsiness not unlike those of a man suddenly waked from sound sleep, or arousing from a too protracted morning's nap after a disturbed night. As the state advances, the subject becomes partially anæsthetic, insensitive to pin pricks, pinching of the skin, etc.; his sense organs are closed to most of the impressions from his surroundings that would normally excite them; if awakened before the sleep has grown more profound, he remembers hazily what has occurred during hypnosis. He is extremely suggestible at the hands of those who, as he thinks, have induced the sleep and will execute movements that the experimenter prescribes to him. The voluntary muscular system evinces a curious rigidity and fixity; the subject will remain in any position in which he is placed. This feature has given the name of "catalepsy" (seizure) to the stage in question. As the sleep is continued, the subject becomes still more anæsthetic, until consciousness seems to lapse altogether; on waking, he has no memory whatsoever of the hypnotic period. The name of "somnambulism" is given to a stage of profound hypnosis in which illusions are produced at the experimenter's suggestion: the subject takes ink for wine, a pillow for a baby, steps carefully over an imaginary book, etc.

These phenomena of sleep or trance, mixed with much that is simply charlatanry, have been discussed and exploited from time immemorial. The medicine men of primitive and savage tribes, the magicians of Egypt and Chaldæa, the Hindu ascetics, the monks of Mount Athos, the quack physicians of all ages, have made use of hypnotism to enhance their personal prestige, to cure the sick, or to induce states of religious ecstasy. The modern history of hypnotism begins with F. A. Mesmer (1733–1815), a German physician who practiced hypnotic therapeutics at Paris from 1778, causing so great a stir in scientific circles that his pretensions were made a matter of inquiry by a royal commission (1785). The report of the commission was unfavorable; but "mesmerism" still flourished. In England valuable works were published in the early forties by J. Braid, a Manchester surgeon (c.1795–1860); but their sanity and importance have but recently been fully recognized. Braid coined

the word "neurohypnotism," or nerve sleep, from which comes the modern word "hypnotism." During the last third of the nineteenth century the facts of hypnosis were thoroughly investigated by physiologists and psychologists. Heidenhain and Preyer in Germany, Richet, Charcot, Liébault, and Bernheim in France, Delbœuf in Belgium, confirmed and extended Braid's results. The French investigators split into two distinct "schools"—that of Charcot and his followers at the Paris Hospital of the Salpêtrière, and that of Bernheim and his followers at Nancy. The Salpêtrière school maintains that hypnotism is a pathological phenomenon, akin to hysteria, and characterized by three well-marked stages; the school of Nancy asserts that it can be set up in the normal individual, that it is a unitary and progressive state, and that the key to its understanding is given with the facts of suggestion. The latter views have found general acceptance; but the controversy undoubtedly hindered the advance of knowledge and threw discredit upon the whole subject. It need hardly be said that the doctrines known as animal magnetism, electrobiology, odism or odylism, mesmeric clairvoyance, etc., are one and all—save in so far as they cover the facts of hypnotism proper—fanciful and ungrounded hypotheses.

In considering the psychology of the hypnotic state we have first to notice that its sole and essential condition is an exaggerated state of passive attention to some object or person. (See ATTENTION.) In popular phraseology there is a "total surrender of the will" of the subject, either to a sense impression or to the experimenter's personality. The condition of hypnosis thus lies—and this fact is of extreme importance—in the mind of the subject himself; the experimenter or "operator" has no power, except as the subject gives him power. The reason that the professional hypnotist and the physician are accredited with a special ability to induce hypnosis is, first, that they "suggest" to the inquirer—whether consciously, by strongly worded advertisement, or unconsciously, by the mere authority of position—that such ability resides in them; and, secondly, that they acquire, in the course of their experience, a tact or insight concerning the best means of bringing the inquirer into the necessary attentive state. The subject comes to them prepared for hypnotization, and they make conditions easy for its attainment. Further than this the ability of the operator does not extend. It is, indeed, entirely possible to hypnotize oneself. (See AUTOSUGGESTION.) Most of us have at times "let ourselves go" mentally, until we were on the verge of what seemed to be a kind of fascination or trance, at the brink of which we aroused ourselves with a start. If now we place ourselves under circumstances favorable to sleep, cutting off, so far as may be, external impressions, and attend concentratedly to the idea of hypnosis, we presently drop into a similar state of "fascination," which soon becomes hypnosis proper and later passes off as ordinary sleep.

We notice, secondly, as a corollary to what has just been said, that all persons of normal constitution are hypnotizable. Hypnosis is "abnormal" only in the sense in which dreaming (q.v.) is abnormal; and as we are all liable, though in varying degree, to dreams, so are all normal minds liable to hypnotization. The strong-minded person who declares that So-and-so tried to hypnotize him, but could not on account of his vigorous resistance, makes a ludicrous misstatement. It is not So-and-so who is to hypnotize him, but he himself; and incapacity for hypnosis is not the mark of a strong, but of a weak mind. Hypnosis (and this is a difference between it and dreaming) is impossible in the case of idiots and of very young children, because they are scatter-brained, unable to attend fixedly and continuously; the more "powerful the will," the easier must hypnosis be. We see this, indeed, in the tendency of vigorous minds to "brown study," a state nearly related to hypnosis, and characterized by the same single-hearted absorption and the same arrest of bodily movement. Whether or not animals can be hypnotized is a disputed question. In the emotion of extreme fear (when, if ever, the animal mind must be dominated by one sole idea, and so approach to the requisite degree of passive attention), we have a muscular rigidity, known as "cataplexy" (cf. the popular word "stroke"), which outwardly resembles the stage of catalepsy in man. Seize a frog firmly by a hind leg, and the animal will spread out, stiff and stark, making no effort to escape. Pigeons, fowls, guinea pigs, etc., can all be readily "hypnotized" by similar means. The trend of expert opinion seems, however, to be that the resemblance to hypnosis is rather external than real.

We turn now to some special questions of hypnosis, and first (1) to that of the *rapport*. This is a supposed subjective link or bond whereby the experimenter, in virtue of his will power or personal magnetism, attaches the subject to himself. Now it is true that there are cases in which a subject can be "hypnotized" only if a certain operator or experimenter allows or commands it. But there is nothing mysterious, still less supernormal, in the matter. The subject in some way (perhaps by self-suggestion, perhaps at the explicit suggestion of a physician) acquires the insistent belief that hypnosis is impossible for him without the presence or assent of the experimenter; and the belief, once acquired, is effective. It is thus the subject, again, whose "will" is concerned, not the operator. The *rapport* is sometimes suggested by physician to patient, in order to prevent interference by outsiders with the conduct of a case, and thus serves a useful purpose. 2. It may be suggested to a somnambulistic subject that at such-and-such a time after waking from the hypnotic sleep he shall perform such-and-such an action. This is termed *posthypnotic* or *terminal* suggestion. Its effectiveness depends upon the fact that the time idea is common both to the hypnotic and to the waking consciousnesses and so forms a bridge between the abnormal and the normal states. "You will go into the kitchen and drink a glass of water at five o'clock." The subject is strongly impressed by the five-o'clock idea. When, therefore, five o'clock actually comes, its perception or idea is sufficient to throw him into the first stage of hypnosis; the suggestion recovers its hypnotic strength, and he goes passively to execute the prescribed act. 3. Although the somnambulist remembers nothing of the hypnotic state from which he is aroused, he may, if rehypnotized, recall what took place during his previous sleep. Memory is thus continued from one hypnotic consciousness to another, as it is from one

waking consciousness to another; but there is no continuity of memory from sleep to waking, or conversely. This fact has given occasion to various theories of double consciousness (q.v.) —quite unnecessarily, for it is adequately explained by the known laws of memory. We remember only when we have a cue to memory, when our present circumstances "suggest" the past. When eating a good dinner after a long walk, we recall other good dinners eaten in like circumstances; we do not recall such dinners when there is nothing to remind us of them. But the waking state, with all the sudden inrush of stimulations that it involves, is entirely different from the hypnotic state; there is nothing in the one (apart from the terminal suggestions just discussed) to remind us of the other; whereas there is everything in a present hypnotic state to revive our memories of foregone like states. Dreams, in the same way, are not seldom continued from night to night, though we forget all about them in the daytime. 4. Lastly, as regards the *therapeutic value* of hypnosis, we may say that as a "suggestion," in the waking life, may make us blush or cry, so the indefinitely stronger suggestions of the hypnotic state may bring about circulatory or secretory changes that are of benefit to the organism. Furthermore, hypnosis is frequently used by psychopathologists, in the treatment of hysteria and other neuropsychoses, to bring about a recall and consequent discharge of the forgotten complexes which are supposed to be responsible for the disorder (see HYSTERIA). But no command to get well can ever mend a broken bone or cure a typhoid patient. Moreover, there is always the danger of setting up an "hypnotic habit" or of breaking down the subject's self-reliance, in which event the remedy is worse than the disease. See FAITH CURE.

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HYPOBOLE, hī-pŏb′ō-lē (Gk. *ὑποβολή*, a throwing under, from *ὑπό, hypo*, under + *βάλλειν, ballein*, to throw). A figure of rhetoric, whereby each of several arguments that appear to favor the side of one's opponent is introduced only to be refuted. See RHETORIC, FIGURES OF.

HYP′OCAUST (Lat. *hypocaustum, hypocauston*, from Gk. *ὑπόκαυστον*, vaulted room with furnace below, from *ὑπό, hypo*, under + *καυστός, kaustos*, burned, from *καίειν, kaiein*, to burn). An arrangement of hollow flooring for the distribution of heat in Roman houses and baths. Upon a lower flooring of concrete short brick pillars (*suspensuræ*), about 2 feet apart in each direction, supported the large tiles of the upper flooring. Into the hollow space thus provided hot air from the furnace was discharged, and the smoke was led through passages partitioned in the same space. The system was universal in the *thermæ*, or baths, and sometimes in large houses, as in that of the Vestal Virgins at Rome. It was invented shortly before Augustus and is now coming again into use for heating the so-called "Turkish baths." It was an effective and agreeable mode of heating, but—except in baths, where the furnace was used to heat the water—enormously costly in fuel. It can be studied in all the details of its arrangement in the ruins of Roman houses and baths. See BATH.

HY′POCHLO′RITES. See HYPOCHLOROUS ACID.

HY′POCHLO′ROUS ACID, HClO. An acid that may be assumed to be formed when chlorine monoxide (Cl_2O) is dissolved in water. Chlorine monoxide, which decomposes into chlorine and oxygen with explosive violence, may be obtained by the action of dry red oxide of mercury upon chlorine. In aqueous solution chlorine monoxide is not explosive. The salts of hypochlorous acid are termed *hypochlorites*, and some of them are valuable bleaching agents. Ordinary bleaching powder is supposed to contain the hypochlorite of calcium; Javelle water contains the hypochlorite of potassium; Labarraque's solution contains the hypochlorite of sodium. Bleaching powder is made by the action of chlorine on lime; similarly the hypochlorite of potassium may be obtained by the action of chlorine upon a cold solution of caustic potash. If solutions of hypochlorites are heated, the corresponding *chlorides* and *chlorates* are formed. See BLEACHING POWDER.

HYPOCHŒRIS, hī′pō-kē′rīs (Neo-Lat., from Gk. *ὑποχοιρίς*, succory plant). A genus of plants of the family Compositæ, of which one species, *Hypochœris radicata*, or long-rooted cat's-ear, is extremely common in meadows and pastures in Great Britain and other parts of Europe and introduced in the eastern part of the United States. Its leaves, which are all radical and spread on the ground, resemble in form those of the dandelion, but are rough; the stem is branched; the flowers somewhat similar to those of the dandelion, but smaller. Cattle eat this plant readily, and its abundance is not deemed injurious to pasture or fodder.

HYPOCHONDRIA, hī′pō-kŏn′drī-ȧ. See HYPOCHONDRIASIS.

HYP′OCHONDRI′ASIS (Neo-Lat., from Lat. *hypochondrium*, Gk. *ὑποχόνδριον*, hypochondriac region; so called because of the supposed connection of the disease with this part of the body). A disease characterized by extreme increase of sensibility, palpitations, morbid feelings that simulate the greater part of diseases, exaggerated uneasiness, and anxiety, chiefly in what concerns the health, etc. In extreme cases it becomes a species of insanity. The disease is very frequently associated with disorder of the digestive functions.

When sombreness of disposition and anxiety concerning personal comfort become exaggerated, and attention is directed chiefly to the state of the health, it amounts to common hypochondriasis. When it passes beyond the control of the will, when the whole mind is directed to the state of the system or to particular organs and exalts and misinterprets sensations, the condition is designated hypochondriacal insanity. The disease may be described as the engrossment of the attention by false impressions conveyed, or conceived to be conveyed, from

internal organs. These sensations may in many instances be real, and proceed from actual alterations in the structure or functions of the parts supposed to be affected; but they may likewise consist of ordinary sensations, excited and intensified by the act of attention which makes them known to the patient. Neither the experience nor the sufferings of the victims are imaginary, however absurd their errors, and however groundless their apprehensions may be; the disease is real, and consists in the exaltation of sensibility and attention and in the delusions which originate in that morbid state. A man lives in constant fear of death; he is firmly convinced that he labors under cancer, consumption, disease of the heart, etc. Hypochondriasis is often a precursor of melancholia, or other kinds of alienation; but it must likewise be regarded as a distinct and independent affection, traceable generally to disorder of the digestive and assimilative apparatus, to sexual excess or other debilitating influences. Such patients always should be watched, for many of them commit suicide while temporarily under the influence of an hallucination or a delusion. Diversion, camp life, hunting, fishing, and other occupations should engross the patient's attention during an outdoor life, or travel should be his resource, always in the society of a lively, healthy companion. Drugs alone produce little benefit. Consult: Falret, *De l'hypochondrie et du suicide* (Paris, 1822); Bucknill and Tuke, *Psychological Medicine* (London, 1879); C. A. Mercier, *Psychology, Normal and Morbid* (New York, 1902); Boris Sidis, *The Foundations of Normal and Abnormal Psychology* (Boston, 1914).

HY'POCOT'YL (abbreviation of *hypocotyledonous*, from Gk. *ὑπό, hypo*, under + *κοτυληδών, kotylēdōn*, cotyledon, from *κοτύλη, kotylē*, socket). In seed plants, the axis of the embryo below the cotyledons. This axis has been variously called radicle and caulicle, but, since it has peculiar structures and powers which do not belong to ordinary roots and stems, it has received a distinctive name. In general, the hypocotyl is the most active organ of the embryo, by its growth liberating the embryo from the seed and putting root and shoot into their proper relations. In other words, it is the organ of the embryo that orients the young plant for its independent existence. This was the basis for Darwin's remark that if a seed plant can be imagined to have a brain it would be found in the hypocotyl. See EMBRYO.

HYP'OCRITE, THE. A play by Isaac Bickerstaffe, produced in 1768, and founded on Cibber's *Non-Juror*, which, in turn, was taken from the *Tartufe* of Molière.

HY'POCY'CLOID. See CYCLOID.

HY'PODER'MIC MEDICATION (from Gk. *ὑπό, hypo*, under + *δέρμα, derma*, skin). Introduction of medicines beneath the skin with a hypodermic syringe. This method is often preferable to that of giving them by the mouth, particularly when a rapid result is essential. The stomach is sometimes in a condition which will not bear the presence of drugs, particularly narcotics, and these are the agents which are most frequently administered hypodermically. A small graduated glass syringe attached to a slender hollow needle, cut off obliquely so that its sharpened extremity may easily be made to pierce the skin, is used. The medicine may be thrown in just beneath the skin, or the point of the syringe is thrust into the body of a muscle. The wounding of blood vessels or nerves should be carefully avoided, and therefore the operation should not be undertaken except by a physician or a trained nurse. Local pains may generally be more successfully treated in this manner than by the common method. In some cases an anæsthetic may, however, be preferable. It is usual to make a special preparation of the drug which is to be introduced. The syringe must be completely filled when used, as the introduction of an air bubble into a vein might be attended with danger. All instruments and drugs used should be thoroughly sterilized, and the skin over the point of puncture cleansed with an antiseptic. The hypodermic syringe should be used with great caution and never by the patient.

HY'PODER'MIS (Neo-Lat., from Gk. *ὑποδερμίς*, under skin, from *ὑπό, hypo*, under + *δέρμα, derma*, skin). In plants, a layer of cells beneath the epidermis. An archesporial cell is said to be hypodermal in origin when it arises immediately beneath the epidermis. Tissues bordering directly upon the epidermis are called *hypodermal*.

HY'PODERMOC'LYSIS (Neo-Lat., from Gk. *ὑπό, hypo*, under + *δέρμα, derma*, skin + *κλύσις, klysis*, a washing). The infusion of saline solution beneath the skin. The term is sometimes used to cover intravenous infusion also. The infusion of saline solution has to a large extent replaced the older operation of blood transfusion, being safer, always available, and obviating the difficulty of obtaining a suitable donor of blood.

Solutions of sodium chloride containing 0.65 to 0.75 per cent of that salt preserve and do not disintegrate the blood corpuscles. The total percentage of saline and alkaline constituents in human blood are variously given by different observers and probably vary in different individuals and under different conditions of the body. A formula which will reproduce exactly the chemical composition and specific gravity of the inorganic portion of the blood serum is not practicable, but the following "artificial serum" answers all purposes:

Sodium chloride	50 grains
Potassium chloride	2 "
Sodium sulphate, Sodium carbonate, Sodium phosphate (each)	25 "
Boiling water	1 pint

Such a solution may be introduced into a vein or injected slowly under the skin, at a temperature of 100° F., or it may be introduced into the lower bowel (*enteroclysis*). The injection of saline solution is employed in hemorrhage, shock, typhoid fever, cholera, and in septic conditions generally. In hemorrhage it acts mechanically by filling the vessels and raising the blood pressure. In shock and collapse it serves as a stimulant, and in toxæmias it acts as an eliminant as well. From a half pint to a quart of solution is used for each injection. See TRANSFUSION OF BLOOD.

HYPOGYNY, hī-pŏj'ĭ-nĭ (from Gk. *ὑπό, hypo*, under + *γυνή, gynē*, woman). The condition in a flower in which the sepals, petals, and stamens arise from beneath the ovary. As a consequence, the ovary is seen inside of the flower and is often spoken of as "superior." The contrasting term is "epigyny" (q.v.). Hypogynous flowers are more primitive than epigynous flowers. The primitive Angiosperms all

have hypogynous flowers, which in turn have arisen from the conelike clusters of the Pteridophytes and Gymnosperms; while all of the three great divisions of Angiosperms (Archichlamydeæ, Sympetalæ, and Monocotyledons) culminate in families with epigynous flowers. It is quite evident, therefore, that one of the strongest evolutionary tendencies among Angiosperms is to pass from hypogyny to epigyny. See FLOWER; EPIGYNY; PERIGYNY.

HY'PONAS'TY (from Gk. *ὑπό, hypo,* under + *ναστός, nastos,* close-pressed, from *νάσσειν, nassein,* to pack closely). In botany, a term applied by De Vries to the occurrence of greater growth upon the underside of a dorsiventral organ, which produces therefore an upward curvature. This may be due to internal or external causes. It is the common condition of young leaves and flower parts when in the bud. The correlative term is "epinasty" (q.v.). See GROWTH, IN PLANTS.

HY'PONI'TRITES. See HYPONITROUS ACID.

HY'PONI'TROUS ACID, $H_2N_2O_2$. A dibasic acid composed of hydrogen, nitrogen, and oxygen, which has been isolated in the form of a crystalline solid substance. It is very soluble in water and is violently explosive. Its salts are termed *hyponitrites,* and the free acid itself is best prepared from the hyponitrite of silver by the action of a solution of hydrochloric acid gas in ether. Silver hyponitrite, $Ag_2N_2O_2$, is a solid yellow substance that may be obtained by allowing sodium amalgam to act upon barium nitrite, neutralizing the resulting solution with acetic acid and precipitating with silver nitrate. Silver hyponitrite explodes if heated to a moderately high temperature. The solution of free hyponitrous acid decomposes, on heating, into nitrous oxide (laughing gas) and water.

HYP'ONOME. See CEPHALOPODA.

HY'POPHOS'PHITES. See HYPOPHOSPHOROUS ACID.

HY'POPHOS'PHOROUS ACID, H_3PO_2. A crystalline compound that melts at about 17.5° C. (63.5° F.) and is readily transformed into ordinary phosphoric acid. It may be obtained by boiling caustic potash with phosphorus, subsequently adding sulphuric acid, concentrating the solution by evaporation, and allowing it to crystallize in the cold. The salts of hypophosphorous acid are termed *hypophosphites,* those of iron, calcium, sodium, and potassium being extensively used in medicine, and often forming ingredients of patent medicines which are claimed to be valuable remedies for tuberculosis. Most such preparations are worthless, being mixtures of the hypophosphites of two or more metals, the several ingredients of which may counteract one another; and some such mixtures are positively harmful. On the other hand, if prescribed separately in moderate doses by a competent physician, the hypophosphites often constitute valuable therapeutic agents, inasmuch as they have the effect of improving nutrition and relieving some of the symptoms of phthisis. The hypophosphite of potassium may be used as an expectorant in chronic bronchitis. The officinal sirup of hypophosphites contains several hypophosphites, a considerable amount of free hypophosphorous acid, and often some iron.

HYPOPH'YSIS. A term used in dicotyledonous plants to designate the cell of the proembryo which completes the hypocotyl tip of the embryo. It is the appearance of the hypophysis that finally differentiates the proembryo into embryo and suspensor.

HYPOS'TASIS (Neo-Lat., from Gk. *ὑπόστασις, hypostasis,* subsistence, from *ὑπόστατος, hypostatos,* substantial, from *ὑφιστάναι, hyphistanai,* to stand under, from *ὑπό, hypo,* under + *ἱστάναι, histanai,* to stand). A term of Greek theology, denoting reality as distinguished from appearance and variously employed before the fourth century, but at last technically used to denote personal distinctions in the Godhead. The Council of Nicæa (325) did not clearly distinguish between *hypostasis* and *ousia* (substance and essence), and a controversy followed. (See HOMOOUSION.) The same uncertainty appears in the West as late as Augustine, who confesses that he does not understand the difference between the two Greek words (*De Trinitate,* v, 8, 10). But gradually the two words were differentiated, and *hypostasis* came to be used exclusively for the personality of Father, Son, or Holy Spirit. It was thus interpreted as being equivalent to *prosopon,* which the Latin rendered by *persona,* whence our word "person," applied to the Trinity. The fully developed trinitarian dogma asserts one essence, or substance (*ousia*), and three persons (*hypostasis*) in the Godhead. This has remained the orthodox doctrine of the Church. Consult: Friedrich Loofs (Halle, 1893); G. P. Fisher (New York, 1896); Adolf Harnack, *History of Dogma,* vol. iv (Boston, 1899); J. Tixeront, *History of Dogmas* (3 vols., St. Louis, 1910); A. L. Graebner, *Outlines of Doctrinal Theology* (2d ed., ib., 1911); T. von Haering, *History of Dogma* (New York, 1911). See CHRISTOLOGY; TRINITY, DOCTRINE OF THE.

HY'POSTAT'IC UNION. A term used to describe the union of Christ's human nature to the hypostasis or person of God the Word, in virtue whereof, while each nature is complete even after union, yet there is but one undivided person of the God-man, to which all the actions, whether divine or human, are ascribed. This form of expression was devised for the purpose of excluding the doctrine of a mere moral union held by Nestorius. See CHRISTOLOGY; MONOPHYSITES; NESTORIANS; TRINITY, DOCTRINE OF THE.

HY'POSUL'PHITES. See THIOSULPHURIC ACID.

HYPOT'ENUSE (Fr. *hypoténuse,* from Gk. *ὑποτείνουσα, hypoteinousa,* subtending, from *ὑποτείνειν, hypoteinein,* to subtend, from *ὑπό, hypo,* under + *τείνειν, teinein,* to stretch). That side of a right-angled triangle opposite to the right angle. The hypotenuse is the longest side of the triangle, and its mid-point is the centre of the circumscribed circle. According to the famous forty-seventh proposition of the first book of Euclid's *Elements,* the square of the hypotenuse of a right-angled triangle equals the sum of the squares on the other two sides. The proof of this proposition is attributed to Pythagoras, although the fact was known in Egypt, and probably in China and elsewhere, long before the time of this philosopher.

HYPOTH'EC, HYPOTH'ECA'TION (ML. *hypothecatio,* from *hypothecare,* to hypothecate, from Lat. *hypotheca,* from Gk. *ὑποθήκη, hypothēkē,* pledge, from *ὑποτιθέναι, hypotithenai,* to place under, from *ὑπό, hypo,* under + *τιθέναι, tithenai,* to place). A lien on property created by agreement or by operation of law. In the most general sense a transaction whereby property, real or personal, is subjected to the claim of another. "Hypothecation" is not a term of

English or American law, but the verb "hypothecate" is sometimes popularly employed as the equivalent of "pledge." At Roman law hypothec was the right to take and sell property belonging to another to satisfy a claim. Any balance remaining after a creditor's claim was satisfied was restored to the former owner of the property. Hypothec might be established by the act of the owner (English mortgage), or it might be created by law (English lien). In either case the hypothecation might be of real property or of personal property, or of both. Many of the legal liens extended over the debtor's entire estate, real and personal. Hypothec was distinguished from pignus, or pledge, in that it was established without delivery of possession. In modern civil law the term "hypothec" is commonly restricted to the mortgage or lien upon real property. At French law a lien upon movables or upon an entire estate is termed a "privilege," the term "hypotheque" being confined to the mortgage of real estate. In Spanish law the term is restricted to the contractual mortgage of real property; all legal liens, whether upon realty or personalty, are "preferences." In Scotland, however, a legal lien upon personal property is called a hypothec. See LIEN; MORTGAGE; PLEDGE; and consult the authorities referred to under REAL PROPERTY.

HYPOTH'ENUSE. See HYPOTENUSE.

HYPOTH'ESIS (Gk. *ὑπόθεσις*, supposition, from *ὑποτιθέναι*, *hypotithenai*, to place under, from *ὑπό*, *hypo*, under + *τιθέναι*, *tithenai*, to place). In scientific procedure, a conjecture as to the explanation of any phenomenon, made provisionally and used as a starting point for further investigation and theory. Thus, in studying the motion of the moon, Newton made the hypothesis that its divergence from the straight line was due to the same cause that brings an apple to the ground when released from the stem. He then proceeded to find whether the rate of fall in the two cases was expressible by some single formula. After years it was discovered that this was the case. It is now quite generally admitted that an hypothesis, to have any value, should be based on some known law and should be the conjectural extension of that law to a new sphere under investigation. Thus, Newton worked from the known law of gravitation on the surface of the earth. The hypothesis of a luminiferous ether is based on the known laws of the motion of fluids, etc. Such a known law is called a *vera causa*. Some empirical extremists insist not only that the point of departure must be a known law, but that the extension of this law to another sphere may not be legitimately made unless its extension is at least conceivably verifiable by sense perception. Thus, they claim that the existence of the luminiferous ether is not a rigidly logical hypothesis, because the ether is thought of as having no properties perceivable by our senses without the use of instruments that no one even supposes capable of construction. Such an interpretation of the *vera causa* is, however, not in accordance with actual scientific practice. An hypothesis is a provisional attempt to *think* things together as instances of the prevalence of the same law; and all that is necessary to make an hypothesis valuable is that it should furnish some conception which shall at least provisionally unify experience by reducing it to law. A distinction is often made between theory and hypothesis. A theory is said to be a verified hypothesis. This distinction is one of degree, not of kind. Even an hypothesis which has been verified may be overthrown by new facts; so that it is rather the fashion nowadays to speak of all the conceptions of natural science as "*working* hypotheses," and to say that they are accepted only tentatively as the basis for further investigations and for further theorizing on results. According to the pragmatistic logic (see PRAGMATISM), all truth is nothing but successfully working hypothesis. See KNOWLEDGE, THEORY OF. For bibliography of the subject, see the works cited in the article LOGIC.

For the use of this term in geometry, see THEOREM.

HYPOTHET'ICAL QUESTION. In the law of evidence, the form of question through which the opinion of an expert witness is properly elicited. In order that the opinion of such a witness shall be of any value to the court or jury trying the case, it is obvious that it must be based on the facts on which the verdict is to be rendered; otherwise it would be irrelevant and on that ground inadmissible. On the other hand, it is not deemed proper to ask an expert witness to give his opinion—as of the mental soundness of a testator or the sanity or insanity of a defendant in a criminal case—on the evidence which has been adduced in his hearing in the course of the trial. To do this would be to require him to make a finding on those facts, perhaps on conflicting or untrustworthy evidence, as a basis for his opinion, and thus in effect, as it is sometimes expressed, to usurp the functions of the jury in passing on the evidence. It is simpler and less confusing to get his opinion on an assumed set of facts. This is the function of the hypothetical question. Its value—or rather the value of the opinion rendered—depends, of course, largely on the closeness with which the assumed, or hypothetical, facts embodied in the question conform to the facts in evidence, or, better yet, to the facts as they present themselves to the court or jury with whom the decision of the case rests. The use of the hypothetical question has been much criticized; but this is due to the abuse of a method which is commonly employed in argument and reasoning, and which is probably indispensable, as it is valuable, in the production of opinion evidence. See EVIDENCE; OPINION.

HYPOXANTHINE, hī'pŏ-zăn'thĭn (from Gk. *ὑπόξανθος*, *hypoxanthos*, yellowish brown, from *ὑπό*, *hypo*, under + *ξανθός*, *xanthos*, yellow), or SARCINE, $C_5H_4N_4O$. An organic substance chemically allied to xanthine, which it usually accompanies. It was discovered by Scherer in 1850. If given to birds, hypoxanthine is excreted largely in the form of uric acid; it is not known by what organ this transformation is effected—probably not by the liver. Hypoxanthine is widely distributed in the animal and vegetable kingdoms. It was synthesized by Emil Fischer in 1897 and again, in a different way, by Traube in 1904. It is a white crystalline substance, slightly soluble in cold water, but somewhat more readily soluble at higher temperatures. See XANTHINE.

HYP'SILAN'TIS. See YPSILANTI.

HYPSIPYLE, hĭp-sĭp'ĭ-lē (Lat., from Gk. Ὑψιπύλη). The daughter of Thoas of Lemnos, whom she saved when the women of the island killed all the other men in revenge for their

neglect. When the Argonauts (q.v.) came to Lemnos, Hypsipyle became by Jason the mother of two sons, Euneus and Nebrophonus, or Thoas. Having been driven out because she had spared her father, Hypsipyle became the nurse of Opheltes, son of the Arcadian King Lycurgus. When Adrastus and the other heroes were on their way to the siege of Thebes, they met Hypsipyle in the Nemean Forest and begged her to show them a spring, and during her absence the boy was killed by a serpent. For this neglect she was imprisoned, but was rescued by her sons. The funeral games instituted by the heroes for the dead Opheltes were the origin of the Nemean Games. See NEMEA.

HYP'SISTA'RIANS (from Gk. Ὑψιστάριοι, *Hypsistarioi*, Hypsistarians, from ὕψιστος, *hypsistos*, most high, from ὕψι, *hypsi*, on high). A small sect which existed in the third and fourth centuries in Asia Minor. It seems to have been monotheistic and Jewish in some of its features, and in others possibly Christian, debased by Sabean elements. It taught the unity of the Deity and His universal dominion; that sacrifices and other phenomena of external worship were to be given up; at the same time it enjoined Sabbath observance and the dietary laws of the Jews. The sect is described by Gregory of Nazianzus in his account of his father. Consult Cumont, *Hypsistos* (Brussels, 1897).

HYPSOM'ETER (from Gk. ὕψι, *hypsi*, on high + μέτρον, *metron*, measure), or THERMOBAROMETER. A name commonly applied to an apparatus arranged to determine the atmospheric pressure at a given point by ascertaining accurately with a thermometer the temperature at which water boils. The boiling point of water diminishes with a decrease in the pressure of the atmosphere, and this always comes with an increase in elevation above the sea level. With the barometer (q.v.) it is possible to measure heights with considerable exactness; consequently, by knowing the atmospheric pressure corresponding to the temperature at which water boils, we are able to find the altitude. The apparatus to determine the boiling point was first used by Wollaston in 1816 and consisted of a metal vessel containing a delicate and carefully tested thermometer with graduations extending from 80° to 100° C., which could be read to 0.01 of a degree. There is a spirit lamp to boil the water, and the instrument is far more portable than a mercurial barometer. The relation between the boiling point of water, the height of the barometer, and the altitude is shown in the following table, which is calculated for a mean temperature of the atmospheric mass in the vicinity of the point of observation:

Boiling point (Centigrade)	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°
Height of barometer (mm.)	760	732.2	707.1	681.9	657.4	633.7	610.6	588.3	566.7	545.8	525
Elevation (in meters)	0	305	610	920	1225	1540	1850	2165	2485	2800	3120

From this table it will be seen that a variation of 0.1° in the boiling point at sea level corresponds to a decrease in the height of the barometer of 28 millimeters, at an elevation of 1000 meters 25 millimeters, at 2000 meters 22 millimeters, and at 3000 meters 21 millimeters. An approximate rule to determine the elevation of a place by this method, expressed in feet and Fahrenheit degrees, is to multiply the difference between the observed boiling point and 212° by 550 if the height is less than half a mile, and by 560 if it is in excess of that amount, these factors representing the average amount of altitude corresponding to 1° at 70° F.

Hypsometers of very accurate construction have been extensively observed with great care in long series of observations made aboard ship by Hecker, also under the direction of L. A. Bauer on board the magnetic yacht *Carnegie*, for the purpose of ascertaining the variations in the force of gravity at sea. As explained above, the pressure of the air is obtained from the readings of the hypsometer. Simultaneous readings of high-grade mercurial barometers should also give the same pressure, except that when all corrections are applied there will still be an outstanding difference between the two pressures thus obtained, because the mercurial barometer is influenced by the force of gravity, while the hypsometer is not. The variable outstanding differences found from point to point over the ocean therefore represent corresponding variations in the force of gravity. This is perhaps the only practicable method of measuring variations of gravity at sea; but the quantities desired are so small, compared with the unavoidable inaccuracies of the observations under even the most favorable circumstances, that entirely conclusive results are hardly attainable as yet. Consult Hecker, *Memoir of the Prussian Geodetic Institute* (1908), and Bauer, *American Journal of Science* (January, 1911, and March, 1912).

HYPSOM'ETRY. The art of measuring heights on the earth's surface. Such measurements are performed by means of trigonometrical observations and calculations, by running a line of precise levels starting from mean sea level and terminating at the point whose height is to be measured, and by barometric observations and calculations. The second of these methods of measurement gives exact heights, but the other two methods give approximate heights only. To illustrate the application of the three methods of measurement, a supposititious case will be assumed, and each method applied to its solution. Let x represent the top of a mountain whose height above the base s it is desired to measure by trigonometrical observation, and whose distance mi from the point of observation is known. The instrument is set up at y, and by it the vertical angle imx is measured. This gives the observer a triangle mix, of which the side mi, the angle imx, and the angle mix (90°) are known, and from these data he can readily calculate the length of the side ix. To this

dimension in order to get the height of the mountain he must add the dimension *io*, which is the height of the instrument above the ground, and the dimension *os*, which is due to the curvature of the earth. The dimension *io* is easy to determine, but *os* has to be calculated. Now, the curvature of the earth is 0.667 foot, or nearly 8 inches in 1 mile, and increases as the square of the distance, being thus 32 inches in 2 miles and 72 in 3 miles. If then the distance *mi* is 1 mile, the dimension *os* is 0.667 foot. Owing to the refraction of the atmosphere, however, the point *x* always appears to the observer to be higher than it really is, and at an average this deceptive elevation amounts to one-seventh of the curvature of the earth and, like the latter, varies with the square of the distance. For a distance *mi* equal to 1 mile, then, the dimension *os* is 0.667 foot due to curvature minus one-seventh of 0.667 foot due to refraction, which makes it 0.5714 foot. In careful geodetic work the calculations for refractions and curvature are made with much more precision than is done above, and the instrument observations are made with exceeding care, but the general method is the same. At best such measurements are only approximate, since the determination of the refractions, which depends upon the atmospheric conditions, can be approximate only. To measure the height *xs* by leveling, the observer starts from mean sea level and runs a line of precise levels inland, which terminates at the point *x* and establishes accurately its height above mean sea level. The same result may be accomplished by starting the line of levels to *x* from a point on a line of levels previously run from mean sea level. The method of running precise levels differs from ordinary spirit leveling (see LEVELING) only in the greater accuracy of the methods and instruments used.

For measuring heights approximately by barometric observations, the aneroid barometer is usually used. Mercury barometers are more accurate and may of course be used; but usually they are not, owing to the greater difficulty in transporting them and of keeping them in proper working order. The adaptability of the barometer as an instrument for measuring heights depends upon the facts that the mercury column falls as the atmospheric pressure decreases, and that the atmospheric pressure decreases gradually as we ascend above the sea level. As a rough average, it may be assumed that the barometer falls 1/10 inch for about 106 feet rise. To measure the height *sx*, therefore, according to Laplace's formula barometer readings are taken simultaneously at *s* and at *x*, and from them the difference in height of *s* and *x* may be found by the formula

$$d = 60{,}158.6\,(\log H - \log h)\left(1 + \frac{T + t - 64^\circ}{900}\right),$$

in which *d* equals the difference in height in feet, *H* and *h* are the two barometric readings in inches of the lower and upper stations, and *T* and *t* are the temperatures of the corresponding stations in degrees Fahrenheit. In the most accurate barometric work various refinements of observation and calculation are introduced, but the general principle of the operation is the same as has been described. Barometrical measurements of heights are only approximate, since the moisture and dryness of the air, the wind, and various other atmospheric phenomena cause variations in the readings recorded, and no comprehensive formula can possibly be devised. Simultaneous observations, with barometers adjusted to the same standard, give the most reliable results.

By using a finely graduated thermometer to determine the boiling point of water it is also possible to determine the pressure and thereby the altitude, this method being used by mountain climbers, as the apparatus, which consists of a thermometer, spirit lamp, and vessel to contain snow or ice, is very portable. An approximate rule is, calling the boiling point at sea level 212° F., to allow 511 feet for the first degree of difference and increase the number to be added 2 feet for each degree. Thus,

ELEVATION	BOILING POINT
0 feet	212°
511	211
511 + 513 = 1024	210
1024 + 515 = 1539	209, etc.

Geographer's tables of corresponding heights have been worked out in considerable detail, as in the *Smithsonian Miscellaneous Collection* (Washington). For a full discussion of the methods of measuring heights by trigonometrical leveling, precise leveling, and barometric observations, consult Johnson, *Theory and Practice of Surveying* (17th ed., rewritten by L. S. Smith, New York, 1913). See SURVEYING; HYPSOMETER.

HYRA'CEUM (Neo-Lat., from Gk. ὕραξ, *hyrax*, mouse; connected with Lat. *sorex*, shrew-mouse). A peculiar substance found in the crevices of the rocks of Table Mountain, Cape of Good Hope. It is one or more of the excrements of the Cape hyrax (*Hyrax capensis*). Hyraceum is a blackish-brown viscid material, not unlike soft pitch, having a strong and offensive taste, not unlike castoreum, for which it has been used as a substitute in medicine, though now obsolete. At one time so large a quantity was found as to suggest the idea of its being used as a manure, but the supply was soon exhausted.

HYRAC'ODON (Neo-Lat., from Gk. ὕραξ, *hyrax*, mouse + ὀδούς, *odous*, tooth). A primitive fossil rhinoceros found in the Miocene rocks of western America and Europe. See RHINOCEROS.

HY'RACOTHE'RIUM (Neo-Lat., from Gk. ὕραξ, *hyrax*, mouse + θηρίον, *thērion*, dim. of θήρ, *thēr*, wild beast). An extinct four-toed ungulate mammal of the size of a fox, generally considered as an ancestral horse, remains of which are found in the Lower Eocene deposits of Europe and western North America. See HORSE, FOSSIL.

HY'RAX (Neo-Lat., from Gk. ὕραξ, mouse). A general name for a suborder (Hyracoidea) of small, peculiar, ungulate mammals comprised in a single genus and family (*Procavia*, Procaviidæ), whose species are locally called conies, damans, and rock rabbits. Numerous species and subspecies are known in southwestern Asia and in East and South Africa. Although having the size and superficial appearance of rodents, and long so considered, Cuvier pointed out their essential agreement, in dentition and anatomical characters, with the ungulates. The molars are quite similar to those of the rhinoceros; but the upper jaw has two incisors curving downward and during youth two very small canines, the lower jaw four incisors without canines. The skull, also, and other bones resemble those of the rhinoceros. The muzzle is short and pointed; the ears short and round. The

ribs are more numerous than even in the rhinoceros—21 pairs, a number exceeded in no quadrupeds except the sloths, whereas no rodent has more than 15 pairs. The toes are united by the skin, as in the elephant and rhinoceros, and are round and soft, merely protected in front by a broad nail, which does not reach the ground. The legs are short. The tail is a mere tubercle. Their bodies are clothed with thick, uniformly dark brown hair, except that it is discolored around a curious gland near the middle of the back, which is naked in several species.

The habits of all the conies (except the tree hyraces) are much alike. The typical Abyssinian species live in rocky or stony places, in communities, like rabbits, and make their homes in holes under rocks or in a rocky watercourse. They seem to be mainly nocturnal and feed at night or in the early morning on leaves and young shoots of trees and bushes. In daytime they lie on rocks in the shade until towards noon, when they are likely to retire to their holes. They are very timid and disappear when they are in the least danger. The only sound they seem to make is a shrill squeak when suddenly alarmed. This description will remind the reader of the closely similar behavior of the pikas (q.v.) of the Rocky Mountains, often called conies. Mosely speaks of "a short, hissing noise" as the alarm cry of the Cape hyrax. All climb about smooth rocks with wonderful agility, which is explained by soft, almost suction-giving pads on the soles of their feet. (Consult Schweinfurth, *Heart of Africa*, vol. i, Leipzig, 1878.) The species longest known is the only Asiatic one (*Procavia syrica*), which inhabits Arabia, Syria, and Palestine, and is the animal called cony in the ordinary version of the Bible, for which the Syrian name is daman. It was among those animals prohibited to the Israelites under the mistaken belief that they chewed the cud; but they are now eaten by the Arabs, though not regarded as very palatable by Europeans. Several species inhabit Abyssinia and East Africa, down to Mozambique; and Cape Colony and Natal are the home of a kind (*Procavia capensis*) having very fine, soft, brown fur, with the spot on the back black, which is familiar to the English colonists under the names rock badger and rock rabbit and to the Dutch as dasse. They are often tamed as pets.

Three species of the genus *Dendrohyrax*, which live in East and West Equatorial Africa, differ decidedly from other conies by the habit of spending their lives and making their breeding nests in holes in trees. These three species agree in that the females have but a single pair of teats (other hyraces have three pairs), and the West Coast one is remarkably large and furry, so that its skin is of much value as material for cloaks.

Consult, for systematic revision of the order, Thomas, "On the Species of the Hyracoidea," in *Proceedings of the Zoölogical Society of London* (London, 1892), and Sclater, *The Mammals of South Africa*, i (ib., 1900).

HYRCA'NIA (Lat., from Gk. Ὑρκανία, *Hyrkania*). An ancient district of Asia, south of the Caspian Sea (anciently called Hyrcanum Mare), bounded on the southeast by the Sariphi Mountains (now Elburz), which separated it from Parthia proper, and on the west by Media. It corresponded to the modern Mazanderan and Astrabad. The district is called Vehrkāna in the *Avesta*, a name which recalls the ancient name for wolf (*vahrka*). The region was wild and heavily wooded, and not generally fertile, with the exception of the valleys among the hills, which produced corn, oil, and wine. The river Gurgan, or Jurjan, an affluent of the Caspian Sea, has preserved the name of the ancient province.

HYRCA'NUS (Lat., from Gk. Ὑρκανός, *Hyrkanos*). The name of two Jewish high priests and princes of the Hasmonæan family. 1. JOHN (Heb., Johanan) HYRCANUS, son of Simon, was, during the lifetime of his father, Governor of the seacoast, with his seat in Gazara, and defeated Cendebæus, the Syrian general. When Simon was murdered by his brother-in-law, Ptolemy, an attempt was made also on Hyrcanus; but he escaped and obtained control of Judæa (135 B.C.). At the beginning of his reign Antiochus VII Sidetes invaded the country, and Hyrcanus was compelled to sue for peace after having been shut up in Jerusalem. Antiochus showed himself inclined to be sparing, and Jerusalem escaped destruction. In 130–129 B.C. Hyrcanus assisted Antiochus in a campaign against his brother, Demetrius Nicator, in which, however, Antiochus lost his life. Demetrius' short reign marked a period of internal dissensions in Syria, which enabled Hyrcanus to establish the independence of Judæa. In this his alliance with Rome was of material help. After the fall of Demetrius and his rival Alexander Zabina, Hyrcanus began (c.123 B.C.) the conquest of troublesome neighbors. First attacking Medaba in the Jordan district, he marched towards Shechem and succeeded in destroying the Samaritan temple on Mount Gerizim (c.120 B.C.), though the Samaritans were not brought to submission till c.109 B.C. Next the Idumæans were conquered and compelled to accept the Jewish faith. Even the trans-Jordanic peoples felt the power of Hyrcanus. Coins were minted with the inscription "Johanan High Priest and Chief of the Commonwealth of the Jews." Like the rulers of his family before him, Hyrcanus was a Pharisee; but because of an aspersion cast upon his mother, who had been a prisoner of war, he became a Sadducee, and the latter part of his reign was involved in this factional difficulty. He died in 104 B.C. and left five sons—Aristobulus, Antigonus, Alexander, Absalom, and another whose name is not known—two of whom, Aristobulus I and Alexander Jannæus, governed with the title of King. It has been suggested by Adolphe Reinach (*Revue des études juives*, lxvii, p. 303, Paris, 1914) that he may have received the surname as a consequence of his participation in the expedition of Antiochus VII Sidetes into Hyrcania. 2. HYRCANUS II, son of Alexander Jannæus and grandson of the preceding. On the death of his father, in 76 B.C., he was appointed high priest by his mother, Salome Alexandra, who ruled Judæa herself for several years. After her death (67 B.C.), he became temporal ruler also; but his younger brother, Aristobulus, an abler and more energetic man, seized the government and forced Hyrcanus to make an agreement by which Aristobulus was to rule and Hyrcanus to be only high priest. Induced by the Idumæan Antipater, he broke this agreement, and, aided by Aretas, King of Arabia Petræa, he endeavored to win back his dominions. Scaurus, the legate of Pompey, was bribed by Aristobulus, and Aretas had to abandon the siege of Jerusalem. By counter bribery on the part of Antipater, Hyrcanus obtained the

control. Pompey took away the kingship from Hyrcanus, leaving him high priest, and proclaimed Antipater Governor of the country in 63 B.C. Aristobulus and his two sons, who had been carried away captives, tried at different times to wrest the power from Antipater, but failed. Finally, in 47 B.C., Cæsar made Hyrcanus tetrarch and high priest, and Antipater was made procurator. Those around Hyrcanus and Hyrcanus himself began to suspect Antipater, and, while banqueting with Hyrcanus, Antipater was poisoned (43 B.C.), though Hyrcanus was not involved in this act. In 40 B.C. Antigonus, son of Aristobulus II, with the help of the Parthians, invaded the land, captured Hyrcanus by treachery, cut off his ears and thus disqualified him for the office of high priest, and carried him off to Seleucia on the Tigris. Some years later Herod, son of Antipater, obtained supreme power in Judæa and invited the aged Hyrcanus home to Jerusalem. For some time he lived in ease and comfort, but, falling under suspicion of the intriguings against Herod, was put to death (30 B.C.). Consult: Grätz, *Geschichte der Juden*, vol. ii (Berlin, 1854–75); Schürer, *Geschichte des jüdischen Volkes*, i (4th ed., Leipzig, 1901); Bevan, *The House of Seleucus* (London, 1902); Bouché-Leclercq, *Histoire des Seleucides* (Paris, 1913); Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

HYRIEUS, hī-rī'ê-ŭs *or* hĭr'ĭ-ŭs (Lat., from Gk. Ὑριεύς, *Hyrieus*, Οὐριεύς, *Ourieus*). Son of Poseidon and King of Hyria in Bœotia, for whom Agamedes and Trophonius built a treasure house. In this, one stone was so arranged that it could be removed from the outside, thus enabling them to plunder the treasury at will. When Agamedes was finally caught in a trap set by the King, Trophonius cut off his brother's head to prevent discovery and fled to Lebadea, where he was swallowed up by the earth. (See TROPHONIUS.) The story is told also of Rhampsinitus, a king in Egypt, by Herodotus (ii, 121) and is found as a folk tale in many lands and in many variations.

HYRTL, hēr't'l, JOSEPH (1810–94). An Austrian anatomist, born in Eisenstadt in Hungary. He was educated at the University of Vienna, where he became prosector in 1833. He became professor of anatomy at Prague in 1837 and filled a similar position at Vienna from 1845 to 1874. His last years were spent in retirement and almost total blindness. Hyrtl endowed several charities in Vienna and elsewhere, especially orphan asylums and nurseries. His high rank in the scientific world was recognized before his death by the erection of a colossal marble statue in the arcade of the University of Vienna (1889). His researches dealt with comparative anatomy, especially that of fishes, the construction of the ear and of the testicles, and, above all, with the subject of angiology, in which his great discoveries were made. Besides monographs on such subjects, including *Untersuchungen über das Gehörorgan des Menschen und der Säugetiere* (1845), *Vergleichende Angiologie* (1850), and *Die Blutgefässe der menschlichen Nachgeburt* (1870), he wrote on general anatomy, *Lehrbuch der Anatomie des Menschen* (1846; 20th ed., 1889) and a valuable and original *Handbuch der topographischen Anatomie* (1847; 7th ed., 1882); and on the history of anatomical nomenclature, *Das Arabische und Hebräische in der Anatomie* (1879), *Onomatologia anatomica* (1880), and *Die alten deutschen Kunstworte der Anatomie* (1884). But his most important work was as a technical anatomist. He had great practical skill, devised special preparations for the dissection of various organs and a microscopical preparation to show the capillary vascular network of the lesser organs, and wrote a *Handbuch der praktischen Zergliederungskunst* (1860).

HYSLOP, hĭs'lop, JAMES (1798–1827). A Scottish poet, born and brought up on a farm in Kirkconnel Parish, Dumfriesshire. He was entirely self-taught, but, while in the employ of a sheep farmer in Muirkirk (1812–16), he became imbued with the Covenant associations of Airdsmoss, which inspired his best poem, "The Cameronian's Dream" (*Edinburgh Magazine*, 1821). Besides other poems, he published in the same periodical his accounts of a three years' voyage to South America, whither he was taken as tutor on a warship, having had previous experience of teaching in Greenock. After spending three years ashore, in teaching and journalism, Hyslop embarked again as tutor on H.M.S. *Tweed*, but within a month died of fever near the Cape Verde Islands and was buried in the Atlantic. His poems, 82 in all, were published in Glasgow (1887), and two years afterward his masterpiece was set to music by Hamish McCunn (q.v.).

HYSSOP (AS. *ysope*, from Lat. *hysopum*, *hyssopum*, *hyssopus*, from Gk. *ὕσσωπος*, *hyssōpos*, *ὕσσωπον*, *hyssōpon*, hyssop, from Heb. *ēzōb*, sort of aromatic plant), *Hyssopus*. A genus of one species of the family Labiatæ. The common hyssop (*Hyssopus officinalis*), a native of southern Europe and the East and naturalized in the United States, is a half-shrubby evergreen plant, about 1½ feet high, with beautiful blue flowers arranged in one-sided whorled racemes. It has long been cultivated for its aromatic leaves, young shoots, and seeds, which are sometimes used to season salads and soups, but more generally in a dried state as a stomachic and carminative. The virtues of hyssop depend on a volatile oil. A sirup made from the leaves is sometimes used for colds, but the plant is less in favor than formerly. It has been supposed that the hyssop of the Bible is some species of *Phytolacca*, as *Phytolacca acinosa*, a native of Asia and Africa; and the common caper has also been so considered. Hedge hyssop is *Gratiola officinalis*. The giant hyssop is *Agastache nepetoides*. The name "water hyssop" is given the species of *Bacopa*, or *Herpestis*.

HYSSOP.

HYS'TALITE. See ILMENITE.

HYSTASPES, hĭs-tăs'pēz (Lat., from Gk. Ὑστάσπης). A name found several times in Persian history. 1. It was the name of the father of King Darius I, and according to the Old Persian inscriptions he was Governor of Parthia, and his father's name is given as Arshāma, which agrees also with Herodotus. The name Hystaspes, or Vishtaspa, of the inscriptions is identical in form with (Kavi) Vishtāspa, the

name of Zoroaster's patron, in the *Avesta;* but there is no historical ground for identifying the two personages, as has been erroneously done by some on the authority of Ammianus Marcellinus. The allusion to Hystaspes in Lactantius in the Church Fathers seems to have reference to Zoroaster's patron. Consult Jackson, *Zoroaster, the Prophet of Ancient Iran* (New York, 1898). 2. HYSTASPES, the son of Darius I and Atossa, was a brother of Xerxes and commanded a force of Bactrians and Sacæ in the latter's army. Consult Justi, *Iranisches Namenbuch* (Marburg, 1895).

HYSTASPES. An ancient Persian author, according to the testimony of several of the Church Fathers. He is supposed to have been a *magus* who wrote a book called *Vaticinia.* Of his life or date we are entirely ignorant. Two passages regarding his writings occur in Justin Martyr—one saying that he foretold the destruction of the world by fire, as the Sibyl did, and the other mentioning the book as an Oriental appendix to the Sibylline works and the prophetic books of the Old Testament. There is in the writing of Clement of Alexandria a reference of doubtful meaning, but usually construed to say that the work was in existence in the second century, and that it referred to the coming of the Messiah and to His kingdom; and another in Lactantius, where Hystaspes, like the Sibyl, is said to predict the destruction of Rome. The name points to Persian origin; but the possibility that it was merely the name of the work, as seems evident from the passage in Clement, when the choice would be due to the fame of the Magians, makes the origin of the work uncertain. Even its existence cannot be considered proved, much less that of an author called Hystaspes. Consult Kuhn, "Eine zoroastrische Prophezeiung in christlichem Gewande," in *Festgruss an Rudolf von Roth* (Stuttgart, 1893), and, for above references to Justin, Clement, and Lactantius, A. C. Coxe, *Ante-Nicene Fathers,* vols. i, ii, vii (Buffalo, 1887).

HYS'TERE'SIS (Neo-Lat., from Gk. *ὑστέρησις,* deficiency, from *ὑστερεῖν, hysterein,* to be behind, from *ὕστερος, hysteros,* latter; connected with Skt. *ud,* AS. *ūt,* OHG. *ūz,* Ger. *aus,* Eng. *out*). The name given a phenomenon in the magnetization of magnetic substances, which was first observed by Warburg in 1881, and later, in 1885, independently by Ewing, to whom the name is due. It is found that if a rod of iron—or any magnetic substance—is placed in a magnetizing helix, and the electric current through this gradually increased to a certain value and then slowly decreased, the magnetic properties of the rod do not follow the same course when the magnetizing current is decreasing as they did when it was increasing. All the properties due to the magnetization—the induction, the change in length, the change in elasticity, etc.—lag behind the magnetizing force. That is, if these properties have certain values for a given magnetizing force when the current is increasing, they will not return to the same values when, as the current is decreasing, the same magnetizing force is reached; but this force must be still further decreased, or even reversed, before these same values are again obtained. The amount of hysteresis varies greatly with different qualities of iron and steel and with different substances. Its value is most important from a commercial standpoint, because each time the magnetization of a piece of iron is reversed—as happens at each alternation of an alternating electric current—there is a definite amount of energy lost in heating the iron, and this amount depends on the hysteresis. There is another kind of hysteresis which is quite different. If a given magnetizing current is applied suddenly to a rod of iron, it may not attain its full magnetism instantly; and the fact that time is required to reach this is said to be due to "viscous" hysteresis, or "magnetic lag." For a full discussion of the importance of hysteresis and of the molecular theory, which explains it, consult Ewing, *Magnetic Induction* (London, 1900). See MAGNETISM.

HYSTE'RIA (Lat., from Gk. *ὑστέρα, hystera,* womb; connected with Lat. *uterus,* womb, Skt. *udara,* belly). A diseased state of the nervous system, characterized by a great variety of symptoms denoting disordered nervous functions. It was formerly considered to be a disease of the womb, and hence came its name; and it was at one time thought to be trifling and under the control of the will of the patient Both these ideas are erroneous; for hysteria is frequently found among males and is a disease of very serious nature, involving not only the brain and spinal cord, but also the peripheral nerves and the sympathetic system. The disease is now classed as a psychoneurosis. The psychic element is the more important, although difficult to define, but there are accompanying functional lesions of the sensory and motor nerve tracts. While comparatively rare among Anglo-Saxons, it is said to be widespread among Latin nations and Scandinavians, being especially frequent among the French. Hysteria arises from predisposing causes of an hereditary nature, such as parental alcoholism, epilepsy, insanity, or hysteria, as well as injudicious training or education in youth, with depressing influences, as of surroundings. Exciting causes are overwork, worry, excessive responsibility, sexual excesses, eye strain, profound or prolonged grief, and emotional or other mental shock, and, lastly, severe trauma, such as a railway accident, fall, or blow may produce. Hysteria is found among the working classes as well as among the idle, wealthy, and self-indulgent, who have never learned self-control or practiced self-denial. Two forms of hysteria are described, for reasons of convenience rather than for scientific reasons, as follows: 1. The form of the disease in which the patient is excitable, emotional, and perverse without cause and without intention, and has disturbances of sensation, motion, circulation, secretion, and excretion; usually falling into this condition after strain or stress, a disappointment, or great fatigue. 2. The form of the disease in which the patient has convulsive attacks, known by some as *hysteria major,* in contradistinction to the former variety, which is sometimes called *hysteria minor.* The patient may suddenly sink to the floor, become partly unconscious and rigid, and, either turning pale or remaining rosy, may breathe violently for a few minutes and then recover perfect consciousness. Or the patient may sink to the floor after experiencing a sharp pain or an aura of some sort, uttering a little cry or calling for help, with pale or ashen face and dilated pupils. Convulsions follow rigidity, resembling epileptic convulsions; there may be frothing at the mouth; after a short relaxation, during which the patient gasps, a repetition of the convulsions occurs, with absolute unconsciousness.

Then the patient rolls, tossing the arms and legs about and assuming various rigid positions, occasionally bending the head forward, doubling up the body, clenching the fists, and folding the arms across the chest or the abdomen, or bending the head and feet backward in the pose called opisthotonos. After several repetitions of such actions, the patient remaining unconscious, relaxation occurs with a short period of repose, followed at once by attitudes of petition, depression, gayety, etc., the patient being delirious and talking of past events or imaginary encounters, not recognizing, though speaking with, those around her, and controlled by hallucinations of sight and hearing. In a varying time the delirium ceases, and the patient becomes conscious, exhausted, and complaining of tenderness in some part of the body; passes a large quantity of pale, limpid urine, and generally resumes her occupation or goes about her house as if nothing had happened. The whole attack may last from 15 to 50 minutes. If these attacks are frequently repeated, the patient's strength is rapidly undermined, and she may be confined to her bed. The form of hysteria with convulsive seizures is often called *hystero-epilepsy* (q.v.)—an unfortunate and misleading term, which should not be used. It really means a combination of hysteria and epilepsy in the same person, which is possible but rare.

Hyperalgesia confined to certain spots, circumscribed areas of anæsthesia, or anæsthesia of a half of the body, hysterical deafness, hysterical blindness, twitching of muscles, or contractures of groups of muscles, the *globus hystericus*, or feeling of a lump in the throat, spasmodic closure of the glottis with pseudo-asthma, retention of urine, paralysis (either hemiplegia or paraplegia), palpitations of the heart, flushing of face, neck, and scalp, with sweating, coldness of extremities or of the entire body, œdema of the extremities, menstrual irregularities, and vomiting of fluid, are among the symptoms of the disease. Mental changes are certain to occur, amounting only to lack of balance and of will power, or impairment of memory in some, in others also recurring melancholy, rapid emotional play, lack of power of application, impaired judgment, diminished regard for truth, and craving for sympathy. The last two symptoms are the basis for the peculiar actions of "fasting girls"; self-mutilating martyrs; alleged sufferers who feign paralysis, pain, tumor, stone in the bladder, etc., and who eagerly submit to surgical operations. The above-mentioned phenomena are sometimes referred to as the stigmata of hysteria.

Hysteria is not dangerous to life. Recovery is rare in prolonged cases, though proper treatment may be followed by cure in cases in which symptoms have reappeared upon provocation many times in the course of a year or two. Harshness used on the erroneous supposition that willfulness or perversity is at the foundation of hysteria always does harm and is unjustifiably brutal. Relief of strain and of worry, change of environment, removal of the patient from home and from accustomed companions in the family, and treatment for indigestion, restoration of function, and nerve building, form the principal features of remedial agencies. Will power must be systematically cultivated, and moral support be given to the patient. Massage, electricity, diet, baths, and sometimes a rest cure, are efficacious.

Psychologically regarded, there are many points of resemblance between hysteria, hypnosis, and dreams; and theories of hysteria tend to correlate the hysterical state either with the hypnotic or with the dream consciousness. An example of the first type is the auto-suggestion theory: hysteria is thought to be a kind of spontaneous hypnosis. We are not told, however, why self-hypnotization should take place; and although many hysterical somnambulisms, anæsthesias, etc., resemble those of hypnosis, the theory is unable to explain the hysterical phenomena which concur with the waking consciousness. Another theory, in some respects similar, is known as the dissociated-idea theory. It is said that in some way, usually as the result of a profound emotional experience, an idea or group of ideas is cut off from the usual train of associations. The field of consciousness is thus restricted; there is a total forgetfulness of other past experiences; and under the dominance of the group the automatisms of hysteria occur. As in the former theory, the state of the hysterical consciousness is regarded as similar to that of the hypnotic consciousness, and the theory is, again, adequate to a large number of phenomena; but the psychology involved in the notion of the dissociated ideas is that of a past generation (see ASSOCIATION OF IDEAS), and the theory fails to explain those hysterias in which consciousness seems to be entirely normal. A third theory finds an intimate relation between hysteria and the dream consciousness; whenever there is an hysterical state, different from the waking consciousness, it is of the same type as the dream. The dream itself is said to be a symbolic presentation which has a remote cause. Briefly, the theory is as follows: at some time previous to the appearance of the hysterical outbreak, usually in childhood, there occurs an experience highly emotional and probably sexual in character, the memory of which is repressed until it plays no part in consciousness. As a result, however, of the conflict between the inhibition and the associative tendency to recurrence, the ideas undergo various transformations until at length they reappear, in dream and hysterical consciousness, in symbolic form; the various symptoms of hysteria are the somatic expressions of the submerged idea. (See DREAMING; FREUD, SIGMUND.) This hypothesis is comparatively recent, and has not yet been brought into relation to current psychological systems; at certain points it needs revision and restatement; but it appears to cover a larger number of facts than any other as yet proposed. (See INSANITY; HYPNOTISM; TEMPERAMENT.) Consult: Richer, *Paralysies et contractures hystériques* (Paris, 1892); Janet, *Etat mental des hystériques: les accidents mentaux* (ib., 1894); Fox, *Psychopathology of Hysteria* (Boston, 1913); Freud, *Studien über Hysterie* (2d ed., Vienna, 1909); *Selected Papers on Hysteria and Other Psychoneuroses* (New York, 1912).

HYSTER'ICS. See HYSTERIA.

HYS'TEROËP'ILEP'SY. An improper, though frequently employed, term for a variety of hysteria in which convulsive attacks occur, of an epileptoid nature. It is not a form of epilepsy, though not differentiated from that disease till Charcot, of Paris, gave an accurate and intelligent description of hysteria, and often distinguished from it with difficulty. The diagnosis often rests upon the discovery of the stig-

mata of hysteria in the period between the convulsive attacks, as the physician rarely sees the attacks, and the description of the fits by the layman is not reliable. Consult: Max Nonne, "Ueber Hystero-epilepsie," in *Mittheilungen a. d. Hamburgurgischen Staatskrankenanstalten*, vol. viii (Hamburg, 1910); Margulies, "Zur Frage der Hystero-epilepsie," in *Klinik für psychische und nervöse Krankheiten*, vol. vi (Halle, 1911); Brill, "Hystero-epilepsy (Piblokoto) among the Eskimos," in *Journal of Nervous and Mental Diseases*, vol. xl (New York, 1913). See HYSTERIA.

HYS'TEROT'OMY. See CÆSAREAN OPERATION.

HYS'TRICOMOR'PHA. See RODENTIA.

HYTHE, hīth (AS., haven). A market town and parliamentary borough in Kent, England, 14 miles south of Canterbury. With its suburbs it is a favorite seaside summer resort and the seat of the national school of musketry (Map: England, H 5). It has an interesting church, under which is an unusual collection of human skulls and bones, reputed to be the remains of Danes slain in a battle fought about 1000. The sea-wall promenade extends 3 miles eastward to Sandgate. Hythe owns its water works. It is one of the Cinque Ports, but through the silting of its harbor the town proper is now a half mile inland. Pop., 1901, 5557; 1911, 6387.

HYTHE, THOMAS ALLNUTT BRASSEY, VISCOUNT (1863–). An English publicist, son of the first Earl Brassey (q.v.). He was educated at Eton and at Balliol College, Oxford; was assistant private secretary to Earl Spencer when he was First Lord of the Admiralty, and assistant secretary to the Royal Commission on Opium in 1894; and became editor of the *Naval Annual* in 1890. In 1892 he contested Epsom Division, Surrey, in 1895 and 1900 Christ Church, and in 1902 Devonport. He was the first civil Governor of Pretoria in 1900, initiated the Oxford University Endowment Fund, served as chairman of the Chichester Diocesan Board of Finance, and became lieutenant colonel of the West Kent Yeomen Cavalry. He published *The Case for Devolution* (1913) and *Problems of Empire, the Faith of a Federalist* (1904; new ed., with foreword by Earl Grey, 1914).

I

I The ninth letter in the alphabets of western Europe. Its form in the north Semitic and early Greek alphabets, from which it is derived, somewhat resembled a narrow upright Z. (See ALPHABET.) After various modifications this was straightened into its present shape. The Greek designation, *iota*, of the letter is an adaptation of its Hebrew name *yōd*, 'hand.' Originally the Semitic letter represented the consonantal sound *y*, but later was used also to indicate the vowel *i*. The dot over our small *i* did not come into use until the fourteenth century.

Phonetic Character. The "short i" in English is described as a high-front or palatal vowel, made by the blade of the tongue approximating the forward part of the palate or roof of the mouth—the sound heard in *it*. When approximated so far as to make a partial contact or closure, this passes over into a semivocalic or consonantal *y*, as in *you* (*iu*), although in English the *y* is often not written, e.g., *minion, million;* other variations may be noticed in *charity, bird*. The corresponding "long i," common in European languages, is found in *machine, police, pique*. This is sometimes known as the "long e" sound in *receive, believe, seat*. The sound commonly called "long i" in English, *wide, ice*, and the name of the letter itself (*i* pronounced *eye*), is really a diphthong, like *aisle*, made by premature opening of the lengthened vowel under stress accent. This phonetic change from the older character of the sound was going on during the Middle Period of transition into the Modern English, so that it is now a phonetic rule that Anglo-Saxon or Old English *ī* regularly calls for a diphthongal long *i* in Modern English, e.g., OE. *wīd, mīl* = Mod. Eng. *wide, mile*. Historically the linguistic character of *i* is fairly stable, Indo-Germ. **uidhevā*, Skt. *vidhávā*, 'widow,' Lat. *vidua*, OChurch Slav. *vĭdova*, AS. *widewe*, Eng. *widow;* or Gk. *οἶνος* (for *Ϝοῖνος*), 'wine,' Lat. *vinum*, AS. *wīn*, Eng. *wine*. For the connection of *i* and *j* see J.

As a Symbol. I in the Roman notation stands for 1; in chemistry I = iodine; in logic I is the symbol of the partial affirmative proposition.

I'ABA'DU IN'SULA (Lat., trans. of Gk. *Ἰαβαδίου Νῆσος, Iabadiou Nēsos*). According to Ptolemy (vii, 2), a large island in the Indian Ocean, southeast of the Golden Chersonese and southwest of the Isles of Satyrs, said to be very fertile and to contain much gold. The island meant was probably the modern Java, though Humboldt and others think of it rather as Sumatra. The name, according to Ptolemy, signified Island of Barley. The capital was named Argyre (*Ἀργυρῆ*).

IACCHUS, ī-ăk'kŭs (Lat., from Gk. *Ἴακχος, Iakchos*). A title used of Bacchus (q.v.) in the Eleusinian Mysteries (q.v.), in which he was regarded as the son or husband of Demeter, or the son of Persephone. He was thus distinguished from Dionysus, the son of Zeus and Semele, but was sometimes called his son and at times identified with him. Consult J. E. Harrison, *Prolegomena to the Study of Greek Religion* (2d ed., Cambridge, 1908).

IAGO, ē-ä'gō. A Spanish and Portuguese form of the name James, now occurring only in the combination Santiago (St. James).

IAGO. In Shakespeare's *Othello*, a calculating and malignant character, the ancient of Othello, whom he secretly hates while retaining his confidence. In revenge for imagined wrongs he skillfully concocts evidence which convinces Othello of the unfaithfulness of his wife, Desdemona. Othello in jealousy murders Desdemona and stabs Iago when the plot comes to light.

IAL'YSUS (Lat., from Gk. *Ἰάλυσος*). An ancient city on the island of Rhodes, on the west coast, near the northern end of the island, possibly a Phœnician settlement, certainly an important place in the Mycenæan period. It was later colonized by Dorians from Argos and formed with Lindus and Camirus the Rhodian Tripolis. Even in the Homeric poems it is famed for its wealth. In 408 B.C. it united with Lindus and Camirus in the foundation of the city of Rhodes (q.v.). Some remains are still traceable near the modern village Ialiso. A necropolis at Ialysus has yielded many Mycenæan vases and other ornaments.

IAM'BI. The name sometimes given by Horace (q.v.) to the poems commonly called epodes. See EPODE.

IAMBIC VERSE (Lat. *iambicus*, Gk. *ἰαμβικός, iambikos*, from *ἴαμβος, iambos*, iambus, from *ἰάπτειν, iaptein*, to assail with words). A term applied in classic prosody to verses consisting of the foot or metre called *iambus*, made up of two syllables, of which the first is short and the second long (⏑—). Archilochus (q.v.) is the reputed inventor of iambic verse. The term is also applied by analogy to English verse wherein unstressed and stressed syllables correspond to a short syllable followed by a long syllable in Latin or Greek verse. The English language runs more easily and naturally in this metre than in any other.

The stág | at éve | had drúnk | his fíll.

See METRE; VERSIFICATION, *Greek and Latin, Iambic Rhythms.*

IAMBLICHUS, ī-ăm'blĭ-kŭs (Lat., from Gk. 'Ιάμβλιχος). 1. A Greek writer of the second century A.D., a Syrian by birth, and the author of the earliest Greek romance of which considerable remains have survived. It was entitled *Babyloniaca* and described in 35 books the remarkable adventures of two lovers, Rhodanes and Sinonis. The original romance has perished, but large extracts are preserved by Photius (chap. xciv). Consult Chassang, *Histoire du roman dans l'antiquité* (Paris, 1862), and Rohde, *Der griechische Roman* (1900); and see PHOTIUS.

2. A Neoplatonic philosopher, born at Chalcis in Cœle-Syria about 283 A.D. He lived mostly at Alexandria. He studied under the Neoplatonists Anatolius and Porphyrius and became deeply imbued with the teachings of Plotinus, which he expounded for many years to a large circle of hearers at Alexandria, but with a considerable admixture of his own peculiar views. He died at Alexandria about 330 A.D. His doctrines were a mixture of Pythagorean and Platonic ideas, with much superstition and magic, and the supposed manifestation of God by ecstasies, and a communication with the spiritual world by means of ceremonies. He was a voluminous writer, but most of his writings are lost. Perhaps they were destroyed by the Emperor Constantine, who ordered the burning of the works of Porphyrius. Of his work, Περὶ Πυθαγόρου Αἱρέσεως, in 10 books, we possess four complete sections, viz.: *On the Life of Pythagoras* (Περὶ τοῦ Πυθαγορικοῦ Βίου), edited by Nauck (St. Petersburg, 1884); *Exhortation to Philosophy* (Προτρεπτικοὶ Λόγοι εἰς Φιλοσοφίαν), edited by Pistelli (Leipzig, 1888); *On Mathematics* (Περὶ τῆς Κοινῆς Μαθηματικῆς Ἐπιστήμης), edited by Festa (ib., 1891); and an introduction to the *Arithmetic* of Nicomachus, edited by Pistelli (ib., 1894). There is also in existence a work on *Mysteries* (Περὶ Μυστηρίων Λόγος), which is attributed to Iamblichus; but the attribution has been questioned, perhaps without reason. On Iamblichus and his philosophy, consult: A. E. Chaignet, *Histoire de la psychologie des Grecs*, vol. v (Paris, 1893); Eduard Zeller, *History of Greek Philosophy* (New York, 1889); T. Whittaker, *The Neo-Platonists* (Cambridge, 1901). See NEOPLATONISM.

IANTHE, ī-ăn'thē. 1. In Roman mythology, a girl to whom Iphis was betrothed (Ovid, *Met.*, ix, 12). 2. A character in Sir William Davenant's *The Siege of Rhodes.* 3. Lady Charlotte Harley, to whom, under the name of Ianthe, Byron dedicated his *Childe Harold.* 4. A character in Shelley's *Queen Mab.*

IAPETUS (Lat., from Gk. 'Ιαπετός). One of the Titans (q.v.), son of Uranus and Gæa, father, according to Hesiod, of Atlas, Menœtius, Prometheus, and Epimetheus. Through Prometheus he is ancestor of Deucalion (q.v.) and so of the human race. He rebelled against Jupiter and so was confined in Tartarus, or under the island Inarime, off the coast of Campania. Many scholars suppose his name to be identical with that of the biblical Japhet; others, like Maximilian Meyer, *Giganten und Titanen* (Berlin, 1887), deny any such connection.

IAPYGIA, ī'ā-pĭj'ĭ-ā (Lat., from Gk. 'Ιαπυγία). A name given to the southeastern district of Italy, forming the heel of the peninsula; also called Messapia. The name Iapygia was familiar to the Greeks, but was not known to the Romans.

IASI. See JASSY.

IBA, ē'bä. The capital of the Province of Zambales, Luzon, Philippines (Map: Philippine Islands, B 3). It is situated on the Iba River, 85 miles northwest of Manila, and has a post office and telegraph station, fine public buildings, and a town hall. Pop., 1903, 4482.

IBADAN, ē-bä'dän. The chief commercial city of the Yoruba, in the interior of the English colony of Lagos in Nigeria, Africa, 123 miles northeast of Lagos (Map: Africa, E 4). It is a walled town, mainly of mud huts, situated on a small river, the Ona. There are many mosques and idol houses. The chief industry is agriculture. Its population is estimated at 150,000, including the people outside the walls.

IBAGUÉ, ē'bä-gā'. Capital of the Department of Tolima, Colombia, situated 60 miles west of Bogotá, on a fertile plain, at an altitude of over 4000 feet (Map: Colombia, B 3). It has a temperate and healthful climate and is a prosperous town of considerable commercial importance. There are a number of sulphur and silver mines in its vicinity. Pop., 1912, 23,607. Ibagué was founded in 1550 and was in 1854 the temporary capital of the Republic.

IBAJAY, ē'bä-hī'. A town of Panay, in the Province of Capiz, Philippines, situated at the mouth of the Ibajay River, 43 miles northwest of Capiz. The town formerly stood at the Point of Potol. Pop., 1903, 14,774.

IBALAO. See LONGOT.

IBALONE, ē'bä-lō nä. See VICOL.

IBANAG, ē'bä-nägʹ. The speech of the Cagayan people in Luzon. See PHILIPPINE ISLANDS.

IBAÑEZ, BLASCO. See BLASCO IBAÑEZ.

IBÁÑEZ DE IBÁÑEZ DE IBERO, ē-bän'yäth dā ē-bän'yäth dā ē-bā'rō, CARLOS, MARQUIS OF MULHACÉN (1825–91). A Spanish military engineer and geodetist, born in Barcelona. As a result of his work in geodesy and geography, both in Spain and in other countries, he was given the title of Marquis of Mulhacén and was elected to many scientific societies. His publications include: *Base central de la triangulación geodésica de España* (1865); *Descripción geodésica de las islas Baleares* (3 vols., 1871); *Tableau géographique et statistique de l'Espagne* (1888).

IBARRA, ē-bär'rä. The capital of the Department of Imbabura, Ecuador, situated at an altitude of over 7000 feet, 60 miles northeast of Quito (Map: Ecuador, B 3). It has some cotton and woolen mills and a population of about 10,000. Once a considerable town with a population of about 16,000, Ibarra was almost wholly destroyed by the earthquake of 1868.

IBARRA, JOAQUÍN (1725–85). A Spanish printer, born at Saragossa. He was appointed court printer at Madrid. The following works from his press are among the masterpieces of the art of printing: a translation of Sallust by the Infante Don Gabriel (1772); an edition of Cervantes' *Don Quixote* (4 vols. quarto, 1780; 4 vols. octavo, 1782); the *Historia de España* of Mariana (2 vols., 1780); and several fine editions of the Bible.

I BEAM. See STEEL SHAPES.

IBERCOURT, ē'bâr'kōōr', HENRY LOUIS D' (1771–1818). A Flemish traveler, born in Mons. His journeyings began in the West India Islands and extended over a great part of South America. His narrations include: *L'Amérique dévoilée* (1811); *Voyage en Chili* (1812); *Nouveau traité*

sur les légumineuses de l'Amérique du Sud (1815). He also wrote a romance, *Un voyageur captif en Patagonie* (1814), and a pamphlet, *La constitution des Etats-Unis, est-elle applicable à l'Europe?* (1818), which so deeply offended the Dutch government that the author suffered a short term of imprisonment.

IBERES, ī-bē′rēz. See IBERIANS; HISPANIA.

IBE′RIA. See HISPANIA.

IBERIAN LANGUAGE. See GEORGIAN LANGUAGE.

IBE′RIAN MADONNA. A wonder-working picture in the Kremlin, Moscow.

IBE′RIANS (Lat. *Iberes*, Gk. Ἴβηρες). A people anciently living at the mouth of the Iberus (Ebro) River in eastern Spain. Later the inhabitants of the entire peninsula were so called. The term is now applied to the primitive Neolithic and Bronze-age men whose remains and relics are found in ancient graves, grottoes, and refuse heaps throughout western Europe. Their ovoid and ellipsoid crania, called Pelasgic type by Sergi, resemble those of ancient Italy, Greece, Asia Minor, Egypt, Ethiopia, and north Africa, belonging to what he denominates the Mediterranean race. Keane also quotes Von der Gabelentz in the proof of identity between the Basque (Iberian) and the Berber speech. This long-headed man, of low stature, has been traced as far as the British Isles and is identified with the Picts and other groups. The term Iberian is used by English ethnologists for the Mediterranean race, and Deniker's title for the same group is Ibero-Insular. Keane subdivides the historical Iberian (Basque) as follows. The descendants from old extinct Iberian are:

Euscara (Spanish Basque)	Guipuzcoan Biscayan, or Upper Navarrese North Upper Navarrese South
Bascunse (French Basque)	Labordin Souletin, or Lower Navarrese East Lower Navarrese West

Consult Keane, *Man: Past and Present* (Cambridge, 1899), and Sergi, *Mediterranean Race* (London, 1901). See MEDITERRANEAN RACE.

IBE′RIS. See CANDYTUFT.

IBE′RUS. The ancient name of the river Ebro (q.v.).

IBERVILLE, ē′bâr′vēl′. A town and the county seat of Iberville Co., Quebec, Canada, on the Richelieu River, and on the Canadian Pacific, the Quebec, Montreal, and Southern, the Central Vermont, and the Rutland railways (Map: Quebec, E 5), opposite the town of St. John's, and about 40 miles southeast of Montreal. Its manufacturing establishments include two iron factories, three potteries, two agricultural-implement factories, monument works, and a carriage factory. Pop., 1901, 1512: 1911, 1905.

IBERVILLE, PIERRE LE MOYNE, SIEUR D' (1661–1706). A French-Canadian soldier, naval commander, and explorer, founder of Louisiana. He was one of the 10 famous sons of Charles le Moyne of Montreal. He studied seamanship in the French navy, but his first exploits were inland—from the Ottawa north to James's Bay, with an expedition destined to gain possession of the English forts there (1686). He took part in the expedition for the destruction of Schenectady (1690). After capturing (1696) and demolishing the stone fort at Pemaquid, built to protect New England, Iberville thought of taking Boston, but sailed instead to Newfoundland, where he burned the village of St. John's, laying waste all the British settlements on the island. Thence he steered for Hudson Bay, where he had a gallant victory over three English ships against his one and destroyed the last remaining post of the Hudson's Bay Company. From the Far North he went to the Far South, sailing from France (1699) to the Gulf of Mexico in search of the mouth of the Mississippi, found it, and built a fort at Biloxi (q.v.), changing afterward to Mobile, thus fulfilling La Salle's dream of planting a French colony on the Gulf. He left Canada in 1702 and was made a captain in the French navy. In 1706 he was placed in command of a small fleet and went on a cruising expedition. When in the West Indies, he was taken ill and went to Havana, where he died.

I′BEX (Lat., chamois). The ancient name of the steinbock of the Alps, and now designating a section or subgenus of goats having the horns flat and marked with prominent transverse knots in front, whereas those of the typical goats are compressed and keeled in front and rounded behind. The group contains four species, all inhabitants of high mountainous regions, as described below. All are characterized by a nearly uniform coloration; but the hue varies with age and season, from gray, yellowish, or grizzled, to various degrees of brown, usually lighter on the throat, belly, and inside of the legs than elsewhere. The short summer coat is exchanged in winter for a longer, warmer one, mixed with an under wool. The pairing season of all is in midwinter, and the kids, usually two, are born in early summer. Cf. GOAT; and see Plate of WILD GOATS.

The typical ibex (*Capra ibex*), called bouquetin by the French, and steinbock by the Germans, has long been exterminated as a wild animal, but is preserved by the Italian government in a few valleys of the Piedmontese region. Formerly it seems to have roamed all over the Alps of Switzerland, Savoy, and the Tirol, but always kept as high as possible, seeking its food, mainly by browsing bushes, at the edge of the snow, and not descending the valleys as does the chamois. Though larger and more powerful than the common goat, it is smaller than the other ibexes. The horns rarely exceed 30 inches in length and have the knobs not prominent, while the beard of the males is so small as to be hardly visible in the summer coat. This ibex is easily tamed when taken young and interbreeds readily with domestic goats.

The Himalayan ibex (*Capra sibirica*) is still numerous and well known to sportsmen. A ram stands 40 inches high at the withers, has a heavy beard, and the roughly knobbed horns often measure more than 50 inches along the outside curve and 11 to 12 inches in greatest girth. It inhabits all the mountain ranges of Central Asia from the borders of Persia eastward to the frontier of Tibet and northward into Siberia, and is found not only on the summits, but on the open plateaus of the Pamir. Ordinarily, however, ibexes remain upon the crags as near as possible to the snow line. They descend in winter only so far as is necessary to find uncovered pasturage and often linger at that season at great altitudes, where the wind sweeps steep slopes and allows them to nibble a scanty subsistence from the withered herbage. The resistance to cold and hardiness of constitution generally which this implies are characteristic of the race. They usually go about in small bands, led by old rams.

but sometimes gather into herds of 100 or more. In the spring the males separate from the band and betake themselves to the highest crags, while the females seek retired places in which to bring forth their young. In spite of constant pursuit by hunters, the ravages of wild dogs, and destruction by avalanches, these animals seem to maintain their numbers (except near Kashmir), as they are prolific and accustomed to wandering widely. Ibex shooting is one of the most exciting and difficult feats offered to the sportsman, because of the nature of the country in which the animals live and their extreme wariness and ability to escape down precipices and over crags which baffle their pursuers. The books of men like MacIntyre, Kinloch, Markham, Pollok, and other Anglo-Indian sportsmen are full of entertaining accounts of this adventurous hunting, and to these observers we owe most of our knowledge of the haunts and habits of these animals.

The Arabian ibex (*Capra sinaitica*), or beden, occupies the rough heights of the Sinaitic Peninsula, Arabia Petræa, Palestine as far as Lebanon, and Upper Egypt. It is rather smaller than the Himalayan, and the knobs on the front of the horns are less prominent and regular. An Abyssinian species, the walie (*Capra walie*), also exists, and differs from the others in the curvature of its horns and a protuberance in the centre of the forehead.

IBILAO, ē'bē-lä'ō. See Ilongot.

I'BIS (Lat. *ibis*, Gk. *ἶβις*, of Egyptian origin). A storklike bird of the family Ibidæ. The bill is long, slender, curved, thick at the base, the point rather obtuse, the upper mandible deeply grooved throughout its length. The face, and generally the greater part of the head, and sometimes even the neck, are destitute of feathers, at least in adult birds. The neck is long. The legs are rather long, naked above the tarsal joint, with three partially united toes in front and one behind; the wings are moderately long; the tail is very short. The family is usually ranked with the storks in the same order as the herons, but there are important points in which the ibises approach the curlews. The sacred ibis, or Egyptian ibis (*Ibis æthiopica*), is an African bird, 2½ feet in length, although the body is little larger than that of a common fowl. The glossy ibis (*Plegadis*, or *Egathens*, *falcinellus*) is a smaller species, also African, but migrating northward into continental Europe and occasionally seen in Great Britain. It occurs in the tropical and subtropical parts of all the world, but is quite uncommon in North America, where ornithologists call it *Plegadis autumnalis*. In the southwestern United States it is replaced by the white-faced glossy ibis (*Plegadis guarauna*), a species in which the adults have the region about the base of the bill white. The habits of both species resemble those of the sacred ibis. The color is black, varied with reddish brown and exhibiting fine purple and green reflections. There are no loose pendent feathers. The white ibis (*Guara alba*), a species with pure white plumage, abounds on the coasts of Florida and is locally abundant as far north as South Carolina and southern Illinois. Audubon saw multitudes on a low islet and counted 47 nests on a single tree. (For its egg, see Colored Plate under Egg.) The scarlet ibis (*Guara rubra*) is a tropical American species, remarkable for its brilliant plumage, which is scarlet, with the tips of a few outer primaries glossy black. The straw-necked ibis (*Carphibis spinicollis*) is a large Australian bird of fine plumage, remarkable for stiff, naked, yellow feather shafts on the neck and throat, which look extraordinarily like bits of straw. The bird known in the southern United States as wood ibis is not an ibis at all, but a stork (q.v.).

The sacred ibis, one of the birds worshiped by the ancient Egyptians and called by them *hab* (or *hib*) and by the modern Egyptians *abu-Hannes* (i.e., Father John), is a bird with long beak and legs and is covered with black and white plumage. It was supposed, from the color of its feathers, to symbolize the light and shade of the moon, its body to represent the heart; its legs described a triangle, and with its beak it performed a medical operation; from all which esoterical ideas it was the avatar of the god Thoth, or Hermes (see Mercury), who escaped in that shape the pursuit of Typhon, as the hawk was that of Ra, or Horus, the sun. Its feathers were supposed to scare, and even kill, the crocodile. It appeared in Egypt at the rise, and disappeared at the inundation, of the Nile, and was thought at that time to deliver Egypt from the winged and other serpents which came from Arabia in certain narrow passes. As it did not make its nest in Egypt, it was thought to be self-engendering, and to lay eggs for a lunar month. According to some, the basilisk was engendered by it. It was celebrated for its purity and drank only from the purest water, and the most strict of the priesthood drank only of the pools where it had been seen; besides which it was fabled to entertain the most invincible love of Egypt and to die of self-starvation if transported elsewhere. Its flesh was thought to be incorruptible after death, and to kill it was punishable with death. Ibises were kept in the temples and unmolested in the neighborhood of cities. After death they were mummied, and there is no animal of which so many remains have been found at Thebes, Memphis, Hermopolis Magna, or Eshmun, and at Ibiu, or Ibeum, 14 miles north of the latter place. They are made up into a conical shape, the wings flat, the legs bent back to the breast, the head placed on the left side, and the beak under the tail. They were prepared as other mummies and wrapped up in linen bandages, which are sometimes plaited in patterns externally. At Thebes they are found in linen bandages only; at Hermopolis, well preserved in wooden or stone boxes of oblong form, sometimes in form of the bird itself or the god Thoth; at Memphis, in conical sugar-loaf-shaped red earthenware jars, the tail downward, the cover of convex form, cemented by lime. There appear to be two sorts of embalmed "ibises"—a smaller one of the size of a rail, very black, and the other black and white. The former is not an ibis at all, but some smaller wading bird. The last is usually found with its eggs, and with its food in its stomach. By the Jews it was held to be an unclean bird. Consult: Pettigrew, *History of Egyptian Mummies* (London, 1840); Wilkinson, *Manners and Customs of the Ancient Egyptians* (New York, 1879); Whymper, *Egyptian Birds* (London, 1909). See Colored Plate of Eggs.

IBIZA. See Iviza.

IB'LIS. One of the names of the Devil, in the Koran, who, however, is more often called *Shaitān* (Satan). Iblis is the chief of the fallen angels, who was once a good angel named Azazil, but, having refused at God's command to render homage to Adam, was first condemned to death,

but subsequently respited till the judgment day (Koran, vii, 13). The legend is borrowed from Jewish sources and is embodied in the Midrashic exposition of Genesis, iii (consult Wünsche, *Midrash Bereshit Rabba*, pp. 32 et seq., Leipzig, 1881). Both words for devil used by Mohammed appear to be of foreign origin, the form *Shaitān* coming close to the designation of Satan in Ethiopic, while *Iblis* may be a distortion of *diabolus*, modified in order to adapt it to a derivation from an Arabic stem *balasa*, 'to confuse,' with which, however, it has really nothing to do. Of the two terms, the former is found in the Koran 87 times, the latter only 11 times. Moreover, the plural of the former is used, whereas the latter occurs only in the singular, and was regarded by Mohammed as a name for a specific devil, the arch devil spirit; *Shaitān*, both in the Koran and the later literature, is used as a general designation for devils or evilly disposed demons. On the basis of the utterances in the Koran, the doctrine of the Devil is further developed in Mohammedan theology, influenced by the specifically Christian and Jewish conceptions current in the Orient whereby the Devil, as a single personage, usurps the powers and attributes of the numerous body of jinns (q.v.) of popular belief. The latter, however, as a survival of primitive religion, continue to hold sway among the people in general, so that in the folklore of the Arabs it is the jinns who are constantly introduced, both for good and evil purposes, whereas the mention of Iblis and of the Satans is largely confined to the body of theological writings. In the latter the contrast between the Devil and the angels is prominently put forward, and the view is expressed that each individual has a devil and an angel appointed as his companions—the former tempting him to evil deeds, the latter prompting him to good. The life of man passes in a constant struggle to be rid of the former and to keep close to the latter. Consult Weil, *Biblische Legenden der Muselmänner* (Frankfort, 1845).

IBN ABI USEIBIA, ĭb'n ă'bē o͞o-sā'bē-ȧ, Muwaffak ad-Din (1203–70). An Arabic physician and author. He was born in Damascus, of a family of physicians, lived in Egypt and Syria, and was educated at Damascus and Cairo (1227–33). For two years he was head of a hospital at Cairo, then he became court doctor to a Syrian emir near his home city. He is best known for his biographical lexicon of Mohammedan physicians (1245–46), which has been edited by August Müller (Königsberg, 1884) and commented on by the same in *Ueber Ibn Abi und seine Geschichte der Aerzte* (Leyden, 1885). Consult: Wüstenfeld, *Geschichte der arabischen Aerzte und Naturforscher* (Göttingen, 1840); Leclerc, *Histoire de la médecine arabe* (Paris, 1876); *Travaux de la VIème session du Congrès international des Orientalistes à Leide*, vol. ii (Leyden, 1884).

IBN AL-ATHIR, ĭb'n ȧl-ȧ-thēr', Izz-ad-Din al-Jazari (1160–1234). An Arabic historian, who was born of good family in Mesopotamia and lived in Mosul. He wrote *Kamil*, a history of the world to the year 1231, edited by Tornberg under the title *Ibn-el-Athiri Chronicon quod Perfectissimum Inscribitur* (1851–76); *Usd alghâba*, on the successors of Mohammed (1864); and a lexicon, edited by Seybold (Weimar, 1896). Excerpts from his other works may be found in Reinaud, *Historiens des croisades* (Paris, 1829).

IBN AL KHATIN. See Fakhr-ad-din.

IBN AL KIFTI. See Kifti.

IBN ARABSHAH, ĭb'n ă'rȧb-shȧ', Ahmed (1392–1450). An Arabic author, born at Damascus. He was carried captive with his family (1400) to Samarkand, after the invasion of Syria by Timur, took advantage of this opportunity to study Turkish and Persian, traveled through Mongolia and Astrakhan, and at Adrianople was employed by the Sultan to translate Arabian writings into Turkish and Persian. The most important of his works is the history of Timur or Tamerlane and his period (last ed., Calcutta, 1818). The book of anecdotes written by him has been published by Freytag, with a Latin translation, under the title *Fructus Imperatorum et Jocatio Ingeniosorum* (2 vols., Bonn, 1832–52).

IBN BAJJA, ĭb'n bä'jȧ. See Avempace.

IBN BATÛTA, ĭb'n bȧ-to͞o'tȧ, Abu Abdallah Mohammed (1304–77). The greatest Mohammedan traveler of all time. He was born at Tangier, Morocco, and spent 25 years (1325–50) in traversing western and Central Asia, large portions of Africa, Russia, India, China, and Spain. For three and one-half years he acted as cadi at Delhi and in the Maldive Islands. After his travels he settled in Morocco. His narrative of his journeys, replete with graphic and picturesque description, has been published in the French translation by Defrémery and Sanguinetti (Paris, 2d ed., 1874–77). There is an English translation from an epitomized version by S. Lee (1829).

IBN DORAID, ĭb'n dō-rā'ĕd, Mohammed (837–934). An Arabic poet and scholar, born at Basra, and later resident in Oman, Persia, and Bagdad. His most famous poem is the elegy entitled *Alkasida-al-Maksura*, dealing with the question of good luck and bad. Among his philological works may be mentioned an etymological and genealogical dictionary of Arabic proper names, edited by Wüstenfeld (1853–54), and two briefer studies in lexicography, edited by Thorbecke (1882).

IBN EZRA, ĭb'n-ĕz'rȧ. See Aben-Esra.

IBN FARID, ĭb'n fa-rēd', Abu'l Kasim Umar (1181–1235). An Arabian poet. He was born in Cairo, lived for some time in Mecca, but died in his native city. While his poetry has been admired for its subtlety and beauty, it is especially as a mystic, a representative of Sufi'ism, that he has exercised a considerable influence. His divan (q.v.) was published at Beirut in 1887; it has also been published with the commentaries of Burini, in 1615, Abdu'l Ghani, in 1853, and Rushayyad Ghitab in 1893. One poem was edited by Hammer-Purgstall under the title *Das arabische Lied der Liebe* (Vienna, 1854). Consult Nicholson, *A Literary History of the Arabs* (London, 1907).

IBN HANBAL, ĭb'n hȧn'bȧl, Abu Abdallah Ahmed (780–855 A.D.). The founder of the fourth orthodox sect of the Sunnites. He was born at Bagdad, but his parents came from Merv. He was instructed there by Al Shafi'i. In the dispute as to whether the Koran was eternal or had been created Ibn Hanbal maintained the former opinion, which incensed against him the Caliph al Mutasim. He was imprisoned in 842 and, it is said, scourged. Al Mutawakkil, however, issued an edict of toleration in 846, and Ibn Hanbal was set free and offered a compensation for his sufferings. Thousands listened to his lectures, and his great work,

the Musnad, containing some 30,000 traditions selected from a much larger number, has had a great influence. He emphasized strongly tradition and rejected absolutely subjective decisions. Ibn Hanbal himself is probably not to be held responsible for the doctrine that Allah had set Mohammed on his throne, which has been widely spread among the Hanbalites. The influence of his school is very slight at the present time. Consult Brockelmann, *Geschichte der arabischen Literatur*, i, 181 (Weimar, 1898). See MOHAMMEDAN SECTS.

IBN HISHAM, ĭb'n hĕ-shäm′, ABU MOHAMMED ABD AL-MALIK (c.760–834). An Arabic scholar of Fostat. He is famed for his genealogical writings and his revision of the life of the Prophet Mohammed, written by Ibn Ishak (c.700–768). The biography was edited by Wüstenfeld (Göttingen, 1858–60), and translated into German by Weil as *Das Leben Mohammeds* (1864).

IBN JANACH, ēb'n hä-näch′, ABULWALID MERWAN, or JONAH MARINUS. A Jewish grammarian of Spain. He was born near the end of the tenth century and died about the middle of the eleventh century, but the exact dates are unknown. He studied Hebrew at his birthplace, Cordova, and in Lucena, under Jewish teachers, and also took up the study of medicine. In 1012, in consequence of political disturbances, he was obliged, with many other Jews, to leave Cordova and settled in Saragossa, where he appears to have spent the rest of his days, and where, while continuing his practice of medicine, he devoted himself also to the investigation of Hebrew grammar, guided largely by the researches of his predecessor, Hayyug (q.v.). Ibn Janach was enabled to advance the knowledge of Hebrew morphology far beyond the point that Hayyug had reached. He did not hesitate to make slight changes in the biblical text where it seemed to be meaningless as it stood. His main work consists of two parts—the first dealing with grammar, *Kitāb-al-Luma*, published by J. Derenbourg (Paris, 1886); the second a lexicon, *Kitāb-al-'Usūl*, published by Neubauer (Oxford, 1873–75). The grammar, based on Arabic models, is the first systematic attempt to cover the entire field of Hebrew grammar. The dictionary is characterized by the same comprehensive knowledge and clear perception as the grammar and, incidental to the explanation of words, furnishes valuable and elaborate discussion of grammatical points. Both the grammar and the dictionary were translated by Judah ben Saul Ibn Tibbon (c.1120–90)—the former having been published by B. Goldberg (Frankfort, 1856), the latter by W. Bacher (Leipzig, 1889). He also wrote several minor grammatical treatises (published by J. and H. Derenbourg, Paris, 1880), in which he defended his views and those of Hayyug against attacks and also amplified the grammatical treatises of the latter. Ibn Janach was also interested in philosophical questions and strenuously opposed the speculations of Ibn Gabirol and other men of the day on the relation of God to the world, on the ground that they led to unbelief. Consult Bacher, *Leben und Werke des Abulwalid Merwan ibn Ganach* (Leipzig, 1885).

IBN KHALDUN, ĭb'n kăl-dōōn′, ABD AL RAHMAN (1332–1406). The greatest of Arabic historians and one of the profoundest students of the philosophy of history in all ages. He was born at Tunis, of a family that had long lived at Seville, but originally came from Hadramaut. Among his ancestors were many eminent men, soldiers, administrators, philosophers, and writers. He early entered the public service, first in Tunis, then at Fez and Tlemcen. In 1362, under the Sultan of Granada, he carried on negotiations for peace with Pedro of Castile, in 1374 he was imprisoned for political reasons in a castle in northern Africa, where he spent his time in historical research, but was permitted to return to Tunis in 1378. Here he finished his famous introduction and wrote the history of the Berbers. In 1382 he set out for Mecca, but remained three years in Egypt, where he gained great favor with the Mameluke rulers and was appointed as cadi at Cairo. After his pilgrimage he returned to Egypt and frequently held judicial positions, though his opposition to the bribery, violence, and wrongdoing of powerful officials often deprived him of his place. In 1400 he was sent as an envoy to Timur, then besieging Damascus. Timur was deeply impressed with the knowledge and wisdom of the great historian. The last years of his life he spent in Egypt, and he held the position of cadi when he died. He was the first among the Arabs to leave the annalistic method, and the first historian to examine carefully the influence of the physical environment, the occupations it indicated for men, the food supply, the manner of life, the religious ideas, on the development of states and empires. He called attention to the differences between nomadic, agricultural, and city life, and pointed out the strength and weakness of each. The enthusiasm created by a universal religion appeared to him to be the sole force that could neutralize the tribal instincts and lead to empire building. Surveying the history of the Moslem world for more than seven centuries; observing the growth and decay of caliphates and sultanates; searching for the deeper-lying causes of progress and arrest; considering the religious ideas, sentiments, and institutions as factors in the building up of social and political organisms—he learned a new method of approach to all historical phenomena and realized himself that he had discovered a new science. His greatest contribution is the *Introduction to History*, edited by Quatremère (Paris, 1858) and translated into French by De Slane (Paris, 1862–68). In this voluminous work he lays down his fundamental conceptions of what the historian's task involves. Centuries passed before the Western world, ignorant of its existence, produced a work in this field worthy of a place beside it. A part of his *History of the Eastern Caliphate* was edited with a Latin translation by Tornberg under the title *Ibn Khalduni Narratio de Expeditionibus Francorum* (1840); and the *History of the Berbers* was edited and translated into French by De Slane (Paris, 1862); the publication of a new French translation, with introduction, was begun in 1914. Ibn Khaldun's style is often prolix and obscure; it is by the weight of his ideas, his critical insight, his questioning of the sources, and his breadth of view, rather than by literary power and elegance, that he evinced his mastery and holds the attention. Consult: Alfred von Kremer, *Ibn Khaldun und seine Kulturgeschichte der islamischer Völker* (Vienna, 1879); A. Müller, *Islam im Morgen und Abendland*, vol. ii (Leipzig, 1886); Carl Brockelmann, *Geschichte der*

arabischen Literatur, vol. ii (ib., 1893); R. A. Nicholson, *A History of Arabic Literature* (Cambridge, 1907); C. I. Huart, *Histoire des arabes* (Paris, 1912).

IBN KHALLIKAN, ĭb'n kă'lē-kăn', SHAMS AL-DIN AHMED (1211–82). An Arabic historian and biographer, born at Arbela, of the family of the Barmecides. He held important offices, both civil and educational, in Cairo and in Damascus, where he died. His most important work is a biographical dictionary, a very important source of knowledge of Arabian literature and its history from the eighth century to his own time. It is edited by Wüstenfeld (Göttingen, 1840–65) and translated into English by MacGuckin de Slane (4 vols., London, 1842–71).

IBN KUTAIBA, ĭb'n kōō-tä'ē-bȧ, ABDALLAH (828–c.889). An Arabic philologist and historian. He was born probably at Bagdad or Kufa and for some time held high judicial offices at Dînawār. Later he was a teacher in Bagdad and died there. Of his works, the most important are: *Adab al-Kâtib*, mainly philological and of great value on literary style and on antiquities, of which Sproull published a part as *An Extract from Ibn Koteiba's Adab al-Kâtib* (1877) and which was edited by Grünert (1900); a collection of biographies of the Arabian poets, published by De Goeje (Leyden, 1904); *Kâtib al-ma-Arif*, an outline of history for practical use, edited by Wüstenfeld (1850); and *Uyun al akhbâr*, a treatise upon government, war, nobility, character, science, friendship, food, women, and other topics, edited by Brockelmann (Weimar, 1898).

IBN ROSHD, ĭb'n rôsh't. See AVERROËS.

IBN SAYIGG, ĭb'n sī-ēg' See AVEMPACE.

IBN SINA, ĭb'n sē'nȧ. See AVICENNA.

IBN TOPHAIL, ĭb'n tō'fȧ-ēl. See ABU-BEKR MOHAMMED IBN TOPHAIL.

IBN TUMART, ĭb'n tōō'mȧrt, MOHAMMED (?–1128 A.D.). The founder of the sect of the Almohades (q.v.). He was born in the Deren Mountain in the Province of Sus in southwest Morocco, probably in the last third of the eleventh century. In 1107 he went to Cordova, then to Mecca for the pilgrimage, and to Bagdad, where he studied theology from the standpoint of the Asharite school. It is not probable that he came into personal contact with Ghazali (q.v.), but he was obviously influenced by him. After his return to Africa he preached at Tripolis and Bougie his doctrine of unity. He opposed both the anthropomorphic views of Allah held by many orthodox Moslems and the allegorical exegesis by which the references to Allah's mouth, face, hands, and feet were explained by the Mutazilites as denoting abstract qualities; emphasized the unity of the divine being, denounced as idolaters those Moslems who held the current opinions, and made the Almoravides responsible. His criticism of the government led to his expulsion from Bougie in 1118, and in 1121 he openly declared himself to be the Mahdi, as Ubaidallah, the founder of the Fatimid sect, had done before him. Essentially he remained a Sunnite, but of the Shiite doctrines he accepted that of the infallibility of the Imam. As Mahdi, he felt himself to be called by Allah to check unrighteousness and destroy error and therefore to wage war against the government that supported what he regarded as idolatry. After his first successes he made Tin Mallal his capital: the ruins of this city were discovered in 1901 by Edmond Doutte. He died probably, as Ibn Khaldun states, in 1128. Ibn Tumart seems to have maintained to the end consistently the ascetic mode of life that won for him so many adherents among the Berber tribes; his was evidently an intense religious nature; his works show an eager study of the Koran and the traditions, and also much sound practical wisdom. His destruction of wine jars and musical instruments may have been due to conviction. Nevertheless his sincerity has been seriously questioned, particularly on the ground that he is said to have claimed miraculous power (though this is not certain), that he declared himself a descendant of Ali, and that he used his theological definitions as a means of justifying a war upon fellow Moslems and as a cloak for his personal ambition. He has been compared with Abd al Wahhab; but whether the charges brought against his character can be fully sustained or not, he does not seem to have possessed the moral integrity and genuine prophetic fervor of the founder of the Wahabite sect. Consult: A. Müller, *Der Islam*, ii, 640 ff. (Berlin, 1887); Goldziher, *Mohammed ibn Toumert et la theologie de l'Islam dans le Nord de l'Afrique au XIe siècle*, which appeared as an Introduction to Luciani, *Le livre d'Ibn Toumert* (Algiers, 1903); A. Bel, *Les Benou Ghanya* (Paris, 1903); id., article "Almohaden," in *Enzyklopädie des Islam* (Leyden, 1910).

IBN ZOAR, ĭb'n zōr, or **IBN ZUHR**. See AVENZOAR.

IBOS, ē'bōz. Dominant negro people of the Niger Delta. Their number is estimated at about 3,000,000. Slaves from this region formerly were called Ibo. Their language is akin to the Ewe and the Tshi. Consult N. W. Thomas, *Anthropological Report on the Ibo-Speaking Peoples of Nigeria* (3 vols., London, 1913).

IBRAHIM, ē'brȧ-hēm' (1615–48). An Ottoman Sultan, third son of Ahmed I. On the death (1640) of his brother, Amurath IV, whose cruelty he had escaped by feigning madness, he came to the throne. In 1645 he attacked the island of Crete, which was then under the control of Venice, but did not live to finish this war, which was the result of an intrigue in his harem. His government was so cruel and the taxes so oppressive that in 1648 the Janizaries rebelled and strangled him.

IBRAHIM OU L'ILLUSTRE BASSA, ē'brȧ'ēm', ōō lē'lụs'tr' bȧ'sȧ'. A romance by Mademoiselle de Scudéry, originally published under the name of her brother (1641).

IBRAHIM PASHA, ē'brȧ-hēm' pȧ-shä' (1789–1848). An Egyptian general. He was the adopted son of Mehemet Ali (q.v.), Governor and subsequently Viceroy of Egypt, and was born at Kavala in the Province of Saloniki in European Turkey. In 1816 he took charge of the army in Arabia and in the course of three years overthrew the Wahhabi power in western Arabia and in Nejd. During the War of Greek Independence he was dispatched at the head of a powerful fleet and a finely disciplined land force to the aid of the Turks in the Morea. In 1825 he stormed Navarino and Tripolitza and in the following year took Missolonghi after a long siege. The destruction of the Turkish-Egyptian fleet in the harbor of Navarino (q.v.), Oct. 20, 1827, and the landing of a French force, led to the evacuation of the Morea by Ibrahim

in September of the following year. As the result of a dispute with the Pasha of Acre, an Egyptian army under Ibrahim invaded Syria in 1831, stormed Acre, May 27, 1832, and defeated the Turkish forces at Homs, Beilan, and Konieh. By the Treaty of Kutayah, May 6, 1833, Mehemet Ali received possession of Syria, while Ibrahim was made Governor of Cilicia. War with the Porte broke out again in 1839, and on June 24 of that year Ibrahim overwhelmed the Turkish army at Nisib, near the Euphrates. Only the interference of the Great Powers saved the Porte from the victorious armies of Mehemet Ali. Ibrahim was forced to evacuate Syria in 1840 and to return to Egypt, suffering the most severe hardships on his march through the desert. He died at Cairo, Nov. 10, 1848, after acting for some months as Regent during the incapacity of Mehemet Ali. His son, Ismail Pasha (q.v.), subsequently became Khedive of Egypt.

IBRAIL, ē-brā'ēl. See BRAÏLA.

IBSAMBUL, ĭp'sām-bo͞ol'. A noted group of ruins on the Nubian Nile. See ABU-SIMBEL.

IBSEN, ĭb'sĕn; *Dan.* ĭp'sĕn, HENRIK (1828–1906). A Norwegian dramatist, who strongly influenced German, French, English, Italian, and Scandinavian literatures. He was born at Skien, March 20, 1828. His great-grandmother was Scotch, his grandmother and mother German, his grandfather's grandfather Danish. They were a family of shipmasters. His father, Knud Ibsen, a merchant, met with reverses in Henrik's boyhood, which compelled the youth to pass six years (1836–42) in great poverty. In the latter years of this period he attended a scientific school at Skien, and late in 1843 he became an apothecary's apprentice at Grimstad, where he remained till 1849, writing a *Catilina*, a drama in four acts (published at Christiania in 1850 under the pseudonym Brynjolf Bjarme; revised ed., 1875), and some poems. He now sought the University of Christiania to study medicine, but in 1850 he was diverted by the successful production at Christiania of his *The Warrior's Mound* from academic studies to the drama. In 1851 he helped to found a short-lived weekly, *The Man* (later called *Andhrimner*), in which appeared his political satire, *Norma*, poems, and critiques. In November he was appointed by the violinist, Ole Bull, stage manager at Bergen, with leave of absence for five months, on a small stipend, to study the art he was to practice. These he spent in Copenhagen and Germany, writing the unsuccessful and unpublished *St. John's Night*. In 1856 *The Feast at Solhoug*, the first of his national dramas, was produced in the theatrical centres of Norway and Sweden. It won him enthusiastic applause and national renown. In 1857 he became director of the Norwegian Theatre at Christiania, but five years of his management reduced it to bankruptcy. Here were produced *Lady Inger of Ostrât*, a saga drama (1855); *The Warriors in Helgeland* (1857); and *Love's Comedy* (1862). In this period he wrote also the longest of his minor poems, *On the Mountain Plains* (1860), and the admirable seafaring romance *Terje Viken* (1861). In 1862, after the bankruptcy of the theatre, Ibsen accepted from the university small grants for researches in folklore and in 1863 petitioned the Storthing for the poet's pension (about $450). He received in 1863 a traveling scholarship and the pension in 1866. Meantime, embittered by delay and the political situation, he left for Rome in April, 1864, whence he sent back (1866) the social satire, *Brand*. In 1868 Ibsen left Rome for Dresden, where he remained till 1874. He visited Munich, Copenhagen, and Stockholm, and in 1869, on invitation of the Khedive, he was present at the festivities on the opening of the Suez Canal, where he wrote the poem *At Port Said*. After a voluntary exile of 10 years he went back to Norway. In 1891 Ibsen made Christiania his home. On his seventieth birthday the poet dramatist received gifts and world-wide greetings. A bronze statue of him was set outside the new National Theatre in September, 1899. He died at Christiania, May 23, 1906.

Besides the dramas above named, Ibsen's works include: *The Pretenders* (1864), an historical drama; *Brand* (1866) and *Peer Gynt* (1867), dramatic poems; *The League of Youth*, a political comedy (1869); the bulky twofold historical drama, *Emperor and Galilean* (1873); and, beginning with 1877, the yet better-known series of dramas that are more characteristic of what passes for Ibsenism: *The Pillars of Society* (1877); *A Doll's House* (1879); *Ghosts* (1881); *An Enemy of the People* (1882); *The Wild Duck* (1884); *Rosmersholm* (1886); *The Lady from the Sea* (1888); *Hedda Gabler* (1890); *The Master-Builder* (1892); *Little Eyolf* (1894); *John Gabriel Borkman* (1896); *When we Dead Awaken* (1900). Ibsen's dramatic work had been at first romantic. This phase culminated in *The Feast at Solhoug*. Then it was historic, but still romantic, up to the *Warriors in Helgeland*. Next the psychologic interest becomes prominent, and with it a tendency to social satire very marked in *Love's Comedy*, a masterpiece of swift action and of biting irony. The dramas from 1864 to 1867 are polemically national rather than social. *The League of Youth* marks the transition from political to social interests. From this time on Ibsen is a pathologist of social ills, dealing with conditions which are universal to modern life and thus winning an ever-widening cosmopolitan audience. The best edition of Ibsen in English is *Collected Works* (13 vols., New York and London, 1909–12), revised, edited, and in part translated, by William Archer, the English dramatic critic. William Archer, be it said, began as early as 1878 to be Ibsen's apologist, and he continued his stout and victorious champion. He had for years to face a band of critics as hidebound as the critics in Ibsen's own country had shown themselves, whose unreasoned violence and virulence were amazing. English dramatic literature is deep in the debt of Mr. Archer for the new inspiration and new point of view, giving rise to a new school of dramatists, that followed the ultimate acceptance of Ibsen's work in England; as it is in the debt of Bernard Shaw, whose free-lance championship of Ibsen, in *The Quintessence of Ibsenism* (1893; and, completed to Ibsen's death, 1913) and in a shower of brilliant dramatic criticisms, put him in the front rank of the champions of the Scandinavian drama of ideas who were soon to triumph. By some Ibsen's work was assailed as immoral, cynical, pessimistic, unfit to be seen or read; by others it was hailed as a new gospel of truth and emancipation. It is not wholly either. The plays are studies in human responsibility under modern social conditions, which in many points Ibsen considers danger-

ously diseased and as threatening the whole body with a gangrene. So he has become the poet of protest, the unveiler of sophistries, the scourger of hypocrisies. He writes of vice, but it is with loathing. He lays bare the cause of evils, but leaves it to others to prescribe the remedy.

Leaving the moral question aside, these social dramas mark a new stage in the evolution of dramatic art. They are dramas of descending, not ascending action—not of preludes, but of consequences. The plays are thoroughly realistic, absolutely unconventional. Their dialogues are so natural as to give the illusion of real though fascinating conversation which the playwright allows his audience to overhear. It would be hard to match them in any literature. Hence their power has been felt throughout the dramatic and literary world, while the realistic dramas of the French naturalistic school, of the Goncourts and Zola, have been regarded with languid curiosity as the products of artistic theory. Ibsen's influence has not been so widespread in the United States, however, as in Europe. The editions of his works are very many, but the final and standard text is found in his *Complete Works* (*Samlede Verker*), with bibliography by J. B. Halvorsen (10 vols., Copenhagen, 1898–1902). Ibsen's writings are translated into most languages of the civilized world. For Ibsen's life and writings, consult: Brandes, *Ibsen; Björnson* (New York, 1882); Wicksteed, *Four Lectures on Ibsen* (ib., 1892); Jaeger, *Henrik Ibsen: A Critical Biography* (Chicago, 1894); Boyesen, *Commentary on the Writings of Henrik Ibsen* (New York, 1894); G. Grau, *Henrik Ibsen, 1828–98* (Bergen, 1898); Archer, "The Real Ibsen," in *International Monthly* (London, 1901); *Letters*, translated by Laurvik and Morison (New York, 1905); Wagner, *Henrik Ibsen* (Copenhagen, 1907); E. Gosse, *Life of Henrik Ibsen* (London, 1908); J. Bing, *Henrik Ibsen* (Copenhagen, 1909); *Efterladte Skrifter* (3 vols., Christiania, 1909); L. C. Nielsen, *Mindeskrift over Ibsen's Forlagger, Fr. Hegel*, with letters (Copenhagen, 1909; rev. ed., 1913); Shaw, *Quintessence of Ibsenism* (New York, 1909); O. Heller, *Ibsen: Plays and Problems* (Boston, 1912); H. Rose, *Ibsen: Poet, Mystic, and Dramatist* (New York, 1913). Consult also the bibliographical appendix to Ibsen's *Speeches and New Letters* (Boston, 1910).

The German Ibsen literature, native and translated, is very extensive; among the more noteworthy and recent contributions to it are: *Sämtliche Werke*, by Brandes, Schlenther, Elias, and Koht, with letters (10 vols., Berlin, 1898–1904); Brahm, *H. Ibsen* (ib., 1887); Andreas-Salomé, *Ibsens Frauengestalten* (ib., 1892); Woerner, *Ibsens Jugenddramen* (Munich, 1895), and *H. Ibsen* (2 vols., Munich, 1900–10; 2d ed., 1911); Jäger, *H. Ibsen* (Swedish, Christiania, 1892; German, Dresden, 1897); Von Haustein, *Ibsen als Idealist* (Leipzig, 1897); Garde, *Der Grundgedanke in Ibsens Dichtung*, translated by Küchler (Leipzig, 1898); Brandes, *H. Ibsen* (Copenhagen, 1898); Reich, *Ibsens Dramen*, (6th ed., Dresden, 1908); Litzmann, *Ibsens Dramen* (Hamburg, 1901).

IBSEN, Sigurd (1859–). A Norwegian statesman and journalist, born at Christiania, a son of the dramatist Henrik Ibsen. From 1864 to 1884 he lived abroad with his parents, was educated at Rome and Munich, entered the diplomatic service in 1885, acted as attaché at Stockholm, Washington, and Vienna, but retired in 1889. He was on the staff of the *Nyt Tidskrift* in 1892–95 and in 1898–99 edited the *Ringeren*. In the latter year he received a post in the Ministry of the Interior, in 1902 became a member of the State Council in Session at Stockholm, and in October, 1903, was appointed Minister of State at Stockholm in the Hagerup cabinet, going out of office in March, 1905. He was in favor of a friendly adjustment of the differences between Sweden and Norway. He married a daughter of Björnstjerne Björnson (q.v.). In 1906 he was appointed a member of The Hague Tribunal and in 1912 was reappointed. He wrote *Menneskelig Kvintessens*, essays (1911; Eng. trans., New York, 1912), and a drama, *Robert Frank* (1914; Ger. and Eng. trans., 1914).

IBYCUS, ĭb′ĭ-kŭs (Lat., from Gk. Ἴβυκος, *Ibykos*). A Greek lyric poet of the sixth century B.C., born at Rhegium in Italy. He lived the life of a wandering minstrel and passed some time at the court of Polycrates, the tyrant of Samos. The story of his death near Corinth, at the hands of robbers, and of the detection of his murderers by means of a flock of cranes (see Plutarch, *De Garrulitate*, xiv), which has been so beautifully told by Schiller in *Die Kraniche des Ibykus*, is based on a similarity between the name of the poet and the Greek word ἴβυξ (a crane). The poet, when dying, called on a flock of cranes to avenge his death; later, one of the robbers, when they were all in the theatre at Corinth, seeing cranes hovering overhead, betrayed himself and his comrades by crying, "Behold the avengers of Ibycus." Of his erotic poems, which celebrated the charms of beautiful lads and lasses, the extant fragments are published by Schneidewin, *Ibyci Rhegini Carminum Reliquiæ* (Göttingen, 1833), and in Bergk, *Poetæ Lyrici Græci*, iii (Leipzig, 1882). Consult also Smyth, *Greek Melic Poets* (London, 1900).

ICA, ē′kä. A maritime department of Peru, bounded by the departments of Lima and Huancavelica on the north, Ayacucho on the east, Arequipa on the southeast, and the Pacific on the southwest (Map: Colombia, B 6). Its area is 8620 square miles. The surface is of varied formation. The eastern part is mountainous, the western is lower and traversed by ridges of low hills. The climate is hot and dry, and the soil, with the exception of the valleys, is thin. The vine and sugar cane are cultivated extensively; corn, cotton, and indigo are also raised. The mineral wealth consists of gold, copper, and iron. Wine and alcohol are produced, and sugar refining is carried on. The population was officially estimated, in 1896, at 90,962. Capital, Ica.

ICA. The capital of the Peruvian department of the same name, situated on the river Ica, 46 miles by rail from Pisco on the coast (Map: Colombia, B 6). It manufactures wine and brandy. It was founded in 1563 and has suffered greatly from earthquakes. Pop., estimated at 10,000.

IÇÁ, ē-sä′, or **PUTUMAYO,** pōō′tōō-mä′yō. An important tributary of the Amazon. It rises in the Colombian Andes and flows southeasterly in a very tortuous course, joining the Amazon near San Antonio (Map: Colombia, C 4). Its total length is about 1000 miles, and it is navigable during the rainy season for nearly 900 miles. The region through which it flows

is very sparsely inhabited and covered mostly with thick forests. The Içá was partly explored in 1878–79. The territory along the middle course of the Putumayo is in dispute between Peru and Colombia. Here occurred the abuses against the Indians employed in rubber gathering, which were brought to light in 1911–12.

ICARIA, ī-kā′rĭ-ȧ (Lat., from Gk. *Ἰκαρία, Ikaria*). A deme of Attica, where excavations were carried on by the American School at Athens in 1888, when many interesting remains were found. Icaria is noted as the birthplace of Thespis, and as the spot to which legend assigns the introduction of wine making and of the cult of Dionysus by the god himself.

ICARIA. An island of the Ægean. See NICARIA.

ICARIANS, ī-kā′rĭ-*anz*. Members of a communistic society, founded by Cabet (q.v.) to realize the ideals set forth in his romance *Voyage en Icarie*. During the years preceding the revolution of 1848 communistic doctrines had a wide following in France; and when, in 1847, Cabet announced the acquisition of land in Texas, a large number of persons agreed to emigrate with him to found a settlement there. In 1848, 69 persons set out for the colony, but were unable to endure the climate and returned after a few months to New Orleans, where they were joined by Cabet with 400 more. Early the following year Cabet, with about 300 followers, emigrated to Nauvoo, Ill., then recently deserted by the Mormons, where the colony was moderately prosperous for a few years, undertaking agriculture as well as trades and manufactures. Dissensions arose, and in 1856 Cabet was expelled together with those members of the community who supported him. In 1860 financial difficulties rendered it necessary for the remaining Icarians to abandon Nauvoo, and 35 of them founded a new settlement in western Iowa. For 20 years they grew in wealth and numbers; but in 1880 the community split into two factions, the Young and the Old Party. The former soon broke up; the latter existed until 1895, when it, too, was dissolved. In 1881 a few members of the Iowa community went to California, where they established Icaria Speranza—a society, however, more like a business corporation than a communistic settlement.

The organization of the Icarian communities was democratic. Directors were elected, but they could only execute the orders of the whole body. The members lived in little houses around a central hall where they took their meals in common. The Icarian settlements were the most successful of the communistic experiments of the early nineteenth century. Consult Shaw, *Icaria* (New York, 1884), and Lux, *Etienne Cabet und der ikarische Kommunismus* (Stuttgart, 1894).

ICA′RIUS (Lat. from Gk. *Ἰκάριος, Ikarios*). 1. In Greek mythology, an Athenian to whom Dionysus taught the cultivation of the vine. After him the deme Icaria (q.v.) was named. 2. The father of Penelope, wife of Odysseus.

IC′ARUS. See DÆDALUS.

ICAZBALCETA, ē′kȧs-bȧl-sā′tȧ, JOAQUIN GARCIA (1825–94). A Mexican author. He was born in the city of Mexico. His first literary work was the contribution of biographical sketches to the *Diccionario universal de historia y geografía;* and he afterward edited and published a *Colección de documentos para la historia de México* (1858–66), *Historia eclesiástica indiana, obra escrita á fines del siglo XVI por Francisco Gerónimo Mendieta de la órden de San Francisco* (1870), and *Nueva colección de documentos para la historia de México* (1886–92). He also prepared the *Bibliografía Méxicana del siglo XVI*, a monumental work, and wrote *Don Fray Juan de Zumarraga* (1881), a biography of the first Bishop and Archbishop of Mexico.

ICE (AS., OHG. *īs*, Ger. *Eis*). Water in the solid state, usually crystallized in the hexagonal system. Ordinarily the crystalline structure of a block of ice is not apparent, owing to the close contact and perfectly regular arrangement of the crystals. But when a piece of ice is exposed to radiation from any luminous source, as the sun, a glowing fire, a gas or oil flame, disintegration gradually takes place, and by the use of a lens numerous small crystals may be seen studding the interior of the block; as the heat continues, these crystals expand and finally assume the shape of six-rayed stars of exquisite beauty. (See SNOW.) The freezing point of pure water is marked 0° on the Centigrade and Réaumur scales, and 32° on the Fahrenheit scale. The influence of changes of pressure on the freezing point is so slight that for all ordinary atmospheric pressures the freezing point of pure water may be considered a constant quantity. Great pressures, however, have the effect of lowering the freezing point very considerably. Thus, according to Tammann, under a pressure of 615 kilograms per square centimeter water freezes at −5° C. (+23° F.); and under a pressure of 1238 kilograms per square centimeter it freezes at −10° C. (+14° F.); and still greater pressure lowers the freezing point still further. (See MELTING POINT.) This phenomenon is connected with the fact that ordinary ice is lighter than water. In nearly all other cases the solid form of a substance is heavier than the liquid form of the same substance, and in all such cases pressure *raises* the freezing point. Even in the case of water it is only ordinary ice, or, as it is denoted, Ice I, that is lighter than water. In recent years Tammann and Bridgman have obtained several new modifications of solid water, called Ice II, Ice III, etc., whose specific gravity is greater than that of liquid water and whose melting point therefore *rises* with increase of pressure. These new modifications of ice can exist only at low temperatures and under high pressures. See PHASE RULE.

By cooling pure and clear water cautiously, it may be "undercooled," i.e., it may, under *ordinary* pressure, be obtained in the liquid state at temperatures several degrees below its normal freezing point. But this is quite different from the effect of high pressures; the state of "undercooled" water is just as unstable as the state of a "supersaturated" solution, and a slight disturbance may cause the whole mass to freeze very rapidly, just as it may cause rapid crystallization to take place in a supersaturated solution. The lowering of the freezing point by pressure has furnished one of the theories explaining the motion of glaciers. This "regelation theory" is illustrated by the following phenomenon: If a wire holding heavy weights at its ends is thrown over a block of ordinary ice, it gradually cuts its way through the block, and yet the latter remains entire. Along the line where the wire presses upon the block the melting point is lowered, and hence the ice melts

and allows the wire to descend through a minute distance; the water immediately above the wire then freezes, because it is freed from pressure, and next the ice immediately below the wire melts, allowing the wire to descend a little farther. Thus melting and almost immediate regelation proceed until the wire has cut through the block.

The freezing point of water, as that of any other liquid, is considerably lowered by dissolving in it substances of any kind, and sea water, on account of its salt, is found to freeze at −2.5° to −3.0° C. (27.5° to 26.6° F.). The solid separating out, under ordinary circumstances, from freezing sea water is not a mixture of ice and salt, but pure ice, and this fact has been utilized in two ways: (1) for concentrating brine in the manufacture of salt; (2) for obtaining sweet drinking water from the salt water of the sea.

Ice, having a lower specific gravity than water, floats on its surface. The specific gravity of ordinary ice at 0° C. is 0.918. The specific heat of ice, i.e., the amount of heat required to raise its temperature 1° C., is much less than that of water in the liquid state; within 30° C. below the freezing point it is very near one-half, and at lower temperatures it is even somewhat less than one-half, that of water. In the process of melting, ice absorbs more heat than any other solid (see FREEZING MIXTURES), more than 80 calories being required to melt 1 gram of ice; the same amount of heat would raise the temperature of the gram of melted water to 80° C. (176° F.).

Arctic Ice. The entire Arctic Ocean is practically covered by permanent heavy ice, or ice pack, throughout the year, though the heat of summer reduces the thickness of the main body of the pack and so facilitates the formation of leads, or open water spaces. While the average thickness of the ice cannot exceed 6 or 7 feet, yet through pressure and underrunning it attains or exceeds 30 feet in places. The average maximum thickness of sea ice in Arctic America, as determined from observations of 18 years, at 15 different and widely separated land stations, was but 76 inches. Moss and Greely have shown conclusively that the very heavy, thick floes of the pack, originally thought to be of oceanic origin, are detached parts of glaciers. Separate heavy floes, colliding under great force, break up their edge into small fragments called *rubble*, which often form enormous and extended heaps along the floe edge and are known as *pressure ridges*. The sea ice forming against the land, and adhering thereto despite the rise and fall of the main sea floe with the tides, is called an *ice foot*.

As there are 1,000,000 square miles of unknown areas within the confines of the Arctic Ocean, it is impossible to fully describe the movements of the whole of the oceanic pack. It is known, however, that the pack to the north of Bering Strait, through the action of the currents and prevailing winds, drifts west-northwesterly to the neighborhood of the pole north of the Franz Josef Archipelago, whence the drift turns southwesterly towards Jan Mayen. Except the discharge of a large and yet very inconsiderable amount of Arctic ice into the Atlantic Ocean, through the Greenland Sea, no ice of any amount emerges from the Arctic Ocean. The pack of Baffin Bay is in large degree stationary, though it divides in summer into three distinct masses, known as the North, the Middle, and the South Ice; the last-named, extending into Davis Strait, becomes navigable in late summer. The ice of Kara Sea similarly divides, but irregularly and with less possibility of navigation. The pack of Barents Sea, affected by a northeasterly current, tends to coalesce with the main pack of the Arctic Ocean. The southerly limit of the Arctic sea ice trends south-southwesterly from about 65° of north latitude, east of Iceland, to the forty-fifth parallel on the Banks of Newfoundland. Along the Arctic coasts of America, Asia, and Europe, there are formed in summer wide shore belts of ice-free sea, varying largely in size according to the season; they are largely due to the influence of the fresh-water discharge from continental rivers.

Antarctic Ice. South-polar ice conditions strikingly contrast with those of the Arctic zone. The very extended Arctic Ocean is permanently covered with ice, of which 99 per cent remains in the vicinity of its formation. In the south the vast continent of Antarctica, with its periphery of 10,000 miles or more, is fringed with a belt of annual formation of sea ice, several hundred miles wide in its northerly extensions. Usually the Antarctic pack drifts northerly, leaving a wide belt of nearly ice-free sea along the continental shelf. The pack does not attain the thickness of that of the Arctic Ocean. It drifts largely into the Temperate zone and disintegrates freely to the north of the Antarctic circle. While its northern limits vary with the seasons and are not definitely determined save for small areas, it has been known to reach the forty-eighth degree of south latitude before entirely melting.

Icebergs. This name is given to sections of glaciers which have become detached from the main body of glacial ice after its front, or snout, has reached a sea or lake. Fresh-water bergs are of rare occurrence and of inferior size. Main interest attaches to oceanic icebergs, which have their birth as offshoots of the glacial caps of lands of considerable area. Such Arctic lands are Greenland, Northeast Land, portions of Grinnell Land, of Spitzbergen, and of Jan Mayen, which are productive of bergs in the order named. To these Greely, supported by Harris, adds a hypothetical land to the northwest of Parry Archipelago. Of the regions named, Greenland is preëminent for the number and the size of the bergs which drift into Atlantic waters. While the most extensive and remarkable of the *live* glaciers—those terminating in the sea—are those debouching into the Greenland Sea from the east Greenland coast, yet the conditions of currents and of winds are such that very few of these icebergs reach the open Atlantic Ocean. The greater number of the bergs of the Atlantic come from Disco Bay, with its wonderful and contributing fiords of Jacobshavn, Torsutakak, and Great Karajak; then follow in importance Uminak Fiord, 71° N., and Angpadlartok (near Upernivik), 73° N. The glaciers of Melville Bay, Kane Sea, Smith Sound, and east Greenland (by drift around Cape Farewell and thence north) together add somewhat to the long procession of icebergs which, collected by currents in about 73° N., skirt the western shores of Baffin Bay in their southward march into the Atlantic waters adjacent to Newfoundland.

The Greenland bergs are occasionally of great

size. Large icebergs tower from 100 to 250 feet above the ocean, which makes their entire height from 700 feet to about 1600, as about one-seventh is above water. Dr. Hayes reports one as rising over 300 feet above the sea, but it was not carefully measured. In Kennedy Channel Greely followed a floeberg (a low tabular iceberg) which was 15 miles long, over 100 feet thick, and of unknown breadth. In the Atlantic Ocean the southern limit of icebergs extends from lat. 60°, southeast of Iceland, in a south-southwesterly direction to about 45° N., off the Banks of Newfoundland. In 1842 an Atlantic berg, it is said, was recorded in 38° 40′ N. lat.

It is in the south-polar regions, however, that are found icebergs in the greatest numbers and of maximum size. Their annual accretions must run into hundreds of thousands, for glacial-capped Antarctica, with its more than 10,000 miles of icy coasts, does not, so far as is known, present 100 consecutive miles of shore free from discharging glaciers. Besides the thousands of miles of live glaciers on land, another very prolific source of bergs is Ross Barrier. This is an oceanic ice-cap, extending through more than 28° of longitude, nearly 600 miles, with a sea face of solid ice rising from 80 to 250 feet above the ocean. The Antarctic icebergs are almost always tabular, flat-topped, with perpendicular sides, which often rise 200 feet or more above the water. Their size is more astounding than their height. Dr. Bruce observed one more than 30 miles in length and of unknown breadth. Two different ships reported another berg, which was more than 40 miles in length, and which must have had more than 1000 miles of surface area. Most of these bergs drift north and melt between lat. 40° and 50° S. They are frequently seen in the neighborhood of Cape of Good Hope, and one was reported in lat. 26° 30′ N., long. 30° 36′ W., within a few hundred miles of Rio de Janeiro.

Bibliography. H. Rink, *Danish Greenland* (London, 1877); John Tyndall, *Forms of Water in Clouds and Rivers, Ice and Glaciers* (New York, 1880); A. W. Greely, *Three Years of Arctic Service*, vol. ii (ib., 1886); H. C. Russell, *Icebergs in the Southern Ocean* (Sydney, 1897); William Coles-Finch, *Water: Its Origin and Use* (New York, 1909). See WATER; MELTING POINT; FREEZING POINT; PHASE RULE; GLACIER; REFRIGERATION.

ICE, LAW OF. After ice has been harvested it is personalty and is subject to the rules of law governing that form of property. Before it is harvested it is deemed realty for most purposes, although a contract for the sale of all the ice on a certain pond is treated as a contract for the sale of a chattel and not of an interest in real estate.

If the land beneath a particular body of water, whether stream or lake, is subject to private ownership, the ice that forms on the water belongs to the owner of such land, and he has exclusive authority to gather and dispose of it. Hence a lease of the land or a conveyance of the fee carries to the tenant or to the grantee the ownership of the ice which forms during the term of the lease, or which exists at the date of the conveyance. It is in the nature of an accession to the land, being an increment arising from a formation over it, and is a part of the real estate under the rule that the ownership thereof extends indefinitely upward from the soil. The landowner may grant to another the right to take ice from private waters, as a profit *à prendre*, i.e., as a right to take the products or proceeds of land.

A riparian owner's right to ice on navigable rivers depends upon his ownership of the land under them. In States where the fee of such rivers is vested in the public the adjoining landowner has no title to the ice, and it belongs to the first appropriator. In other States, where riparian owners are accorded title to the land under navigable waters, they can maintain trespass against any one taking the ice without their consent. At times ice-covered streams or lakes are used as highways of travel, and the question has arisen whether the harvesting of ice upon such a thoroughfare amounts to a nuisance, as an unlawful obstruction to travel. The courts have given this answer: In the absence of legislation on the subject, the right of travel and the right of harvesting ice on navigable waters are public and are to be exercised reasonably. What is a reasonable use of either right depends upon the relative benefits to the community from its exercise. If the privilege of harvesting ice is deemed of greater importance than that of traveling upon it, the latter cannot be set up to prevent or abridge the exercise of the former.

The right to harvest ice forming upon public waters is not private, but public or common. Any person may enter such ice fields and take what he pleases, so long as he does not unlawfully interfere with the like right of others. What acts amount to an appropriation of ice on public waters is a question upon which the courts are not agreed. One view is that an appropriation is made by marking and staking off a plot of ice and preparing the surface for cutting. The other view is that a person does not gain any property rights in such a plot of ice until he has actually reduced it to possession. The subject is regulated in some States by statute. Consult: Gould, *The Law of Waters, Including Riparian Rights* (Chicago, 1900); Coulson and Forbes, *The Law Relating to Waters* (London, 1902); and the statutes of the various States.

ICE AGE. See GLACIAL PERIOD; PLEISTOCENE PERIOD.

ICE BEAR. The polar bear. See BEAR.

ICE'BERG'. See ICE.

ICE-BREAKING STEAMER. A vessel used for keeping open a navigable passage through ice. Such vessels are much used on the Great Lakes of the United States, where they are usually adapted for carrying cargoes or railway cars. They are very heavily built to stand the shock of ramming the ice or of running up on it at the bow and breaking it by reason of their weight. (See FERRY.) During many years the problem of constructing such vessels was studied by Admiral Makaroff, of the Russian navy, and several vessels were built from his designs. The largest of these was built in England in 1898–99, and is called the *Yermak*. She is of 8000 tons' displacement and has four screws, one under the overhanging bow to suck down the ice, so that the bow will ride over it and, descending, crush it. This screw also creates a current which drives the broken ice astern. The stern is recessed to receive the bow of a vessel following her through the channel which she makes. Her length is 305 feet; beam, 71 feet; and draft, 25

feet. The coal capacity is very great—3000 tons—as it was intended to use her in Arctic exploration; she spent some months in the Arctic Ocean during the summer of 1900 and was very successful in breaking her way through ice fields in harbors; but in 1901, against the heavy ice of the polar pack, she proved inefficient. During the past year (1914–15) heavy gyroscopes have been mounted on ice-breaking steamers for the purpose of making them roll and thereby add to their efficiency. The preliminary experiments have been successful, and it is likely that ice breakers will hereafter be fitted with devices of this kind. See FERRY.

ICE CAVE. Any natural formation of ice in a cave or crevice. The walls of caves often become cooled to such a point by the infiltration of cold air in winter or during the frosty nights of spring and autumn that the percolating waters rapidly freeze. The ice usually disappears for a few weeks in September. The most celebrated ice cave in the world is that of Dobschau (Dobsina) in Hungary, situated in the Carpathians, at an elevation of about 2700 feet. Consult Balch, *Glacières or Freezing Caverns* (Philadelphia, 1900).

ICE COLUMNS. See FROST.

ICE GULL. A name given to several gulls encountered by sailors in icy regions, most properly perhaps to Ross's gull. See GULL.

ICE INDUSTRY, THE. The ice industry is divided into two branches, in accordance with the origin of the ice itself. *Natural ice* is cut in winter from rivers, lakes, and ponds, stored in ice houses, and distributed to consumers as needed. Manufactured ice—or, as it is more commonly called, *artificial ice*—is produced when and where required and is generally distributed with comparatively little intervening storage. The collection and preservation of ice and snow, on a scale which was small indeed as compared with the operations of the present day, appear to have been practiced from early times by most civilized nations having the natural products within their reach. Where neither snow nor ice was provided by nature, various means of artificial production have been practiced in a small way for centuries; such as the exposure of water in porous receptacles, and packing common or some other kind of salt about vessels containing water. But the modern ice industry began in the United States early in the nineteenth century, with the transportation of ice in sailing ships from cold northern to warm southern ports; and the production and sale of manufactured ice has attained large proportions and made an ample and cheap ice supply quite independent of local temperatures.

Natural Ice. It is said that both the Greeks and the Romans packed snow in deep underground pits, and that Nero established ice houses in Rome. At the end of the seventeenth century dealers in ice and snow were quite common in France. In 1799 a cargo of ice, cut from a pond near Canal Street in New York City, was shipped to Charleston, S. C. This may be considered as of little moment; but in the winter of 1805–06 Frederick Tudor, of Boston, Mass., entered the ice field in good earnest and after some heavy losses succeeded in establishing an export trade in ice which was the beginning of the modern industry. Tudor's first ice cargo, of 130 tons, was shipped from Boston to Martinique in the winter of 1805–06, but though the ice reached its destination in safety, the venture resulted in a loss. Two years later a shipment of 240 tons to Havana, Cuba, also resulted in a loss to Tudor. A monopoly of the ice trade with the British West Indies was secured by Tudor about 1816, and a like privilege from Spain in 1815–16. From 1815 to 1820 the same merchant extended his ice trade to Charleston, S. C., Savannah, Ga., and New Orleans, La. Others followed his example, until in 1855 ice exports from the United States, according to statistics of the Treasury Department, amounted to 41,117 tons, valued at $190,793. These exports increased to 68,802 tons, valued at $267,702, in 1870, after which time they decreased until in 1900 the tonnage was 13,720 and its value $29,501; while in 1913, 7979 tons, valued at $31,751, were exported. The foreign ice trade was soon outstripped by the domestic commerce in what had long since changed from a luxury to a necessity. Published figures for the harvest of Maine and Hudson River ice showed that those two sources alone produced yearly quantities ranging from 2,226,000 tons in 1880 to 5,626,430 tons in 1899. The capacity of Hudson River district ice houses in 1902 reached a maximum, being placed at 4,833,100 tons, of which 4,606,800 tons actually were housed; but this capacity declined steadily and in 1914 was 3,226,086 tons, while 1,938,149 tons actually were harvested. This total capacity in recent years has been rarely utilized, the deficiency in the amount of ice housed sometimes reaching as much as 65.6 per cent (1913). The house capacity of the natural-ice business in the United States in 1914 was estimated at 30,000,000 tons, valued at $75,000,000, and the real estate valued at $60,000,000. It should be remembered, further, that in the aggregate the additional harvest for private purposes is immense.

Harvesting Ice is a comparatively simple operation, or series of operations, the main features of which are as follows: The snow, if any, lying on the ice is removed by scrapers, as is also any contamination of the top surface. In case there is an upper layer of snow ice, it is loosened by field planes and then removed. Markers are next used to outline the blocks, which are followed by plows, which cut the grooves still deeper. The scrapers, planes, markers, and plows are drawn by horses or mules. The parallel grooves, it should be understood, are first cut in one direction, then another series is cut at right angles to the first. The final grooves extend nearly through the ice, so that the cakes may readily be pried apart by means of suitable tools. When the latter operation has been effected, the cakes are floated to the shore through channels provided for the purpose, and there elevators, generally inclined, lift the ice to the ice houses. Dirty and broken cakes are rejected, and in some houses the cakes are planed to nearly uniform thickness on the elevators. The cakes are packed close together, with sawdust or other insulating material above the final layer, and between the ice and the outer walls of the ice house, the idea being to eliminate melting as much as possible. The ice houses are generally tall structures, with outer walls composed of one to three compartments filled with insulating materials. Once the most approved plan was to have an outer compartment in which the air was allowed to circulate. An inner or dead-air compartment is usually found, but some authorities recommend that this

also should be packed with sawdust or shavings as well as a central space packed tightly with the same material. Now the elimination of air is considered desirable, and the ice should be piled very high. The bottom of the ice house

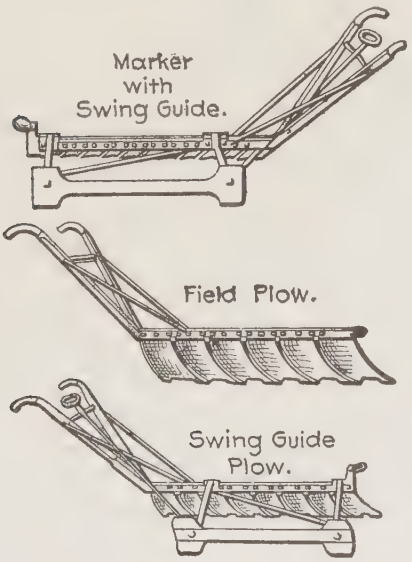

Fig. 1. ICE TOOLS

should have tight and well-constructed foundations going down below frost and must be well drained, while the roof should be not only watertight but as well insulated as the walls, and movable covers for the ice are also recommended. Recent experiments have shown that an efficient and economical ice house that is also fireproof may be made of glazed terra-cotta tile in two walls 10 inches apart with mineral wool or cork between. Railway sidings or docks, or both, afford means for shipping the ice to dis-

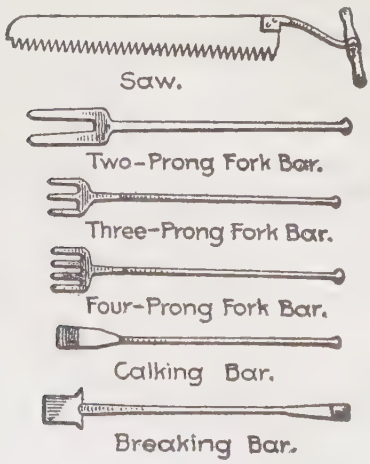

Fig. 2. ICE TOOLS.

tributing centres. Specially constructed cars, with lined sides and bottoms, are used where ice is to be shipped long distances, and in the South the cakes are carefully packed in addition.

Besides the ice tools already named (snow scraper, ice plane, marker, and plow) the following may be mentioned: augers and tapping axes, for inspecting the ice and for draining it of surface water; saws; forked and pronged and chisel and needle bars, for separating the cakes after the markers and plows have done their work; trimmer bars, for squaring the cakes; hooks, grapples, and forks, for pushing them to the elevator; chain scoop nets and sieve shovels, for removing slush ice from the channels; hoisting, drag, and edging tongs, adzes and long-handled chisels, for packing the ice in the

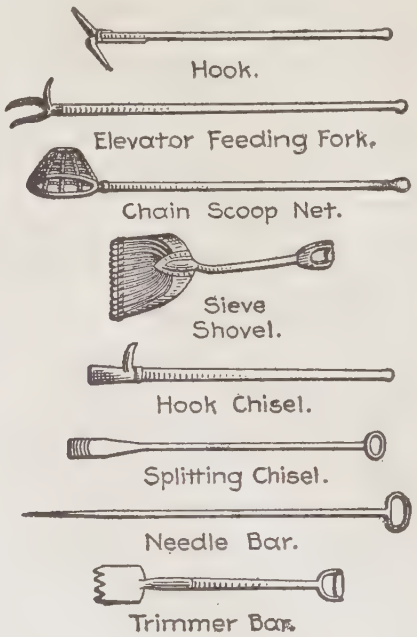

Fig. 3. ICE TOOLS.

houses; saws and bars, for loosening the ice preparatory to shipment from the houses; and, finally, delivery wagons, tongs, saws, axes, shaves, and scales.

Artificial Ice. A sketch of the development of ice-making apparatus and descriptions of the principles and practices involved will be found under REFRIGERATION. The following figures regarding the growth of the industry in this country are taken from the section on the Manufactured Ice Industry in the Thirteenth Census of the United States (Manufactures, 1913). The first ice factory of importance in this country was erected at New Orleans in 1866. In 1870 three other factories located in Southern States were included in the census returns. The number of establishments reported increased to 35 in 1879, 222 in 1889, 775 in 1899, and 2004 in 1909. The total capital invested in these 2004 plants was $118,641,538, and the value of the products, which aggregated 12,647,949 tons, was $42,953,055 against $13,874,513 in 1899. An unofficial estimate for 1914 places the number of ice factories at 3500, their yearly output at 18,000,000 tons, valued at $45,000,000, their daily capacity 135,000 tons, and the total investment some $150,000,000.

These figures, like those previously given for natural ice, do not include the hundreds of plants making ice exclusively for their own use, such as breweries and cold-storage houses. Of

the 2004 plants reported in 1909, 1616 used the compressor and 357 the absorption system (see REFRIGERATION), while 31 used both systems. In 1899 the total product of the 775 factories was 4,294,439 tons, of which 4,139,764 tons, or 96.4 per cent, were can ice and only 154,675 tons plate ice. In 1909 the product of the 2004 establishments was 12,647,949 tons, of which 11,671,547 tons (92.3 per cent) were can ice and 976,402 tons (7.7 per cent) were plate ice. The Middle States produced more ice than any other group, the amount being 1,574,980 tons, as compared with 1,414,158 tons for the Southern States, and only 40,059 tons for the New England States. The average value of the ice at the plants for the whole country in 1899 was $3.11 per ton for can ice and $2.85 for plate ice. In 1909 the average value was $3.15, ranging from $2.33 in Missouri to $4.70 in Texas, $5.26 in Oregon, and $6.08 in Idaho. As a rule, the Southern States now depend wholly upon the manufactured product for their ice supply. Texas in 1909 ranked second among the States in the value of the product. As one goes farther north, natural ice comes more and more into competition with the manufactured article, until at the extreme north it actually or practically displaces the latter, no establishments for its manufacture, e.g., being reported to the Thirteenth Census for Maine, New Hampshire, Minnesota, North Dakota, South Dakota, Montana, or Wyoming. But the use of manufactured ice has increased rapidly of late and is continually extending towards the north.

Sanitary Aspects. The sanitary quality of ice supplies depends chiefly upon the presence or absence of disease germs, chiefly those of typhoid fever, in the original water, and upon the effect of freezing upon such germs. In addition there is the possibility that manufactured ice may become contaminated during the freezing process by sick or careless workmen, and that any ice may be fouled while it is being distributed to consumers. Proper washing of ice before delivery and domestic use, care not to bring ice in contact with food or water, and proper supervision of ice factories, would go far towards preventing danger from what may be termed incidental contamination. The water from which artificial ice is made is frequently distilled or filtered, or both. In general, it may be said that artificial ice should be made from none but naturally pure water or from that which has been purified, and that natural ice should not be harvested from polluted streams or lakes. It may be noted, however, that natural ice, when formed in fairly deep and quiet water, eliminates much of the impurities while freezing, and that recent bacterial studies show that after a few weeks practically all bacteria, and particularly the dangerous ones, disappear. In other words, the effect of storage is advantageous in tending to cause germs to perish. Under anything like carefully guarded conditions, therefore, the chance of typhoid infection by means of ice is small. In the case of artificial ice the freezing process, being from the outside in, concentrates the impurities at and near the centre of the cake.

Bibliography. Hile, *The Ice Crop* (New York, 1892); Louis Schmidt, *Principles and Practice of Artificial Ice-Making and Refrigeration* (3d ed., Philadelphia, 1908); *Ice and Refrigeration Blue Book* (2d ed., Chicago, 1909); and for the sanitary aspects of the subject, consult: *Reports of the Massachusetts State Board of Health* for 1889, 1892, and 1900; *Report of the Boston Board of Health* for 1901; Prudden, *Drinking Water and Ice Supplies* (New York, 1900); Sedgwick, *Principles of Sanitary Science and Public Health* (ib., 1908). The files of the *Refrigerating World* (New York, monthly) and *Ice and Refrigeration* (Chicago and New York, monthly) may be consulted for current news and trade developments.

ICE'LAND. An island in the north Atlantic, under the sovereignty of Denmark. Its main area is barely outside the Polar zone, as the Arctic circle intersects the most northerly points of the island. It extends from long. 13° 23′ to 24° 35′ W., while its most southerly limits are in lat. 63° 35′ N. (Map: Denmark, F 1). The nearest land is Greenland, about 150 miles to the northwest, while Scotland is 500 miles to the southeast.

Area and Physiography. The area of Iceland has been variously estimated from a minimum of 39,756 to a maximum of 40,497 square miles, of which less than one-half is available for farming and pasturage. The south shores are sandy lowlands, unbroken by bays or harbors, while the rest of the coasts presents a succession of high precipitous cliffs, indented by numerous fiords. On the southwest shore are the harbors easiest accessible to shipping. It has been appropriately termed the contrasting land of fire and ice, of volcanoes, glaciers, and geysers. The surface in general consists of series of rough plateaus, formed of lava and other eruptive matter. About one-eighth of the land is glacier-hidden. Here and there are large mountain domes, mostly ice-clad—the highest, Oræfajokull, 6424 feet. Fossiliferous strata, especially in the northwest peninsula, of the Tertiary period show that extensive forest areas then existed. Glacial moraines and lava streams have formed numerous depressions, wherein have gathered many lakes. Elsewhere are true crater lakes, the latter class being numerous in the region to the west of the great snow fields of Vanajokull on the southeast coast.

Climate. The subarctic and oceanic situation makes the climate harsh rather than extreme. Southerly-drifting ice besets the northern coasts, making the summer cold; but the northerly ocean currents along the south shore ameliorate the temperature. While the average winter temperatures of the entire coast line vary slightly from 32° F., the summer averages of the north and east shores range from 43° to 44° against 48° to 50° on the south and west coasts.

Fauna and Flora. Few, if any, of the land animals are indigenous. Reindeer were introduced in 1770. Foxes came from ice floes, and rodents from ships. Reptiles and batrachians are absent. Half of the hundred species of birds are aquatic, and among them the eider duck is valued and protected for its down. Walrus and whales are now rare, and seals are steadily decreasing in number. The vegetation is of the Arctic-European type. While there were extensive forests in the Tertiary period, the trees to-day are dwarf beeches, willows, elms, and mountain ash, specimens 30 feet high being rare.

Volcanoes. The island is especially of volcanic origin, as from such activities have been built up the ragged, lava-covered, ice-strewn uplands, averaging 2000 feet or more in elevation, which form nine-tenths of the area of the surface. Magnificent as to scenery, these plateaus

are largely regions of desolation. Practically the only vegetation of the lava slopes is scattered coverings of Iceland moss, which there finds favoring foothold. Indeed the whole land has suffered from volcanic eruptions, of which 25 have occurred within historic times. In all there are more than 100 separate volcanoes, of which the most widely known is Hecla, 5100 feet high, in the extreme southern part. There are thousands of craters, that of Askja with an area of 34 square miles being the largest. Hecla had 18 eruptions in historic times up to 1845, and Katla 13 up to 1860. The eruption of Askja, southwest of Vatna, in 1875 was so violent and long-continued that its ashes reached as far east as Sweden. The most violent and destructive eruption was that of Laki in 1783, which was doubly dangerous from the torrential floods caused through the melting of large glacial masses by the molten lava. An area of not less than 218 square miles was permanently covered by the flowing lava. Enormous regions of pasturage and of arable land were devastated, and 80 per cent of the stock—cattle, sheep, and ponies—were killed. Famine conditions, and epidemics arising from volcanic gases, caused more than 9000 persons, about one-fifth of the population, to perish before normal conditions were restored. Including the snow-hidden portions, the present lava fields cover one-fourth of the surface of the island. The largest snow-free lava field, to the north of Vatna, is over 1700 square miles in extent. Largely formed from eruptions of Askja, it has accretions from 19 other volcanoes. Earthquakes of violence have repeatedly occurred and at times have caused enormous damage. Those of 1784 and of 1896 each destroyed many buildings and injured others by the hundreds.

Glaciers. In the Glacial age the island was completely covered with ice. At present there are more than 120 separate glaciers of considerable size, their aggregate areas approximating 5200 square miles. There are very few, if any, living glaciers, though Vatna closely approaches the sea. The location and surface areas in square miles of the largest glaciers are as follows: Vatna, in the southeast, 3280; Hofs, near the centre, 520; Lang, in the west, 500; and Myrdals, in the north centre, 390.

Geysers. Hot springs are numerous throughout several parts of the island, and in the so-called geyser region, about 30 miles northwest of Hecla, there are more than 100 in a small area. The most widely known of them is the Great Geyser, 60 feet in diameter and having an intermittent period of discharge varying at different times from 6 to 30 hours. It throws at times, to the height of 150 feet or more, immense columns of water of temperatures varying from 170° to 190°. One geyser at its bottom depths was found to have water of the temperature of 262° F.—possibly the hottest spring in the world.

Agriculture and Other Industries. More than one-half of the inhabitants live by horse, cattle, and sheep raising. A large part of the slopes and river valleys of the plateaus affords excellent pasture for sheep, and in the low-lying lands are extensive meadows, which, properly managed, could support twice the number of cattle that now graze on them. In 1911 the island contained 43,879 horses, 25,982 head of cattle, 574,053 sheep, and 671 goats. A great deal has been done latterly to improve the soil. Agricultural societies have been formed, and there are now four agricultural schools. At one time a little barley was grown, but it could not be made to pay, and therefore field cultivation has been abandoned. Horticulture, on the other hand, makes great progress; potatoes, cabbages, and rhubarb thrive well, and some berries, such as currants, are cultivated. Woods have never existed since the Glacial period, and the brushwood of birch is less extensive than formerly, owing to the sheep. The birch is seldom higher than a man, though in one place on the east side some specimens attain a height of over 30 feet. The mountain ash reaches the same height. The fishing grounds (cod, herring, flounders, whale, and seal) are frequented by English and French boats. The sea is very stormy, and therefore fishing is best pursued in large and strong vessels. The fishermen of Iceland have had to content themselves with small open boats. They brave the billows of the ocean in winter with the greatest boldness and contempt of danger, and every year many lose their lives. Want of capital has prevented them from acquiring large vessels, but considerable progress has been made in this direction, and the Icelanders now possess a fair fleet of fishing smacks. The fisheries furnish nearly three-fourths of all exports and give employment to about one-sixth of the population. The cod fisheries are among the most important in the world. In 1910 the export of salt cod amounted to 6,753,711 kroner (1 krone = $0.268). Manufacturing industries, with the exception of cod liver and other fish oil, are utterly absent. The simpler articles of dress and necessaries of life are usually supplied by every native for himself, and the number of artisans is very small. The mineral deposits are not sufficiently large to repay exploitation. Turf is the chief fuel, but some coal is imported.

The chief exports are dried fish, wool, live sheep and horses, eider down, salted meat, butter, hides and skins, cod liver and other fish oil, and whalebone. The annual value of the exports amounts at present to over $4,000,000. The imports consist of textiles, cereals and other foodstuffs, coal and wood, manufactures of metals, and boats, and have an annual value of between $3,000,000 and $3,750,000. In 1911 the imports were valued at $3,813,622 and the exports at $4,280,144. The exports to Denmark in 1912 amounted to nearly $2,000,000 and the imports from Denmark to about $1,300,000. Up to 1854 the trade of Iceland was a state monopoly of Denmark. Since then it has been free and is now chiefly in the hands of Denmark and Great Britain. Iceland has regular steam communication with Denmark via Leith, the port of Edinburgh. There are a number of trading stations on the island, and six commercial centres. There are few roads. In the settled districts the traveler follows bridle paths worn by the hoofs of the small Iceland horses. A few good roads have recently been built, and some of the streams are being bridged. At the end of 1910 Iceland had 87 telegraph and telephone stations, with 857 miles of line. The people are sturdy and have not allowed the hardships they have endured to crush them. As the farthest outpost of civilization, they have always had to fight a hard battle with nature. They are of an earnest, quiet, and somewhat melancholy disposition, and as a rule very intelligent. Though the lower classes live in poor circumstances, they are very enlightened; perhaps

in no other country of Europe are so many books, in proportion to the population, printed and sold as in Iceland. The island contains several printing establishments, from which issue 18 newspapers besides other periodicals. During recent decades many Icelanders have emigrated to America and have founded flourishing colonies in Manitoba. In all about 15,600 have crossed the Atlantic, but of late years the emigration has fallen off. Besides Reykjavik, the capital, with a population of 11,600 (census of 1910), the chief settlements are Akureyri (2089) and Isafiord (1859).

Government. At the head of the administration is a minister, appointed by the King of Denmark, resident at Reykjavik, and responsible to the Althing for all acts concerning Iceland. The Althing, or the Parliament of the colony, although in existence since the Norwegian occupation, had not attained its full power before 1874, when the new constitution granted by the King of Denmark endowed it with complete legislative authority. The Althing consists of 36 members, of whom 30 are elected by the people and 6 appointed by the crown. It is convened every two years and is divided into two chambers, of which the upper is composed of six elected and the six appointed members, and the lower consists of 24 elected members. The King of Denmark has the nominal right of veto. In 1911 suffrage was extended to women and servants, and the right is now possessed by all competent adults. For purposes of administration the island is divided into three districts—the South, the West, and the North and East—administered by two officials having their seats at Reykjavik and Akureyri. The districts are subdivided into 20 smaller divisions known as syssels and administered by sheriffs, who perform the functions of tax collectors and judges of first instance. At Reykjavik there is a court of second instance for the trial of cases from which appeals are made to the Supreme Court at Copenhagen. The revenue of the country is derived almost entirely from customs and tax on spirits, tobacco, coffee, and sugar. Elementary education is well provided for, and the number of illiterates is remarkably small. There are also a number of higher schools, a theological seminary, a college and a university at Reykjavik, with about 100 students. For religious purposes Iceland forms a separate bishopric in the Lutheran church.

Population. The population, estimated at over 46,000 at the beginning of the nineteenth century, was 72,445 in 1880, 78,470 in 1901, and 85,188 in 1911. The birth rate is large, but it is offset by the large infant mortality resulting from the severity of the climate. The Icelanders are of Norwegian origin and belong exclusively to the Lutheran church. They live mostly on isolated farms, there being very few settlements.

History. Iceland was not visited by Europeans, as far as is known, until the end of the eighth century, when some Celts landed on the island; but its history really dates from about 870, when various Norsemen discovered it, chiefly by accident. One of these, Flóki Vilgertharson, gave it its present name. Soon thereafter the Norwegians came in large numbers, owing to the despotism of Harald Haarfagr (q.v.) at home, and permanent settlements were made, among them the present capital, Reykjavik. The settlements were all independent of one another, and for some time the only bond of union was furnished by their common religion, until finally in 927 one Ulfljotr was sent to Norway to prepare a code of laws. He did so, returning in 930. His constitution provided for a yearly assembly, but all details are lacking to us. Many legal changes, however, had to take place before even a semblance of order prevailed in Iceland. In time regular territorial divisions appeared, and a system of law very similar to that of Anglo-Saxon England. The most important event in the early history of Iceland was the conversion of its inhabitants to Christianity. The first missionary was Thorvaldr Kothranson, who came in 981, but after five years left the country, having failed utterly. More successful was the attempt made under the auspices of King Olaf Tryggvason of Norway (995–1000), who introduced Christianity, chiefly by force, about the year 1000. Under the influence of the new religion civilization gradually spread, and the laws became milder. Until 1103 Iceland belonged to the province of the Archbishop of Bremen, later to that of Lund. Meanwhile the kings of Norway regarded Iceland with a jealous eye, for it was a place of refuge for all their rebellious subjects; but all attempts to conquer it failed for many years. The history of the island was mainly one of rivalries of different chiefs, and about the beginning of the twelfth century all the contests in the land were connected with those of the three sons of Sturle—the historian Snorri, Thord, and Sieghvat, the most powerful chiefs of their time. By marriage and other means, Sturle Thordson had become *godar*, or supreme magistrate, of several provinces, for these offices were hereditary in certain families. These offices he transmitted to his sons, who, however, were unable to agree. Finally, in 1262, Norway having been appealed to, King Haakon of that country induced Iceland to join its fortunes to that of Norway. The prosperity of the country from that time onward rapidly declined, as strict navigation laws were enforced. In 1280 Iceland, joined together with Norway, came under the crown of Denmark. This is called the union of the Three Crowns. Much of the subsequent history of the island is filled with the relation of physical evils which desolated the land and effectually subdued the spirit of its inhabitants. Thus, there were repeatedly severe volcanic eruptions, and between 1402 and 1404 the black death swept away, it is said, two-thirds of the population. In 1540 Christian III of Denmark began to introduce into Iceland the Reformation, which rapidly prevailed throughout the whole country. During the Napoleonic wars England captured it, but gave it back to Denmark by the Treaty of Vienna in 1815. The Althing, or Legislative Assembly, was dissolved, but was reorganized in 1843. For many years constitutional conflicts with Denmark went on, which were amicably settled in 1874 by granting home rule to Iceland. In 1903 the ministry for Iceland in the Danish government was transferred to Reykjavik. In 1911 a ministry strongly favoring home rule was chosen.

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ICELAN'DIC LANGUAGE. With the Norwegian popular dialects and Faroese, Icelandic forms the West Norse subdivision of the Scandinavian languages, as opposed to the East Norse, made up of Swedish and Danish. The history of Icelandic begins with the settlement of Iceland by Norwegians, principally from western Norway, at the end of the ninth century. After this time there was gradually developed in Iceland a particular West Norwegian dialect, which, however, at the outset differed but slightly from the parent Norwegian. Only after the introduction of Christianity, about the year 1000, is it possible to speak of languages instead of dialects in the whole Scandinavian north, and at this time Icelandic, too, ranged itself by the side of Norwegian, Swedish, and Danish as a separate language, with characteristic differences in sounds, inflection, and vocabulary.

In the history of Icelandic it is customary to distinguish two main periods—Old Icelandic, from the settlement of the island, in the ninth century, to the Reformation, at the middle of the sixteenth century; and New Icelandic, down to the present day. Old Icelandic is further subdivided into three periods—the first of which extends from 874 until about to the middle of the twelfth century; the second, the so-called classical period, during which the principal literary works were produced, from about 1150 to about 1350; and the third, or transitional period, from 1350 to 1540. The language of the first period, at the beginning identical with that of Norway, at the end is distinguishable from it by but comparatively few differences. One of the most plainly discernible and characteristic distinctions between the two is the retention in Icelandic of initial *hl*, *hm*, *hr*, whose *h* early disappears in Norwegian, as it does in Swedish and Danish, but which has remained in Icelandic, alone of all the Germanic languages, to this very day. The language of the second period, on the other hand, exhibits many important changes along broad lines, in phonetic conditions and in inflectional forms, that from this time on sharply differentiate Icelandic and Norwegian. This forms an intermediary period which witnesses the gradual growth of those changes in the language whose consummation marks the beginning of the new period of Icelandic. During this whole time the language remained practically homogeneous throughout the island, and no sharply defined dialectic differences were developed. Manuscripts of the thirteenth and fourteenth centuries from the west of Iceland show, it is true, characteristic phonetic conditions in certain instances, and it is likely that others existed as between the north, west, and southeast, but none of them are important. From 983 to about 1400 Icelandic was also spoken in the settlements of Greenland, but to what extent this language deviated from that of Iceland cannot be determined from the few runic inscriptions which have come down to us.

Old Icelandic, both from the standpoint of the language itself and of the literature written in it, is by far the most important of the ancient Scandinavian languages. The sources of our knowledge of it are an almost unparalleled literature in prose and verse, written after the early part of the twelfth century and even in the thirteenth century, but often of far more ancient ultimate origin. The alphabet used is the usual Latin script of the end of the Middle Ages, introduced by way of England and modified to fit the special conditions of the language. The few runic inscriptions that exist in Iceland are unimportant from a linguistic point of view, in that they are all more recent than the oldest manuscripts written in Latin letters. The oldest conditions, however, are in many cases not to be found in the oldest manuscripts, but in poems contained in manuscripts of the thirteenth century, which, as a consequence of their metrical construction, have kept forms as old in some instances as the ninth century, from which early time they had been transmitted orally from generation to generation. The oldest manuscript that has been preserved is an inventory of the church at Reykjaholt in Iceland, the most ancient part of which was probably written between 1178 and 1193. The principal manuscript of the *Elder Edda*, the so-called *Codex Regius*, dates from the end of the thirteenth century; the principal manuscript of the *Snorri Edda*, the so-called *Codex Upsaliensis*, is of the same period. The best manuscripts are all written before the middle of the fourteenth century. Icelandic manuscripts are both parchment and paper. The former medium was used from the beginning of writing, at the end of the twelfth century, down into the sixteenth century; the latter from the fifteenth century almost to the present day. Old Icelandic manuscripts are preserved principally in four large collections—viz., the Arnamagnæan collection, so called from the Icelander Arni Magnússon, who collected and gave it to the University Library in Copenhagen; the collection in the Royal Library in Copenhagen; the so-called Delagardic collection in the University Library in Upsala, Sweden; and the collection in the Royal Library in Stockholm. Besides these, there are a few manuscripts in the University Library in Christiania, Norway; in the British Museum in London; the Bodleian Library in Oxford; the Advocates' Library in Edinburgh; in Wolfenbüttel and Tübingen, Germany; in

Utrecht, Holland; in Vienna and Paris. No manuscripts of importance whatever have been left in Iceland, with the exception of the Reykjaholt inventory, which is a single quarto leaf of parchment preserved in the public archives in Reykjavik.

The most predominant characteristics of Old Icelandic as a Scandinavian language are, in the main, the following: To an extent unknown to the other members of the Germanic group Icelandic exhibits a consistent and widely developed process of assimilation in consonants and vowels; under this head falls the extraordinary extension of umlaut, which is here not merely a process of palatalization, as elsewhere in the Germanic languages, but of labialization as well. There are, besides this, a characteristic preference for suffixes, as exhibited in the use of the suffixed definite article with substantives, masc. *-nn*, fem. *-n*, neut. *-t;* the formation of an entirely new medio-passive conjugation by the suffixal use of the reflexive pronoun; and the expression of negation by an added *-gi*, *-a*, or *-at*. Other important characteristics are the universal shortening of the vowels of inflection and of derivation; the disappearance of final *n* in the so-called weak inflection of substantives and adjectives, and in the infinitive of verbs, whose accompanying preposition, furthermore, is *at*, instead of *du* (*zu*), as in the other Germanic languages, and the use of the consonantal case ending *-r*, elsewhere retained only in Gothic as *-s*, in masculine and feminine substantives. There are, in addition, many other minor peculiarities in sounds, inflections, and syntax. Contrasted with Old Swedish and Old Danish, whose earliest documentary remains date from 1281 and 1329 respectively, Old Icelandic possesses, as a whole, as is to be expected, a much more ancient character in sounds and in inflectional forms. It is, however, by no means invariably the most conservative. The far greater extension of the process of umlaut, e.g., in Old Icelandic, results in a large number of forms that are more recent than the corresponding ones in the other Scandinavian languages in their oldest period. The notably wide vocabulary of Old Icelandic shows some admixture of foreign elements. These are Latin words, introduced mainly through the Church after the Christianization of Iceland in the year 1000; Celtic words, introduced in considerable number as a result of the contact of Celtic-speaking people in the British Islands with the Norwegian settlers of Iceland, many of whom came by the way of Scotland, Ireland, the Orkneys, the Hebrides, and the Shetlands, where they had previously lived for longer or shorter periods; Anglo-Saxon words, which came in as a consequence of the close contact of Icelanders in England with the people, their language, and their culture; and finally, a few French and German words, due to the use in literature of foreign material, derived either directly or remotely from these sources.

The history of New Icelandic, or the present period of the language, begins with the Reformation, although the conditions that characterize it can already be observed in process of development in the transitional period at the end of Old Icelandic. The earliest literary monument of New Icelandic is the first Icelandic printed book, the New Testament, translated by Odd Gottskalksson, and printed at Roskilde in Denmark in 1540. In general, Icelandic has still retained, to the present time, along broad lines, in inflections and vocabulary, its archaic characteristics, so that to-day it is on the whole the most ancient in appearance of the Germanic tongues. Since the beginning of the period the language has, however, in reality undergone a continual internal development. This is particularly true of the sounds, which have been very materially changed in pronunciation, although frequently the conservative retention of the old orthography gives no clew to it. What has helped Icelandic to retain its early conditions is, more than anything else, its relative isolation and the consequent minimum contact with other languages, on the one side, and the fact of its unbroken use in literature on the other. The production of literature in Iceland, although it dwindles in value and amount after the classical period until it is awakened to new life by the Reformation, has never wholly ceased since its very beginning. All this, with the continuous culture of the old literature, which has in some form or other never been forgotten, has tended to keep the language phenomenally pure and homogeneous throughout the island. After 1380, when Iceland, which since the end of the Republic in 1262 had belonged to Norway, fell with that country under the sovereignty of Denmark, a Danish influence was exerted upon the language which has continued, with varying effect, down to the present time. This influence was particularly active in the two centuries immediately following the Reformation, when, as a consequence of the reawakened literary activity, which brought with it many translations of foreign and especially of Danish books, it made itself felt in vocabulary and orthography to such an extent that the language seemed on the way to lose forever its characteristic purity. It was an appeal to the old literature which furnished the missing norm and not only checked the further introduction of Danicisms, but set on foot a reactionary tendency towards the forms and orthography of the classical period of the language. This puristic movement began towards the end of the eighteenth century, but was particularly furthered by the formation of the Icelandic Literary Society by the Danish philologist Rask in 1816. Since that time an influence has been carefully and intelligently exerted, both to eliminate foreign elements from the vocabulary, and either to rehabilitate old forms or to set in their place new forms made out of the old elements of the language, and to reform the orthography from the standpoint of etymology. A printed page of Icelandic at the present day has as a consequence a much more primitive character than the facts of its pronunciation actually warrant. In comparison with the other Germanic languages, changes have nevertheless been relatively few, and Icelandic, not only apparently but in reality, as it is in use to-day, is inherently the best preserved of this entire group.

The present territory of Icelandic, aside from small settlements in the United States and in British America, is the island of Iceland, where it is the spoken and written language of the 85,000 inhabitants. The literary language of the present time is to all intents and purposes the spoken speech, not of any particular region or of any separate class, but of the people of the whole country, with the reservation that in the capital and the trading places along the coast much Danish is in use, and the spoken language is no longer as pure as elsewhere. As

in the old period, there are no dialects in modern Icelandic, although there are still, as then, minor differences that give the language of certain parts of the country a local color.

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ICELANDIC LITERATURE. In order to understand the remarkable brilliancy of the classical Icelandic literature of the twelfth and thirteenth centuries, it is necessary to bear in mind the fact that the early settlers were among the cream of the Norwegian people. In spite of the political difficulties that had induced these hardy Norsemen to seek a home almost in the ocean itself, intercourse between Iceland and the Scandinavian peninsula continued to be very close, especially as a result of the frequent visits made to Norway by young Icelanders of rank. Another reason for the literary supremacy of the early Icelanders is closely connected with one of the principal natural drawbacks of the island, its severe climate, and the consequent isolation of the people during the greater part of the year. Persons in Iceland were thus greatly thrown upon their own resources. As a result, the art of story-telling was resorted to for passing away the monotony of the dark winter days. The periodical meetings in summer were used for an interchange of news and of stories and poems, and to this day the Icelanders are probably the greatest lovers of oral literature. The Icelandic classics still form the most popular reading matter of the masses of the people. This vitality of the Icelandic literature is again closely connected with social conditions. The Icelanders are a homogeneous people, and in reading the accounts of the early heroes of Iceland they read the stories of their own ancestors, whose names have been familiar to them from early childhood. For them the long genealogies, which the most patient foreign reader finds tiresome, are full of interest as family records of the remote past, and the most insignificant detail is fraught with the vividness of personal association.

Turning to the literature itself, we find, as is the case with the other literatures of the world, that the earliest monuments are in verse form. The earliest monument of Icelandic literature, furthermore, the so-called *Elder Edda*, is, like our own *Beowulf*, the most important and interesting work produced, and claims, more than any other single work, the attention of Icelandic scholars. The *Elder Edda* is not a poem, in the strict sense of the word, but a collection of more or less closely connected poems of varying length and character, which were preserved for a long time by oral tradition, suffering inevitable changes in the process of transmission. For many centuries the manuscript containing the poems was forgotten, and on its discovery in 1643 it was attributed to the classical writer Sæmund, called the Wise, who lived in the last half of the eleventh and the first half of the twelfth century. It has since been proved conclusively that it was redacted by an unknown Icelander. A curious error is also frequently repeated with regard to the etymology of the word Edda itself, which is explained as meaning 'great-grandmother.' As a matter of fact, the name was improperly extended from a prose work, the so-called *Younger Edda*, the work of Snorri Sturluson (q.v.). The age of the *Elder Edda* has been greatly exaggerated, the oldest portions probably belonging in their present form to the tenth century. (For an account of the poems, see EDDA.) The *Younger*, or *Prose, Edda* is of great value, because of the information it gives of Icelandic mythology and the language of the early skalds. It is a sort of *ars poetica* and was compiled for the guidance of young poets. Its style is admirable, its tales of the gods and goddesses being related with a due attention to effect. The style of most of the early Icelandic poetry is in marked contrast to the simplicity and directness of the classical prose. The most complicated figures and the most obscure references are freely used. The form is alliteration combined with assonance, or the agreement of medial vowels. Most of the poems of the skalds are short, eight verses each, but some few longer poems occur. The most striking of the latter are the three poems by Egil Skallagrimsson, the hero of the *Egils Saga*. They are much simpler than the short poems by the same author, and are full of feeling and dignity. Egil's elegy on his son may be ranked among the great poems of the world. To the eleventh and twelfth centuries belong poems com-

posed in imitation of the ancient works, consisting of moral and didactic maxims—the former conceived from an assumed heathen, the latter from a Christian, point of view. In the thirteenth century the skaldic art declined and gave place to an inferior literature based upon biblical stories and legends of the saints. Two centuries later appeared the *ríma*, or ballad, which closely resembles in form and subject matter the ballad as found on the Continent. These continued in popularity until the seventeenth century. Frequently the classical sagas were paraphrased in these *rímas*.

The earliest Icelandic prose belongs to the beginning of the twelfth century, when Ari the Wise (1067–1148) composed a history of his native island and its population in the *Islendinga-bók* (The Book of the Icelanders), which is a revision of an earlier work by Ari. The value of this work is historical rather than literary, for its facts, while detailed and reliable, are not presented in an interesting style. It has been edited, with a German introduction and notes (Halle, 1891). The *Landnáma-bók* (Landtaking Book), also by Ari, is based upon the earlier *Islendinga-bók*. It describes the discovery and settlement of Iceland and contains detailed accounts of 3000 persons and 1700 places. It was continued by others. There is an English translation by T. Ellwood (London, 1898). These works entered largely into the composition of the annals of the early kings of Norway, composed a century later by Snorri Sturluson (q.v.), under the title of the *Heimskringla* (Circuit of the World), the opening word of the work. This work deserves special notice as being the most important historical contribution of the Middle Ages. It is characterized by a vivid style, and so strongly does it appeal to the Icelandic consciousness that it is still the most popular book after the Bible in Iceland. A new translation into Dano-Norwegian has been made (1900) by G. Storm, and published with a subvention by the Norwegian Parliament. The best edition in the original is that edited by F. Jónsson (1893–1901), who has also edited a shorter edition (1911). A continuation of the *Heimskringla* was composed by several authors. It has twice been translated into English—by David Laing (London, 1844 and 1889) and by W. Morris and E. Magnússon (ib., 1895). Other histories belonging to a later period are *Flateyarbók*, containing a rather confused selection of sagas, the *Færeyingasaga*, which tells of the introduction of Christianity into the Faroe Islands (trans. by F. York Powell, 1896), and the *Orkneyingasaga*, relating the history of the earls of Orkney. The parts of the *Flateyarbók* relating to the discovery of America have been edited by A. M. Reeves in *The Finding of Wineland the Good* (London, 1890). The compilation of the laws of the island attracted the attention of the Icelanders at an early period, and in 1118 a complete code, known as the *Grágás* (gray goose), which had been derived from the ancient Norse law, was submitted to the Althing, or popular assembly, and in 1123 the canons of the Church, or the *Kristinrettr*, were settled and reduced to writing. A collection of these enactments in the ancient and subsequent codes has been made by Stephensen and Sigurdsson, under the title of *Lovsamling for Island* (21 vols., Copenhagen, 1853–89).

Of hardly inferior interest to the *Edda* and the *Heimskringla* are the sagas (q.v.). This term in its broadest sense includes all Icelandic prose works of a narrative character. Thus, strictly speaking, Ari's works cited above are sagas, as is also the *Heimskringla*. But, as generally used, the term "saga" is applied to shorter narratives the interest of which centres in one person. The scene of the saga may be laid either wholly or in part in Iceland, or occasionally altogether outside of Iceland. Sagas are divided into several classes, the first of which is the mythic-heroic. The representatives of this class often give a later version of some well-known story which appears in other literatures. This is notably the case with the most interesting representative, the *Völsunga Saga*, earlier traces of which appear in the Eddas, and a later version in the *Nibelungenlied* (q.v.). It has been translated by W. Morris and E. Magnússon (London, 1888). The *Vilkina Saga*, treating of Dietrich of Bern, is later and shows German influence. The *Fridthiofs Saga* is of special interest as being the earliest version of the story made famous by the Swedish poet Tegnér (q.v.). A number of legendary stories were translated into Icelandic prose, the most important of which is the *Saga of Barlaam and Josaphat* (q.v.). The second and most characteristic class of sagas are the family sagas, accounts of individual men and their families. These biographies, as they would now be called, deal with the earliest settlers of the island and extend to about 1050. They are marked by great simplicity of style, with frequent highly dramatic passages, extreme detail, especially in connection with genealogies and chronologies, and keen characterization. A striking feature of all the sagas is the introduction of verses supposed to be the work of the characters. This is particularly noticeable in the *Kormaks Saga*, which contains an average of over one poem to each page. The family sagas are subdivided into two classes, the larger sagas and the smaller sagas. To the first belong the *Njáls*, the *Egils*, the *Laxdœla*, and the *Eyrbyggja*. Of these, the first has been admirably translated by G. Webbe Dasent (New York, 1912), and the last was translated in a condensed form by Sir Walter Scott. The *Egils Saga* has been edited with a German introduction and notes by Finnur Jónsson (Halle, 1894), and in the same series the *Laxdœla Saga* has appeared, edited by Kr. Kaalund (1896). Among the smaller sagas the most interesting are the *Kormaks Saga* and the *Saga of Gunnlaug Serpent Tongue*, both of which are love tales. Apart from their literary qualities, the Icelandic sagas are of great value in throwing light upon many Old Norse customs—religious, legal, and social—that would otherwise be entirely unknown. This is especially true of the *Eyrbyggja*. For the English reader, the introduction to Dasent's translation of the *Egils Saga* is of interest in connection with the general subject of sagas.

Modern Icelandic literature begins with the introduction of printing (1530) by the last Roman Catholic Bishop of Iceland. The first Icelandic translation of the New Testament was made in 1540. During the seventeenth century many learned works were written, the leader in this movement being Arngrímur Jónsson (1568–1648). Many manuscripts were collected and copied, and communication between Icelandic and Danish and Swedish scholars was close. Grammars and dictionaries were compiled, and many antiquarian works were published. Among the principal scholars of this period were Thor-

mod Torfæus (1636–1719) and Arni Magnússon (q.v.). During this same period, and without interruption down to the present day, Iceland has produced a surprisingly large number of poets—a larger number, indeed, in proportion to the population, than any other country in Europe. Among these poets may be mentioned Hallgrimur Pjetursson (1614–74), the leading Icelandic psalm writer; Stefán Olafsson (1620–88); Eggert Olafsson (1726–68); and Jón Thorláksson (1744–1819). The latter made an excellent translation of *Paradise Lost* and Klopstock's *Messias*. Among nineteenth-century poets may be noted Bjárni Thórarenson (1786–1841), who is probably the most popular recent Icelandic poet; Jónas Hallgrimsson (1807–45), who introduced several foreign verse forms, notably the hexameter. Of the younger poets we may mention Gestur Pálsson (1852–91); Steingrímur Thorsteinsson (1831–); Thorsteinn Erlingsson (1858–); and Hannes Hafsteinn (1861–). The most prominent dramatists are Matthias Jochumsson (1835–), also one of the most productive poets and translators; Indriði Einarsson (1851–), who began as a Romanticist, but in his later works shows strong Ibsenian influence; and Jóhann Sigurjónsson, whose *Fjalla-Eyvindur* (Eyvind of the Mountains) is the strongest Icelandic drama to date. The principal Icelandic novels are Jón Thoroddsen's *Piltur ok Stúlka*, translated by Reeves as *Lad and Lass* (London, 1890), and *Maður ok Kona* (Man and Wife).

Bibliography. The standard history of Old Norse literature is Finnur Jónsson's *Den oldnorske og oldislandske Litteraturs Historie* (3 vols., Copenhagen, 1894–1902). *Den islandske Literaturs Historie* (ib., 1907) is a shorter work by the same author. The only treatment of the whole subject in English is Winkel Horn, *History of the Literature of the Scandinavian North*, translated by Anderson (Chicago, 1884). This contains a useful bibliography. The *Prolegomena* to Vigfússon's edition of the *Sturlunga Saga* (Oxford, 1878) discusses the classical literature, and the same author's *Corpus Poeticum Boreale* (ib., 1883) contains a complete collection of the poetry down to the thirteenth century, with English translations, notes, etc. Vigfússon and Powell, *Origines Islandicæ* (Oxford, 1905), contains sagas and other texts, usually accompanied by English translations. Consult also: Morris and Magnússon, *Saga Library* (6 vols., London, 1891–1905); Mogk, *Geschichte der norwegisch-isländischen Literatur* (Strassburg, 1904); W. C. Green, *Translations from the Icelandic* (London, 1908); Hensler, *Zum isländischen Fehdewesen in der Sturlungazeit* (Berlin, 1912); Craigie, *The Icelandic Sagas* (New York, 1913). See also Saga.

ICE'LAND MOSS (*Cetraria islandica*). A lichen found in cold climates, especially in Iceland and Norway, in which places it forms an important article of commerce. It is also met with on the higher mountains to the south, but is not collected in quantity. It is used largely as a food by the Icelanders and the Laplanders, who either powder the dried plant and make it into bread or boil it with milk. As food also it has been used in other countries to which it is exported. Before it becomes edible, however, it must be steeped in water to remove a bitter principle. Other uses are in the manufacture of sizing paper and in dressing the warp in weaving. Formerly it was used as a remedy in pulmonary troubles, but is now regarded as a bland mucilaginous diet in such cases.

ICELAND SPAR. A transparent variety of calcite that is found chiefly in Iceland. Owing to its transparency and double refracting property, it is used for polarizing prisms and in other optical instruments. See Calcite.

ICE MAKING. See Refrigeration; Ice Industry.

ICE NEEDLES. See Frost.

ICE'NI. A tribe of ancient Britain, occupying, as is supposed, the present counties of Norfolk and Suffolk. The Iceni joined the ranks of Aulus Plautius in 43 A.D. and aided in the defeat of the sons of Cymbeline (q.v.). Some years later, when the Romans endeavored to establish their authority more firmly in the country, the Iceni rebelled under their Queen, Boadicea (q.v.), but were subdued. Consult C. W. C. Oman (ed.), "England before the Norman Conquest," in his *History of England*, vol. i (New York, 1910).

ICE PACK. See Ice.

ICE PLANT (*Mesembryanthemum crystallinum*). A native of Africa and of the south of Europe, remarkable for the glistening bladder-shaped hairs with which its whole surface is covered, and which sparkle in the sun like granules of ice. The seeds are used for food in the Madeira Islands. The ashes supply barilla, which is extensively used as a source of carbonate of soda in soap and glass making, and for which the plant is burned in countries where it abounds. There are in all about 400 species of this genus, most of which are natives

ICE PLANT.

of the south of Africa. The ice plant is introduced and spreading in southern California. *Mesembryanthemum æquilaterale*, a trailing plant, is also common in California, where its purple flowers, 1½ inches across, are very striking. *Mesembryanthemum edule* bears edible fruits called Hottentot figs.

ICE POLO. A game on skates, which should not be confounded with ice hockey nor with the equestrian game of polo, though it is related to both these games. While ice polo is similar in object to ice hockey, it is very different in

methods of play. A ball is used instead of a puck, the construction of the stick and the method of handling it are different, and there is a more open manner of play. This open play is brought about through the permission to indulge, in an ice-polo game, in what would in ice hockey be off-side play, i.e., getting between the ball and the opponents' goal. Five men make up a team, two less than in ice hockey. There are two rushers, one centre, one halfback, and one goal tend. The goals are 4 feet wide, and the distance from goal to goal is 150 feet. There are two playing periods of 20 minutes each, with 10 minutes' interval. A goal counts three points. See HOCKEY.

ICE YACHTING. Excepting Russia, no country in the world shares with America the sport of ice yachting, and Russia is only a sharer in the sense that a few of its boats, such as those of the Russian River Club, are sailed over a portion of the Gulf of Finland, near St. Petersburg. As early as the year 1790 there were ice boats, and contests at Poughkeepsie on the Hudson, the runners of one of the boats being still preserved. It was built by Oliver Booth and was little more than a square box on three runner skates—one on each side of the box, and the rudder one set in an oak post with an oar tiller. It was sailed with a small flat-headed spritsail. More than half a century passed before there was much improvement in this primitive design. The first real innovation was that of Allaire of Red Bank, N. J., on the Shrewsbury River, who in 1856 mounted his three runners on a triangular frame—a pattern that was at once seen to give advantage over the previous method. From this the Hudson River boats were gradually developed, the side bars forming with the body a bridge or runner plank (at right angles with the body of the yacht) projecting on each side and carrying at each end one runner or skate. The mast was stepped at the junction of the runner plank with the main beam; and they had low sails with large jibs, short nonpeaked gaffs, and booms extending many feet out from the stern. This style reached its limit in 1869 in the old *Icicle*. The stepping of the mast over the runner plank placed the centre of effort so far aft that the boats would run away with their occupants and throw them out, sometimes to their great peril. In 1879 this class was practically superseded, on the Hudson River, by the *Robert Scott* type of a single backbone with an elliptical steering box. Then the mast was stepped forward of the intersecting runner plank, and the jibs and boom shortened. Improvements have continued, but mainly in construction, which has aimed at strength combined with lightness in backbone and masts, and springiness in the cross or runner plank—a very desirable condition, for if a runner under an ice yacht weighing 2000 pounds and going at 45 miles an hour strikes a hummock of ice and has no give or spring in it, the consequence may be a shock that will reduce the craft to pieces. In the year 1866 the lateen sail was adopted, both on the Hudson and Shrewsbury rivers. *Scud*, with the largest lateen ever rigged, was sent from the Shrewsbury to Poughkeepsie on the Hudson and entered for the pennant several years. She, as well as *Ariel* and *Blizzard*, was exceedingly fast; but without apparent reason they would spin round on their heels like tops, or bolt, and in spite of its many admittedly good qualities and undoubted speed, the rig lost supporters. Theoretically any sailing craft should do its best with all its canvas in one piece. *Flying Scud* modified the lateen by spreading its 615 feet of sail, or catboat fashion, by supplementing it with a small jib, and *Vixen* and *Ranger* had other developments of the lateen. The lateen sail has still some stanch friends. The *Georgie* of the Shrewsbury River fleet, and Colonel Higginson's *Cold Wave*, with the Mohegan cat rig, are two examples of it.

The latest design in runners is that of H. Percy Ashley, known as the rocker type. These have a curve fore and aft. They are especially useful on rough ice. The elongated tiller, too, is of the utmost importance on occasions, because it allows the sailer to lie head forward in the steering box and guide the yacht with his feet while yet tending sheet with his hands.

The usual course in races is a triangle of one mile on each leg, of which only one can be before the wind, and five times around the triangle constitutes a heat. This necessitates 14 sharp turns. The time made by boats over such a course necessarily varies very much on each leg, and still more from day to day, according to the condition of the ice and the force and direction of the wind. The world's record for speed over a two-point course was made in 1907 at Kalamazoo, Mich., by the *Wolverine*, of the Kalamazoo Ice Yacht Club, which sailed a 20-mile course in 39 minutes, 50 seconds, the boat being obliged to turn every two miles. The exact distance sailed is unknown. The fastest time made in the pennant championship was in 1893 by *Jack Frost*, which sailed a 20-mile course in 49 minutes, 30 seconds, or at the rate of a mile in 2 minutes, 28 seconds, but the calculated distance the yacht sailed was 31.38 miles, and her rate was therefore a mile in 1 minute, 34 seconds. Much faster time has been made on a straight-away course in a favorable wind. In Stone's *Ice-Boating*, Archibald Rogers reports his test of several small boats over a measured mile. He says: "the best record was 59 seconds. Estimated speeds, that is, sailing up or down the river between known landmarks, have given still higher rates of velocity; in one instance a passage was made by two yachts racing on a reach where the time made was believed to be at the rate of 84 miles per hour."

The principal original locations for ice yachting are the Hudson River above Poughkeepsie, Newburgh, and Orange Lake, N. Y., the Shrewsbury River in New Jersey. From these the sport spread westward in the sixties to Lake Minnetonka, Minn., where it was introduced by Theodore Wetmore, and much fine sport has been had by yachtsmen from St. Paul and Minneapolis. Lake Winnebago, Wis., has also a half-dozen clubs on its borders. Lake Pepin, about 40 miles south of St. Paul, is the centre for the boats of several towns, and there is much racing on Gull Lake at Kalamazoo, Mich., and along the American shores of Lake Erie and Lake Ontario. There is excellent sport at Burlington, Vt., on Lake Champlain.

There are many prizes annually competed for; but as ice yachts are by their nature difficult to move from watershed to watershed, they are mostly local. For a series of informing articles on the history and development of the ice yacht, with precise directions for the construction of various types of the craft, consult Stone, *Ice-*

Boating (New York, 1913), and H. P. Ashley, *How to Build an Ice Yacht* (ib., 1914).

ICHABOD, ĭk'ă-bŏd. A poem by Whittier, intended as a rebuke to Daniel Webster for his change of attitude towards the question of slavery.

ICHANG, ē'chäng', or **ECHANG.** A *fu,* or departmental city, of the Province of Hupeh, China, situated on the left bank of the river Yang-tse, about 1000 miles from the sea, and about 10 miles below the entrance to the great Yang-tse Gorges (Map: China, K 5). It stands in the centre of a hilly country rich in rice, cotton, wheat, barley, and wood-oil trees (the *T'ung-shu,* or *Aleurites cordata*), and many kinds of fruit grown in the sheltered valleys near by. The climate is dry, with warm summers and pleasant winters.

The place is of great commercial importance, as the river may be navigated with comparative ease up to this point by vessels of light draft. The few attempts that have been made to mount the rapids of the upper Yang-tse have resulted in disaster. Hence all cargoes destined upstream are here transshipped to craft specially constructed for the navigation of the river above Ichang, and most of the downstream cargoes from Szechwan are also transshipped. The city is one of four opened in 1877 to foreign residence and trade, in accordance with the convention signed at Chefoo in 1876, and a few foreign business houses have agents here. Great godowns or warehouses have been built to accommodate this transit trade, and a foreign settlement has been laid out just below the native city. In 1912 the total imports of Ichang amounted to hk. tls. 2,065,825 (in 1912 a tael was worth $0.70 United States gold), and total exports to hk. tls. 3,487,070, making the total trade of the port in that year hk. tls. 5,552,895. Of the imports, hk. tls. 1,150,550 came from foreign countries, and hk. tls. 915,275 from Chinese points. An immense amount of produce from the Province of Szechwan is reshipped at Ichang for ports downstream and upstream.

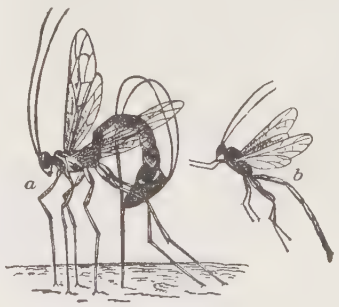
Steamer traffic is mainly in the hands of the British and Chinese. Some 19,000 native craft of all sizes (the largest probably about 60 tons) pass this port or call at it in the course of the year, the river being practically the only way of reaching the rich coal fields and fine agricultural lands of Szechwan, and the northern parts of Kweichow and Yunnan. Ichang has a splendid location as an emporium for the exchange of goods and products, but Hankow and Shanghai far excel it in that respect. The population numbers about 55,000. A route for a railway from Ichang to Kweichow was surveyed in 1905. By December, 1914, a distance of 80 miles from Ichang had been constructed. A railway from Ichang to Hankow is now contemplated.

ICH DIEN, ĭĸ dēn (Ger., I serve). The motto of the Prince of Wales, which, surmounted by three ostrich feathers (originally one), forms his official crest. According to one theory of its derivation Edward I, on presenting his new born son, Edward of Carnarvon, to the Welsh, who had demanded a native-born prince, used the expression in its Welsh signification—*Eich dyn* (Behold your man). Another view, not historically verified, attributes it to the occasion of the killing of John, King of Bohemia, by the English at Crécy, and asserts that the Black Prince found the motto under the plume worn by the dead King and assumed it to imply that "he served under the King, his father."

ICHIJI, ē'chē'jē', H. (1860–1912). A Japanese naval officer. He entered the Japanese naval college in 1874, was naval attaché in Rome during the Chino-Japanese War, and became captain in 1900. In 1903 he was appointed captain of the *Nikasa;* he served as flag captain under Admiral Togo during the Russo-Japanese War, and became rear admiral in 1906 and vice admiral in 1910. He twice commanded the Japanese training squadron which visited Australia and the United States between 1906 and 1909. At the time of his death he commanded the naval station at the Pescadores and was a member of the Admiralty Board.

ICHNEUMON, ĭk-nū'mŏn (Lat., from Gk. *ἰχνεύμων, ichneumōn,* tracker, from *ἰχνεύειν, ichneuein,* to track, from *ἴχνος, ichnos,* track). An old name for the civets of the genus *Herpestes,* now generally called mongooses. (See MONGOOSE.) The name belongs specifically to the Egyptian mongoose, or "Pharaoh's rat" (*Herpestes ichneumon*).

ICHNEUMON FLY. An insect of a group of parasitic Hymenoptera, forming the family Ichneumonidæ. More than 2000 genera and 25,000 species of ichneumon flies have been described. Economically considered, they are among the most important groups of insects, since without exception they are parasitic upon or within other insects, and in the very great majority of instances they destroy injurious species. As a rule, the ichneumon fly lays her eggs beneath the skin of the host insect. The egg hatches, and the young footless grub feeds upon the fat and blood and lymph of the host, piercing the fatty tissue with a pair of sharp-pointed jaws. It respects the viscera and vital organs



A LARGE ICHNEUMON FLY.

Male (*b*) and female (*a*) of *Thalessa lunator,* in relative size, the latter in the act of forcing her ovipositor into a log.

of the host up to the last limit and only sacrifices them towards the completion of its growth. Its skin is very delicate, and it breathes by absorbing oxygen through this skin from the blood of the host insect and not, as the older writers supposed, by placing itself in communication with the tracheæ of the host. The digestive tube has a very large stomach, which is closed behind and remains closed until the larva is full grown. When this time is reached, and the larva transforms to pupa, a rectal opening is formed, and the excrement is voided. That such an economy as this is necessary to the life of the parasitic larva is at once seen when we consider that if the excrement were voided daily it would cause speedy inflammation and the death of the host insect before the parasite could

become mature. It was formerly supposed that for this same reason the parasitic larva did not cast its skin, but Seurat has recently shown that some of them do occasionally molt.

Some ichneumon flies lay their eggs on the skin of the insects they attack, and others near the host insect, so that the parasitic larva, after hatching, finds its way to its prey. When the host insect is an internal feeder, like a wood borer or a gall insect, the ichneumon larva lives upon instead of within the host. There is no uniformity in the degree of rapidity with which they develop, and they may pass the winter months either as larvæ, pupæ, or adults. As a rule, they are long-bodied, slender insects, varying much in size. Many of them have long, stinglike ovipositors—in some instances, as in *Rhyssa*, more than twice as long as the body.

Both the scientific and popular names of this group of insects were derived from the Egyptian ichneumon, or "Pharaoh's rat," which devours the eggs and young of the crocodile.

Consult: Comstock, *Manual for the Study of Insects* (Ithaca, 1885); Sharp, *Cambridge Natural History*, vol. v (London, 1895); Ashmead, "Classification of the Ichneumon-Flies," in *Proceedings of the United States National Museum* (Washington, 1900); Viereck, "Type Species of the Genera of Ichneumon Flies," in *United States National Museum, Bulletin 83* (ib., 1914). See Colored Plate of Insects.

ICHNOLOGY, ĭk-nŏl′ŏ-jĭ (from Gk. *ἴχνος, ichnos,* trace + *-λογία, -logia,* account, from *λέγειν, legein,* to say). The study of fossil footprints, tracks, trails, and impressions found in the rocks of various geological ages. The most prolific sources of such footprints and impressions in North America are the Jura-Trias sandstones of Massachusetts, Connecticut, and New Jersey. Prof. Edward Hitchcock gathered a great collection of them from the New England localities and placed it in the Amherst College Museum. This collection contains over 8000 tracks, and it furnished the material for Hitchcock's *Ichnology of New England: A Report on the Sandstone of the Connecticut Valley, especially its Fossil Footmarks.* Many of the tracks therein described were first supposed to have been made by birds, but they are now known to be the footprints of ornithopod dinosaurs like *Anchisaurus* (q.v.). Still others were made by heavy five-toed animals of unknown nature. Some of the smaller tracks were made by insect larvæ which are found in the same series of deposits. (See Mormolucoides.) For an entertaining account of fossil footprints, see the chapter on "Impressions of the Past," in F. A. Lucas, *Animals of the Past,* "American Museum of Natural History, Handbook Series, No. 4" (New York, 1913); also consult Lull, "Nature's Hieroglyphics," in *Popular Science Monthly* (ib., 1904). See Fossil; Jurassic System; Triassic System.

ICHTHYOCRINUS, ĭk′thĭ-ŏk′rĭ-nŭs (Neo-Lat., from Gk. *ἰχθύς, ichthys,* fish + *κρίνον, krinon,* lily). The representative genus of the important family Ichthyocrinidæ of the Crinoidea. In this family the base is dicyclic, the radials are succeeded by costals which increase in size upward, the brachials are united by more or less wavy sutures, and the arms are nonpinnate. In *Ichthyocrinus* the radials and lower brachials are laterally in contact, as all sides and the crown appear like a perfectly solid body when the short arms are closed. The genus extends from the Silurian to the coal measures and is found both in Europe and America, but is best known by its representatives in the Niagara group. See Crinoidea.

ICH′THYODOR′ULITES (pl., from Neo-Lat., from Gk. *ἰχθύς, ichthys,* fish + *δόρυ, dory,* spear + *λίθος, lithos,* stone). The fossil spines of sharks, which are often found isolated in the ancient rocks. Many of them are of large size and because of their hardness and phosphatic nature have been preserved with a considerable degree of perfection. Some of them are well known under the names Ctenacanthus, Macæracanthus, Pleuracanthus, Cyracanthus, etc. Some of these spines have been found in their original positions at the front edges of the fins of fossil sharks. See Shark.

ICHTHYOL, ĭk′thĭ-ŏl (from Gk. *ἰχθύς, ichthys,* fish), or Ammonium Ichthyol-Sulphonate. A dark-red oily liquid obtained from a bituminous quartz rich in fossil fish, found in the Tirol and on the coasts of the Adriatic Sea. To prepare the drug, the mineral is distilled with strong sulphuric acid, a saturated aqueous solution of common salt is added to the distillate, and the ichthyol-sulphonic acid which separates out is neutralized with ammonia. The ichthyol thus obtained has a disagreeable bituminous odor and taste and is soluble in water, in glycerin, and in various oils. It is an antiseptic, mild irritant, and somewhat of a styptic. It is absorbed with ease by the skin when applied externally and by the intestinal mucous membrane when administered internally. It is one of the best-known remedies for erysipelas, in which disease it is applied externally in the form of an ointment made up with lanolin. The same preparation is highly recommended for cases of acute articular rheumatism, as affording prompt relief by reducing the pain and the swelling. Unna has declared it to be the remedy par excellence in acne. He applies it externally in the form of a 15 per cent ointment and gives it internally in doses of from 2 to 10 grains in pills or in capsules; he also recommends the free use of ichthyol soap. Ichthyol is extensively employed in the treatment of various skin diseases and is said to be particularly efficacious in eczema, chronic urticaria, and simple sycosis. It is frequently prescribed, with success, as a local application in chronic nasal catarrh, especially in the form known as ulcerative rhinitis. The formula of ammonium ichthyol-sulphonate is supposed to be $C_{28}H_{26}S(SO_3NH_4)_2$. But the ichthyol ordinarily sold contains also a strongly smelling oil, some ammonium sulphate, and a great deal of water. Ichthyol can be freed from its disagreeable odor without in the least impairing its therapeutic power, and at present such an ichthyol preparation is to be found in the pharmaceutical market.

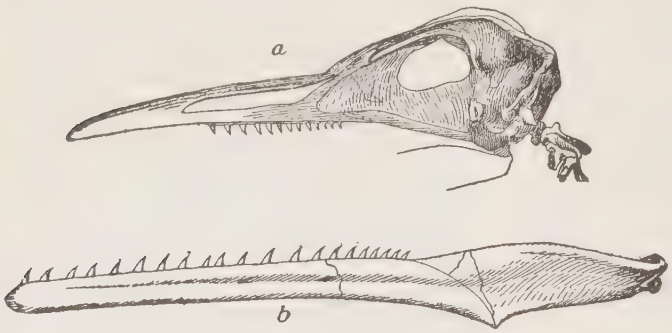
ICHTHYOLOGY, ĭk′thĭ-ŏl′ŏ-jĭ (Gk. *ἰχθύς, ichthys,* fish + *-λογία, -logia,* account, from *λέγειν, legein,* to say). That branch of natural history which treats of fishes. See Fish.

ICHTHYOPHAGI, ĭk′thĭ-ŏf′ā-jī (Lat. nom. pl., from Gk. *Ἰχθυοφάγοι, Ichthyophagoi,* fish eaters, from *ἰχθύς, ichthys,* fish + *φαγεῖν, phagein,* to eat). Among the ancient Greeks, a name for various tribes of coast dwellers on the southern seas, e.g., in Asia, on the coast of southern China, Gedrosia, and northeastern Arabia; in Africa, on the west coast of the Arabian Gulf and in Senegambia.

ICHTHYOPSIDA, ĭk′thĭ-ŏp′sĭ-dà (Neo-Lat.,

from Gk. *ἰχθύς, ichthys*, fish + *ὄψις, opsis*, appearance). A division of the Vertebrata, including all such forms as have no amnion and allantois, but which have, either persistently or temporarily, gills as their respiratory organs. The group includes the Amphibia (q.v.) and the fishlike forms. This division was introduced by Huxley.

ICHTHYORNIS, ĭk'thĭ-ôr'nĭs (Neo-Lat., from *ἰχθύς, ichthys*, fish + *ὄρνις, ornis*, bird). A genus of toothed birds of the Cretaceous age, found fossil numerously in western Kansas, along with remains of *Hesperornis, Aptornis*, and the like. These two genera represent the division Odontotormæ of the toothed birds (see BIRD, FOSSIL), characterized by having the teeth, with which the mandibles were plentifully furnished, set each in a separate alveolar socket. The various species were birds not greater than a pigeon in size and resembling terns in general appearance and probably in habits. They were sea birds of powerful flight, and the structure of their wings, legs, and carinate sternum much resembles that of modern birds. The skull, however, retains many reptilian features besides the teeth, such as the diminutive elongated space for the brain, the single-headed quadrate bone, and the union of the lower jaws in front by a ligament. The vertebræ, also, differ from those of *Hesperornis* and all modern birds in being biconcave. This form of vertebra is seen in a few recent and many extinct reptiles, but is especially characteristic of fishes; the presence of this character alone would indicate the very antique origin of the group. These birds doubtless lived and fed as do modern gulls, seizing living fishes, and going ashore only to breed and roost at night. They were doubtless well feathered and seem to have flourished until the end of the Cretaceous era. Most of the fossil remains thus far obtained are in the museums of Yale University and of the University of Kansas. See HESPERORNIS; and consult the authorities there referred to.



SKULL OF ICHTHYORNIS.

a, cranium and upper mandible of *Ichthyornis regalis; b*, lower mandible of the larger *Ichthyornis victor*.

ICHTHYOSAURUS, ĭk'thĭ-ô-są'rŭs (Neo-Lat., from Gk. *ἰχθύς, ichthys*, fish + *σαῦρος, sauros*, lizard). An extinct genus of fishlike reptiles found in the Mesozoic rocks of Europe and North America. The ichthyosaurs among reptiles are analogous to the whales among mammals, and they have many points of resemblance to these. Their bodies were round and tapering, heads large, with long snouts and very short necks, limbs reduced to paddles, and they had a broad, vertical fin on the tail and a triangular fin at the middle of the back. The body was covered with thin, smooth skin, and no traces of dermal plates have been discovered. The jaws were armed with a large number of sharp, conical teeth that have a complicated internal structure similar to that of the teeth of Labyrinthodonts or Stegocephalia. The eyes are surrounded by circles of sclerotic bones, and there is a large pineal foramen on top of the skull between the eyes. The vertebræ are biconcave, and the pelvic arch is separated from the vertebral column, for there is no sacrum. In size they ranged from 4 to 40 feet, and they must have swarmed in immense numbers in some portions of the European seas, especially during Liassic time, for their remains have been found in abundance in deposits of that age at Lyme Regis, England, and in Württemberg, Germany. That they were predacious animals and fed largely on fish, is evidenced by the fish fragments found within their coprolites and also within the abdominal cavity of some skeletons. Some ichthyosaurs were viviparous, for specimens obtained in the Württemberg quarries show several small embryonic skeletons contained in the abdominal cavities of the adults. About 35 species of *Ichthyosaurus* are known, and they have been found in the Mesozoic deposits of Europe, the East Indies, Australia, New Zealand, and South America. Allied genera are *Mixosaurus*, of small size from the Trias, and *Ophthalmosaurus*, a toothless ichthyosaur from the Upper Jurassic and Lower Cretaceous. A single representative, *Baptanodon*, is found in the North American Jurassic and is very close to *Ophthalmosaurus*. The ichthyosaurs and their allies, together with the Sauropterygia, comprising the plesiosaurs and allied forms, were formerly included in an order Enaliosauria, which is not now recognized.

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ICHTHYOSIS, ĭk'thĭ-ō'sĭs (Neo-Lat., from Gk. *ἰχθυώσις*, from *ἰχθύς, ichthys*, fish), or FISH-SKIN DISEASE. A disease characterized by a hardened, thickened, rough, and almost horny state of the epidermis, which breaks into small, irregular, scalelike pieces, which do not readily exfoliate, but which if removed are speedily reproduced. In the localities less profoundly altered by the ichthyotic condition, there is hypersecretion of sweat; in the hardened and thickened places many sudoriparous glands are suppressed, and the surface is dry. The disease may affect almost the whole surface or may be confined to a single part, and is most frequently, but not always, congenital. It is attended with

no constitutional disturbance. The disease is extremely obstinate and when congenital may be considered as incurable. The treatment consists in the frequent use of the warm or vapor bath, so as to soften the thickened epidermis and to facilitate its removal, and friction by means of a piece of flannel may be conjoined with the bath. The internal administration of tar, cod-liver oil, etc., sometimes gives relief.

ICHTHYS, ĭk′thĭs (Gk. *ἰχθύς, ichthys,* fish). An early Christian symbol. It was discovered that the Greek word for fish consisted of the first letters of the common ascriptive title to Christ: Jesus Christ, the Son of God, the Saviour, or in Greek Ἰ|ησοῦς Χ|ριστὸς Θ|εοῦ Υ|ἱὸς Σ|ωτήρ. A fish thus became the symbol of Christ, and to make the sign of a fish was to give to the initiated the plainest indication of being a Christian. Accordingly it entered into the freemasonry of early Christianity. Both the acrostic and the figure of a fish appear upon the monuments.

ICICA, ĭs′ĭ-kȧ. See PROTIUM.

ICIL′IUS. The name of a plebeian family in Rome, which produced some of the most zealous defenders of the plebeians against the patricians. The name of one of them, betrothed to the unfortunate Virginia, is associated with one of the most touching incidents in the legendary history of Rome. See APPIUS CLAUDIUS CRASSUS.

ICILIUS, QUINTUS. See GUICHARD, K. T.

ICKELSAMER, ĭk′el-sä′mēr, VALENTIN (c.1500–c.1537). A German grammarian. Nothing definite is known of his life. He was perhaps born at Rothenburg-an-der-Tauber; at any rate, about 1525 he was schoolmaster there. From the title-page of one of his works we may gather that he lived for a time, possibly as schoolmaster, at Karlstadt. Afterward he lived at Erfurt and at Augsburg. His two principal works were: *Rechte Weis auffs kürtzist lesen zu lernen* (c.1527), the foundation of the German phonetic method; and *Teutsche Grammatica* (written c.1527, but published with neither date nor place), one of the earliest German grammars. Both these books are reprinted in Müller, *Quellenschriften und Geschichte des deutschsprachlichen Unterrichts* (Gotha, 1882). Consult Vogel, *Leben und Verdienste V. Ickelsamers* (1894).

ICKNIELD (ĭk′nēld) **STREET,** or **WAY.** An ancient road running from Cornwall to Norfolk in England. The name is connected with the Iceni. See FOSSWAY.

ICOLMKILL, ĭk′om-kĭl′. See IONA.

ICON BASILIKE, ī′kŏn bȧ-sĭl′ĭ-kē. See EIKON BASILIKE.

ICO′NIUM. A town of Asia Minor. See KONIEH.

ICON′OCLASM (from Gk. *εἰκών, eikōn,* image + *κλᾶν, klan,* to break). The name given to any movement against the religious use of images, but especially to the crusade against their use which excited the whole Eastern church in the eighth century, dating in its definite character from a decree of the Emperor Leo, the Isaurian, which enjoined the destruction of such images. The question was settled by ecclesiastical authority at the second Council of Nicæa (787) (q.v.), when the cult of images was sustained as veneration, not adoration. In 811, under a new line of iconoclastic emperors headed by Leo V, the controversy raged anew till 842, when images were restored by Imperial command. There was also some iconoclastic trouble after the second Council of Nicæa in the Frankish church. During the Reformation the Protestant revolt against images in the churches caused iconoclasm both on the Continent and in England. Consult Schwartzlose, *Der Bilderstreit* (Gotha, 1890), and Harnack, *History of Dogma,* vols. iii, iv, v (Boston, 1897–99). See IMAGE WORSHIP.

ICON′OCLAST. The nom de plume of Charles Bradlaugh.

ICONOCLAST EMPERORS. The Byzantine emperors by whom the contest against iconolatry in the Eastern church was waged: Leo III the Isaurian, Constantine V, Leo IV, Leo V the Armenian, and Theophilus.

I′CONOG′RAPHY. A term originally used, in its etymological sense, to signify the science of antique portraiture, i.e., the discussion, enumeration, and history of the portraits of prominent persons in statues, busts, paintings, coins, gems, etc. This science was first resurrected by Michelangelo and Fulvius Ursinus, and further developed by Canini, in his *Iconografia* (Rome, 1669), and especially by Visconti in a series of monumental works cited below. The term "iconography" is occasionally applied to the portraits or images of mythological personages and objects of antiquity—a subject generally treated in the article MYTHOLOGY IN ART. Its chief use, however, is in reference to the attributes, emblems, and symbols with which Christian deities, saints, and conceptions are represented in art.

Christian Iconography. In the early Christian centuries the representations were few in number and quite simple, leaving much freedom to the artist. They embraced subjects like the "Good Shepherd" and the emblems of faith, familiar to all. In the fourth and fifth centuries iconography became more complicated. The clergy began to use it as a factor of systematic religious instruction, controlling the representations which were now executed in strict accordance with formulas. Christ, as King of Heaven, was by far the favorite subject from the fourth to the seventh century, while from the eighth to the twelfth the "Last Judgment" and scenes from the Revelation were in vogue. There were two schools—the Eastern, or Byzantine, and the Western, or Latino-German. The former was by far the most original and important, dominating not only the East, but Europe during the Carlovingian period, and remaining supreme in Italy until late in the Gothic age. It found its expression in mosaics, frescoes, and illuminated manuscripts, sculpture being excluded as a result of the iconoclastic conflict. (See BYZANTINE ART.) The iconography of the Romanesque (q.v.) period was meagre and unsystematic, but during the Gothic age an independent Western system originated in France, spreading throughout Europe. In the North it found its chief expression in the sculptures of the great cathedrals and endeavored to represent the encyclopædic conceptions of the scholastics. (See GOTHIC ART.) In Italy it manifested itself chiefly in painting. Iconography remained under clerical control until, with the Renaissance, the human element superseded the divine, the old subjects being used as a means for the expression of human feeling and artistic ability. The old subjects from biblical history, especially those illustrating the plans of salvation and those from the lives of the saints, continued

to be used, the most popular subject being the Madonna with the Christ Child, represented as an earthly mother or in more divine attitudes. The more important subjects of Christian iconography are treated under separate titles, like CHRISTIAN ART; JESUS CHRIST IN ART; HOLY FAMILY. For the important part played by emblems and symbols in iconography, see the article SYMBOLISM, and such special articles as AUREOLE; NIMBUS; ETC.

Bibliography. The foundations of the modern science of Christian iconography were laid by Didron, *Iconographie chrétienne, grecque et latine* (Paris, 1845; Eng. trans. in Bohn's Library, based on the treatise of the Byzantine monk Dionysos (London, 1851). Consult Durand, *Histoire de Dieu, iconographie des personnes divines* (Paris, 1844), and Wessely, *Ikonographie Gottes und der Heiligen* (Leipzig, 1875). The best modern works are: Barbier de Montault, *Traité d'iconographie chrétienne* (Paris, 1890); Detzel, *Die christliche Ikonographie* (Freiburg, 1895). There is no scholarly work on the subject in English, but a number of popular treatises, such as A. B. Jameson, *Sacred and Legendary Art* (2 vols., London, 1863); C. E. Clement, *Angels in Art* (Boston, 1898); *Saints in Art* (ib., 1899); N. R. E. Bell, *Lives and Legends of the Evangelists, Apostles, and other Early Saints* (New York, 1901); id., *Lives and Legends of the Great Hermits and Fathers of the Church* (ib., 1902). A good brief manual, alphabetically arranged, is by Liefmann, *Kunst und Heilige* (Jena, 1912). For iconography in the sense of classical portraiture, consult the monumental works of Visconti: *Iconographie grecque* (3 vols., Paris, 1808); *Iconographie romaine* (3 vols., ib., 1818–20); Bernouilli, *Römische Ikonographie* (Stuttgart, 1882–91); *Griechische Ikonographie* (Munich, 1901).

ICONOSTASIS, ī'kŏ-nŏs'tà-sĭs. A screen in a Greek church or basilica, separating the sanctuary from the rest of the church; so called from the pictures (*icons*) of Christ, the Virgin, and saints usually placed upon it. It is usually a solid screen, with three doors hung with curtains which are dropped during the celebration of the Mass. The open screen of columns in St. Mark's at Venice is often called the iconostasis, but with doubtful propriety. See BYZANTINE ARCHITECTURE; CHURCH.

ICTEROHÆMATURIA, ĭk'tēr-ō-hĕm'à-tū'rĭ-à (Neo-Lat., from Gk. *ἴκτερος, ikteros*, jaundice + *αἷμα, haima*, blood + *οὖρον, ouron*, urine), CARCEAG or PIROPLASMOSIS OF SHEEP. A malignant disease of sheep in Europe, due to the action of (*Piroplasma*) *Babesia ovis*, a parasite of the red blood corpuscles closely related to that of Texas fever. In nature this protozoan parasite is transmitted from diseased to healthy sheep by a tick, *Rhipicephalus bursa*. The chief symptoms are fever; constipation followed by diarrhœa; bloody urine; jaundice of the eyelids, nostrils, and sometimes of the skin; and paralysis of the hind quarters. During the progress of the disease there is a decrease in the number of red blood corpuscles and an increase in the number of white corpuscles. Post mortem examinations reveal hemorrhagic inflammation, an acute swelling of the spleen, and parenchymatous degeneration of the liver and kidneys. The disease occurs in restricted localities, where it causes serious losses of sheep. It appears to be safe, however, to raise goats on such infected areas. Recovery from the disease conveys to the sheep an immunity of long duration against new infection. Consult Hutyra and Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol. i (Amer. ed., from 3d rev. Ger. ed., 2 vols., Chicago, 1912).

IC'TERUS. See JAUNDICE.

ICTI'NUS (Lat., from Gk. *Ἰκτῖνος*). The chief architect of the age of Pericles, designer of the Parthenon (q.v.) at Athens, the great hall for the mysteries (Telesterion) at Eleusis (q.v.), and the temple of Apollo Epicurius at Phigalia (q.v.; see also PHIGALIAN MARBLES). He is said to have written an architectural treatise on the Parthenon.

I'DA (Lat., from Gk. *Ἴδη, Idē, Ἴδα, Ida*). A mountain range of Asia Minor, extending through Phrygia and Mysia; now known as Kaz Dagh. The Granicus, the Simois, the Scamander, and other streams famous in ancient story flowed from its sides. The highest peak was Mount Gargarus, 5748 feet, near the plain of Troy. Ida was an ancient seat of the worship of Cybele, who was hence called *Idæa Mater*. There was another Ida, almost equally famous, in Crete. This is now called Psiloriti. It rises to a height of about 8000 feet above sea level. Zeus is said to have been nurtured in a cave in this mountain. See JUPITER.

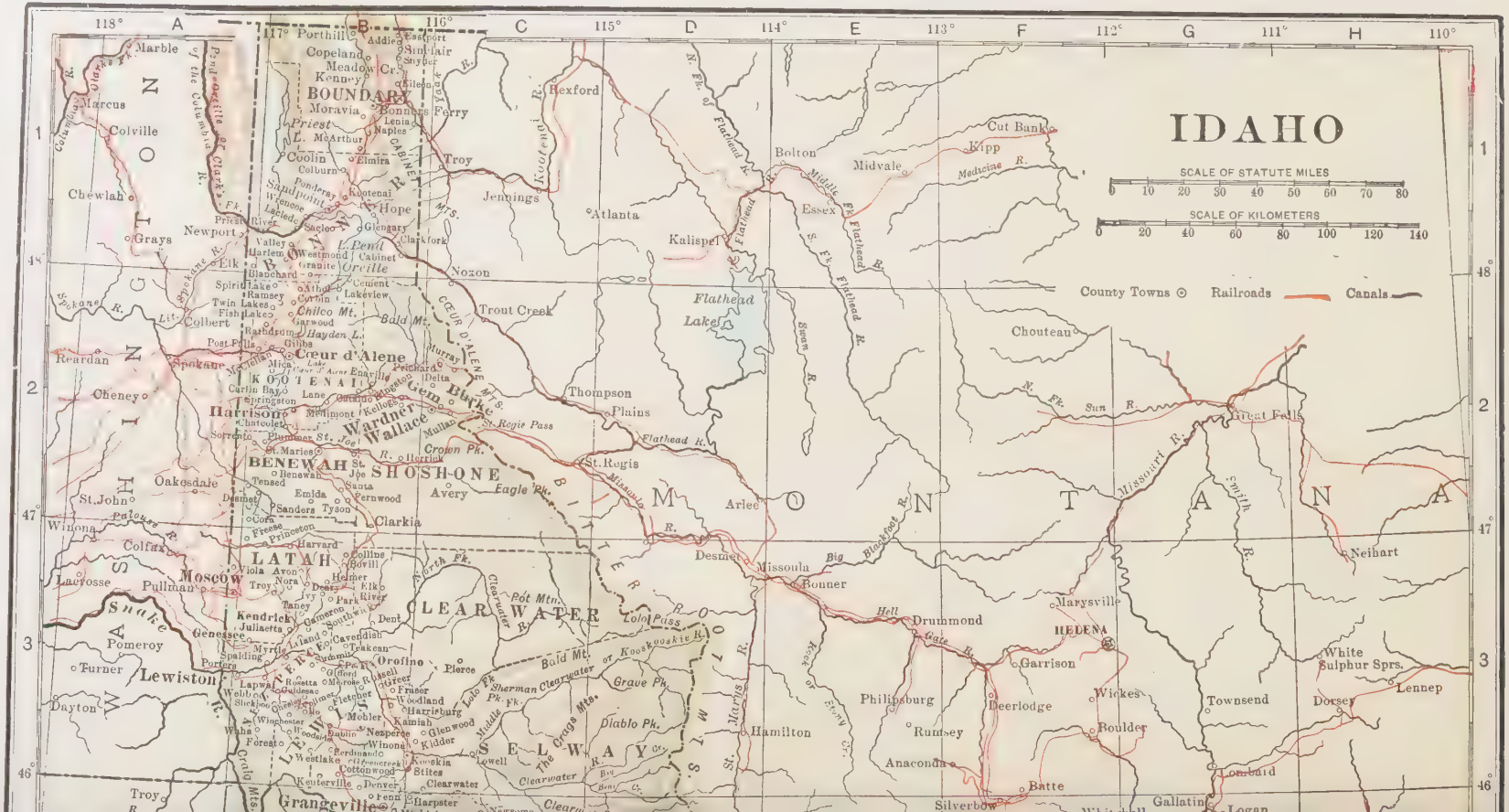
IDA. The princess, in Tennyson's poem of that name.

IDÆ'I DAC'TYLI (Lat., from Gk. *Ἰδαῖοι Δάκτυλοι, Idaioi Daktyloi*). Like the Corybantes and the Curetes, the Idæi Dactyli were attendants upon Cybele (q.v.), and were originally connected with Mount Ida in Phrygia, whence they were transferred to Mount Ida in Crete; there they watched the infant Zeus. (See IDA.) They are supernatural metal workers (their names meant Furnace, Smith, Anvil, etc.). They seem to have derived the title "dactyli" from their ready fingers (compare *δάκτυλος*, finger). Some regard them as idealized inhabitants of the region, which abounds in metals. Their number is given as 5, or 10, or sometimes even 100. In Greece they appear only at Olympia, where they seem to have been brought from Crete and were identified with Hercules and four brothers who first competed in the foot race.

IDA GROVE. A city and the county seat of Ida Co., Iowa, on the Maple River, 80 miles by rail east by south of Sioux City, on the Chicago and Northwestern Railroad (Map: Iowa, B 2). It is the commercial centre of a fertile agricultural and stock-raising district and has grain elevators, a flour mill, two hospitals, a cigar factory, cement-block works, etc. A municipal heating and electric-lighting plant is in successful operation. Pop., 1900, 1967; 1910, 1874.

IDAHO, ī'dà-hō (N. Amer. Indian, gem of the mountains, or sunrise mountains). One of the Western States of the American Union, lying between lat. 42° and 49° N. and long. 111° and 117° W. It is bounded on the north by British Columbia and Montana, on the east by Montana and Wyoming, on the south by Utah and Nevada, and on the west by Oregon and Washington. The extreme length from north to south along the west boundary is 483.5 miles. The width varies from about 45 miles in the north to 310 miles in the south. Its area is 84,000 square miles, including 534 square miles covered by lakes.

Topography. The surface of Idaho is greatly


IDAHO
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SCALE OF KILOMETERS
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BONNER
KOOTENAI
SHOSHONE
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LATAH
CLEARWATER
NEZ PERCE
LEWIS
IDAHO
NEVADA
MONTANA
Porthill
Bonners Ferry
Rexford
Troy
Moscow
Lewiston
Pullman
Coeur d'Alene
Spokane
Wallace
Kellogg
Grangeville
Orofino
Kamiah
Harrison
St. Maries
Clarkia
Avery
Kalispell
Bolton
Cut Bank
Midvale
Essex
Atlanta
Jennings
Trout Creek
Thompson Plains
St. Regis
Arlee
Missoula
Bonner
Desmet
Drummond
Philipsburg
Hamilton
Anaconda
Butte
Silverbow
Garrison
Helena
Marysville
Beerlodge
Rumsey
Boulder
Townsend
Great Falls
Chouteau
Neihart
White Sulphur Sprs.
Lennep
Dorsey
Lombard
Gallatin
Logan
Flathead Lake
Flathead R.
Clearwater R.
Snake R.
Clark Fk.
Kootenai R.
Missouri R.
Big Blackfoot R.
Bitter Root Mts.
Coeur d'Alene Mts.
Cabinet Mts.
Bitter Root Mts.
Crags Mts.
Selway R.
Lochsa R.
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St. Regis Pass
Lolo Trail
Lolo Creek
Lolo Pk.
Diablo Pk.
Grave Pk.
Eagle Pk.
Crown Pk.
Pot Mtn.
Bald Mt.
Sherman Clearwater
Hell Gate R.
Gate R.
Smith R.
Sun R.
Medicine R.
Kipp
Priest River
Priest L.
Pend Oreille L.
Hayden L.
Coeur d'Alene L.
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Colville
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Grays
Reardan
Cheney
Oakesdale
St. John
Winona
Colfax
Lacrosse
Pomeroy
Turner
Dayton
Genesee
Kendrick
Juliaetta
Troy
Deary
Orofino
Pierce
Weippe
Kooskia
Stites
Kooskia
Lowell
Clearwater
Denver
Cottonwood
Winchester
Nezperce
Lapwai
Lewiston
Sandpoint
Priest River
Newport
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Harrison
Rathdrum
Post Falls
Spokane
Cheney
Reardan
Colbert
Fish Lake
Twin Lakes
Spirit Lake
Athol
Hayden L.
Coeur d'Alene L.
Chilco Mt.
Bald Mt.
Murray
Pritchard
Delta
Enaville
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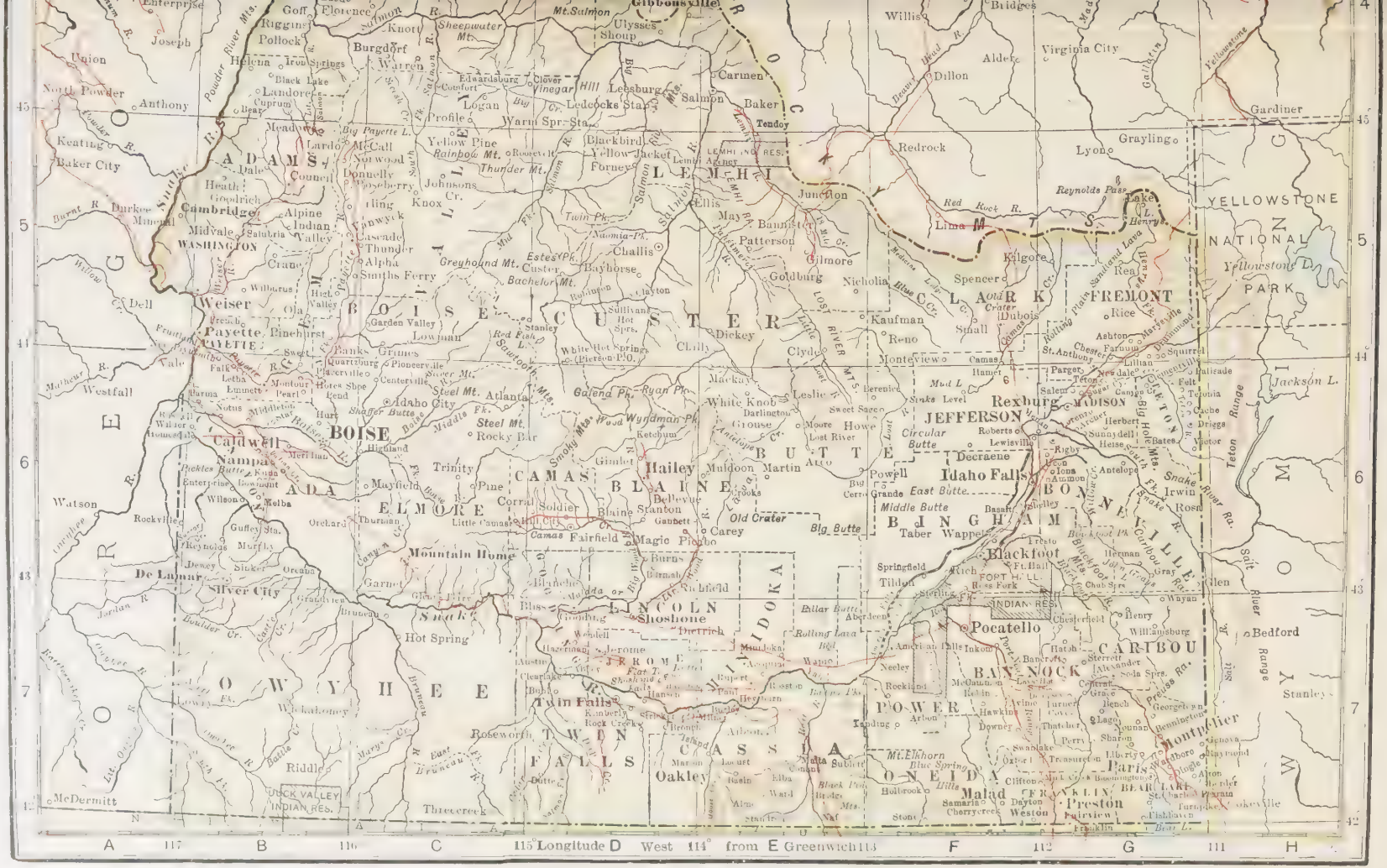
Gibbonville
Mt. Salmon
Ulysses
Shoup
Willis
Bridges
Virginia City
Alder
Dillon
Gardiner
Carmen
Salmon
Baker
Tendoy
Leesburg
Ledocks Sta.
Warm Spr. Sta.
Logan
Profile
Blackbird
Yellow Jacket
Redrock
Lyon
Grayling
Lemhi Agency
Junction
Ellis
Mayfield
Bannister
Patterson
Challis
Bayhorse
Gilmore
Goldburg
Nicholia
Spencer
Kilgore
Reynolds Pass
Lake
L. Henry
YELLOWSTONE NATIONAL Yellowstone D. PARK
Lima
Red Rock R.
Kaufman
Reno
Dickey
Clyde
Chilly
Monteview
Camas
Hamer
Dubois
Small
Rice
FREMONT
Ashton
Parker
Teton
Newdale
Lillian
Felt
Tetonia
Victor
Driggs
Teton Range
Jackson L.
Palisade
Salem
Rexburg
MADISON
Sunnydell
Heise
Roberts
Lewisville
Rigby
Ucon
Idaho Falls
Ammon
Antelope
Irwin
Rosn
Decraene
Powell
Grande
East Butte
Middle Butte
Big Butte
Arco
Howe
Lost River
Leslie
White Knob
Darlington
Sweet Sacco
Mackay
Muldoon
Martin
Hailey
BLAINE
CAMAS
BUTTE
JEFFERSON
BONNEVILLE
BINGHAM
Taber
Wapello
Blackfoot
Springfield
Aich
Tilden
Sterling
FORT HALL
Ft. Hall
Ross Fork
Chut Spr.
INDIAN RES.
Pocatello
Chesterfield
Henry
Williamsburg
Bedford
CARIBOU
BANNOCK
Inkom
Lava
Hatch
Bancroft
Alexander
Soda Spr.
Sterrett
Central
Grace
Bench
Georgetown
Montpelier
Genoa
Sharon
Liberty
Paris
Bloomington
Clifton
Dayton
Weston
Preston
Fairview
Franklin
Malad
ONEIDA
FRANKLIN
BEAR LAKE
Mt. Elkhorn
Blue Spring
Hollbrook
Cherrycreek
Samaria
Arbon
Downey
Tyhee
Lago
Swanlake
Oxford
Treasureton
Perry
Thatcher
Yanan
Stanley
Range
Snake River Ra.
Teton Range
Big Hole Mts.
Snake R.
Spit
Caribou Mts.
Blackfoot Mts.
Gray Ra.
Preuss Ra.
Bear R.
Bear L.
Aberdeen
Rockland
Neeley
Raft R.
Rolling Lava Bed
Pillar Butte
Shoshone
Dietrich
LINCOLN
Wendell
Hazelton
Jerome
Gooding
Bliss
Twin Falls
Kimberly
Rock Creek
Hansen
Filer
Rogerson
TWIN FALLS
CASSIA
Oakley
Albion
Elba
Malta
Burley
Basin
Ward
Almo
Naf
Stone
Yale
Clarkston
Paul
Rupert
Heyburn
Minidoka
Acequia
Jerome
Fat T.
Shoshone
Hot Spring
Hot Springs
Thousand Springs
Snake R.
MINIDOKA
OWYHEE
ADA
ELMORE
BOISE
CUSTER
LEMHI
ADAMS
WASHINGTON
PAYETTE
CANYON
GEM
Caldwell
Nampa
Meridian
Kuna
Boulevard
Enterprise
Wilson
Melba
Watson
Rockyville
Guffey Sta.
Reynolds
Murphy
Dewey
Silver City
De Lamar
Owyhee
Orchard
Thurman
Mayfield
Trinity
Pine
Corral
Soldier
Hill City
Little Camas
Camas
Fairfield
Magic
Picabo
Carey
Gannett
Bellevue
Blaine
Stanton
Ketchum
Sun Valley
Wood R.
Wyndman Pk.
Galena Pk.
Ryan Pk.
Steel Mt.
Rocky Bar
Atlanta
Idaho City
Placerville
Quartzburg
Pioneerville
Centerville
Grimes
Banks
Garden Valley
Lowman
Crouch
Horseshoe Bend
Boise
Middleton
Star
Notus
Parma
Letha
Emmett
Montour
Sweet
Falk
Vale
Ontario
Weiser
Cambridge
Midvale
Salubria
Valley
Indian
Alpine
Heath
Goodrich
Baker City
Keating
North Powder
Anthony
Union
Joseph
Enterprise
Cove
Elgin
Island City
La Grande
Imbler
Summerville
Meacham
Pilot Rock
Pendleton
Umatilla
Hermiston
Echo
Stanfield
Irrigon
Boardman
Ione
Lexington
Heppner
Willow
Gooseberry
Condon
Fossil
Wheeler
Mitchell
Prineville
Redmond
Madras
Metolius
Culver
Sisters
Bend
Tumalo
Powell Butte
Crooked R.
Deschutes R.
Ochoco Mts.
Blue Mts.
Wallowa Mts.
Seven Devils
Salmon R.
Snake R.
Columbia R.
Powder River Mts.
Burnt R.
Malheur R.
Owyhee R.
Jordan
Bruneau
Boulder Cr.
Big Wood
Big Lost
Little Lost
Lost River Mts.
Lemhi Mts.
Beaverhead Mts.
Pioneer Mts.
Smoky Mts.
Sawtooth Mts.
Boise Mts.
Middle Fk.
Steel Mt.
Galena Pk.
Ryan Pk.
Wood R.
Wyndman Pk.
Sawtooth
Thunder Mt.
Rainbow Mt.
Yellow Pine
Meadows
Big Payette L.
Lardo
McCall
Norwood
Donnelly
Knox
Johnsons
Cr.
Cascade
Thunder
Alpha
Smiths Ferry
Greyhound Mt.
Custer
Bayhorse
Challis
Twin Pk.
Atomia Pk.
Bonanza
Estes Pk.
Bachelor Mt.
Robinson
Sullivan
Hot Spgs.
Clayton
Stanley
Red Fish L.
Sawtooth
White Hot Springs
Pierson P.O.
Lowman
Garden Valley
Grimes
Pioneerville
Centerville
Quartzburg
Banks

diversified. Almost the entire State is in the drainage area of the Columbia River and is naturally divided into two sections by the Salmon River Mountains, which cross it from east to west at about 45° N. All rail communication between north and south Idaho is (1914) by means of lines running for a large part of the distance outside of this State. The elevation varies from 738 feet at Lewiston, where the deep cañon of the Snake leaves the State on the west border, to the snow-clad peaks of the Sawtooth Mountains, over 12,000 feet high. The general elevation is from 2000 to 7000 feet.

The mountain systems are numerous and irregular, including the Bitter Root Mountains and continental divide in the north, rising to an elevation seldom greater than 6500 feet, while to the south some of the peaks reach 11,000 feet; the Salmon River and Sawtooth ranges (central), containing the loftiest summits and noted for their rugged character and alpine scenery; and many minor ranges with distinct names.

The dominating physiographic feature of south Idaho, and the one most affecting its economic development, is the vast Snake River plain, stretching in a curved course, concave to the north, quite across the State, in a belt 50 to 75 miles wide and 350 miles along its medial line. The elevation gradually increases from 2114 feet at Weiser on the west to 4959 feet at St. Anthony on the east. It was built up principally of lava outpoured in great horizontal sheets and contemporaneously by lake and stream sedimentation and by æolian deposits. The Snake River (Lewis Fork) traverses it a part of the distance in box cañons, but in other portions builds up flood plains. The characteristic vegetation is an arborescent growth of sagebrush (*Artemisia tridentata*), which with the scarcity of water has given the plain a desert aspect. In reality the soil of great areas becomes wonderfully fertile upon irrigation, and it is this possibility which is the controlling factor in the settlement of south Idaho. A number of streams, as Big and Little Lost rivers, Birch and Camas creeks, reach the Snake River plain only to disappear.

Water power on a great scale constitutes one of the State's leading resources. Modern plants have been installed along the Snake at American Falls, the Minidoka Dam, Shoshone Falls, Swan Falls, Salmon Falls, the Thousand Springs, on the Malade at its mouth, and at Post Falls on the Spokane. In each case several thousand horse power are developed, but this is less than 3 per cent of the possible development throughout the State.

In the north there are numerous lakes, the largest of which are Cœur d'Alene, Pend Oreille, and Priest. In the centre are the Payette lakes and in the southeast, on the Utah line, Bear Lake.

Climate. Idaho enjoys a milder climate than its latitude and altitude would indicate, through the effect of the mild conditions of the north Pacific on the one side and the protection of the great continental divide on the other. In the north the climate is ordinarily free from extremes of heat or cold, owing to the proximity of the Pacific Ocean and the occurrence of chinook winds. In south Idaho the climate is varied in the extreme. There are large areas where the snow seldom remains long and flowers bloom in January, while in the near-by mountains a fire is needed almost every evening in the year. Normal annual precipitation ranges from 8 inches in part of the Snake River plain to 40 inches in the Bitter Root Mountains. The heavy precipitation of the mountains comes largely in the form of snow and is stored for summer use in irrigation of the plains and valleys below. The average highest temperature attained throughout the State in summer is 100.8° F., while the average lowest temperature in winter is — 21.5° F. The mean annual temperature is 45.5° F.

Soils. North Idaho is noted for the fertility of the famous Palouse soil and that of the Nez Percé and Camas prairies, produced by disintegration of the lava outflows and by æolian action. These are famous for their production of macaroni wheat. The soils of the broad valleys of the Panhandle, black in color and rich in vegetable mold, are exceptionally fertile. The soils of south Idaho are exceptionally well supplied with all elements of fertility, except in regions of deficient rainfall, which are low in humus and nitrogen.

Geology. Taking the State from north to south, in the Panhandle we have the Paleozoic sediments to the east, and some granites and schistose rock to the west in the neighborhood of Priest Lake. The sediments extend to about the north boundary of Latah and Clearwater counties, where they join the granite area to the east and the basalt to the west. The granite area extends south almost to the Snake River, but is complicated with large areas of Paleozoic sediments and Archean gneisses towards the Montana boundary. The basalt area extends south from Latah County into Washington and Oregon and thence up the Snake River almost to the eastern boundary and also south to the Nevada line. In the extreme southeastern corner there is a complex of sedimentary rock, mainly Carboniferous limestone. Glacial action is marked in many parts of central and north Idaho.

Flora and Fauna. See paragraphs on these respective topics under the article Rocky Mountains.

Mining. The State has valuable mineral resources, many of which have not been fully developed. The centre of the industry is the Cœur d'Alene lead-silver mining districts in Shoshone County. Lead, the mineral product of chief value, constitutes approximately 60 per cent of the State's total mineral production, which in 1914 was 345,000,000 pounds, valued at $13,198,000, the State ranking second only to Missouri in the production of lead ores. Silver is second in importance among the mineral products, Idaho being outranked only by Nevada, Utah, and Montana. The mine yield of silver in 1914 amounted to 13,000,000 ounces, valued at more than $7,115,000. Nearly all the silver is derived from lead ore and concentrate. A considerable amount of gold is produced from both placer and quartz mines, the product of 1914 being valued at $1,115,000. The gold production from quartz mines has decreased, but gold output from dredging has increased; 35 per cent of the gold is produced in Boise County, which leads Owyhee and Lemhi counties in the order named. Idaho's importance as a producer of copper is increasing, the output in 1913 being 9,592,966 pounds, valued at $1,486,910. The production fell off in 1914 to 5,500,000 pounds, of $724,000 value. About 60 per cent of this

mineral comes from Shoshone County. Zinc production amounted in 1914 to 19,307 short tons. Other mineral products included clay products, coal (lignite), gem materials, lime, mica, phosphate rock, salt, sand, gravel, sand-lime brick, and stone. A non-metallic resource of great promise is phosphate, found mostly in the southeastern part of the State. The total mineral products in 1913 were valued at $24,565,826. In 1914 the products of gold, silver, copper, lead, and zinc were valued at $24,141,000. In that year there were 384 producing mines.

Forests. Approximately one-third of Idaho is covered with timber. The total stand is estimated by the government at 129,000,000,000 feet board measure. The species of commercial value belong almost wholly to the coniferous group and occupy the more mountainous portions. In the northern part, however, in the valleys of some of the larger streams and on the flat, marshy lands adjacent to lakes, the black cottonwood (*Populus trichocarpa*) forms dense stands of merchantable timber of large size. This is the only hardwood growing in merchantable quantities.

The coniferous species, discussed in the order of their importance, are the western white pine (*Pinus monticola*) in the lower valleys and the northern slopes (to an elevation of 4500 feet) of all the northern counties; yellow pine (*Pinus ponderosa*), occupying the drier regions (at elevations below 5000 feet) supporting tree growth, and also the southern slopes of the white-pine belt, comprising nearly 40 per cent of the total stand of merchantable timber; western red cedar (*Thuja plicata*), coextensive with the white pine, but also found farther south on the eastern side of this State; Douglas, or red, fir (*Pseudotsuga taxifolia*), coextensive with the yellow pine but found also at higher elevations; western larch (*Larix occidentalis*), found associated with the white and yellow pine and Douglas fir; white fir (*Abies grandis*), scattered generally over the entire timbered area; Engelmann spruce (*Picea engelmanni*), confined to the northern slopes; lodgepole pine (*Pinus contorta-murrayana*), confined to the dry areas; western, or lowland, hemlock (*Tsuga heterophylla*), which grows to large size in the extreme north; limber pine (*Pinus flexilis*); and western juniper (*Juniperus occidentalis*), on the north slopes of the hills in parts of the arid belt in the south.

Approximately 20,000,000 acres of Idaho land is included in national forests, and over 4,000,000 acres, owned mostly by large corporations, is under the protection of the North Idaho Forestry Association, which is composed of four smaller timber protective associations. In 1909, 4036 farms reported forest products to the value of $1,280,512.

Agriculture. By far the greater portion of the agricultural land is found in the plains on the banks of the Snake River. When irrigated, these prove to be wonderfully fertile. On the uplands heavy yields of wheat are secured without irrigation. On the alluvial bottoms and the bench lands of the small valleys in the Rocky Mountain portion of the State there are numerous areas of irrigated and dry farmed lands.

Of the total approximate land area of 53,346,560 acres in 1910, there were, in farms, 5,283,604 acres; in improved land in farms, 2,778,740 acres. The number of all farms in 1910 was 30,807 compared with 17,471 in 1900. The average acres per farm decreased from 183.4 in 1900 to 171.5 in 1910. The value of farm property in 1910 was $305,317,185, compared to $67,271,202 in 1900. Another great increase was in the average value of property per farm, which was $9911 in 1910 and but $3850 in 1900. The average value of farm per acre in 1910 was $41.63 and, in 1900, $11.07. Of the State's entire land area in 1910 9.9 per cent was in farms. Only five counties had more than one-fifth of their land in farms in that year. One of the striking characteristics of the State's agriculture is the presence of great areas of semiarid lands utilized, if at all, only for grazing purposes, these districts being divided into large ranches, frequently exceeding 100,000 acres in extent.

In 1910, 27,619 farms were operated by owners and managers and 3188 by tenants. A great majority of these have been acquired by their owners or operators from the government or private corporations in the form of homesteads, Carey Act entries, desert-land entries or irrigated farms, the actual number of farms in the hands of tenants doubling in the decade 1900–10. In 1910 four-fifths of the farmers were native whites, the foreign-born white farmers immigrating principally from Germany, Sweden, England, Denmark, and Canada. The general character of the agricultural products in 1914 is indicated by the following table:

LEADING CROPS	Acreage	Prod. bu.	Value
Corn	19,000	589,000	$424,000
Wheat	549,000	14,362,000	12,495,000
Oats	332,000	14,608,000	5,551,000
Barley	185,000	7,030,000	3,515,000
Rye	3,000	60,000	40,000
Potatoes	34,000	5,270,000	2,530,000
Hay	705,000	*1,868,000	13,636,000

*Tons.

It will be noted that cereals, hay, and forage constitute the larger part of the crop production, the remainder consisting mostly of potatoes and vegetables, forest products, and fruits and nuts. In 1909 the product of sugar beets was valued at $813,604. Orchard fruits were produced in the same year to the value of $863,516. This total included apples, peaches, nectarines, pears, plums, prunes, cherries, and apricots. Strawberries, which are the most important small fruit, yielded 953,723 quarts, valued at $92,904 in 1909, out of a total value for all small fruits of $201,525. In 1912 the estimated acreage of orchards was 142,773, 40,000 of these being estimated to be fruit bearing. The estimated value of fruit products in 1912 was $3,000,000, the product being shipped principally to Chicago and eastern markets and to Europe.

Stock Raising. The estimated acreage of pasture land in Idaho is over 25,000,000, indicating that the cattle-raising industry is still of great importance, although short summers and depth of winter snows in the north and mountainous parts increase considerably the expense, confining the most productive stock-raising territory to the valleys along the Snake River. Estimates for Jan. 1, 1914, place the number of dairy cows at 112,000 and other cattle at 354,000. The total value of all cattle for 1912 was $22,403,000. The estimated number of horses in 1914 was 224,000, valued at $22,464,000. The estimated number of mules in the

same year was 4000, valued at $412,000. The estimated number of sheep in 1914 was 2,981,000, valued at $12,520,000. In 1910 fowls of all kinds on farms numbered 1,053,876, valued at $598,190. In 1909 the production of eggs amounted to 5,088,988 dozen, valued at $1,213,724. In 1909, 20,861,072 gallons of milk and 3,542,135 pounds of butter, valued at $982,397, were produced on farms. The total value of milk, creamery butter, and cheese was $1,962,500.

Irrigation. The occurrence of widespread areas of level or gently sloping fertile land combined with deficient rainfall, notably in the Snake River plain and its tributary valleys, has given opportunity for many large irrigation projects, especially those built by private capital under the Carey Act (1894) and by the Federal government under the Reclamation Act (1902). At Milner is a rock-fill dam across the channel of the Snake, which is the diversion dam for the main canals of two of the largest Carey Act projects as yet constructed, the Twin Falls North Side and Twin Falls South Side, each irrigating over 200,000 acres. Another rock fill is the Reclamation Service Dam across the Snake at Minidoka. It diverts water for 119,000 acres, 49,000 of which are reached by pumping, with a maximum lift of 90 feet. Ten thousand electric horse power are generated at this dam, of which 7000 are used in summer to run the pumps. Near Twin Falls are two high-storage dams for Carey Act projects—the Salmon River Dam, a concrete structure 220 feet high, and the Oakley Dam, an earth dam with concrete core 143 feet high. In the Arrow Rock Dam, a storage dam built by the government across the Boise River, Idaho has the highest masonry dam in the world. It is 351 feet high, crest length 1060 feet, concrete required 530,000 cubic yards, and has a reservoir capacity of 230,000 acre feet.

Manufactures. Since its admission as a State in 1890, the manufacturing industries of Idaho have more than kept pace with the growth of population. Industries, as a whole, showed a large percentage of increase during the five-year periods 1899–1904 and 1904–09. The accompanying table shows the most important facts in relation to the manufacturing industries in 1909, in comparison with 1904:

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE—ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Cost of materials	Value of products	Value added by manufacture
					Expressed in thousands				
All industries	1909	725	9,909	8,220	$32,477	$5,498	$9,920	$22,400	$12,480
	1904	364	3,791	3,061	9,689	2,059	4,069	8,769	4,700
Brick and tile	1909	36	347	286	800	179	109	444	335
	1904	19	95	72	91	45	27	113	86
Butter, cheese, and condensed milk	1909	18	159	118	231	77	681	884	203
	1904	16	35	13	44	10	136	172	36
Cars and general shop construction and repairs by steam-railroad companies	1909	5	870	849	468	672	659	1,366	707
	1904	8	753	713	183	539	326	914	588
Flour-mill and gristmill products	1909	57	242	125	2,038	91	2,025	2,480	455
	1904	28	127	84	685	67	1,315	1,584	269
Liquors, malt	1909	11	111	74	1,231	65	234	698	464
	1904	14	86	61	459	54	74	303	229
Lumber and timber products	1909	256	5,904	5,212	17,872	382	3,345	10,689	7,344
	1904	107	1,670	1,449	3,516	3,876	906	3,142	2,236
Printing and publishing	1909	132	758	468	1,106	373	243	1,148	905
	1904	91	398	258	488	178	107	549	442
All other industries	1909	210	1,518	1,088	8,731	659	2,624	4,691	2,067
	1904	81	627	411	4,223	290	1,178	1,992	814

The total number of wage earners in 1909 was 8220. Of these 8035 were men and 155 women. There were only 30 persons under 16 years of age employed. For the majority of the wage earners the prevailing hours of labor in 1909 were 60 a week, 24.1 per cent of the total being employed in establishments where they work less than that number of hours, and only 10 per cent being employed where they work longer. Boise, the capital and metropolis, is not important as a manufacturing centre. In 1909, 6.9 per cent of the establishments, 5 per cent of the wage earners, and 7.4 per cent of the value of products were found in that city.

Transportation. In recent years there has been considerable building of railroads, the mileage increasing from 1740 on Jan. 1, 1907, to 3577 in 1914, these figures including single and double tracks, yard tracks, and sidings. The Oregon Short Line passes through the southern part of the State and has the greatest length of line, 1336 miles. The Northern Pacific with 320 miles of track, the Great Northern with 80, and the Chicago, Milwaukee, and Puget Sound with 180, pass through the northern portion. The Oregon-Washington Railroad and Navigation Company has 135 miles of track, and the Spo-

kane International Railway Company 122 miles. A Public Utilities Commission has general charge of the regulation of railway rates. The development of mines within the great central part of the State has stimulated the construction of wagon roads and trails, but these are not adequate to the needs of the district.

Banks. There were, on June 4, 1913, 55 national banks, with a capital of $3,495,000 and deposits aggregating $29,231,000; 118 State banks, with deposits subject to check amounting to $8,677,451; and savings banks with 962 depositors, with deposits subject to check aggregating $47,710, and savings deposits amounting to $183,495. In addition there were 11 loan and trust companies, with deposits subject to check amounting to $1,533,218 and savings deposits amounting to $276,046. Private banks numbered 6, with deposits of $55,534.

Government. The present constitution was adopted by a convention held in 1889. Up to 1913 there were 22 amendments. An amendment to the constitution may be proposed in either branch of the Legislature, and, if agreed to by two-thirds of all the members of each House, voting separately, it shall be presented to the electors at the next general election. A convention for the revision or amendment of the constitution may be held upon recommendation to the electorate by vote of two-thirds of the members elected in each branch of the Legislature and majority vote of the electors at the next general election. The convention shall consist of a number of members not less than double the number of the most numerous branch of the Legislature.

Legislative.—The legislative power is vested in a Senate and House of Representatives. The Senate consisted in 1914 of 33 members and the House of 61 members. The Legislature has the power of increasing the number of Senators and Representatives. The House is composed of at least one member from each county, and it must never exceed three times the membership of the Senate. Both Senators and Representatives are elected for a term of two years. Sessions of the Legislature are held biennially, commencing on the first Monday after the first day of January. On Nov. 5, 1912, the people approved an amendment providing for the initiative and referendum.

Executive.—The executive department consists of the Governor, Lieutenant Governor, Secretary of State, State Auditor, Attorney-General, and Superintendent of Public Instruction, each holding office for two years. The Governor, Lieutenant Governor, and Attorney-General must be 30 years of age at the time of their election. The Governor, Secretary of State, and Attorney-General constitute a board of pardons. The Governor has the usual veto power, and the Lieutenant Governor is President of the Senate. The Governor, Secretary of State, and Attorney-General constitute a board of State-prison commissioners, and the Governor, Superintendent of Public Instruction, Secretary of State, Attorney-General, and State Auditor constitute a State board of land commissioners which has direction, control, and disposition of the public lands under such regulations as may be prescribed by law.

Judiciary.—The judicial power is vested in a court for the trial of impeachments, a supreme court, district courts, probate courts, courts of justices of the peace, and such other courts inferior to the supreme court as may be established by law for any incorporated city or town. The court for the trial of impeachments is the Senate. The supreme court consists of five justices, a majority of whom is necessary to make a quorum or pronounce a decision. The justices of the supreme court are elected by the electors at large. The term of office is six years. The State is divided into nine judicial districts, for each of which (except the third, fourth, and eighth) a judge, whose term of office is four years, is chosen by the qualified electors thereof. In the excepted districts there are two judges. District courts must be held in each county at least twice in each year. The Legislature has the power to reduce or increase the number of districts, district judges, and prosecuting attorneys. A prosecuting attorney is elected for each county by the qualified electors thereof and holds office for two years. The judges of the district courts are required on the first day of July in each year to report in writing to the justices of the supreme court such defects or omissions in the laws as their knowledge and experience may suggest, and the justices of the supreme court shall, on or before the first of December of each year, send a report in writing to the Governor, to be by him transmitted to the Legislature, on such defects and omissions in the constitutional laws as they may find to exist.

Suffrage and Elections.—Every male and female citizen of the United States, 21 years of age, who has actually resided in the State for six months and in the county 30 days, if registered as provided by law, is a qualified elector. In accordance with the provisions of a direct primary law enacted in 1909, all candidates for Congress and all elective State, district, and county officers are nominated at primary election held biennially. Each candidate for office, or some qualified voter in his behalf, is required to file a nomination paper at least 30 days and not more than 60 days prior to the primary election. Provision is made on the official ballot for voters to signify first or second choice of candidates for the respective offices. Candidates are required to file itemized statements of receipts and disbursements. Nominations may be made at conventions or primary meetings; they may also be made by petition. Provision is made for the registration of voters prior to elections, and crimes against the elective franchise, including bribery, illegal registration, etc., are severely punished. In 1909 the Legislature also passed a measure providing for elections under local-option law. On Nov. 5, 1912, a constitutional amendment providing for the recall of all public officers except judicial officers was carried.

Local and Municipal Government.—Any county or incorporated city or town may make and enforce within its limits all such local police, sanitary, and other regulations as are not in conflict with its charter or with its general laws. No county, town, city, or other municipal corporation may become a stockholder in any joint-stock company, corporation, or association whatever, or raise money for, or make donation or loan its credit to, or in aid of, any such company or association. The county officers are county commissioners, the sheriff, county treasurer, probate judge, county superintendent of public instruction, county assessor, a coroner, and a surveyor. Cities and towns are permitted

to adopt a commission form of government. The Legislature in 1911 enacted a commission charter for cities of 2500 or more if they adopt the act at a special election. The charter provides for nomination by petition, for initiative, referendum, and recall. It may be abandoned after six years by vote at a special election called by a petition of 25 per cent of the voters.

Other Constitutional and Statutory Provisions.—No charters of incorporation are granted, amended, or exchanged by special law except for such municipal, charitable, educational, penal, or reformatory corporations as may be under the control of the State. There is a bureau of immigration and labor statistics, which is under the charge of a commissioner of immigration, labor, and statistics, appointed by the Governor. Not more than eight hours' actual work constitutes a lawful day in all municipal undertakings. A county local-option law was passed in 1909, and a strong search and seizure law was passed in 1911. In 1913, 21 of the 33 counties were "dry." There is an employers' liability law restricting the defenses of fellow servant and assumption of risk. The sanitary laws provide for the inspection of hotels and for sanitation in dairies and forbid the sale of adulterated, misbranded, or impure foods or drugs. In 1913 the Legislature enacted a law providing for a Public Utilities Commission, consisting of three members, and the law closely follows that of California and Washington as regards powers and duties. A State Tax Commission consisting of the same members as the Public Utilities Commission was also created. A Blue Sky Law was also passed.

Finance. The report of the State Treasurer for the biennial period ending Dec. 1, 1914, showed a balance on hand at the beginning of the year of $1,091,151. The receipts for 1913 amounted to $2,143,122, and the disbursements to $2,169,517, leaving a balance at the end of the fiscal year of $165.85. The chief expenditures are for the expenses of State government and the maintenance of State institutions. The chief sources of income are from general tax levies, receipts from the Secretary of State's Department, interest on current funds, and receipts from sundry other departments. The amount of bonded indebtedness at the end of the fiscal year was $2,421,450. A State board of equalization, consisting of the Governor, Secretary of State, Attorney-General, State Auditor, and State Treasurer, meets each year to equalize the value of property. The total value of all property for assessment purposes in the year 1912 was $418,780,394. In 1911 the tax laws were revised.

Militia. The militia consists of a regiment of infantry and one detachment of sanitary troops. The number of enlisted men in 1913 was 790, and the officers numbered 50. The State designation is the National Guard of Idaho. The total number of males of militia age in 1910 was 86,384.

Population. The population has steadily increased from its earliest settlement, the figures by decades being as follows: 1870, 14,999; 1880, 32,610; 1890, 88,584; 1900, 161,772; 1910, 325,594. The estimated population on July 1, 1914, was 395,407; 1920, 431,866. Of the total population, in 1910, 185,546 were males and 140,048 females. The population per square mile in 1910 was 3.9 per cent. The urban population was 69,898, and the rural population 255,696 in 1910. In 1910 the native white population numbered 203,599; the native whites of foreign or mixed parentage in 1910 numbered 75,195; and the foreign-born whites, 40,427. The Indian population of the State in 1910 numbered 3488, compared with 4226 in 1900. There were, in 1910, 859 Chinese and 1363 Japanese. The largest city and the capital is Boise. The population in 1910 was 17,358, compared with 5597 in 1900. The other cities with a population of 2500 and over in 1910 are Cœur d'Alene, 7291; Pocatello, 9110; Lewiston, 6043; Twin Falls, 5258 (incorporated in 1908); Idaho Falls, 4897; Nampa, 4205; Caldwell, 3543; Moscow, 3670; Wallace, 3000; Sandpoint, 2993 (incorporated in 1907); Weiser, 2600.

Indians. There were, in 1913, 4089 Indians. There were four reservations—Cœur d'Alene, Fort Hall, Lapwai, and Lemhi—with a total area of 482,139 acres. The tribes include the Cœur d'Alene, Kutenai, Pend d'Oreille, Spokan, Bannock, Shoshoni, and Nez Percé. Schools for these Indians are maintained at Cœur d'Alene, Kalispel, Kootenai, and Fort Hall. The total area of Indian lands in the State is 770,706 acres, of which 289,188 acres had been allotted in 1913, and 481,518 acres were unallotted. The total number of Indian children in the schools in 1913 was 663 out of a total of 970 of school age.

Education. In matters relating to education Idaho is progressive. The Legislature of 1911 passed a series of laws which practically revised the existing code, and these laws were further amended in 1912. A State board for the general supervision, government, and control of all educational institutions was created, this board constituting also the board of regents of the University of Idaho and exerting wider powers than the body which was in existence before its creation. The office of Commissioner of Education was established to propose and execute beneficial educational policies and to have general supervision over the educational institutions and public schools of the State. The State board is appointed by the Governor for a six-year term. The superintendent, the executive officer of the board, must be a graduate of an approved normal school, college, or university. Superintendents of public instruction are elected in each county biennially. The system of issuing certificates to teachers was revised and greatly improved. Provision was made for the holding of teachers' institutes annually under the direction of the county superintendent, and for a commission of summer normal schools—one at Pocatello, one at Boise, and one at either Cœur d'Alene or Sandpoint. Provision was also made for the establishment of rural high schools. The compulsory education law was amended and strengthened. The State board was given power to formulate rules and regulations for building schoolhouses, and important changes were made in the method of apportioning the school fund. A law forbids the employment of children under 14 during school hours and before 6 A.M. or after 9 P.M. Children between 14 and 16 are placed under the same limitations unless they have certain educational requirements.

The total school population (ages 6 to 20) according to the thirteenth census was, in 1910, 96,819. Of these, 66,779 were in attendance in that year. The enrollment in schools on June 30, 1912, was 84,791, and the average daily attendance was 66,359. There were 2710 teachers,

of whom 2021 were women and 689 men. The average monthly salary paid to women teachers was $68.88 and to men teachers $87.21. The total number of schoolhouses was 1287, and the estimated value of all school property was $7,090,106. The total number of city and town high schools was 102, and rural high schools 15. The total expenditures in 1912 amounted to $3,225,496. Of a total population in 1910 of 325,594, 3416 were illiterate, or a percentage of 1.5 per cent. Institutions of higher learning include the University of Idaho at Moscow, the Academy of Idaho at Pocatello, Lewiston Normal School at Lewiston, Albion Normal School at Albion, Industrial Training School at St. Anthony, the State School for Deaf and Blind at Gooding, and the College of Idaho at Caldwell.

Charities and Corrections. Institutions under State control include the Soldiers' Home at Boise, the State Penitentiary at Boise, the State Insane Asylum at Blackfoot, North Idaho Insane Asylum at Orofino, and the State Sanitarium at Nampa. In 1911 the Legislature passed a measure authorizing the establishment of a State sanitarium for feeble-minded and epileptics near Nampa, and created a prison commission to investigate conditions in the State Penitentiary.

Religion. In religion Idaho is, like Utah, strongly Mormon. Roman Catholics are the next strongest, and the Methodists, Presbyterians, and Baptists follow in the order named.

History. The first white explorers of Idaho were Lewis and Clark in the first decade of the nineteenth century. A mission is reported to have been established at Cœur d'Alene in 1842, but for many years after that the region was visited only by hunters and prospectors. It was organized as a Territory on March 3, 1863, but with an area more than three times as large as at present, since it included the whole of Montana and nearly all of Wyoming. In May, 1864, a part was set off to Montana, and in 1868 Wyoming was organized. The discovery of gold in 1882 at Cœur d'Alene in the northern part of the State was followed by a large immigration. In 1889 a new constitution was adopted, and the University of Idaho was established at Moscow. On July 3, 1890, Idaho was admitted to the Union. The presence of a large number of Mormons in the southern part of the State excited alarm and in 1883 led to hostile action on the part of the Legislature. A law depriving professed polygamists of the right to vote was sustained by the United States Supreme Court. In 1893 the heads of the Mormon church rejected polygamy as an essential element of their creed, the anti-Mormon restrictions were removed, and all single-wived Latter Day Saints were admitted to the ballot. From May to September, 1892, a miners' strike at Cœur d'Alene resulted in bloody conflicts between union and nonunion workers. Federal troops were sent to the scene of disturbance, and military law was proclaimed. The strike failed, but dissatisfaction persisted among the mine workers and in April, 1899, blazed out in renewed strikes and riots, necessitating again the use of United States troops. The bitter feeling engendered by the long conflict persisted and resulted in Dec. 30, 1905, in the assassination of ex-Governor Steunenberg. The chief officials of the Western Federation of Miners, William H. Moyer, president, William D. Haywood, and George W. Pettibone, accused of complicity, were arrested in Denver and taken to Boise. An appeal was taken to the United States courts including the Supreme Court for a writ of habeas corpus on the ground that they had been unlawfully taken from the jurisdiction of the State of Colorado, but the writ was refused. The evidence against them consisted chiefly of a remarkable confession made by Harry Orchard, whose real name was Alfred E. Horsley, who testified to having taken part in a number of murders, assaults, and explosions in Colorado, Idaho, and other Western States while in the employ of the officials of the Western Federation of Miners. He testified further that he had placed the bomb which killed Governor Steunenberg after several previous attempts had failed. Haywood and Pettibone were acquitted, and the case against Moyer dropped. Orchard was placed on trial, pleaded guilty, and was sentenced to death. The State Board of Pardons commuted the sentence to imprisonment for life. The year 1910 was marked by the most disastrous forest fires in the history of the State. These fires began early in August and raged in the Cœur d'Alene region in and around the towns of Wallace, Murray, and Mullan for several weeks. Wallace and several smaller towns were almost entirely destroyed, and many lives were lost. In 1912 constitutional amendments providing for the initiative, referendum, and recall were carried by large majorities. Statutes relating to the bonded indebtedness of the State and taxation were also submitted and carried. An amendment providing for increased membership of the Legislature was carried. The Republicans elected all representatives to Congress, and William E. Borah was reëlected United States Senator on Jan. 14, 1913. Senator Heyburn died on Oct. 17, 1912, and the Governor appointed Kirtland I. Perky to fill out the unexpired term until his successor could be elected. The Legislature of Jan. 24, 1913, elected James H. Brady, former Governor, to fill out the term, which expired on March 3, 1915. The State has, by the apportionment of 1910, two members in the House of Representatives; prior to that year it had but one.

In national elections Idaho was carried by the Democrats, or the Democrats and Populists in fusion, in 1892, 1896, 1900, and 1912, and by the Republicans in 1904 and 1908.

A comparison of the vote in the presidential elections of 1908 and 1912 follows:

1908		1912	
Taft, Rep.	52,606	Wilson, Dem.	33,921
Bryan, Dem.	36,080	Taft, Rep.	32,810
Chapin, Prohib.	1,740	Roosevelt, Prog.	25,530
Debs, Soc.	6,243		

In 1912 Haines, Republican, was elected Governor with 35,134 votes against Hawley, Democrat, with 33,992 votes. In the State elections of November, 1914, the Democrats succeeded in electing a Governor, but James H. Brady, Republican, was reëlected to the Senate. The governors since its organization as a Territory have been as follows:

TERRITORIAL

William H. Wallace	1863–64
Caleb Lyon	1864–66
David W. Ballard	1866–70
Gilman Marston	resigned without acting
Thomas M. Bowen	resigned without acting
Thomas W. Bennett	1871–75
D. P. Thompson	1875–76
Mason Brayman	1876–80

John B. Neil	1880–83
John N. Irwin	1883
William M. Bunn	1884–85
Edward A. Stevenson	1885–89
George L. Shoup	1889–90

STATE

George L. Shoup	Republican	1890
Norman B. Willey	"	1891–92
William J. McConnell	"	1893–97
Frank Steunenberg	Democrat-Populist	1897–1901
Frank W. Hunt	"	1901–03
John I. Morrison		1903–05
Frank R. Gooding		1905–07
James H. Brady	Republican	1907–11
James B. Hawley	Democrat	1911–13
John M. Haines	Republican	1913–15
Moses Alexander	Democrat	1915–19
D. W. Davis	Republican	1919–

Bibliography. Onderdonk, *Idaho, Facts and Statistics Concerning its Mining, Farming, and Industries* (San Francisco, 1885); Bancroft, *Washington, Idaho, and Montana* (ib., 1890); John Hailey, *History of Idaho* (Boise, 1910); Talkington, *Political History, State Constitution and School Laws of Idaho* (Lewiston, 1911); Rose, *Civil Government of Idaho* (Boise, 1912); McConnell, *Early History of Idaho* (Moscow, Idaho, 1913); United States Geological Survey, *Mineral Resources of the United States* (Washington, 1882 et seq.); id., *Bulletins* (ib., 1903 et seq.). Consult also *State Laws*, issued biennially.

IDAHO, University of. A State educational institution, situated at Moscow, Idaho. It was founded in 1889, but was not opened for the reception of students until 1892. It is under the control of the State Board of Education and the Commissioner of Education and offers free instruction to students of both sexes. There are colleges of letters and sciences (including home economics, music, and forestry), engineering, agriculture, and law; and a summer session. It maintains agricultural experiment stations and has organized movable schools of agriculture throughout the State. In recent years agricultural extension, including coöperation with several counties of the State, has been developed, the headquarters being in the State House, Boise. Military drill is required of freshmen and sophomores in the university. The degrees of B.A., B.S., LL.B., and B.S. in home economics, forestry, agriculture, and engineering, also M.A. and M.S., are conferred. The attendance (1913–14) was 747. The faculty numbered about 80. The library contains about 35,000 volumes and 8000 pamphlets. The endowment consists of 286,000 acres of land, none of which can be sold for less than $10 an acre. The buildings are valued at $517,165, and the grounds at $57,775. The income in 1913–14 was $262,120. The president in 1914 was Melvin Amos Brannon, Ph.D.

IDAHO FALLS. A city and the county seat of Bonneville Co., Idaho, 30 miles northeast of Blackfoot, on Snake River, and on the Oregon Short Line (Map: Idaho, F 6). It has excellent water power and is situated in a fertile irrigated agricultural region, for which it is the distributing centre. It has a sugar factory, and there is a Carnegie library here. The water works and electric-light plant are owned by the city. Pop., 1900, 1262; 1910, 4827.

IDAHO SPRINGS. A city in Clear Creek Co., Colo., 37 miles by rail west of Denver, on the Colorado and Southern Railroad (Map: Colorado, D 2). Picturesquely situated in the famous Clear Creek Cañon, at an elevation of 7543 feet, and having cold and hot soda springs, it is one of the noted summer resorts of the State. In 1859 gold was first discovered in Colorado, at Jackson's Bar, within the present city limits. Since then the mineral production of the district has been enormous. The town has a number of concentrating mills, machine shops, lumber yards, etc., and is famed for its mining tunnels, notably the Newhouse Tunnel, one of the longest in the world. There are municipal water works and a Carnegie library. Pop., 1900, 2502; 1910, 2154.

IDALIA, ī-dā'lī-ȧ, or **IDALIAN,** ī-dā'lī-*an* An epithet of Aphrodite. See Venus; Idalium.

IDA'LIUM (Lat., from Gk. *Ἰδάλιον, Idalion*). A town in Cyprus, adjoining which was a forest sacred to Aphrodite, who was hence sometimes called *Idalia*. The site is the modern Dalin.

IDDESLEIGH, īdz'lī, first Earl of. See Northcote.

ID'DINGS, Joseph Paxson (1857–1920). An American geologist, born in Baltimore, Md. He graduated at Sheffield Scientific School (Yale) in 1877, was a graduate student and assistant in mechanical drawing and surveying there until 1878, and continued his studies in geology and microscopic petrography at Columbia University and Heidelberg. From 1880 until 1892 he was in the service of the United States Geological Survey, to which he returned in 1895. In 1892–95 he was assistant professor, and from 1895 to 1908 professor, of petrology at the University of Chicago. In 1907 he became a member of the National Academy of Sciences. His government explorations were described in many reports and contributions to scientific journals. Among his more important writings are: *The Nature and Origin of Lithophysæ and the Lamination of Acid Lavas* (1887), reprinted from the *American Journal of Science; On the Development of Crystallization in the Igneous Rocks of Washoe, Nev.* (1885), with Arnold Hague; *Rock Minerals* (1906; 2d ed., 1911); *Igneous Rocks* (2 vols., 1909–13).

IDE, īd (Norw., Swed. *id*, roach). A fish (*Leuciscus idus*), closely allied to the roach. It inhabits the lakes of the northern parts of Europe and ascends rivers in April and May to spawn. It is excellent for the table. A gold-colored variety, called orfe, is bred in Germany and is sold extensively for ornamental aquariums.

IDE, Henry Clay (1844–1921). An American public official, born at Barnet, Vt. He graduated from Dartmouth College in 1866. In 1876–78 he was State attorney of Vermont, in 1882–85 member of the State Senate, and in 1884 president of the Republican State Convention. Appointed United States Commissioner to Samoa in 1891, he was for four years (1893–97) chief justice there under the joint appointment of Germany, England, and the United States. As a member of the Taft Commission, he helped to establish in 1900 civil government in the Philippine Islands, where he was subsequently Secretary of Finance and Justice (1901–04), Vice Governor (1904–05), acting Governor (1905–06), and Governor-General (1906). He was receiver for the Knickerbocker Trust Company, New York, in 1907–08 and from 1909 to 1913 was Minister to Spain. He published: *Code of Procedure in Civil Actions and Special Proceedings in the Philippine Islands* (1901); *The Land Registration Act* (1903); *The Internal Revenue of 1904 of the Philippine Islands.*

IDEA, ī-dē'ȧ (Lat., from Gk. *ἰδέα*, form, from *ἰδεῖν*, *idein*, to see; connected with Lat. *videre*, to see, Skt. *vid*, AS. *witan*, Eng. *wit*, to know). The term "idea" has undergone a radical change of meaning in the history of psychology. "Employed by Plato to express the real form of the intelligible world, in lofty contrast to the unreal images of the sensible, it was lowered by Descartes, who extended it to the objects of our consciousness in general" (Hamilton). In modern philosophy the word has a distinctly empirical flavor. Locke (q.v.) defines idea as "whatsoever is the object of the understanding when a man thinks," "that which the mind is applied about whilst thinking"; and the English Associationistic school (see ASSOCIATION OF IDEAS), failing to distinguish between existential "mental process" (q.v.) and logical "meaning" (q.v.), tended to regard the static, cognitive "idea" as the sole mental formation. Current psychological usage, recognizing this distinction, emphasizes the fluid, changing character of ideas, and regards meaning as only incidentally a conscious matter, not inherent in the idea, but deriving from conscious context and determination. According as an essential psychological difference between sensation and image (see IMAGINATION) is or is not admitted, ideas form a class of primary complexes made up of the latter element alone or of the two elements in conjunction, and the psychology of idea is the counterpart of the psychology of perception (q.v.) or is identical with it.

Ideas may be formed, somewhat after the manner of the composite photograph, as the resultant of a large number of similar impressions. By the mutual inhibition of the elements of these impressions which are not identical, the idea loses definiteness of detail; while, by the repetition of the identical elements, it acquires an especial liability to associative reproduction. Under the influence of abstractive determination (see ABSTRACTION) some, even of the frequently repeated elements, may be inhibited; and the ideational content may thus become less and less evidently "relevant" to its logical meaning. Such an idea, which forms the characteristic complex in thought (q.v.), is called an "abstract" idea. When, in the later stages of development, context and determination lapse from consciousness, and the idea becomes symbolic (e.g., a word), it is named a "concept." Ideational masses of complex but vague contents, which require the operation of active attention to bring their constituents to separate recognition—such as our idea of the sentence that we are about to utter, or (on a still larger scale) our idea of self—are called "aggregate" ideas.

Consult: Sully, *The Human Mind* (London, 1892); Ladd, *Psychology, Descriptive and Explanatory* (New York, 1894); James, *Principles of Psychology* (2 vols., ib., 1890); Titchener, *Text-Book of Psychology* (ib., 1910); Wundt, *Grundzüge der physiologischen Psychologie* (Leipzig, 1911).

IDE'ALISM. In philosophy, the theory that all material objects are only ideas in some mind, or the theory, developing from this one, that no reality is independent of consciousness. Its ordinary antithesis is realism, or the theory that the reality of things is not dependent upon their relation to mind or consciousness. In modern thought idealism found its classic expression first in George Berkeley's philosophy. Locke had distinguished between the primary and the secondary qualities of matter, the former belonging to matter in itself, and the latter being entirely subjective. Berkeley argued that there is no more reason for considering Locke's primary qualities objective than his secondary qualities. Hence he ranked all qualities of matter as subjective, and denied the existence of independent matter altogether, on the ground that it is an impossible abstraction. Hume followed Berkeley in the denial of independent matter. Kant reduced all matter to sensations, actual or possible, in the subjective forms of space and time and ordered by the categories. (See CATEGORY.) But Kant still believed in things-in-themselves, i.e., things not dependent in any way on our experience for their reality. Thus, all experience for Kant was ideal, but experience does not exhaust reality. Kant's immediate successors, Fichte, Schelling, and Hegel, each in his way continued Kant's view of the ideal character of experience, but declined to admit any things-in-themselves. Fichte's and Hegel's idealisms were the starting points for various idealistic movements which have continued to the present day.

Thus, we see that genetically modern idealism is of two fundamentally different types, the Berkeleyan and the post-Kantian, with more or less close affiliations between the two types. The Berkeleyan idealism is pluralistic, in that the world of nature, the "objective world," is not considered as one but as many, each spirit having his own world in his own ideas. Of these ideas some constitute his real world, others constitute his world of imaginary objects. The post-Kantian idealism is monistic, there being for it one world which is contained within the "consciousness" or the "experience" of an all-inclusive spirit—the Absolute—of which finite spirits are in some sort parts. The content of the Absolute's consciousness or experience, so far as it transcends finite consciousnesses or experiences, is the objective world of these finite spirits. The Absolute is not the cause of the finite spirit but its complement, while Berkeley's God, the supreme spirit, has a separate and distinct equipment of ideas, and this world of ideas is the real world for other spirits only in the sense that it is the prototype of the real ideas in finite spirits. God causes the finite spirits to have some ideas which correspond in the way of likeness to the contents of his own mind. The Absolute is the ideal completion of all the implications of finite experiences—an ideal completion actually realized. Thus, Berkeleyan idealism operates with the conception of causality as its highest category, while post-Kantian idealism operates with the categories of mutual implication, cause being only one such category and usually a subordinate one.

Berkeleyan idealism has survived into post-Kantian times, but usually with modifications influenced by post-Kantian idealism. In many cases, therefore, the idealists of the present day cannot be strictly classed as either Berkeleyan or post-Kantian, but they represent various degrees of synthesis or of syncretism based on these two distinct historical idealisms. A detailed account of these various idealisms is impossible here. For more details of system and for bibliography, see BERKELEY; HUME; KANT; FICHTE; SCHOPENHAUER; LOTZE; GREEN, T. H.; BOSANQUET; WARD, JAMES; ROYCE; MÜNSTERBERG; EUCKEN; CAIRD, J. and E.; HOWISON.

See ROMANTICISM; REALISM AND NATURALISM.

IDEAS, ASSOCIATION OF. See ASSOCIATION OF IDEAS.

IDELER, ē'de-lēr, CHRISTIAN LUDWIG (1766–1846). A German astronomer and chronologist, born at Gross-Brese, near Perleberg, in Prussia. After holding various offices under the Prussian government he received a professorship at the University of Berlin in 1821, and in 1829 he was made a foreign member of the Institute of France. Ideler's most important works are: *Handbuch der mathematischen und technischen Chronologie* (2 vols., 1825–26; 2d ed., 1883), which was the first work that presented a clear view of the reckoning of time among the ancients; and *Die Zeitrechnung der Chinesen* (1839), a supplement to the *Handbuch*. He also wrote, in conjunction with Nolte, handbooks of the French and English languages and literatures, which passed through numerous editions.—His son, JULIUS LUDWIG IDELER (1809–42), was born in Berlin and was educated in the medical department of the University of Berlin. He wrote: *Meteorologia Veterum Græcorum et Romanorum* (1832); *Die Sage von Schuss des Tell* (1836); *Hermapion* (2 vols., 1841).

IDEN'TITY (ML. *identitas*, sameness, from *identicus*, same, from Lat. *idem*, same). A term used in philosophy in various meanings, often confused. In a puristic sense a thing is said to be identical when it is conceived of as an unchanging unit with no internal differences. Identity in this sense is not a relation, but rather the absence of relation. Again, identity is often used as manifesting itself in similarity; but when this is done, what is supposed to differentiate it from similarity is that the identical in similar things is considered as an unchanging core of undifferentiated quality, around which the differences which distinguish the similar things are grouped. Such a view is natural to those who regard universals as having an existence of their own and getting individuation by entanglement with other universals. Thus, it may be supposed that redness is an unchanging quality, then said to be identical in all reds. Mix in a bit of an unchanging white with the red and you get pink; mix in an unchanging blue and you get purple. According to this view, the universal is identical in the first sense of the term, and things are said to be identical when they partake in identical universals. All particulars are complexes of universals; particularity is composition of the identical universals as atomic elements. Since Hegel's time it has been more usual to consider such strict identity as an abstraction. From this point of view there is no identity without diversity. Identity is thus a relation which always involves at least two terms, and the duality of the terms, with whatever individuates them, is as essential as the relation which connects the terms. Identity is, in other words, an abstraction from the concrete fact of the existence of similar things. In so far as two things are like each other, they are identical in the respect in which they are alike. But this respect in which they are alike is not to be erected into a metaphysical entity, which has independent or logically prior existence, and which then becomes differentiated in the two particulars. The existence of things in the relation of similarity is the ultimate fact, and identity is what we get when we ignore the differences between the things and dwell only on the similarity. Consult: F. H. Bradley, *Principles of Logic* (London, 1883); G. S. Fullerton, *Sameness and Identity* (Philadelphia, 1890); F. H. Bradley, *Appearance and Reality* (2d ed., London, 1897); William James, *Principles of Psychology* (New York, 1899); Bernard Bosanquet, *Logic* (2 vols., 2d ed., Oxford, 1911); also various authorities referred to under LOGIC.

ID'EOG'RAPHY (from Gk. *ἰδέα, idea*, idea + *-γραφία, -graphia*, a writing, from *γράφειν, graphein*, to write). The art of representing ideas by graphic signs, as may be seen in the hieroglyphics (q.v.) found on the monumental relics of Egypt.

IDES, īdz. See under KALENDS.

IDIOCY, ĭd'ĭ-ō-sĭ (from Gk. *ἰδιωτεία, idiōteia*, uncouthness, from *ἰδιώτης, idiōtēs*, private citizen, from *ἴδιος, idios;* connected ultimately with Lat. *suus*, Skt. *sva*, own). A condition of arrest of development of the brain, and, in consequence, of the intellectual faculties, of the infant or child. If the nondevelopment is such that the child is capable of feeding himself and of appreciating enough of his surroundings to avoid injury, the condition is usually termed *imbecility*. If there is no such evidence of mental capacity, *idiocy* is the term usually employed. *Feeble-mindedness* occupies an intermediate position between normality and imbecility. The defect or disease of the brain which interferes with normal evolution may be congenital or acquired; the cerebral functions may be all more or less involved. Ribot and also Sollier maintain that the slow development of the cerebral faculties is due to want of attention; that spontaneous attention is caused by affective states brought into action by sensations, and that those young children are the most attentive whose nervous systems are most easily stimulated. Hence the faculty of attention is closely related to the activity of the sensations. The greater the power of attention, the more intelligent does the individual become. In idiocy, owing to the diminution or loss of the power of attention, the perceptions aroused by sensations are more or less indefinite, and the resultant idea likewise ill-defined. Sensations become more numerous as the organism develops, and the lack of ideas and recognitions becomes more noticeable. Frederick Peterson, whose translation of Sollier we quote, sounds a warning that there are other faculties of mind, such as will and memory, which are absolutely necessary to all subsequent mental activity, and adds that lack of the power of attention, while common in idiocy, cannot be taken in any way as distinguishing this condition of mind from other forms of mental impairment. Frequently somatic and especially cranial and facial characteristics are noticeable upon the birth of the idiot, though idiocy exists also when physical evidence is wanting. An idiot may not take the breast, may cry without motive and with different notes from normal children. Deafness or blindness may be congenital. The senses of smell and of taste may be undeveloped. The movements of the eyes may be irregular. The idiot may be slow in responding to the stimulus of touch; he may not laugh; thermic sensibility is diminished; a constant rhythmic, automatic motion may be present; he may not learn to walk, and all voluntary movements may be acquired late in youth and imperfectly. Organic sensations

are blunted, including hunger, thirst, desire for defecation or urination. Lack of the faculty of attention exists, owing to defective senses which convey feeble impressions to the brain, as well as to a lack of the affective state; the internal form of attention (reflection of Ribot) is absent or deficient in the idiot. He is practically incapable of preoccupation. His instincts are defective, whether of hunger or of self-preservation; while the instinct of irritation is very strong, and the sexual instinct is seldom normal, being exaggerated, impaired, absent, or perverted. Occasionally remarkable special aptitudes are seen in idiots in the direction of music, mathematics, mechanical arts, drawing, painting, memory for facts or dates, playing certain games, and a low order of wit or drollery. It is said that the court fools and jesters of ancient times were idiots of high grade or imbeciles, until others, seeing the emolument to be obtained, studied and practiced the art. Ribot says that Sikorski is authority for the statement that the activity and attention of normal children are mainly developed through play. Idiots for the greater part manifest little tendency to play, clinging to the simplest games of infancy and preferring solitary pastimes. Others of higher grade prefer noisy, destructive sports, and traits of brutality, selfishness, and quarrelsomeness are apparent. Civility and politeness are rarely acquired. Destructiveness, evidenced in their play, may develop into a vicious satisfaction in inflicting injury, commission of arson, or of homicide, or of self-mutilation. Sentiments and sensation are rudimentary or absent; the absence of ideas of right and wrong, the varying respect for authority, the absence of religious feeling, and the absence of veracity being especially noticeable.

It has been said that idiot children sometimes show facial characteristics at birth. They are always ungracious, uncouth, or ugly in figure, face, attitudes, or movements. Very common among them are misshapen or unsymmetrical heads, dwarfishness, lack of proportion of the limbs, stooping and slovenly postures, deformities of the hands or feet, and awkward gait. (Peterson.) The expression of the face varies from apathy to constant laughing, leering, or scowling; the mental characteristics being evident also. There may be deformities of the iris, cornea, or the lids of the eyes, as well as malformation of the nose, ears, and chin. Microcephalus, hydrocephalus, and cretinism are found in some idiots. There are speech defects. Sollier finds two kinds of mutism in idiots, a motor and a sensory aphasia (q.v.). In the first the idiot cannot talk, though he understands; in the second he understands nothing which is said. Language is developed late in the idiots who talk. As stated, when infants, their notes are not normal, but meaningless, and monotonous cries take the place of the usual crowing of a baby. Speech disturbances are common, as regards both absence of words to express ideas, or imperfections of grammar, and also excessive and infinite loquacity. Reading is impossible in idiots who suffer from defects of the visual centres or the visual apparatus. The writing centre is the latest part of the linguistic cerebral equipment to be developed, together with its association tracts. They learn to reproduce letters, though never to write well, and they exhibit a tendency to write with the left hand and also to write from right to left. They execute drawing only by copying, without perspective, or produce scrawls of fantastic nature.

From preceding statements it has been gathered that the intelligence of the idiot varies from the normal in different degrees. He has fewer ideas than the imbecile. Imitation does not furnish ideas for him: it simply centres on mechanism, except in the idiots of higher grade, in whom the idea, assimilated by the intelligence, unfortunately is not retained, but lost. Sollier reminds us that memory is hereditary, organic, or acquired. (See MEMORY.) Hereditary memory exists often in idiots. Organic memory, or unconscious memory (as of walking and other associated movements), though sometimes completely absent in idiots, owing to defective nerve centres and lack of attention, is nevertheless better developed than either hereditary or acquired memory. Attention being an absolute requisite for acquired memory, idiots are rarely possessed of this power. Memory fixed by repetition of sensation, without emotional basis, is found in educable idiots; as, e.g., memory of the location of the dining room, of the bed, etc. The phenomenon of specialized memories, such as those for musical airs, or dates, e.g., is inexplicable. Association of ideas, occurring, as it does, by resemblance, contrast, and contiguity, hardly exists in idiots. They experience an association of sensations. Judgment and reason also are very faulty. Volitions do not exist in the lowest order of idiots. Voluntary control of the sphincters occurs in idiots who walk only after they have learned to do so. In higher idiots the will is manifested by more complex movements than actions accomplished for the satisfaction of natural needs and appetites; but even these complex movements may become secondarily automatic. Self-respect, to which one may appeal in an imbecile, is little developed in the idiot.

As to the psychological development of an idiot, points are reached in every case at which education ceases, and further mental progress is impossible. Peterson places the limits as follows: in the inferior types intellectual progress ceases at the age of six or seven, and sentiments and senses continue their development to 18 or 20; while in the superior grades the improvement of senses, sentiments, and intellect may all cease about puberty. Retrogression may occur, following the same law as dementia, to wit, enfeeblement of will, intelligence, sentiments, and sensations in this order. The causes of idiocy are various. Its elements are in many instances hereditary, i.e., a course of conduct in a parent which tends to degeneration, such as excessive alcoholic indulgence of any kind, will tend to induce arrested normal healthy development in offspring. Other causes are injuries received during childbirth, acute disease of the brain or its coverings in early infancy, or even while intrauterine. Injury to the brain may result in idiocy. Chronic disease of the brain coverings, tuberculosis, tumors within the brain, hydrocephalus, are other causes. A peculiar type of idiocy is due to maldevelopment of the thyroid gland. This is called cretinism, or myxedematous idiocy. The attempt to educate idiots commenced in the seventeenth century with an experiment of St. Vincent de Paul at the priory of St. Lazarus. His efforts to teach idiots, though continued for many years, were not successful. In 1799 the celebrated Itard took a wild boy found in the forests of Aveyron

and attempted to teach him; and although the success in this particular case was slight, he believed that he had discovered methods and facts which would be of use in other cases. These he communicated to his pupil, Dr. Edouard Seguin, who in 1838 opened a school for idiots in the Hospital for Incurables in Paris. He met with success enough to have the idiots at the Bicêtre sent to the hospital to be instructed, and in the course of three years he received the approval of the French Academy. Dr. Seguin adopted a system involving the theory that idiocy was prolonged infancy. His practice, founded upon this, was to excite and continue the process of development. Of course a variable success attended the experiment. The art of effecting such development requires much knowledge, tact, and patience. Different kinds of idiots need different stimulants, physical and mental. Pure air, good nutritious food, exercise—in short, any treatment which is calculated to increase the bodily and mental functions—will improve the idiot. Wherever his interest can be awakened there will be a mental stimulus, and as the tendency of development is towards a normal standard, more or less improvement must follow. Seguin was succeeded by the celebrated Bourneville at Fondation Vallée, attached to Bicêtre, who carried forward to a new point the systematic education of the idiot and was remarkably successful with imbeciles. Dr. Seguin removed to New York City, where he established a school for idiots and feeble-minded children which was very successful. Other similar institutions exist in various parts of the country. Statistics are unreliable, as confusion is apt to be caused by the inclusion of epileptics and insane people with the feeble-minded and imbecile.

Consult: Sollier, *Psychologie de l'idiot et de l'imbécile* (Paris, 1891); Preyer, *The Mind of the Child*, translated by H. W. Brown (New York, 1893); Ribot, *The Psychology of Attention* (Chicago, 1894); Peterson, "The Psychology of the Idiot," in *American Journal of Insanity* (Utica, New York, 1896); Barr, *Mental Defectives* (Philadelphia, 1904); Huey, *Backward and Feeble-Minded Children* (Baltimore, 1912); Goddard, *Feeble-Mindedness: Its Causes and Consequences* (New York, 1914); Tredgold, *Mental Deficiency (Amentia)* (ib., 1914). See also MENTAL DEFICIENCY; MENTAL PATHOLOGY.

IDIOCY, IN LAW. A total lack of reasoning powers, or of those intellectual faculties by which man is peculiarly distinguished. Its legal consequences, so far as contract and tort obligations as well as criminal responsibility are concerned, are the same as those of insanity (q.v.). The term is ordinarily limited to those who have had no understanding from birth, although some courts have declared that it is properly applicable to those who have become totally imbecile from sickness or other causes, as well as to congenital idiots. In case of one who has never possessed a glimmer of reason, the law presumes that he will never attain any. Hence, if a freehold tenant of land, the custody of his person and of his lands formerly vested in the lord of whom the fee was held. Because of the abuse of this power, Parliament transferred the wardship of idiots to the King, by Statute of 17 Edw. II, c. 9. In this country the care of their persons and property is provided for by statute or safeguarded by constitutional provisions. It was laid down by ancient English writers upon law that a man who is born blind, deaf, and dumb can have no understanding and hence cannot make a valid contract, gift, or grant. This doctrine had its origin in a misconception of certain texts of the civil law, which declared that one who was deaf or dumb could not be a party to a *stipulatio*, i.e., a contract which was entered into by an oral question and answer, in certain formal words. It is quite clear that a dumb person could not be a party to this formal contract, for he could not ask the question nor speak the response. Deafness also incapacitated one for such a contract, by preventing his hearing the question or the answer. But the civil law never countenanced the presumption that a deaf and dumb person was mentally incapable of entering into a consensual contract. In modern English law the presumption is only prima facie, and may be repelled by evidence, that the particular person whose competency is brought into question does possess sufficient intelligence to rank as one of sound mind. Consult the *Commentaries* of Blackstone and Kent; Holmes, *Misunderstandings of the Civil Law*, 6 Am. Law Rev. 37; and the authorities referred to under MEDICAL JURISPRUDENCE.

ID'IOM (Ger. *Idiom*, Fr. *idiome*, Lat. *idioma*, Gk. *ἰδίωμα, idiōma*, peculiarity, from *ἰδιοῦσθαι, idiousthai*, to make one's own). A term used to denote a phrase or form of words approved by the general usage of a language and sometimes admitting neither grammatical nor logical analysis. In a broader sense it denotes the genius or peculiar cast of a language; hence it is often applied to a peculiar form or variation of a language, a dialect.

IDIOM, NEUTRAL. See UNIVERSAL LANGUAGE.

ID'IOP'ATHY (from Gk. *ἰδιοπάθεια, idiopatheia*, peculiar feeling, from *ἰδιοπαθής, idiopathēs*, affected peculiarly, from *ἴδιος, idios*, peculiar + *πάθος, pathos*, feeling). A term in pathology, denoting the quality of being idiopathic. An idiopathic disease is a primary condition, not dependent on another disease or injury. Idiopathic epilepsy, e.g., is so called when it is not secondary to or dependent upon any obvious cause, such as injury to the head or reflex influences. (See EPILEPSY.) In the sense of idiosyncrasy (q.v.) or peculiar susceptibility, the word is obsolete.

ID'IOSYN'CRASY (Gk. *ἰδιοσυγκρασία, idiosynkrasia*, peculiar temperament, from *ἴδιος, idios*, peculiar + *σύγκρασις, synkrasis*, mixture, from *συγκεραννύναι, synkerannynai*, to mix together, from *σύν, syn*, together + *κεραννύναι, kerannynai*, to mix, from *κρᾶσις, krasis*, mixture). An individual trait or constitutional peculiarity. Thus, there are persons who have a great dislike to particular kinds of food, smells, sounds, etc., which to most persons are agreeable; and, on the other hand, a desire is sometimes manifested for things generally disliked. In particular individuals an eruption of the skin will be caused by eating strawberries, or fainting by the smell of a rose, when the person is unaware of the cause. Idiosyncrasies also occur in consequence of which certain medicines become inoperative, or certain poisons harmless. On the other hand, many individuals exhibit an idiosyncrasy to certain drugs, so that minute doses of them will produce profound or even alarming effects. Idiosyncrasies are either permanent or temporary, sometimes arising from mere morbid conditions and disappearing along

with them. The term is also employed to denote *mental* as well as *physical* peculiarities, which are often signs of insanity, such as baseless antipathies to certain persons, bizarre arrangement of articles in one's room, permanent dread of passing certain objects, etc.

ID'IOT. See IDIOCY; MENTAL DEFICIENCY.

IDITAROD, ê-dē'tà-rōt'. An Alaskan mining town, the centre of the gold-mining industries of the upper Innoko and Iditarod valleys and of adjacent regions (Map: Alaska, G 4). It has a wireless station and is connected by a winter trail of 512 miles with Seward, via Susitna (pop., 233) and Knik (pop., 118).

I'DLER, THE. The title of a series of papers by Dr. Johnson, published in Payne's *Universal Chronicle* (1758–60).

IDOCRASE, ī'dō-krās. See VESUVIANITE.

I'DOL (OF. *idole*, Lat. *idolum*, from Gk. *εἴδωλον*, *eidōlon*, image, from *εἰδέναι*, *eidenai*, Skt. *vid*, to know, Lat. *videre*, to see). An image intended to represent a deity and to be adored as such. The act of such adoration is idolatry. Through theological usage the term "idolatry" has come to mean in a general sense any worship or obeisance paid to any other than the Supreme Being as conceived by Judaism, Christianity, or Islam. Confining ourselves to the more restricted usage, the worship of idols appears to be a phase of religious evolution that is natural to man at a certain stage of culture. It arises from the desire to furnish some tangible evidence of the presence of the powers upon whom man feels himself to be dependent. In this sense idolatry is to be distinguished from the attribution of divine force to a sacred stone, river, or other object. The sanctity is inherent, for one reason or the other, in such objects themselves, whereas the sanctity of an idol is due to its being a symbol. It becomes evident, therefore, that while the direct worship of objects is a link in leading to a symbolical image worship, the latter belongs to a phase of religious thought transcending the more primitive manifestations of the religious instinct. This thesis finds an illustration in the religious history of the Semites as well as in that of the Greeks and Romans. The localization of nature deities, such as the sun, moon, and certain planets, led in the case of the Babylonians and Egyptians to representation of the gods of a more or less fanciful character, and the development of the art instinct acts as a powerful factor in promoting and maintaining the worship of these gods under the form of images of men or animals, or of a combination of the two. The influence exerted by Babylonian and Egyptian culture led the nations of Palestine—notably the Phœnicians—to replace poles and stones by symbolical representations of the gods, and the Hebrews likewise after they had advanced to the agricultural stage fell a prey to these same influences until, through the reaction brought about by the teachings of the prophets, an emphatic protest against all manner of idolatry is embodied in the religious system and cult of post-exilic Judaism. The rise of Christianity helped to spread the doctrine further, though the Christian veneration of sacred images (see IMAGE WORSHIP) was by some confounded with idolatry. Islam struck at the root of the matter by forbidding the making of any representation of any living thing, whether intended to be worshiped or not. (Cf. Ex. xx. 4.) To give life was felt to be the exclusive prerogative of God, and to attempt to reproduce even the external form of a living thing was regarded as impiety. As a consequence, wherever Islam secured a foothold idolatry was doomed. Zoroastrianism at least did not encourage idolatry, but it is noticeable that in the extreme East—India, China, and Japan—idolatry was not only reconciled with the remarkable development of religious thought that took place in those regions, but its hold seemed to grow stronger with each new phase in this evolution.

IDOLATRY. See IDOL.

IDOMENEUS, ī-dŏm'ĕ-nūs (Lat., from Gk. *Ἰδομενεύς*). The grandson of Minos and son of Deucalion of Crete. As ruler of Cnosus and Crete, he led 80 ships to Troy. In the *Iliad* he is described as one of the mightiest of the heroes, and in the battle at the ships he plays a leading part. The early history makes him return to his home in safety and receive there in due time an honorable burial. In later writers he was represented as vowing during a storm to sacrifice to Poseidon the first living thing that should meet him on a safe return to Crete. The victim was his son. When presently a plague broke out in the island, his subjects drove him forth. He wandered to Calabria in Italy, where he built a temple to Athena, and later from Italy to Asia Minor, where he established a shrine of Apollo near Colophon. Here he died and was buried.

IDRAC, ē'drȧk', ANTOINE (1849–85). A French sculptor, born at Toulouse. He studied under Guillaume and Falguière at the Beaux-Arts. He first exhibited at the Salon in 1877 and won a first-class medal in 1879. The Luxembourg has his "Mercury Discovering the Caduceus" and "Salambo." The latter reveals remarkable ability in representing the suppleness of the nude, the mastery of which was the chief characteristic of his art. "Salambo" won him the cross of the Legion of Honor.

IDRIA, ē'drē-ȧ. An important mining town in the Austrian Crownland of Carniola, situated in a deep caldron-shaped valley on the Idriza, 25 miles west of Laibach (Map: Austria-Hungary, D 3). Idria is famous for its quicksilver mines, ranking only second to the Almaden mines of Spain. They were discovered in 1497 and have been operated by the state since 1580, employing altogether about 1250 persons and yielding over 500 tons of quicksilver annually. It has also a trade school for bobbin workers, a bobbin factory, and electric works. Pop. (district), 1910, 16,876.

IDRISI, ĭd-rē'sē. See EDRISI.

IDRISITES, ĭd'rĭ-sīts. A dynasty of Arab rulers in the northwest of Africa. The founder of the line was Idris of the race of Ali, who in 786 became ruler over several native Berber tribes. His capital was Walili, on the site of the Roman city Volubilis. His son Idris II founded Fez in 808 and greatly increased his possessions by conquest, but on his death the kingdom was divided among his sons, and, thus weakened, it fell an easy prey to the power of the Fatimites, who took possession of Fez in 921. One of the Idrisites, Al Hasan, maintained himself in a part of Fez until 926. Consult Mackenzie, *The Khalifate of the West* (London, 1911).

ID'UMÆ'A. See EDOM.

IDUN, ē'dōōn (Icel. *Iðunn;* perhaps from *iðr*, energy, cf. Eng. *eddy;* or from prefix *iðr*, meaning 'again'). The name of a goddess of Scandinavian mythology. She was the daughter of the

dwarf Ivald, but, being received among the Æsir, she became the wife of Bragi. Idun possessed a box of apples, by the use of which the gods preserved their perpetual youth. She was carried off by the giant Thiassi, with the assistance of Loki. But the gods, beginning to grow old and gray without their apples, sent Loki after her, and, changing himself into a falcon and Idun into a nut, he returned with her to Asgard. In this myth Idun represents spring, and Thiassi winter. According to Sophus Bugge, the main story may be closely connected with the Greek myth of the golden apples of the Hesperides in an Irish version. The introduction of edible apples at a time when this fruit was unknown in the North seems to imply a foreign source.

ID'YA. A poetical name of Britannia.

I'DYL, or **I'DYLL** (from Fr. *idylle*, Lat. *idyllium*, from Gk. *εἰδύλλιον*, *eidyllion*, short poem, from *εἶδος*, *eidos*, form, scene). A term generally used to designate a species of poems of moderate length representing scenes of pastoral or out-of-door life. It is, however, an error to suppose that the idyl is exclusively pastoral; certainly there is no warrant for such a notion in either ancient or modern usage. Of the 31 idyls attributed to Theocritus (q.v.), only 10 are bucolic.

IDYLLS OF THE KING. Twelve poems by Tennyson, published between 1842 and 1885, based on the Arthurian romances. The titles are: "The Coming of Arthur," "Gareth and Lynette," "The Marriage of Geraint," "Geraint and Enid," "Balin and Balan," "Merlin and Vivien," "Lancelot and Elaine," "The Holy Grail," "Pelleas and Ettarre," "The Last Tournament," "Guinevere," "The Passing of Arthur."

IDZŪ, ē'dzo͞o. One of the 15 provinces of Japan which make up the Tōkaidō, or East Sea Circuit, and through which the highway called the Tōkaidō runs. It is a mountainous peninsula, with numerous bays and promontories, 32 miles long and 16 wide, lying between the bays of Sagami on the east and Suruga on the west. Geologically and orographically it forms part of the volcanic range of mountains with which the name Hakone is associated. Its most important river is the Kanōgawa, which flows north into Suruga Bay, and its highest peak is Amagi-san, with a height of about 4800 feet. Its chief towns are Mishima, on the Tōkaidō, and the small but beautiful port of Shimoda, on the southeast coast. The rearing of silkworms and the reeling of silk form the principal industry of the peninsula. It abounds in hot springs and watering places, the chief of which is Atami, about 45 miles from Yokohama. To Idzu-Shichito belong, both geologically and politically, the "Seven Volcanic Islands," of which Oshima, or Vries Island, 38 miles from the mainland, is the chief, and farther south Hachi-jo-shima, long used as a place of banishment. Consult Rein, *Japan* (London, 1884), and Satow and Hawes, *Handbook for Travellers in Central and Northern Japan* (Yokohama, 1881).

IERNE, ī-ẽr'nẽ. An ancient Greek name for Ireland.

IE'SI. See Jesi.

IF, ēf. A rocky island about 2 miles west of Marseilles, with a castle, the Château d'If, built in 1529, and later used as a state prison. In it Mirabeau, Philippe Egalité, and others were confined. The castle is most widely known through Dumas's *Count of Monte Cristo.*

IFFLAND, ĕf'länt, August Wilhelm (1759–1814). A German actor and dramatist. He was born at Hanover and was intended for the Church, but before he was 19 the stage had become his choice. He went to Gotha, where he studied under Gotter, Beck, Beil, and Ekhof, and thence in 1779 to Mannheim, where he first became famous by his rôle of Franz Moor in Schiller's *Räuber.* Differences with his manager induced Iffland in 1796 to accept the post of director in the Berlin National Theatre. Fifteen years afterward he was made superintendent of all the royal theatres, and under his management the Berlin stage reached its highest point. But he was not merely an able manager. As an actor, he showed himself artistic, painstaking, and minute, strong in comedy of everyday life. Voice and figure unfitted him for tragedy. For the stage he translated and wrote himself, for the most part, plays of over-great sentiment and too strongly urged didactic purpose. Iffland was really no poet, but he so well knew how to depict on the stage the everyday troubles of the ordinary mortal that his plays were very popular. In them, however, he displayed some literary talent and great practical knowledge of the stage. *Verbrecher aus Ehrsucht, Die Jäger, Dienstpflicht, Der Spieler,* and *Die Mündel* kept the stage for a century. Iffland's dramatic criticism is to be found in his *Almanach für Theater und Theaterfreunde* (1806–11) and *Theorie der Schauspielkunst* (1815). His complete works appeared in 24 volumes (1843 et seq.). Consult: Duncker, *Iffland in seinen Schriften* (Berlin, 1859); the autobiography, *Meine theatralische Laufbahn,* edited by Holstein (Heilbronn, 1886); Genée, *Ifflands Berliner Theaterleitung* (Berlin, 1896); A. O. Stichler, *Das Iffland'sche Rührstück* (Hamburg, 1898); Karl Lampe, *Studien über Iffland als Dramatiker* (Celle, 1899).

IFNI, ēf'nē. A seaport town of Africa, situated on the west coast of Morocco, opposite the Canary Islands (Map: Africa, C 2). It was ceded by Morocco to Spain in 1883. Pop., about 6000.

IFUGAO, ĭ'fo͞o-gou'. A Malay tribe which occupies the subprovince of Ifugao in northern Luzon. They are a strong, well-built people, of medium height, with dark brown skins and straight hair. The ordinary clothing of both sexes is very scanty, but this lack is in part made up for by elaborate tattooing and extensive use of ear, neck, arm, and leg ornaments. The Ifugao live in settlements the buildings of which are raised several feet above the ground and are carefully constructed of boards. These villages are always near the rice fields in order that the people may keep watch on their crops. The rugged nature of the country has compelled the people to cultivate the mountain sides, and there they have developed a system of terraced fields which excels that of any other primitive tribe. The stone retaining walls are often 40 feet high, and so steep are the mountain sides that the level plots gained by building such walls and filling in behind them are often not more than 20 feet wide. Water is brought for long distances by means of flumes and ditches and then is skillfully led from plot to plot. In addition to being wonderful agriculturists, the Ifugao are expert workers in iron and steel and are also skillful wood carvers. When not held in check, the men are still inveterate head hunters, and it is no uncommon thing to find the skulls of enemies placed on a shelf beside

the entrance to a dwelling. The people known as Quiangan belong to this tribe. See PHILIPPINE ISLANDS.

IGBARA, ēg'bȧ-rȧ, or **IGBIRA,** ēg'bĭ-rȧ. A negro people of the Sudan living at Nupé on the right bank of the Niger and southward to Yoruba. They are said to be industrious and commercial. Their language belongs to the same linguistic group with Nupé, Ewe, and Tshi. Half a century ago the Kingdom of Nupé was subdued by the Hamitic Fulahs, and the Igbaras, together with other kindred tribes, were brought under Moslem influence, though many are still pagan. The ruins of Fende, or Panda, the capital of this once powerful dominion, are still to be seen. They are governed by a Fulah Emir, but are within the British Protectorate. See FULAH.

IGERNA, ĭ-gĕr'nȧ, **IGERNE,** ĭ-gĕrn', **IGRAINE,** ĭ-grān', or **YGNERNE,** ĭg-nērn'. In the Arthurian romance, the wife of Gorlois, Duke of Cornwall. She was loved by Uther, King of Britain, and by him became the mother of Arthur.

IGLAU, ē'glou. An ancient town of the Austrian Crownland of Moravia, situated on the Iglawa and on the Bohemian frontier, 56 miles northwest of Brünn (Map: Austria-Hungary, D 2). It has a fine market place, a number of interesting churches (including St. John's, dating from the eighth century), a Rathaus, barracks (formerly a Dominican monastery), and a cloth hall. In the Middle Ages Iglau was an important silver-mining centre, but since the Thirty Years' War mining has been practically extinct, and the manufacturing of cloth and woolen goods is now the foremost industry. There are numerous weaving, spinning, and dyeing establishments, and a state cigar factory employing over 2500 hands; also manufactures of plush, lace, shoes, leather, ether, furniture, pottery, and sugar. There is also a considerable trade in agricultural products, cloths, and lumber. Pop. (district), 1900, 36,930; 1910, 38,369, chiefly German Catholics and including over 4000 Czechs. Iglau is a town of great antiquity, its silver mines having been worked as early as the eighth century. By the Treaty of Iglau, in 1436, a settlement was effected between the Hussites and Sigismund, who was acknowledged King of Bohemia. The town suffered heavily from a fire in 1523 and was twice captured by the Swedes during the Thirty Years' War.

IGLESIAS, ĕ-glā'sē-ȧs, JOSÉ MARÍA (1823–91). A Mexican statesman and author. He was born in the city of Mexico, studied law in the university there, and later became professor of jurisprudence in that institution. He early entered politics and speedily attracted attention by his natural ability. Political preferment rewarded his loyalty to the government, and in 1857 he became Secretary of Justice and a little later Secretary of the Treasury. In 1863 he was again Secretary of Justice, and from 1864 to 1867 he held the two portfolios of Justice and the Treasury. In 1868 he was a member of the General Congress, and the same year was appointed Secretary of the Interior by Juárez, to whose fluctuating fortunes he had clung with unswerving fidelity. In 1873 he became president of the Supreme Court and by virtue of that office assumed the presidency of the Republic when Lerdo de Tejada was overthrown in 1876, but was soon compelled to give up the position to Díaz. After 1878 he applied himself to journalism and published several works on Mexican history, among them *Revistas históricas sobre la intervención francesa en México* (Mexico, 1867–69).

IGLESIAS, MIGUEL (1822–1901). A Peruvian soldier, born in Cajamarca. He came into prominence just before the Chilean-Peruvian War, serving as Minister of War in 1880. In 1881 he did valiant service in the defense of Lima against the Chileans and was captured, but afterward escaped. He held the view that it was necessary to accede to Chile's demand for alienation of territory in order to secure the withdrawal of the invading army. At the suggestion of Chile in 1883 he assumed the presidency, formed a cabinet, and entered into the Treaty of Ancón on October 20. (See PERU.) The many Peruvians who did not approve the treaty opposed General Iglesias under the leadership of General Caceres. The opposition secured such success that, in 1885, an agreement was entered into, by which both Iglesias and Caceres resigned from power and a council of ministers was formed to govern till an election was held. Upon the election of Caceres to the presidency in 1886 Iglesias went into exile.

IGLESIAS, PABLO (1850–). A Spanish politician and Socialist leader, born in the Province of Coruña. He learned the printer's trade and in 1868 became affiliated with the Internationale des Travailleurs. In 1871 he was a member of the federal council of the International of Spain and worked on the Socialist paper, *La Emancipación.* He was one of the organizers of the Partido Socialista Obrero in 1878 and later served as president of the Asociación del Arte de Imprimir and of the Federación Tipográfica. After 1885, when he became editor of *El Socialista,* the official organ of the Socialist party, he was most active as an agitator. In 1910 he was elected one of the representatives of Madrid to the Cortes, and in 1913 was president of the Unión General de Trabajadores (Labor Union).

IGLESIAS DE LA CASA, dȧ lȧ kȧ'sȧ, JOSÉ (1748–91). A Spanish poet, born at Salamanca. His earliest writings were satires in the form of epigrams and *letrillas* directed against contemporary society. After entering the Church he wrote works of a graver nature, and later his verses were merely rhymed theological discussions. His style has much clearness and animation, but lacks originality. The first edition of his works is that of Salamanca (1798). The idyls and romances included in this edition are not so well known as his poetry and are of less value. His name is included in the *Catálogo de autoridades de la lengua,* published by the Academia Española. Consult *Biblioteca de autores españoles,* vol. lxi (Madrid, 1869), and Iglesias, "Poesías inéditas," in *Revue hispanique,* vol. ii (Paris, 1895).

IGLOO, ĭg'lo͞o. See SEWARD PENINSULA.

IGLOO, or **IGLU.** See ESKIMO.

IGNACIO, ĕg-nä'thē-ō, JOSÉ DE JESU MARÍA (1721–80). A German Jesuit, whose secular name was Herman Loessing. He was born in Paderborn and began his clerical career as professor of rhetoric and philosophy in the College of Old Mexico. While there he became interested in the antiquities of the country and spent about 10 years in collecting them. Returning home with his spoils, he became librarian to the Archbishop of Cologne (1768) and published *De Arte Hieroglyphum Mexicanorum* (1774), *His-*

toria Novæ Hispaniæ (1777), *Reisen in Neu-Spanien* (1778), *Historia Regni Aztecorum* (1780), and *Cosmographia* (1780). He became blind before his death, and after it his notes were incorporated into two works by Chastelard.

IGNATIEFF, ĭg-nā′tyĕf, NIKOLAI PAVLOVITCH, COUNT (1832–1908). A Russian general and diplomat, born in St. Petersburg, Jan. 29, 1832. He was the son of a favorite officer of the Emperor Nicholas and was commissioned in the Guards in 1849; he served in the Crimean War, and was made a colonel in 1856 and a major general in 1858. In the latter year he was made diplomatic attaché to General Muravieff, Governor of east Siberia, and in this capacity negotiated with China the Treaty of Aigun (May 28, 1858), by which Russia came into possession of the region of the Amur. He was subsequently sent on a special mission to Khiva and Bokhara, and as Plenipotentiary to Peking in 1860. He was made adjutant general of the Czar in 1863 and was placed at the head of the Asiatic department of the Ministry of Foreign Affairs. In the following year he was sent to Constantinople to represent the Czar at the court of the Sultan, and he remained in this important post until the outbreak of the Russo-Turkish War in 1877, which he did much to bring about. He was an active agent in the events of this exciting and critical period, encouraging the restlessness of the Christian peoples of the Balkans, while endeavoring to maintain the Russian influence over the Sultan. In the pursuit of his ends Ignatieff did not hesitate to resort to duplicity and the basest kind of intrigue and succeeded in gaining the sobriquet of Liar Pasha. Through such means he was quite successful in maintaining the Russian influence during the life of Abdul Aziz; but after the latter's violent death and the deposition of Amurath V (1876), the anti-Russian influence became predominant with Abdul Hamid, and events moved rapidly towards war. After the conference at Constantinople during the winter of 1876–77, Ignatieff hastened to Berlin, Vienna, and London on diplomatic business. At the close of the war he participated in the negotiations of Adrianople and was mainly responsible for the Treaty of San Stefano. On account of disagreements with Gortchakoff he retired from office, but on the accession of Alexander III (1881) he was recalled and made Minister of the Imperial Domains and then of the Interior. While holding this office he attained prominence as a persecutor of the Jews. His administrative inability led to his dismissal, June 21, 1882.—His brother ALEXEI PAVLOVITCH (1842–1906) rose to be lieutenant general, and was Governor-General of Kiev in 1889–97 and of Odessa for a short time in 1905. He was a noted reactionary and was assassinated in December, 1906.

IGNATIUS, ĭg-nā′shĭ-ŭs, SAINT (c.790–878). A patriarch of Constantinople, youngest son of the Emperor Michael I. In 813 the Armenian usurper Leo V forced him to enter a cloister. From the position of abbot the Empress Theodora raised him to that of Patriarch of Constantinople (847). He had no sympathy with the iconoclasts and so was in favor with the Empress. On the other hand, he excommunicated her brother Bardas, who made him one of his first victims when he took the reins of government for the young Michael III (857). Ignatius refused to abdicate until forced to do so in 866. He was reinstated on the accession of the Emperor Basilius in 867. He is still a favorite saint in the Greek church and his day is celebrated on the 23d of October.

IGNATIUS OF ANTIOCH, SAINT. Bishop of Antioch in the reign of Trajan, and author of seven Greek letters which are included among the works of the Apostolic Fathers (q.v.). Little is known of Ignatius' life. He was born probably not far from the middle of the first century. Syria appears to have been his home. Tradition says that he was a disciple of the Apostle John, which is not impossible. Much less likely is the tradition which makes him the child whom Jesus took in His arms and blessed. There is no reasonable ground for doubting that Ignatius was Bishop of Antioch, but we do not know how long he held that office. The statement of Origen and Eusebius that he was the second Bishop may be accepted. This leaves Peter out of account and makes Ignatius the successor of Evodius. Respecting the close of his life we have more definite information. He was condemned to be killed by wild beasts in the arena and for that purpose was taken to Rome, under guard of 10 Roman soldiers. They passed through Asia Minor, stopping here and there and being received with Christian hospitality by the churches along their route. At Smyrna Ignatius wrote letters to the churches of Ephesus, Magnesia, Tralles, and Rome. Farther on, at Troas, he wrote to the Philadelphians, the Smyrnæans, and to Polycarp, Bishop of Smyrna. He then was led to Rome, where he suffered martyrdom, probably at some time between 107 and 117 A.D., though Harnack would extend the time to 125 A.D. It was believed, at a considerably later time, that his remains were carried to Antioch for burial.

The extant *Martyr Acts* of Ignatius are not authentic. Long and bitter controversy has raged over the epistles which bear his name. They are extant in several different versions, especially three: (1) *the longer Greek*, containing 13 epistles; (2) *the shorter Greek*, containing seven epistles; (3) *the Syriac*, containing only three epistles. The critical question is, Which form, if any, is the genuine one? Opinions have varied widely. It has been held (*a*) that all the recensions are spurious; (*b*) that the shorter Greek form alone is genuine; (*c*) that the Syriac alone is genuine; (*d*) that, of the shorter Greek form, all the epistles except Romans are genuine; and (*e*) that Romans only is a genuine epistle. The best modern criticism holds to the authenticity of the seven epistles in the shorter Greek form. There is almost contemporary witness borne to the Ignatian letters in the Epistle of Polycarp to the Philippians, where the usually accepted letters are mentioned. See POLYCARP.

Accepting these seven as genuine letters of Ignatius, we learn to know their author as a fervent, enthusiastic Christian bishop, of intense zeal for martyrdom. He constantly insists on maintaining allegiance and obedience to the bishop, who is the centre of unity. It is evident that the monarchical episcopate, i.e., the system of having one bishop over each church, had already been developed in Syria and other portions of the East, whatever may have been the case elsewhere. No early Christian writer is so important for the history of the hierarchy as Ignatius. The heresy against which Ignatius warns is chiefly docetism, for he declares that Christ suffered in fact, not merely in appearance. He also warns against Judaizing heresies.

From the doctrinal point of view Ignatius is highly important, standing as he does in the line of catholic development which passes from Paul and John, through Ignatius and Irenæus, to the full-grown Nicene theology. It is in his letter to the Christians of Smyrna that we meet for the first time with the phrase "the Catholic Church," which here means "the universal Church." He also uses the term "eucharist" for the Lord's Supper. But, above all else, his epistles bear witness to the earnest, devoted spirit of early second-century Christianity and to the vitality of faith in the age succeeding that of the Apostles.

For the best edition of Ignatius, consult: Lightfoot, *The Apostolic Fathers: Part II, S. Ignatius and S. Polycarp* (London, 1889), with English translation. Text and translation are also found in the small edition of Lightfoot, *Apostolic Fathers* (ib., 1893); English translation alone in the *Ante-Nicene Fathers*, edited by Roberts and Donaldson, vol. i (Buffalo, 1886). In general, consult: Smith and Wace, *Dictionary of Christian Biography* (4 vols., Boston, 1877–87); Cruttwell, *Literary History of Early Christianity* (London, 1893); Von der Goltz, *Ignatius von Antiochien* (Leipzig, 1894); Kruger, *Early Christian Literature* (New York, 1897); Harnack, *Chronologie der altchristlichen Litteratur* (Leipzig, 1897). Catholic presentations of his teaching are in Newman, *Historical Sketches*, vol. i (London, 1890), and Gasquet, *Studies* (ib., 1904).

IGNATIUS OF LOYOLA, lō-yō'lȧ, SAINT (1491 or 1495–1556). The founder of the Jesuits. Iñigo Lopez de Recalde was the youngest of 13 children, of a noble family. He is usually said to have been born on Christmas night, 1491, but the Bollandists and Polanco are authority for the change to 1495. He was born in the ancestral castle of Loyola, near Azpeitía, in the Basque Provinces, not far from the French frontier. At 14, after a scanty education, he became a page at the court of Ferdinand the Catholic. Court life grew distasteful after some years, however, and he became a soldier under his relative, the Duke of Najera, in 1517. He fought bravely against the Navarrese, the Moors, the Portuguese, and the French. He had reached the rank of captain when, while directing the defense of Pamplona against the French in the war between Francis I and Charles V, he was wounded severely, May 20, 1521. He was taken prisoner and conveyed to the castle of Loyola. As a result of the wound, one leg was badly deformed. This would have been very unsightly in the fashionable hose of the day, and he bade the surgeon reduce the deformity at any cost. The leg was rebroken, and he bore the operation and consequent suffering without complaint. His convalescence was prolonged, and time hung heavily on his hands. He asked for some romances of knight-errantry then popular, but there were none in the castle. Instead they brought him a translation of Ludolf of Saxony's life of Christ, and some lives of the saints. Ignatius' life as a soldier had been the careless and gay one of an officer. For want of anything better to do, however, he read and reread these pious books. The spiritual achievements of St. Francis and St. Dominic came to replace the deeds of his knightly heroes in his imagination. He began to see visions, and his family grew alarmed lest he should rashly surrender his career for a life of religion. As soon as he was able he went to the shrine of the Virgin at Montserrat, where, after a confession of his whole life on the vigil of the Annunciation, March 24, 1522, he hung up his arms as a votive offering and a symbol of his renunciation of his military career and of his entire devotion henceforth to the spiritual warfare, gave away his rich clothing, and went to the neighboring town of Manresa, where he served the sick and poor in the hospital. He lived in a cave, and his austerity finally impaired his health, though it was at this time that his *Spiritual Exercises*, from which he drew great spiritual strength, took form in his mind. Thus began a life of extreme asceticism, which, though it often endangered his health, yielded to his mystical mind ecstatic experiences. After this he went on a pilgrimage to the Holy Land and would have stayed at Jerusalem to spread the gospel among the infidels, but was forbidden by the local authorities. He returned to Barcelona in 1524. Realizing now that to do good he must have more knowledge, he began, at the age of 33, the rudiments of grammar in a public school beside boys. After two years he went to the new University of Alcalá and later to Salamanca. Because of public religious teaching with what was thought insufficient education, he incurred the censure of ecclesiastical authorities at both places. In 1528 he repaired to Paris to continue his studies. He was robbed by a companion and had to lodge in a hospital, where he did menial work for his support while attending the university. During his summer vacations he visited Spanish merchants in Antwerp, Bruges, and London so as to obtain money to continue his studies. During his student years he had no resources but the charity of the faithful. His earlier companions did not all remain his followers, but at Paris he formed a pious confraternity, out of which developed later the Society of Jesus. (See JESUITS.) Most of these were men of unusual ability. One became later the great Apostle of the Indies, Francis Xavier, and three, Lainez, Salmeron, and Lejay, became the leading theological advisers to the Council of Trent. One of the others, Faber, received the honors of beatification from the Church. In the crypt of the church of the Martyrs, on Montmartre, on the Feast of the Assumption, Aug. 15, 1534, the little band took their vows. At first their intention was to evangelize Palestine. They made their way to Venice for this purpose; but the war between the Christians and the Turks closed the way to the Holy Land, so they resolved to offer themselves to the Pope for any service he might assign. Paul III received them with great kindness. The pulpits of churches in various Italian towns were assigned to them, and their burning discourses and saintly lives soon attracted attention. No other of them was so effective as Ignatius himself, who spoke as the plain, blunt, but intensely earnest soldier. In 1539 Ignatius asked for papal approbation of his order. In spite of opposition to the erection of another religious order in the Church, the Pope read the draft of the Constitutions, and said, "The finger of God is here." While occupied with his constantly growing society, of which he was the superior, Ignatius found much to do besides its direction and the writings of the Constitutions. Though a Spaniard, he devoted himself to the care of the Jewish converts and secured the correction of many abuses in the treatment of those who wished to remain orthodox Jews. He

IGNATIUS LOYOLA

AFTER A PAINTING BY RUBENS

founded a house for fallen women and was not ashamed to be seen conducting them to it through the streets. He tried to prevent the occasions of their fall by providing a home for friendless girls. He established orphan asylums for boys and girls. The influence he acquired can be understood from the fact that he was able to end a dispute between the Pope and John III of Portugal that threatened serious harm to religion at the moment, and another between the citizens of Tivoli and their ruler, Margaret of Austria.

His writings consist only of the Constitutions and rules of the Society of Jesus, his Letters, and the *Exercitia Spiritualia*. This last little book of scarcely 100 duodecimo pages has proved one of the most influential works ever written. In 1552 he began to teach his spiritual exercises to his companions, and the earliest extant text of their publication dates from 1541. From the very beginning this work formed the basis of the spiritual training of the Jesuits themselves and the mold in which their retreats and missions to the people were cast. It has come to be the acknowledged model after which the missions and retreats given by most of the other religious orders of the Roman Catholic church are conducted. Three things are treated of particularly in the book: the service of Jesus Christ, placed above all that the kings of the earth can offer; the discernment of spirits; and finally the choice of a state of life. It was this book that accomplished the reforms the Jesuits effected. The Constitutions of the Jesuits are entirely the expressions of Ignatius' ideas. They have been but slightly modified, never in any essential, by successive General Congregations. It is often said that Ignatius founded the Jesuits to counteract the effects of the German Reformation, but there is good authority for believing that when Ignatius conceived the idea of his order he had not even heard the name of Luther. Even more than a decade later, he seems to have paid little heed to the religious movements in Europe, especially in Germany. One year before his death, in 1555, the society comprised eight provinces, divided as follows: Italy, two; Spain, three; Portugal, one; Brazil, one; India and Japan one. In Germany there were but two residences, Cologne and Vienna. He died in Rome, July 31, 1556. He was beatified in 1609 and canonized in 1622.

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IGNATIUS' BEAN, Saint. See Saint Ignatius' Bean.

IG'NEOUS ROCKS (Lat. *igneus*, fiery, from *ignis*, Skt. *agni*, fire). Rocks produced as the result of solidification from a molten condition. They are also often called eruptive rocks, although the word "eruptive" belongs more properly to that class of igneous rocks that have cooled at the surface. The igneous rocks include lavas which have been poured out upon the earth's surface; the fillings of the fissures, pipes, and other passages in the earth's crust through which molten material was conducted during its rise to or towards the surface; and the larger masses which consolidated at great depths and are commonly known as plutonic rocks. The agents of decomposition and disintegration of rock material and those of transportation and degradation necessarily expose to view these several types of igneous rocks, each of which possesses certain general and distinguishing characteristics. The most noteworthy general characteristic of the igneous rocks, when unmetamorphosed, is a massive structure without lamination or bedding, such as is characteristic of the sedimentary or clastic rocks on the one hand; or schistose structure, such as is developed in the metamorphic rocks. Inasmuch, however, as it has been shown that many *metamorphic rocks* (q.v.) have been formed from igneous rocks, it is clear that no sharp line can be drawn to separate these classes on the basis of structure, although in the main the above distinction applies. See Plutonic Rocks.

Prominent among the textures characteristic of the igneous rocks are the granitic, the porphyritic, and the vitreous, or glassy. The granitic texture is crystalline throughout and consists of an interlocking mosaic of the different mineral constituents, the nearly uniform size of the grains indicating that the process of consolidation was essentially an uninterrupted one, and that practically the same conditions obtained during all stages of the process. In this mosaic the mineral constituents which first separated from the magma have more or less perfect crystal outlines, whereas those of later separation have irregular boundaries because sufficient space was not available in which to build out their crystal faces. The porphyritic texture, which is the next most common among the igneous rocks, has crystals of one or more of the mineral constituents of the rock embedded in a base or ground mass of smaller crystals or of rock glass. The crystals embedded in the ground mass are known as porphyritic crystals, or phenocrysts (q.v.). It is generally supposed that the phenocrysts were crystallized out of the magma in a stage of the process of consolidation earlier than that which produced the ground mass of the rock; and as most igneous rocks of porphyritic texture have been formed either at the surface of the earth or at quite moderate depths below it, it is supposed that the phenocrysts were formed at considerable depths before the magma rose to or near the surface. In the lavas that flow from Vesuvius or from most other volcanoes, the phenocrysts may be picked out of the still molten lava as it flows from the volcano. The vit-

reous, or glassy, texture is one of comparatively infrequent occurrence, but is represented by obsidian (q.v.) and pitchstone. It is now generally recognized that many igneous rocks which have an entirely crystalline texture were once largely composed of rock glass, which has devitrified through processes of chemical alteration and crystallization.

In addition to the above textures characteristic of igneous rocks and dependent upon the state of crystallization of the rock substance, there are other features which call for notice. One of the most common observed in lava (q.v.) is a peculiar crumpled lamination of the rock caused by the arrangement of mineral constituents of unequal dimensions with their longer axes parallel to the crumpled lines. This fluxion structure is conditioned by the flow of the lava, the crumpled lines indicating the direction of flow. Other structures, as the amygdaloidal, scoriaceous, and pumiceous, which indicate different grades of cellular or porous texture, are conditioned by the steam once held in the lava and the opportunities for expansion and escape of this steam as the lava approached the surface of the earth.

In chemical composition the igneous rocks show wide variation, though limits are set by the laws of formation of magmas. No such limits are set for the clastic rocks. By processes of alteration the igneous rocks change into the metamorphic rocks (as do also the clastic rocks), so that no sharp line can be drawn to separate these great divisions.

Great difficulties arise in the systematic classification of igneous rocks by reason of the many ways in which it is possible to describe them, and the varying importance which is attached to each method; hence great difference of opinion exists among petrographers as to the best scheme to be adopted. On the continent of Europe, and especially in Germany, the manner of occurrence of a rock, whether as a boss or batholite (q.v.), as a dike (q.v.), or as a sheet or flow, is given the first importance; and the age of the rock, once considered paramount, still retains its importance in the secondary classification. In America opinion seems to favor as bases of classification the chemical composition, the texture, and the mineral composition; but the future must be awaited before any classification free from serious objections is likely to be adopted. The scheme which has the greatest number of followers among recent workers in petrography perhaps is the so-called quantitative classification proposed by Iddings, Cross, Washington, and Pirsson, and described in the *Journal of Geology* for 1902. The basis of this classification is chemical composition, and rocks of similar chemical character are grouped together. The chemical composition is expressed in terms of certain standard minerals, which are divided into two groups, the alkali-calcic and the iron-magnesia groups. The rocks are separated into five main classes according to the relative proportions of the minerals present belonging to the two groups. The principal defect of the scheme from a practical standpoint seems to be that an exact chemical analysis is a necessary preliminary to placing a rock in its proper class.

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IG'NIS FATUUS, făt'ū-ŭs (Lat., vain fire). A luminous appearance, frequently seen in marshy places, in churchyards, and over stagnant pools. It generally appears a little after sunset as a pale, bluish-colored flame, varying in size and shape; sometimes it shines steadily till morning, at other times disappears, and reappears within about half-hourly intervals. It floats in air at about 2 feet from the ground, is sometimes fixed, and sometimes travels with great rapidity. Many efforts have been made to discover its cause; but so varied are its appearances and so void of any common principle that these attempts have failed. Two of the various explanations offered may be mentioned here. The first is that the ignis fatuus is due to phosphureted hydrogen gas, PH_3, which possesses the property of igniting when it comes in contact with dry atmospheric air; the gas would be generated by the decomposition of animal matter present in a marshy soil. The second is that it is due to the combustion of methane, or marsh gas, CH_4, produced by the decomposition of vegetable matter; but though this supposition satisfactorily accounts for many appearances connected with the ignis fatuus, the gas itself is not spontaneously combustible, and an additional supposition becomes necessary to account for its ignition. The probable conclusion is that a number of phenomena, apparently similar, but arising from different causes, are aggregated under the term "ignis fatuus."

The appearance of ignis fatuus is not a common phenomenon, and many distinguished naturalists who desired to investigate it have never succeeded in finding it; but it is not unfrequently seen in the north of Germany, the swamp and moorland districts in the south and northwest of England, and in the lowlands of Scotland. It is seen in the above places from the middle of autumn till the beginning of November. In former times the ignis fatuus, under the names of Will-o'-the-Wisp, Jack-o'-lantern, Spunkie, etc., was an object of superstition among the inhabitants of the districts where it appears and was believed to be due to the agency of evil spirits attempting to lure travelers to their destruction.

IGNITION. See INTERNAL-COMBUSTION ENGINE and MOTOR VEHICLES.

IGNJATOVIĆ, ĭg-nyät'o-vĭch, IAKŠA (JACOB) (1824–89). A Servian novelist and critic, born in Szent-Endre, Hungary. He received a legal education at Budapest and elsewhere. After the revolution of 1848 he lived for some time in Paris, and he traveled extensively in south Europe. Returning to Hungary, he became editor of the *Review* (*Letopis*) of the Servian Literary Society (Matica) and was twice elected deputy to Parliament. He wrote numerous novels, historical, humorous, and social, of which the best are *George Brankovich* (1859), historical, and *The Sufferers* and *Old and New Masters*, dealing with contemporary Servian life. He also wrote short stories and political and literary essays.

IGNORANCE OF THE LAW. One of the important maxims of the common law is *Igno-*

rance of the law excuses no one. It is not, however, an aphorism of universal application, nor is it to be pressed into the service of injustice; neither does it warrant the presumption that every one knows the law. There is, of course, no such presumption. Yet the rule that ignorance of law shall not serve as an excuse for illegal acts or omissions is common to all systems of law and is not only expedient but necessary.

In criminal law particularly the maxim gives expression to an important principle of public policy. To permit a person who has committed a crime to escape the penalties of his wrongdoing by the plea that he did not know that the act was a crime, would plainly be subversive of the whole system of criminal justice. Yet even in criminal cases the principle has real or apparent exceptions. If a person is indicted for larceny, he may show that he honestly believed the property to be his own, although it appeared that this belief was due to his ignorance of a rule of law which vested the property in another. This results from the fact that he does not commit the crime of larceny unless he intended to appropriate another person's property to his own use. Had the indicted person been sued for conversion by the true owner, his ignorance of the law would have been no excuse. In the civil action for conversion his motive, or intention, or belief in taking would be immaterial. One who takes and uses property as his own acts at his peril. So, if a person enters into an honest and fair contract, he cannot absolve himself from its obligations by showing that he would not thus have contracted had he known the legal consequences of so doing.

In general it may also be said that a person who has paid money in ignorance of the law cannot recover it in a quasi-contract action as money paid under a mistake. This means that no man will be permitted to exempt himself from a duty, or shelter himself from the consequences of infringing a prohibition imposed by law, or acquire an advantage in opposition to the legal rights and interests of another, by pretending error or ignorance of law. See MISTAKE; QUASI CONTRACT.

IG'NORAN'TINES (from Lat. *ignorare*, to be ignorant), FRATRES IGNORANTIÆ. A religious congregation of men in the Roman Catholic church, associated for the gratuitous instruction of poor children in sacred as well as secular learning. See BROTHERS OF THE CHRISTIAN SCHOOLS.

IGOROT, ĭ'gō-rōt'. The designation Igorot is a term meaning 'mountain people,' which was formerly applied to all the interior people of northern Luzon. At present it is generally understood to refer to the pagan inhabitants of Bontoc, Benguet, Lepanto, and Amburayan subprovinces. In culture these people are much alike except for the fact that those outside of Bontoc have been more modified by the white man. Both are agricultural and depend almost solely on the fields for sustenance. Like the Ifugao, they construct mountain-side terraces, to which they conduct water by means of flumes and ditches. The houses, which are grouped in villages, have grass roofs which overhang the board side walls. The ground floor is used as a sleeping apartment and general workroom, while in the roof is a dimly lighted apartment which serves as a kitchen and storeroom.

The people of both divisions are of excellent build, but the inhabitants of Bontoc are somewhat larger and more aggressive than the Benguet-Lepanto people. The Bontoc are addicted to head hunting and until recent years have been ardent warriors. Their villages are divided into *atos* (or divisions), in each of which is to be found a special house for the unmarried men and boys, while a similar structure serves for the girls. The Philippine census of 1903 stated the total number of the Igorot people as 211,520.

While less aggressive than the people of Bontoc, the Benguet-Lepanto Igorot have developed further in many ways, and are now, as they have been for many centuries, miners and workers in gold and copper. Consult Jenks, *The Bontoc Igorot* (Manila, P. I., 1905). See PHILIPPINE ISLANDS.

IGOR'S (ē'gôrz) **BAND,** SONG OF (Russ. *Slovo o polku Igorevě*). An early Russian prose narrative, of uncertain date. It recites the unfortunate outcome of the expedition (1185) of Igor (Scand. Ingvar), Prince of Novgorod-Syeversk, into the country of the Polovtsy in southern Russia. The Prince was defeated and taken prisoner, but later he escaped with the help of a slave. This song, so called, is not contemporary with the events it relates. Generally admired are the lyric passages depicting the grief of Nature over the Prince's capture; the lament of Yaroslavona, his consort, on hearing of his fate; and the escape of Igor. The original manuscript, discovered by Count Musin-Pushkin and published in 1800, was destroyed in the Moscow fire of 1812. The editing was very poor, and another copy found in 1864 among Catharine II's papers is hardly more satisfactory. Its authenticity has been an object of bitter controversy, and a vast literature on the subject has grown up. A translation by Wolfsohn in *Schönwissenschaftliche Litteratur der Russen* (Leipzig, 1843) and one with introduction and notes by Paucker (Berlin, 1884) are very good. There are also French translations by Rambaud (*La Russie épique*, Paris, 1876) and others. There is an English translation by Wiener in *Anthology of Russian Literature*, vol. i (New York, 1902).

IGRAINE, ĭ-grān'. See IGERNA.

IGUALA, or **IGUALA DE ITURBIDE,** ē-gwä'lä dā ē'tōōr-bē'dā. A town in the State of Guerrero, Mexico (Map: Mexico, J 8). It is in a rich mining and agricultural district and is the largest town of the state. The first silver mines worked by the Spaniards in Mexico were near here. It has a prominent place in Mexican history from the fact that the Plan de Iguala, or the Plan of the Three Guarantees, was announced here by Iturbide on Feb. 24, 1821. (See MEXICO, *History.*) In 1907 a severe earthquake destroyed many buildings in the town. Pop., 1910, 8195.

IGUALADA, ē'gwä-lä'dä. A city in the Province of Barcelona, Spain, situated on the river Noya, in a mountainous but fertile district, 46 miles by rail northwest of Barcelona (Map: Spain, F 2). It was formerly a fortified town, but its walls are now in ruins. It has manufactures of cotton, linen, and other textiles. The famous mountain and Benedictine monastery of Monserrat lie 12 miles to the east. Pop., 1900, 10,476; 1910, 11,754.

IGUANA, ĭ-gwä'nä (Sp., from the Haitian name, *igoana, hiuana, yuana*). A genus of tropical American lizards, representing the family Iguanidæ, of which there are about 55 genera and 250 or more species. In external and internal structure iguanas closely resemble the Agamidæ

of the Old World and are distinguished mainly by the pleurodont dentition. The tongue is thick and villous. All the North American forms possess femoral pores, but few of the South American species have them. In habits also the Iguanidæ closely resemble the Agamidæ, save that

TEETH OF AN IGUANA.

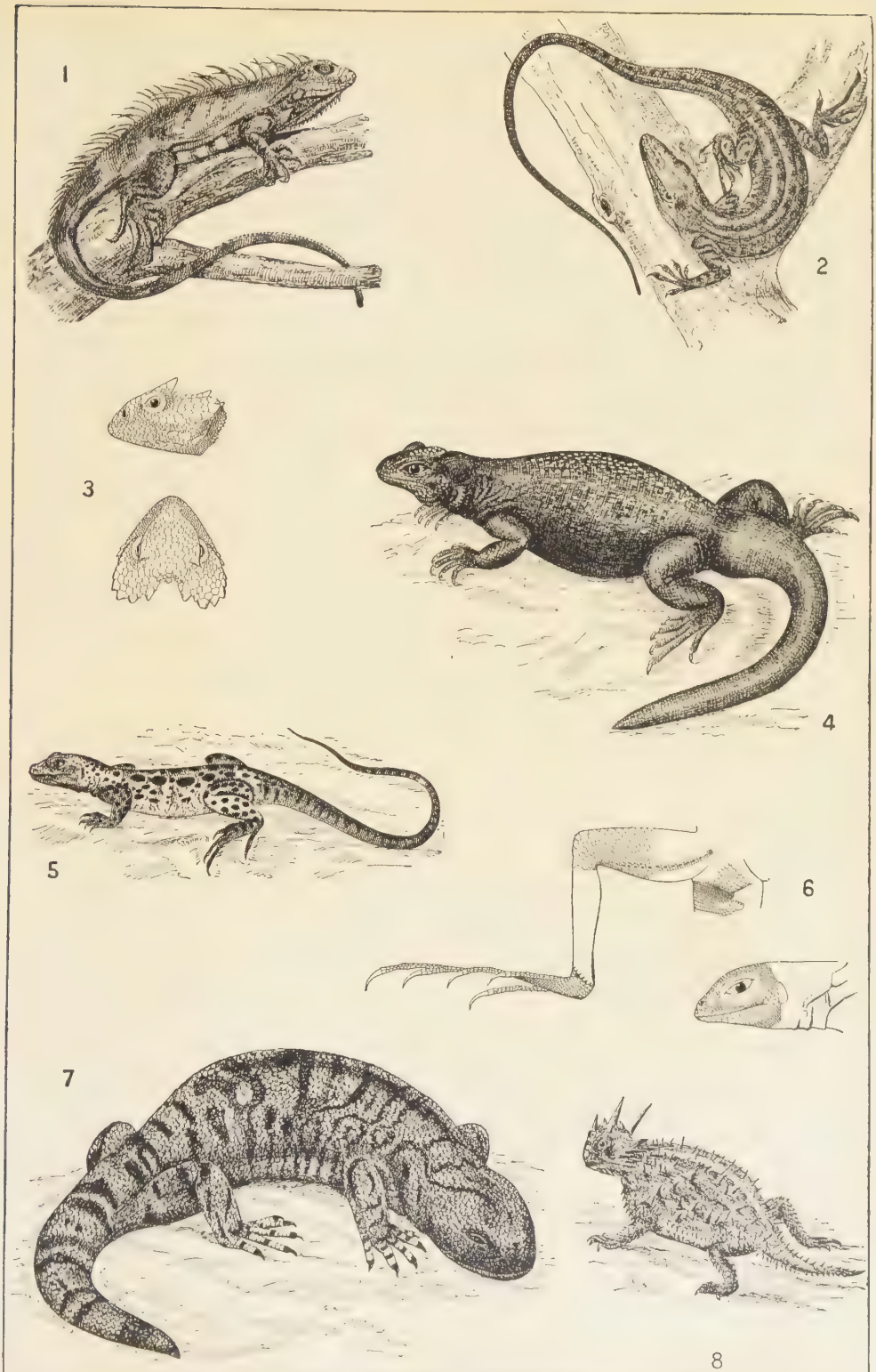
there are no flying forms to correspond with the flying dragon of the Agamidæ, while in America some of the iguanas, such as *Anolis*, have digital expansions, and others are semimarine, neither of which conditions is met with in the Old World family. The family contains several of the largest lizards. Most of the species are arboreal, but some of them live on the surface of the sand and stones of the desert and have a depressed form. Several species live wholly, or almost wholly, on vegetable food—the blossoms and leaves of plants. For this reason the flesh of several of them, especially of the genus *Iguana*, is very palatable, is sought by the natives of Central and South America as food, and is sold in their markets in considerable quantity. One of the species most eaten is *Iguana tuberculata*, a repulsive-looking lizard, with a high, dorsal, fringed ridge and a large dewlap. (See Plate.) It basks on the limbs of trees during the warm hours and while thus situated seems rather indifferent to the approach of man. It is fond of music and of having the body stroked. The natives take advantage of these facts, whistle a lively tune as they approach, and when near enough stroke the sides of the iguana with a stick until they succeed in getting a noose over its head. (Consult Belt, *Naturalist in Nicaragua*, London, 1888.) The natives also dig them out of their burrows or chase them into trees with dogs trained for the purpose. On the Galapagos Islands there is a semiaquatic genus, *Amblyrhynchus*, whose species feed on seaweeds along shore. This lizard is described in detail by Darwin, in chap. v of his *Naturalist's Voyage* (London, 1860). There are other species of the same genus that live for months without water by feeding on the succulent cactus. The great iguana of Jamaica, with the prominent serrate crest, is *Cyclura lophoma*. In the southwestern United States, from western Kansas to southern California and Mexico, dwell several genera of green, dark-gray, or brown iguanid lizards, such as *Uta*, *Holbrookia* (q.v.), *Ctenosaura*, and *Crotaphytus*. (See Collared Lizard.) The large genus *Sceloporus* ranges not only over the western and central parts of the United States, but in all the eastern and Gulf States as far north as New Jersey and Indiana. Another widely distributed genus, *Anolis*, has two representatives in the South Atlantic States, popularly called chameleons. (See Anolis.) These lizards possess mimicry of color in a remarkable degree and have a considerable power of changing their color. They are insectivorous, and the wanton destruction of them is much to be deplored, for in their native habitats they are of considerable economic importance to agriculture. To this family belongs also the basilisk of Central and South America, so named on account of its fancied resemblance to the creature of fable. (See Basilisk.) It is a large, harmless lizard, found no farther north than southern Mexico. The family also includes those peculiar, spiny, short-tailed, flattened lizards known as horned toads. (See Horned Toad.)

Consult: G. A. Boulenger, *Catalogue of Lizards of the British Museum* (London, 1885); J. S. Kingsley (ed.), *Standard Natural History*, vol. iii (Boston, 1885); L. H. Stejneger, *Death Valley Expedition* (Department of Agriculture, Washington, 1893); E. D. Cope, *Crocodilians, Lizards, and Snakes* (Smithsonian Institution, ib., 1900); Hans Gadow, *Amphibia and Reptiles* (New York, 1901). See Lizard.

IGUANODON, ĭ-gwăn′ō-dŏn (Neo-Lat., from Eng. *iguana* + Gk. *ὀδούς, odous,* tooth). A genus of ornithopod dinosaurs, found fossil in Jurassic and Lower Cretaceous rocks of Europe. *Iguanodon* is perhaps the first dinosaur brought to light, for it was described by Mantell in 1825 from specimens found in Kent, England. The animal was 15 to 25 feet long; the head was large and narrow, the jaws heavy and furnished with numerous teeth of peculiar form that resemble those of the modern American lizard, *Iguana*. The anterior portions of the jaws are provided with strong, horny beaks like those of turtles. The fore limbs have four toes and a "spur" and are much shorter than the heavy three-toed hind limbs. The pelvis is elongated and the tail heavy, and there is a ridge of strong vertebral spines extending along the dorsal surface from the neck to the middle of the tail. All the bones are hollow. *Iguanodon* was an herbivorous dinosaur that walked on its hind legs and sat on a tripod formed by the hind legs and tail, after the manner of the kangaroo. It lived in great numbers in the swampy regions of England and Belgium and other parts of Europe during Jurassic time, as indicated by the mode of occurrence of its fossil skeletons, 29 of which were found at one time in Upper Jurassic sandstones of the coal regions at Bernissart, Belgium. *Iguanodon* has not been found in the Mesozoics of America, where it is represented by similar genera *Camptosaurus*, *Laosaurus*, and *Thespesius*. A very instructive account of the discovery and early history of *Iguanodon*, illustrating the method by which fragmentary material has after careful work yielded valuable results, is to be found in Mantell's *Petrifactions and their Teachings* (London, 1851). See also Woodward, *Outlines of Vertebrate Palæontology for Students of Zoölogy* (Cambridge, 1898). For more specialized articles, consult: Dollo, "Quatrième note sur les Dinosauriens de Bernissart," in *Bulletin du Musée Royal d'Histoire Naturelle de Belgique*, ii (Brussels, 1883); Woodward, *Geological Magazine* (London, 1895); Knipe, *Evolution in the Past* (ib., 1912). See Camptosaurus; Dinosauria.

IGUAZÚ, ē′guä-sōō′. A river of Brazil, which rises near the Atlantic Ocean in the State of Paraná, flows westward for about 790 miles, and empties into the Paraná River (Map: Argentina, J 3). It forms most of the boundary between the states of Paraná and Santa Catharina and also for a short distance between Brazil and Argentina (Misiones). The middle course is navigable for river steamers for some distance. The lower course is broken by numerous cascades and falls, some being from 30 to 90 feet in height. About 11 miles from its mouth are the wonderful Falls of Iguazú, one of the most magnificent cataracts in the world.

IGUANAS AND OTHER AMERICAN LIZARDS



1. IGUANA (Iguana tuberculata).
2. GREEN LIZARD (Anolis principalis).
3. NORTHERN HORNED TOAD (Phrynosoma Douglassi); top of head and profile.
4. CHUCKWALLA (Sauromalus ater).
5. LEOPARD LIZARD (Crotaphytus Wislizeni).
6. DESERT LIZARD (Callisaurus draconoides); head and hind limb.
7. GILA MONSTER (Heloderma horridum).
8. COMMON HORNED TOAD (Phrynosoma cornutum).

The Falls are formed by a double drop, each having a fall of about 180 feet. In the dry season there are two crescents, known respectively as the Argentine and Brazilian falls, each with a width of 800 yards. In the wet season the two are joined into one vast fall of some 4000 yards in width. Situated in the midst of a virgin tropical forest, the Falls are difficult of access. Those who have visited them say they surpass Niagara in magnitude and splendor. Consult Manuel Bernárdez, *De Buenos Aires al Iguazú* (2d ed., Buenos Aires, 1901).

IGUVINE TABLETS. See Eugubine Tables.

IGUVIUM. See Eugubine Tables; Gubbio.

IHERING, Hermann and Rudolf. See Jhering.

I. H. N. CLUBS. See Lend-a-Hand Clubs.

IHNE, ē′ne, Wilhelm (1821–1902). A German historian, born at Fürth, and educated at Bonn (1839–43). He was private tutor in England (1843–47) and returned to Liverpool, where he had charge of a school (1849–63), after two years' teaching at Elberfeld. In 1863 he went to Heidelberg, where he was made professor in 1873. He wrote: *Quæstiones Terentianæ* (1843); *Researches into the History of the Roman Constitution* (1853); *Plea for the Emperor Tiberius* (1856); a *History of Rome* (1871–82), of which the German edition was published later; and *Early Rome* (1876).

IHRE, ē′re, Johan (1707–80). A Swedish scholar of Scottish extraction. He was born at Lund and educated at the University of Upsala, where he acquired a great reputation and carried off the highest honors. He subsequently traveled in France and England, was appointed underlibrarian to the Academy of Sciences on his return to Sweden, and rose through a variety of offices to be professor of belles-lettres and political economy (1748). Ihre's principal work is his *Glossarium Suiogothicum* (1769), which may be regarded as the foundation of Swedish philology. It was published at the cost of the state, which gave Ihre $10,000 to execute it. His numerous academical disputations, amounting to upward of 450, are still valuable, especially those on the Mœso-Gothic version of the Gospels by Ulfilas.

I. H. S. See Abbreviations.

II KAMON NO KAMI, ē-ē kä′mŏn nō kä′mē, or Ii Naosuké, Baron (1815–61). The Japanese statesman whose wise and vigorous statesmanship led to the opening of Japan to foreign nations and the establishment of friendly relations with them. He was the fourteenth son of Baron Ii, of Hikone on Lake Biwa, and was born of a line of ancestors known honorably in the tenth century. At 21 Ii went to Yeddo and had his mansion within the inclosure of Yeddo Castle at Sakurada, or Cherry Field. In 1850 he was made heir to the barony, assuming the highly honorable title of Kamon no kami, which gave him standing at the Shogun's court. In 1853 the question of foreign intercourse, precipitated by Commodore Perry, divided the opinions of the daimyos. Although he shared with many a feeling of hatred towards foreigners, Ii drew a line of distinction between personal feelings and national interests and declared himself to be in favor of intercourse with foreigners and of a revival of the military spirit for national defense. The Shogun Iyesada being childless and in poor health, the question of appointing an heir added to the complication of the period. Pressed by Townsend Harris (q.v.) to sign the treaty which he had negotiated, and which the Mikado's court in Kyoto opposed, the Shogun had to face a crisis which admitted of no delay. On June 4, 1858, two days after the Mikado's refusal to approve the treaty, the Shogun appointed Ii to be Tairo, or Regent, and on the 5th he was publicly installed, as the virtual ruler of Japan, but acting in the name of the Shogun. The Shogun Iyesada died suddenly, August 15, leaving no heirs. Carrying out his master's wishes, Ii appointed Kikuchiyo, who subsequently took the name of Iyémochi, the Prince of Kiushu, then a child of 12, to be his successor, and, taking the responsibility, in view of the rapid approach of the squadrons of the Russians, British, and French after their victorious campaign in China, he signed the liberal treaty drawn up by the United States Minister. The treaty with Great Britain followed on August 26 and that with France on October 9.

The great daimyos of Mito, Owari, and Echizen, however, opposed his nominee to the shogunate, the two former daimyos wishing also to have Echizen made Regent. On the outbreak of the long-gathering storm of opposition Ii crushed his enemies with a strong hand and dispatched an embassy to the United States to ratify the treaty. Among other triumphs he had the Princess Kazu, aunt of the present Emperor, betrothed in marriage to the young Shogun, and they were married in Yeddo in 1861. Before this, on the 23d of March, 1861, a snowy day, while on his way in his palanquin with a large following of bodyguards to the palace in Yeddo, they were attacked by a band of 18 assassins—17 from Mito, one from Satsuma, all of them Ronins. In the fight which ensued Baron Ii himself was stabbed, and his head cut off and carried away to the castle town of Mito and there exposed on a pole. For years the name Ii rested under a cloud, but it has been cleansed by Shimada Saburo in his book *Kai Koku Shimatsŭ* (Opening of the Country, Beginning and End), which has been translated into English under the title of *Agitated Japan* (1896). The man and the episode of his assassination have given rise to a considerable body of native literature, and the episode is treated in fiction by A. C. Maclay in *Mito Yashiki* (3d ed., 1899).

IIWI, ē-ē′vē. The English spelling by many voyagers of the name of a Hawaiian bird, otherwise known as mamo (q.v.), whose scarlet plumage was used for the native feather cloaks.

IKAO, ē-kä′ō. A famous summer resort of Japan, situated in the Province of Kotsuke, about 20 miles by rail from Takasaki, and 88 miles from Tokyo. It is built on the slopes of the Haruna Mountain and is celebrated for the picturesqueness of its situation as well as for its two hot springs and rich vegetation. The mineral springs have a temperature of 113° F. and contain iron and sulphate of soda.

IK MARVEL, īk mär′vēl. See Mitchell, Donald Grant.

IKUNO, ē-kōō′nō. A mining town of Japan, situated at an altitude of 1200 feet, in the Prefecture of Hyogo, about 35 miles northwest of Kobe, and 31 miles by rail from Himeji (Map: Japan, D 6). Its silver mines, the second largest in Japan, are operated by the government. Over 1500 persons are employed, and the mines are worked day and night. Besides silver they also yield gold. Pop. (est.), 3000.

ILAGAN, ē-lä′gän. The capital of the Prov-

ince of Isabela in Luzon, Philippines (Map: Philippine Islands, C 2). It is situated at the mouth of the Grande de Cagayán, 270 miles north-northeast of Manila, and 36 miles northwest of Palanan, its nearest port. Its tobacco industry is important. Pop., 1903, 16,008.

ILCHI, ēl'chē. A city of China. See KHOTAN.

ÎLE DE FRANCE, ēl de fräns. The former name of Mauritius (q.v.), an island in the Indian Ocean.

ÎLE DE FRANCE. One of the old provinces of France, having Paris as its capital, and now mostly comprised in the departments of Seine, Seine-et-Oise, Seine-et-Marne, Aisne, and Oise. During the last century of the Carolingian dynasty, the Ile de France was possessed by a race of powerful nobles who took the title of dukes of France. One of the ablest of these was Hugh, or Hugues, surnamed the Great, or the White, who for 20 years previous to his death (956) virtually wielded the sovereign power under the Carolingian kings Louis IV and Lothair. His son Hugh Capet eventually became the actual sovereign. Consult A. Longnon, "L'Ile de France," in *Mémoires de la Société de l'Histoire de Paris et de l'Ile de France*, vol. i (Paris, 1875), and E. W. Rose, *Cathedrals and Cloisters of the Isle de France* (2 vols., New York, 1910).

ÎLE DE RE. See RE, ILE DE.

ILEOCÆCAL (ĭl'ē-ō-sē'kal) **VALVE.** A valvular constriction that guards the passage between the large and the small intestine, at the opening of the cæcum. It consists of a double fold of mucous membrane and is present in all mammals except certain carnivora.

ILER'DA. See LÉRIDA.

IL'EUM. See INTESTINE.

IL'EUS (Neo-Lat., from Lat. *ileos*, Gk. *εἰλεός, eileos, ἰλεός, ileos*, severe colic, from *εἰλεῖν, eilein*, to roll up; connected with Lat. *volvere*, to roll, Eng. *wallow*). A severe colic, due to intestinal obstruction. Its symptoms are pain, nausea, and vomiting—which latter may contain feculent matter—rapid and feeble heart, and collapse. The obstruction may relieve itself, or, if of mechanical origin, it may require operative interference to save life.

I'LEX (Lat., holm oak). A tree often named in the Latin classics, the evergreen oak or holm oak (*Quercus ilex*). It is a native of most parts of the south of Europe and of the north of Africa and often attains large dimensions. Its leaves are ovate-oblong, acute, leathery, hoary beneath; but they vary much in some respects, from the size of a sloe leaf to that of a beech and from being very spiny at the edge to perfect evenness. Its wood is very hard and heavy, tough, durable, and useful, particularly for axles, pulleys, screws, and whatever is to be subjected to much friction. The acorns are of various quality, sometimes bitter and sometimes sweet and eatable. In modern botany *Ilex* is the generic name of the holly (q.v.).

ILFORD, ĭl'fērd. An urban district in Essex, England, on the Roding, 7 miles east-southeast of London (Map: London, D 9). Its modern growth and importance are due to the photographic industry, the establishment of dry-plate works, and a paper mill. The erection also of the London County Council's Claybury Hall Lunatic Asylum, holding 2000 persons, has been instrumental in adding to the population. The chapel of the twelfth-century mediæval hospital of St. Mary and St. Thomas is of archæological interest. The British Museum contains fossil remains of mammoths discovered here. Across the river is Little Ilford. Pop., 1891, 10,913; 1901, 41,244; 1911, 78,205.

ILFRACOMBE, ĭl'frà-kōōm. A market town, seaport, and watering place on the north coast of Devon, England, finely situated amid picturesque irregular hills, on an inlet of the Bristol Channel, 11 miles north of Barnstaple (Map: England, B 5). The harbor is formed by ramparts of rock and furnished with a lighthouse and a pier. The climate is mild, and it has an excellent promenade. Fishing is still an active industry, but shipping has declined. It is an old town and in the fourteenth century was of considerable commercial importance. Pop., 1901, 8557; 1911, 8935.

ILGEN, ēl'gen, KARL DAVID (1763–1834). A German philologist and educator, born at Burgholzhausen in Saxony and educated at Leipzig. In 1789 he became rector of the Gymnasium at Naumburg, in 1794 professor of Oriental languages at Jena, and in 1802 rector of the Landesschule at Pforta, where he labored with conspicuous success for nearly 30 years. His main works are: *De Jobi Natura atque Virtutibus* (1788); *Urkunden des ersten Buches Mosis in ihrer Urgestalt* (1798); *Die Geschichte Tobis nach drei verschiedenen Originalen übersetzt* (1800); *Hymni Homerici* (1796); *Scolia Græcorum* (1798); *Opuscula Varia Philologica* (1797); *Animadversiones ad Vergilii Copam* (1820). Consult Naumann, *Ilgeniana* (Leipzig, 1853).

IL GRECCHETTO. See CASTIGLIONE, GIOVANNI BENEDETTO.

ILI, ē'lē'. A river which rises, under the name of Tekes, in the Tian-Shan Mountains, on the borders of Russia and China, not far from Lake Issyk-kul, flows at first in a northeasterly and then in a westerly direction, passing the town of Kuldja, and falls into Lake Balkhash in the Russian Central Asiatic Province of Semirietchensk (Map: Asia, J 4). It is about 800 miles long, flows through a fertile and populous valley stocked with sheep and cattle, and is navigable from Kuldja.

IL'IAC ARTERIES. The two arteries formed by the bifurcation of the abdominal aorta. The aorta (q.v.) divides at its lowest point—which is usually on the left side of the body of the fourth lumbar vertebra—into the two common iliac arteries, which pass downward and outward on each side to the margin of the pelvis for about 2½ inches and then divide into the external and internal iliac artery of either side. The external iliac passes obliquely downward and outward to the femoral arch, when it enters the thigh and becomes the femoral artery. The internal iliac is a short vessel, about 1½ inches in length, which divides into an anterior and a posterior trunk. The anterior trunk divides into several branches, which supply the bladder, the rectum, the generative organs, and muscles both within and on the outside of the pelvis, with arterial blood; while the branches of the posterior trunk mainly supply muscles within and on the outside of the pelvis. The importance of the internal iliac artery in carrying on the circulation in uterine life is noticed in the article FŒTUS.

IL'IAD. See HOMER.

ILIAD OF FRANCE, THE. A name sometimes given to the *Roman de la Rose* (q.v.).

ILIAN TABLET. See TABULA ILIACA.

ILIJĆ, ĭl'ĭch, Dragutin (1858–). A Servian poet and critic. Besides some poems, his important works in prose are: *Novels* (1892); *Splendid Pictures from the First Days of Christianity* (1896); *The Last Prophet* (1897); and several dramas.

ILIJĆ, Jovan (1823–1901). A popular Servian poet, born in Belgrade and educated at Kragujevac, Belgrade, and Vienna. He took part in the revolution of 1848–49 as a volunteer against Hungary; returning to Servia, he became a member of the Supreme Court and from 1869 to 1873 he was Minister of Justice. There have been four editions of his poems, which are mostly written in the manner of Servian folk poesy. The *Bysmylach* and the *Dervish Baba* are, however, of Oriental character. His prose writings are less important. His three sons were all writers.

ILIJĆ, Voyislav (1862–94). An important Servian poet, born in Belgrade; he died in Pristina (Albania) while Servian Vice Consul. The youngest and favorite son of Jovan Ilijć, he thoroughly studied Russian literature, being greatly influenced by Pushkin. He appeared before the public with his poems, chiefly elegiac, about 1880, and during the following 15 years held a leading position among the poets of his nation, giving a new direction to Servian poetry. A complete collection of his poems, originally published in various periodicals, appeared in 1907. He also wrote in prose, and left an unfinished tragedy, *Radoslav*.

ILION, ĭl'ĭ-on. A village in Herkimer Co., N. Y., on the Mohawk River and Erie and Barge canals, 12 miles east-southeast of Utica, on the New York Central and Hudson River and the West Shore railroads (Map: New York, E 4). It has a fine public library and a hospital. The manufactures include firearms, typewriters, store fixtures, knit goods, and cabinet and filing cases. The water works and electric-light plant are owned by the municipality. One or two families seem to have moved to the site of Ilion about 1816, but there was properly no village here until about 1828. It was incorporated in 1852. Pop., 1900, 5138; 1910, 6588; 1920, 10,169.

ILION, ILIOS. See Ilus; Troy.

ILI'ONA (Lat., from Gk. Ἰλιόνη, *Ilionē*). In Greek mythology, the wife of Polymestor, King of Thrace. She was the daughter of Priam and Hecuba and according to one legend brought up her brother Polydorus, who had been committed to the care of Polymestor. When the latter, instigated by the Greeks, who wished to exterminate the race of Priam, designed the murder of Polydorus, Iliona substituted his own son, Deipilus, who was put to death instead. According to a story given by Vergil, *Æneid*, iii, 50 ff., Polymestor murdered Polydorus for the sake of a great sum of gold Priam had sent with Polydorus for safe keeping.

ILIONEUS, ĭ-lī'ō-nūs (Lat., from Gk. Ἰλιονεύς). The son of Niobe, killed with all her other children. He was praying, and Apollo would have saved him if the arrow had not already been sent.

ILITHYIA, ĭl'ĭ-thī'yà (Lat., from Gk. Εἰλείθυια, *Eileithyia*). The Greek goddess who presided over childbirth. The plural form (Ilithyiæ) is used in the *Iliad*, but elsewhere only one goddess of the name is mentioned.

IL'IUM. See Troy.

ILIUM (Lat., flank). A portion of one of the bones of the pelvis, the os innominatum. In the undeveloped child it is a distinct portion, which afterward becomes united to the pubis in front and to the ischium behind and below. It is the hip bone, or haunch bone. See Pelvis.

ILKESTON, ĭl'kĕs-ton. A market town in Derbyshire, England, 9 miles northeast of Derby, on an eminence in the valley of Erewash (Map: England, E 4). There are manufactures of hosiery, lace, and stoneware; and coal and iron works in the vicinity. The town has a medicinal mineral spring and baths, which are now closed. It obtained a grant for a market and fair in 1251, but was incorporated in 1887. It owns its gas, water, markets, and cemetery. Pop., 1901, 25,384; 1911, 31,673.

ILKHANS, ĭl-känz'. See Mongol Dynasties.

ILLÆNUS, ĭl-lē'nŭs. An important genus of trilobites, the type of the family Illænidæ, characterized by its large convex cephalic and caudal shields which are nearly smooth, both the glabella of the former and the axis of the latter being indistinct. The thoracic segments, usually 10 in number, are also smooth. The genus is represented by numerous species in the Ordovician and Silurian of Europe, Asia, and North America. See Trilobita.

ILLAMPU, ē-lyäm'pōō. A mountain of the Andes. See Sorata.

ILLA-TICSI, ē'lyà-tēk'sē (Quichua, Eternal Light). A name given to the supreme god of the Peruvians, Uiracocha.

ILLE-ET-VILAINE, ēl'-ā'-vē'lān'. A maritime department in the northwest of France, a portion of the old Province of Brittany, lying between the English Channel and the Department of Loire-Inférieure (Map: France, N., D 4). Area, 2699 square miles. Pop., 1911, 608,098. It is watered chiefly by the rivers from which it derives its name—the Vilaine, and its tributary, the Ille. Flax, hemp, wheat, buckwheat, oats, barley, potatoes, and fruits are extensively produced, and the cider of this district is esteemed the best produced in the country. The department is famous for its dairy products. Cattle are reared in great numbers, iron, zinc, and lead are worked, and great varieties of linen and woolen fabrics are manufactured. The seaports have large fisheries and yearly equip fleets for the Newfoundland banks. Rennes is the capital, and Saint-Malo the principal seaport.

IL'LEGAL'ITY. A legal condition or status resulting from the performance or attempted performance of an act forbidden by law. The act may be a contract or a conveyance or devise of property for a forbidden purpose or in violation of some principle of public policy, and the effect of the illegality is to render the transaction ineffectual as a legal act and, therefore, unenforceable in any proceeding at law or in equity. Illegality may result either from a statute prohibiting an act, as gaming or the taking of usury, or from general considerations of morality and public policy, as in the case of agreements for illicit cohabitation or conveyances in fraud of creditors. Hence we have the classification of such acts as evils prohibited by law (*mala prohibita*) and acts wrongful in themselves (*mala in se*).

The doctrine of illegality finds its most frequent application in the law of contracts. It is a general rule that the law will never give its aid to a party in the enforcement of an illegal contract into which he has entered, whether the same be in direct violation of a statute, against

public policy, or opposed to public morals. This rule is, however, subject to the qualification that, in the case of *mala prohibita*, an innocent party to such a contract, as where a debtor pays usurious interest, is not estopped from asserting such rights as he may have thereunder. But where the parties are *in pari delicto*, as is usually, if not always, the case, where the transaction is *malum in se*, the rule is rigorously applied to each and every one of them. The defendant in a suit based on such a contract is permitted to set up the illegality, as a defense, not from any tenderness for him, but because, under our procedure, there is no other way in which the plaintiff can be prevented from enforcing the illegal obligation.

But the law has not been content merely to refuse to lend its aid to the accomplishment of an illegal purpose. It goes further and refuses to allow its process to be used to undo an illegal act by restoring the parties to their former condition. Thus, if one has paid a consideration or made a conveyance or mortgage for an illegal purpose, as to compound a felony or as a reward or inducement for illicit cohabitation, the courts will refuse to recognize the illegality of the transaction as a ground for rescinding it. Thus, in the case of a mortgage given for an illegal purpose, the mortgagee cannot foreclose nor the mortgagor redeem. The parties are simply left in the predicament in which they have placed themselves.

On the other hand innocent third parties are always entitled to relief against an illegal transaction, as when a creditor seeks to set aside a conveyance or contract made in fraud of creditors.

For specific applications of the principle of illegality in conveyances of land, see CONDITION; and, in relation to corporate acts, CORPORATION; ULTRA VIRES.

IL'LEGIT'IMACY (from Lat. *in-*, not + *legitimus*, legal, from *lex*, law). According to the civil and statute law as found in many states, the status of children born out of wedlock. In England children born out of wedlock have been held as illegitimate even upon subsequent intermarriage of the parents; also children of the deceased wife's sister have long been considered illegitimate. In Italy much confusion has arisen as to legitimacy, owing to the strife between church and state. It has been held that children resulting from marriages which had been solemnized by the church only were illegitimate, a civil marriage being necessary to give legitimacy to offspring.

Where common-law marriages are recognized the children of a man and woman cohabiting professedly as husband and wife are legitimate. In France, where informal unions are common, this rule does not hold. Children of such a union are considered illegitimate. A great variety exists as to theory and practice in different lands, and reference must be made to special treatises on the subject. Illegitimacy has been much discussed from three distinct points of view—the moral, the economic, and the legal.

COUNTRY	1900			1910		
	Total births	Illegitimate	Per cent illegitimate	Total births	Illegitimate	Per cent illegitimate
England and Wales	926,304	36,814	4.00	896,962	36,635	4.10
Ireland	101,459	2,702	2.70	101,963	2,833	2.80
Scotland	131,355	8,503	6.50	124,000	8,492	7.00
Germany	* 2,045,286	* 183,504	* 8.90	1,982,836	179,584	9.10
France	827,297	73,121	8.80	774,390	66,978	8.60
Belgium	* 194,268	* 14,919	* 7.68	176,413	10,837	6.10
Italy	1,067,376	63,406	6.00	1,144,410	56,615	4.10
Holland	162,611	4,247	2.60	166,527	3,327	2.00
Sweden	† 136,523	† 15,641	† 11.40	135,625	19,322	14.80

* 1899. † 1898.

A remarkable fact illustrated by the accompanying tables is the low degree of variation in the rate of illegitimacy of the several countries during the lapse of a decade. The constancy of the rate points to social conditions deeply fixed in the national life. The following table for the German Empire and a number of its constituent states illustrates the same fact:

PERCENTAGE OF ILLEGITIMATE BIRTHS

	1900	1905	1910
German Empire	8.7	8.5	9.1
Prussia	7.3	7.2	7.7
Bavaria	13.2	12.6	12.2
Saxony	12.6	13.4	14.9
Württemberg	9.7	8.6	8.3
Baden	7.6	7.2	7.9
Hesse	7.9	6.9	7.6
Mecklenburg-Schwerin	11.7	11.8	14.0
Saxony-Weimar	9.6	10.6	11.5
Oldenburg	5.5	5.5	5.7
Braunschweig	10.0	10.2	11.8
Anhalt	9.1	10.7	12.4
Schaumburg-Lippe	4.4	3.3	4.2
Alsace-Lorraine	8.7	8.5	9.1

For the Empire as a whole a slight reduction in the illegitimacy rate has taken place in the last 60 years, as the following table indicates:

AVERAGE PERCENTAGE OF ILLEGITIMATE BIRTHS IN THE GERMAN EMPIRE

Period	Per cent	Period	Per cent
1851–60	11.5	1881–1890	9.3
1861–70	11.5	1891–1900	9.1
1871–80	8.9	1901–1910	8.6

Of all subjects for statistical investigation, illegitimacy presents perhaps the most difficulties, owing to the lack of agreement among different legal authorities as to what constitutes illegitimacy and to the fact that it is a phenomenon naturally subject to concealment. Complete figures up to date cannot be secured; it

appears, however, that in civilized lands children born out of wedlock vary from 3 per cent to 12 per cent of all births. In most cases figures on illegitimacy exclude stillbirths.

Attempts have been made to demonstrate statistically the causes of illegitimacy, but with little success. The study, e.g., of the fecundity of women throws very little light upon it. In Russia, in 1896, the number of births to 10 marriages was 65, while the number of illegitimates was only 31 to 1000 births. During the same period in France there were only 27 births to 10 marriages, with 88 illegitimate births per 1000. In Austria there were 44 births to 10 marriages, and 145 illegitimates per 1000 births, and England showed about 36 births to 10 marriages and 42 illegitimates to 1000. It seems evident that the apparent strong tendency to childbearing cannot explain the phenomenon.

Equally uncertain is evidence gathered to show that climatic conditions have any large part to play. The following table (for 1896) presents some figures bearing upon the geographic distribution of illegitimacy. The division of cities is roughly made, those in the first column being north of lat. 52° N. and those in the second column south of lat. 49°:

ILLEGITIMATES PER 1000 BIRTHS

Northern		Southern	
Rotterdam	70	Naples	86
Hamburg	138	Venice	189
Berlin	154	Milan	204
St. Petersburg	276	Paris	268
Copenhagen	279	Rome	194
Stockholm	396	Vienna	449

As is seen by the table, the difference is scarcely worth considering. It certainly does not corroborate the view that the southern cities are less moral than the northern.

It has long been believed that the moral conditions of the cities are lower than those of rural districts. Increased knowledge of rural conditions has tended to qualify this view. In general, it may be said that the rate of illegitimacy is higher in cities than in the country. This is due to a variety of causes. There is in the city less social restraint, less danger of detection of paternity, and a greater degree of abandonment on the part of the females. In some instances, however, as in Bavaria and in some other continental countries, the greater freedom of marriage laws and better industrial opportunities in the city render family life more convenient and irregular relations less common than in country districts, where the conditions of holdings hinder marriages. The high degree of illegitimacy is often an indication of certain laws which affect the situation, as, e.g., was the case in Bavaria. In former times the laws were extremely unfavorable to marriage, and a high rate of illegitimacy resulted. The rate of illegitimacy was as follows: 1865–69, 20.59 per cent; 1871–80, 12.86 per cent; 1887–91, 14.01 per cent. With the passing of more liberal marriage laws the number of marriages rapidly rose, and a corresponding fall in the number of illegitimates took place. The number of marriages increased in the period from 1840 to 1870 from 65 per 10,000 population to 81 per 10,000 population; at the same time the rate of illegitimacy fell from 20.59 per 100 births to 12.86 per 100. From this point there has been no considerable further decline, the rate in 1910 being 12.2.

Laws instituting an inquiry as to parentage have so far had little effect in checking illegitimacy. The following table will serve to illustrate this feature of the case:

RATE PER 1000 CHILDREN BORN, PERIOD 1878–82, STILLBIRTHS EXCLUDED

Countries where inquiry as to paternity is refused	Rate per 1000 births	Countries where inquiry is allowed	Rate per 1000 births
Belgium	77	Austria	144
France*	74	Saxony	127
Italy	73	Bavaria	132
Holland	30	Sweden	101
Russia	28	Denmark	101
		Scotland	84
		England and Wales	48
		Switzerland	47
		Ireland	25

* The inquiry as to paternity is now permitted in France, but the present percentage of illegitimacy is 8.6.

The presence in society of illegitimate children might be expected to involve serious economic and moral evils, since they are frequently deserted by their natural protectors, and since by heredity and environment they would naturally tend towards pauperism and crime. The greater death rate among this class of children diminishes these social and economic effects. The following table shows the death rate among infants under one year in each class, in the countries named:

COUNTRY	Per cent deaths among legitimates	Per cent deaths among illegitimates
Austria	24.5	33.3
France	15.5	30.0
Belgium	16.1	26.2
Norway	9.9	12.16
Prussia	19.3	34.8
Bavaria	29.3	38.6
Württemberg	29.6	36.4
Berlin	25.0	32.8

The death rate among illegitimate children in most countries is declining, but not more rapidly than the death rate among the legitimate. The best comparative study through a period of time covers the Kingdom of Saxony only (Prenger, *Die Unehelichkeit im Königreich Sachsen*, Leipzig, 1913). The following table gives the results of this study:

DEATHS OF CHILDREN UNDER ONE YEAR PER 100

	Legitimate	Illegitimate
1881–85	26.71	38.31
1886–90	26.67	39.02
1891–95	26.49	38.69
1896–1900	25.07	36.50
1901–05	23.35	32.92
1906–10	18.72	26.07

Investigations undertaken to show the physical and moral development of illegitimates are inconclusive in results. This question has been studied in Germany, and most experiments seem to show that illegitimates do not differ greatly

from the normal. For example, of 277 illegitimates examined for military service in Berlin in 1870, there were 90 accepted; of the same number of legitimates, 95 were accepted. Among criminals investigations have shown that the illegitimates furnish a large number of those arrested for theft and for begging.

An important question from the standpoint of the economist and public financier is the burden imposed by illegitimacy upon the public. It may work against the welfare of the state by unduly increasing the population, because it removes the feeling of responsibility felt by those who know they must support those whom they bring into the world. The more practical and immediate aspect of the problem, however, is the expense the state must meet in caring for the illegitimates. The importance of this item depends on three conditions: first, the actual number of those thrown on the public; second, the share of this burden borne by private charity; third, the degree of responsibility placed on the reputed parents as to the support of the illegitimate children. This leads to a detailed study of charity work, however, for which reference must be made to that head.

As to the support of illegitimates, the common-law rule is that the putative father of a bastard child is not liable for its support, this obligation falling legally on the mother.

By statute law, both in England and most of the United States, upon complaint of the mother or of certain designated public officers, an inquiry may be had as to the identity of the putative father, and upon sufficient proof an order of affiliation made whereby the father is adjudged to pay for the support of the child.

Under common law an illegitimate child can neither inherit nor transmit property. The exception to this rule is that to his own offspring he may will property of his own accumulation. Laws of the United States have modified this condition and, as a rule, allow inheritance and transmission of property through the mother.

The legitimation of children born out of wedlock by statute law in most of the States follows upon the intermarriage of the parents and acknowledgment of the children. The legitimation of illegitimates secures them, in general, all the privileges of children born in wedlock. It therefore carries with it the right of property and inheritance and the name of the father. In England the intermarriage of the parents at any time before the birth of the child legitimates the child. English law recognizes the status of the child in the place where the parents were domiciled. In the civil and canon law the intermarriage of parents has always made the child legitimate. This is the law of Scotland, Holland, Germany, and France. Consult: Leffingwell, *Illegitimacy* (2d ed., New York, 1892); G. Brigida, *Del diritto agli alimenti del figlo della unione adulterina o incestuosa, in rapporto al genitore secondo il codice civile italiano* (Naples, 1895); Paul Laffrat, *La protection des enfants naturels d'après la loi du 2 juillet, 1907* (Paris, 1908); Othmar Spann, "Die Verpflegungsverhältnisse der unehelichen Kinder," in *Archiv für Sozialwissenschaft und Sozialpolitik*, vol. xxvii (Tübingen, 1908); Jean Delangre, *De la tutelle des enfants naturels* (Lille, 1909).

ILLICHPUR. See ELLICHPUR.

ILLICIUM, il-lĭsh'ĭ-ŭm (Neo-Lat., from Lat. *illicere*, to allure, from *in*, in + *lacere*, to entice). A genus of trees and shrubs of the family Magnoliaceæ. The species are few, but very widely distributed. The most important is *Illicium anisatum*, star or Chinese anise, the fruit of which is used in medicine and as a condiment. This tree is held in high esteem by the Japanese and is planted near their temples. The star anise of commerce is now derived principally from Anam. Among the other species is *Illicium floridanum*, a shrub with dark-red flowers, a native of Alabama and western Florida, of which the leaves and capsules smell something like rosin. Similar in fragrance is *Illicium parviflorum*, another much rarer Floridian species. See ANISE.

ILLIGEN, êl'lĕ'zhän', ANDRÉ (1638–70). A French buccaneer, native of Ixelles, near Brussels. From the merchant service of the Netherlands, he passed into that of the French filibuster Montbars, who had saved him from the Spaniards, and together they sacked cities and ships of the enemy. Illigen afterward worked with the famous Welsh pirate Sir Henry Morgan, with whom he coöperated during some of the latter's noted expeditions against the possessions of Spain in the West Indies and South America.

ILLIMANI, ēl'yē-mä'nē. A volcano in the Bolivian Andes, South America, situated about 25 miles southeast of the city of La Paz (Map: Bolivia, D 7). It is surmounted by four peaks, of which one, Condor Blanco, is over 20,800 feet high. It is covered with perpetual snow above 15,000 feet, whence its name, signifying 'snow mountain.' There is a lake in the mountain mass 15,900 feet above sea level, and glaciers on the north side at an altitude of 16,350 feet. The first ascent to the summit of one of its peaks was made in 1877 by Wiener, Grumbhow, and Ocampo; and the highest peak was ascended by Sir Martin Conway in 1898.

IL'LINGTON, MARGARET (1881–). An American actress, born at Bloomington, Ill. She studied at Illinois Wesleyan University and at the Chicago Musical College. Her début was made in *The Pride of Jennico* in New York City in 1900. In 1903 she took the leading part in *The Japanese Nightingale;* and thereafter she played important rôles in various notable plays, including *The Two Orphans* (1904), *Mrs. Leffingwell's Boots* (1905), *The Lion and the Mouse*, in London (1906), *His House in Order* (1906), and *The Thief* (1907); and she starred in *Kindling* (1911–12), *Within the Law* (1913–14), and *The Lie*, by Henry Arthur Jones (1914).

ILLINOIS, il'lĭ-noi' *or* -noiz' (Amer. Indian, *Illini*, men). A group of North American Indian tribes belonging to the great Algonquian linguistic family (see ALGONQUIAN STOCK) and originally occupying the State that received their name. La Salle speaks of Lake Michigan as Lac des Illinois. Some of the separate tribes in this group were the Cahokias, after whom the gigantic pyramidal mound opposite St. Louis was named, Kaskaskia, Michigami, Moingwena, Peoria, and Tamaroa. Most of them have left the record of their existence in place names here and there about the State.

The Illinois came early into relations with La Salle (1670–82) and the French traders. Through the influence of the Trappist monks these tribes were held loyal to the French in their wars with the neighboring tribes and afterward with the English. At the close of the Revolution the United States had great difficulty in subduing them. There are now but 128 individ-

uals passing as Peorias, residing in Oklahoma. Very little is known of their culture, but it seems to have resembled that of the Miami and Shawano.

ILLINOIS, known as the "Prairie State." A north-central State of the United States. Its location has influenced greatly its settlement and development. 1. It is between the Great Lakes and the Mississippi and Ohio rivers and has a length of 385 miles, extending from the latitude of Lynn, Mass., to that of Newport News, Va. Since American expansion has been chiefly westward, along such highways as the Great Lakes and the Ohio River, the State drew its early population from widely separated areas. Later, the waterways mentioned afforded access both to southern and eastern markets. 2. More than nine-tenths of the State is within the glaciated area. To this fact Illinois is indebted for most of its fertile soil and for the gentle topography which has made easy the building of wagon roads and railroads and the use of labor-saving farm machinery. 3. Illinois is near the centre of the humid region of the United States and has a climate highly favorable for the growth of many crops and for most human activities. These matters are far more significant than the mere fact that Illinois lies between lat. 36° 59′ and 42° 30′ N. and long. 87° 35′ and 91° 40′ W. Area, 56,665 square miles.

Topography. Much of the State has a nearly level surface. The general slope is from northeast to south-southwest. The highest point, Charles Mound on the Wisconsin boundary, is 1257 feet above sea level, while the lowest, less than 300 feet above the sea, is at the junction of the Mississippi and Ohio rivers. The northern quarter or so has an elevation of above 700 feet, the central half between 500 and 700 feet, and the southern quarter below 500. Topographically Illinois may be divided into (1) the drift plains, whose surfaces are at about the average altitude of the State; (2) the morainic hills and ridges, which rise above the prevailing level; (3) the uplands of the unglaciated areas, in the northwest and the south; and (4) the valley floors of the larger rivers, which form lowlands distinctly below the general level.

Hydrography. Most of the large rivers of the surrounding States flow towards Illinois, a fact formerly of much economic significance. Most of the rivers rising in the State flow from morainic ridges and are tributary to the Wabash, Ohio, or Mississippi. The most important river within the State is the Illinois. It was followed by the first white men who crossed the State, it was an important highway for the fur trader, it guided thousands of emigrants into central Illinois, and it formed one of the greater commercial routes of the interior during the period of steamboat navigation. To-day the counties bordering the Illinois River and its continuation, the Illinois-Michigan Canal, contain about half the people of the State. The deposits of a tributary stream, acting as a dam, have produced the wide expansion of the middle Illinois River, known as Lake Peoria. Among the other larger rivers are the Rock, Kaskaskia, Big Muddy, and Embarras; once important as highways, they long since were abandoned by trade. Some of the rivers of Illinois are acquiring new importance in connection with the development of hydroelectric power.

Climate. The climate is little modified either by contrasts of topography or by the influence of the Great Lakes. The State lies across the paths of many cyclonic storms, which bring it frequent and at times sudden changes of weather. Cold waves invade all parts, and high temperatures prevail in all sections for longer or shorter intervals almost every summer. The mean temperature for July ranges from 70° F. in the extreme northeast to about 80° F. at Cairo. The mean for January ranges from 20° F. and less in the northern counties (except near Lake Michigan) to 30° F. and more in the southern counties. The mean annual rainfall ranges from 43 inches at the south end of the State to 33 inches at the north end; the average for the State is about 38 inches. The precipitation is fairly well distributed in time, though severe droughts may be experienced at any time in any part. The growing season, the period between the latest and the earliest killing frosts, is about six months long at the north and about seven months long at the south.

Soils. The soils of Illinois vary greatly in fertility.

With some local exceptions, those of the younger drift sheets (in the north and northeast) are rich in mineral plant foods, for they constitute an intimate mixture of materials ground up by the ancient glaciers from many kinds of rock, and in most places they have not been injured seriously by washing and leaching. Over large areas the surface is nearly free from stones, owing to a deposit of loess or loess-like silt. The soils of the oldest drift sheet (towards the south end of the State) are of relatively inferior quality. Extensive tile drainage has been necessary on the flattish, intermorainic plains.

In the unglaciated sections the residual soils of the uplands are, as a rule, less fertile and, especially on the hill slopes, less thick than the alluvial soils of the larger valley bottoms.

Mining. No iron ore is produced in Illinois. The furnaces, located chiefly in the northern part, convenient to lake transportation, receive their supplies of ore from Lake Superior. The prominence of the State in mining is due to its large production of coal, in which Illinois is exceeded only by Pennsylvania and West Virginia. The value of coal produced considerably exceeds 50 per cent of its total mineral production. There are 102 counties in the State, and coal is mined in 50 of these. The counties credited with the largest production are in the southern and southwestern part, in the neighborhood of the city of St. Louis, although in the northern part, where the mines are close to Chicago markets, large mining operations are carried on. The reason for the larger production in the southern part of the State appears to be that the beds in that section are thicker than those worked in the northern part, and moreover the Chicago market is one which to a considerable extent is supplied by West Virginia coal, and most of the coal used in the manufacture of coke in Chicago and Joliet is from West Virginia mines. The total coal production in 1913 was 61,618,744 tons, valued at $70,313,605, the highest production in the coal-mining history of the State, in spite of the fact that the industry has been seriously hampered in recent years by labor difficulties. The total number of men employed in the coal mines of Illinois in 1913 was 79,529, working for an average of 189 days. Nearly half the coal is mined by machines. The State is an important producer of coke: 1,859,553 short tons, valued at $8,593,581 in 1913. At least 80 per

cent of the raw coal used in the coke ovens comes from West Virginia.

Petroleum is second in importance among the mineral products; the State ranking third in 1913 as a producer of this mineral, being the most important State in this respect east of the Mississippi River. The production in 1913 was 23,893,899 barrels, valued at $30,971,910. Prior to 1905 the oil production of Illinois was measured by a few hundred barrels, but in the last six months of that year, owing to some developments near Casey, Clark Co., the production rose to about 180,000 barrels. Even with this there was little thought of the importance which the State would achieve as a petroleum producer. Within the three years of the extension of the oil territory, however, the production increased to over 33,000,000 barrels, and since that time it has averaged 30,000,000 barrels yearly. A decrease in the production in 1911, 1912, and 1913 gave rise to some apprehension that the standing of the State as a producer of petroleum would be short-lived. In the value of manufactured clay products, Illinois ranks fourth, with a total in 1913 of $15,195,874. Raw material for the manufacture of these products is present everywhere. The clay-working industry is in a large measure concentrated in the vicinity of Chicago. The principal clay products are building brick, vitrified brick, architectural terra cotta, drain tile, and pottery. Other important mineral industries are cement, 4,734,540 barrels, valued in 1913 at $4,784,696; sand and gravel, in 1913, 7,992,140 short tons, valued at $2,070,491; stone production, in 1913, valued at $4,140,953; and sulphuric-acid production, in 1913, 195,145 short tons, valued at $1,303,986. The cement plants are located chiefly in the north, convenient to the Chicago market and to water transportation on Lake Michigan. The principal quarry product is limestone. Illinois ranks first among the States in the production of fluor spar, mined at Rosiclare in the south. It is second in the production of tripoli, a residual siliceous material used as a basis for abrasives and for filtration. Other mineral products are asphalt, glass sand and other sands, gravel, lead, lime, mineral paints, mineral waters, silver, and zinc. The output of pig iron in 1913 was 2,892,263 long tons, valued at $45,796,966. In addition to pig iron, ferro-alloys, amounting in total value to over $800,000 yearly, are made. The total value of the mineral production in 1913 was $131,825,221.

Agriculture. A very large proportion of the total land area of Illinois is topographically suited to the best forms of agricultural occupation, while the great variety of soil and the favorable location with regard to transportation and markets have made possible a diversified and profitable agriculture. Of the entire land area, over nine-tenths is in farms, and the counties in the central and northern parts have in the greater number of cases from 90 to 95 per cent of their land in farms, and a comparatively large number have over 95 per cent. The southern counties show in frequent instances from 80 to 90 per cent of their total area in farms. The total number of all farms in the State in 1910 was 251,872. The average per farm in the same year was 129.1 acres. In 1910 the value of farm property was $3,905,321,075, the average value of all property per farm was $15,505, and the average value of land per acre was $95.02.

Of the total number of farms in 1910, 147,493 were operated by owners and managers and 104,379 by tenants. In 1880 about 31 per cent of the farms were operated by tenants. This proportion increased during the following decades until 1910, when about 41 per cent of the farms were thus operated. Of these almost 15 per cent were operated by cash tenants and about 26 per cent by share tenants and cash-share tenants.

Of the total number of owned farms in 1910 (145,107), 86,713 were free from mortgage. The average debt per farm in the same year was $3135, and the average equity per farm was $9179.

Over six-sevenths of the farmers in 1910 were native whites, and nearly one-seventh were foreign-born whites. The native white farmers numbered 217,053, the foreign-born farmers 33,394, and the negro and other nonwhite farmers, 1425. Of the foreign-born white farmers, over half were born in Germany.

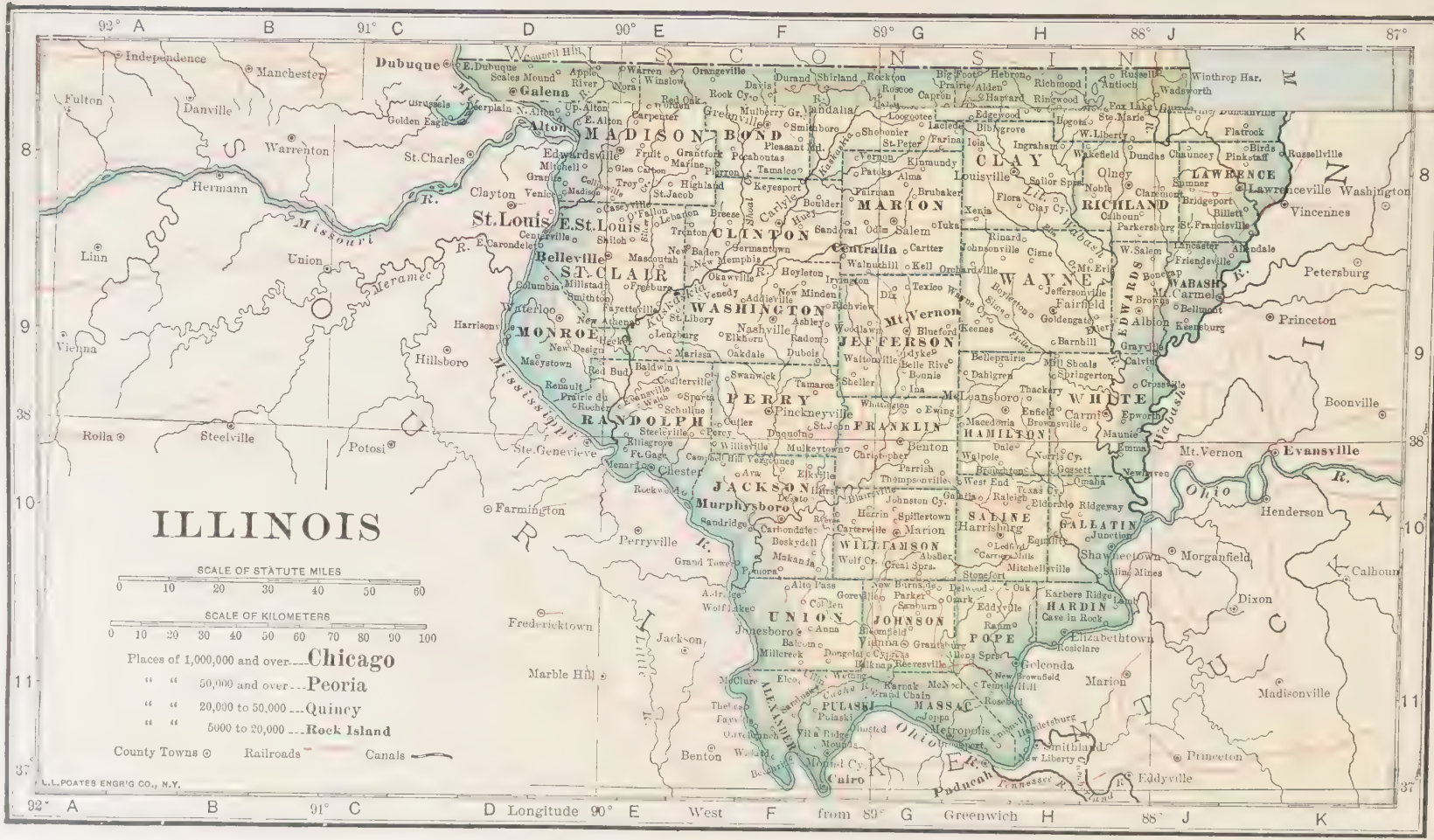
The table below gives the most important facts relating to the principal crops in 1914. The figures are according to estimates of the United States Department of Agriculture.

CROPS	Acreage	Prod. bu.	Value
Corn	10,346,000	300,034,000	$183,021,000
Wheat	2,500,000	46,250,000	46,712,000
Oats	4,300,000	125,990,000	55,436,000
Barley	55,000	1,622,000	989,000
Rye	49,000	784,000	666,000
Potatoes	124,000	7,440,000	4,538,000
Hay	2,250,000	* 1,912,000	27,533,000
Tobacco	600	† 468,000	56,000

* Tons. † Pounds.

While the production of corn is very general, the greatest acreages are in the central counties. Oats are grown throughout the State, though in very small amounts in the southern counties. Wheat is grown principally in the west and south, and showed very great increase in the western counties during the decade 1899–1909, but decreases in the acreage of this crop are found in most of the southern and for a few of the northern counties. The hay and forage acreage is very evenly distributed. Alfalfa has made little headway, although grown in almost every county. There is a considerable production of sugar beets. In 1909 the production was 14,981 pounds, with a value of $77,732. Sorghum cane, valued at $496,114, was produced in the same year. From this there were made 977,238 gallons of sirup, valued at $490,569. In 1910 there were 15,033,743 fruit trees or vines of bearing age. There were produced, in 1909, 4,939,211 bushels of orchard fruits, valued at $3,857,743. The most important of these is apples, of which 3,093,321 bushels, valued at $2,111,866, were produced in that year. Second in importance are peaches and nectarines, the production of which in 1909 was 1,222,570 bushels, valued at $999,516. Then follow cherries, plums, and quinces. Most parts of the State are very favorable for the production of grapes, of which the total production in 1909 was 16,582,785 pounds, valued at $426,468.

Of small fruits there were produced, in 1909, 13,602,676 quarts, valued at $1,109,747. The most important of these was strawberries, of which there were produced 8,031,824 quarts, valued at $613,917. Other important small fruits are blackberries and dewberries, raspberries and


ILLINOIS
SCALE OF STATUTE MILES
0 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90 100
Places of 1,000,000 and over---Chicago
" " 50,000 and over---Peoria
" " 20,000 to 50,000---Quincy
" " 5000 to 20,000---Rock Island
County Towns ⊙ Railroads Canals
L.L. POATES ENGR'G CO., N.Y.
Longitude West from Greenwich
Dubuque
Galena
Alton
Edwardsville
Hermann
Warrenton
Danville
Fulton
Manchester
Independence
St. Charles
Clayton
St. Louis
E. St. Louis
Belleville
Linn
Union
Vienna
Hillsboro
Rolla
Steelville
Potosi
Ste. Genevieve
Farmington
Perryville
Fredericktown
Jackson
Marble Hill
Chester
Murphysboro
Cairo
Benton
Mt. Vernon
Evansville
Henderson
Morganfield
Calhoun
Dixon
Madisonville
Princeton
Eddyville
Paducah
Vincennes
Petersburg
Boonville
Olney
Lawrenceville
Washington
Albion
Carmi
Fairfield
Mt. Carmel
Wabash R.
Ohio R.
Mississippi R.
Missouri R.
Illinois R.
Kaskaskia R.
Meramec R.
Big Muddy R.
Embarras R.
Little Wabash R.
Saline R.
Cumberland R.
Tennessee R.
MADISON
BOND
CLINTON
MARION
CLAY
RICHLAND
LAWRENCE
WAYNE
EDWARDS
WABASH
WHITE
ST. CLAIR
MONROE
RANDOLPH
WASHINGTON
JEFFERSON
PERRY
FRANKLIN
HAMILTON
JACKSON
WILLIAMSON
SALINE
GALLATIN
UNION
JOHNSON
POPE
HARDIN
MASSAC
PULASKI

loganberries, gooseberries, currants, and cranberries. Sweet potatoes are an important crop. In 1909 the acreage of these was 10,568, the production 1,050,932 bushels, and the value $506,760. Broom corn is also one of the most important of the minor crops; the acreage harvested in 1909 was 38,452, the production 19,309,425 pounds, and the value $1,457,172.

Live Stock.—On Jan. 1, 1914, according to the estimates of the United States Department of Agriculture, there were in the State 2,233,000 cattle, valued at $102,843,000; 1,497,000 horses, valued at $169,161,000; 148,000 mules, valued at $17,908,000; 4,358,000 swine, valued at $47,066,000; 984,000 sheep, valued at $4,920,000. The total number of poultry of all kinds in 1910 was 21,409,835, with a value of $11,696,650.

Dairy Products.—In 1909, 320,440,399 gallons of milk were produced. The butter made amounted to 46,609,992 pounds, and the cheese, 81,918. Butter was valued at $10,493,217, and cheese at $8396. The milk sold was valued at $18,314,172.

Forest Products. There were 54,618 farms in the State in 1909 which reported forest products. These included firewood, fencing material, logs, railroad ties, telegraph and telephone poles, materials for barrels, bark, and naval stores, with a total value of $3,325,259. In 1909 there were 814 saw mills in the State; but the greater part of the total value of products was from the planing mills, which include establishments making sash, doors, blinds, stair work, moldings, and interior woodwork. The total value of products of these industries in 1909 was $44,952,000.

Manufactures. Illinois is the most important manufacturing State west of the Alleghanies. It has excellent railroad facilities and has the advantages of cheap water transportation afforded by the Mississippi and its tributaries and by the Great Lakes. (See *Transportation*, below.) In 1910 there were 32 incorporated places with populations of 10,000 or over. These contained 52.3 per cent of the total population, and in 1909 had 83.1 per cent of the total value of its manufactures. The growth of the industry is shown by the fact that in 1849 there was an average of 11,559 wage earners, representing 1.4 per cent of the total population. In 1879 this had increased to an average of 144,727 wage earners, or 4.7 per cent of the total, and in 1909 to an average of 465,764 wage earners, or 8.3 per cent of the total population. The gross value of products per capita of the total population increased from $19.42 in 1849 to $340.38 in 1909, and the proportion which the manufactures of the State represented of the total value of the products of manufacturing industries in the United States increased from 1.6 per cent in 1849 to 9.3 per cent in 1909. In the value of its manufactures Illinois ranked fifteenth in 1849 and third in 1909. Details in regard to the most important manufactures of the State in 1904 and 1909 are shown in the table herewith. On account of the limitations of space only those industries whose product in 1909 had a value of $10,000,000 or more are included in this table.

In 1909 there were 95 industries, or industry groups, the products of which were valued at more than $500,000 each. These include 8 with products exceeding $50,000,000, 8 with products between $25,000,000 and $50,000,000 in value, 15 with products between $10,000,000 and $25,000,000 in value, 17 with products between $5,000,000 and $10,000,000 in value, 34 with products between $1,000,000 and $5,000,000 in value, and 13 with products between $500,000 and $1,000,000. The most important single industry in value of products is that connected with slaughtering and meat packing. In this industry Illinois held first place—the value of the output in 1909 ($389,595,000) forming 28.4 per cent of the total for the industry in the United States. Second in value of products are those related to foundries and machine shops. Then follow the men's clothing industries and printing and publishing. Most of the clothing establishments are located in Chicago. In printing and publishing industries Illinois ranks second only to New York, and the value of the products in 1909 formed 11.8 per cent of the total for the United States. The products of iron and steel, steel works and rolling mills, ranked fifth, and the manufacture of agricultural implements sixth, in point of value. In 1909 Illinois contributed $38,300,000, or 9.8 per cent of the total value of products for all blast furnaces in the country. The manufacture of wire is a very important branch of the iron and steel industry. Illinois has always been the leading State in the manufacture of agricultural implements and in 1909 manufactured 39.1 per cent of the total value of these products for the United States. The growth in the manufacture of automobiles from 1904 to 1909 is remarkable. The total number of persons engaged in manufactures during 1909 was 561,044, of whom 465,764 were wage earners. In all the manufacturing industries combined, 82.2 per cent of the average number in 1909 were males 16 years of age and over; 16.3 per cent were females 16 years of age and over; and 1.5 per cent were children under the age of 16. The men's clothing industry employed more women than any other industry, and together with women's clothing and men's furnishing-goods industries employed nearly one-third of the total number of female wage earners 16 years of age and over. Other industries employing large numbers of female wage earners are printing and publishing, slaughtering and meat packing, and the manufacture of clocks and watches, millinery and lace goods, electrical machinery, tobacco products, and fancy and paper goods. Of the wage earners under 16 years of age, the larger number were employed in the men's clothing industry, printing and publishing, the manufacture of fancy and paper boxes, boot and shoe industry, the manufacture of pianos and organs, the confectionery industry, and in the foundry and machine shops.

In 1909, 69.5 per cent of the establishments were located in cities having a population of 10,000 and over. Of the value of products, 83.1 per cent was produced in incorporated places having over 10,000 inhabitants. Of the total number of wage earners employed in 1909, 63.1 per cent were in Chicago, and 66.8 per cent of the total value of products was produced in that city. For details in regard to manufacturing industries of Chicago, see CHICAGO; and for industries relating to other cities in Illinois, see separate titles.

In all industries 28.9 per cent were under corporate ownership in 1909. Establishments owned by corporations produced 85.8 per cent of the total value of products in 1909; establishments under firm ownership represented only 16.5 per cent of the total number in 1909.

The total figures for manufactures presented

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE — ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY				Capital	Wages	Value of products	Value added by manufacture
			Total	Proprietors and firm members	Salaried employees	Wage earners (average number)	Expressed in thousands			
All industries	1909	18,026	561,044	17,357	77,923	465,764	$1,548,171	$273,319	$1,919,277	$758,350
	1904	14,921	447,947	13,990	54,521	379,436	975,845	208,405	1,410,342	570,285
Agricultural implements	1909	79	21,511	48	2,223	19,240	110,605	11,718	57,268	32,444
	1904	82	17,331	43	1,929	15,359	71,383	8,851	38,412	20,661
Boots and shoes, including cut stock and findings.	1909	53	6,392	38	562	5,792	7,570	3,143	16,755	5,886
	1904	52	4,587	41	297	4,249	3,945	1,991	9,993	3,578
Bread and other bakery products.	1909	2,099	12,566	2,409	1,546	8,611	24,224	5,495	36,118	14,512
	1904	1,406	9,632	1,512	705	7,415	13,515	4,115	26,145	11,866
Butter, cheese, and condensed milk.	1909	295	3,000	896	372	1,732	7,820	942	17,798	3,531
	1904	405	2,302	272	295	1,735	5,322	829	13,277	2,568
Carriages and wagons and materials.	1909	325	6,746	349	545	5,852	17,859	3,588	16,831	7,352
	1904	324	5,981	361	465	5,155	12,005	2,778	11,392	5,646
Cars and general shop construction and repairs by steam-railroad companies.	1909	73	24,406	....	1,275	23,131	18,722	15,288	32,229	16,996
	1904	99	20,232	....	1,137	19,095	13,242	12,105	25,491	13,223
Cars, steam-railroad, not including operations of railroad companies.	1909	28	11,782	2	835	10,945	37,935	7,824	27,001	11,665
	1904	16	9,666	2	628	9,036	15,467	5,931	30,926	9,753
Clothing, men's, including shirts.	1909	715	41,122	861	4,109	36,152	38,763	16,580	89,473	44,245
	1904	624	25,063	746	2,962	21,355	19,724	10,215	57,002	28,976
Clothing, women's	1909	221	7,279	267	861	6,151	5,567	3,152	16,635	7,421
	1904	191	5,664	256	718	4,690	3,558	2,198	12,237	5,904
Coffee and spice, roasting and grinding.	1909	35	1,792	23	751	1,018	8,752	525	19,751	4,637
	1904	25	1,361	22	386	953	6,488	432	15,745	3,262
Confectionery	1909	140	4,622	112	711	3,799	6,094	1,429	12,798	5,133
	1904	87	4,115	67	461	3,587	3,704	1,170	7,646	3,444
Copper, tin, and sheet-iron products.	1909	483	8,897	508	916	7,473	31,018	4,315	22,823	9,630
	1904	288	6,472	305	522	5,645	27,378	2,958	15,385	6,590
Electrical machinery, apparatus, and supplies.	1909	143	11,854	55	2,158	9,641	24,202	6,413	26,826	13,198
	1904	104	7,808	46	1,631	6,131	21,645	3,203	16,700	9,051
Flour-mill and gristmill products.	1909	461	3,634	544	626	2,464	18,454	1,271	51,111	5,521
	1904	363	3,287	412	465	2,410	14,128	1,211	39,892	4,962
Foundry and machine-shop products.	1909	1,178	61,303	700	8,337	52,266	143,277	33,157	138,579	74,769
	1904	*947	48,912	639	5,644	42,629	95,618	25,425	94,917	55,156
Furniture and refrigerators	1909	267	15,240	300	1,365	13,575	22,383	8,100	27,900	15,399
	1904	207	13,638	141	1,071	12,426	17,027	6,714	22,395	12,731
Gas, illuminating and heating	1909	78	8,020	12	1,717	6,301	131,790	2,967	21,052	14,842
	1904	64	4,069	10	1,095	2,964	97,119	1,695	16,008	11,489
Iron and steel, blast furnaces	1909	6	2,927	....	434	2,493	52,390	1,793	38,300	7,392
	1904	4	1,993	....	83	1,910	14,263	1,398	27,331	8,326
Iron and steel, steel works and rolling mills.	1909	24	19,437	3	1,850	17,584	69,682	12,962	86,608	30,364
	1904	23	17,718	3	1,267	16,448	44,276	10,071	60,022	21,372
Leather, tanned, curried, and finished.	1909	29	3,194	26	167	3,001	15,975	1,582	14,912	2,781
	1904	28	2,887	20	97	2,770	11,649	1,326	10,758	2,584
Liquors, distilled	1909	9	851	1	100	750	7,500	479	55,200	45,991
	1904	11	762	3	67	692	5,456	407	54,102	47,696
Liquors, malt	1909	106	5,361	25	938	4,398	56,141	3,473	28,449	21,416
	1904	116	4,861	51	777	4,033	39,003	3,004	23,787	18,516
Lumber and timber products	1909	814	19,025	825	1,633	16,567	29,778	9,110	44,952	17,688
	1904	591	16,909	611	1,172	15,126	21,651	7,424	32,741	14,519
Musical instruments, pianos and organs and materials.	1909	68	9,628	18	833	8,777	27,719	5,009	19,176	10,534
	1904	56	8,265	18	739	7,508	16,471	3,932	13,323	7,925
Paint and varnish	1909	74	2,906	31	1,083	1,792	15,725	1,114	20,434	7,532
	1904	63	1,979	19	684	1,276	11,340	771	13,325	4,669
Patent medicines and compounds and druggists' preparations.	1909	359	3,902	249	1,784	1,869	7,989	805	13,114	8,701
	1904	312	3,428	237	1,823	1,868	7,062	818	13,320	9,882
Printing and publishing	1909	2,608	43,074	2,384	12,046	28,644	60,084	18,437	87,247	62,567
	1904	2,414	32,909	2,232	7,859	22,818	41,380	13,883	62,292	45,258
Slaughtering and meat packing.	1909	109	32,642	93	5,844	26,705	131,026	14,602	389,595	45,619
	1904	95	32,856	99	5,646	27,111	80,733	14,658	318,201	37,609
Soap	1909	34	3,408	20	1,200	2,188	11,694	1,053	20,181	6,233
	1904	34	2,497	24	568	1,905	7,604	887	14,157	4,812
Stoves and furnaces, including gas and oil stoves.	1909	71	5,223	28	696	4,499	9,863	2,957	10,287	6,431
	1904	60	4,350	25	417	3,908	7,543	2,358	7,867	5,052
Tobacco manufactures	1909	1,944	10,707	2,127	546	8,034	12,794	4,216	21,870	13,267
	1904	1,825	9,874	2,032	371	7,471	9,102	3,738	16,062	10,067

* Excluding statistics for two establishments, to avoid disclosure of individual operations.

herewith do not include the statistics for an establishment operated by the Federal government —the arsenal at Rock Island. In 1909 this plant employed an average of 1698 wage earners, and the value of its products, which consisted of infantry, cavalry, and artillery equipment, was $3,114,338.

Transportation. Many trunk lines, both between the East and West and between the North and South, enter or pass through Illinois, and nearly every county is traversed by one or more railroads running into Chicago or St. Louis. On Jan. 30, 1909, there were 150 railroad companies having lines through the State. In that year Illinois had approximately 12,000 miles of main track of steam railroad, an average of over 21 miles for every 100 square miles of territory, and also 2700 miles of electric railroads. In addition to these ample railroad facilities the State has the advantage of cheap water transportation afforded by the Mississippi River and its navigable tributaries and by the Great Lakes. The total mileage of main lines on June 30, 1913, was 12,168. There were in addition 3024 miles of additional main tracks, 563 miles of industrial tracks, and 7496 miles of yard tracks and sidings, or a total of 23,252 miles. There were in the same year 1544 miles of surface and elevated electric railways. This includes only main lines. There were also 213 miles of additional main tracks, 33 miles of industrial tracks, and 139 miles of yard tracks and sidings, making a total electric mileage of 930. In railway mileage Illinois exceeds every other State except Texas. In 1907 a canal was completed by the United States government from Hennepin to Rock River. This, together with the Illinois and Michigan Canal at La Salle, completed in 1848, provides an improved waterway from Chicago to the Mississippi River. In 1908 a bond issue to the amount of $20,000,000 was authorized to provide for making a canal as far as the city of Utica, on the Illinois River, and for connecting this with the Chicago Sanitary District at Joliet. (For an account of the transportation facilities of Chicago, see CHICAGO.) A railway and warehouse commission has general charge of the railways with authority to fix freight and passenger rates. This commission was established in 1871 and is the oldest commission of the sort in the United States. The laws governing this commission were amended in 1911, and its powers were increased. The United States government is making improvements in several rivers.

Banks. There were in Illinois, on June 4, 1913, 459 national banks, with a capital of $75,777,000 and deposits of $863,142,000; 697 State banks, with deposits subject to check amounting to $89,009,781 and savings deposits of $76,289,250; 53 loan and trust companies, with deposits subject to check amounting to $85,329,102 and savings deposits of $216,644,432; and 235 private banks with deposits subject to check of $17,513,737 and savings deposits of $9,139,065.

Finance. Receipts from all sources and disbursements from Oct. 1, 1912, to Sept. 30, 1914, amounted to $39,708,784 and $32,952,862 respectively. There was a balance at the end of the period of $12,255,132. The chief sources of revenue are State taxes, the inheritance tax, the Illinois Central Railroad, and fees collected by the different State departments. The chief expenditures are for the National Guard, the University of Illinois, normal schools, charitable and penal institutions, the salaries of officers and employees, and members of the Legislature. The bonded debt of the State was $17,500.

Government. The State has been governed under three constitutions. The first became operative when Illinois was admitted to the Union in 1818, the second was ratified by the people in 1848, and the third and present constitution in 1870. It has been several times amended since its adoption. A convention for amending or revising the constitution may be called upon the concurrence of a two-thirds majority of each House submitting the question of whether such convention shall be held to the electors, who shall decide, by a majority vote, whether a convention shall be held. If the proposal is accepted by the electors the General Assembly shall at the next session provide for a convention to consist of double the number of members in the Senate. This convention must within three months after the election prepare such revision, alteration, or amendments of the constitution as shall be deemed necessary. These amendments are then submitted to the electors for their ratification or rejection at an election appointed by the convention for that purpose, not less than two nor more than six months after the adjournment. Amendments may also be proposed in either House of the General Assembly, and if they shall be voted for by two-thirds of all the members elected to each of the two Houses, such proposed amendments shall be submitted to the electors at the next election. The General Assembly may not propose amendments to more than one article of the constitution at the same session nor to the same article more than once in four years.

Legislative.—Legislative power is vested in a General Assembly, which consists of a Senate and House of Representatives. Elections for members are held biennially on the first Tuesday after the first Monday in November. A senator must be 25 years of age and a representative 21 years of age. The State is divided into 51 senatorial districts, each of which elects one senator, whose term of office is four years. The General Assembly apportions the State every 10 years in accordance with the results of the Federal census. The result is divided by 51, and the quotient obtained is the ratio of representation in the Senate. Each senatorial district elects three representatives to serve for a term of two years. In all elections of representatives each qualified voter may cast as many votes for one candidate as there are representatives to be elected, or may distribute the same, or equal parts thereof, among the candidates, as he shall see fit; and the candidates highest in number of votes shall be declared elected. This provision of the constitution is designed to secure minority representation. The legislators receive $2000 each for the two years for which they are elected. The General Assembly may not pass local or special laws for granting divorces, regulating county or township affairs, regulating the practice in courts of impeachment, regulating the practice in courts of justice, or granting to any corporation, association, or individual any special or exclusive privilege, immunity, or franchise. The House of Representatives has the sole power of impeachment, and all impeachments are tried by the Senate.

Executive.—The executive department of the government consists of a Governor, Lieutenant Governor, Secretary of State, Auditor of Public Accounts, Treasurer, Superintendent of Public

Instruction, and Attorney-General. These, with the exception of the Treasurer, hold office for four years, from the second Monday of January next after election. They must, except the Lieutenant Governor, reside at the seat of government during their term of office. The Treasurer holds office for two years and until his successor is elected and qualified. He is ineligible to the office for two years next after the end of the term for which he was elected. No person is eligible to the office of Governor or Lieutenant Governor who has not attained the age of 30 years and who has not been for the five years immediately preceding his election a citizen of the State. The Governor has the usual veto power over legislative measures. The Lieutenant Governor is President of the Senate.

Judiciary.—Judicial power is vested in a supreme court, circuit courts, appellate courts, county courts, probate courts, and such courts as may be created by law in and for cities and incorporated towns. The supreme court consists of seven judges, one of whom shall be chief justice. Four of these constitute a quorum, and a concurrence of four is necessary to every decision. The State is divided into seven districts, in each of which a judge of the supreme court is elected for a term of nine years. The State, exclusive of Cook County and other counties having a population of 100,000 or over, is divided into judicial circuits. For each of these three judges are elected for a term of six years. The circuit courts have original jurisdiction of all cases in law and equity and such appellate jurisdiction as is or may be provided by law. They are required to hold two or more terms each year in every county. Inferior appellate courts, of uniform organization and jurisdiction, may be created in districts formed for that purpose. In these courts such appeals and writs of error as the General Assembly may provide may be prosecuted from circuit and other courts. Appellate courts are held by such number of judges of the circuit courts and at such times and places and in such manner as may be provided by law. One judge is elected for each county. County courts are courts of record and have original jurisdiction in all matters of probate, settlement of estates of deceased persons, and such other jurisdiction as may be provided by general law. Cook County, which comprises the city of Chicago, forms one judicial district. The courts of Cook County consist of 14 judges of the Circuit Court of Cook County, one of whom is chief justice, and 18 judges of the superior court of Cook County. These are all elected for six years.

Suffrage and Elections.—Persons who have resided in the State for one year, in the county 90 days, and in the election district 30 days immediately preceding any election therein, and those who were electors in the State on the first day of April, 1848, or obtained a certificate of naturalization before any court of record in the State prior to the first day of January, 1870, or those who are male citizens of the United States above the age of 21 years, are qualified voters. The Legislature of 1913 passed a measure giving to all women who are citizens of the United States and 21 years old the right to vote for nominees for all offices created by statute. Its limitations prevent women from voting for governor, United States senators, representatives in Congress, members of the Legislature, nearly all judges, and limits the voting privilege to the presidential electors, university trustees, and various county, township, and municipal officers. This measure was upheld as valid by the Supreme Court of the State in 1914. The Legislature in special session in 1910 passed acts providing for primary elections. Three primary laws passed prior to that year had been declared unconstitutional by the State court. The first of these measures, passed in 1910, was a general act to provide for the holding of primary elections by political parties, and the second provided for the holding of primary elections for the nomination of members of the General Assembly and the election of senatorial committeemen. By provisions of the general act a political party which at the general election for State and county officers next preceding a primary polled more than 2 per cent of the entire vote cast is declared to be a political party within the State and may nominate all candidates provided for in the act. Primary elections are held for the nomination of all candidates for State, congressional, senatorial, county, town, city, or village officers, and for the election of precinct, ward, and State central committeemen, and delegates and alternate delegates to national nominating conventions. The act does not apply to nominations of candidates for election of President and Vice President of the United States, trustees of the State University, school or township officers. All conventions are held on the first Friday after the first Monday next succeeding the September primary. The convention of each political party has power to make nominations for presidential electors and trustees of the University of Illinois. It may also adopt a party platform.

The primary to nominate candidates for State, congressional, senatorial, and county officers to be elected on the first Tuesday after the first Monday in November is held on the first Wednesday after the second Tuesday in September. The Legislature of 1913 amended the measures relating to elections so as to bring them into conformation with the Seventeenth Amendment of the United States Constitution, providing for the direct election of senators. In every year in which a President of the United States is to be elected, a primary is held on the second Tuesday in April to nominate delegates and alternate delegates to national nominating conventions and for the purpose of securing an expression of the sentiment and will of the voters in respect to candidates for the nomination for President. This is the presidential primary and provides that the vote of the State at large is to be considered advisory to delegates at large to conventions, and the vote of each congressional district is considered to be advisory to delegates of the district. Candidates for United States senator are included as "State officers" and are nominated at the September primary in the same manner as other State officers.

Local and Municipal Government.—The General Assembly provides for township organization under which any county may organize whenever a majority of the legal voters voting at any general election shall so determine. Each county has a board of commissioners. The county affairs of Cook County, which includes Chicago, are managed by a board of commissioners of 15 persons, 10 of whom are elected from the city of Chicago and 5 persons from outside that city. The officials include a county judge, county clerk, sheriff, and treasurer. The Legislature of 1910 passed a measure providing for a commission

form of government in towns and cities, by the terms of which all cities and villages not exceeding 200,000 in population have the power to adopt a commission form of government. Whenever the electors of such city or village equal in number to one-tenth of the votes cast for all candidates for mayor or president of the board of trustees at the last preceding election shall petition the judge of the circuit court of the county to submit to a vote of the electors of the city or village the proposition as to whether it shall adopt and become entitled to the provisions of the act, it is the duty of the judge of the court to submit such a proposition at a special city or village election to be held within 60 days. The measure includes provisions for the recall of elective officers and for the initiative and referendum. By the provisions of the general election law, on a written petition signed by 25 per cent of the registered voters of any incorporated town, village, city, township, county, or school district, or 10 per cent of the registered voters of the State, it shall be the duty of the proper election officers in each case to submit any questions of public policy so petitioned for to the electors of such incorporated towns, villages, etc., at any general or special election named in the petition. Not more than three propositions shall be submitted at the same election, and these propositions must be submitted in the order of their filing.

Other Constitutional and Statutory Provisions.—No corporation may be created by special laws, or its charter extended, changed, or amended, except those for charitable, educational, penal, or reformatory purposes. It is unlawful for commissioners of any penitentiary or other reformatory institutions to let by contract to any person or persons or corporations the labor of any convict confined within the institutions. There is a pure-food law conforming in its chief features to the national law, administered under the supervision of the State Food Commissioner. There is a stringent workmen's compensation law, applying to certain dangerous industries only. Physicians are required to report cases of occupational diseases, and employers must arrange for the examination by a licensed physician, once every calendar month, of all employees in dangerous processes likely to result in such diseases. A State mining board composed of five members has charge of the administration of the coal-mining laws. The Legislature of 1913 passed a measure providing for mothers' pensions and for the municipal ownership of public utilities. The State is under a system of local option for the control of liquor traffic. At the end of 1913 the following cities with a population of 5000 or more were under "no license": Champaign, Evanston, Jacksonville, Oak Park, Paris, Rockford, Urbana, and Zion City. The proportion of the population under "no license" on that date was 33 per cent. The local-option law, which was enacted in 1907, provides for a vote on the liquor question in townships, villages, and cities. Drinking and drunkenness on railroad trains and interurban cars are prohibited. The Legislature of 1913 passed a 4-mile dry-zone bill which makes it impossible for saloons to be located within 4 miles of the State University at Champaign and Urbana.

Militia. The total number of males of militia age in 1910 was 1,330,556. The organization consists of a first, second, and third brigade of infantry, the first regiment of cavalry, the first battalion of field artillery, a company of engineers, a company of signal troops, and a company of sanitary troops. There are five regiments of 12 companies each, one regiment of 12 companies, one machine-gun platoon, and two regiments of 11 companies each. The cavalry regiment consists of nine troops, and the field artillery consists of one battalion and three batteries. The total number of enlisted men on Jan. 1, 1913, was 5408. The officers numbered 506.

Population. The population by decades has been as follows: 1810, 12,282; 1820, 55,211; 1830, 157,445; 1840, 476,183; 1850, 851,470; 1860, 1,711,951; 1870, 2,539,891; 1880, 3,077,871; 1890, 3,816,351; 1900, 4,821,550; 1910, 5,638,591; 1914, 5,986,781; 1920, 6,485,280. The population per square mile in 1910 was 100.6. In 1910 the population in places of 2500 or more was 3,476,929, or 61.7 per cent. The rural population in 1910 was 2,161,662. The white population in 1910 numbered 5,526,962, and the negroes numbered 109,049. The whites of native parentage in 1910 numbered 2,600,555. The native whites of foreign or mixed parentage numbered 1,723,847. The foreign-born whites numbered 1,202,560. Germans are most numerous among both the foreign-born whites and native whites of foreign parentage. The State was divided by sex in 1910 between 2,911,674 males and 2,726,917 females. The males of voting age numbered 1,743,182.

In 1910 there were 12 cities with a population of 25,000 or over. The populations of these in 1910 were as follows: Chicago, 2,185,283; Peoria, 66,950; East St. Louis, 58,547; Springfield, 51,678; Rockford, 45,401; Quincy, 36,587; Joliet, 34,670; Decatur, 31,140; Aurora, 29,807; Danville, 27,871; Elgin, 25,976; Bloomington, 25,768. The estimated population of Chicago on July 1, 1914, was 2,393,325.

Religion. Estimated upon the reported number of Church communicants, the Methodists about equal the Roman Catholics in their adherents. The Baptists, Disciples of Christ, Presbyterians, German Evangelicals, Congregationalists, Lutherans (General Council), and Protestant Episcopalians follow in importance in the order named.

Education. The free-school system of Illinois dates from 1855, and progress has been made in perfecting it, especially in lengthening the school year. According to the thirteenth census, the school population, ages 6 to 20, was 1,615,914; the average number in school attendance was 1,025,053; out of a total population of 10 years old or over (4,493,734), only 168,294, or 3.7 per cent, were illiterate. Illiterates among the native whites numbered only 40,486, or 1.3 per cent, and among foreign-born whites, 117,751, or 10.1 per cent. Among the negroes illiterates numbered 9713, with a percentage of 10.5. On June 30, 1913, the school population, ages 6 to 21, was, according to the report of the State Superintendent of Public Instruction, 1,582,180; the enrollment was 1,010,215. There were employed 5609 men teachers and 24,956 women teachers, making a total of 30,565 teachers. The average annual wages paid to men teachers was $772.07 and to women teachers $643.70. The amount expended for all school purposes in 1913 was $37,923,943. In 1912 there were 671 high schools, in which were enrolled 71,577 secondary students; of these, 65 schools were in cities of 4000 population. There were in addition 91 private high schools and

academies. The Legislature of 1911 increased the school fund from $1,000,000 to $2,000,000, and the Legislature of 1913 made another addition of $1,000,000 to this fund. The same Legislature passed a certificating bill which placed Illinois in the front rank in this respect. A free high-school tuition act was passed at this session, as was a law permitting local school boards to levy 2 instead of 1½ per cent for operating expenses, when authorized by the people. A position of high-school inspector with a salary of $4000 a year was created. Boards of education are authorized to establish and maintain classes for the deaf, dumb, and blind, and for delinquent children, the State to pay the excess cost. The Legislature of 1911 authorized the boards of education in districts having more than 1000 and less than 100,000 inhabitants to establish and maintain a fund for the retirement of teachers upon an assessment basis.

The normal schools are as follows: Southern Illinois State Normal University at Carbondale, Eastern Illinois State Normal School at Charleston, Chicago Normal School at Chicago, Northern Illinois State Normal School at DeKalb, Western Illinois State Normal School at Macomb, and the Illinois State Normal University at Normal. Summer schools are maintained at the normal schools and at many other schools. There are 33 institutions of collegiate rank. Of these the most important are the University of Chicago at Chicago, the University of Illinois at Champaign and Urbana, the Armour Institute of Technology at Chicago, Northwestern University at Evanston, Knox College at Galesburg, Illinois College at Jacksonville, Illinois Women's College at Jacksonville, Lake Forest College at Lake Forest, Illinois Wesleyan University at Bloomington, James Millikin University at Decatur, and Loyola and De Paul universities (both Roman Catholic) at Chicago.

Charities and Corrections. As a result of a campaign conducted by the State Board of Charities, a law was passed in 1905 which placed the employees of the State charitable and correctional institutions, with a few exceptions, under the State civil-service law. In 1906 the system of medical administration in State institutions was completely modernized and made uniform, and a State Psychopathic Institute was established to teach physicians in the service and for carrying on research work in the treatment and causes of insanity. In 1909 the Legislature passed a new charities administration law, which centralized administration of all institutions in one board, composed of five members. A centralized system of inspection, criticism, and recommendation by the board, known as the Charities Commission, made up of five nonsalaried members, was also put into effect. This body is in no way responsible for administration and is therefore free to criticize the executive branch of the service. The inspectional and critical service is extended beyond the central Charities Commission into the several institutions in the form of a nonpaid board of visitors for each, and the service is still further extended to each county almshouse and jail in the form of county auxiliary boards—one for each county, each having three members. The board of visitors and the county auxiliary boards must report to the Charities Commission. This measure contains every advanced idea in the administration of public charities that up to that time had been tried successfully in other States, especially in the treatment of the insane, and is unique among American public-charity statutes. Some of the names of the institutions were changed by the new law so as to eliminate the words "insane," "feeble-minded," "asylum," from the legal nomenclature. This measure went into effect on Jan. 1, 1910. The Legislature of 1911 made an appropriation for the construction of a new hospital for the insane at Chicago, for the erection of a surgical institute for crippled children, $10,000 for the visitation and education of the adult blind in their own homes, and for the State Psychopathic Institute, which enabled it to complete its equipment and staff, which included a director, an assistant, a chemist, a pathologist, and a bacteriologist. In the same year plans were completed for a new prison at Joliet to cost in the neighborhood of $7,000,000. In 1912 all the insane in the county farms or rural communities were removed to State hospitals, and in the same year the State took over the Dunning County Hospital for the Insane with 2700 patients. One division of the State Charities Commission is a bureau of criminal statistics which collects annually statistics of crime. The counties are authorized to pay pensions to needy widows with dependent children. There has been a juvenile-court law in existence since 1899, and this has produced excellent results, especially in Chicago. (See JUVENILE COURTS.) The charitable and correctional institutions include the Lincoln State School and Colony at Lincoln, the Soldiers' Orphans' Home at Normal, the Kankakee State Hospital at Kankakee, the Dunning State Hospital at Chicago, the Soldiers' Home at Quincy, the Anna State Hospital at Anna, the Jacksonville State Hospital at Jacksonville, the Elgin State Hospital at Elgin, the Chester State Hospital at Chester, the Industrial Home for the Blind at Chicago, the Eye and Ear Infirmary at Chicago, the Watertown State Hospital at Watertown, the State Training School for Girls at Geneva, the St. Charles School for Boys at St. Charles, the Soldiers' Widows' Home at Wilmington, and the Peoria State Hospital at Peoria. The Alton State Hospital at Alton and the Colony for Epileptics were created by the Legislature of 1913. The total population of these institutions on June 30, 1913, was 19,816, and the total appropriations for the two years beginning July 1, 1913, was approximately $13,000,000 for maintenance, improvement, and extension. The correctional institutions are the State prisons at Joliet and Chester and the State Reformatory for Boys at Pontiac.

History. In 1673 Father Marquette ascended the Illinois River and two years later established a Jesuit mission at the Indian village of Kaskaskia. La Salle entered the river in 1679, named it Illinois from the tribes inhabiting the region, and built Fort Crèvecœur at the foot of what is now called Lake Peoria. His explorations were continued by Tonty, whom he left behind in 1680 when he returned to Canada. Fort St. Louis on Starved Rock was built in 1682, and between 1683 and 1690 French traders established themselves at Kaskaskia, Cahokia, and other Indian villages, though the actual settlement of Kaskaskia, the oldest town in Illinois, probably did not occur before 1700. By 1751 there were six important settlements within the present limits of the State. The French showed a remarkable aptitude for controlling the Indians and adapting themselves to their mode

of life. Intermarriage between French and Indians was common, and ties of friendship were established which lasted after the power of France had passed away. Pontiac's rising prevented the English for two years from taking possession of the Illinois country ceded to them in 1763. In general, conditions remained unaltered after the English occupation; but many prominent French settlers fled from English rule to St. Louis, Natchez, and other towns in the valley of the Mississippi. In 1778–79 a force of Virginians under George Rogers Clark (q.v.) captured Kaskaskia and subdued the province. Virginia ceded its claims to the southern part of the region in 1784, Massachusetts and Connecticut gave up their rights in the following year, and in 1787 the region became a part of the Northwest Territory. Ohio was set off in 1800, Indiana in 1802, and Michigan in 1805; what remained was organized as Illinois Territory on Feb. 3, 1809. The hostility of the Indians prevented rapid settlement in the north. On Aug. 15, 1812, the garrison at Fort Dearborn (Chicago) was massacred. On Aug. 18, 1818, the first constitution was adopted. On December 3 Illinois was admitted into the Union with boundaries so extended to the north as to include the port of Chicago. By 1805 most of the Indian titles to land within the Territory had been extinguished. There ensued a period of wild land speculation, marked by stupendous frauds. The early immigrants, who came chiefly from the South, brought with them a decided predilection for slavery. The first Legislature passed stringent laws to protect the few slaveholders in the State, and from 1818 to 1865 a harsh code of antinegro laws, known as the Black Laws, was in force. In 1824 an attempt was made to call a convention for the purpose of legalizing slavery in spite of the Ordinance of 1787, but the project was quickly and definitely defeated. The murder of Elijah P. Lovejoy (q.v.) at Alton in 1837, however, showed the persistence of a strong proslavery sentiment. After 1820 the people were hurried into an unhealthy state of precarious prosperity. Banks were established at Edwardsville and Shawneetown entirely on paper credit, and an elaborate system of internal improvements was begun. As the northern part of the State after the Black Hawk War began to fill up with immigrants from New England and the Middle States, the process of economic development was accelerated. The Illinois and Michigan Canal was begun in 1834 and was built with the proceeds of the sale of public lands granted by Congress. The inception of other public improvements was followed by a panic in 1842, when the State bank suspended specie payments. The people, however, recovered quickly, and in 1850 Congress made an extensive cession of public lands to aid in the construction of the Illinois Central Railroad, an enterprise which contributed greatly to the development of the State. In 1840 the Mormons, who had immigrated from Missouri and founded Nauvoo, began to figure in the politics of Illinois. Welcomed at first, they became in the course of a very few years obnoxious to the mass of the inhabitants. Acting as a unit, under autocratic direction, they succeeded in obtaining exclusive privileges from the Legislature. Their religious practices jarred with the feelings of their neighbors; they were inclined to look upon Gentiles with superciliousness; they were prosperous. Bitter feelings led to hostile action in 1844, when Joseph Smith, founder of the sect, while in prison at Carthage on the charge of treason, was murdered by a mob. In the following year the Mormons left Illinois. In 1858 occurred the great contest for the United States senatorship between Abraham Lincoln and Stephen A. Douglas. At the outbreak of the Civil War Illinois was in an extremely prosperous condition. It produced three-fifths of all the grain exported to Europe and was the second State in the Union in railway mileage. During the war the State readily furnished its quota of troops, sending 260,000 men into the field. In peace its prosperous development continued. In 1865 Chicago had become the leading live-stock market of the world and a great grain centre. Legislation between 1865 and 1885 was largely concerned with corporations and especially with the railroad companies. The constitution of 1870, replacing the one adopted in 1849, forbade the creation of corporations by special law. A State board of railroad commissioners was created to protect the interests of the State against the railway companies, and the Legislature frequently attempted to fix a maximum for transportation and to prevent discrimination in rates. Between 1872 and 1875 the farmers of Illinois participated in the widespread Granger movement of the time. (See GRANGE.) On Oct. 8–10, 1871, a fire laid waste a large part of Chicago and rendered 100,000 people homeless. The loss to the city was estimated at nearly $300,000,000. The action of the mayor in calling in the Federal troops to preserve order during the excitement following the calamity occasioned a bitter dispute between that official and the Governor of the State, who showed himself jealous for the honor of the civil authority. A general feeling of unrest found expression in 1885 and 1886 in bitter strikes and bloody riots; in Chicago there were serious riots, during which bombs, killing several people, were thrown. In 1893 the Columbian Exposition was held in Chicago. In 1894 a strike of the employees of the Pullman Palace Car Company developed into a general strike of railway men. Traffic in Illinois was almost suspended, and in June lawlessness broke out. Interference with the United States mails led to the intervention of the Federal government. Chicago was occupied by the Federal troops; the leaders of the strikers were arrested on civil process and sentenced to short terms of imprisonment for contempt of court. The backbone of the strike was thus broken. In national politics Illinois was Democratic before 1860. In that year it cast its vote for Lincoln, and from that time it has been consistently Republican with the exception of 1892, when it voted for Grover Cleveland, and 1912, when its vote was cast for Wilson. In State politics the year 1857 marks the beginning of Republican ascendancy. In the latter part of the first decade of the twentieth century political interest was largely centred in efforts to change the laws relating to elections. From 1907 to 1910 the Legislature was occupied in attempting to pass a primary election law which the Supreme Court of the State would allow to stand. (See *Suffrage and Elections*, above.) In the national election in 1908 Illinois, on account of divisions in the Republican party, was among the doubtful States, but it was carried by Taft by a vote of 629,932 to 450,810 for Bryan. For Governor, Deneen, Republican, received 550,076 votes, and Stevenson, Democrat, 526,912. On account of the lack of plurality of votes by any

candidate for the United States Senate it was necessary for the Legislature when it convened in January, 1909, to elect a Senator. There were several candidates, the most prominent of whom was Albert J. Hopkins, who made a strong fight for reëlection. After a deadlock which lasted from Jan. 19 to May 26, 1909, William Lorimer, a Representative in Congress at that time, was elected Senator by a coalition of Democratic and Republican votes. This ended one of the most stubborn political struggles in the history of the country. It was, however, but the beginning of an even more serious situation. Lorimer had for many years been one of the strongest figures in Illinois politics and was generally considered to be the chief Republican "boss" of Chicago. In April, 1910, a Chicago newspaper published what purported to be a confession of a Democratic member of the House, in which it was charged that Lorimer had been elected by the wholesale bribery of Democratic legislators. As a result of investigations into the facts alleged in this confession, many prominent members of the Legislature were indicted by a grand jury. On May 28, 1910, Senator Lorimer defended himself in a long speech in the Senate; in this he denounced the alleged confession as false. He asked for an investigation, and a committee was at once appointed by the Senate to make an examination into the facts alleged. On Dec. 12, 1910, a majority of the committee made a report exonerating Lorimer. A minority report was filed by Senator Beveridge, of Indiana. In this he claimed that the charges were abundantly proved. Senator Beveridge also introduced a resolution declaring Lorimer's seat vacant on account of corruption in his election. A vote was had in the Senate in March, 1911, and by 46 to 40 its members refused to unseat him. In the meantime the State Legislature had taken action, and another investigation was authorized in January, 1911. This produced new and even more startling testimony of corruption and bribery. A resolution was adopted requesting the Senate to reopen the investigation, and on June 1 the Committee on Privileges and Elections was so authorized, and a subcommittee to take testimony was appointed on June 5, 1911. Hearings on the evidence were carried on for nearly a year. On May 20, 1912, a majority of the committee reported that the hearing had produced no new evidence of value. The minority members, however, declared that the new evidence showed conclusively that Senator Lorimer had been elected through corrupt practices. A vote was taken in the Senate on July 13, 1912, and by 58 to 28 the Senators adopted a resolution declaring that corrupt methods and practices had been employed in the election of William Lorimer and that his election was therefore invalid. This vote was preceded by a remarkable debate of seven days, three of which were occupied by Mr. Lorimer himself, who spoke in his own defense. This action left the State of Illinois with but one representative in the Senate chamber.

Senator Cullom, although 84 years of age, was a candidate for reëlection in 1912, opposed to Lawrence Y. Sherman, a well-known Republican lawyer. At a special session of the Legislature a presidential primary election was authorized on March 30, 1912, and at this election voters cast their ballots also for candidates for the Senate. In this election Roosevelt received 226,917 votes; Taft, 127,487; La Follette, 42,692. Champ Clark received a plurality of the Democratic votes. For candidate for the Senate, Senator Cullom was defeated by Sherman. Governor Deneen was renominated by the Republicans, and E. F. Dunne by the Democrats. In the presidential election on Nov. 5, 1912, Wilson received 405,048 votes; Roosevelt, 386,478; Taft, 253,593; and Debs, Socialist, 81,278. For Governor, Dunne received 443,120 votes; Deneen, 318,469; Funk, Progressive, 303,401. The Democrats elected 19 out of 25 representatives to Congress. Among the prominent Congressmen defeated were Joseph G. Cannon, Speaker of the House, and William B. McKinley, who had charge of President Taft's campaign. The Legislature elected included 97 Democrats, 76 Republicans, 27 Progressives, and 4 Socialists. The balance of power for the election of United States Senator was therefore in the hands of the Progressives and Socialists. When the Legislature convened in January, 1913, there was a deadlock in the election of officers which lasted from January 1 to the last week in that month. It was ended by the election of a Speaker by a combination of Democratic and Republican votes. Another deadlock resulted from the attempt to elect two United States Senators—one to succeed Senator Cullom and the other as a successor to Senator Lorimer. A compromise was finally arranged on March 26 by which James Hamilton Lewis, Democrat, was elected for the term of six years from March 4, 1913, and Lawrence Y. Sherman, Republican, was elected for the unexpired portion of the term left vacant by the exclusion of Mr. Lorimer. The State election of 1914 centred about the choice of a United States Senator. Senator Sherman was reëlected, defeating Mr. Sullivan in a close contest.

The first elections in the State in which women participated were municipal and were held in 1914. In a number of smaller cities women officials were elected, but all the women candidates for aldermen in Chicago were defeated. Local-option elections were held on the same date, and it was in the voting on this question that the influence of women voters was most potent. No-license advocates gained a number of the larger cities. By the apportionment of 1910 the State has 27 members in the national House of Representatives; prior to that year it had 25.

The Governors of the State have been:

TERRITORIAL

Ninian Edwards		1809–18

STATE

Shadrach Bond	Democrat	1818–22
Edward Coles	"	1822–26
Ninian Edwards	"	1826–30
John Reynolds	"	1830–34
Joseph Duncan	"	1834–38
Thomas Carlin	"	1838–42
Thomas Ford	"	1842–46
Augustus C. French	"	1846–53
Joel A. Matteson	"	1853–57
William H. Bissell	Republican	1857–60
John Wood	"	[illegible]
Richard Yates	"	[illegible]
Richard J. Oglesby	"	[illegible]
John M. Palmer	"	[illegible]
Richard J. Oglesby	"	[illegible]
John L. Beveridge	"	[illegible]
Shelby M. Cullom	"	[illegible]
John M. Hamilton	"	[illegible]
Richard J. Oglesby	"	[illegible]
Joseph W. Fifer	"	[illegible]
John Peter Altgeld	Democrat	[illegible]
John Riley Tanner	Republican	[illegible]
Richard Yates	"	[illegible]
Charles S. Deneen	"	1905–13
Edward F. Dunne	Democrat	1913–17
F. O. Lowden	Republican	[illegible]
Len Small	"	1921–

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ILLINOIS, UNIVERSITY OF. The State University of Illinois, occupying a site of 610 acres, between the cities of Urbana and Champaign, was chartered in 1867 as the Illinois Industrial University and assumed its present name in 1885. In 1870 women were admitted as students and now form about one-fifth of the whole attendance. The university comprises the colleges of liberal arts and sciences, engineering, agriculture, law, medicine, and dentistry; and the schools of library science, music, education, pharmacy, and the graduate school. The State laboratory of natural history and the United States agricultural experiment station, the engineering experiment station, the State geological and water surveys, and the State entomological office are connected with the university. The schools of pharmacy, medicine, and dentistry are situated in Chicago. The university owns valuable collections in zoölogy, botany, entomology, geology, and other departments. The library contains 310,000 volumes. The university holds a summer session of eight weeks, primarily for teachers. It maintains close relations with the high schools of the State through a careful system of inspection and accrediting. It has developed rapidly and is constantly engaged in scientific investigations bearing upon the interests of the State. In 1914 it had 45 buildings, 704 instructors, and about 5500 students, of whom about 800 were in attendance at the Chicago departments. At the same time its endowment amounted to $647,000, its buildings and grounds were valued at $3,000,000, and its annual income, mainly derived from legislative appropriations, was $2,775,000. The General Assembly of Illinois in 1911 established a tax of one mill on the assessed valuation of the taxable property of the State to be set apart as a fund for the maintenance of the university. The president in 1914 was E. J. James, Ph.D., LL.D. Consult E. E. Slosson, *Great American Universities* (New York, 1910).

ILLINOIS AND MICHIGAN CANAL. See CANAL.

ILLINOIS COLLEGE. The oldest collegiate institution of Illinois, founded in 1829 at Jacksonville, Ill., in part through the efforts of an Eastern organization known as the Yale Band. The curriculum is arranged on the "major" system, with elective courses mainly after the freshman year, and leads to the bachelor's and master's degrees. The college had, in 1913–14, 131 collegiate, 189 music, 11 art, and 60 preparatory students, and 26 instructors. At the same time the value of its grounds and buildings was $315,290, and its endowment $386,700. The library contains about 14,000 volumes, with about 4000 volumes in the libraries of the literary societies. The president in 1914 was C. H. Rammelkamp, Ph.D.

ILLINOIS INDIANS. See ILLINOIS, 1.

ILLINOIS RIVER. The most important tributary of the upper Mississippi, traversing the State of Illinois (Map: Illinois, F 4). It is formed by the junction of the Des Plaines and the Kankakee in Grundy Co., Ill., about 45 miles southwest of Chicago. It flows generally southwest, joining the Mississippi about 24 miles above the mouth of the Missouri. Its length is 500 miles and its drainage area 29,013 square miles, of which 24,726 square miles lie in Illinois and the remainder in Indiana and Wisconsin. It is broad and deep, and navigable for steamers 250 miles, to La Salle, whence a ship canal connects it with the south branch of the Chicago River (q.v.), thus affording uninterrupted water communication between the Great Lakes and the Mississippi. The chief cities on the river are Ottawa and Peoria.

ILLINOIS STATE NORMAL UNIVERSITY. An institution for normal and higher education, founded in 1857 at Normal, Ill. The institution undertakes to prepare every sort of teacher required by the public-school system of Illinois and therefore offers a great variety of courses in accord with the statutes of the State for the certification of teachers. The programmes of study offered are for prospective country teachers, upper-grade teachers, intermediate teachers, kindergarten-primary teachers, and special teachers of music, art, manual training, domestic science, domestic art, agriculture, and commercial branches. A four-year programme is offered for high-school teachers, superintendents, and others requiring a longer preparation. The degree of bachelor of education is conferred upon students who complete the full four-year course. This is the oldest normal school in the Mississippi valley. The school is in session 48 weeks in the year. It is claimed that this school has contributed a larger number of prominent men and women to the educational forces of this generation than has any other school of like character in America. The attendance in 1914 was about 3036, and the faculty numbered about 80. The library contains about 30,000 volumes. The president in 1914 was David Felmley, LL.D.

ILLINOIS WESLEYAN UNIVERSITY. A Methodist Episcopal college at Bloomington, Ill. It was founded in 1850 and comprises a preparatory school, a college of letters (embodying the elective system), and schools of law, music, and oratory. The degrees conferred in course are B.A., B.S., LL.B., and the honorary degrees D.D. and LL.D. The total number of students enrolled in the university in 1913 was 688, of whom 235 were collegiate students. At the same time the faculty numbered 42 instructors. The library contains some 8000 volumes. The university has an endowment of $350,000, and grounds and buildings valued at $175,000. The president in 1914 was Theodore Kemp, D.D.

ILLITERACY (from Lat. *illiteratus*, uneducated, from *in-*, not + *literatus*, educated, from *litera, littera*, letter). Inability to read and write one's own language. As used in the United States census, the term is used also of those who can read but not write.

There are several methods of determining the

percentage of illiterates, and unfortunately the various nations follow different plans. Some statisticians prefer to base their estimates on the number of applicants for marriage licenses who cannot sign their names. Most of the European countries find the percentage from the examinations of the recruits for the army and navy, thus confining the test to men of a certain age. In the United States the census makes inquiry of each person and takes his or her word, there being no test of any sort. In all countries children under a certain age are not included, as it is not expected that they should know how to read and write. The age taken naturally affects the percentage. The United States does not count children under 10; Italy fixes the age at six. Naturally, the country which best enforces compulsory school attendance will show the lowest percentage.

The report of the United States Commissioner of Education for 1900 contains the following table for the different countries:

	Per cent		Per cent
Germany	0.11	Hungary	28.10
Switzerland	0.30	Greece	30.00
Scotland	3.57	Italy	38.30
Holland	4.00	Russia	61.70
France	4.90	Spain	68.10
England	5.80	Portugal	79.00
Belgium	12.80	Servia	86.00
Ireland	17.00	Rumania	89.00
Austria	23.80		

According to the census of 1910 illiterates in the United States numbered 5,516,163, or 7.7 per cent of the population 10 years of age and older. We may compare this percentage with 14.1 for France (1904), 12.7 for Belgium (1910), 17.4 for Ireland (1901), 22.6 for Austria (1900), 40.9 for Hungary (12 years and over, in 1900), 57.2 per cent for Greece (1907), 48.2 per cent for Italy (1901), 70 per cent for Russia (1907), 73.4 per cent for Portugal and 78.9 per cent for Servia (1900), 65.5 per cent for Bulgaria (1905). Methods of attaining the foregoing percentages differ so widely for the several countries that comparison is on an insecure basis. It is none the less certain that the problem of illiteracy is far from solution in southern and eastern Europe—the chief source of recent emigration to America.

Of the illiterates in the United States, 28 per cent were native whites, 30 per cent foreign-born whites, 40 per cent negroes, and 2 per cent Indians, Chinese, Japanese, etc. Illiteracy is chiefly characteristic of rural territory: 4.8 per cent of the native whites in rural territory were illiterate; 0.8 per cent in urban communities. Of the rural negro population, 40 per cent were illiterate; of the urban negro population, 17.6.

From the following table it will appear that illiteracy is largely indicative of lack of educational opportunities in earlier decades of our history. The percentage of illiteracy increases regularly with advancing years.

YEARS	Percentage of illiterates in total population in age group	Percentage of illiterates among whites in age group	Percentage of illiterates among negroes in age group
10–14	4.1	1.8	18.9
15–19	4.9	2.8	20.3
20–24	6.9	4.6	23.9
25–34	7.3	5.2	24.4
35–44	8.1	5.4	27.7
45–64	10.7	6.7	52.7
65–	14.5	9.4	74.5

There were 2,273,603 illiterate males 21 years of age and over. Of these, 617,733 were native-born whites, 788,631 foreign-born whites, and 819,135 negroes. In percentages, illiterate males 21 years and over represented 4.1 per cent of the native born, 11.9 per cent of the foreign born, 33.7 per cent of the negroes. The potential political significance of illiteracy is indicated by the following table for cities having 8 per cent and upward of illiterate males of voting age.

CITY	Per cent of illiterates in population 10 years and upward	Per cent of illiterates in male population 21 years and upward
Fall River	13.2	15.6
Birmingham	10.4	10.7
Scranton	8.9	12.2
Nashville	8.8	9.4
Atlanta	8.6	8.1
Richmond	8.2	8.6

Of the six cities in the foregoing table, the high percentage of illiteracy in Birmingham, Nashville, Atlanta, and Richmond is due to the presence of a large negro population. In the case of Fall River and Scranton it is due to the high proportion of foreign born.

Illiteracy in the five largest cities is indicated by the following table:

CITY	Per cent of illiterates in population 10 years and upward	Per cent of illiterates in male population 21 years and upward
New York	6.7	6.4
Chicago	4.5	5.1
Philadelphia	4.6	4.7
Boston	4.4	4.5
St. Louis	3.7	4.1

Cities having less than 2 per cent illiteracy in the population 10 years and over are given in the following table. It is noteworthy that all are on the Pacific coast, where the negro and low-grade foreign population is at a minimum.

CITY	Per cent of illiterates in population 10 years and upward	Per cent of illiterates in male population 21 years and upward
Seattle	1.1	1.4
Portland	1.2	1.3
Spokane	1.3	1.8
Los Angeles	1.9	2.0

The States having the lowest percentage of illiteracy in the population of 10 years and over are Iowa (1.7), Nebraska (1.9), Oregon (1.9), Washington (2.0), Kansas (2.2), Idaho (2.2), Utah (2.5), South Dakota (2.9). The States having the highest percentages are Louisiana (29.0), South Carolina (25.7), Alabama (22.9), Mississippi (22.4), Arizona (20.9), New Mexico (20.2). The high percentages in the case of Arizona and New Mexico are explained by the presence of a large Mexican population. In the other cases it is explained mainly by the large negro population. The native white population shows a percentage of illiteracy of 5 and above in Florida, Mississippi, West Virginia, Arkansas, Georgia, Virginia, Tennessee, Alabama, Kentucky, the Carolinas, Louisiana, and New Mexico.

Until recently it has been assumed that no

effective means could be devised to reduce illiteracy among the adult population; that the percentage could be lowered only through the supplanting of the older generations by the more literate younger generations. A number of experiments have shown that there is no insuperable difficulty in teaching illiterate adults to read and write. One of the most interesting of these experiments was conducted by Superintendent of Schools Mrs. Cora Wilson Stewart in Rowan Co., Ky. In night schools organized in that county one-third of the whole adult population was enrolled and a majority were redeemed from illiteracy. Equally good results have been attained among the illiterate foreign born in some of the large cities. Consult: *Census of the United States* (1900 and 1910); *Annual Reports of the Commissioner of Education* (Washington); *Illiteracy in the United States* (Bulletin No. 20 of the United States Bureau of Education, Washington, 1913); reports of ministers and departments of education of various European countries. See IMMIGRATION.

ILLUMINATED DOCTOR, THE (Lat. *Doctor Illuminatus*). A title given to Raymond Lully and to Johann Tauler (qq.v.).

ILLUMINATED MANUSCRIPTS. Those adorned with figurès, letters, and other designs in color and gold. Such decorations are called illuminations—a term originally used in connection with book ornamentation of the later Middle Ages; but its use has been extended to the embellishment of manuscripts in general. The term *miniature* is often used indiscriminately to designate illuminations as well as minute painting on ivory or other material; but the best usage restricts it to the last-named subject. (See MINIATURE.) Illuminations consist chiefly of large ornate initials, marginal drawings and borders, and illustrations of figures and incidents. In the early Middle Ages the painter of the scriptoria of the monasteries was usually called the *pictor*. The Egyptian papyri of the ritualistic class, as old as the eighteenth dynasty, especially the *Book of the Dead*, are ornamented with vignettes or miniatures, attached to the chapters, either designed in black outlines or painted in primary colors in tempera. Except these papyri, no other manuscripts of antiquity were, strictly speaking, illuminated; such Greek and Roman ones of the first century as have reached the present day being written only. Pliny, indeed, mentions from Varro that authors had their portraits painted on their works, and mentions a biographical work with numerous portraits introduced; but all such have disappeared in the wreck of ages, the oldest illuminated manuscripts which have survived dating from the fourth century. St. Jerome complains of the abuse of the practice, as shown by filling up books with capital letters of preposterous size. The art of illuminating manuscripts with gold and silver letters is supposed to have been derived from Egypt, but it is remarkable that no papyrus has any gold or silver introduced into it. The artists who painted in gold, called *chrysographi*, are mentioned as early as the second century. There were, in fact, from the beginning two distinct classes of illuminated manuscripts (1) those with decorative letters and (2) those with figured compositions. These were often crossed, and figures painted within and around the letters. The purely figured illustrations, similar to the larger compositions in mosaic and fresco, originated in early Byzantine art, and the decorative letter style was a specialty of the northern races, especially Irish and Saxon. One of the oldest manuscripts of this style is the *Codex Argenteus* of Ulfilas (c.500 A.D.), and the charter of King Edgar (966 A.D.) shows the use of these letters. The principal late Roman illustrated manuscripts are the two *Vergils* of the Vatican, the *Iliad* of the Ambrosian (Milan), and the *Roman Philocalian Calendar* at Vienna, all belonging to the fourth century or the early part of the fifth, and illustrating the last phase of the secular school. There exist also a few copies of originals of this date or earlier, such as the Terence plays at the Vatican and Bibliothèque Nationale and the *Calendar of Aratus* at Boulogne. Of Greek classic descent are the exquisite pictures in the Viennese manuscript of the medical writings of Dioscorides, not executed till 505 A.D.

Early Byzantine. In the Eastern Empire, during the fifth and sixth centuries, illuminating became one of the most important branches of Christian art and remained so until the sixteenth century. With an innate talent for color born of the Orient, the Byzantines, while retaining a free, rather classic drawing, used brighter colors and applied gold more freely than had hitherto been done. Manuscripts of the Old Testament, either as a whole or in separate books, and Gospel manuscripts were systematically searched for incidents of historic or religious importance. At first there was even a superabundance of pictures, as in the roll of Joshua at the Vatican, and, though less so, in the fifth-century codices of Genesis at Vienna and the British Museum. The normal type was given at this time by the *Rossano Gospels*, a work of the Byzantine school which was creating the new art. In the teaching of the people by pictures it is difficult to decide which branch of art gave the suggestive types for the scenes—the illuminators or the mosaicists and fresco painters. Outside of the Bible the chief work is the manuscript of Cosmas Indicopleustes at the Vatican, with its 54 pictures of the sixth century. Until the seventh century the illuminations were square or oblong pictures interrupting the text, but at that time the calligraphic style of decoration began, with its initial letters and its interweaving of human, animal, and geometric forms with the letters. Already in the famous Syriac manuscript at the Laurentian Library (Florence) this decorative sense had shown itself. It was developed by the Byzantine artists of the Iconoclastic age, who preferred ornamentation to the human figure, and by the Irish and Anglo-Saxon schools, which showed an originality and boldness in decorative design equal to their ineptitude in treating the figure.

The Irish school was essentially a native product, developed without foreign influence, in the monasteries of Ireland during the seventh century, whence it was transplanted to Scotland and England. In England the style was continued by later monks, though modified by Byzantine and later by Carolingian influences. The Irish style broke away entirely not only from all classic traditions but from all naturalism. Spirals, knots, bands, zigzags, and other geometric forms, derived largely from metal work, were interwoven often with fantastic beasts and impossible men. The colors are harmonious and rich as enamel, and in pure Irish

work no gold is used. The *Book of Deir*, the Dorbeer *Life of Columba*, the *Lindisfarne Gospels*, the *Book of Kells*, the *St. Gall Gospels*, the *Würzburg Epistles*, the *Utrecht Psalter*, are among the finest works of this school.

Carolingian. Meanwhile in the West the Benedictine monks of the sixth and seventh centuries had continued the degenerate Roman style, as in the Pentateuch of Tours, or were copying Byzantine models, as in the *Cambridge Gospels*. The prominence of Irish and Anglo-Saxon monks in the missionary and educational worlds in the eighth century throughout northern Europe made them the teachers of the Carolingian school of illuminators that sprang up in France and Germany. This school, while adopting much of the decorative scheme, including the immense and highly ornamental initial letters of the Irish, added the use of sacred compositions with the human figure, largely from Latin or Byzantine models. Rich architectural details are used to frame the scenes, and large single figures of Christ, the Emperor, the Evangelists, etc., prevail. The backgrounds are not gilt, but plain or broken up by accessories. The Gospel book of Charlemagne from Soissons (Bibliothèque Nationale, Paris) is dated 781 and is one of the earliest and finest works of the school. It had several branches. In France were: (1) the Franco-Saxon branch, extending from Paris to the Rhine, of which over 30 examples remain, including the Gospels at Arras, the Psalter at Vienna, and the above Gospels from Soissons; (2) the branch of Tours, founded by Alcuin, illustrated by Bibles and Gospels, in the British Museum, belonging to Alcuin, Charles the Bald, and Lothair; (3) the branch of Orléans, with Bibles at the Bibliothèque Nationale and Le Puy. In Germany were: (1) the branch at Metz, to which the Sacramentary of Drogo belongs; and (2) that at St. Gall, which has specimens in the Munich Library. In these Carolingian works the colored outline drawing was brilliant rather than solid, the figures clumsy and inclined to overaction. But the general effect was of splendor and originality.

Romanesque. The true continuators of the Carolingian style in the Romanesque period were the German illuminators of the time of the Othos and the Henrys, who tempered the earlier exaggerations of movement and size through contact with Byzantine art. Both the Rhenish and the Saxon schools, especially the latter, have left many works executed for these emperors, now preserved at Bamberg, Munich, Treves, Paris, etc., especially Gospel books. The architectural details and borders are particularly good and rich, including also the animals and birds so frequent in Romanesque art. Body colors, usually light in tone, replaced the Carolingian outline style; figures were better drawn and more dignified. In the eleventh century the richness of initials and backgrounds increased, often with tapestry effects as in the *Regensburg Gospels;* but there came a decadence, which lasted nearly up to the Gothic period.

Meanwhile other countries were lagging far behind. In France the Carolingian methods became crude and barbarous, as in the *Noailles Bible*. Italy had never even participated in the Carolingian revival and confined itself to clumsy figure painting, mostly in outline, without displaying any decorative ability. The English school contained the older Irish and Anglo-Saxon work with modifications first due to Carolingian influence, as in *Æthelwold's Benedictional*. With the Conquest, however, the body-color technique replaced the outlined work, as in Germany.

Late Byzantine. The ninth, tenth, and eleventh centuries were the golden age of Byzantine illuminations. Under the Macedonian dynasty (867–1057) there was a return to more classic models, to figure painting in place of the decorative work of the Iconoclastic age. The famous *Paris Psalter* has scenes of antique grace showing a copying of very early models; but even works of purely contemporary art, like the Paris sermons of Gregory of Nazianzus, show an understanding of form and drapery denied to Western art. The brilliant gold grounds, the rich solid coloring, the simplicity of composition and ornament, belong to a severer style. One of the most extensive series of pictures is contained in the *Menologium* of Emperor Basil II (976–1025) in the Vatican. The decline is heralded in the Paris *Homilies of St. John Chrysostom* illuminated for Nicephorus III (1078–81), and is quite evident from about 1100. In the two following centuries the figures lose all semblance to life, and the artists turned to decorative work and initials.

Gothic. While Byzantine illumination was dying, the golden age of the art in Europe was beginning, at the close of the twelfth century. First Germany and then France take the lead. The *Hortus Deliciarum* of Herrad of Landsperg, a sort of cyclopædia in design, was a forerunner of Gothic design, whose first steps are shown by Landgrave Hermann's Psalter. It was under St. Louis (1226–70) in France, however, that the Gothic style of illumination really originated and developed. The lingering influence of Byzantine art is shown in the clear outlines, the solid strong coloring, the small-sized figures, the simplicity of accessories, and the good taste shown in every particular. Of course the ornaments and other details were adapted from the Gothic style of architecture, with growing realism in the use of plants and flowers. A *Psalter* of St. Louis is the earliest masterpiece of the type so familiar to the strong style of stained-glass windows. In the course of the fourteenth century a lighter scheme was introduced, with delicate shading instead of flat tints, with more detail and expression. This French-Gothic school was extremely systematic in its use of subjects —in this as in the larger arts—and it originated the type of the *Bible Historiée*, corresponding to the German *Biblia Pauperum*, with its great wealth of illustrations. The other main class of religious illuminated manuscripts was the *Book of Hours*, or prayer book. Such works, executed for the use of royal and feudal personages, were the most exquisite products of the school. But the field of subjects was immeasurably enlarged beyond the religious sphere, which had hitherto reigned alone. Works of poetry and legend, of history and literature of every kind, were decorated as a matter of course with illuminations.

Other countries followed in the wake of France, adopting her Gothic style in this as in other branches of art. Still, though England, Germany, and the Netherlands had flourishing schools, there was a lack of originality and less perfection of design and color.

In France itself the latter part of the fourteenth century saw a further approach to the

methods of naturalistic painting. Exquisite borders of elaborate floral patterns commonly inclosed the entire page, often enlivened by little birds, animals, and figures. Contemporary costume, furniture, and other accessories are reproduced with minute fidelity. Brushwork is evident in the modeling, and faces are exquisitely treated. Work in monochrome, in the light *grisaille*, and in *camaïeu* became popular. The libraries of King Charles V and of the dukes of Berry, Anjou, and Burgundy were enriched with many illuminated manuscripts, often by court illuminators—missals, gospels, psalters, breviaries, books of hours, romances, poems, treatises on falconry, jousting, astronomy, physics. The number of illuminations in some of these works can be judged by the fact that a Bible done for the Duke of Burgundy contained over 2500 pictures. The great public and private collections testify to the enormous productivity of the French schools during the latter part of the thirteenth and the whole of the fourteenth century.

It was at this time that two influences are noticeable, that of Italy and that of Flanders. The Italian Giottesque revival extended to illumination, and Giotto's contemporary, the Sienese master Simone Memmi, executed illustrations to Vergil and to Petrarch in a simple broad style, imported from wall painting, which henceforth characterized Italian illuminating. The manuscript statutes of the Order of the Holy Ghost illustrate the development of this school. When the popes established themselves at Avignon, the Italian miniaturists with them began to influence the French artists. On the other hand, the powerful school of Flanders began to dominate French art on the northern side, in this as in other branches, with tendency to heaviness, realism, and portraiture, especially remarkable in the following century.

The fifteenth century still belongs to the golden age in the West. In France, except for a few exceptional men who adopted the Renaissance style, led by Fouquet, the Gothic manner still ruled supreme. Here it was the feudal nobles and the royal family, and not the churches or monasteries, for whom nearly all the masterpieces were executed: the *Books of Hours*, or prayer books, were especially beautiful. Those of Philip the Good of Burgundy, at The Hague, and those of Charles the Bold and Mary of Burgundy, at Vienna, are typical of Flemish art, which was taking the lead in powerful naturalism. The *Breviary* of the Duke of Bedford (c.1430) shows Franco-Flemish art in the service of England. The *Hours* executed for Chevalier and the *Jewish Antiquities* of Josephus are among the masterpieces of Fouquet, even more great as a painter than miniaturist, who combined the pure Italian Renaissance with North French realism. In Bohemia also the art was royally patronized by Emperor Charles IV and his son Wenceslas, while King Matthias Corvinus of Hungary helped develop the genius of some of the greatest Italian miniaturists.

Renaissance. Italy forged to the front during this century. The Sforzas at Milan, the dukes of Ferrara, the royal house of Naples, the Medici at Florence, were the greatest patrons besides the cathedral churches. The cathedral of Siena still has the finest collection of illuminated missals and choir books decorated by Liberale da Verona, Girolamo da Cremona, Francesco di Lorenzo, Roselli, and other leading artists. But the greatest of all artists was Attavante (q.v.), some of whose work can be seen at Florence (in the cathedral), beside that of Gherardo, of Strozzi, the pupil of Fra Angelico, and others. Some of Attavante's greatest masterpieces were executed for Matthias Corvinus (e.g., Missal of 1485–87). This Italian school did not aim at the delicate French effects. It remained broader, preferred to use large capital letters to frame its compositions, aimed at simplicity of composition with few figures.

The invention of printing, while it limited the scope of illumination by greatly diminishing the demand for manuscripts, did not at once give it its death blow. Printed books were often at first illuminated with initials or pictures added by hand in spaces left for them—a practice that lasted even into the first decade of the sixteenth century. Quite as fatal was the introduction of foreign methods into the art, borrowed from fresco and oil painting. The old simplicity and aloofness from naturalism gave way to attempts at effects that were totally foreign to the true spirit of illumination—shading and delicacy of coloring, imitation of natural objects, importance given to perspective and accessories. Prominent among the works of the old school is the somewhat earlier Grimani *Breviary* (c.1477) in Venice, so long ascribed to Memling. A remarkable facsimile of this great work was printed in Germany in 1900. In France the famous Missal of Anne of Brittany (1508, St. Petersburg Library) is the expiring effort of the national school, which was succeeded by the Italian masters of the Fontainebleau group. The breaking down of the technical differences between the larger forms of painting and illumination was at this time helped by the work of such artists as Fra Bartolommeo, who practiced both branches. A few works of rare beauty and workmanship continued, however, to be produced; like the *Books of Hours* by Giulio Clovio (q.v.), of which a fine example is in the library of J. P. Morgan, New York. Henceforth illumination ceased to count in the history of art. In the reign of Louis XIV the art became extinct, ending in the style called *camaïeu gris*, a kind of monochrome in which the lights are white or gold and shaded so as to emulate bas-reliefs.

Oriental. Among Oriental nations the Persians, Hindus, and Chinese have illuminated manuscripts of great beauty, with figured compositions. The branches of Mohammedan art stricter than the Persians have confined their illuminations to ornamental work, as in the mediæval works of the schools of Cairo and Damascus, mainly represented by magnificent Korans. The best works were produced during the comparatively brief period between the thirteenth and sixteenth centuries, described under INDIAN ART; MOHAMMEDAN ART; ETC.

Bibliography. The best general account of the subject is by J. A. Herbert, *Illuminated Manuscripts*, "Connoisseurs Library Series" (New York, 1911). There are very good chapters in such general historic works as Woltmann and Woermann, *History of Painting* (Eng. trans., ib., 1880), and especially in Michel, *Histoire de l'art* (Paris, 1905 et seq.). The general historic treatment in J. Labarte, *Histoire des arts industriels* (ib., 1866), remains excellent. So is the handbook in the French series of Quantin, Lecoy de la Marche, *Les manuscrits et la miniature* (ib., 1884). Valuable treatises have been written on special schools of illumination, e.g.,

for the Byzantine: Kondakov, *Histoire de l'art byzantin, considéré principalement dans les miniatures* (ib., 1886–91). For Irish and Anglo-Saxon: Westwood, *Facsimiles of the Miniatures and Ornaments of the Anglo-Saxon and Irish Manuscripts* (London, 1868), an admirable monograph with excellent facsimiles. For the French: Martin, *Les peintres des manuscrits et la miniature en France* (Paris, 1909); Vogelstein, *Von französischer Buchmalerei* (Munich, 1911). For the English: Bernard Quaritch, *Examples of the Art of Book Illustration* (4 vols., London, 1889); E. M. Thompson, *English Illuminated Manuscripts* (ib., 1895); Herbert, in the work cited above. Historical: *Introduction to the Collection of Illuminated Letters and Borders in the National Art Museum*, published by the Victoria and Albert Museum (ib., 1901); *Catalogue of the John Pierpont Morgan Collection of Manuscripts and Early Printed Books* (4 vols., ib., 1906–07). Many of the important manuscripts have been published in facsimile by the Vatican Library, the British Paleographical Society, in the Leyden series of facsimiles, and by other societies and private publishers. Facsimiles of illuminations from various sources are published in such works as De Bastard, *Peintures et ornements des manuscrits* (1832–69); Shaw and Madden, *Illuminated Ornaments from Manuscripts and Early Printed Works* (London, 1833); Tikanen, *Die Psalter-Illustrationen in Mittelalter* (Helsingfors, 1895 et seq.); Kobell, *Kunstvolle Miniaturen und Initialen aus Handschriften des 4. bis 16. Jahrhunderts* (2d ed., Munich, 1892); G. E. Warner, *Illuminated Manuscripts in the British Museum* (London, 1903); the *Facsimiles* of the Paleographical Society and the New Paleographical Society (London, 1903 et seq.); *Collezione paleografia Vaticana* (Rome, 1905 et seq.). For the technical side, consult: Merrifield, *Original Treatises Dating from the Twelfth to the Eighteenth Centuries on the Art of Painting* (London, 1849); Audsley, *Guide to the Art of Illuminating and Missal Painting* (ib., 1862); Johnston, *Writing and Illuminating and Lettering* (ib., 1908). See MANUSCRIPTS, ILLUMINATED.

ILLU'MINA'TI (Lat. nom. pl., enlightened). A name which has been borne by four different societies. 1. The earliest was that of the *Alombrados* in Spain, followers of a seductive mysticism, said to have had Gnostic elements. It first appeared in 1492 and spread rapidly through Spain about the middle of the sixteenth century, though vigorously combated by the apostle of Andalusia, John of Avila, and by Ignatius Loyola. About 1625 it was spreading in France, where it was suppressed in 1635. It was finally suppressed by the Inquisition, though it lingered until the middle of the seventeenth century and had a few scattered followers even at the beginning of the eighteenth. Consult Pelayo, *Historia de los heterodoxos españoles* (Madrid, 1880). 2. A group of enthusiasts and visionaries, known as *Guérinets*, in France about 1684. 3. An association of mystics in Belgium in the latter half of the eighteenth century. 4. A society to which the name is now most commonly applied, the Order of the Illuminati, which was founded at Ingolstadt on May 1, 1776, and soon spread over almost all the Roman Catholic parts of Germany. Its founder at first called it the Order of the Perfectibilists. It owed its existence to Adam Weishaupt, professor of canon law at Ingolstadt—a man of superior abilities and much benevolence, but deficient in practical knowledge of mankind. Impatient of the slow advance of human progress, he conceived the idea of forming an association which should consist of the choicest spirits, labor for the establishment of the dominion of reason, and promote religious and political enlightenment and emancipation. Religious dogmas and forms of worship were to be rejected, a system of deism was to be propagated together with republican opinions. The accession of Baron von Knigge to the new order, and the support which it received from the Freemasons, led to its rapid extension. Weishaupt's knowledge of the Order of the Jesuits, whose pupil he had been, led him to borrow some of the methods of organization which had proved so successful in their hands for building up a strong and united system, especially the absolute obedience of superiors. His arrangements were calculated to place the threads all in one hand by which the holy legion was to be led on, as it was imagined, to the benefaction of mankind; but from this cause the dissolution of the order soon ensued. Weishaupt and Knigge, its two leaders, quarreled with one another. The order began to be openly denounced as dangerous, and on June 22, 1784, an edict was issued by the Elector of Bavaria for its suppression, which was followed by others (March 2, 1785) of a more drastic character, and under the prosecution ensuing the order was suppressed. Weishaupt was removed from his professorship. He returned to Gotha, where he was received and died as court councilor, in 1830, at the age of 82. Various other members were severely punished, and the form of justice was not strictly observed in the proceedings against them. Great importance was at one time attached to the Order of the Illuminati, whose secret influence was regarded, incorrectly, as a principal cause of many of the political events of the time of the French Revolution. The Bavarian government published confiscated documents in 1787. Consult: Adam Weishaupt, *Das Verbesserte System der Illuminaten mit allen seinen Einrichtungen und Garden* (Frankfort, 1787); Kloss, *Bibliographie der Freimaurerei und der mit ihr in Verbindung gesetzten geheimen Gesellschaften* (Frankfort, 1844); Engel, *Geschichte des Illuminaten Orden* (Berlin, 1906).

ILLUMINATING. See ILLUMINATED MANUSCRIPTS.

ILLUMINATING ENGINEERING SOCIETY. See ILLUMINATION.

ILLUMINATING GAS. See GAS, ILLUMINATING AND FUEL.

ILLU'MINA'TION. The use and arrangement of sources of light so as to render objects readily visible, with due consideration to available facilities and proper economy. The extreme brightness of modern illuminants is recognized, not only on account of the inartistic effects due to uneven illumination of surfaces, but also for the injurious influence on the human eye. Modern illumination is concerned chiefly with the various forms of electric and gas lamps in use, such as the electric incandescent and arc lights and gas burners of the mantle type. (See ELECTRIC LIGHTING; GAS.) For interior lighting, the past few years have seen the rapid displacement of carbon filament incandescent lamps by those of tungsten, and of open-flame gas burners by incandescent mantle lamps, whereby the same or a greater amount of light is secured

at a lower cost, or, what is the usual case, for the same cost a much greater amount of illumination is obtained. Furthermore, there have been developed illuminants of such intense brightness as to make them unsuitable for general interior illumination, except for large areas, such as stores, public halls, workshops, railway stations, etc. To secure the best results for each particular location and problem is the province of the illuminating engineer.

For the comparison of various illuminants, the standard of reference is the standard candle (see PHOTOMETRY), while the degree of illumination on a surface distant 1 foot from a standard candle is called a "foot candle." To express luminous flux, there is used a unit called the "lumen," equal to the flux emitted in a unit solid angle by a point source of one candle power. For the C. G. S. unit of illumination, one lumen per square centimeter, the name "phot" has been proposed, this being equal to 929 lumens per square foot. To put this ratio in another way, one foot candle is one lumen per square foot and is equal to 1.0764 milliphots. The unit of illumination commonly employed is the lux, which is equal to 0.0929 lumen per square foot, or 0.0929 foot candle.

In providing illumination a surface of reference, called the "plane of illumination," perpendicular to the rays of light, is chosen, which is that on which the effective degree of brightness for the special purpose is desired. In offices, schools, libraries, or stores, this reference plane is commonly taken at a height of from $2\frac{1}{2}$ to 3 feet from the floor, approximately that of a desk or table; and in certain locations, such as the book stacks of a library, the reference plane is chosen somewhat higher than this, say 5 to 6 feet. A picture gallery requires a vertical reference plane, the surface extending usually from 5 to 10 feet from the floor. Special problems in vertical lighting are often solved by an arrangement of lamps in vertical or horizontal rows, shielded by columns or coves, for bringing out the details of a chancel of a church, or a recess in an art gallery, as well as to display goods in show windows, where it is essential that the articles displayed may be adequately illuminated, while not disclosing the direct sources of light. Obviously there must be considerable calculation, involving not only the nature and dimensions of the area to be lighted, but also the intensity and distribution of the illuminants so that illuminating engineering involves no small amount of theoretical consideration as well as practical application.

Investigation shows a wide variance in the intensity of illumination required for different purposes. For ordinary reading as well as for drafting rooms and work of a similar character, an illumination of from 2.5 to 4 foot candles is usually satisfactory, while for the examination of or work on certain textiles, and in operations where the goods worked upon are dark in color or black, a higher degree of illumination is necessary, sometimes being carried to as much as 8 foot candles for satisfactory results. Proper illumination, however, requires not only sufficient light, but also the distribution of radiation in such manner that there are no deep shadows or points where sharp contrasts of light and shade are noticeable. Uniformity of illumination is one of the causes of the pleasing effect of the great area of the Grand Central Terminal concourse in New York City, with its adequate and even illumination, both by daylight and by artificial light.

Illuminating engineers have made an extended study of the bad effects of glare, which is the regular or specular reflection of light from surfaces of paper, furniture, etc. At a certain angle the incident light is reflected directly from the page of a book, or the polished top of a piece of furniture, or even from the walls of a room, into the eye of the observer, making it less sensitive to detail and causing a strain and consequent fatigue that will lead to injurious results. Glare may be avoided by using more lamps of diminished brightness or by changing the position of the lamps, so that their radiations shall reach the desk or printed page at an angle that will cause diffuse reflection. For the general reduction of glare, however, the surfaces of walls and furnishings of a room must be of such nature and color as to diffuse the incident light from every possible angle. For interior illumination all lights should be shielded by globes or shades to prevent the radiations coming with undiminished intensity to the eye, as this causes excessive eye strain and its injurious consequences.

In order to avoid the many unsatisfactory effects of what is called "direct lighting," and also for the purpose of producing a more uniform illumination in the interior of buildings, the "indirect" system and the "semi-indirect" are both largely in use. The indirect system commonly employs an opaque bowl, suspended from the ceiling of the apartment to be lighted. Lamps are placed inside the bowl, from which the direct radiations are first received on the ceiling and upper portion of the walls of the apartment, resulting in a wide diffusion and satisfactory illumination without glare. In this system, however, some of the bowls used cause shadows on floor and furniture, so that the semi-indirect method is frequently preferred by architects and illuminating engineers, as in this latter system the lamps are placed in bowls made of translucent material, such as opalescent or white glass, alabaster, etc., with the result that a portion of the radiation from the lamps is received on the ceiling and walls and diffused by them, while another portion passing through the bowl is received directly on the floor and the furniture, but of so softened, diffused, and uniform a quality as to render the effect restful to the eye, yet providing sufficient illumination according to circumstances to render it easy to read or do any other kind of work in any part of the apartment lighted.

In school buildings much attention is being paid to the principles of correct illumination, as a large proportion of the increasing amount of eye trouble among school children doubtless is caused by bad lighting conditions in the class rooms, not omitting those that are usually worse at home. Children are frequently allowed to study with an unshaded light facing them at the desk. Likewise, in stores, factories, and workshops, faulty arrangements for lighting are also common. In machine shops an unshaded electric lamp is often hung in front of or directly over a lathe or milling machine, which, though throwing a bright light on the work, puts a blinding glare in the eyes of the workman the moment he looks up from the work, and making deep shadows around the base of the machines near the floor, where a man is likely to trip and fall, with resulting injury.

The color of the illuminant also is a matter of great importance in many illumination problems. Naturally, for the examination of textiles, the illumination of art galleries or public rooms, the nearest approach to daylight, at present realized in artificial illuminants in the tungsten lamp, must be secured. In many workshops this consideration can be neglected, and one of the most efficient illuminants in use, the mercury vapor lamp, with a pronounced green hue, is highly favored for a great variety of manufacturing plants, but is unsuitable for public places, owing to the ghastly appearance produced on the human countenance by the absence of red radiations from the lamp.

For street or outside illumination, lamps must be placed at such a height that the radiation will not strike directly in the eyes of pedestrians and drivers. They must be so spaced that there will be no areas in deep shadow, and at the same time must be located with regard to one another, to secure the maximum amount of radiation from each unit, without the waste which would accrue from too close spacing. According to economic and civic conditions in cities and villages, there are many systems of street lighting in use, ranging from incandescent lamps 300 feet apart, an arrangement suitable for small villages, to the most powerful flaming arc lights in pairs, providing a uniform illumination of sidewalks, roadway, and buildings with a brightness sufficient to enable one to read newspaper print.

It is estimated that at least $200,000,000 a year are spent in the United States for lighting by oil, gas, and electricity, and that 20 per cent of this sum is wasted by faulty design and arrangement of the details of illumination. The work of the illuminating engineer is therefore of benefit to the community in many ways, as his advice in the installation and arrangement of lighting systems results in the social, economic, and physiological benefit of the community as well as in the saving of large amounts of money.

The importance of the artistic, physiological, and industrial effects of proper lighting has attracted the attention of electrical engineers and architects and resulted in the formation of a society for the discussion and investigation of problems concerning this subject. The Illuminating Engineering Society in the United States was organized in 1906 and in 1915 had a membership of about 1500, comprising electrical engineers, architects, and decorators, as well as designers and manufacturers of fixtures. The society aims to bring together the interests enumerated herewith and to publish results of their investigations in both public and private lighting work. Its object is the advancement of the theory and practice of illumination, and the dissemination of knowledge relating thereto. Frequent meetings are held, as well as an annual convention, where papers are read and discussed concerning the latest practice and art of both public and private illumination. In London a society of the same name and with the same objects in view was founded in 1909, and there is a similar organization in Paris.

Bibliography. C. P. Steinmetz, *Radiation, Light, and Illumination* (New York, 1909); W. E. Wickenden, *Illumination and Photometry* (ib., 1910); *Lectures on Illuminating Engineering*, delivered at Johns Hopkins University (Baltimore, 1911); W. E. Barrows, *Light, Photometry, and Illumination* (New York, 1912); L. Bloch, *Science of Illumination* (London, 1912); H. Bohle, *Electrical Photometry and Illumination* (ib., 1912); *Transactions of the American Institute of Electrical Engineers* (New York, 1884–); *Proceedings of the National Electric Light Association* (ib., 1885–); *Transactions of the American Gas Institute* (ib.,

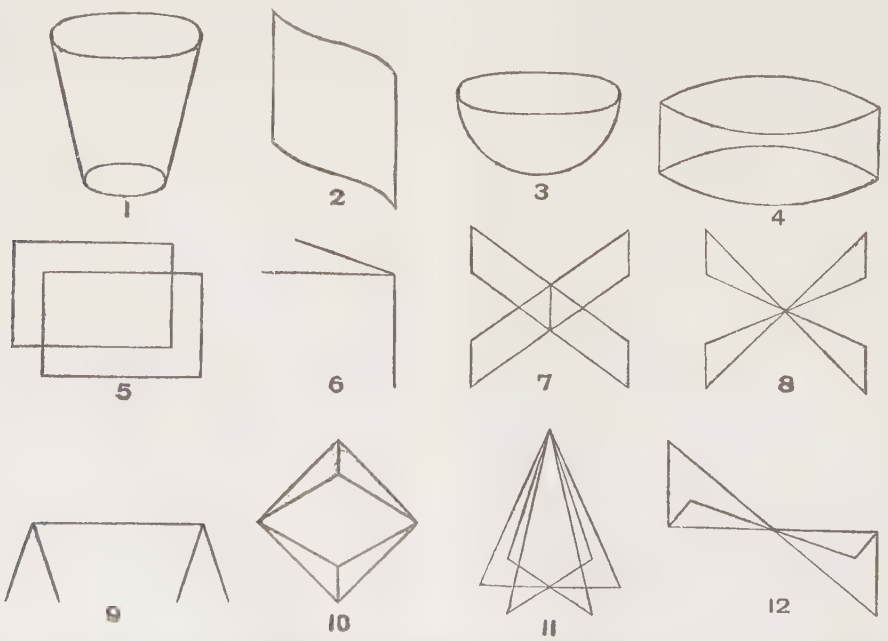

FIG. 1. ILLUSIONS OF REVERSIBLE PERSPECTIVE. (From Titchener, *Experimental Psychology.*)

Notice that while you look at the figures, without changing the position of the book, certain lines or planes appear now farther from and now nearer to the eyes. To show the influence of fixation and eye-movement, the figures must be drawn on a large scale, and preferably in white lines on a black ground.

1907–); *Transactions of the Illuminating Engineering Society* (ib., 1911–); H. Pender (ed.), *American Electrical Handbook* (ib., 1914). For the architect and engineer as well as the general reader: Cravath and Lansing, *Practical Illumination* (ib., 1907); W. S. Franklin, *Electric Lighting* (ib., 1912); Louis Bell, *Art of Illumination* (ib., 1912); C. E. Clewell, *Factory Lighting* (ib., 1913).

ILLUPI, il'u-pī (East Indian name), **ILLUPIE, ELLOOPA** (*Bassia longifolia*). An East Indian evergreen tree of many local uses. The bark is prescribed in cases of itch; the gummy juice is employed as a remedy for rheumatism; the leaves and the milky juice of the immature fruit are also used in medicine; the flowers, roasted or boiled, furnish an article of food, and the seeds yield a greenish fixed oil, known as illupi oil.

ILLU'SION (from Lat. *illusio*, mockery, from *illudere*, to mock, from *in*, in + *ludere*, to play).

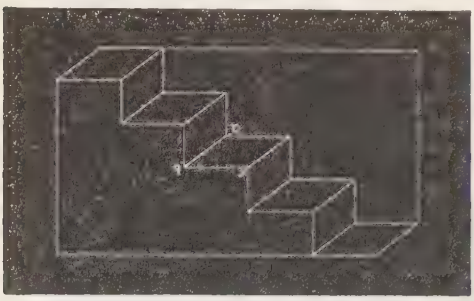

FIG. 2. SHROEDER'S REVERSIBLE STAIR FIGURE.

The figure fluctuates as you observe it. If at first you seem to be looking at a flight of steps, the appearance soon changes, so that you seem to see a piece of overhanging masonry. To show the influence of fixation and eye movement, the figure must be drawn on a large scale.

In general, a distorted or abnormal perception (q.v.). The word is used in English psychology in two principal senses: 1. As the counterpart of hallucination (q.v.), "an assimilation of an hallucinatory character" (Wundt), a distortion or misinterpretation of the contents of perception, due to an abnormal irritability of the sensory centres of the brain cortex. The distortion may take the form of subjective enhancement of the intensity of stimulus, as when a gentle knocking at the door is taken for the growl of thunder; it may involve a qualitative alteration of the stimulus, as when the monotonous sighing of the wind is heard as angelic music; or it may consist in a fantastic modeling and grouping of the forms of perceived objects, as when a dimly seen stone or tree stump is regarded as a ghost. Sane persons of imaginative disposition are liable to illusion, more especially at times of mental stress or overwork; and, indeed, the readiness with which we can find faces in the fire and monsters in the clouds shows how short is the path from normal to abnormal assimilation. We reach the stage of unquestioned abnormality with patients who interpret the half-heard conversation of passers-by as threats directed against their life and see on the face of every stranger an expression of disgust or contempt or menace.

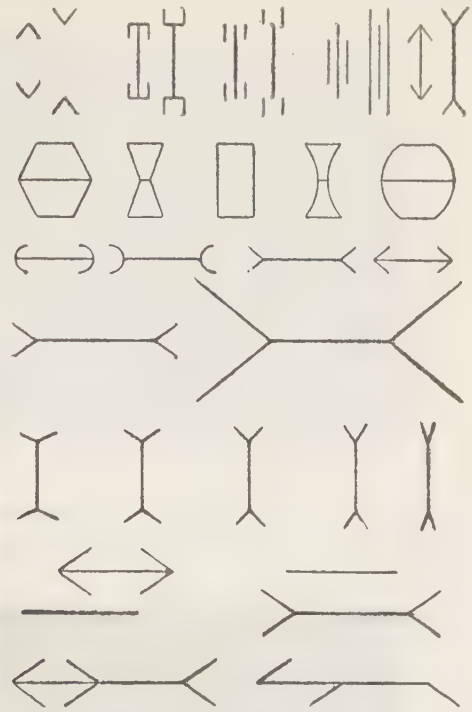

FIG. 4. THE ARROWHEAD AND FEATHER ILLUSION. (From Sanford, *Course in Experimental Psychology.*)

In the first row the distances between the points of the angles are equal, and the vertical lines subject to illusion are all equal to these distances and to one another. In the second row of figures the top and bottom lines are all equal; in the third and fourth rows the horizontal, in the fifth row the vertical, and in the sixth row the horizontal lines are all equal in length. In the lowest row the parts of the horizontal lines marked off by the points of the angles are all equal.

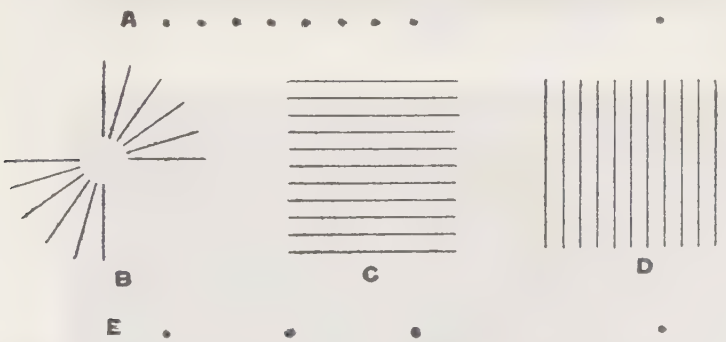

FIG. 3. VARIABLE ILLUSIONS OF EXTENT. (From Sanford, *Course in Experimental Psychology.*)

In *A* the space covered by the 8 dots at the left seems greater than that between the 8th and that at the extreme right. In *B* the quadrants with inscribed radii appear greater than those that are empty. The figures *C* and *D* (Helmholtz Squares) appear respectively higher and broader than they should by objective measurement. Figure *E* is a variant of *A*, the illusion being the reverse of that in *A*; here the eye tends to fixate the middle point of the left-hand distance and thus to apprehend that distance without traversing its length.

2. In its second meaning illusion is a perversion of the contents of perception due to structural or functional peculiarities of the perceptual apparatus (sense organs and cortex). So far from being abnormal, this form of illusion is both natural and necessary. We speak

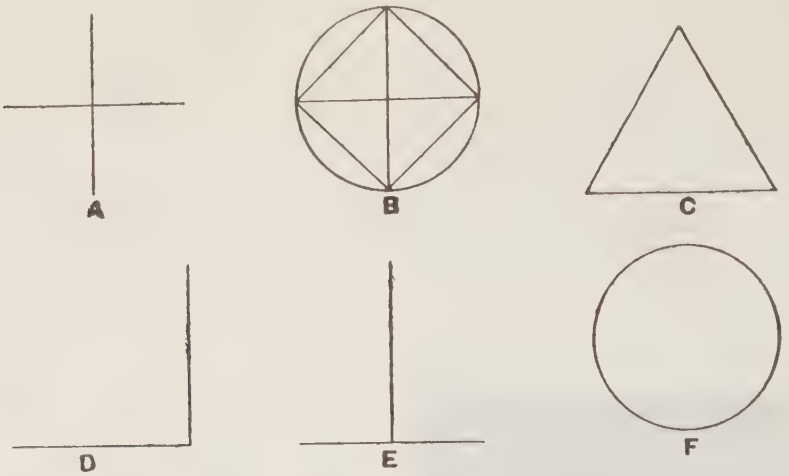

FIG. 5. CONSTANT ILLUSIONS OF EXTENT. (From Titchener, *Experimental Psychology*.)
In *A–E*, the vertical appear to be greater than the horizontal dimensions. *A* and *B* show further peculiarities, mentioned in the text. *F* gives rise to no illusion; it is inserted for comparison with *B*.

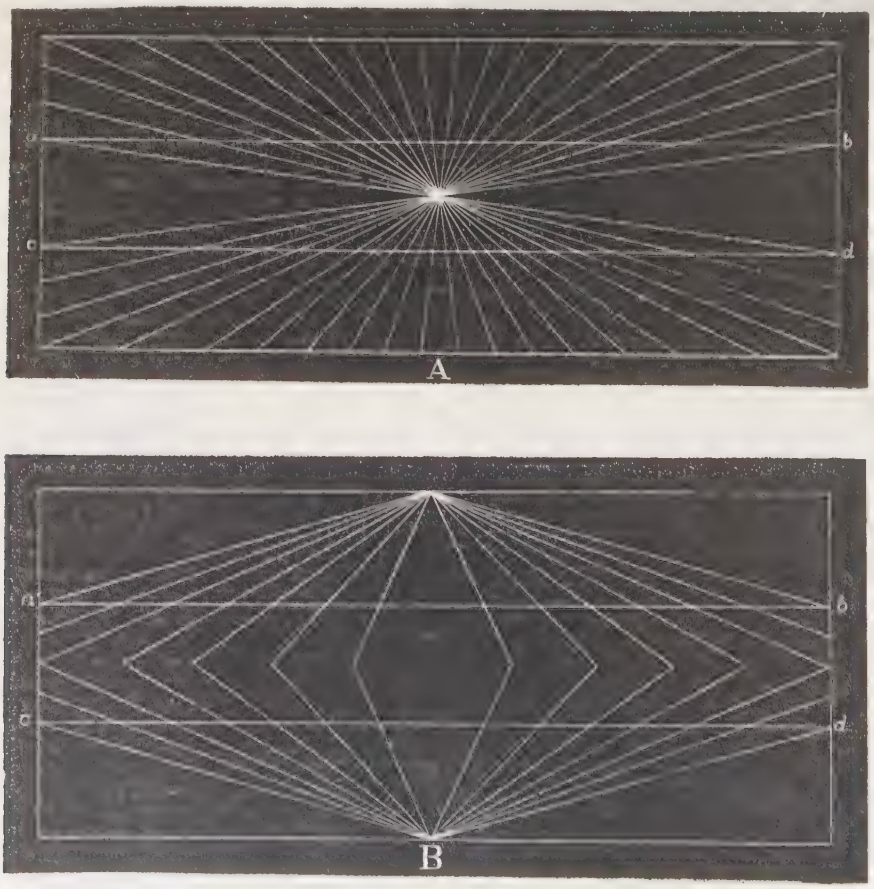

FIG. 6. VARIABLE ILLUSIONS OF DIRECTION. (*A* the Hering figure, *B* Wundt's figure.)
The objectively parallel lines *ab* and *cd* in *A* seem to be nearer together at the ends than in the middle. In *B* the opposite is the case.

of the perceptions as "illusory" simply because they are of a character different from that which our previous knowledge of the stimuli,

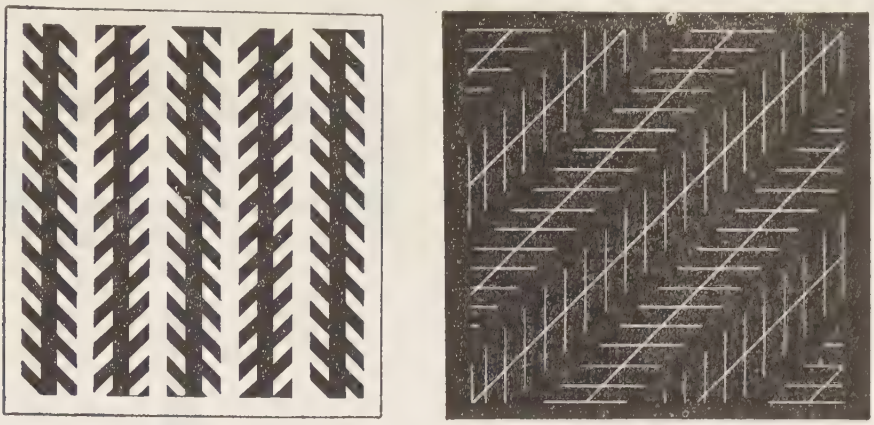

FIG. 7. VARIABLE ILLUSIONS OF DIRECTION. (Zöllner's figures.)

In *A* the vertical lines and in *B* the diagonal lines in the square appear to converge and diverge, though objectively they are parallel.

or our experience under other conditions, would lead us to expect. For instance, we know that all four sides of a square are equal. We expect therefore that a square will look as high as it is broad. As a matter of fact, the perfect square always looks like a rectangle whose vertical dimension is somewhat greater than the horizontal. Again, we are extremely familiar with the appearance of the circle, which we have seen in all sorts of figures and under the most varied conditions. When, then, we inscribe a square in a given circle, we do not expect that the appearance of circularity will be affected. In actual fact, the circle seems to be pinched in at the points where its circumference is touched by the angles of the square, so that we perceive not a circle at all, but four arcs apparently belonging to circles of less radius than the circle which should include the square. No one whose vision is normal can escape these illusions; their occurrence is, as we shall see, intrinsic to the perceiving eye in its function as a "space organ"; the perceptions are illusory only in the sense that they conflict with our other knowledge, i.e., with the verdict of the "mathematical" or "measuring" eye.

The most important of these "normal" illusions are the spatial illusions of touch and sight. The latter, which were first demonstrated by J. Oppel (1815–94) in certain simple geometrical figures, have been termed collectively the *geometrical optical illusions*. They are exceedingly numerous, and explanations have been almost as plentiful as illusions. Three attempts at systematic treatment have, however, been made by later investigators; the one by Wundt (q.v.), who seeks, so far as possible, to account for the illusions in physiological terms (fixation and eye movement); the second by Lipps (q.v.), who offers a "mechanical æsthetic" principle of explanation. Lipps's theory is, in brief, that we read into the lines and figures in question forces and counterforces, strivings and resistances, akin to those which we experience in ourselves; so that the column "seeks" or "strives" to rise, the horizontal line to stretch itself, the circle to "hold itself together," etc. The third theory emphasizes our own general attitude to the object of perception. Just as we constantly

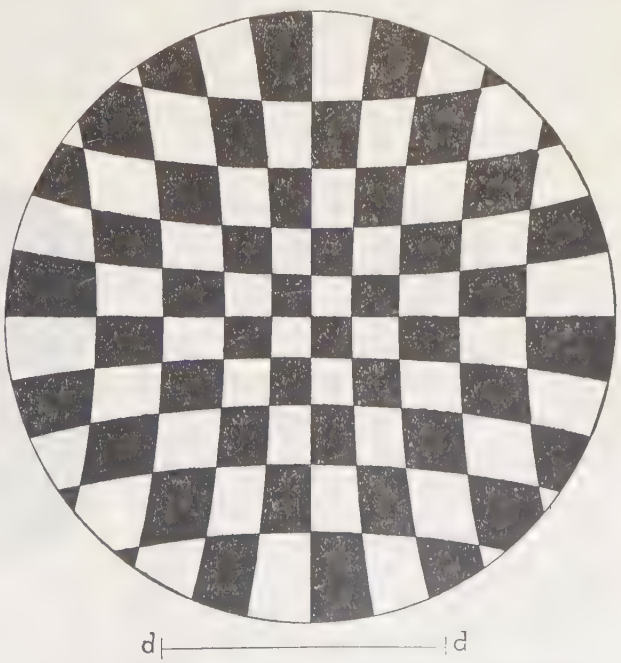

FIG. 8. CONSTANT ILLUSION OF DIRECTION. (Von Recklinghausen.)

Look at the centre of the figure with one eye, from the distance *dd*, and the whole appears as a field of squares.

misread the headlines of the newspapers because we are prepared or predisposed for news of a certain sort, so do we perceive a geometrical figure in one way if we take it as a total impression, in another way if we take it critically, analytically, limiting our attention to certain lines and disregarding others, etc. We shall here give Wundt's classification and explanation, partly because they are the most complete, and partly because, in matters of perception, physiological conditions must take priority over psychological.

The first group of geometrical optical illusions contains (*a*) the illusions of reversible perspective. It is a familiar fact that many outline figures—a bowl, an open book, a cube, a stairway —will "turn inside out" in the most perplexing

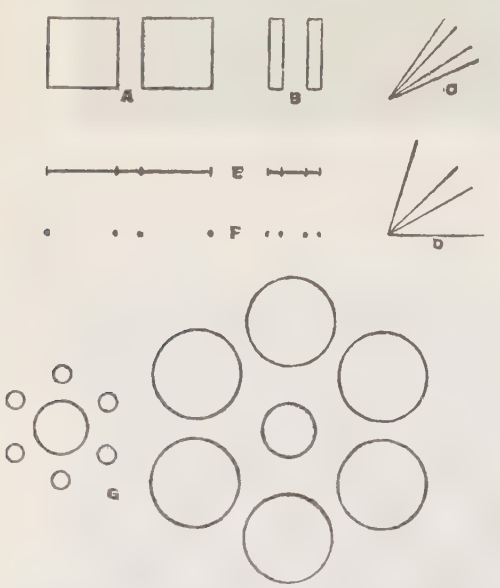

FIG. 9. ASSOCIATIVE ILLUSIONS. (From Sanford, *Course in Experimental Psychology.*)

In *A* and *B* the breadth of the included spaces, and in *C* and *D* the included angles, are objectively equal. In *E* and *F* the small central lines and spaces are equal. In *G* the circle surrounded by small circles is the same in size as that surrounded by large circles, though it appears larger.

way as one looks at them. Even two crossed lines, drawn X-wise upon a sheet of paper, may be made to take on the appearance of a right-angled cross, seen in perspective, with either the lower or the higher point of the line which forms the horizontal arms nearer to the observer. Very little practice suffices to show that the direction of perspective depends here upon the point fixated and the course along which the eye moves; the point of fixation is the point nearer the observer, and movement of the eye towards a given point brings that, in its turn, to the front of the figure. (*b*) Next follow the illusions of extent, variable and constant. A dotted line looks longer than a drawn line of equal objective length, for the reason that it offers more halting places as the eye moves along it. Draw an outline square; then a group of horizontal lines filling the same area as the square; and then a similar group of vertical lines. The horizontal group looks higher, the vertical group broader, than the objectively equal square, for the reason, again, that the grouped lines offer more obstacles to the passage of the eye over the area of the figure. One of the most disputed figures of this class is the illusion of Müller-Lyer, or the arrowhead and feather illusion. Draw two vertical or horizontal lines of equal length. Tip the two ends

FIG. 10. THE STROBOSCOPE OR ZOÖTROPE.

Looking at the figures through the slits in the rim, you get, when the instrument is rotated, an effect of continuous movement, similar to that of the kinetoscope, and depending on the same conditions.

of the one with oblique lines directed inward (arrowheads), and the two ends of the other with oblique lines of the same length directed outward (arrow feathers); the latter appears considerably the longer of the two. Wundt's explanation is that the inward-going obliques offer a check to the passage of the eye along the principal line, while the outward-going obliques

FIG. 11. AN ILLUSION OF MOVEMENT. (From Sanford, *Course in Experimental Psychology.*)

Move the figure around in a circle in its own plane, and observe the apparent motion of the six outer disks and the reverse movement of the central cogwheel.

favor a continuance of eye movement. The constant illusions of extent (due to asymmetries of muscular action about the eyeball) are summed

up in a right-angled and equal-armed cross. The vertical line in this figure seems to be longer than the horizontal; the upper vertical arm longer than the lower; and, in monocular vision, the outer horizontal arm looks longer than the inner. (*c*) Thirdly, we have variable and constant illusions of direction. Draw a large outline square, marking in one of the diagonals, and three or four lines parallel to the diagonal, at equal distances on either side of it. Now proceed to crosshatch the oblique lines, cutting the diagonal with short vertical

straight lines, owing to the concavity of the retina. (*d*) There remains a group of illusions which Wundt classes as "associative," i.e., as psychological, not physiological, in origin. If equal short horizontal lines are drawn, some grouped closely together and some widely spaced, the latter appear longer than the former; the length of the line is "assimilated" to the size of the interspaces. In the same way, if two broad and two narrow rectangles are drawn, of equal height and separated by equal spaces, the space between the larger rectangles will look

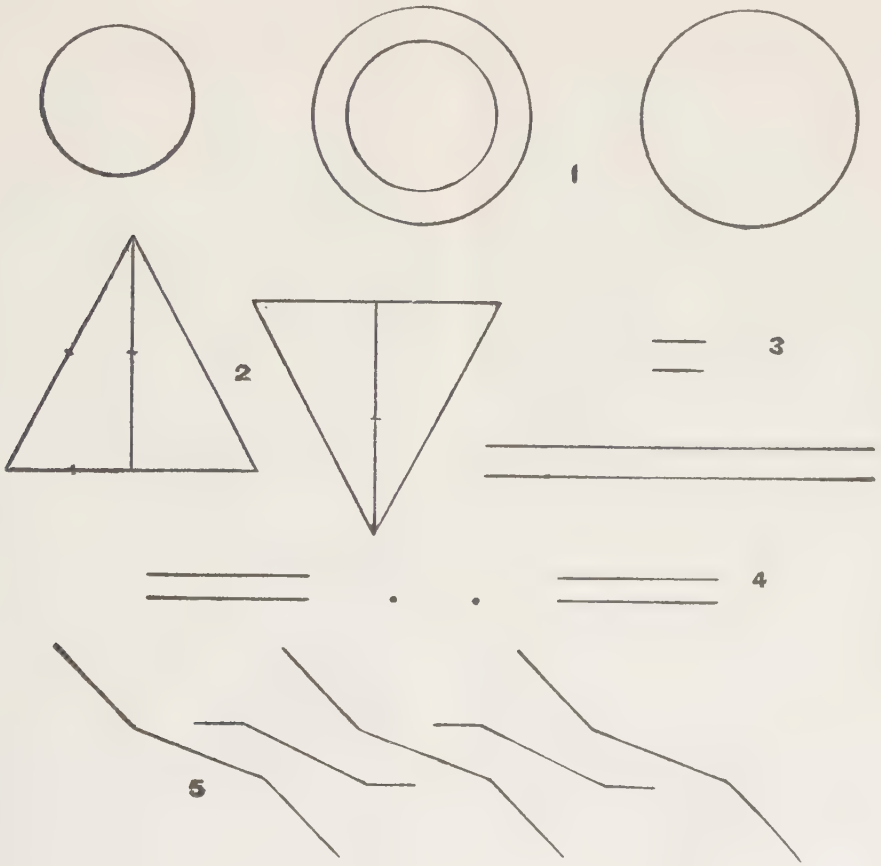

FIG. 12. MIXED ILLUSIONS. (From Titchener, *Experimental Psychology*.)

In 1 compare the size of the left-hand circle with the inner circle in the middle figure; also the outer circle of the middle figure with the right-hand circle. In 2 note the apparent lengths of the halves of the various bisected lines. In 3 the shorter parallel lines seem farther apart than the longer parallels (Wundt). In 4 "the dots are really at the level of the lower line, but seem a little too high, especially when the figure is held so as to make the lines oblique" (Sanford). In 5 the middle sections of the five broken lines are all equal and parallel, though they appear to be otherwise (Lipps).

pieces, the two adjoining obliques with short horizontal pieces, the two oblique lines next beyond these with verticals again, the two next with horizontals, and so forth. Notice that the parallel obliques no longer look parallel, but appear to converge and diverge alternately. The explanation of this and similar illusions is that small angles are overestimated, and large angles relatively underestimated; and the reason for such overestimation, again, is that it takes more muscular effort and energy to start a movement of the eye than it does to continue a movement already begun. The constant illusion of direction is that, under certain conditions of fixation, hyperbolas are perceived as

smaller than the space between the narrower; the interspaces are differently estimated by "contrast" with the adjacent figures. (See CONTRAST.) (*e*) Finally, we may, of course, have figures in which several of the above-mentioned motives, physiological and psychological, coöperate to produce the illusion.

It is significant that, with the associative illusions, Wundt is forced to leave the periphery for the centre, the sense organ for the cortex, physiology for psychology; since, if central or psychical factors are of influence in one sort of illusory perception, there seems to be no a priori reason why they should not be effective in others. Recent investigations show, in fact, a distinct

tendency to give the central organ a far larger share in the determination of perception than is allowed it in Wundt's *Physiological Psychology;* concepts like predisposition, attitude, set, tendency, have been introduced and are freely used; and experiments have been made in which variation is not confined to the figures studied, but extends as well to instructions for observing, direction of attention, etc. We may perhaps believe that a satisfactory theory of illusory perception will combine the first and the third of the theories mentioned above; Lipps's view, at least in any general form, must probably be given up.

We may further include under the general heading of optical illusions: (1) the physical illusions produced by mirrors, lenses, prisms, etc. (see MIRAGE; REFLECTION; REFRACTION); (2) the physiological illusions of color (see AFTER-IMAGES; CONTRAST); (3) illusions of movement, such as, e.g., the apparent movement of the moon when viewed through drifting clouds; and (4) illusions of distance. Under the latter category falls the apparent enlargement of sun and moon when seen near the horizon. The distance between the observing eye and the horizon seems to be longer (owing to the haziness of the air, the number of intervening objects, etc.) than the distance between the eye and the zenith. But if two objects subtend the same visual angle (give the same retinal image) at different distances, the one which is farther off must be larger than the other.

Touch, no less than sight, is subject to spatial illusion. (*a*) If two compass points are set down upon the skin, first on an area of greater and then on an area of less sensitivity, the distance between them will seem to be greater in the former case than in the latter. Give the points, e.g., a separation that enables them to be clearly perceived as distinct impressions when they are set crosswise upon the skin of the upper arm. Now draw the compasses down the inner surface of the arm to forearm, wrist, and finger tips. The two parallel lines which they describe will appear to converge and diverge upon the regions of less and greater sensitivity. Or set the points down, vertically, upon the upper and lower lips, and draw the compasses outward, towards the ear. The points seem to converge as they travel over the skin. (*b*) Cross the tip of the second over that of the third finger and place a marble or other small object between the crossed tips. Since the two surfaces now stimulated are never affected, in ordinary life, by one and the same object, but only by two different objects, the single marble is "felt" as two. This illusion of localization is described by Aristotle, in his tract *On Dreams.* (*c*) Draw a given length of coarse thread between the finger and thumb, at first slowly and then more quickly. The thread appears to be much longer in the former case; the separate pressure sensations have a longer time in which to run their course undisturbed by subsequent pressures, and fullness of sensation is interpreted as length of thread. (*d*) If a point be moved over the skin at a uniform rate, it will seem to travel more quickly as it crosses areas of greater sensitivity and to become slow again as it enters regions of less sensitivity. See also MOVEMENT, PERCEPTION OF.

A striking illusion of temperature is described by the English philosopher Locke (q.v.). Hold the one hand in a bowl of heated, the other in a bowl of cold, water. After a short time plunge both hands into a bowl of lukewarm water. This will appear hot to the cooled, and cold to the heated, hand. The illusion is due to the preceding adaptation of the temperature organs of the skin. (See CUTANEOUS SENSATIONS.) An equally striking illusion in the sphere of kinæsthetic sensation is afforded by the fact that a small weight, when lifted, always appears heavier than a larger weight of the same objective heaviness. The smaller weight stimulates intensively a limited cutaneous area, with its underlying tissues; the larger weight stimulates lightly a large area of skin and leaves the underlying tissues practically unaffected. These instances, which could be multiplied almost indefinitely, show clearly that the term "illusion" implies nothing more than a discrepancy between perception and objective measurement.

Bibliography. For (1), consult Wundt, *Physiologische Psychologie* (Leipzig, 1910). For (2), consult: Hoppe, *Psychologisch-physiologische Optik* (ib., 1881); Lipps, *Raumæsthetik und geometrisch-optische Täuschungen* (ib., 1897); Wundt, *Die geometrisch-optischen Täuschungen* (ib., 1898); William James, *Principles of Psychology* (2 vols., New York, 1899); Titchener, *Experimental Psychology,* vol. i (ib., 1901); Benussi, "Zur Psychologie des Gestalterfassens," in Meinong, *Untersuchungen zur Gegenstandstheorie und Psychologie* (Leipzig, 1904); Witasek, *Psychologie der Raumwahrnehmung des Auges* (Heidelberg, 1910); Titchener, *Text-Book of Psychology* (New York, 1910).

ILLUSION. See HINDUISM; MAYA.

ILLUSION COMIQUE, ē'lụ'zyōN' kō'mēk', L' (Fr., The Comic Illusion). A complicated and improbable play by Corneille (1636), embracing a comedy and a tragedy.

ILLUSIONS, OPTICAL. See ILLUSION.

ILLUSIONS PERDUES, ē'lụ'zyōN' pâr'dụ', LES (Fr., The Lost Illusions). A work in three parts by Balzac (1837–43).

ILLUSTRATED LONDON NEWS. The oldest illustrated weekly, founded in 1842 by Herbert Ingram.

IL'LUSTRA'TION. A term generally used in reference to the pictorial decoration and illustration of books. In the more usual sense book illustration is the addition to a book of pictures (and indirectly of maps and plans) which may aid in the right understanding of the text. This service they may render in a serious and practical way by giving views of buildings, accurate drawings or other reproductions of dress, portraits of individuals, copies of works of art named, and the like, these being things which are impossible adequately to describe in words, and of which a clear presentation to the reader is desired. On the other hand, the illustrations may also be merely extensions of the text; thus, when Cruikshank or Leech illustrates *Oliver Twist* or *Mr. Jorrock's Hunt,* the description or narrative passage of the text is in a sense repeated by the artist—a part of the story is retold in line and light and shade.

A book consisting almost entirely of pictures, or having those for its principal subject, cannot be said to be an illustrated book. Thus, the volumes of the Paris *Salon,* with large photogravures of the paintings and statuary of the year with a text which is rather perfunctory, or that little volume which made the delight of schoolboys 60 years ago, *Mr. Jonathan Oldbuck,* or, in more recent times, the albums of Caran

D'Ache and Forain, or Howard Pyle's or T. S. Sullivant's "Fables," are of this class. In the one case the pictures are the book, and the text is not absolutely needed; in the other case the pictures and the brief legends or the rewritten Æsop Fable 100 words long, form together a humorous study of which the picture is much the more important part. This is hardly illustration. And in like manner, when the pictures drawn for a book are large, and few in number, and are printed on separate plates and bound in, they have less the air of illustration, and indeed serve less well their purpose as illustration, than those which, being smaller, are inserted in the text. The very admirable pictures by Albert Lynch given with the quarto edition of Maupassant's *Pierre et Jean*, although spoken of with great respect by excellent judges and although admirable compositions, are yet less effective as illustrations than the less pretentious and really less able drawings by Myrbach, and others which are scattered through the duodecimo volumes of Daudet's *L'Immortel* or Bourget's *Mensonges*, and immeasurably inferior to the roughly cut headpieces by Meissonier in *Les contes rémois*. From this point of view the famous "vignettes" of the eighteenth-century illustrated books are the least satisfactory of illustrations. They render, indeed, a single scene or incident of the story, but they are wholly unrealistic in character, the figures ordinarily being posed without general truth of attitude or truth of gesture, and while they are attractive and instructive as works of the draftsman and of the engraver's art, they are also models of all that is to be avoided in book illustration.

History. The history of illustration is hard to treat as a continuous narrative. The Egyptian manuscript *Books of the Dead* contain numbers of delicate and very ornamental paintings, usually of small size and combined with the text in an admirable way; and the paintings in the Ani Papyrus in the British Museum, and a few other recently discovered manuscripts, have larger drawings. On the other hand, we are without any knowledge of Greek manuscripts of an early date with drawings accompanying them. Of Roman Imperial manuscripts with illustrations there is nothing known prior to the Christian epoch; but the paintings which accompany the famous *Genesis* of the Vienna Museum, certain manuscripts of plays of Terence, and a very few other contemporary books remain to us. It is the opinion of excellent critics that these monuments of a decadent epoch will mislead us if we try to judge from them the character of work of the earlier and better times; but those who urge this may forget that one art continues to flourish while others lapse. Moreover, the antique look and something of the pagan spirit are still to be found in the Christian illustrations of the fourth and fifth centuries, whereas the Church has had its own way with the mediæval manuscripts of the eleventh and twelfth centuries; those of much earlier date, like the Irish and the Anglo-Saxon, are too barbaric and too purely ornamental to be considered as actual illustrations, despite the decorative effectiveness of the illuminated page.

The mediæval manuscripts combine illustration by means of miniatures with the decoration of the page in a very wonderful way. (See ILLUMINATED MANUSCRIPTS.) With the revival of learning in Italy the painting of miniatures became an elaborate art, and some of these miniatures of early time are finished pictures with background, distance, and everything that a modern landscape or genre picture has, except cast shadows. Even the shadows appear towards the close of the fifteenth century, and with the shadows comes the end of illumination considered as a separate art. The famous *Breviario Grimani* is, however, without shadows and yet is dated at the very close of the fifteenth century; and the borders which Albert Dürer drew for the margins of the printed book called *Maximilian's Prayer Book*, and which were executed in 1515, have their elaborate groups of busy little figures drawn without traceable or outlined shadows, although the figures themselves may be partly relieved on a dark shading.

With the earliest printed books come the earliest wood engravings which are of exclusively artistic character. The *Hypnerotomachia* of the so-called Poliphilo (Francisco Colonna), printed by Aldus at Venice in 1499, has large and very open drawings, sometimes filling nearly the whole of a small folio page. The *Epistles of Saint Jerome*, of 1497, has a great number of small illustrations, not larger than a lady's visiting card, but full of character and containing sometimes a dozen figures boldly drawn and skillfully grouped. The several illustrated editions of the *Divine Comedy* of Dante, of which perhaps the earliest is of 1497, have woodcuts and illustrations also in outline. During the next century this same tendency to simple and rather formal illustration, in outline except for some arbitrary shading, continues; and it is not to be doubted that the expectation was that hand coloring would be called in to complete these designs. In fact, many books, with their pictures elaborately colored by hand, remain to us from this epoch. The constant reprinting of the early books tended to preserve the abstract and simple character of illustration, and it is not until the middle of the sixteenth century, with the copper engraved plates illustrating the different manuals of swordplay, and the delicate little woodcuts illustrating the Old Testament, and the "Dance of Death" ascribed to Holbein, that a freer style is introduced. Entire freedom in drawing for wood engraving came slowly; even Albert Dürer's work is largely confined to outline, and single plates of the "Apocalypse" and the "Life of Mary" are found elaborately painted in water color and touched with gold. But with the last quarter of the sixteenth century complete light and shade is sought for, as in the woodcuts ascribed to Jost Amman, published by Feyerabend of Frankfort, and those of Vecellia, dated 1590. In the seventeenth century were published quaint books of history and topography, sometimes adorned with crowded battle pieces, or, like the curious history of the wars between England, France, and the United Provinces, with views of sea fights, minutely engraved on copper and effective enough in a black and crowded way. One of these pictures shows the great fire of London in 1666, the book being printed two years later. The books published by Matthäus Merian of Frankfort with the admirable views of German cities are of this time: and Wenceslaus Hollar began his wonderful career of simple and perfect work as an engraver in Merian's employ. Book illustration was, however, feeble during the hundred years

from 1650 to 1750, although the fashion of providing elaborate frontispieces and title-pages engraved on copper produced some very admirable samples of the engraver's art. The French *Livres à Vignette* mentioned above are noteworthy, in spite of their inadequacy, as helping to restore the art. (Consult De Goncourt, *Les vignettistes*, Paris, 1868.) Wood engraving was revived in the course of the eighteenth century, and as early as 1775 Thomas Bewick produced his illustrations of Æsop's *Fables* and his natural-history books, the *Quadrupeds* and the *Birds;* the little narrative drawings serving as tailpieces to the chapters of the quadrupeds forming the most important step in book illustration which had been made for a century.

The great modern movement in book illustration begins about 1830 with the woodcuts made for French classics, such as Molière and Bernardin de Saint-Pierre; and in England with the earliest books illustrated by Cruikshank. The work of Rowlandson, ending as Cruikshank began, must have influenced him greatly at first. But Cruikshank soon worked out of the exaggerated and purely farcical manner which the earlier artist retained to his death, and achieved distinction primarily as an illustrator of books, keeping up his full power until an advanced age. His work exists in great abundance in woodcut and also in a simple kind of etching, in which last process he was followed and surpassed as to technical excellence by John Leech.

For the important influence of the humorous journals, see CARICATURE. The foundation of *Punch* led to the creation of a whole school of illustrators; and Leech, as a draftsman for wood engraving, was the chief of Englishmen of his time, keeping up his power till his death, in 1864. Richard Doyle and Hablot K. Browne were his contemporaries; Du Maurier and Charles Keene, the latter one of the greatest artists in black and white, were his successors. All these men did much work in illustrating separate books. The Frenchmen Jean François Gigoux, Tony Johannot, Sulpice Chevallier (Gavarni), were their contemporaries in the French world of books.

The book illustrations of the years since 1870 are remarkable for the introduction of photographic process prints (see PHOTO-ENGRAVING); but there has been also, particularly in the United States, a notable rise and decline of wood engraving (q.v.). Colored illustrations can be produced now at reasonable cost, and some of them are of great beauty. (See THREE-COLOR PROCESS; LITHOGRAPHY.) Of decisive influence upon the development of illustration of the present day are the numerous illustrated magazines and newspapers in America and Europe. See PERIODICAL; NEWSPAPER.

That form of illustration which is sometimes called Extra Illustration, or Grangerism (from James Granger, died 1776, a celebrated print collector), is the insertion into a book, by way of illustration, of pictures which did not originally belong to it. Thus, a history or an historical novel may be illustrated by collecting portraits of men famous at the time dealt with in the book, and scenes of historical interest previously drawn and engraved, and these prints may be bound into the book or simply laid between its leaves. In this way a book of one volume may be extended to a dozen; and as some of the plates will be large, the smaller ones are occasionally "inlaid," i.e., their edges are fitted into a hole cut in a larger sheet of paper, while the printed leaves are treated in the same way, so that all the leaves of the enlarged book may be of the same size. This proceeding has been the cause of the destruction of many valuable books, for a whole volume will be sacrificed for the sake of its frontispiece or its illustrated title-page, or marred by the extraction from it of one or two portraits. Consult: Bouchot, *The Book*, translated by Bigmore, edited by Grevel (London, 1890); Joseph Pennell, *Modern Illustration* (ib., 1895); id., *Illustration of Books* (ib., 1896); White, *English Illustration, "the Sixties"* (ib., 1897); Blackburn, *Art of Illustration* (Edinburgh, 1901); Crane, *Decorative Illustration of Books* (London, 1901); Kirkbride, *Engraving for Illustration, Historical and Practical Notes* (New York, 1903); Sketchley, *English Book-Illustration of Today* (London, 1903); Hardie, *English Coloured Books* (ib., 1906).

ILLUSTRATION, L', lē'lụs'trà'syôN'. An illustrated Paris weekly, founded in 1843, modeled on the *Illustrated London News.*

ILLUSTRIERTE ZEITUNG, ĭl'ụs-trēr'te tsī'tụng (Ger., illustrated news). The oldest German illustrated weekly, founded in Leipzig by J. J. Weber in 1843.

ILLYRIA, ĭ-lĭr'ĭ-à. See ILLYRIANS; ILLYRICUM.

ILLYRIAN PROVINCES. See ILLYRICUM.

ILLYR'IANS (Lat. *Illyria*, from Gk. 'Ιλλύριοι, *Illyrioi*, from 'Ιλλυρίς, *Illyris*, 'Ιλλυρία, *Illyria*, Illyria). A people of doubtful ethnic kinship, who at the dawn of history inhabited the northern and eastern shores of the Adriatic and the northwestern part of modern Greece. From this latter region a migration took place at a very early period across the Ionian Sea to the southeastern corner of Italy. It seems, on the whole, plausible to regard the modern Albanians as the representatives of the Illyrians, both in ethnology and in language. See ALBANIA; ALBANIAN LANGUAGE.

ILLYR'ICUM (Lat., from Gk. 'Ιλλυρικόν, *Illyrikon*, from 'Ιλλυρίς, *Illyris*, 'Ιλλυρία, *Illyria*, Illyria). The Roman name of a Roman administrative district, whose limits in ancient times varied very considerably (Illyria was the name of the territory occupied by the Illyrians; Illyricum often included much more than that territory). In the fourth century B.C. the Illyrians inhabited the eastern coast of the Adriatic Sea and the adjacent islands, with the western parts of Macedonia as far south as Epirus. Philip of Macedon conquered the country as far as the river Drilon (modern Drino), and thence arose the division into *Illyris Græca* and *Illyris Barbara*, afterward *Illyris Romana.* The former, now Albania (q.v.), was incorporated with Macedonia. *Illyris Barbara* or *Romana* was divided into Iapydia, Liburnia, and Dalmatia. There were Greek settlements on the coasts of Illyria as early as the sixth century B.C. The kings of Macedonia long fought with the Illyrians; Philip, father of Alexander the Great, finally subdued them and annexed part of their country. After this time the Illyrians were much addicted to piracy, which soon brought them into collision with the Romans, who waged a successful war against the Illyrian Queen, Teuta, in 229 B.C. About 168 B.C. the southern Illyrians became subject to Rome, but the subjugation of the northern Illyrians was not effected until the time of Augustus (33 B.C.).

Under the Roman Empire the country of the Illyrians, under the name of Dalmatia (in the wider sense), formed the southern part of the diocese of Illyricum, which extended as far north as the Danube. It is represented in modern times by part of Croatia, nearly all of Bosnia, Dalmatia, Herzegovina, Montenegro, and the northern part of Albania. Under Constantine the prefecture of Illyricum embraced a great part of the Roman dominions in Europe east of the Adriatic. A decree of Napoleon, Oct. 14, 1809, organized the dominion known as the Illyrian Provinces, erected out of territories taken from Austria. It comprised Carniola, part of Carinthia, most of Croatia, Dalmatia, Istria, Fiume, etc. At his fall these provinces were united as a kingdom to the Austrian Empire, and some alterations were made in its boundaries. The kingdom was divided into the two governments of Laibach and Triest, Laibach being the capital, which arrangement continued till 1849, when the kingdom was subdivided, for administrative purposes, into the duchies of Carinthia and Carniola, and the coast district, containing Görz and Gradisca, Istria and Triest. Consult: Bahn, *Die Ursprung der römischen Provinz Illyrien* (Grimma, 1876); Zippel, *Die römische Herrschaft in Illyrien bis auf Augustus* (Leipzig, 1877); Eduard Meyer, *Geschichte des Altertums*, vol. i (2d ed., Stuttgart, 1907); Schütt, *Untersuchungen Zur Geschichte der alten Illyrien* (Breslau, 1910).

ILMEN, ĭl'mĕn; *Russ. pron.* ē'ly'-mă-ny'. A lake in the Russian Government of Novgorod, situated about 60 feet above the level of the Gulf of Finland (Map: Russia, D 3). Area, over 350 square miles. The banks are mostly low and in some parts marshy. Ilmen receives many streams, and its waters, which discharge into Lake Ladoga through the Volkhov, are almost always muddy. The fisheries of the lake are extensive and exploited largely by artels (see Artel). There is steam navigation during the summer between Novgorod and Staraia Russa.

IL'MENITE (so called from the *Ilmen* mountains in the southern Urals), or Menaccanite. A mineral with the composition $(FeTi)_2O_4$, crystallizing in the hexagonal system, possessing a semimetallic lustre and a color ranging from brown to iron black. It occurs in scattered grains and crystals as an abundant constituent of certain igneous rocks, including basalt, diabase, and gabbro, and of magnetic iron ore. The proportion of titanium, which varies within wide limits, gives rise to a number of varieties of ilmenite, such as *kibdelophane, crichtonite, hystalite, mohsite,* etc. When mixed with magnetite (titaniferous iron ore) in any considerable amount, it has been considered detrimental to the latter for smelting purposes. Ilmenite is found at various localities in Russia, Norway, France, in the Adirondacks of New York, in Connecticut, Massachusetts, and in Canada.

ILME'NIUM (Neo-Lat., from the *Ilmen* mountains in the southern Urals). A name given to a mixture of columbium and tantalum, which was at one time mistaken for an element.

IL NOTAJO DA LENTINO. See Lentino, Jacopo da.

IL OBEID. See El Obeid.

ILOCANO, ĭl-ō-kä'nō. The people known as Ilocano make up one of the most important of the civilized tribes of the Philippines. They form practically all the Christianized population of Ilocos Norte, Ilocos Sur, and Union provinces, and have migrated in large numbers to other parts of Luzon. They seem to be of the same stock as the pagan tribe known as Tinguian, whom they resemble in personal appearance and language. After the arrival of the Spaniards the Ilocano were converted to Christianity and soon adopted many of the customs and utensils of the newcomers, but they still retain many traces of the old culture. The census of 1903 puts the total number at 803,942. See Philippine Islands.

ILOCOS NORTE, ē-lō'kŏs nōr'tā. A Philippine province occupying the northwest corner of the island of Luzon (Map: Philippine Islands, C 1). It is bounded on the west and north by the China Sea, on the east by the provinces of Cagayán and Abra, and on the south by the latter and Ilocos Sur. Area, 1265 square miles. It is traversed from north to south by a chain of mountains rising to a height of 4828 feet and covered with forests of pine and hardwoods. As the province is exposed in winter to the north winds, its climate is more tempered and more agreeable to foreigners than that of other parts of the island. The province is well watered, the principal river being the Laoag, and the valleys are very fertile, producing, besides the grains and fruits of the temperate zone, a fine quality of rice, good cotton and tobacco, chocolate, and sugar. Fruits include the pineapple, orange, and lemon. Iron ore is abundant. Cattle and horses are a great source of wealth, and the *carabao*, a species of ox or buffalo peculiar to the Philippines, is very numerous. The fisheries on the coast are also lucrative, a textile known as "blankets of Ilocos" is produced, and, on the whole, the province is one of the best developed on the island. A highroad leads through the province from Manila, and a railroad is projected from that city to Laoag (q.v.). Ilocos Norte was united with Ilocos Sur previous to 1818, when they were separated on account of their growing importance and population. Capital, Laoag. Pop., 1903, 178,995, chiefly Ilocano and Igorot. The census of 1903 classifies this total as 176,785 civilized and 2210 "wild."

ILOCOS SUR, sōōr. A Philippine province, situated in the northwestern part of the island of Luzon (Map: Philippine Islands, C 2). It is bounded on the north by Ilocos Norte, on the east by Abra and Lepanto, on the south by La Unión, and on the west by the China Sea. It is a narrow strip of rather low and flat coast land, with an area of 491 square miles. It is partly bounded by the river Amburayan and crossed by the Agra and a number of smaller streams; in the east are the mountains, culminating in Nagupu (4154 feet); the soil is very fertile, producing corn, peanuts, chocolate, indigo, sugar, and coconuts, all of which are exported. In the mountains are copper and timber, while there are also manufactures of furniture and carriages, baskets and hats; and the weaving of cotton textiles by the women in their homes is practiced all over the province. The towns are connected by good roads, though most of the rivers have to be forded, as there are few bridges. The highroad and projected railroad from Manila to Laoag passes through the province. Pop., 1903, 187,411, of which 173,800 are classed as civilized and 13,611 as "wild." Capital, Vigan (q.v.). See Ilocos Norte.

ILOILO, ē'lō-ē'lō. A province comprising the

southern half of the island of Panay in the Philippines and 56 outlying islands, one of which, Guimaras, has an area of 228 square miles and a population (1903) of 21,306 (Map: Philippine Islands, D 5). The area of the province is 1776 square miles. Pop., 1903, 410,315, of which 6383 are classed as "wild." The Panay part of the province has a coast line of 140 miles, with numerous safe harbors and anchoring grounds, among which those of Iloilo and Concepción are the best. The province is separated from those of Capiz and Antique on the north by a chain of rugged mountains. It is covered with forests of pine and dyewood, from which numerous rivers and torrents flow to the sea, often bringing destructive floods. The climate, tempered by the constant monsoons, is much more moderate and far more healthful than that of Manila. The level lands, which constitute the greater part of the area of the province, produce sugar, tobacco, corn, rice, coffee, cotton, and hemp. The chief manufacturing industry is that of textiles, such as homespun fabrics of sinamay, piña, jusi; also the refining of sugar. Commercial communication between the cities is easy and regular, the roads being generally in good condition. The inhabitants consist almost entirely of Visayas, with some European and Chinese *Mestizos*, or half breeds, in the cities, and a few Negritos in the mountains. The Visayas were first converted to Christianity by the Augustine fathers in the middle of the sixteenth century. The province suffered for a long time from the piratical Moros, and forts were built here by the Spaniards as early as 1581. In 1616 an unsuccessful attempt was made by the Dutch to capture Panay. At the end of the Spanish-American War in 1898 the natives were in complete possession of the island and showed determined resistance to American authority. The capital, Iloilo (q.v.), is the second port of the Philippines.

ILOILO. The capital of the Province of Iloilo (q.v.), situated on the low sandy shore of the southeastern side of the island of Panay, on a strait separating Guimaras Island from the mainland (Map: Philippine Islands, D 5). It has a seminary, a good government house, a church, an excellent harbor, is fortified and, next to Manila, is the chief commercial centre of the Philippines. It makes jusi, lime, vinegar, piña, machinery, hats, and vehicles. Its chief exports are sugar, tobacco, rice, coffee, and dyewoods, and it supports several industrial establishments, among which are a machine shop and a foundry. Pop., 1903, 19,054. In February, 1899, it was partly burned by the Filipinos when bombarded by United States troops.

ILONGOS, ē-lôŋ′gōs. A town of the Philippine Islands. See HILONGOS.

ILONGOT, ĭ-lôn′gōt, or **IBALAO,** ē′bä-lou′. The Ilongot live on the headwaters of the Cagayan River in northern Luzon. They are primitive Malays, yet many of the tribe show a deep strain of Negrito blood. Their costume is simple and much abbreviated. The dress of the man consists of a bark clout and a girdle, while that of the woman is a short, one-piece bark skirt. Society is on a very simple plane. When a good hunter is mated to an industrious wife there is a commodious dwelling and an ample supply of food. A man who has taken many heads or who is reputed to possess magical power may be held in high esteem. Even in these instances a man is not lifted above his fellows in daily life or in matters of government. Government is, in fact, according to custom. True village life is wholly absent, the dwellings being scattered along the mountain sides close to the clearings, in which the people raise rice, corn, millet, and sweet potatoes. To these products are added the game and fish which they are able to procure with their primitive traps and weapons. The tribe is to-day the wildest and least known in northern Luzon. The census of 1903 puts the total number of persons in the tribe at 3016. See PHILIPPINE ISLANDS.

ILOPANGO, ē′lō-päŋ′gō. A lake in the Central American Republic of Salvador, situated in a fertile and beautiful plain surrounded by high hills, a short distance east of the capital (Map: Central America, C 4). Its water is saline and sulphurous and unfit to drink, though it abounds in fish. It is 10 miles long by 6 broad and contains a number of islets, of which one was raised to about 400 feet by an eruption in 1879–80 and remains in the form of a volcanic cone.

ILORIN, ē-lō′rēn, or **ALORI,** ä-lō′rē. The capital of a British province of northern Nigeria, West Africa, on the Asa, a tributary of the Niger, 170 miles northeast of Lagos (Map: Africa, E 4). Like Abeokuta (q.v.), it was a municipal confederation of the Kingdom of Yoruba, established for mutual protection. The town is surrounded by a mud wall, 12 miles in circumference, and has several mosques, Mohammedans predominating among the heterogeneous population of natives. It has an extensive caravan trade with Central Africa and numerous local industries, including woven fabrics, arms, wood carving, pottery, and leather. Pop. (est.), 1911, 60,000 to 80,000.

ILOW, ē′lō, CHRISTIAN, BARON (c.1585–1634). An Imperial general in the Thirty Years' War, born at Neumark. He entered the ranks at the beginning of the war and rapidly rose to the command of a regiment. After fighting bravely under Tilly at Stadtlohn (1623), he was transferred to Wallenstein's army. He easily won the confidence of his general and took part in the intrigues which resulted in the break between Wallenstein and the Emperor. He was assassinated at the banquet of Eger.

ILSE, ĭl′ze, PRINCESS. In German legend, the daughter of the giant of the Ilsenstein, who threw herself into the flood when parted from her lover and was changed into a water spirit.

I′LUS (Lat., from Gk. Ἴλος). In Greek mythology, the reputed founder of Troy. He was born in Dardania on Mount Ida and was the son of Tros, great-grandson of Dardanus, and father of Laomedon. In an athletic contest in Phrygia he received, as the prize of victory, 50 youths and 50 maidens. In addition, at the command of the oracle, a spotted cow was given to him, and he was directed to follow her until she should lie down and on that spot to establish a city. This spot was the hill of the Phrygian Ate, where he founded the town which from his name was called Ilios, or Ilion, and from the name of his father, Troy. The Palladium (q.v.) came to him there as a sign from Zeus.

IL′VA. See ELBA.

ILYA MUROMETS, ē-lyä′ mōō′rō-mĕts (Russ., Elijah of Murom). The favorite hero of the Russian *bylina* (q.v.), a representative of the peasant class. The strongest of the "younger paladins," he spent his life in guarding his country against her enemies and in protecting wid-

ows and orphans. In extreme cases only did he shed blood. Usually the foe was frightened away by the exhibition of Ilya's strength in turning some mighty oak into splinters or some similar display of prowess. Consult Isabel Hapgood, *Epic Songs of Russia* (New York, 1885).

IMAGE. A term used in psychology, (1) for an elementary mental process having the same general attributes as sensation, and (2) for a primary complex of such imaginal processes. In the former sense images are the characteristic elements of ideas, as sensations are the characteristic elements of perception.

It is a moot question whether the elementary image is psychologically distinguishable from sensation, and even whether, as centrally initiated, it is psychophysically distinguishable from sensation as peripherally initiated; for peripheral stimulation seems to play a part in the arousal of many processes that are commonly termed images. Starting out from sensation, e.g., we have first the afterimage. (See AFTER-IMAGES.) Next comes the memory-afterimage, a sort of instantaneous photograph of the original sensation, resembling the positive afterimage in quality, but differing from it in dependence upon intention, brief stimulation, and precedent clearness of sensation. Then follow the images of synæsthesia (q.v.) and of hallucination (q.v.), both of them definitely sensory in character. Certain visually minded persons have, further, "mental images" of such substantial nature that they can excite afterimages; thus, an imagined blue may be followed by an afterimage of yellow. In minds of this constitution, again, habitual memories are likely to be carried by stable and vivid images of a "typical" or "generic" sort. So far there is no observable difference between image and sensation. We are on more doubtful ground when we pass to the "tied" images by which, e.g., we fill out the missing lines in a drawing, or interpret a few blotches of color as a human figure in a certain position; and when we come to the memory-image proper. It is often said that the quality of the memory-image is relatively pale, misty, washed out, and that its duration and intensity are less than those of the corresponding sensation. But these are differences only of degree; sensations themselves may be pale, weak, and short-lived. There may perhaps be a textural difference between the memory-image proper and the sensation; but this question, as was said above, is still unsettled.

If we consider as images those processes of a sensory kind which appear without any obvious intervention of an external stimulus, we may say that visual and auditory images are common. Taste and smell images, though of undoubted occurrence, play but a small part in human consciousness. Kinæsthetic images are difficult to discriminate from weak kinæsthetic sensations due to actual movement or muscular contraction. Other organic images are rare.

Consult: Galton, *Inquiries into Human Faculty* (London, 1883); Kuelpe, *Outlines of Psychology* (New York, 1901); *Philosophische Studien*, xix (Leipzig, 1902); Ebbinghaus, *Grundzüge der Psychologie* (ib., 1905); Wundt, *Physiologische Psychologie* (ib., 1908–11); Peillaube, *Les images* (Paris, 1910); Titchener, *Text-Book of Psychology* (New York, 1910).

IMAGE WORSHIP. The use, in public or private religious services, of graven or painted representations of sacred persons or things, and especially the exhibition of honor, reverence, or worship to such representations. The most primitive religions needed no images, for the gods were the visible heavenly bodies or objects of nature. When the gods became more abstract, the sense of their reality was helped by the formation of images. (See IDOL.) The early Hebrews used images. David kept teraphim in his house, and the two shrines at Bethel and Dan had images of Jehovah in the form of a bull (1 Kings xii. 26 ff.). The work of the prophets resulted in severe condemnation and, in the exile and later, in sarcasm and scorn of image worship (Isa. xl. 10–17, Bel and the Dragon). Before the beginning of the Christian era image worship had completely disappeared from Hebrew usage. In Christianity images, not for worship but as aids to devotion, came into use before 200 A.D. Tertullian at the beginning of the third century mentions the image of the Good Shepherd as engraved upon chalices quite as if this were and had been for a long time a common practice. Crucifixes seem to have been introduced very early; this is proved by a graffito, often supposed to be a pagan caricature of Christianity, probably of the end of the second century, scratched upon the wall of a room in the palace of the Cæsars. (See GRAFFITI.) It is a rude representation of a man standing in the attitude of prayer, with outstretched hands, before a grotesque caricature of the crucifixion, bearing the legend "Alexamenus worships God." The tombs of the Christians in the Roman catacombs, many of which are of a date anterior to Constantine, frequently have graven representations of the dove, of the cross, of the symbolical fish, of the ship, of Adam and Eve, of Moses striking the rock, of Jonah, of Daniel in the lions' den, of the Apostles Peter and Paul, and, above all, of the Good Shepherd. The chapels of the catacombs are profusely decorated with sacred representations, the age of which it is not easy to determine with accuracy, though some of them seem to come at least from the second century. After the condemnation of the Nestorian heresy in 430, statues and pictures of Christ, of the Virgin Mary, and the saints were very commonly used in public and private religious services and in churches and religious edifices. As the mass of the people became more ignorant in the sixth and seventh centuries, certain abuses with regard to the veneration of images in religious worship crept in. These led to a reaction against image worship in the East, which culminated in the movement known as iconoclasm (q.v.), because it commanded the breaking of images. The formal beginning of iconoclasm was an edict by the Emperor Leo III (717–741), known in history as the Isaurian. The exact terms, as well as the exact date, of the edict are unknown, though Hefele places it in 726. It commanded the destruction of all pious images in public places. The removal of a famous image of Christ over the palace door caused a popular uprising in Constantinople. In Greece and Lower Italy the opposition to the edict was pronounced. The Patriarch of Constantinople refused to allow it to be put into force, and Pope Gregory II (715–731) condemned it. Leo persisted, however, apparently influenced by the Caliph Yezid II, who set the example of destroying images in accordance with the Mohammedan religion. St. John of Damascus (died about 760), who lived under the Caliph, wrote three discourses

in defense of the use of images for religious purposes. Under Leo's successor, Constantine Copronymus, a council confirmed the Imperial edict. Leo IV also upheld iconoclasm. Under his widow, Irene, however, the second Council of Nicæa (787) reaffirmed the orthodox views as to image worship; but succeeding emperors, except Michael the Stammerer (820–829), who tried to effect a compromise, were iconoclasts. On Feb. 19, 842, Theodora, widow of Theophilus (829–842), brought back the images in triumph to the cathedral of Constantinople. This date is kept as the feast of orthodoxy. By an error the acts of the Nicene Council were sent in a garbled translation to Charlemagne. He objected to their publication in his realm in the *Libri Carolini*, now generally considered authentic, sent to Pope Hadrian I (772–795) about 793. The Nicene Council solemnly declared that the worship to be paid to images is not true adoration, *latreia*, which is to be given to God alone, but *douleia*, or veneration. While the Greek verb προσκυνεῖν, 'to worship,' is used, it is explained that it is only in the sense of honoring because they represent God or His saints, and because the honor which is given to images is referred to their prototypes. When the error of translation was explained, the misunderstanding ceased to exist. The Council of Trent reaffirmed the declarations and distinctions of the second Nicene Council as to image worship, adding that there is "no virtue in images themselves on account of which they are to be worshiped; that no petition can be addressed to them; and that no trust is to be placed in them." The council advocates the true use of images, however, contending that they are of great advantage especially for the rude and unlearned, for whom they serve as memorials of the sufferings and of the mercy of Christ, as instructive records of the virtues of the saints and exhortations to the imitation of their example, and as incentives to the love of God and to the practice of piety. In certain parts of the world there are in Roman Catholic churches images for which there is a special veneration. Sometimes the traditions, if not the images, can be traced back to pagan times. The belief of the common people in such an image is the foundation of Selma Lagerlöf's story, *The Antichrist*, but the Church has never officially taught that such images have power in themselves. In the Eastern churches, especially the Russian, great reverence is paid to printed pictures of the saints, or representations in relief, called icons. Every house has one or more; and in the churches the iconostasis, or screen which separates the sanctuary from the body of the church, is covered with them. Statues, except of the angels, are not used.

The Reformers rejected the use of images as an unscriptural novelty and stigmatized the Catholic practice as superstitious or even idolatrous. The Zwinglian and subsequently the Calvinistic churches absolutely and entirely repudiated all use of images for the purpose of worship. Luther, on the contrary, while he condemned the Roman worship of images, regarded the simple use of them, even in the church for the purpose of instruction and as incentive to faith and devotion, as one of those indifferent things which may be permitted, although not of necessary institution. In the Lutheran churches of Germany and the northern kingdoms, pictures, crucifixes, and religious emblems are still freely retained. In all wholly Protestant communions images are entirely unknown, although their use has been revived in the High Church portion of the Anglican communion of late years. Consult: Hefele, *Conciliengeschichte* (7 vols., Freiburg, 1854–71); Lüdtke, *Die Bilderverehrung und bildlichen Darstellungen in den ersten christlichen Jahrhunderten* (ib., 1874); Kraus, *Roma sotterranea* (ib., 1879); E. B. Tylor, *Primitive Culture* (4th ed., 2 vols., London, 1903); L. R. Farnell, *Evolution of Religion* (ib., 1905).

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ā as in ale, fate.
a̓ " " senate, chaotic.
â " " glare, care, and as *e* in there.
ă " " am, at.
ä " " arm, father.
à " " ant, and final *a* in America, armada, etc.
a " " final, regal, pleasant.
ą " " all, fall.
ē " " eve.
e̓ " " elate, evade.
ĕ " " end, pet.
ẽ " " fern, her, and as *i* in sir, etc.
e " " agency, judgment.
ī " " ice, quiet.
i̓ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
o̓ " " obey, sobriety.
ô " " orb, nor.
ŏ " " odd, forest, not.
o " " atom, carol.
oi " " oil, boil.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse.
ū " " use, mule.
u̓ " " unite.
ŭ " " cut, but.
u̯ " " full, put, or as *oo* in foot, book.
û " " urn, burn.
y " " yet, yield.
B " " Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese.
D " " Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g " " go, get.
G " " German Landtag = *ch* in Ger. ach, etc.
H " *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw " *wh* in which.
K " *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̲ " in sinker, longer.
ng " " sing, long.
N " " French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz''m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

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THE NEW INTERNATIONAL ENCYCLOPÆDIA

IMAGINARY POINTS AND LINES. In analytic geometry a point is said to be imaginary if one or more of its coördinates are imaginary; e.g., the points of intersection of the straight line $x = 6$ and the circle $x^2 + y^2 = 4$, found by solving the two equations, are $x = 6$, $y = 4\ \sqrt{-2}$, and $x = 6$, $y = -4\ \sqrt{-2}$, the two values of y (i.e., the ordinates of the points) being imaginary, the points of intersection of the given line and circle are said to be imaginary. Similarly, the conjugate axis of the hyperbola (q.v.) cuts the hyperbola in two imaginary points. A line whose equation contains imaginary coefficients is called an imaginary line; e.g., the asymptotes of an ellipse or circle are imaginary lines. Their equations may be obtained from the equations of the curves thus: Let $x^2 + y^2 = 0$, then $(x + yi)(x - yi) = 0$, and $x + yi = 0$, $x - yi = 0$ are the imaginary asymptotes to the circle. Similarly,

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 0,$$

then

$$\left(\frac{x}{a} + \frac{y}{b}i\right)\left(\frac{x}{a} - \frac{y}{b}i\right) = 0;$$

and

$$\frac{x}{a} + \frac{y}{b}i = 0, \quad \frac{x}{a} - \frac{y}{b}i = 0,$$

are the imaginary asymptotes to the ellipse. All of these imaginary lines have the real point $x = 0$, $y = 0$. See CONTINUITY.

IMAGINARY QUANTITY. See COMPLEX NUMBER.

IMAGINATION (Lat. *imaginatio*, from *imaginari*, to imagine, from *imago*, image). The conscious representation of objects, relations, attributes, or processes which have not been personally experienced; or the capacity for such representation. Thus defined, imagination is the counterpart of memory, whose function is the representation of previous experience.

The fundamental mental process in both memory and imagination is the idea (q.v.), a complex of images. The power of imagination, therefore, like that of memory, is dependent, first of all, upon the individual's equipment of imagery. An individual born blind never has visual images; one born deaf never hears tunes "ringing in his head." The capacity for various sorts of images, moreover, varies greatly from one individual to another; one person may tend to ideate in visual, another in auditory and kinæsthetic, a third in merely kinæsthetic, images. See IMAGE; MEMORY.

The distinction of idea of memory and idea of imagination has usually been the popular or logical distinction, based upon meaning or reference. The idea of memory means or refers to some part of one's past experience (one has a memory-idea of one's home or of a piece of familiar music); the idea of imagination has no personal reference (one imagines a centaur, a golden mountain, a novel phrase of music). This reference, if conscious at all, is in the case of memory an associative context, a feeling of familiarity or "at-homeness," or a conscious attitude of placing or dating. In the case of imagination, since the idea is novel, associated ideas are lacking; and the reference is carried by a feeling of unfamiliarity or strangeness, or by a conscious attitude of search or inquiry. (See MEANING; THOUGHT.) The idea of imagination itself seems to be distinguished from the idea of memory as being relatively complete, and as forming simultaneously, whereas the memory-idea is abbreviated and sketchy, and its phases constitute a development in time. This difference may be referred to differences in the interplay of determining and associative tendencies. In remembering, associative tendencies play the leading part; and the resulting formation, provided that it is in any way fitted to mean the experience to be recalled, may be partial or even symbolical. The function of imagination, on the other hand, is to represent a new experience. The idea of imagination must not only mean "something new"; it must be something new, a production rather than a reproduction. This requirement limits the part which association may play, and at the same time is the condition of a strong determining tendency. So the course of ideas in imagination, directed by a stronger and more narrowly defined determination, will be less discursive, more integrative, than that in memory.

The total consciousness in which the idea of imagination is set may show the pattern either of primary or of secondary attention (see ATTENTION), and we may speak accordingly of passive or reproductive and of active or creative imagination. The first is exemplified in the reading of an interesting novel; the second in mechanical or artistic invention or production.

In both cases consciousness is restricted to processes which are directly determined by the context or by the problem to be solved. If, in creative imagination, attention is limited more closely to ideas sharply selected for expressing a single conception or a single mood, this difference is a matter of degree and not of kind.

Consult: Bain, *The Senses and the Intellect* (London, 1888); Sully, *Outlines of Psychology* (New York, 1891); Hoefler, *Psychologie* (Vienna, 1897); Ambrosi, *Psychologia dell' immaginazione* (Rome, 1898); William James, *Principles of Psychology* (2 vols., New York, 1899); Ribot, *Essay on the Creative Imagination* (Chicago, 1906); Lucka, *Die Phantasie* (Vienna, 1908); Titchener, *Text-Book of Psychology* (New York, 1910).

IMA'GO. The adult, sexually mature form of an insect which passes through metamorphoses. See METAMORPHOSIS.

IMAM, ē-mäm' (Ar. *'imām,* leader, from *'amma,* to lead, set an example). The appellation given in general to teachers among the Mohammedans, as leaders whose example is to be followed. It is commonly employed to designate any of the persons belonging to the Mohammedan ulema (q.v.), or "learned" body. They are distinguished from the laity by a turban somewhat higher than usual and are held in great reverence by the people. Besides this general use, there are also certain specific applications of the term. Among the Shiites (i.e., the followers of Ali) the term "imam" is applied to the 12 legitimate successors of Ali. Among the orthodox Mohammedans the imam is properly the caliph, or leader of the entire body of Mohammedans; but the name is also extended to any authority whose views on theology and law are followed. In the course of time every Mohammedan community came to have its imam, whose chief function it was to lead the congregation in prayer. He takes his stand in front of the group of worshipers, who take up a position behind him arranged in fixed rows and imitate the genuflections and attitudes assumed by the leader in the course of the prescribed prayers.

IMAMITES, ē-mäm'īts. A Mohammedan sect whose members recognize the 12 imams, descendants of Mohammed's son-in-law Ali, whom they consider the first real imam, or caliph. They are commonly known as Shiites (q.v.).

IMAZIGHEN, ē'mä'zē'gĕn'. The designation of all the Berber tribes of the Atlas Mountains, in Algeria and Morocco, comprising the Kabyles, Shulluhs, and Haratin. The Kabyles, who call themselves Imazighen, are farthest north and more mixed with Semites and Europeans; the Shulluhs (Shluhs) are to be found on the northward-sloping valleys of the Atlas Mountains, while the Haratin Berbers are on the southern slopes and mixed with negroes. (See KABYLES; SHULLUHS; HARATIN.) They are Hamites fundamentally in blood, but have long been accultured with Arab speech and religion. Their mountain retreats have enabled the Imazighen Berbers to preserve their ancient patriarchal mode of life, so that many hundreds of clans and families keep up their small organizations at the same time that they are united into larger nations. Consult Bertholon and Chantre, *Recherches anthropologiques dans la Berbérie Orientale* (Lyons, 1913).

IMBAT'TLED. See EMBATTLED.

IM'BECILE. See MENTAL DEFECTIVES.

IM'BECIL/ITY (from Lat. *imbecillitas,* weakness, from *imbecillus,* weak). 1. Mental weakness or defect. Imbecility and idiocy are comparative terms. They are both states due to similar processes, consisting of imperfect development of the brain, and due to congenital influences or acquired injury or disease. (See IDIOCY.) Thus, it is almost impossible to determine the dividing line that separates an idiot from an imbecile, and such differentiation may entail much study and careful following of the mental development. In general understanding, an idiot is unable to attend to the simple primary affairs of his organization. An imbecile is able to attend to these. At the other end of the scale the imbecile shades into the normal average human mind by imperceptible gradations, and it may be just as difficult to separate the imbecile from feeble-minded, dull, and stupid individuals as it is to separate the idiots from imbeciles. There are large numbers of weak-minded, useless persons in every community who differ from the more robust intellects solely in degree. These are largely imbeciles or feeble-minded. But the more marked and recognizable idiocy is characterized by many of the following signs: the vacant expression, dull senses, small head, deformed body, vacillating and restless gait; pendent, thrown back, or agitated head; escaping saliva, limited and infantile language. The ideas may be few and consist of mere sensuous impressions; the temper, timid, facile, and vain; and the passions are little susceptible of control. The idiot is profoundly defective and largely unteachable. The higher grades may be slightly trained in self-help. The imbecile responds to training and generally may be materially improved, but cannot take an independent place in the world. With close moral support he may ply a simple trade and earn his living.

2. As a generic legal term, a weakness of mind falling short of idiocy (q.v.) on the one hand and full mental capacity to contract or to distinguish between right and wrong on the other. The victim of imbecility, using the word in this sense, is not absolutely incapable of binding himself by contract or of committing crime. If his weakness is taken advantage of by another, any contract or conveyance so secured may be set aside; but the mere fact that a man is of weak understanding, or that his intellectual capacity is below the average of mankind, if no fraud or no undue advantage be taken, is not of itself an adequate ground to set aside a transaction. It should be added that a lower degree of intelligence is required for a valid will than for a business contract or conveyance. In various jurisdictions imbeciles are more or less protected against the fraud of others or their own acts of indiscretion by placing them more or less under the control of others, as in Scotland by interdiction or by the appointment of a committee or guardian. Consult Barr, *Mental Defectives* (Philadelphia, 1904), and Goddard, *Feeble-Mindedness: Its Causes and Consequences* (New York, 1914). See INTERDICTION; COMMITTEE; GUARDIAN; also see IDIOCY; INSANITY; LUNACY; and the authorities there referred to.

IMBER, ĭm'bĕr, NAPHTALI HERZ (1854–1909). A Hebrew poet and Cabbalist, born of poor parentage at Zloczow in Galicia. He received a thorough training in the Talmud and after the age of 14 led the life of a wandering

scholar, visiting in turn Constantinople, Egypt, and Palestine. There he studied the Oriental languages and especially Hebrew. From Palestine he went to England, where he worked for some time in collaboration with Israel Zangwill, whom he taught the Yiddish language. In 1892 he came to America and made his home at different times in New York City, Boston, Chicago, San Francisco, and Los Angeles. In addition to many volumes of poetry and Cabbalistic lore, he wrote extensively for the Hebrew press. In his mastery of the ancient language of the Bible he takes rank with the leading scholars of Europe and America. His poetical works in form and thought are modeled to a great extent upon the songs of Judah ha Levi (q.v.), whose fervent love for and hope in Zion Imber more than echoes. Among his works are: *Austria*, a poem; *The Mystery of the Golden Calf; The Keynote to Mystic Science; The Treasures of Ancient Jerusalem; The Letters of Rabbi Akibah; The Education of the Talmud*, printed by the United States government; *Music of the Psalms*. His "Hope of Zion" has become the hymn of the Zionist party the world over.

IMBERT DE SAINT-AMAND, ăN'bâr' de săN'tà'mäN', Arthur Léon, Baron (1834–1900). A French author, born in Paris. He was privately educated, studied law, and after being admitted to practice entered the government service in the Department of Foreign Affairs. Here he rose through the several ranks to the grade of Minister Plenipotentiary of the first class in 1882 and was assigned to special service in the central offices of the department in Paris. He is best known as the author of an interesting and popular series of biographical and social studies of the women of the French courts. The first of these, entitled *Les femmes de Versailles* (5 vols., 1875–79), covered the period from Louis XIV to the close of the *ancien régime;* the second, *Les femmes des Tuileries* (37 vols., 1880–99), began with the last days of Marie Antoinette and concluded with the women of the Second Empire. The series has been translated into English under the title of *Women of the French Court.* Among his other published works, some of which have also been translated into English, are: *Portraits de femmes françaises du XVIII et du XIX siècle* (1869); *Les femmes de la cour des derniers Valois* (1872); *Madame de Girardin* (1874); *Portraits de grandes dames* (1875); *La cour de Louis XVIII* (1891); *La cour de Charles X* (1891).

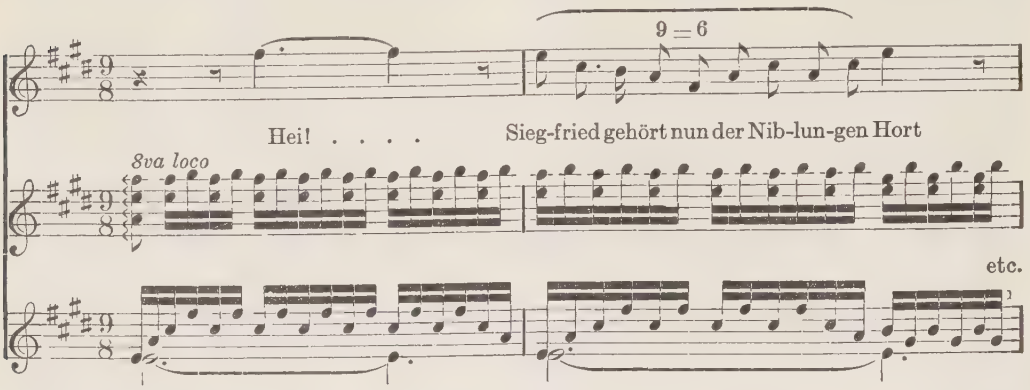
IMBIBITION, ĭm'bĭ-bĭsh'ŭn (from Lat. *imbibere,* to drink in, from *in,* in + *bibere,* for **pibere,* to drink, Skt. *pā,* to drink, OIr. *ibim,* I drink). The physical process of swelling of solids by the absorption of liquid. It is exhibited most freely by organized bodies, i.e., those formed by living beings, which have therefore a characteristic structure, but is not confined to them. The swelling depends on a separation of the structural units of the body, which are believed to be not its molecules but rather molecular complexes. Imbibition, therefore, differs from solution in that the separation of the particles is not so extensive; and when the water is removed by evaporation or otherwise they return to their original relations, so that the body regains its previous form and structure. After solution, on the contrary, the separated molecules may rearrange themselves completely. In a normal condition all parts of plants hold large quantities of water imbibed in their substance. Even in the walls of wood cells, the least watery material, there is usually 50 per cent of water, while in the protoplasm there may be as much as 95 per cent. Indeed, the plant may be considered as a mass of water held between the structural particles of the cells composing it and exceeding in volume the material by which it is so held. This condition alone makes it possible for plants to obtain materials from the water and air about them. See Absorption, in Plants.

The force of imbibition results from the surface of the ultramicroscopical particles, making up the swelling body, adsorbing water or other liquids imbibed. When a dry starch grain imbibes water, heat is developed (on account of the compression of the water) to an amount which indicates (according to Rodewald) a pressure of over 2500 atmospheres. The force exerted by a confined swelling body is at first enormous, but becomes rapidly weaker as the particles are separated farther and farther. Correspondingly water is held loosely when abundant, but more and more tenaciously when only a little is imbibed. Thus, when a bit of laminaria is completely swollen, water can be removed from it by slight pressure; when it holds 170 per cent of water, it requires a pressure of 16 atmospheres to extract water; when only 93 per cent is present, a pressure of 200 atmospheres is needed. Applications of the force of swelling are made in splitting stone by wooden wedges driven in and then wetted, in shortening ropes by wetting, in the use of laminaria for surgical distention, etc. The phenomena of imbibition afford the chief basis for theories concerning the molecular structure of organized bodies. See Colloids; Adsorption.

IMBRIANI, ēm'brē-ä'nē, Vittorio (1840–86). An Italian poet and critic, born in Naples. He pursued studies in the universities of Naples, Zurich, and Berlin, and took part in the campaigns of 1859 and 1866. In 1884 he was appointed to the chair of æsthetics at the university of his native city, but was then too ill to assume the duties of this post. His political life was a troubled one by reason of his excessively passionate nature, which excited bitter antagonism. He is best known for his collections of popular tales and verse, such as *Canti popolari delle provincie meridionali* (1871–72), *Dodici canti pomiglianesi* (1876), *La novellaja fiorentina* (1877), etc. A number of his poems are to be found in a collection entitled *Esercizj di prosodia* (1874). Among his critical works are some monographs on Dante, and the *Fame usurpate* (1877), in which he seeks to demonstrate that Goethe's *Faust* is a production devoid of all merit.

IM'BRICATED SNOUT BEETLE. A very injurious weevil (*Epicærus imbricatus*), which damages many different kinds of garden vegetables and fruits, such as onions, radishes, cabbages, beans, watermelons, cucumbers, corn, beets, and strawberries, by sucking the juices of the leaves, stems, roots, or fruit. It also punctures the leaves and twigs of the apple and pear. The life history is not thoroughly known, although the eggs and young larvæ found on the leaves of the strawberry have been described by Chittenden. The best remedy consists in spraying with a Paris green or some other standard mixture.

IMBROGLIO, ēm-brōl'yō (It., confusion). A musical term denoting the synchronous execu-

tion of conflicting rhythms in different groups of instruments or voices; as the following from Wagner's *Siegfried* (Act ii, Scene 2):

The passage must be executed so that the first nine eighth notes of the voice coincide exactly with the first six eighth notes of the orchestra. Voice and instruments come together on the first and third beats of the bar, but not on the second. Another famous example is found in the scene of the Last Supper in *Parsifal* (Act i). Against arpeggios of the strings in 4/4 time the wood wind executes a rhythmic figure in 6/4 time in such a manner that the two groups of instruments come together on the first and third beats, but not on the second and fourth. The most extended and complicated employment of imbroglio occurs in the finale of the second act of *Die Meistersinger*.

IMBROS, ĭm′brŏs. A Turkish island in the Ægean Sea, situated about 13 miles northeast of Lemnos (Map: Greece, E 4). Area, about 87 square miles. It is of volcanic origin, rocky, and mostly barren, but a small part of its area is very fertile. It produces wheat, barley, oats, olives, and fruit. Pop., about 8000, mostly Greeks, engaged in fishing. The chief town is Kastron (Castro), the seat of a Greek bishop.

IMERITIA, ĕ′mĕ-rĭsh′ĭ-ȧ. Formerly an independent kingdom in Georgia (q.v.), now constituting a part of the Government of Kutais (q.v.) in Russian Transcaucasia. Its history as an independent country begins towards the end of the fifteenth century. In 1621 it first asked Russia for aid and came under her suzerainty in 1650. About 1750 it was occupied by the Turks, who were expelled by the Russians in 1769. In 1810 it was annexed to Russia. The Imers, or Imeritians, who number less than half a million, are one of the tribes belonging to the southern, or Georgian, group of peoples of the Caucasus. They are considered by Pantiukhoff to be the purest representatives of the primitive Georgian type. See GEORGIANS.

IMHOFF, ĭm′hŏf, AMALIE VON. See HELVIG.

IMHOFFER, ĭm′hŏf-ẽr, GUSTAV MELCHIOR (1593–1651). An Austrian Jesuit and South American explorer. He was born near Graz, Styria, and went to Peru as a missionary in 1624. Twelve years afterward he crossed the Andes to the source of the Amazon and was the first European to leave upon record his exploration of that stream to its mouth. His account was published in two volumes in Madrid (1640) and in London (1689), the latter edition called *A Relation of a Journey along the River Amazon*. Father Imhoffer was head of the Jesuit College at Bahía and the author of several treatises upon the language, history, and customs of his adopted country that were published by the Society of Jesus 20 years after his death.

IMHOOF-BLUMER, ĭm′hōf blo͞o′mẽr, FRIEDRICH (1838–). A German numismatist, known as an authority on Greek coins. Born at Winterthur, he became interested in numismatics as a boy, gave up the business career planned for him, received a classical education, and amassed a valuable collection of more than 20,000 ancient Greek coins, bought in 1900 by the Royal Numismatic Cabinet in Berlin. The great work of the Prussian Academy of Science, *Die antiken Münzen Nordgriechenlands* (1899 et seq.), was undertaken at his instance; and in 1901 he gave to the Academy the sum of 100,000 francs for the promotion of the science of numismatics. He wrote: *Zur Münzkunde und Paläographie Böotiens* (1871); *Die Münzen Akarnaniens* (1878); *Porträtköpfe auf römischen Münzen* (2d ed., 1893); *Porträtköpfe auf antiken Münzen hellenischer und hellenisierter Völker* (1885); *Zur Münzkunde Grossgriechenlands* (1886); *Tier- und Pflanzenbilder auf Münzen und Gemmen* (1889), with Keller; *Lydische Stadtmünzen* (1897); *Kleinasiatische Münzen* (1901–13 et seq.), as well as the great illustrated works, *Monnaies grecques* (1883) and *Griechische Münzen* (1890).

IMHOTEP, ĭm-hō′tĕp. An Egyptian divinity, identified with Æsculapius; the son of Ptah and Sekhmet, who with Imhotep formed the triad chiefly honored at Memphis.

IMITATION (Lat. *imitatio*, from *imitari*, to imitate). The repetition of any thought, feeling, or act, or the copying of any example or model. The term is sometimes used in a narrower sense, to denote behavior, the model for which is another person or another like individual.

Imitation, as such, may be conscious to the imitator, as in learning a foreign language; or it may be unconscious, as when an individual in a crowd unknowingly feels and acts like his neighbors. Conscious imitation is to be explained in the same way as voluntary behavior at large. (See ACTION; WILL.) Unconscious imitation—behavior which is imitative, not to the imitator but only to the reflecting onlooker—requires further consideration. There seems to be no sufficient ground for assuming a general instinct of imitation, an inherited tendency to duplicate all impressions either in kind or symbolically. Only certain modes of behavior

are imitated; and imitation therefore should be regarded as an expression of specific instinctive tendencies. Similarity of nervous structure in similar beings must mean similarity of behavior in face of given situations; many cases of imitation may be thus understood. Perception of the movements made by an individual in response to a given stimulus may further, it seems, bring about similar movements in a second individual who would otherwise have remained at rest; but the imitative behavior here is apparently a result of attention to the stimulus, of attention attracted in a particular direction by the movement, and not a direct result of the movement itself. Again, when an individual has often been affected and has often reacted in the same way as another, with a simultaneous perception of the movement of that other, an association may be formed such that at a later time the mere perception of movement suffices to touch off a corresponding movement, or arouses a memory of the original situation and is thereupon followed by the appropriate expressive movement. The behavior of a given individual may thus in some cases be the immediate condition of similar behavior in a second individual, though it can serve as adequate incitement only if an instinctive or associative predisposition towards a similar response already exists in the imitator. See IMITATION IN ANIMALS.

In a wide sense imitation denotes the copying of any model whatever and implies merely a certain resemblance between copy and original. In this sense imitation has been used, often without rigorous analysis, as a more or less fundamental concept in a number of arts and sciences. The discussion of imitation in theory of art dates from Plato and Aristotle. In music the term has become technical, indicating the repetition of a phrase or theme in a pitch or key or vocal part different from that of the original, or a repetition with such variation of rhythm or interval as does not destroy resemblance. The importance of imitation in education has been often emphasized. In ethnology imitation has been offered as a key to the understanding of magic and primitive religion. The savage believes that he can bring about desirable conditions by imitating them: thus, he may fling water in the air to bring about rain, or he may try to bring death to an enemy by impaling an image on thorns, or he may worship his god by offering gifts to an idol, the imitation of the god. In certain systems of sociology imitation is regarded as an elementary and fundamental endowment; and custom, fashion, institutions, and the other phenomena of social life are explained in terms of it. These systems, however, fail to take account of the original similarities of activity mentioned earlier in this article; and other systems, which build upon the like responses of like organisms to the same situations, seem not only possible but also more thoroughgoing. For imitation in biology, see MIMICRY.

Consult: Bagehot, *Physics and Politics* (New York, 1873); Bain, *Senses and Intellect* (London, 1888); Preyer, *Mind of the Child* (New York, 1888–93); Grove, *Dictionary of Music and Musicians* (London, 1890); Bosanquet, *History of Æsthetic* (New York, 1892); Giddings, *Principles of Sociology* (London, 1899); Wundt, *Völkerpsychologie* (Leipzig, 1900); Skeat, *Malay Magic* (London, 1900); Tarde, *The Laws of Imitation* (New York, 1903); Baldwin, *Mental Development in the Child and in the Race* (ib., 1906); McDougall, *Social Psychology* (London, 1908); Frazer, *The Golden Bough* (ib., 1911).

IMITATION. In the science of musical composition, the repetition of the same passage, or the following of a passage with a similar one, in one or more of the other parts or voices. It may be either strict or free. When the imitated passage is repeated note for note, and every interval is the same, it is called strict, and it may take place in the unison or octave, or in any other of the degrees of the scale, either above or below the original passage. The progression of a passage may also be imitated by an inversion, or by reversing the movement of the original; also by notes of a greater or of a lesser value. (See CANON; COUNTERPOINT; FUGUE.) Imitation in composition is one of the most important means of producing unity and animation in the progression of the parts and is used in a strict and also in a free manner. Many composers, however, resort to imitation improperly, either from poverty of musical ideas or from pedantry. In the works of the contrapuntal writers of the Netherlands examples of retrograde imitation are found. This is hardly legitimate art.

IMITATION IN ANIMALS. The patterning of the behavior of one animal after that of another. It has been suggested that imitation in animals might be limited to the mode of learning in which one animal acquires a new form of behavior by copying the performance of another—a definition that excludes unconscious imitative movements which do not become the basis of an habitual form of response. The wider usage is, however, more generally accepted. The broadest definition of imitation as the copying of any model whatever (see IMITATION) has not been used by comparative psychologists.

Imitation implies attention on the part of the imitating animal to the movements to be imitated. The attention may be of any degree. Further the performance copied must be repeated more or less successfully by the imitator. In certain experiments upon monkeys an untrained individual was placed in a cage with a second who had learned to obtain food by pulling one of several strings. In many cases the untrained monkey was aided in his effort to obtain food by observing the behavior of its companion. Two degrees of attention were apparent—one in which the untrained animal merely watched the other, and one in which it followed the other about. There were three levels of success: (1) a spatial discrimination, in which the monkey went to the right place in the cage; (2) an objective discrimination, in which the monkey not only went to the right place but also handled the mechanism (e.g., the string) by which the food was obtained; (3) a complete imitation, in which the animal went to the right place and immediately made the right movement to secure the food.

On the psychological side we may distinguish three kinds of imitation—two in which the imitation as such is unconscious, one in which it is conscious. 1. In *automatic imitation* the imitative movement is set off at once by the perception of the movement in another individual. The movement is not consciously anticipated; it lacks a motive. It is to be explained by reference to an already established tendency, which is usually innate. Hence this form of imitation has also been called instinctive. An example

may be seen in the pecking movements of the chick. The movements are instinctive; but they are also imitative, because they are usually first set off by the pecking of another chick or of the hen. In the absence of previous experience in food getting the action cannot be determined by the idea of the satisfaction of hunger (inferential imitation); nor can it, in its immediate perfection, be the result merely of especial interest in the object at which the peck is directed (focal imitation). 2. *Focal imitation* involves a high degree of attention on the part of the imitator to the movement subsequently imitated. The attention is usually determined by some aspect of the situation which makes a strong appeal to the animal. In the experiments with monkeys it was the sight of the food that aroused the interest of the animal in the movements connected with the getting of food. This interest, dependent upon the focal position of the perception of the movement, acts as a motive and results in the animal's going to a certain place and handling a given mechanism. After the interest is once aroused, only those processes which represent its object remain focal in the animal's consciousness; the degree of perfection of the imitation depends upon the degree of relevant selectiveness of this interest. Although the *perception* of the end accomplished may have served at the outset to determine attention, there need be no subsequent *idea* of end. 3. *Inferential* (or telic) *imitation* implies the participation of the idea of end in the motive to the imitative action and is therefore consciously imitative. The movements and their result are perceived. Later the idea of the result leads to the idea of the movements and thence to their performance. This form of imitation, involving as it does the free idea, is presumably rare among the lower animals, although common in man. It may be assumed when a complicated imitative act is performed correctly on the first attempt; for the idea of end may be expected to result in a more specific determination of behavior than the selective interest.

Below the vertebrates there is no evidence of imitation, since the lower forms of animals do not ordinarily attend to one another's movements. Among the vertebrates some experimenters have found negative evidence for the capacity of focal or inferential imitation in dogs, cats, white rats, and monkeys; while others, with the last three mentioned forms and with raccoons, are convinced of the possibility of an imitation which is probably of the focal type. It is possible that some monkeys are capable of inferential imitation—a form which, as we have seen, involves the free idea, and thus a higher degree of intelligence than is generally found in the animal world. Consult: Washburn, *Animal Mind* (New York, 1908); Haggerty, "Imitation in Monkeys," in *Journal of Comparative Neurology and Psychology*, vol. xix (Granville, Ohio, 1909); Thorndike, *Animal Intelligence* (New York, 1912). See IMITATION; also ANIMAL PSYCHOLOGY; INSTINCT; INTELLIGENCE IN ANIMALS.

IMITATION OF CHRIST (Lat. *De Imitatione Christi*). The most widely read, after the Bible, of all spiritual books. It is a series of counsels for the attainment of perfection, written in a spirit of sincere and humble piety, interspersed with prayers and colloquies between Christ and the devout soul. It was originally written in Latin. It is strange that the authorship of a book so popular and comparatively so recent should have been the subject of one of the most curious controversies in literary history. Following his own counsels of humility, the author concealed his name. The oldest certainly dated manuscripts—the Wolfenbüttel (1424), the Gaesdonck (1427), and the Roolf (1431)—are all anonymous. The book was attributed with more or less positiveness to as many as 35 different authors, including St. Bernard, Innocent III, and John Scotus Erigena. The choice finally narrowed to three—Thomas à Kempis, the great Chancellor Gerson (q.v.), and a person of the name of John Gersen, a Benedictine abbot of Vercelli. Most of the fifteenth-century printed copies bear the Chancellor's name; but the proportion alters in the sixteenth, and the claimant Gersen, or Gesen, appears for the first time in 1604. The controversy raged acrimoniously in religious orders, universities, and even the Parliament of Paris. Between 1615 and 1837 no less than 150 works devoted to the question appeared in France alone. The weight of evidence, both internal and external, has for a long time been considered to rest on the side of Thomas à Kempis (q.v.). The book was finished in 1421 and first printed at Augsburg, probably between 1470 and 1472. The best critical edition of the Latin text is by C. Hirsche (Berlin, 1874; 2d ed., 1891). Consult: Kettlewell, *The Authorship of the De Imitatione Christi* (London, 1777); Malou, *Recherches historiques et critiques sur le véritable auteur du livre de l'Imitation* (3d ed., Louvain, 1858); Wheatley, *The Story of the Imitatio Christi* (London, 1891); Cruise, *Who Was the Author of the Imitation?* (ib., 1898); Montmorency, *Thomas à Kempis: His Age and his Book* (ib., 1906); and an excellent bibliography by a learned modern defender of the Gersen theory, Wolfsgruber, in *Giovanni Gersen, sein Leben und sein Werk De Imitatione Christi* (Augsburg, 1880).

IMITATIVE INSANITY, INDUCED MANIA, INSANITY BY IMITATION. These old terms were adopted upon a mistaken notion. It has been supposed that sane people became insane through imitation of maniacs, through too constant intercourse with them, or through the efforts of a strong imagination in the sane. This is untrue. The physicians or nurses who become insane while living in institutions for those of unsound mind are affected because of stress of overwork or alcoholism, or other debilitating cause which would have been operative had they been engaged in other vocations. Insane people are imitative. Frequently cases occur in a family in which a sister, previously unsuspected of being insane, betrays the delusions and adopts the obsessions of an avowedly maniacal sister. This is called *folie à deux*, or "communicated insanity." The insanity exists first, and then the imitation occurs. Imitation of crimes upon reading of them or seeing them committed is due to idiocy (q.v.) or hysteria (q.v.) in most cases.

IM'LAC. A character in Dr. Johnson's *Rasselas*.

IMMACULATE CONCEPTION OF THE VIRGIN MARY. A dogma of the Roman Catholic church, promulgated by Pope Pius IX in 1854. It declares that the "doctrine which holds the blessed Virgin Mary, from the first instant of her conception, to have been kept free

from all stain of original sin, by the singular grace and privilege of Almighty God, in view of the merits of Christ Jesus the Saviour of mankind, is revealed by God, and therefore firmly and constantly to be believed by all the faithful."

Previous to 1854 Roman Catholic theologians had commonly believed in the immaculate conception, but it was held only as a "pious opinion," not as a dogma. Its history may be traced from early times and shows gradual enlargements. The New Testament is silent on the subject of Mary's conception. In the ancient Church many persons believed in her perpetual virginity, and this found expression in some of the apocryphal Gospels. Belief seems next to have advanced to her sinlessness after the birth of Christ, then to sinlessness from her own birth, and finally to the idea that she was sinless from her very conception; Roman Catholics believe that the modern definition involves its having been held, at least implicitly, from the first. The fact that Mohammed seems to have known of these Christian tenets (cf. *Koran*, Sura, iii) is an indication that they were widespread among the Asiatic churches at an early date. The Eastern church, however, has not formulated the dogma, and to this day the immaculate conception remains only a pious opinion in that great branch of Christendom. In the West the history of the doctrine is closely associated with that of the feast. An effort was made in Lyons, in 1139, to introduce the festival of the Immaculate Conception; but it met with pronounced opposition from Bernard of Clairvaux, who did not accept the doctrine exactly as generally explained, and urged that the feast had not received official sanction from Rome. A prolonged controversy broke out early in the fourteenth century, which rather involved a minute technical point of the exact moment of her sanctification than the absolute acceptance or rejection of the main doctrine. The Schoolmen took opposite sides, Duns Scotus and the Scotists maintaining the doctrine in its exactness, while the Thomists, following their leader, Thomas Aquinas, opposed it. The dispute extended to the two great mendicant orders. Scotus was a Franciscan, Thomas a Dominican. The Franciscans accordingly sided with the Scotists in supporting the doctrine; the Dominicans sided with the Thomists in opposing it. There were keen debates, and mutual charges of heresy. The influential University of Paris at first sided with the Dominicans and Thomists; but afterward its position was reversed, and by the end of the fifteenth century it required from every candidate for its doctorate an oath to defend the truth of the immaculate conception wherever it was denied. Among many other forces which worked towards the same end, we may mention the favorable action of the Council of Basel (1439), the pronouncements of Pope Sixtus IV (especially his constitution *Grave nimis*, in 1483), the decrees of Trent, excepting Mary from the universal curse of original sin (Session V, 1546), and the strong support of the Society of Jesus (e.g., in the person of Bellarmine). In 1622 Pope Gregory XV forbade any one (with the conspicuous exception of the Dominicans, and these only in discussions among themselves) to teach that the Virgin Mary was stained by original sin. About 40 years later (1661) Alexander VII set forth the belief of the Church in terms very like those of the decree of 1854. Yet in spite of the general acceptance of the doctrine, the most that could be said for it down to modern times was what Benedict XIV cautiously affirmed, about the middle of the eighteenth century: "The Church inclines to the opinion of the immaculate conception."

Pius IX was assiduously devoted to the cult of the Virgin. In 1849 he addressed a circular letter to the bishops, inviting their opinions on the advisability of defining the dogma of her immaculate conception. Out of some 600 replies, the great majority favored the proposed action. Four opposed it. Several influential bishops, especially in Germany and France, deemed it inopportune, inexpedient, and possibly injurious to the Church. In view of the generally favorable sentiment, however, the Pope proceeded to promulgate the dogma, as stated above. The decree was read in the presence of about 200 cardinals, archbishops, and bishops, assembled in St. Peter's, on Dec. 8, 1854, the Feast of the Immaculate Conception. Although not a conciliar decision, it has binding force for the whole Roman Catholic world.

In explanation of the dogma, Catholic writers sometimes quote from a sermon by Bossuet, delivered on a Feast of the Immaculate Conception, in which he thus addresses Christ: "Thou art innocent by nature, Mary only by grace; Thou by excellence, she only by privilege; Thou as Redeemer, she as the first of those whom Thy precious blood hath purified." The Catholic interpretation of the matter is clearly implied in these few words. For Roman theologians distinguish between "active" and "passive" conception. The former is the physical act of the parents, and, so far as this is concerned, Mary is held to have been conceived like other mortals. The latter is the divine infusion of the rational soul (on the theory of creationism), and this, in the case of Mary, is held to have been accompanied by a special gift of grace, whereby she differs from all other mortals. She was sanctified, and therefore sinless, from the beginning. But this was through the merits of the Son who was to be born from her, not through independent merits of her own. In this way the Church believes that it solves the two main problems raised by the doctrine of the immaculate conception—first, how it affects the Virgin Mary in her relation to the rest of the human race, and, secondly, how it affects her in relation to Christ. See Gen. iii. 15; Luke i. 28, 42.

The Feast of the Immaculate Conception, in the Roman calendar, falls on December 8; in the Greek calendar, on the day following.

Consult: Passaglia, *De Immaculato Deiparæ Semper Virginis Conceptu* (3 vols., Rome, 1854–55); Addis and Arnold, *Catholic Dictionary*, art. "Immaculate Conception" (London, 1884); Wetzer and Welte, *Kirchenlexikon*, iv (Freiburg, 1886); Ullathorne, *The Immaculate Conception of the Mother of God* (2d ed., London, 1904). On the Protestant side, consult: Schaff, *Creeds of Christendom* (New York, 1877), which gives the history of the doctrine, and the Latin and English text of the constitution *Ineffabilis Deus*.

IMMAN'UEL. See EMMANUEL.

IMMEMORIAL. Of great antiquity, reaching back beyond memory or record. As a legal term, a right or usage of such long continuance that its origin cannot be traced. Specifically, in English law, a right or usage running back to the accession of Richard I to the throne (1189). Rights resting upon custom, whether

the general custom of the realm or the local custom of a community or of a particular calling, depend for their validity on the proof or on the presumption that the custom has been generally observed and practiced from that date. As in most cases the fact cannot be established by direct proof, the person relying upon the custom is aided by a presumption of law that if it has been in existence during the period of living memory its previous existence from the time of Richard I will be presumed. This presumption may, however, be rebutted by showing, if that be possible, that the custom did not in fact exist, or that it could not have existed, at that remote period.

This doctrine, which the lapse of time has converted into an absurdity, still prevails generally in England and in some of the United States, where it has been held that no customary right can exist in America by reason of the fact that it could not have been practiced in the reign of Richard I. In most American States, however, it has been superseded by a more reasonable doctrine, giving effect to a custom which has been in existence during the period of living memory, or in some instances during a fixed period of time, usually 20 years. In England also it has been provided by statute (Prescription Act, 1832) that rights to claims of common, etc., may be established by showing an uninterrupted enjoyment as of right—in some cases for 30, in others for 20, years. See Common; Custom; and for the modern doctrine governing the acquisition of private rights, as easements and profits *à prendre* in another's land by long-continued use, see Easement; Prescription.

IM'MER GOOSE. See Loon.

IM'MERMANN, Karl (1796–1840). A German dramatist, born in Magdeburg, April 24, 1796. From the Gymnasium of Magdeburg Immermann went in 1813 to the University of Halle to study law, but he interrupted his studies to take part in the War of Liberation. Disabled by a nervous disorder, he left the field in 1815 and returned to Halle, where his brave protest to the King at the brutal treatment of a dissenting fellow student by the overzealous student societies embroiled him with the latter. He entered the government service and in 1824 became a judge. He had already in Münster become acquainted with Countess Elise von Ahlefeldt (1788–1855), with whom he lived on terms of intimacy for years. He had become widely known as a dramatist when, in 1835, he took charge of the Düsseldorf theatre, which he developed artistically; but the theatre failed for the lack of proper financial support, and he became a judge again. Immermann married Marianne Niemeyer in 1839 and died Aug. 25, 1840. His plays were strongly influenced by Shakespeare. Among his best pieces are *Das Trauerspiel in Tirol* (1827) and *Merlin* (1831). Two representative novels are *Die Epigonen* (1835), an echo of *Wilhelm Meister*, and *Münchhausen* (1838–39), in which the village life of Westphalia is imaginatively described. The beautiful prose idyl *Der Oberhof*, contained in this book, is his best-known work. Here, too, Poe may have found a hint for *The Fall of the House of Usher*. He stood at the turning point between romanticism and realism. Immermann's *Collected Works* appeared at Düsseldorf in 1835–43, and a new edition, with *Biography and Introduction*, came out in 20 volumes at Berlin in 1883; a new edition in six volumes appeared in 1911. Consult: Putlitz, *Karl Immermann, sein Leben und Werke* (Berlin, 1870); E. Schmidt, *Charakteristiken*, i (ib., 1886); Kaiser, *Untersuchungen zu Immermanns Romantechnik* (Halle, 1906); Thewissen, *Goethes Einfluss auf Immermanns Romane* (Marburg, 1907).

IMMER'SION. See Baptism; Emersion.

IM'MIGRA'TION (from Lat. *immigrare*, to remove into, from *in*, in + *migrare*, to migrate). In its broadest sense, the transfer of residence from one country to another, viewed from the standpoint of the country in which the new residence is taken. The causes of this phenomenon have been discussed in the article devoted to emigration, which treated the movement at its source. We are concerned here with the effect of these movements on the countries which receive the newcomers. The invasion of the immigrant is the movement of the individual who seeks to improve his condition by a change of residence, who submits to the political institutions of the land of his adoption, and whose coming thither is frequently openly encouraged, or at least not actually opposed, by the country in which he settles.

Immigration and colonization are intimately related. When a new country is to be developed and its resources increased by human labor, immigration is encouraged by its authorities, and every gain in population is deemed an economic advantage. It has been in such countries in the past century into which the flow of emigration from Europe has been poured. They are Australia, South America, Canada, and the United States, in each of which immigration has raised diverse social and economic questions which must be individually studied and do not lend themselves to a general treatment. Before turning to the United States, where the immigration problem is perhaps the most acute, we may briefly consider the facts connected with immigration in other countries.

Australia. The Australian Commonwealth owes its origin to the penal settlement established there by Great Britain at the close of the eighteenth century, to which a considerable number of convicts were deported until the middle of the last century, when, at the earnest solicitation of the colonials, the system was abandoned. Efforts were made by the government to send out free colonists to Australia, but, despite the liberal assistance of the government, the total population by 1851 was only 430,596. Following the discovery of gold in 1850, the population increased threefold in the next 10 years, and considerable increments have been made to it at each subsequent census.

The following table gives the increase of population ascribed to the excess of immigration over emigration down to 1900. In 1920 the emigration exceeded the immigration by 27,779.

1851–1860	613,253
1861–1870	291,342
1871–1880	336,297
1881–1890	386,018
1891–1900	63,482

The colonies showed great variations from year to year, as the discovery of gold in one colony after another attracted the fortune seekers. The distance of Australia from Europe and the cost of passage have been an obstacle to immigration to that country compared with the more accessible Canada and the United States. The attractive force of the gold mines

has partially offset the difficulty, while the colonies at one time generally pursued a policy of aiding immigrants by paying a portion, if not all, of the passage money. Up to 1896 there had been introduced into the colonies, either wholly or partially at the expense of the state, no less than 756,695 persons, of whom 578,559 came in the period prior to 1881.

Under these circumstances the Australian colonies have to a large extent chosen their immigrants. It is not surprising, therefore, that the great bulk of the immigrants into Australia have been natives of the United Kingdom. According to the census of 1891, 68.58 per cent of the population were Australian born, 14.76 per cent born in England and Wales, 3.86 per cent in Scotland, 7.13 per cent in Ireland. According to the census of 1901, 76.99 per cent of the population, exclusive of aborigines, were Australian born; 10.30 per cent were born in England and Wales; 2.78 per cent in Scotland; 5.13 per cent in Ireland; leaving only 4.80 per cent natives of other British colonies and foreigners. Immigration in later years has maintained practically the same character; its volume has remained so small as not to affect the general population as indicated by the 1901 census.

South America. Of the South American countries, the Argentine Republic, Brazil, and Uruguay are the only ones in which immigration brings any considerable increment to the population. In Uruguay in 1920 immigrants numbered 137,639; emigrants, 125,807. In Brazil 2,845,980 are reported for the years 1835–1912; 71,206 for 1920. In Argentina the immigration in the years 1857–1912 was 4,248,355, consisting of 2,133,508 Italians, 1,298,122 Spaniards, 206,912 French; in 1920, 188,688.

In the immigration to the South American countries the states of southern Europe are the largest contributors. Italy stands at the head of the list. In the immigration of Brazil the Portuguese take the first place, followed by the Spaniards and the Italians.

Canada. There is greater difficulty in determining the amount of immigration to Canada than to other countries, not only because a large number of persons land there whose destination is the United States, but because a considerable number whose original intention was to remain in Canada drift into the United States. So great is the difficulty of precisely ascertaining the number that a few years ago the Canadian authorities gave up the attempt. The most recent figures obtainable are put forward by the authorities with many cautions as to their accuracy. In seven periods the figures are as follows:

ANNUAL AVERAGE IMMIGRATION TO CANADA

1871-1875	34,212
1876–1880	36,304
1881–1885	115,413
1886–1890	40,911
1901–1905	101,298
1908–1913	284,691
1914–1921	132,021

A computation by British authorities that, from 1815 to 1889, 12,481,708 persons emigrated from the United Kingdom, showed that of these 8,317,019 went to the United States, 1,987,247 to Canada, and 1,663,388 to Australasia.

The immigration into Canada is largely from the mother country and the United States. The census of 1901 showed that there were 684,671 foreign born in the population, of whom 127,899 were natives of the United States. The United Kingdom furnished 386,545; other parts of the British Empire furnished 19,338, while the quota of foreign nations, among whom Germans and Russians predominated, was 150,889. In the period 1914–21 the United States furnished 475,379 immigrants to Canada out of 1,056,167; England and Wales furnished 349,801.

United States. The great bulk of those who have left Europe to seek new homes have come to the United States. Here the various phenomena connected with immigration can be studied in their fullest development. Records of immigration to the United States begin in 1820. For the period before that time the chief sources of information as to immigration are the frequent newspaper allusions to the arrival of vessels bringing immigrants, of whom a certain number were "foreigners," i.e., those who spoke a language other than English. The record of arrivals since 1820 is shown in the accompanying table:

NUMBER OF IMMIGRANTS ARRIVING IN THE UNITED STATES EACH YEAR FROM 1820 TO 1921

Year ending September 30

1820	8,385	1827	18,875
1821	9,127	1828	27,382
1822	6,911	1829	22,520
1823	6,354	1830	23,322
1824	7,912	1831	22,633
1825	10,199	Oct. 1, 1831, to Dec.	
1826	10,837	31, 1832	60,482

Year ending December 31

1833	58,640	1839	68,069
1834	65,365	1840	84,066
1835	45,374	1841	80,289
1836	76,242	1842	104,565
1837	79,340	Jan. 1 to Sept. 30,	
1838	38,914	1843	52,496

Year ending September 30

1844	78,615	1849	297,024
1845	114,371	1850	310,004
1846	154,416	Oct. 1 to Dec. 31,	
1847	234,968	1850	59,976
1848	226,527		

Year ending December 31

1851	379,466	1855	200,877
1852	371,603	1856	195,857
1853	368,645	Jan. 1 to June 30,	
1854	427,833	1857	112,123

Year ending June 30

1858	191,942	1890	455,302
1859	129,571	1891	560,319
1860	133,143	1892	479,663
1861	142,877	1893	439,730
1862	72,183	1894	285,631
1863	132,925	1895	258,536
1864	191,114	1896	343,267
1865	180,339	1897	230,832
1866	332,577	1898	229,299
1867	303,104	1899	311,715
1868	282,189	1900	448,572
1869	352,783	1901	487,918
1870	387,260	1902	648,743
1871	321,350	1903	857,046
1872	404,806	1904	812,870
1873	459,803	1905	1,026,499
1874	313,339	1906	1,100,735
1875	227,498	1907	1,285,349
1876	169,986	1908	782,870
1877	141,857	1909	751,786
1878	138,469	1910	1,041,570
1879	177,826	1911	878,587
1880	457,257	1912	838,172
1881	669,431	1913	1,197,892
1882	788,992	1914	1,218,480
1883	603,322	1915	326,700
1884	518,592	1916	298,826
1885	395,346	1917	295,403
1886	334,203	1918	110,618
1887	490,109	1919	141,132
1888	546,889	1920	430,000
1889	444,427	1921	805,228

In long periods the increase is marked, but year by year the fluctuation is considerable.

It mirrors the economic conditions at home and abroad. Thus, the panic of 1837 is reflected in the decline of immigration from 79,340 in that year to 38,914 in 1838. The wholesale emigration from Ireland after the potato famine is reflected in the rise of American immigration from 154,416 in 1846 to 234,968 in 1847, and before this influence and that of the political disturbances in Europe were spent came the discovery of gold and the rush to the mines, which culminated in an immigration of 427,833 in 1854, a figure not reached again until nearly 20 years later. After that year immigration fell off slightly, and received a sudden check after the panic of 1857, when it was reduced from 246,945 in 1857 to 119,501 in 1858. The year 1860 showed symptoms of a rising tide, but this was checked by the outbreak of the Civil War. The prosperous times which followed the close of the war increased immigration until, in 1873, it reached a figure of 459,803, higher than in 1854. Again economic distress brought a falling off, and in 1878 it was not more than 138,469. But the symptoms of returning prosperity in the early eighties reacted powerfully upon the volume of immigration, which in 1882 reached the enormous total of 788,992. By 1886 immigration had fallen to 334,203, but it soon recovered and maintained high figures until 1893. In the following year it dropped to 285,631 and reached its lowest point in recent years in 1898, when it was 229,299; but again there was a rapid recovery, and in 1903 the total was 857,046. In 1904 the number fell off slightly, but in 1905, 1906, and 1907 it passed the million mark. In 1908 and 1909, as a result of the crisis of 1907, the number of immigrants fell to 782,870 and 751,786, but rose again in 1910 to over 1,000,000. In the year 1914 the number of immigrants was 1,218,480—a point reached only once before in the history of American immigration. In 1921 it was 805,228.

Influenced by temporary causes, as we have seen, the progress of immigration has been generally forward, with setbacks, apparently temporary, only in the decades 1861–70 and 1891–1900. In estimating the force of immigration it is well to take into account the concurrent growth of the population. The following table brings out the facts:

DECADE	Population at beginning	Immigrants	Immigrants in 10 years per 1000 of initial population
1821–1830	9,633,822	143,439	15
1831–1840	12,866,020	599,125	47
1841–1850	17,069,453	1,713,251	100
1851–1860	23,191,876	2,598,214	110
1861–1870	31,443,321	2,314,824	73
1871–1880	38,558,371	2,812,191	73
1881–1890	50,155,783	5,246,616	104
1891–1900	62,622,250	3,844,420	61
1901–1910	75,994,575	8,795,386	116
1911–1920	91,972,266	5,735,811	62

It appears in this table that the greatest relative immigration has been in the 10 years ending 1910, closely followed by the decades 1861–70 and 1881–90, and it is to be noted that in each of these periods the agitation against the policy of unrestricted immigration was widespread.

The effect of this immigration on the population can be traced since 1850 in the number of foreign born enumerated by the census and is shown in the following table:

YEAR	Population	Foreign born	Per cent foreign born	Increase of foreign born over previous census	Immigration previous decade
1850	23,191,876	2,244,602	9.7		
1860	31,443,321	4,138,697	13.2	1,894,095	2,598,214
1870	38,558,371	5,567,229	14.4	1,428,532	2,314,824
1880	50,155,783	6,679,943	13.3	1,112,714	2,812,191
1890	63,069,756	9,308,104	14.8	2,628,161	5,246,613
1900	76,303,387	10,460,085	13.7	1,151,981	3,687,564
1910	91,972,266	13,515,886	14.7	3,174,610	8,795,386
1920	105,710,620	13,712,754	12.8	367,209	5,735,311

While the total number of the foreign born has increased at each census, the proportion to the total population has not materially changed since 1860. The increase in the foreign born for each decade falls far short of the total number of immigrants by reason of the following factors: (1) deaths among the foreign born present at the beginning of the decade, and (2) emigration from among the same; (3) deaths among the immigrants during the decade, and (4) return of some of these latter to their native lands. The number who return to their country of origin fluctuates, like immigration, with prosperity and depression. Thus, in 1916, 129,765 aliens emigrated, whereas in the five years 1917–21 the average annual emigration of aliens amounted to 164,083.

The developments of recent years are shown in the following figures:

INHABITANTS	Per cent of total immigration						
	1821–1830	1831–1850	1851–1860	1871–1880	1881–1890	1891–1900	1901–1910	1920–1921
United Kingdom		54.5	43.5	29.9	19.4	9.6	24.2	
Germany	76.5	38.2	34.3	30.7	14.1	4.0	15.9	
Sweden, Denmark, and Norway	6.8	1.0	11.2	16.0	9.9	5.9	6.3	
Italy, Russia, Poland, and Austria-Hungary	0.2	0.4	8.1	19.4	49.3	64.7	34.9	
All others	0.3	5.9	2.9	4.0	7.3	15.8	18.7	
	16.0							

There has been of late years a change in the character of immigration, and much has been written of the "undesirable" quality of recent immigration. The most desirable immigrant is doubtless he who promises most rapidly to be absorbed into the great mass of our population

and lose his identity as a newcomer. Kinship in language and race is the prime mark of this desirability. Other things being equal, English-speaking immigrants are preferable to all others, those of allied race and language more to be desired than those allied by neither race nor language to the mass of the people.

The last decade shows marked contrasts with peoples of a certain racial kinship, who as late as the decade 1881–90 comprised nearly one-half of the immigrants, while in the later periods the nations of southern and eastern Europe have assumed the leadership. Equally instructive is the separation of the immigrants by race, which for the fiscal years 1911–1921 is shown in the following table:

RACES	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
African (black)	6,721	6,759	6,634	8,447	5,660	4,576	7,971	5,706	5,823	8,174	9,873
Armenian	3,092	5,222	9,353	7,785	932	964	1,221	221	282	2,762	10,212
Bohemian and Moravian	9,223	8,439	11,091	9,928	1,651	642	327	74	105	415	1,743
Bulgarian, Servian, Montenegrin	10,222	10,657	9,087	15,084	3,506	3,146	1,134	150	205	1,064	7,700
Chinese	1,307	1,608	2,022	2,354	2,469	2,239	1,843	1,576	1,697	2,148	4,017
Croatian and Slovenian	18,982	24,366	42,499	37,284	1,942	791	305	33	23	493	11,035
Cuban	3,914	3,155	3,099	3,539	3,402	3,442	3,428	1,179	1,169	1,510	1,523
Dalmatian, Bosnian, Herzegovinian	4,400	3,672	4,520	5,149	305	114	94	15	4	63	930
Dutch and Flemish	13,862	10,935	14,507	12,566	6,675	6,443	5,393	2,200	2,735	12,730	12,813
East Indian	517	165	188	172	82	80	69	61	68	160	353
English	57,258	49,689	55,522	51,746	38,662	36,168	32,246	12,980	26,889	58,366	54,627
Finnish	9,779	6,641	12,756	12,805	3,472	5,649	5,900	1,867	968	1,510	4,233
French	18,132	18,382	20,652	18,166	12,636	19,518	24,405	6,840	12,598	27,390	24,122
German	66,471	65,343	80,865	79,871	20,729	11,555	9,682	1,992	1,837	7,338	24,168
Greek	37,021	31,566	38,644	45,881	15,187	26,792	25,919	2,602	813	13,998	31,828
Hebrew	91,223	80,595	101,330	138,051	26,497	15,108	17,342	3,672	3,055	14,292	119,036
Irish	40,246	33,922	37,023	33,898	23,503	20,636	17,462	4,657	7,910	20,784	39,056
Italian (north)	30,312	26,443	42,534	44,802	10,660	4,905	3,796	1,074	1,236	12,918	27,459
Italian (south)	159,638	135,830	231,613	251,612	46,557	33,909	35,154	5,234	2,137	84,882	195,037
Japanese	4,575	6,172	8,302	8,941	8,609	8,711	8,925	10,168	10,056	9,279	7,531
Korean	8	33	64	152	146	154	194	149	77	72	61
Lithuanian	17,027	14,078	24,647	21,584	2,638	599	479	135	160	422	829
Magyar	19,996	23,599	30,610	44,538	3,604	981	434	32	52	252	9,377
Mexican	18,784	22,001	10,954	13,089	10,993	17,198	16,438	17,602	28,844	51,042	29,603
Pacific Islander	12	3	11	1	6	5	10	17	6	17	13
Polish	71,446	85,163	174,365	122,657	9,065	4,502	3,109	668	732	2,519	21,146
Portuguese	7,469	9,403	13,566	9,647	4,376	12,208	10,194	2,319	1,574	15,174	18,856
Rumanian	5,311	8,329	13,451	24,070	1,200	953	522	155	89	898	5,925
Russian	18,721	22,558	51,472	44,957	4,459	4,858	3,711	1,513	1,532	2,378	2,887
Ruthenian (Russniak)	17,724	21,965	30,588	36,727	2,933	1,365	1,211	49	103	258	958
Scandinavian	45,859	31,601	38,737	36,053	24,263	19,172	19,596	8,741	8,261	16,621	25,812
Scottish	25,625	20,293	21,293	18,997	14,310	13,515	13,350	5,204	10,364	21,180	24,649
Slovak	21,415	25,281	27,234	25,819	2,069	577	244	35	85	3,824	35,047
Spanish	8,068	9,070	9,042	11,064	5,705	9,259	15,019	7,909	4,224	3,594	27,448
Spanish-American	1,153	1,342	1,363	1,544	1,667	1,881	2,587	2,231	3,092	3,934	3,325
Syrian	5,441	5,525	9,210	9,023	1,767	676	976	210	231	3,047	5,105
Turkish	918	1,336	2,015	2,693	273	216	454	24	18	140	353
Welsh	2,248	2,239	2,820	2,558	1,390	983	793	278	608	1,462	1,748
West Indian (except Cuban)	1,141	1,132	1,171	1,396	823	948	1,369	732	1,223	1,546	1,553
Other peoples	3,323	3,660	3,038	3,830	1,877	3,388	2,097	314	247	1,345	3,237
Total	878,587	838,172	1,197,892	1,218,480	326,700	298,826	295,403	110,618	141,132	430,001	805,228

the first. Then more than three-quarters of American immigrants spoke English, but now this element represents less than one-fifth of the total. This relative decline was at first made up by an influx of Germans and Scandinavians,

That such a notable change in the character of immigration must affect the composition of the foreign born in the United States is obvious and is disclosed in the following statement from the censuses of 1900 and 1910:

FOREIGN-BORN POPULATION, 1910, 1900, AND 1890, BY NATIONALITIES

NATIVES OF	FOREIGN BORN, 1910		FOREIGN BORN, 1900		FOREIGN BORN, 1890	
	Number	Per cent	Number	Per cent	Number	Per cent
England, Scotland, and Wales	1,221,283	9.0	1,169,737	11.3	1,251,402	13.5
Ireland	1,352,251	10.0	1,618,567	15.6	1,871,509	20.2
Germany	2,501,333	18.5	2,666,990	25.8	2,784,894	30.1
Sweden, Norway, and Denmark	1,250,733	9.3	1,064,309	10.3	933,249	10.1
	6,335,600	46.8	6,519,603	63.0	6,841,054	73.9
Austria-Hungary	1,670,582	12.4	579,042	5.6	303,812	3.3
Italy	1,343,125	9.9	484,207	4.7	182,580	2.0
Russia and Poland	* 1,732,462	12.8	807,606	7.8	330,084	3.6
	5,746,369	35.1	1,870,855	18.1	816,476	8.9
All other countries	1,433,917	18.1	1,966,176	18.9	1,592,017	17.2
Total	13,515,886	100.0	† 10,356,634	100.0	9,249,547	100.0

* In the 1910 census the classification Russia and Poland was dropped and Russia and Finland substituted.
† The total here given differs from that of a previous table, as this does not include Alaska and Hawaii.

These figures show that the older immigration, relatively stronger in the foreign born than in the new arrivals, is still losing ground. In the decades 1891–1910 the absolute number of the foreign born of the first group of races declined; of the entire group only the Scandinavians showed an increase. In the decade 1901–10 the same group, as a whole, shows a further decline, although a slight increase appears in the number of aliens born in Great Britain and in Scandinavia. On the other hand, the absolute numbers of the foreign born from eastern and southern Europe more than doubled.

The reports of the Bureau of Immigration enable us to study many characteristics of the immigrants. That males predominate over females, inasmuch as the immigration embraces so many unmarried men, and so many married men who have left their families behind them, who come to seek fortune in the New World, is well known. It is, however, interesting to note that the proportion of males is increasing. In 1893 to 1895 it was 61.5 per cent of the total; in 1896 to 1900, 63.5 per cent; and in the two fiscal years, 1904 and 1905, it averaged as much as 69.2 per cent. In 1914, however, it declined to 65.4 per cent. The older immigration was by families to a larger extent than at present, and this is seen by comparing some of the older and newer elements in it.

In 1913 the figures for some of the prominent races were as follows:

RACES	Males	Females	Per cent males
English	31,320	24,202	56
Irish	19,072	17,951	51
German	45,974	34,891	57
Scandinavian	25,243	13,494	65
Hebrew	57,148	44,182	56
Italian (south)	176,472	55,141	76
Polish	115,772	58,593	66
Russian	45,633	5,839	89
Croatian and Slovenian	31,590	10,909	74
Greek	35,143	3,501	91

It will be noted that the races which show a less percentage of men than 65 belong, with the exception of the Hebrews, to the older immigration. The Hebrews represent more largely than the other races immigration by families.

Among the immigrants the proportion of persons in the prime of life is always considerable. The increase of the proportion indicates a falling off of family immigration. Figures for the entire period are not uniform, but the following statement shows this characteristic plainly:

PER CENT OF TOTAL IMMIGRATION

FISCAL YEARS	Under 15 years	15–40 years
1893–1895	18.8	71.1
1896–1898	16.1	72.7

FISCAL YEARS	Under 14 years	14–45 years
1903–1904	13.4	80.8
1904–1905	11.1	83.3
1912–1913	12.3	82.4

Considering the same races as in the case of the sexes, we find the percentage of children under 14 in 1913 to be as follows, the average being 12.3:

English	16.1	Italian (south)	11.7
Irish	6.7	Polish	9.9
German	17.8	Russian	3.3
Scandinavian	7.7	Croatian and Slovenian	8.1
Hebrew	22.0	Greek	3.2

Here again it appears that family immigration is especially prominent among the Hebrews and plays a considerable rôle among Germans and natives of Great Britain. The low percentage of children among the Irish is a consequence of the large immigration of unmarried women, and this is true, in some measure, of the Scandinavians.

OCCUPATIONS	FISCAL YEARS 1881–90		FISCAL YEAR 1913		FISCAL YEAR 1921	
	Number	Per cent	Number	Per cent	Number	Per cent
Professional	27,006	1.0	13,469	1.5	14,592	2.9
Skilled labor	540,411	19.6	160,108	17.7	131,774	26.2
Miscellaneous	2,195,292	79.4	727,127	80.8	357,721	70.9
Total with occupation	2,762,709	100.0	900,704	100.0	504,087	100.0
No occupation	2,483,904		297,188		301,141	
Total	5,246,613		1,197,892		805,228	

Statistics of occupation among the immigrants show comparatively few in the professional class or that of skilled laborers. By far the greatest number are in the classes grouped as miscellaneous, in which laborers, farm laborers, and personal and domestic servants make up nearly the entire number. The general results are given in the preceding table.

The figures above given indicate that the relative proportions of professional, skilled, and unskilled have not been greatly affected by the change in the character of immigration. Among the newer immigrants the Greeks and Italians show low percentages of professional and skilled labor, while the Hebrews show a very large percentage of skilled. This is in large measure explained by the specialization of the Hebrews to the needle trades.

	English	German	Hebrew	Italian (south)	Greek
Professional	9.5	4.0	1.5	0.4	0.3
Skilled	44.5	27.5	70.1	11.8	6.3
Miscellaneous	46.0	68.5	28.4	87.8	93.4

The immigrant population, as a whole, shows a high percentage of illiteracy. Of immigrants

over 14, for the year 1913, 26.6 per cent were illiterate. Illiteracy is very rare among English, Scandinavian, French, Dutch, and Finnish. It is relatively low among Germans, Magyars, and Hebrews. It runs very high among immigrants from southern and eastern Europe—Italians, Greeks, Dalmatians, Croatians, and Slovenians, Ruthenians, Lithuanians. Illiteracy among immigrants is largely a reflection of the backward state of education in their countries of origin. In the most extreme cases it also reflects racial oppression. Thus, the Croatians and Slovenians, the Bosnians, the Lithuanians, are peoples possessed of a language and historical traditions other than those of the race that dominates popular education. Accordingly it is dangerous to make deductions from literacy statistics as to the mental or even social quality of the immigrants.

Effect upon the Population. The influence of immigration upon the population at large depends not only upon its volume but also upon its diffusion. We have already seen that the foreign born in 1910 constituted 14.5 per cent of the total population of the country; but it is to be noted that the foreign born are concentrated in particular sections. Of the foreign born 84.8 per cent were found in the North (north Atlantic and north Central States). The South had only 5.4 per cent of the foreign born, and the West (mountain and Pacific States), 9.7 per cent. The distribution of the general population in the three sections was as follows: North, 60.6 per cent; South, 32 per cent; West, 7.4 per cent. The States having the highest percentage of foreign born in their population (25–35 per cent) were Massachusetts, Connecticut, and Rhode Island, New York and New Jersey, Minnesota and North Dakota.

The tendencies to concentration in cities are clearly shown in the tables on this page.

There is a marked tendency towards concentration of the foreign born in the cities. According to the census of 1910, while 44.2 per cent of the general population was found in urban communities, 72.2 per cent of the foreign born were living in such communities. In general, the greater the city the greater the relative proportion of foreign born. The following table gives the percentage of total population and of foreign born living in the several classes of urban communities in 1910:

COMMUNITIES	Per cent of total population	Per cent of foreign born
Cities of 2,500–10,000	9.2	8.8
Cities of 10,000–25,000	6.1	7.3
Cities of 25,000–100,000	9.0	62.5
Cities of 100,000–500,000	9.6	14.6
Cities of 500,000 and over	12.5	29.0

Over one-fifth of the population of cities of 100,000–500,000 and nearly one-third of the population of cities of over 500,000 were foreign born.

The census of 1910 shows that the tendency towards settlement in cities characterizes almost all immigrant nationalities. Only the immigrants from Norway, Mexico, and Montenegro show a less percentage urban than that of the native white population. The immigrants from northwestern Europe show a less tendency towards urban concentration than those from southern and eastern Europe—68.3 per cent as compared with 78.6 per cent. The highest percentages of urban concentration among European immigrants are shown by natives of Rumania (91.9) and Russia (87.0)—a fact to be explained by the large Jewish element in the immigration from those countries. But Ireland follows closely with 84.7 per cent, Turkey in Europe with 79.5 per cent, and Italy with 78.1 per cent.

Russia is the country of birth of the largest contingent of the foreign born of New York City and of Philadelphia. German born are the most numerous element in Baltimore, Buffalo, Chicago, Cincinnati, Detroit, Jersey City, Los Angeles, Milwaukee, Newark, Pittsburgh, St. Louis, and San Francisco. Ireland leads in Boston and Washington; Sweden in Minneapolis, Italy in New Orleans, Austria in Cleveland. The Russian born stand second in Baltimore, Milwaukee, Newark, Pittsburgh, and St. Louis; the Germans in Cleveland, New Orleans, and Washington; the Canadians in Boston, Buffalo, Detroit, and Los Angeles; the Irish in Jersey City and Newark; the Italians in New York; the Austrians in Chicago; the Hungarians in Cincinnati; the Norwegians in Minneapolis. As a rule, immigrants are attracted to those cities already having a large population of the same nationality.

The following table gives the cities of 100,000 and over having in 1910 a foreign-born population in excess of 30 per cent of the total:

CITIES	Population	Foreign born	Per cent of foreign born
Boston	670,585	240,722	35.9
Bridgeport, Conn.	102,054	36,180	35.5
Cambridge, Mass.	104,839	34,608	33.0
Chicago	2,184,283	783,428	35.7
Cleveland	560,663	195,703	34.9
Detroit	465,766	156,565	33.6
Fall River	119,295	50,874	42.6
Lowell, Mass.	106,294	43,457	40.9
New Haven	133,605	42,784	32.0
New York	4,766,883	1,927,703	40.4
Newark	347,469	110,655	31.8
Paterson, N. J.	125,600	45,398	36.1
Providence	224,326	76,303	34.0
San Francisco	416,912	130,874	31.4
Worcester, Mass.	145,986	48,492	33.2

But these figures do not display the whole significance of the city concentration, for it will be remembered that immigrants are largely men and adults. The proportion of foreigners among males of voting age is perhaps a more forcible indication of their influence in the community. In 1910 foreign-born males made up the following percentages of males of voting age:

Fall River	63.8	Cleveland	53.2
Lowell	58.1	Bridgeport	51.9
New York	57.8	Detroit	50.2
Paterson	54.7	Worcester	50.0
Chicago	54.2		

The significance of this concentration is in its relation to the problem of assimilation. The evidences of assimilation cannot well be treated statistically, and we have only a few indications of it. One of these lies in naturalization. In 1910, of 6,646,817 foreign-born white males, 21 years of age and over, 3,034,117 were naturalized, and 570,772 had taken out their first

papers. The following table gives interesting details as to the tendency towards naturalization of the several races.

NATURALIZATION, 1910

COUNTRY OF BIRTH	FOREIGN-BORN WHITE MALES 21 YEARS OF AGE AND OVER, 1910				
	Total	Per cent distribution by citizenship			
		Naturalized	Having first papers	Alien	Citizenship not reported
UNITED STATES					
All countries	6,646,817	45.6	8.6	34.1	11.7
Germany	1,278,667	69.5	7.2	9.9	13.3
Russia	737,120	26.1	13.0	52.4	8.6
Italy	712,812	17.7	7.8	65.7	8.7
Austria	609,347	24.6	9.6	57.3	8.4
Ireland	597,860	67.8	5.8	13.8	12.7
Canada and Newfoundland	533,359	51.0	4.9	28.3	15.9
Canada — French	170,987	44.7	3.9	40.2	11.2
England	437,152	59.4	6.9	18.8	14.9
Sweden	349,022	62.8	11.5	14.9	10.8
Hungary	255,844	14.3	10.1	68.2	7.4
Norway	213,042	57.1	15.2	16.2	11.5
Scotland	133,116	56.5	7.8	21.5	14.3
Denmark	102,398	61.6	12.6	13.8	12.0
Mexico	102,009	10.7	2.3	66.6	20.4
Greece	74,975	6.6	6.1	77.6	9.7
Finland	70,716	30.6	15.9	45.9	7.5
Switzerland	69,241	61.8	9.5	14.9	13.8
Netherlands	59,752	56.8	10.7	19.6	12.9
France	59,661	49.6	8.1	27.8	14.4
Wales	43,054	69.2	4.6	10.3	15.9
Turkey in Asia	32,691	21.2	10.3	59.4	9.1
Portugal	28,693	24.9	3.9	64.3	7.0
Rumania	27,835	28.8	17.7	45.2	8.3
Belgium and Luxemburg	27,619	43.0	14.4	31.5	11.2
Turkey in Europe	22,788	6.5	6.4	79.3	7.8
Bulgaria, Servia, and Montenegro	17,524	4.7	5.2	83.0	7.1
Spain	14,170	16.4	5.8	65.0	12.8
Cuba and other West Indies	9,671	30.6	6.3	44.2	18.9
Central and South America	3,315	34.8	8.2	37.4	19.6

The high percentage of naturalization among the nations furnishing the older immigration is largely accounted for by length of residence in the country. A comparison of the figures for the newer immigration shows considerable differences. Thus, of the Greeks only 12.7 per cent are naturalized or have taken out their first papers, and only 9.9 per cent of the Bulgarians, Servians, and Montenegrins. Of the Finns, 46.5 per cent fall in this class; of the Russians, 39.1 per cent; of the Rumanians, 46.5; of those from Turkey in Asia, 31.5 per cent. The high percentages are indicative of a definite tendency of such races to expatriate themselves, and are to be explained by political conditions of the land whence the immigrants come. Finns, Russian and Rumanian Jews, Armenians and Syrians from Turkey, do not contemplate return.

Another statistical evidence of assimilation is found in the acquisition of the English language. There were enumerated, in 1900, 1,217,280 foreign-born persons over 10 years of age, or 12 per cent of the total, who could not speak English. But many of the foreign born from Great Britain and Ireland and Canada speak English as their mother tongue, as much as 24.5 per cent of all. Allowing for these, the percentage of foreign born who had no English antecedents and who had not acquired English was 18.3. The census reports do not go sufficiently into details to give us any indication how far the inability to speak English was due to unwillingness to acquire it and how far to lack of opportunity, due to recent arrival in the United States. It has already been noted that 2,609,173 of the foreign born had arrived in the preceding decade, and that in the decade the non-English speaking elements, even allowing for immigration from Canada, approximated three-fourths of the arrivals. That the foreign element is not averse to learning English would seem to be indicated by the fact that among the native whites of foreign parentage the proportion who do not speak English is only 0.6 per cent.

If we turn now to consider the social effects of immigration, we find our testimony chiefly in the statistics of illiteracy, crime, pauperism, and insanity. As one would naturally expect, illiteracy is more common among the foreign born than among the native whites. For 1910 the figures were 12.7 per cent and 3 per cent respectively. The corresponding figures for 1900 were 12.9 and 4.6; for 1890, 13.1 and 6.2. Illiteracy among the foreign born thus tends to decline.

While illiteracy is more common among the foreign born than among the native born, the children of the foreign born show a lower percentage of illiteracy than those of native parentage. Illiteracy among the children of foreign parentage amounted to 2.2 per cent in 1890, 1.6 per cent in 1900, 1.1 per cent in 1910. The corresponding figures for whites of native parentage were 7.5, 5.7, and 3.7. The superior literacy of the children of foreign parents is doubtless due to the concentration of the foreign born in cities, where educational opportunities are good.

Crime. It is often claimed that the immigrants fill the jails and penitentiaries of the country; and the impression is widespread that, were it not for immigration, there would be little use for such institutions. This impression is entirely erroneous. While it is likely that the foreign born contribute somewhat more

than their proportional quota to the army of law breakers, the disproportion is by no means such as to change materially the amount of crime which would occur were there no foreigners in the population. The extent of their influence upon the volume of crime may be briefly studied.

According to the census of 1910, the total number of offenders in prisons on Jan. 1, 1910, was 111,498, of whom 72,797 were white, 19,438 were foreign born. Thus, while the foreign born represented 16.3 per cent of the white population, they contributed 26.7 per cent of the inmates of the prisons. But criminality is largely confined to adulthood and to the male sex. Now, when it is borne in mind that the foreign born constituted 25.1 per cent of the white population over 21, and 27.3 per cent of the white male population over 21, the apparent excess of criminality dwindles to insignificance.

Insanity and Feeble-Mindedness. A much greater excess of the foreign born appears in the figures for the inmates of hospitals for the insane. Of a total of 115,402 white inmates, on Jan. 1, 1910, the foreign born numbered 54,096, or 47 per cent. A larger proportion of foreign born than of native born was to have been expected in the case of the foreign born, on account of the disproportion of male adults. No such figure as 47 per cent can be explained in this way. The fact that the foreign born are concentrated in the cities probably has something to do with the high percentage of insanity. The strain of city life may tend to produce mental disorder; moreover, many cases of insanity that are neglected under rural conditions are of such seriousness under urban conditions as to require detention in hospitals.

Among the feeble-minded the quota provided by the foreign born is naturally small (6.1 per cent). This is chiefly a result of the rigorous selection to which immigrants are subject upon landing. The effects of this selective process seem entirely to disappear in the second generation. The native born of foreign or mixed parentage constitute 23.6 per cent of the white population and contribute 26.5 per cent of the feeble-minded in institutions. Whether this represents a real excess or not is impossible to determine, since the foreign born of foreign parentage are more decidedly urban than the native born of native parentage, and under urban conditions a degree of feeble-mindedness that might be considered innocuous in the country leads to detention in hospitals.

Pauperism. Of the 77,734 paupers in almshouses enumerated on Jan. 1, 1910, 33,125 were foreign born, or 42.6 per cent of the total. This is a contingent much in excess of the percentage contribution of the foreign born to the general population, even when allowance is made for the greater proportion of persons of advanced age among the foreign born. Its only adequate explanation is the initial poverty of the immigrant and his failure to become adjusted to American economic conditions. It is notable that the native born of foreign parentage contributed only 13 per cent to the number of paupers in almshouses.

Industrial Effects. Looking at the immigration problem from the economic side, we not infrequently hear a complaint that immigration lowers wages. In prosperous times little is heard of this, but when depression sets in complaint becomes general.

The difficulty here is to determine the facts. So complex are the conditions affecting wages that the Industrial Commission, after hearing the most conflicting evidence on both sides of the question, was forced to conclude that a positive effect of immigration on wages cannot be predicated. The Immigration Commission, appointed in 1907, reached the conclusion that there has been a tendency for immigration to lower the wages and standard of living of industrial workers.

The proposition can be supported by inference rather than by direct proof. If the numbers of the foreign born in a given industry are small, it is contrary to reason to suppose that they have a depressing effect upon wages. This raises the question of the amount of competition in a given industry. To this the answer can be found in the census statistics of occupations. The special report on *Occupations at the Twelfth Census* of the bureau of the census shows the percentage of the various elements in the white population employed in the main occupation groups. The concentration of the foreign born in mechanical and manufacturing pursuits, which was already marked in 1890, is shown by the census of 1900 to be on the increase. An interesting point is the apparent tendency of the native born of foreign parentage to show much the same preferences for the industrial group. The percentage of all three population classes engaged in trade and transportation shows a fairly uniform increase.

The concentration of the foreigners in industrial pursuits, as indicated by this table, is to be correlated with their tendency to gravitate towards the cities already discussed. They have gone to the cities because the latter furnish the opportunities of employment, and this was due to the development of mechanical and manufacturing industries. The proportion of the foreign born in these broad groups is not such as to lead us to infer that they exercise a dominating influence upon wages, even if it could be proved, which is extremely doubtful, that they are any

DISTRIBUTION BY OCCUPATIONS OF MALES IN EACH PRINCIPAL ELEMENT OF THE WHITE POPULATION. GAINFULLY EMPLOYED, 1890 AND 1900

OCCUPATIONS	Native born, native parents		Native born, foreign parents		Foreign born	
	1890	1900	1890	1900	1890	1900
Agricultural pursuits	51.4%	47.6%	27.1%	26.0%	25.1%	21.3%
Professional service	4.4	4.4	3.0	3.5	2.2	2.4
Domestic and personal service	8.4	10.5	12.3	13.5	20.1	19.9
Trade and transportation	16.5	18.2	23.3	24.8	15.6	17.5
Manufacturing and mechanical pursuits	19.3	19.3	34.3	32.2	37.0	38.9

more willing than the native laborer to work for low wages. It can therefore only be in certain specified industries, in which the proportion of the foreign born is very large and in which the pressure for work is considerable, that any appreciable influence upon wages will be exerted. Where they do not thus dominate an industry they conform to the current rate of wages. Investigations of the Commissioner of Labor into the cost of production in the iron and steel industries and in the textile industries amply prove this proposition.

On the other hand, where the foreign born crowd for employment and dominate a given industry, as in the clothing industry in New York and Philadelphia, they reduce the rate of wages, and such a permanent reduction is possible because the standard of living which they adopt is so much inferior to that which is customary among their American competitors. The contest with the sweatshop in our great cities leaves no doubt upon this point. The report of the Industrial Commission furnishes cumulative evidence of this tendency in a few lines of activity to build up industries on a basis of starvation wages which themselves rest upon the ignorance, helplessness, and incapacity of the foreign-born population of the tenement-house districts.

The problem of immigration is a problem of assimilation; and this means conformity to modes of living, modes of thought, and modes of action in many different fields of activity. With respect to the permanent additions to the population, the question which concerns us is as to how far it is desirable that we should continue to recruit what are economically the weakest and least promising classes in the community. The idea that there must always be some one to do rough work has no standing in court. Modern engineering devises mechanical appliances for these purposes, and we have no fear that progress will cease because the human race is unwilling to be mere hewers of wood and drawers of water.

Legislation. It has already been pointed out that immigration into the United States was so much a matter of course that before 1820 it was not even recorded. While in that year records of the number of arrivals were introduced, nothing was done in the way of legislation, either to promote or to restrict immigration into the United States, until the year 1864.

We may disregard the brief period in which the famous Alien Law was in force (1798–1801), which authorized the President to expel foreigners dangerous to the peace of the nation, for this law was passed to meet a supposed political danger and not to avert a threatened economic injury. Nor did the agitation against the foreigner, which gained such force in the Know-Nothing movement during the early part of the fifties, lead to legislation. It is doubtful if the question would have assumed so large an importance had it not been for popular discontent with the older political parties. Moreover, the agitation was quite as much anti-Catholic as it was antiforeign, and no majority of the American people could be gained for an attitude savoring of religious persecution.

The police and sanitary regulations, including quarantine, affecting the immigrants upon their landing in the United States were matters of State, and not Federal legislation.

When, in 1864, Congress finally took cognizance of the immigration question, it was with the idea of encouraging immigration into the United States. Under the pressure of the demand for laborers in industrial pursuits, an act was passed to encourage immigration which offered to the immigrants freedom from compulsory military service, and the services, upon their arrival, of a commissioner of immigration, whose duty it was to assist immigrants in obtaining transportation to their destination and to protect them from the impositions to which their ignorance exposed them. The Act was repealed in 1868, and no further legislation to promote immigration was enacted. The general spirit of the times was, however, favorable to immigration, and certain special reports of the Bureau of Statistics, *Labor in Europe and America* (1870), e.g., were widely disseminated with a view to encouraging immigration. About the same time the States, particularly those of the West, established boards and commissioners of immigration, charged with the duty of promoting immigration into their respective States.

It soon became evident that encouragement was no longer needed, and the tide of public opinion began to turn towards restriction. This did not at first extend beyond the idea of preventing the introduction into the country of manifestly undesirable elements—the criminal, the pauper, the insane, and the vicious. Section 1 of the Act of Aug. 3, 1882, imposed a head tax of 50 cents (increased to $1 by the Act approved Aug. 18, 1894, and to $2 by Act of March 3, 1903) on each passenger not a citizen of the United States, stipulating that the money collected shall be paid into the United States Treasury as a fund to defray the expenses of regulating immigration, of caring for immigrants, and relieving those in distress, and for the general purposes and expenses of carrying the act into effect. By Act of Feb. 20, 1907, the head tax was increased to $4. An Act of March 4, 1909, abolished the immigrant fund and ordered the covering of the receipts from the tax into the general Treasury. Since 1903 the tax has regularly produced a surplus above the cost of administration of the immigration law. In 1913 this surplus revenue amounted to nearly $2,000,000.

Section 2 provided that the Secretary of the Treasury should be charged with the duty of executing the provisions of the act, and for that purpose empowered him to enter into contracts with the officials of the several States at their several ports. By the Act of March 3, 1903, the Commissioner General of Immigration is placed under the authority of the Secretary of the Treasury, although the Immigration Bureau is subordinate to the Department of Labor.

Section 3 provided that the Secretary of the Treasury establish such rules and regulations, and issue from time to time such instructions, not inconsistent with law, as he should deem best calculated for the protection of immigrants from fraud and loss and for carrying out the provisions of the act and the immigration laws of the United States, etc.

Section 4 treated of the exclusion and deportation of specified classes. It provided that foreign convicts, except those convicted of political offenses, lunatics, idiots, or any persons not able to take care of themselves without becoming public charges, should be sent back at the expense of the owners of the vessels on which they had come.

The Act of 1882 is still in force in principle

though in minor points it was modified by a Law of March 3, 1891, of which the following section is the most important:

"That the following classes of aliens shall be excluded from admission into the United States, in accordance with the existing acts regulating immigration, other than those concerning Chinese laborers: All idiots, insane persons, paupers, or persons likely to become a public charge, persons suffering from a loathsome or a dangerous contagious disease, persons who have been convicted of a felony or other infamous crime or misdemeanor involving moral turpitude, polygamists, and also any person whose ticket or passage is paid for with the money of another, or who is assisted by others to come, unless it is affirmatively and satisfactorily shown, on special inquiry, that such person does not belong to one of the foregoing excluded classes, or to the class of contract laborers excluded by the Act of February 26, 1885; but this section shall not be held to exclude persons living in the United States from sending for a relative or a friend who is not of the excluded classes under such regulations as the Secretary of the Treasury may prescribe. *Provided*, That nothing in this act shall be construed to apply to or exclude persons convicted of a political offense, notwithstanding said political offense may be designated as a 'felony, crime, infamous crime, or misdemeanor involving moral turpitude' by the laws of the land whence he came, or by the court convicting."

The act was further amended by the Law of March 3, 1903. By this law the Bureau of Immigration is given a right to deport epileptics, persons who have been insane within the five years preceding their arrival in America, and persons who advocate the overthrow of all governments or the assassination of public officials. Deportation may take place any time within three years after arrival. For the sexually immoral classes the three-year limitation has been removed.

The joint administration of immigration affairs by Federal and State officials which had been in vogue since the passage of the Act of 1882 had not proved satisfactory, and by the Act of 1891 the entire charge of the matter was assumed by the general government. The Statute of March 3, 1893, took a step in advance of previous legislation by requiring at least a preliminary inspection of immigrants at the point of departure. Each immigrant is provided with a number identifying him to the inspectors of the United States. The medical inspection provided by the act has been a useful aid in preventing the introduction of disease. Furthermore, a fine of $100 is assessed upon any steamship company that brings to the United States an alien afflicted with a loathsome or dangerous contagious disease, tuberculosis, idiocy, imbecility, epilepsy. Under this provision $30,200 was levied in fines in 1913.

Side by side with legislation to exclude persons morally and physically undesirable has gone the effort to exclude the contract laborer. The first law on this subject was passed Feb. 26, 1885. It made it unlawful for any person, company, partnership, or corporation in any manner whatsoever to prepay the transportation or in any way assist or encourage the importation or migration of any alien or foreigner into the United States, under contract or agreement or parole, special, expressed, or implied, made previous to the importation of such alien or foreigner to perform labor or service of any kind in the United States. The law excepted strictly personal and domestic servants from its provisions.

The object of this legislation was to prevent the agents of manufacturers from contracting in Europe with the laborers, oftentimes in herds, for the purpose of breaking strikes or introducing a supposedly more docile, because more ignorant, class of laborers. Moreover, it is plain that contracts made abroad would be made with reference to the scale of wages existing in foreign countries rather than those in force here and would thus introduce a lower-priced competition, dangerous to the well-being of the working classes. The general spirit of the law has been commended by public opinion, though in its first form it presented some crudities which placed it in a ridiculous light, as where a clergyman was denied admission to the United States by reason of a contract made in England to assume charge of a parish in New York. Subsequent modifications distinctly eliminating the professional classes and bringing the operation of the law within the intention of the legislators have much improved the statute.

The general characteristic of the United States immigration laws is that whoever enters in violation of the law is to be returned to the point of departure at the expense of the steamship company which brought him, and that this liability extends in all cases for a period of one year after arrival. The machinery for the enforcement of the law has been progressively improved. The following table will indicate the extent to which the practice of exclusion has been employed, and on what grounds, in recent years. It is to be borne in mind that the principal effect of the law is to compel a fairly minute examination, by the transportation companies, of intending immigrants.

CAUSE OF REJECTION	1907	1908	1909	1910	1911	1912	1913
Idiots	29	20	18	16	12	10	18
Imbeciles	....	45	42	40	26	44	54
Feeble-minded persons	....	121	121	125	126	110	483
Insanity (including epileptics)	189	184	167	198	144	133	198
Likely to become a public charge (including paupers and beggars)	6,866	3,741	4,458	15,927	12,048	8,182	7,956
Afflicted with contagious diseases	3,822	2,847	2,308	3,033	2,735	1,674	2,457
Afflicted with tuberculosis	....	59	82	95	111	74	107
Physically or mentally defective	....	870	370	312	3,055	2,288	4,208
Criminals	341	136	273	580	644	592	808
Prostitutes and other immoral aliens	18	124	323	316	253	263	367
Procurers of prostitutes	1	43	181	179	141	192	253
Contract laborers	1,434	1,932	1,172	1,786	1,336	1,333	1,624

One of the great difficulties in the way of the thorough administration of the law is the comparative ease with which persons of the undesir-

able classes obtain access to the United States through Canada. Arrangements have been made between the Canadian government and the immigration service establishing an inspection in Canada. The effort is made to inspect not only the immigrants who give the United States as their destination, though arriving at Canadian ports, but also those who give Canada as their destination, but come into the United States. The fact that, of less than 5000 persons of the latter class inspected, 2000 were turned back, indicates clearly that the ineligible classes have been coming into the United States over the Canadian border.

The present immigration laws represent little more than sanitary measures designed to protect society from the introduction of positively vicious and undesirable elements. The demand has been heard, and has been supported by a wealth of argument, that the United States should be more liberal in its interpretation of the word "undesirable," and exclude also such immigrants as by reason of incapacity and ignorance give the least promise of assimilation.

The question of still further restricting immigration made its appearance in the early nineties. It was felt that many persons were admitted into the United States who were not desirable acquisitions to its population. The demand was heard in many quarters that the illiterate should be excluded, and the question was actively agitated in Congress until 1897. In that year a bill passed both Houses of Congress which excluded from admission to the United States all foreign persons over 16 years of age who could not read or write the English or some other language, except parents or grandparents accompanying persons otherwise qualified, or coming to join relatives already in the United States. The bill was vetoed in the closing hours of Congress, March 3, 1897, by President Cleveland, on grounds of general policy, as well as for material defects in the measure, such as the exclusion of the illiterate wives of qualified persons. The bill was reconsidered in the House of Representatives and passed over the President's veto by the constitutional majority of two-thirds; but no attempt was made to force a vote in the Senate. In 1906 a measure excluding immigrants unable to read or write English and increasing the head tax was debated in Congress, but as amended merely provided a bureau of immigration and naturalization, whose duty it is to keep a registry of all aliens entering the United States. The Immigration Commission in its recommendations, published in 1911, strongly urged limitation of immigration and favored a literacy test among the measures that would have a restricting tendency. A measure limiting the immigration of illiterates to certain specified classes was passed by both Houses of Congress in 1912, but was vetoed by President Taft. A similar measure was vetoed by President Wilson in 1915. A new principle of restriction was proposed by the Immigration Commission: the limitation of immigrants from a specific country to a definite percentage of the immigrants from that country already in the United States. This proposal was embodied in the Dillingham Immigration Bill, introduced in Congress in 1910. By Act of Congress approved March 4, 1913, a Bureau of Immigration, under the Department of Labor, was created.

In 1917, President Wilson for the second time vetoed an immigration law containing a literacy test. He declared that this test was not one of personal fitness or character. He said that it would serve merely as a penalty for lack of opportunities in the country from which the alien came. A second reason given by him was that the bill contained a provision for admitting refugees from religious persecution even if they could not pass the literacy test. He feared that the presence of such a clause would make it necessary for immigration officials to pass judgment on the laws and policies of foreign governments, and that it might lead to unnecessary friction between the United States and the government concerned. The bill was passed over the president's veto and thus became effective. The literacy provision excludes from the United States all aliens over 16 years of age and physically able to read, who cannot read the English language, or some other language or dialect. Any alien, however, who is admitted, can bring in, or send for, a father, or grandfather, over fifty-five years of age, his wife,

IMMIGRATION QUOTAS UNDER RESTRICTION ACT

Country or Place of Birth	Quota Fiscal Year 1921-22	Limit Per Mo., Fiscal Year 1921-22	Country or Place of Birth	Quota Fiscal Year 1921-22	Limit Per Mo., Fiscal Year 1921-22	Country or Place of Birth	Quota Fiscal Year 1921-22	Limit Per Mo., Fiscal Year 1921-22
Albania	287	57	Roumania	7,414	1,483	Zone). Persons born in Siberia are included in Russian quota	78	16
Austria	7,444	1,489	Russia (incl. Siberia)	34,247	6,849	Africa	120	24
Belgium	1,557	311	Spain	663	133	Australia	271	54
Bulgaria	301	60	Sweden	19,956	3,991	New Zealand	50	10
Czecho-Slovakia	14,269	2,854	Switzerland	3,745	749	Atlantic Is. (other than Azores, Madeira, and islands adjacent to the American Continents)	60	12
Danzig	285	57	United Kingdom	77,206	15,441			
Denmark	5,644	1,129	Other Europe (including Andorra, Gibr'lt'r, Lich'nst'n, Malta, Monaco, S. Marino, Iceland)	86	17	Pacific Is. (other than New Zealand and islands adjacent to the American Continents)	22	4
Finland	3,890	778						
Fiume	71	14						
France	5,692	1,138						
Germany	68,039	13,608						
Greece	3,286	657	Armenia	1,588	318			
Hungary	5,635	1,127	Palestine	56	11			
Italy	42,021	8,404	Smyrna District	438	88			
Jugo-Slavia	6,405	1,281	Syria	905	181			
Luxemburg	92	18	Oth. Turkey (Europe, and Asia)	215	43			
Netherlands	3,602	720						
Norway	12,116	2,423	Other Asia (including Persia and territory other than Siberia which is not included in the Asiatic Barred					
Poland	20,019	4,004						
Eastern Galicia	5,781	1,156						
Portugal (incl. Azores and Madeira Is.)	2,269	454				Total	355,825	71,163

mother, grandmother, or unmarried or widowed daughter, regardless of whether such relatives can read or not.

This new immigration law did little to check the flood of arrivals after the war. Consequently there was a widespread demand in many quarters for greater restrictive measures. As a result an emergency measure was adopted on May 19, 1921. The essential features of the act are as follows:

Sec. 2 (a) That the number of aliens of any nationality who may be admitted under the immigration laws to the United States in any fiscal year shall be limited to 3 per cent of the number of foreign-born persons of such nationality resident in the United States as determined by the United States census of 1910. This provision shall not apply to the following, and they shall not be counted in reckoning any of the percentage limits provided in this act: (1) Government officials, their families, attendants, servants, and employees; (2) aliens in continuous transit through the United States; (3) aliens lawfully admitted to the United States who later go in transit from one part of the United States to another through foreign contiguous territory; (4) aliens visiting the United States as tourists or temporarily for business or pleasure; (5) aliens from countries, immigration from which is regulated in accordance with treaties or agreements relating solely to immigration; (6) aliens from the so-called Asiatic barred zone; (7) aliens who have resided continuously for at least one year immediately preceding the time of their admission to the United States in the Dominion of Canada, Newfoundland, the Republic of Cuba, the Republic of Mexico, countries of Central or South America, or adjacent islands; or (8) aliens under the age of 18, children of American citizens.

(b) For the purposes of this act nationality shall be determined by country of birth, treating as separate countries the colonies or dependencies for which separate enumeration was made in the United States census of 1910.

(c) When the maximum number of aliens of any nationality who may be admitted in any fiscal year under this act shall have been admitted, all other aliens of such nationality, except as otherwise provided in this act, who may apply for admission during the same fiscal year, shall be excluded; *Provided*, that the number of aliens of any nationality who may be admitted in any month shall not exceed 20 per cent of the total number of aliens of such nationality who are admissible in that fiscal year; *Provided further*, That aliens returning from a temporary visit abroad, aliens who are professional actors, artists, lecturers, singers, nurses, ministers of any religious denomination, professors for colleges or seminaries, aliens belonging to any recognized learned profession or aliens employed as domestic servants, may, if otherwise admissible, be admitted notwithstanding the maximum number of aliens of the same nationality admissible in the same month or fiscal year, as the case may be, shall have entered the United States; but aliens of the classes included in this proviso who entered the United States before such maximum number shall have entered shall (unless excluded by subdivision (a) from being counted) be counted in reckoning the percentage limits provided in this act.

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IMMIGRATION, CHANGES IN BODILY FORM OF DESCENDANTS OF IMMIGRANTS. The Immigration Commission of the United States appointed Professor Franz Boas, New York City, to conduct an investigation of the modifications undergone by the descendants of immigrants residing in New York City. The results of this study were announced in 1911, from which it appears that among other changes the children of Europeans show a tendency to change their head form. Thus, according to the cephalic index (see INDEX, CEPHALIC), Sicilians born in Sicily are rated at 78, while Sicilians born in New York are rated at 80; and again European-born Jews at 83 as against 81 for the New York born. Similar changes were found among other immigrants. (For tables of measurements, consult *Report of the Immigration Commission*, Washington, 1911.) It is claimed that these changes are entirely due to the geographical or other environment, and that on the whole the differences tend towards a medium index of 80, suggesting that the American environment may be forming a distinct type by changing the anatomy of its inhabitants. To this interpretation many authorities object, but the fact remains that a difference has been demonstrated between the foreign born and the native born. To determine the true significance of these differences, further investigation will be necessary.

IMMISCH, ĭm'ĭsh, OTTO (1862–). A German classical scholar, born at Wartha, Lusatia. He was educated at the University of Leipzig, where he became lecturer in 1889 and was professor from 1896 to 1907. After six years at Giessen, in 1913 he became professor at the University of Königsberg. He wrote much for philological journals, and among his separately published works the more important are: *Philologische Studien zu Plato* (1896; 1903); *Die innere Entwicklung des griechischen Epos* (1904); a revision of Susemihl's *Aristotelis Politica* (1909); *Wie studiert man klassische Philologie?* (1909); *Das Erbe des Alten* (1911).

IM'MOLA'TION (Lat. *immolatio*, from *immolare*, to sacrifice, from *in*, in + *mola*, grindstone, meal, from *molere*, to grind; connected with Goth., AS., OHG. *malan*, Icel. *mala*, Ger. *mahlen*, to grind, Eng. *meal*). A Roman sacrificial ceremony in which the victim was sprinkled with meal coarsely ground and mixed with salt (called *mola salsa*). Hence, to immolate means to sacrifice.

IM'MORAL'ITY (from Lat. *in-*, not + *moralis*, moral, from *mos*, custom, right). In its broadest sense, any breach of the duty which one owes to God, to his fellowmen, or to himself; in a narrower, popular sense, an act or course of conduct which strongly violates the sense of decency of the community, especially offenses of a sexual character.

Immorality, as such, is generally not punished by law, but is left to be dealt with by the informal agencies of social control or by the ecclesiastical authorities. It is only when an immoral act or course of conduct is so harmful to others than the wrongdoer, or is so repugnant to the sense of decency and morality of the community as to excite general indignation, that its control and punishment are taken over by the law. As the foundation of criminal jurisprudence is the duty and necessity which rests upon the authorities of preserving the peace, the class of immoral acts first recognized as proper subjects for legal recognition are crimes of violence, and then, at a later stage, any other acts leading to breaches of the peace. Acts of private immorality, i.e., such as do not directly affect any others than the participants therein, as drunkenness, gambling, fornication, and the like, have not generally, except under an ecclesiastical dispensation, been noticed by the law, except in cases where they were committed publicly so as to constitute them a public nuisance.

But though the law may tolerate immorality, certain classes of immoral acts may yet incur indirectly the condemnation of the law, as by denying to the person who has been guilty of them his right to enforce a claim upon a contract or a tort arising out of such an act. Thus, a bond given for an immoral consideration, or to secure the performance of an immoral act, is unenforceable. However, a completed transfer of property, real or personal, is none the less valid and binding because based on an immoral consideration. Immorality which does not fall under the ban of municipal law rarely, if ever, affects the legal rights or status of a person. It may subject him to social censure, but it does not defeat him in the prosecution of a legal claim. Cf. MALUM IN SE.

The present tendency, both in Europe and in the United States, seems to be to extend the control of the law over the private lives of persons and more and more to make acts of immorality subject to legal penalties. See ADULTERY; FORNICATION; DRUNKENNESS; GAMBLING.

IM'MORTAL'ITY (Lat. *immortalitas*, from *immortalis*, undying, from *in-*, not + *mortalis*, mortal, from *mors*, death; connected with Skt. *mar*, to die, Gk. *μόρος*, *moros*, death, and *βροτός*, *brotos*, mortal, Lith. *mirti*, to die, OChurch Slav. *mrŭtvŭ*, dead, OHG. *mord*, Ger. *Mord*, murder, AS. *morþ*, death). The endless existence of the human soul in the continued possession of its distinct personality and consciousness. How early the idea of a survival after death entered the mind of man cannot be determined. Some evidence has been recently forthcoming of such a disposal of the dead already in the later periods of the Paleolithic age as would seem to indicate at least a tendency of thought in this direction; and when the marvelous artistic development of the Magdalenian period is considered, revealing as it does a comparatively advanced religious speculation, this interpretation of certain apparent mortuary customs is by no means improbable. In the Neolithic age not only the ornaments, weapons, tools, and food placed by the side of the dead, but the houses, mounds, chulpas, and tombs built for them, testify to a belief that some of the dead for some time continue some kind of an existence after death. It is probable that at first death was looked upon as a deep and prolonged sleep. The dead was left in his dwelling place, the survivors seeking a new home, or a special structure was made for him. Visions of the departed in dreams naturally led to the conclusion that they left their dwellings in the night, and, upon further reflection, to the theory of a double of finer material, but dependent upon the food and drink brought to the tomb. The practices of the Neolithic age already imply the development of some such theory of a "soul." The fact that these customs and the faith they imply survived into the more advanced civilizations of antiquity and are to be found extensively at the present time among peoples that have remained upon lower stages of development, indicates for them a very high age.

Tombs were the earliest temples, and the ancestral cult was the earliest form of divine worship. As long as offerings were made to the dead the departed ancestors were believed to exist and to protect their descendants. Thus the cult itself tended to create a confidence in an indefinite prolongation of existence in the case of the objects of filial worship. As the great cosmic forces began to attract more attention, the double of the dead might be connected with them in one way or another and thereby become more independent of the tomb. But even where, as in Egypt, this process can be most clearly perceived, the ancestral cult as the basis of hope for survival maintained itself to the latest times. Whether the mass of men in Egypt who were too poor to pay the cost of embalming and "a house for eternity" were regarded as long surviving the shock of death, is doubtful. But the assurance in a future life, as rich as the present and not very different in its outward conditions, for those properly embalmed and entombed, was very strong. Numerous pictorial representations and inscriptions in tombs and papyri from different periods show how intensely the inhabitants of the Nile valley believed in a life after death.

Starting from the same premises, speculation as to the future took a different turn in India. The doctrine of metempsychosis was developed. Without losing its identity the spiritual substance in man was supposed to enter into other forms of life, rising or sinking in the scale of being in consequence of the deeds wrought in the body and the character formed. (See ESCHATOLOGY.) This transmigration of souls implied eternal existence before as well as after any appearance in the world as a human being. It precluded the idea of a disembodied spirit, and it adjusted outward circumstance to inner character, punishment to crime, and reward to virtue more nicely than any other system of thought. But this assurance of eternal life became itself a burden to the mind of man, and it cried out for deliverance from the endlessly turning wheel of existence. Buddhism offered relief in the hope of Nirvana. In Persia Mazdaism proclaimed, possibly not in the Gathic period, but at least as early as the fifth century B.C., the doctrine of a resurrection (q.v.). This doctrine was no doubt based upon the simpler

and more widespread belief that the sleepers in the dust might be aroused. Cases of apparent death and successful resuscitation would strengthen this expectation. The animistic basis is quite evident.

Among the Iranian peoples of the northwest, the Sarmatians, the Scythians, and the Thracians, the faith in a future life was very strong. From Thrace the Orphic cult spread in the Greek world. While the Mycenæan tombs, as compared with the remains of the preceding age, reveal a growing importance attached to the life beyond, but no conceptions differing from those generally associated with the ancestral cult, and the Homeric poems tell of Elysian fields as well as of a barren and cheerless Hades, but put no emphasis upon what still is a somewhat shadowy existence beyond with no moral distinctions, the Orphic cult societies offered to the initiated the hope of a blessed immortality. (See ESCHATOLOGY; HEAVEN; HELL.) The arguments of Socrates and Plato are far from being the first intimations of immortality among the Greeks. They are not endeavors to open new vistas into a life beyond. On the contrary, they represent a critical tendency seeking to establish the truth of a view held by many, and to find the rational grounds on which it can be maintained, if at all. In the following periods skepticism prevailed in some circles, ardent belief in others. If the practical character of the Roman caused him to cling to the ancestral cult, his hospitality to religious ideas opened the doors to the doctrines taught by the Orphic and Dionysiac societies. It was a real life of battle and of joy to which the Teutonic warriors looked forward in Odin's hall, Valhalla.

Among the Semitic nations the prevailing view left little joy in the thought of man's fate after death. The Babylonians and Assyrians seem to have believed in a semiconscious later existence, but with no distinctions based on character or conduct and no feature rendering it desirable. The myth of Ishtar's descent to the nether world shows that imagination occupied itself with the abode of the dead, and the translation of some heroes to be with the gods tends to mark the contrast with the ordinary issues of human life. Substantially the same conception of the future was held by the ancient Hebrews. (See SHEOL; HADES.) There was no conception of an endless existence of the human soul in possession of a distinct consciousness, and no intimation of a difference based on conduct in this life. A poetic passage (Isa. xiv) possibly shows that the kings were thought of as sitting upon thrones—consequently a social distinction. The intense religious life of the nation did not occupy itself much with the future of the individual. Neither the prophets, nor the legislators, nor the poets, nor the great wisdom teachers, seem to have attached much importance to it. Their opposition to the ancestral cult and to necromancy may account in a measure for this indifference. Only as the sufferings of innocent individuals, particularly in the Exile, made the question of the divine government of the world acute, did "the hope of man" receive attention by the thinkers of Israel. But the author of Job presents this possibility of a restoration to life only in order to reject it. He is not willing to obscure the issues by the introduction of what he considers a vain and improbable speculation. A high type of piety thus flourished without a hope of immortality. But the growing demand for a justification of the ways of God was met by foreign conceptions that brought relief by a temporary postponement of the problem. Persia contributed the thought of a resurrection, Greece that of immortality in the stricter sense. The conception of a resurrection appears for the first time in Jewish literature in the last chapter of the Book of Daniel (written in 165 B.C.). Here some of the dead are raised, probably the martyrs of the great persecution and their oppressors, to continue their life on earth.

There is evidence that this new life was sometimes regarded as of limited duration. In regard to the new body, some maintained that it was identical with the old, or of a similar substance; others that it was spiritual; some that it was bestowed on men at a general resurrection in the future; others that it was given immediately after death. In some circles it was thought that only the Israelites or the good would be raised; in others, that all men, even the wicked, would rise. (See RESURRECTION.) The new doctrine was chiefly accepted by the Pharisees; the Sadducees strongly opposed it. Ecclesiastes rejected the idea of a survival after death in every form. Meanwhile the Greek conception of immortality based on the nature of the soul, with or without the notion of preexistence, found acceptance not only among the Alexandrian Jews but to some extent also in Palestine. A doctrine of a future life in which the resurrection had no place is found in the Slavonic Enoch (see ENOCH, BOOKS OF), Wisdom of Solomon, Philo, among the Essenes, and elsewhere. Jesus himself seems to have believed in a spiritual resurrection occurring immediately after death. A somewhat similar conception is found in the Pauline literature, while the Fourth Gospel presents the eternal life as a sharing in the divine nature that may begin in time and continue through eternity, and seems to use the term "resurrection" figuratively. The firm conviction of the early Church that Jesus had risen from the nether world and ascended to heaven, and that He would presently return in glory to raise the dead and establish His kingdom on earth, tended to base the hope of survival upon His resurrection.

In 1 Corinthians xv the thought is expressed that if Jesus was not risen His disciples are not raised, and that it does not matter how life is lived if that is the case. It was felt that through His resurrection He had thrown light upon life and immortality. Much of the success of Christianity was no doubt due to the prospect that it held out for a future life. It offered to all men, even slaves and barbarians not permitted to participate in the official cult and not invited to take the holy vows of the secret cult societies, the same blessed immortality that was promised to those initiated in the Orphic, Dionysiac, and Mithraic mysteries, and it was itself influenced by the thoughts that had prevailed in these religious societies. (See HEAVEN; HELL.) The Greek idea that the soul is immortal by virtue of its own nature became dominant in Christian theology. The controversies within the Church have not affected this fundamental position, but have had reference to the character of the future life.

Through Maimonides the Greek conception of immortality found its way into the synagogue. At first it had a tendency to exclude the doctrine of a resurrection; subsequently it was

made the philosophical basis of this doctrine, as in the Church. With the renascence of learning and the development of natural science doubts as to the immortality of the soul began to be expressed. Uriel Acosta (q.v.) was persecuted for rejecting this doctrine, and he had sympathizers among the deists. The growth of evolutionary philosophy in the nineteenth century led many minds to question the survival of the human soul after death, and the possibility of a continued life of the spirit apart from the bodily organism is to-day widely denied in scientific circles. Various reasons are given for this negative position. It is maintained that the mental life of man is so closely connected with and invariably dependent upon the brain that a continuance of any intellectual functions after the dissolution of the body is inconceivable. As the mentality of man appears to differ from that of the animal only in degree, and not in kind, any argument from the peculiarities of the human mind is held to imply also the immortality of the lower organisms.

Still greater difficulties are thought to arise from man's embryological development. The lack of any convincing evidence of communication between the dead and the living is pointed out, and it is urged that the origin of the belief can be naturally accounted for, and that its persistence is largely due to the social conditions in which man is placed. On the other hand, the doctrine is defended not only from the standpoint of belief in an infallible revelation, but also by thinkers who claim the right of free inquiry and base their views solely upon what appears to them to be sufficient evidence. As a more careful exegesis renders it increasingly difficult to appeal to the Old Testament on that subject, it is generally the New Testament, and particularly the words ascribed to Jesus Himself, that furnish the authority. Even from an independent point of view, great weight is often accorded to the conception of Jesus and the New Testament writers, on the ground of the deeper intuition into religious truth possessed by them. The uncertainty, however, as to the actual words of Jesus and the growing impression that some at least of the writers of the New Testament did not believe in a natural immortality, but in an endless life bestowed as a free gift of God upon His children in an especial sense, have led many scholars who attach much importance to these spiritual authorities to accept the theory of a conditional immortality. The good, in their opinion, will continue to exist; the wicked are destined for final annihilation.

Where the question of man's survival is decided in the affirmative without an appeal to authority, the reasons given are such as the inadequacy of the objections, the difficulty of accounting for certain phenomena except as manifestations of spirits, the incompleteness of the present life, and the "intimations of immortality" to which it is felt that an objective reality must correspond. Facts are quoted that tend to show the independence of man's mind operating with great clearness, precision, and strength even in wholly abnormal physical conditions; and though, to render the argument strictly cogent, it would be necessary to prove that in these instances the brain was also affected, and that the mental power would not have been enhanced if the physical conditions had been more normal, importance seems to be rightly attached to this consideration. That the relation between mental activities and cerebral changes is very intimate is not denied; but it is thought that a distinct and separable spirit using the brain as its organ might act upon it in such a manner as to express different perceptions through different cerebral centres. The argument based on the evolution of mental life in animal and man, and the transmission of psychical as well as physical characteristics from man to man, is met by the observation that the consciousness of self, whatever its origin, is so distinguishing a mark of human nature and so intrinsically significant that a greater permanence and a loftier destiny may well be associated with it. Instead of making self-consciousness the basis of immortality, others prefer to think of the possession of a sense of right or a peculiarly high development of the moral nature as furnishing the ground for survival.

A mass of testimony is produced, ancient and modern, to show actual communication between the dead and the living. Much of this testimony comes from persons bereaved of some relative or friend whose potent personality still occupies the mind. In almost all instances the initiative is taken by the living, and the communication is mediated through a third person. A critical sifting is often impossible. Where the manifestations through a medium have been watched and studied by scientifically trained observers, there is at best only a small residue of facts that cannot be accounted for by known laws of nature. In the present state of our knowledge of psychical phenomena it is sometimes hazardous to pronounce a judgment. The scientist is, as a rule, inclined to assume the operation of some law of nature not yet fully understood. The manifestations may thus furnish to our minds a presumption in favor of immortality, but they cannot prove it. With more effect an argument is founded upon the incompleteness of the present life. The largest part of the human race die in infancy, or before years of discretion have been reached, and it is natural to ask whether there is no outflowering elsewhere of the human life that only buds here. Even the longest lifetime raises more intellectual problems than it solves, and leaves the mind curiously looking for their solutions to the last. The moral imperfections, seen even in the best, painfully apparent in the masses of men, give the impression of something fragmentary, unfinished, partially realized.. The inequalities of life as regards wealth, position, health, opportunity for self-realization, and the still more marked inequalities of character, seem to call for a readjustment, for compensations in another life. If these considerations strictly prove only a dissatisfaction with prevailing conditions, and would to some extent lose their validity as arguments in a state of society better organized, more intelligent, resourceful, and strong than the present, the shrinking from even a painless death, the sense of an inalienable personality, and the long and widespread prevalence of the hope of a future life are deemed by many to have evidential value. The fear of death may indeed be a dread of extinction, and the fear of something after death the involuntary reflection of a belief long cherished by mankind. But it is forcefully argued that a belief so strong and persistent is not likely to be a sheer delusion.

While manifestly it is not safe to conclude from the intensity and popularity of an idea that there must be an objective reality corresponding to it, and while it is especially to be considered that modern science has revolutionized that estimate of the universe, held throughout the ages, with which all eschatological speculations in antiquity were closely connected, it nevertheless seems plausible that some fact in nature's economy is reflected in the hope of immortality. That the elements composing man's body at death are imperishable and will forever continue to be integral parts of forms that manifest the eternal energy, is reasonably certain. That his psychical peculiarities survive in his offspring and in the human lives that directly or indirectly come into contact with him, is a matter of easy observation. Whether this survival in the race is endless seems to some thinkers doubtful, on the ground that the earth itself will some day have run its course and ceased to be the bearer through space of organic life. But as it is quite inconceivable that in an infinite universe, constituted, as spectral analysis shows, of essentially the same substances, a single satellite of a single sun should have produced intelligence like that of man, the secret of the earth's life may become known, and the influence of the human race, large or small, good or bad, may be felt elsewhere in the universe ere the final catastrophe comes, and even out of the death of this planet are likely to rise new forms of life.

That man will live forever in other forms of physical organization and of consciousness may therefore be regarded as exceedingly probable. Whether the consciousness of personal identity which cannot be stripped off or dissolved in the succession of fluctuating mental states and the accompanying sense of moral accountability can be fully explained as products of the brain due to the persistency of the physical type, in spite of incessant changes in the organism, may be gravely questioned. From the standpoint of idealistic philosophy this consciousness of self is interpreted as betokening the presence of a spiritual monad reflected to human sense perception only as though it possessed a material form. But even if the ultimate reality is conceived of as an infinite, eternal, and inexhaustible energy, it does not seem to follow that each or any of its individualized expressions shares its everlasting persistence. Rather would it seem as if the reality that no longer is shadowed forth to our sense in the outward form of a man must have ceased to be what it was. The idea of a conditional immortality has received some additional strength from the doctrine of a survival of the fittest. It encounters great difficulties, however, in attempting to define what constitutes fitness. The difference between a short life on earth and an endless existence is so infinitely great that the mind shrinks from ascribing the power to determine so momentous a fate to any conviction that has been formed, or disposition that has been developed, or line of conduct that had been adhered to, during a few years of earthly life, especially in view of the enormous influence of heredity and environment. If therefore scientific inquiry apparently leads to a *non liquet*, and assurance based on authority can be preserved only until the authority itself is questioned, it is the more gratifying to note the important place the doctrine of immortality has had in the education of the human race in enhancing the worth of the individual and emphasizing his higher spiritual interests, in maintaining his confidence in the inherent rightness of the universe, and in training him to regulate his present conduct by considerations of the future.

In Occidental philosophy the question of immortality has been discussed with great vigor and interest since the time of Socrates; but in this article it will be possible to give only a few typical quotations from modern philosophers, to show how varying have been the reasons given for the affirmative answer to the question. Kant's treatment of the subject is famous; after criticizing the rationalistic position on the subject, according to which immortality can be proved from the simplicity of the soul, Kant makes of immortality not a demonstrable doctrine but a moral postulate. "The realization of the *summum bonum* in the world is the necessary object of a will determinable by the moral law. But in this will the *perfect accordance* of the mind with the moral law is the supreme condition of the *summum bonum*. This then must be possible, as well as its object, since it is contained in the command to promote the latter. Now, the perfect accordance of the will with the moral law is *holiness*, a perfection of which no rational being of the sensible world is capable at any moment of his existence. Since, nevertheless, it is required as practically necessary, it can only be found in a progress *in infinitum* towards that perfect accordance, and on the principles of pure practical reason it is necessary to assume such a practical progress as the real object of our will. Now, this endless progress is only possible on the supposition of an *endless* duration of the existence and personality of the same rational being (which is called the immortality of the soul). The *summum bonum*, then, practically is only possible on the supposition of the immortality of the soul; consequently this immortality, being inseparably connected with the moral law, is a postulate of practical reason (by which I mean a *theoretical* proposition, not demonstrable as such, but which is an inseparable result of an unconditional *a priori practical* law)." (*Kritik of Practical Reason*, pp. 262–263; Abbott's translation.) Some followers of Kant have on Kantian principles attempted to go further than their master and to *demonstrate* immortality. Thus, Professor Howison, taking the Kantian thesis that time is not objectively real, but "an expression of each mind's spontaneous activity," establishes upon this the "eternity of the individual spirit in the only ultimate meaning of eternity; since, as the ground and source of Time itself, the being of the soul must transcend Time, though including Time, and consequently, while involving everlastingness, must have its *full* meaning in just that spontaneous sourcefulness of self-consciousness from which everlastingness arises." Thus the "sourceful and directive power of our individuality" involves, "first, the essential supremacy of the soul over death, and then its intrinsic imperishableness from any cause." (*Limits of Evolution*, pp. 303 ff.) This, as is seen, is a carrying out of Kant's principles to a multipersonalistic issue. Royce, taking the position of absolute and monistic idealism, has his own way of proving immortality. According to his absolute idealism every individual finite experience is a

fragment of the eternal and absolute experience, which he calls God. Now, "in three ways, our union with God implies an immortal and individual life. For first, in God, we are real individuals, and really conscious Selves—a fact which neither human thought nor human experience, nor yet any aspect of our present form of consciousness, can make present and obvious to our consciousness, as now it is. But since this very fact of our eternal and individual Selfhood is real as a conscious fact, in God, we too, in him, are conscious of our individuality in a form higher than that now accessible to us. And secondly, the death of an individual is a possible fact, in an idealistic world, only in case such death occurs as an incident in the life of a larger individual, whose existence as this Self and no other, in its individual contrast with the rest of the world, is continuous in meaning with the individuality that death cuts short. No Self, then, can end until itself consciously declares, 'My work is done, here I cease.' But, thirdly, no ethical self, in its union with God, can ever view its task as accomplished, or its work as done, or its individuality as ceasing to seek, in God, a temporal future. In Eternity all is done, and we too rest from our labors. In Time there is no end to the individual ethical task." (*The World and the Individual*, vol. ii, p. 445.) In this a very strong echo of Kant is detected. James does not attempt to prove immortality, but to make it tenable as a working hypothesis. In his view the main argument against immortality is the fact that thought is a function of the brain. "When the physiologist who thinks that his science cuts off all hope of immortality pronounces the phrase, 'Thought is a function of the brain,' he thinks of the matter just as he thinks when he says, 'Steam is a function of the teakettle,' 'Light is a function of the electric circuit,' 'Power is a function of the moving waterfall.' In these latter cases the several material objects have the function of inwardly creating or engendering their effects, and their function must be called *productive* function. . . . But in the world of physical nature productive function of this sort is not the only kind of function with which we are familiar. We have also releasing or permissive function, and we have transmissive function. The trigger of a crossbow has a releasing function: it removes the obstacle that holds the string, and lets the bow fly back to its natural shape. . . . In the case of a colored glass, a prism, or a refracting lens, we have transmissive function. The energy of the light, no matter how produced, is by the glass sifted and limited in color. . . . My thesis now is this: that, when we think of the law that thought is a function of the brain, we are not required to think of productive function only; *we are entitled also to consider permissive or transmissive function.*" Suppose that behind the veil of material things there lies "one infinite Thought," and that "our brains are thin and half-transparent places in the veil. What will happen? Why, the life of souls as it is in its fullness will break through our several brains into this world in all sorts of restricted forms, and with all the imperfections and queernesses that characterize our finite individualities here below. . . . And when finally a brain stops acting altogether, or decays, that special stream of consciousness which it subserved will vanish entirely from this natural world. But the sphere of being that supplied the consciousness would still be intact; and in that more real world with which, even whilst here, it was continuous, the consciousness might, in ways unknown to us, continue still." (*Human Immortality*, pp. 12 ff.) Bergson rests his belief in immortality on his view that one of the essential functions of consciousness is "to accumulate and preserve the past, that very probably . . . the brain is an instrument of forgetfulness as much as one of remembrance, and that in pure consciousness nothing of the past is lost, the whole life of a conscious personality being an indivisible continuity"; are we not by this led to suppose "that the effort continues *beyond*, and that in this passage of consciousness through matter (the passage which at the tunnel's exit gives distinct personalities) consciousness is tempered like steel, and tests itself by clearly constituting personalities and preparing them, by the very effort which each of them is called upon to make, for a higher form of existence? If we admit that with man consciousness has finally left the tunnel, that everywhere else consciousness has remained imprisoned, that every other species corresponds to the arrest of something which in man, succeeded in overcoming resistance and in expanding almost freely, thus displaying itself in true personalities capable of remembering all and willing all and controlling their past and their future, we shall have no repugnance in admitting that in man, though perhaps in man alone, consciousness pursues its path beyond this earthly life. This is as much as to say that, in my opinion, the aspirations of our moral nature are not in the least contradicted by positive science." (*Hibbert Journal*, vol. x, p. 43.) The philosophers thus quoted all believe more or less assuredly in a future life, but many philosophers are either agnostic or disbelievers. But explicit disavowal of any hope of immortality is rather rare. James says: "I confess that my surprise was great when I came to look into books for a passage explicitly denying immortality on physiological grounds, . . . I was unable to find anything blunt and distinct enough to serve. I looked through all the books that would naturally suggest themselves, with no effect; and I vainly asked various psychological colleagues. And yet I should almost have been ready to take oath that I had read several such passages of the most categoric sort within the last decade. Very likely this is a false impression, and it may be with this opinion as with many others. The atmosphere is full of them; many a writer's pages logically presuppose and involve them; yet, if you wish to refer a student to an express and radical statement that he may employ as a text to comment on, you find almost nothing that will do." The most explicit passage he could find after all this search is the following: "Not only consciousness, but every stirring of life, depends on functions that go out like a flame when nourishment is cut off. . . . The phenomena of consciousness correspond, element for element, to the operations of special parts of the brain. . . . This fundamental proposition . . . carries with it the denial of the immortality of the soul." (Dühring, *Der Wert des Lebens*, 3d ed., pp. 48, 168.) As a good example of the agnostic position, we find Lotze's saying: "The question of the immortality of the soul does not belong to Metaphysic. We have no other principle for deciding

it beyond this general idealistic conviction: every created thing will continue if and so long as its continuance belongs to the meaning of the world; every one will pass away whose actuality had only in some transitory phase of the world's course a place that justified it." (*Metaphysic*, § 245.)

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IMMORTALITY, Conditional. See Annihilationism.

IMMORTEL, ē'môr'tĕl', L'. A romance by Alphonse Daudet (1888), picturing with keen insight and irony the intrigues and petty strivings of the academic world.

IMMORTELLE, ĭm'ŏr-tĕl' (Fr., fem. sing. of *immortel*, immortal). A name applied to various species of *Helichrysum*, especially *Helichrysum arenarium* and *Helichrysum orientale*, which are grown extensively in France, where the flowers are made into compact wreaths for home use or for export. They are chiefly used as mortuary decorations, either in their natural color (yellow) or bleached white. Like other flowers, such as tuberoses and callas, that have been used largely for funereal decoration, immortelles have suffered in popularity, especially since the barbarous practice of dyeing them purple and vermilion, and working them into fantastic designs, came into vogue. The most striking feature of the immortelle is the one that suggested the name; the flowers, being dry and firm, are so-called "everlasting." They retain their natural colors for months or even years. See Amaranth.

IMMU'NITY (from Lat. *immunitas*, exemption, from *immunis*, exempt, from *in-*, not + *munis*, serving, from *munus*, duty). Immunity may be described as the state or condition of an individual who is resistant or nonsusceptible to a particular infection. There is no such thing as absolute immunity. While animals or individuals may seem under natural conditions to be immune to certain diseases, yet when they are placed in an unfavorable environment, or when the natural vigor is lowered by climate or insufficient food, they become susceptible to diseases to which they are ordinarily immune. There is a great difference in the resistance shown to the invasion by germs of disease by certain animals of allied nature. Human beings, cattle, and guinea pigs show great susceptibility to tuberculosis, while the cat, dog, and horse resist it. Man easily becames a victim of typhoid fever, while domestic animals never suffer from it. It has long been a matter of observation that an attack of certain infections, such as smallpox, measles, typhoid fever, cholera, typhus fever, leads to immunity, while attacks of others not only fail to confer immunity but leave the individual more susceptible than before. Among these latter are pneumonia, erysipelas, influenza, diphtheria, dysentery, tonsillitis, and acne. This phenomenon is explained on the theory of hypersusceptibility or anaphylaxis (q.v.). Immunity is either (1) *natural* or (2) *acquired*. Natural immunity is a congenital insensitiveness to infection or contagion which is possessed by certain individuals, families, or species, or which exists as a racial characteristic. The same individual may be immune against a certain disease at one age and become susceptible to it at another age; thus, infants are almost entirely immune against yellow fever, and but few cases occur among them. The Arab is said to be absolutely immune to typhoid fever, and the Japanese to scarlet fever. *Acquired immunity* is a condition of insusceptibility which results from passing through an attack of the disease, or from being inoculated with the poison of the disease, which results in a change in the blood. Immunity to yellow fever results after one attack of the disease. One attack of typhoid fever is almost a certain guard against another—a statement which is true also of scarlet fever and measles. *Active immunity* may be produced by the injection of cultures of living or dead bacteria, or their toxins, into an animal. Passive immunity is brought about by the injection of antitoxic serums. That is to say, the immunity conferred by a vaccine is an active resistance, while that conferred, e.g., by diphtheria antitoxin is a passive immunity. *Experimental immunity* results from introducing, for experimental purposes, attenuated microörganisms into susceptible animals, and thereby causing the production of immunity to virulent forms of those organisms. The house mouse and the white mouse, naturally very susceptible to anthrax, are rendered immune to this disease by receiving an inoculation of blood from a convalescent tetanic animal.

Immunity is lost or destroyed in a number of ways. It may be destroyed by (1) variation

from the normal temperature. Pasteur found that chickens, naturally immune to anthrax, become susceptible to the disease after being plunged into a cold bath. (2) Altering the chemical composition of the blood by changing the diet or by injection of drugs. (3) Loss of strength, or exhaustion, is a cause of loss of immunity, as Roget demonstrated by inoculating previously immune white rats with anthrax, after compelling them to work at revolving a wheel. (4) Removal of the spleen is followed by susceptibility to disease. (Bardach.) (5) Combining various microörganisms destroys immunity in some experimental cases.

Theories of Immunity. The exact causes of the phenomena of immunity are not well understood, but various theories have been proposed which make them more or less intelligible. In 1880 Pasteur taught that the microorganism, by its growth in the body, uses up some substances necessary for its existence and then perishes. If the removal of this substance be complete, perfect immunity results. This is the *exhaustion theory*. Sternberg combats it, saying that if it were true we must have in each of our bodies certain smallpox material, measles material, and scarlet-fever material, etc., each of which must be exhausted by its appropriate microörganism, thus necessitating an almost inconceivably complex body chemistry. The *retention theory* was advanced in 1880 by Chauveau, who suggested that the growth of the bacteria in the body probably originated some substance prejudicial to their further development. The *phagocytosis theory* was suggested by Carl Roser in 1881, received attention from Sternberg, and also from Koch, but was not advanced with any insistence until, in 1884, Metchnikoff enthusiastically championed it and gave it his name. There are two varieties of the white blood corpuscle whose duty it is to destroy bacteria; these are the large, unicellular leucocyte, or macrophagocyte, and the smaller forms, the polynuclear leucocyte, or microphagocyte. Both these forms exhibit amœboid movements and possess the attractive force called chemotaxis, which exists between amœboid cells and food particles. Phagocytosis is the incorporation of foreign particles by these amœboid white blood corpuscles. Leucocytes actually take up and envelop living pathogenic organisms, as demonstrated by Koch in 1878. The activities of the phagocytes have been shown, by Wright and Douglas, to have their effects furthered by certain substances in the blood called opsonins (from Gk. *ὄψωνεῖν*, to cater). These substances have the power of acting on invading bacteria, so that the latter are prepared for phagocytosis. The *humoral theory*, suggested by Grohmann in 1884, was advanced by Buchner, who claimed that not phagocytosis, but the bactericidal action of blood plasma, is the cause of the destruction of pathogenic bacteria. He showed that freshly drained blood, blood plasma, as well as aqueous humor, destroyed such organisms. It was shown in rebuttal that dispersion in a large amount of watery fluid causes the death of microörganisms, which grow well when allowed in a close colony. The prevalent and generally adopted theory is the *antitoxin theory*, defended by Behring and Kitasato, Brieger, Tizzoni, Cattani, Roux, Villard, and others. According to this theory, the metabolism of bacteria during disease gives rise, in the blood of the sick person, not only to poisonous alkaloids called toxins (existing either in the bodies of the bacteria or produced by them), but also to defensive proteids called antitoxins, which possess the property of neutralizing the toxins. Hankin divides the antitoxins (formerly called *alexins* by Buchner) into four groups. Proteid substances that occur naturally in animals and possess the power of destroying bacteria or their products, he calls *sozins*. Similar proteids resulting from acquired immunity in animals he calls *phylaxins*. Sozins are subdivided into those which have the property of killing bacteria, or *mycosozins*, and those which neutralize bacterial products, or *toxosozins*. A phylaxin which destroys bacteria he calls a *mycophylaxin*, and a phylaxin which neutralizes their ptomaines he calls *toxophylaxin*.

Ehrlich's side-chain theory has received much support. Ehrlich contends that each cell has side chains or processes, whose function is to assimilate particular food. Each of these processes is specific for a particular substance and will not unite with any other. These side chains are constantly being produced and cast off, in health as well as in disease. Either a lack or a superabundance of specific side chains may explain the nature of natural immunity. Side chains are also called *receptors* and have been grouped under three heads according to their action. The first group fixes or unites molecules of simple constitution; the second group has the power of combining with the food molecule, together with a symotoxic action; and the third group combines with the food molecule and also fixes a ferment in the fluid medium surrounding an *amboceptor*. The latter is a substance which acts as an intermediary between the invading bacterium and the complement; the complement being the destructive principle.

Consult: Roser, *Entzündung und Heilung* (Leipzig, 1886); Behring, *Die Blutserumtherapie* (ib., 1892); Sternberg, *Immunity: Protective Inoculations in Infectious Diseases and Serum Therapy* (New York, 1895); Chauveau, *Traité de physique biologique* (Paris, 1901); Simon, *Introduction to the Study of Infection and Immunity* (New York, 1914). For the method of securing artificial immunity by means of defensive proteids, see ANTITOXIN; TOXIN; SERUM THERAPY; VACCINATION.

IMMUNITY, in feudal law and in international law. See FEUDALISM; INVIOLABILITY.

IMOGEN, ĭm'ō-jĕn. The daughter of Cymbeline and wife of Posthumus, in Shakespeare's *Cymbeline*.

IMOGENE, ĭm'ō-jēn, THE FAIR. The heroine of Lewis's ballad "Alonzo the Brave and the Fair Imogene."

IMOLA, ē'mō-lä. An episcopal city on the Santerno in the Province of Bologna, Italy, 21 miles southeast of the city of Bologna (Map: Italy, C 2). It has a cathedral, dating from the twelfth century (modernized in the eighteenth), a communal library with some rare manuscripts, and an old citadel. There is also an agricultural school. It has been the seat of a bishop since 422. It markets wine and vegetables and manufactures silk goods, soap, leather, majolica, bricks, and gunpowder. Near by are mineral springs. In Roman times the city was called Forum Cornelii, said by Prudentius to have been founded by L. Cornelius Sulla. Here were born Chrysologus, Archbishop of Ravenna, who died in 449, and the painter Innocenzo da Imola, who died about 1550. Two

of his paintings are in the communal palace. Pop. (commune), 1901, 33,210; 1911, 86,068.

IMOLA, Innocenzo da (c.1494–c.1550). An Italian painter, born at Imola. His real name was Innocenzo di Pietro Francucci, and he was the pupil of Francia at Bologna and of Albertinelli in Florence. Afterward he went to Bologna and painted the frescoes of the "Death and Assumption of the Virgin" at San Michele (1519), also the "Madonna in Glory," and a "Madonna with Kneeling Donors," both in the gallery of that city. Among his other works are altarpieces in the cathedral at Faenza, in Berlin, and in Munich. His best pictures are reminiscent of Raphael.

IMOSHAGH, ē'mō-shäg'. The national name of certain pastoral tribes of Tuaregs in the Sahara Desert, who are independent. See Tuareg.

IM'PACT (from OF. *impacter, empacter,* to press close together, from Lat. *impingere,* to dash against, from *in,* in + *pangere,* to fasten). If a body in motion meets a second body—either at rest or in motion itself—there is said to be an "impact" between them. The general principles of mechanics of course may be applied to the changes in the motion. (See Mechanics.) The geometrical sum of the linear momentum of the two bodies is not changed by the impact; nor is the sum of their kinetic energies, provided they are perfectly elastic. Consider the two bodies as moving along the same horizontal line. Let their masses be m_1 and m_2 and the velocities of their centres of inertia before and after impact be v_1 and v_2 and V_1 and V_2 respectively. Then, for all bodies

$$m_1v_1 + m_2v_2 = m_1V_1 + m_2V_2.$$

(This law was given by Wallis, Wren, and Huygens almost simultaneously, 1668. The first applied it to inelastic bodies, the last two to elastic ones.) If the bodies are absolutely inelastic, $V_1 = V_2$; if they are perfectly elastic,

$$\tfrac{1}{2}m_1v_1^2 + \tfrac{1}{2}m_2v_2^2 = \tfrac{1}{2}m_1V_1^2 + \tfrac{1}{2}m_2V_2^2;$$

if they are imperfectly elastic and of the same material, Newton has shown that

$$\frac{V_1 - v_1}{v_2 - V_2} = e,$$

a constant for a given kind of material, which is called the "coefficient of restitution." See Centre of Impact.

IMPAC'TION. See Horse, *Diseases.*

IMPALE' (from Fr. *empaler,* It. *impalare,* ML. *impalare,* to impale, from Lat. *in,* in + *palus,* pole). In heraldry, to arrange two coats of arms side by side in one shield divided per pale. It is usual thus to exhibit the conjoined coats of husband and wife, the husband's arms occupying the dexter side or place of honor, and the wife's the sinister side of the escutcheon. A husband impaling his wife's coat with his own is not allowed to surround the former with the collar or insignia of any order of knighthood to which he may belong. Bishops, deans, heads of colleges, and kings of arms impale their arms with their insignia of office, giving the dexter side to the former. In early heraldry, when two coats were represented in one shield side by side, only half of each was exhibited—an arrangement which had been called dimidiation (q.v.). Sometimes the one coat only was dimidiated. A reminiscence of dimidiation is preserved in the practice of omitting bordures, orles, and tressures in impaled arms on the side bounded by the line of impalement.

IMPAL'LA (African name). An antelope. See Palla.

IM'PANA'TION (Fr. *impanation,* Portug. *impanacão,* It. *impanazione,* from Lat. *in,* in + *panis,* bread). A word coined in the Middle Ages to indicate a modification of the theory of transubstantiation. It first appears at the end of the eleventh century. Formed upon the model of the word "incarnation," it ought to denote that the divine Logos took upon Himself the elements of the bread and wine of the Eucharist, just as He did humanity in the Incarnation. But it was used to denote the view that, instead of a transubstantiation by which the substance of the bread and wine became the substance of the body and blood, there was in the Eucharist an assumption by the whole Christ, body as well as divine Logos, of the bread and wine, so that He was wholly present in them. This differs so little from Luther's personal view, which was that of the "sacramental permeation of the substance of the bread by the substance of the body," etc., that he was charged by Bellarmine and other Roman Catholics with reviving the old error of impanation. The official doctrine of the Lutheran church, however, is that of the "sacramental coexistence at the same place of the two substances, both continuing to exist in their unmodified integrity." See Lord's Supper; Transubstantiation.

IMPANEL. See Empanel.

IMPAR'LANCE (OF. *emparlance,* from *emparler,* to talk, from *en,* in + *parler,* to talk, from ML. *parabolare,* to discourse, from Lat. *parabola,* parable, from Gk. *παραβολή, parabolē,* comparison, from *παραβάλλειν, paraballein,* to place beside, from *παρά, para,* beside + *βάλλειν, ballein,* to throw). In common-law pleading, an allowance of time to the defendant in a civil suit to put in his defense. As the name indicates, the grant of time was originally made to enable the defendant, before pleading, to talk with the plaintiff, with the view of coming to an amicable understanding with him. Later, in certain classes of cases, the defendant was entitled to demand one imparlance for this purpose, and this practice in course of time became a mere device for securing a reasonable time in which to plead. The term is no longer in use either in England or the United States. Consult Blackstone, *Commentaries on the Laws of England.* See Plea; Pleading.

IMPAS'TO (It., covered with paste). The name given to the practice of laying on pigments so thickly as to be opaque. Certain schools at one time loaded with color the light portions of their picture and left the shadows thinly painted. In this way they thought to secure transparency, as it was called, in the shadows. The practice to-day, however, is to attain transparency in shadows by their exact relation to the light parts of the picture, and this is usually done by painting all parts with equal thickness of pigment.

IMPATIENS, īm-pā'shī-ĕnz. See Balsam.

IMPEACH'MENT (OF. *empeschement,* Fr. *empêchement,* hindrance, from OF. *empescher,* Fr. *empêcher,* to hinder, from ML. *impedicare,* to entangle, fetter, from Lat. *in,* in + *pedica,* fetter, from *pes,* foot). In the most general sense, the legal process of calling a person to account for some misconduct, or of discrediting

a witness, a document, or a record. Specifically, in English and American law, the accusation and trial of a person for treason or high crimes or misdemeanors by the legislature. In England impeachment differs from the ordinary criminal prosecution in two respects: (1) the prosecutor is the House of Commons, and not the crown; (2) the trial court is the House of Lords, and not an ordinary judicial tribunal. In the United States an impeachment is generally instituted and prosecuted by the Lower House of Congress or of a State Legislature before the Upper House or Senate, although a few of the States provide for impeachments in the ordinary courts of justice, and in some the judges of the highest appellate court sit with the Senators as members of the Court of Impeachment.

This method of prosecuting criminals was employed for the first time in England, in the case of Lord Latimer and others, who were accused of frauds and malpractices connected with the revenues of the crown in the latter part of the reign of Edward III, and who were found guilty and condemned to imprisonment and removed from office. Several other cases of impeachment of crime followed; but after 1459 acts of attainder (see ATTAINDER) took the place of impeachments for nearly two centuries. Under the Stuarts, however, Parliament again returned to impeachments as an effective method of dealing with officers of the crown who were corrupt or oppressive. In 1621 Sir Giles Mompesson and Lord Bacon were impeached and convicted, removed from office, and heavily fined for gross official misconduct. Since that date there have been 52 cases of impeachment in England, of which number but one has occurred within recent years, and that one in 1805. The proceeding is practically obsolete there.

In the United States, however, it is still a live and vigorous institution. The court for the trial of impeachment is accounted the very capstone of American judicial systems, Federal as well as State. Its existence is secured and its organization is regulated by national and State constitutions. For example, the organic law of the Union provides that "the House of Representatives shall have the sole power of impeachment" (Art. I, Sec. 2, cl. 5), and "the Senate shall have the sole power to try all impeachments. When sitting for that purpose," it is declared, "they shall be on oath or affirmation. When the President of the United States is tried, the Chief Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present. Judgment in cases of impeachment shall not extend further than to the removal from office and disqualification to hold and enjoy any office of honor, trust, or profit under the United States, but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment, and punishment, according to law." (Art. I, Sec. 3, cl. 6 and 7.) The Constitution further provides that "the President . . . shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment" (Art. II, Sec. 2, cl. 1); and again, "the President, Vice President and all civil officers of the United States, shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors." (Art. II, Sec. 4.) Similar provisions are contained in nearly every State constitution, although a few States remit impeachment trials to the ordinary courts of justice.

Impeachment in England is only a specialized method of exercising the judicial functions of the High Court of Parliament and is not necessarily confined to the prosecution of officers of the crown. Commoners as well as lords may be tried by this method, though in practice it has usually been employed only in the case of public officials. In the United States, however, it exists only as a means of removing from office an officer of the government who has by his misconduct forfeited his right thereto. This restricted scope of the process of impeachment in America has given rise to some important questions. One of these is the question whether an official can escape impeachment by resigning his office. The Senate of the United States decided in the case of Belknap, by a vote of 37 to 29, that he cannot. On the other hand, the Supreme Court of Nebraska has held that the prime object of impeachment proceedings is to protect the State from official misconduct, and that as soon as an officer resigns, the reason for resorting to these proceedings ceases. Thereafter the offender is to be prosecuted like any other criminal by indictment and trial in the proper judicial tribunal.

Differences of opinion have developed, also, in the United States concerning the nature of impeachable offenses. According to one view, only such official misconduct as renders the wrongdoer liable to indictment will warrant an impeachment; while another view is that this proceeding was intended to be very elastic and comprehensive and to be applicable to every sort of official misdemeanor which is subversive of any fundamental or essential principle of government or highly prejudicial to the public interests. This view was adopted by the House of Representatives in preparing its articles of impeachment of President Johnson and has been approved by the Supreme Court of Nebraska. It has been embodied in the constitutions of some of the States.

In the recent impeachment of Governor Sulzer of New York (1913), the question was raised for the first time whether a public officer was liable to impeachment for acts committed by him before as well as after his assumption of office, and it was decided by the High Court of Impeachment that it was not limited to acts of an official character nor to acts committed by the impeached official while in office.

Bibliography. The literature upon this topic is quite extensive, both in England and in America. Blackstone, *Commentaries* (1st ed., 4 vols., London, 1765–69); *Chase's Trial* (Baltimore, 1805); *Prescott's Trial* (Boston, 1821); *Impeachment of President Johnson* (Washington, 1868); *Belknap's Trial* (ib., 1876); Story, *Commentaries on the Constitution* (Boston, 1882); Stephen, *History of the Criminal Law of England* (London, 1883); *Peck's Trial* (Boston, 1883); Anson, *Law and Custom of the Constitution* (Oxford, 1886); Mechem, *On the Law of Public Offices and Officers* (Chicago, 1890); Pike, *Constitutional History of the House of Lords* (London, 1894); Foster, *Commentaries on the Constitution of the United States* (Boston, 1895); May, *Parliamentary Practice* (10th ed., London, 1901); Griffin, *Select List of References on Impeachment* (Washington, 1905).

IMPEACHMENT OF WASTE. Liability

for waste committed by a tenant for life or years. The law of waste, of great antiquity, and obviously devised to protect the inheritance against the depredations of tenants, was in the course of time developed by judicial refinements into a barbarous code of restrictions which seriously hampered the tenant in the reasonable use and enjoyment of his estate. Its sole aim was to perpetuate the existing condition and use of the land and to preserve it intact for the landlord.

It was waste for the tenant to cut timber for any purpose but necessary repairs; it was waste to make any substantial improvement, as by converting waste or meadow lands into arable land, or by erecting new buildings or enlarging or rebuilding old ones; and it was waste, for which the tenant was held liable, if buildings were destroyed by the act of an incendiary or by accident, or if timber was cut by a trespasser without the tenant's fault; and the penalties for waste were of the Draconian order—forfeiture of the estate and a fine, or amercement, of three times the value of the "waste" committed or suffered.

Under these circumstances a devise of an estate for life or years was a gift of doubtful value, and accordingly it became common in such devises or in marriage settlements to provide that the estate should be held "without impeachment of waste."

This provision was held to relieve the tenant from all liability under the common law of waste and to permit him to deal with the land very much as though it were his own. But the abuse of this privilege is restrained by the courts of equity, which will by injunction interpose to prevent the wasteful destruction of the woodlands of the estate, the cutting down of ornamental timber, or the defacing or destruction of the family mansion. See WASTE.

IMPE'DANCE. A word used in connection with alternating electric currents to express a property of the circuit which corresponds in some respects with that of electric resistance in the case of steady currents. If in an electric circuit there is a resistance R and an inductance L, and if an alternating electromotive force $E = E_0 \cos pt$ is introduced, thus making the frequency $2\pi/p$, i.e., the "number of alternations" $4\pi/p$, the resulting electric current is

$$J = \frac{E_0 \cos (pt - \alpha)}{\sqrt{R^2 + p^2 L^2}},$$

where $\tan \alpha = \frac{pL}{R}$. The quantity $\sqrt{R^2 + p^2 L^2}$ is called the "impedance."

Similarly, if the circuit contains, in addition to the resistance R and the inductance L, a condenser of capacity C, the resulting current is

$$J = \frac{E_0 \cos (pt - \alpha)}{\sqrt{R^2 + p^2 \left(L - \frac{1}{p^2 C}\right)^2}},$$

where $\tan \alpha = \frac{p\left(L - \frac{1}{p^2 C}\right)}{R}$. This gives a more general value of the impedance. The angle α is, for obvious reasons, called the "angle of lag." In the above expressions all the electric quantities are supposed to be measured in the "C. G. S. electromagnetic" system.

IMPED'IMENTS TO MARRIAGE. Facts which constitute a bar to the contracting of a lawful marriage. Such impediments were recognized by the Church and were cognizable by the ecclesiastical courts as a basis for annulling a marriage contracted while they existed, and they are recognized by all nations under the Christian dispensation. In English and American law the following impediments to marriage are recognized: (1) the existence of a prior, undissolved marriage; (2) relationship within the prohibited degrees; (3) want of sufficient age; (4) mental incapacity; (5) physical incapacity; and (6) force, fraud, or mistake.

See BIGAMY; PROHIBITED DEGREES; AGE, IN LAW; INSANITY; IMPOTENCY; and, for a general treatment of the subject, MARRIAGE.

IMPEND'ING CRISIS, THE. See HELPER, HINTON ROWAN.

IMPER'ATIVE, CATEGORICAL. See CATEGORICAL IMPERATIVE; ETHICS.

IMPERATIVE MOOD. See CONJUGATION.

IM'PERA'TOR. See EMPEROR.

IMPE'RIAL. A city in Imperial Co., Cal., 25 miles south of Old Beach, on the Southern Pacific Railway (Map: California, K 10). It is in a rich agricultural and stock-raising country, carries on a large trade in farming implements, cotton, and fruits, and has a cotton compress, brewery, meat-packing plant, creamery, cement works, soap factory, stockyards, and cantaloupe and grape packing houses. The city contains a fine high school and a public library and owns its water works. Pop., 1910, 1257.

IMPERIAL CHAMBER (Ger. *Reichskammergericht*). One of the two highest courts of the Holy Roman Empire, coördinate with the Aulic Council (q.v.). It was created in 1495 by the Emperor Maximilian under pressure of the princes of the Empire, whose influence was greatly strengthened by the erection of the new tribunal, and lasted until 1806, when the Empire was dissolved. It was composed of a president nominated by the Emperor, two vice presidents, and a number of associate judges, varying at different times from 16 to 50, selected partly from among men learned in the law and partly from the ranks of the nobility. Its jurisdiction included primarily all cases involving the princes of the Empire, but it sat also as the highest court of appeal in civil cases involving the interests of the member of any estate. It also offered redress for any refusal, delay, or miscarriage of justice on the part of any inferior court. Its sessions were held at Frankfort, Speyer, and, from 1693 to 1806, at Wetzlar. Its greatest contribution was to make the Roman law the uniform law of Germany. See HOLY ROMAN EMPIRE.

IMPERIAL CITY, THE. A title frequently given to Rome.

IMPERIAL EAGLE. See EAGLE.

IMPERIAL FEDERATION. A plan to unite the parts of the British Empire by a stronger tie than that of the crown. Such a plan was conceived as early as the middle of the eighteenth century, but the motive of the mother country at that time was chiefly the extraction of revenue from its colonies, and the more important of them successfully revolted on that issue. Again, the policy of a strict control over the remaining colonies was one of the principal causes of the rebellion in Canada in 1837. The policy of granting responsible

government in the colonies was substituted on that occasion. This was in some quarters adjudged to be a badge of potential independence, and for several years the professed desire that the colonies should be detached as a means of relief from the burdens entailed by them was not uncommon. But from this extreme anti-imperialism the demand for a more united Empire has quite steadily developed for half a century, having been fostered in recent years by the growing consciousness of the need of defense and the benefit from reciprocal trade relations. In 1868 The Royal Colonial Institute was founded and took as its motto "United Empire." Four years later Disraeli, in a memorable speech, voiced the opinion that self-government in the colonies "ought to have been conceded as a part of a great policy of Imperial consolidation . . . ought to have been accomplished by the institution of some representative council in the metropolis which would have brought the colonies into constant and continuous relation with the home government." In July, 1884, a gathering of leading members of both the Liberal and Conservative parties, in London, under the presidency of the Right Hon. W. E. Forster, resulted in the formation, in November of the same year, of the Imperial Federation League. Branches or allied organizations were established in many parts of the Empire, and in 1886 the league petitioned the Prime Minister to summon an Imperial conference for the express purpose of forming an Imperial council. The petition was granted only to the extent of calling a conference to consider "union for purposes of mutual defense." However, the meeting of that first Imperial conference was a distinct advance towards practical imperialism, and the conference has since become an established institution, meeting in 1894, 1897, 1902, 1907, and 1911. Besides the subject of defense there were, even at the first conference, important deliberations on the question of Imperial preference in trade. At the meeting held in Ottawa in 1894 preferential trade and the development of trade within the Empire by means of improved communication were the chief topics discussed. The keynote of the discussions was loyalty to the mother country and a determination to maintain intercolonial solidarity, but there was some doubt if the mother country would permit herself to be outvoted by a combination of the colonies, or whether each part would be willing to aid the others in matters not directly affecting itself. For such questions Joseph Chamberlain, the stanchest of the Imperialists, soon had a solution in his proposal of complete free trade within the Empire and liberty for each state to fix its own tariff rates on foreign goods. This proposal, however, was not popular in the mother country, and the cause of imperialism was furthered at this time rather by the loyalty of the colonies during the Boer War of 1899–1902. In 1905 Sir Frederick Pollock formulated a scheme for a representative Imperial council to act in an advisory capacity to the ministry and the administration. At the conference held in London in 1907 it was unanimously resolved, "That it will be to the advantage of the Empire if a conference, to be called the Imperial Conference, is held every four years, at which questions of common interest may be discussed and considered as between his Majesty's government and his governments of the self-governing dominions beyond the seas." The conference thus permanently established is made to consist of the several prime ministers, the Secretary of State for the Colonies, and such other ministers as each government may appoint, but not more than two representatives from any government may take part in a discussion, and each government has only one vote. It is further provided that in the interim between two full conferences important questions may be referred to subsidiary conferences of representatives from the governments concerned, and the colonies are authorized to refer to the Committee of Imperial Defense any local question requiring expert advice. Much closer than ever before were the representatives of the Empire drawn together in the Conference of 1911 on the question of defense, and it was then and there agreed that naval training and discipline in the colonies should be made uniform with that of the United Kingdom, and that there should be an interchange of officers and men. The same conference recommended the appointment of a representative royal commission to investigate and report on the natural resources of the several parts of the Empire and the facilities for their development, and it was appointed the following year. The proceedings of this conference show an increase in the number and variety of subjects discussed, and that the establishment of an advisory council was still urged in some quarters.

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IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES, AND INDIA. A memorial of the Queen's Jubilee of 1887, which is a public institution in South Kensington intended to contain "sample collections of the natural products and resources of every portion of the British Empire, so arranged and displayed as to be of practical benefit to commercial business men and to allow of scientific research by every class of students." It is furnished, therefore, with laboratories and with reading and lecture rooms as well as with exhibitory departments. In 1902 it was transferred to the Board of Trade by act of Parliament.

IMPE'RIALISM. The policy of extending the dominion of a state beyond the limits of self-coherent or at least potentially self-coherent nationality. The extension of the dominion of the United States over Louisiana and over the territories acquired from Mexico was not imperialistic, since such territories would eventually become homogeneous in population and institutions with the original territory of the United States. The annexation of the Philippines and Porto Rico, on the other hand, was essentially imperialistic, since no rational basis existed for contemplating their complete assimilation, and assimilation was not in fact contemplated by the United States. The annexation of Alsace-Lorraine by Germany was not imperialistic, because complete assimilation was contemplated.

The earliest historical examples of imperial-

ism are the great monarchies of Asia and Africa: Assyria, Persia, Egypt. The Roman Empire is the one great example of the policy in ancient Europe. The Imperial policy was revived by Charlemagne in the Middle Ages and never wholly disappeared; it culminated, in early modern times, in the Empire of Charles V, which in the middle of the sixteenth century included the Hapsburg dominions, Spain and Portugal, Naples, Sicily and Sardinia, the Netherlands, and the East and West Indies, conceived broadly to include mainland as well as islands. The extension of the personal dominion of Napoleon over non-French territories is the most striking instance of imperialism in recent times.

Down to the collapse of the power of Napoleon imperialistic policy uniformly set for itself as ultimate object dominion over the whole accessible world. After 1815 European politics were characterized by a remarkable development of the idea of nationality. Liberal opinion everywhere recognized the desirability of complete independence and unification of each naturally homogeneous nation. Among the results of the nationalist movement were the unification of Germany, the liberation of Italy from Austrian rule and its consolidation, the liberation of Greece and the Balkan states from Turkish rule. The separation of Norway from Sweden and the wars of 1912–13 in the Balkans were the latest fruits of the nationalist movement. Strivings for autonomy on the part of Hungary, Poland, Finland, and Ireland were equally inspired by the same tendency.

During the nationalist period the opinion was widely current that colonies and dependencies that could not be incorporated in the national life represented a burden upon the state. British liberal statesmen, like Cobden and Gladstone, looked forward to the time when the colonies with inhabitants of British origin should be independent. In accordance with this view Canada, Australia, New Zealand, and Cape Colony were, between 1840 and 1870, given practically complete autonomy. Colonies inhabited by non-Europeans, like India, were regarded by the same school of statesmen as an encumbrance, to be borne only until the problem of orderly government in such colonies could be solved.

Shortly after 1870 a new imperialistic movement made itself manifest in European politics. Unlike that of earlier periods, the new imperialism accepted the principle of national independence in so far as civilized states are concerned. The British imperialist would not subject to British rule France or Spain or any other modern industrial state. Only the states supposed to be incapable of self-government are regarded as fit subjects for Imperial dominion. The new imperialism contemplates not one, but a number of world states, each consisting of a civilized power together with its permanent dependencies and protectorates.

The impetus to the new imperialism was given by the Franco-Prussian War. France, deprived of Alsace-Lorraine, turned to her African province of Algeria to restore her forces. Active colonization of Algeria was soon followed by extension of the borders of the province. Thus was inaugurated the struggle between nations for the partition of Africa, which eventually engaged France, Great Britain, Germany, Portugal, Belgium, Spain, and Italy. Parallel with the partition of Africa was the progress of imperialism in Asia, in which Great Britain, France, Germany, Russia, and Japan took part. The United States also, through the annexation of Hawaii, the Philippines, and Porto Rico, was drawn into the imperialistic movement. The years 1884–1901 represent the period of most rapid extension of Imperial dominion. The following table gives a summary of the colonial acquisitions during those years:

COUNTRIES	Area, sq. m.	Population
Great Britain	3,711,957	57,436,000
France	3,583,580	36,553,000
Germany	1,026,220	16,687,100
Russia	112,320	3,300,000
Belgium	900,000	30,000,000
Portugal	800,760	9,111,757
Italy	185,250	867,000
Japan	13,991	3,000,000
United States	125,000	10,004,000

From 1901 to 1914 the principal imperialistic advances were the following: annexation of Korea by Japan (84,738 square miles), 1910; annexation by Italy of Tripoli and Cyrenaica (406,000 square miles), 1912; cession by France of 107,270 square miles in Central Africa to Germany, 1911; establishment of French protectorate over Morocco (176,000 square miles), 1912; Russo-British establishment of spheres of influence in Persia, 1907 (Russian sphere, 305,000 square miles; British, 137,000 square miles; neutral, 188,000 square miles). Informal imperialistic enterprise is embodied in the agreement between China and Russia of 1913, by the terms of which Russia recognized the sovereignty of China in Mongolia; but both powers agreed to refrain from colonizing or sending troops into the territory, while Russia assured herself of substantial control through a six-million-ruble loan to the province, and through free trade between Mongolia and Russian territories. A similar enterprise appears in the agreements between Russia and Japan as to their respective interests in Manchuria; and in the control by the United States of the finances of Santo Domingo. Upon entry of Turkey into the Great European War in 1914 Great Britain proclaimed the annexation of Cyprus and Egypt a British protectorate.

The resurgence of imperialism since 1870 is closely connected with the revival of protectionism in the United States after the Civil War; in Germany and France after the Franco-German War; and in Russia, Japan, and Italy in the last two decades of the nineteenth century. The apparent determination of the several Great Powers to create a national industry adequate to supply domestic needs as well as to provide a balance of exports gave an impetus to the policy of annexing nonindustrial territories the markets of which could be protected against hostile customs regulations. A further impetus was given to the movement by the reduction in cost of railway building, following the substitution, in the seventies, of steel for iron rails. This change made possible the opening up of barbaric districts that had formerly been of slight commercial value and created a new field for lucrative investments. In relatively few instances, however, did the acquisition of colonies prove to be profitable to the colonizing nation, if account be taken of the military and naval

expenditures occasioned directly or indirectly by the imperialistic policy.

Since modern imperialism is a competitive policy, it has played a large part in fomenting discord among the Great Powers. The Chino-Japanese, the Russo-Japanese, the Boer, and the Turco-Italian wars are the more important conflicts directly due to the imperialist tendency. The Spanish-American War while perhaps chiefly a result of humanitarian agitation against the Spanish methods of suppressing insurrection in Cuba, was not wholly uninfluenced by imperialist motives. In addition to armed conflicts several serious international crises must be set down among the moral costs of imperialism. At the time of the Fashoda incident (1898) England and France were brought to the verge of war over the delimitation of their respective claims to Soudanese territory. In 1905, and again in 1911, France and Germany came very near war over the question of the French advance in Morocco. The international hostilities originating in imperialism played an important part in bringing on the Great European War of 1914. See WAR IN EUROPE.

In most of the Imperial nations political parties of greater or less strength have sought ineffectually to check the imperialistic tendencies. In the United States, after the acquisition of the Philippines, an active agitation was carried on by the so-called anti-imperialists, having for its object the grant of independence to the Philippines. Anti-imperialism was indorsed by the Democratic party in 1900 and commanded the loyalty of many of the leaders of that party for over a decade. In England the party opposed to the further extension of British dominion were known opprobriously as "Little Englanders." In continental states opposition to imperialism was especially strong among the Socialistic parties. The designs of Italy upon Abyssinia in 1896 were frustrated, in part, by the anti-imperialistic agitation of the Socialists at home; and popular antipathy to imperialistic designs contributed to the defeat of the Russians in the war with Japan.

The term "imperialism" is also employed to designate the movement in Great Britain and her self-governing colonies towards a closer form of union. See IMPERIAL FEDERATION.

Consult: J. A. Hobson, *Imperialism* (New York, 1902); Ernst Freund, *Empire and Sovereignty* (Chicago, 1903); Erich Marcks, *Die imperialistische Idee in der Gegenwart* (Dresden, 1903); Achille Viallate, *La crise anglaise* (Paris, 1905); G. v. Schulze-Gaevernitz, *Britischer Imperialismus und englischer Freihandel* (Leipzig, 1906); P. Adam, *Les Imperialismes* (Paris, 1908); Earl Cromer, *Ancient and Modern Imperialism* (London, 1910).

IMPERIAL MOTH. The largest of the "royal moths" (*Basilona imperialis*), sulphur yellow marked with purplish brown. The wings expand from 4 to 5 inches; the larva is thinly clothed with hairs and bears spiny horns on the second and third segments. It feeds on the hickory, butternut, and other forest trees.

IMPERIAL SERVICE ORDER, THE. A new order instituted in London, June 26, 1902, by King Edward VII, to confer honor on those who have held continuous office under the British crown either in England or in the colonies. The order consists of a sovereign and companions. The number of companions is limited to 425, of whom 250 are to belong to the Home Civil Service and the remainder to the Civil Services of the Colonies and Protectorates. Appointments to the order will be made after 25 (or in unhealthy colonies 16) years' service.

IMPERIAL WOODPECKER. See IVORY-BILL.

IMPE'RIUM (Lat., power, jurisdiction). A term applied to the sovereign power of a Roman magistrate, especially when such magistrate was in command outside of Rome. (See EMPEROR.) When Augustus took under his own control all the important functions of the state, and the (nominal) republic was merged into a monarchy, the *imperium* became the exclusive prerogative of Augustus and his successors, and *imperator* passed to its modern meaning of emperor. Consult Smith, *A Dictionary of Greek and Roman Antiquities*, vol. i (3d ed., London, 1890), and Greenidge, *Roman Public Life* (ib., 1901).

IM'PETI'GO (Lat., from *impetere*, to attack, from *in*, in + *petere*, to seek). A disease of the skin. The term was formerly applied to many different diseases of the skin which were characterized by pimples, pustules, and scales. In modern practice the term is restricted to a disease of the skin characterized by an eruption of small itching pustules, single or in groups, terminating in scaly crusts of a yellowish color. Hebra and more recent writers discard the term and classify the old impetigo as a form of eczema (q.v.). Tillbury Fox, of London, describes impetigo contagiosa as an acute pustular, contagious skin disease, during which the patient suffers from fever, with vesicles and pustules on the face and hands, and thence extending to other parts of the body and followed by the production of yellowish crusts. Impetigo herpetiformis is a similar, noncontagious eruptive dermatosis, occurring in pregnant women, attended with grave general symptoms. Impetigo rodens is either cancer or syphilis. For treatment of impetiginous eczema, see ECZEMA.

IMPEY, ĭm'pĭ, SIR ELIJAH (1732–1809). An English jurist, Chief Justice of Bengal, born at Hammersmith. He was educated at Westminster School and at Trinity College, Cambridge (B.A., 1756), and was called to the bar in 1756. He was counsel for the East India Company in 1772 and two years later was knighted and sent out to Calcutta as the first Chief Justice under the new regulating act. He naturally sided with his old schoolfellow, Warren Hastings, in that governor's political troubles, and this course of conduct, together with his condemning to death the famous forger Nuncomar, brought about his own recall and impeachment (1783); but he was discharged with honor, having been revealed as an amiable and upright judge, perhaps a trifle vain and too easily led by Hastings. Impey was elected member of Parliament for New Romney in 1790, but, although he held his seat until 1796, retired to the country in a couple of years, and spent his latter days in educating his family and enjoying the society of his friends. Consult *Memoirs of Sir Elijah Impey* (London, 1847).

IM'PEYAN PHEASANT. See PHEASANT.

IM'PLEMENTS, AGRICULTURAL. A loose term applied to all implements and tools used in farming, not only in the tilling of the soil, but in harvesting and the later preparation of the crop for market. Doubtless the first implements used were such as required only human strength in their manipulation. The crude spade, hoe, rake, sickle, or scythe, and the flail

of the ancients are the prototypes of the modern plow, cultivator, harrow, self-binder, and threshing machine. After animals were subdued by man, the primitive plow and harrow appeared. Cultivators and other implements for clearing the ground of weeds and stirring the soil are all modern inventions. Especially during the last century have improvements been made in almost every kind of farm implement. Indeed, not a few first appeared during that period, notably the perfected manure spreader, seed and fertilizer drills, harvesters, hay loaders and stackers, and combined harvester and thresher. The threshing machine has not only supplanted the flail and the use of animals in treading out the grain, but has also rendered obsolete the ancient methods of winnowing away the chaff. In short, every necessary operation of the farm is now performed with some implement or machine specially adapted to the purpose, and horse, steam, wind, electric, and other forms of power have supplanted manual labor as far as such substitution has been deemed feasible. It is largely because of the extensive use of labor-saving machinery that the United States has enjoyed such a high degree of agricultural prosperity. The value of agricultural implements manufactured in the United States in 1909 was $146,329,268, an increase of 44.6 per cent since 1900. This was the product of 640 establishments, employing 50,551 persons. The value of agricultural implements used in the United States per acre of farm land was $1.44, an increase of 61.8 per cent since 1900. Since the publication of Thomas's *Farm Implements and Machinery* (1859 and 1869), a few American books have appeared which illustrate and describe many farm conveniences and appliances; but improvements in farm implements have been so numerous and important, and the applications of science so striking, that all works on the subject are inadequate.

Consult: Myrick, *Farm Conveniences* (New York, 1884); Martin, *Farm Appliances* (ib., 1892); R. L. Ardrey, *American Agricultural Implements* (Chicago, 1894); Bailey, article "Tools," in *Cyclopedia of American Horticulture* (New York, 1900); Coupan, *Machiner de culture* (Paris, 1907); P. McConnell, *Farm Equipment* (New York, 1910); R. Cobleigh, *Handy Farm Devices* (ib., 1910); L. W. Ellis, *Minor Articles of Farm Equipment*, United States Department of Agriculture, Bureau of Plant Industry, Circular 44 (Washington, 1911); Carson and others, *Horse, Truck, and Tractor* (Chicago, 1913); Bornemann, *Die Motorkultus in Deutschland* (Berlin, 1913). See HARVEST AND HARVESTING; THRESHING; ETC.

IMPLU'VIUM (Lat., receptacle for rain water). A tank or basin in the centre of the court or atrium of a Roman house, placed immediately under the unroofed part, or *compluvium*, of the atrium, to receive the rain discharged from the roofed portion. The impluvium was commonly of marble, was frequently adorned with a fountain, and with busts, statues, and vases, and formed a very peculiar and interesting feature in the house. The term was also applied to the open space under the compluvium, even if unprovided with a collecting basin.

IMPOON, ĭm-pōōn' (Zulu name). One of the duikers (*Cephalophus grimmi*), a small antelope, very plentiful in South Africa, in wooded districts. See DUIKER.

IM'PORTS AND EX'PORTS. See INTERNATIONAL TRADE; COMMERCE; BALANCE OF TRADE; for exports and imports of the several nations, see articles on those nations.

IM'POST (Fr. *imposte*, from Lat. *impositus*, p.p. of *imponere*, to place upon, from *in*, in + *ponere*, to place, from *po-*, Gk. *ἀπό*, *apo*, away + *sinere*, to allow). The top or cap of a pier or abutment from which an arch is sprung; the stone immediately under the springer of an arch. This stone is usually emphasized by being made to project and by moldings, especially in the classic and neo-classic styles. (See Illustration under ARCH.) In Gothic architecture, especially late Gothic, the arch often springs from the pier without any impost, architecturally speaking. When an arch springs from coupled columns, an architrave or entablature is interposed as an impost between the capitals and the arch. In some early Christian basilicas and in Byzantine buildings an impost block is often interposed between the arch springer and the capital, even over single columns.

IMPOS'TORS, THE THREE (Lat. *De Tribus Impostoribus*). The name given to a work alleged to deny all divine revelation, characterizing the three great founders of religions—Moses, Jesus, and Mohammed—as impostors. Though it is often mentioned since the tenth century, and attributed to heretics of various ages and various degrees of eminence, no authentic copy is known to have ever been seen. A book bearing this title, and professedly published in 1598, was reprinted by E. Weller, with German translation, Leipzig, 1846; without the translation, Heilbronn, 1876. In the eighteenth century renewed attention directed to the subject by the spread of infidelity caused the appearance of an apocryphal edition, which has been frequently reprinted. Consult Genthe, *De Impostura Religionum* (Leipzig, 1833).

IM'POTENCY (from Lat. *impotentia*, inability, from *impotens*, powerless, from *in-*, not + *potens*, able, from *potis*, powerful; connected with Lith. *patis*, Skt. *pati*, lord). In law, an incurable incapacity to perform the sexual act. As the procreation of children is deemed the principal object of marriage, the ability to procreate is considered an implied condition of the marriage contract; and the marriage of an impotent person, the disability not being known to the other party, is regarded as a species of fraud which vitiates the transaction and entitles the defrauded party to have it set aside or declared null and void. This is not properly a divorce, though in some American statutes it is so denominated, as a divorce is properly the dissolution of a valid marriage, and accordingly a decree nullifying a marriage on the ground of the impotency of one of the parties was recognized by the Church, which does not tolerate divorce, and may be granted in a State, like South Carolina, which does not recognize any ground for divorce. The annulment of the marriage for impotency may be obtained by either party if the disability existed at the time of marriage and is incurable, whether it results from a defect caused by nature, or by accident or disease, or by the acts of the party. It has been held, however, that, "where impotency is simply the result of old age, the marriage is still binding; that a man of 60 who marries a woman of 52 should be content to take her *tamquam soror*." The burden of proving impotency is upon the party alleging it as

a ground for the nullification of the marriage. See DIVORCE; HUSBAND AND WIFE.

IMPOUND'ING. The act of putting in a place of custody cattle which have strayed on one's land and are found there doing damage, or which have been taken up as estrays, or goods which have been taken by distress. The right of impounding cattle doing damage was an incident of the right of the party injured by the trespass to hold them until the owner had made compensation for the damage committed by them, which was a species of common-law lien; whereas the impounding of estrays was for the safe-keeping of the animals until the owner reclaimed them. There were public pounds in many parishes, and where these were of convenient access the party taking up the cattle was bound to impound them there. Where this was not feasible, they might be impounded on the premises of the finder or taker. See ESTRAY; LIEN; POUND.

The term "impounding" is also used for the retention of a deed or other legal document in the custody of a court in which it is produced. This may be done where the instrument is suspected of being forged, or is otherwise of such a character as to satisfy the court that it may be used as the basis of a criminal prosecution, or it may be done merely for the purpose of preventing its being made away with by the person having the custody thereof. It is then impounded by order of the court, in order that it may be available when required.

IMPRES'SIONIST PAINTING (from Lat. *impressio*, from *imprimere*, to impress, from *in*, in + *premere*, to press). The practice of painting objects in nature as they first strike the eye, without selection or elaboration. Strictly, every painter is an impressionist in so far as he renders his own impressions, and the term Luminists has been proposed by Van Dyke as more appropriate, since the school is mainly concerned with rendering light. The theory is as follows: The only source of color in nature is the sunlight, which by its vibrations envelops and reveals all things. Without light we see no color at all; with it certain spots of color, according as the rays of the spectrum reflect a particular shade. The idea of outline is an artificial one. The impression of form, perspective, and distance is conveyed to us by different values of color. Shadow is but a different quality of light, modified by refractions and reflections. The painter therefore should only paint with the seven colors of the spectrum, discarding all others. He should juxtapose them just as in nature, trusting to distance to produce the effect. Thus only can he attain the actual, ever-changing effects of light. As the Impressionists are concerned with the representation of nature, they constitute a branch of the Naturalist school, corresponding to the modern Naturalists of sculpture and literature. They differ from Realists like Courbet in that they paint only the appearance of nature—what they actually see—not what they know it to be. It presents, they say, a series of flat, colored surfaces, and not figures in rounded contours. Their pictures are marked by an absence of modeling.

The chief object of the Impressionists is to render the effects of light. They paint everything in full light and condemn the practice of painting in the studio as giving untrue tones. All their pigments are light. Bright colors are placed side by side, and the school avoids the middle tones by which earlier painters achieved harmony of color. Their works, being momentary impressions, are marked by great rapidity of execution and seem sketchy in character. Indeed, the members of the school have justly laid themselves open to the criticism of exhibiting unfinished sketches for pictures. Closely inspected, their paintings seem mere blotches of color roughly applied; but seen at a distance they present pictures strikingly true to nature. Their rapidity of execution enables the Impressionists to portray motion and the nuances of expression to an extent not previously attained. Their figures are real men and women in the actions of daily life, not models posed in a studio. They took the final step in the liberation of modern art from ancient tradition in color—a revolution begun by the Romanticists under Delacroix and continued by the Realists under Courbet. Being the latest school, they came nearest to solving the specific problem of nineteenth-century art—the representation of light, color, and movement.

The Impressionists found their way to public favor very slowly. At first they were the subject of much ridicule. Edouard Manet, the founder of the school, had to exhibit his first Impressionist picture in the Salon des Refusés in 1863. A powerful factor in their progress to public favor was their championship by Zola, whose articles in behalf of Manet attracted great attention. They were much aided by the picture dealer Durand-Ruel, who, at a time when they were generally condemned, held exhibitions of their work side by side with that of the Barbizon masters. It was not until the early seventies that critics and the general public began to take them seriously. Painters, however, were quicker to recognize the progress in color and atmosphere which impressionism represents. Its work is quite generally accepted and followed, and its permanent influence has been to raise the pitch of light in present painting.

The greatest names connected with the long history of impressionism are, besides Manet, Edgar Degas, Claude Monet, for the landscape, and Auguste Renoir; associated with and influenced by whom were Pissaro, Sisley, Berthe Morisot, Mary Cassatt (an American), and Boudin. Mention should be made of a series of painter illustrators connected with the movement, such as Raffaelli, Toulouse-Lautrec, Forain, and Cheret. Among important painters who have adopted the principles of impressionism, yet whose work represents more or less of a compromise with the earlier school, are Bastien-Lepage, L'Hermitte, Gervex, Dagnan-Bouveret, Carrière, Besnard, and Aman-Jean. Impressionism has had a powerful effect upon the art of Germany and Austria, especially that of Munich. In Great Britain its influence was greatest in the Glasgow school. In Spain it counts among its adherents the two greatest among present-day painters, Sorolla and Zuloaga. In the United States also its influence has been very great, and among its direct adherents may be numbered artists like Theodore Robinson, J. A. Weir, Twachtman, and Childe Hassam.

Bibliography. Among the best accounts of the movement are: Duranty, *La nouvelle peinture* (Paris, 1876); Duret, *Les peintres impressionistes* (ib., 1878; new ed., 1907); Lecomte, *L'Art impressioniste* (Berlin, 1892); Muther, *History of Modern Painting* (London,

1896); Mauclair, *The French Impressionists*, translated from the French (ib., n. d.), a brief but highly interesting account; Meier-Graefe, *Impressionisten* (Munich, 1907); Wiesbach, *Impressionismus—ein Problem in der Antike und Neuzeit* (2 vols., Berlin, 1910–11).

IMPRESS'MENT. The seizure of the person or the personal property of individuals for the service of the state. The right of impressment is analogous to the power of eminent domain (q.v.), under which the government may take the lands of private persons for public use, and exists in all modern nations, though it varies a good deal, both as to the persons and property which may be taken and as to the circumstances under which it may be exercised. It is deemed an incident of the prerogative, or sovereignty, and is justified by the necessities of the state. As such necessities are, as a rule, urgent and pressing only in time of war or of preparation for war, the practice is almost unknown in the United States, but is freely employed in the countries of Europe and Asia, which are in a constant state of war or warlike preparation. The most conspicuous instance of impressment is the compulsory recruiting of the military and naval forces of those countries whose military system is based on conscription. In other respects also, as in the seizing of railroads, horses, carriages, and other means of transportation in time of war, the practice is common in military states.

Though the military and naval forces of Great Britain are wholly recruited by voluntary enlistment, the practice of impressment for service in the army and navy was formerly in use in England, but has in both cases been discontinued. It is doubtful whether impressment for military service was ever lawful. It was resorted to without statutory authority by an exercise of the royal prerogative, but was abolished by Act of Parliament in 1640 (16 Car. I, c. 28) and has never since been legalized. Impressment of seafaring men for naval service is, however, permitted by statute and was at one time extensively practiced, but is no longer in use, though it might at any time be revived by proclamation. All seafaring men, except masters and mates of merchant vessels, watermen apprentices, and certain other exempted persons, were liable to be forcibly seized, taken on board men-of-war, and compelled to serve. The practice was extended to cover men on board vessels in other than home waters. As the British government claimed a right to the services of her seamen wherever found, men were seized on board foreign merchant vessels, and even on men-of-war which were too weak to resist. Similarity of language and the fact that many American seamen were of British birth caused the United States to be the greatest sufferer from the British press gangs, and eventually this grievance became a leading cause of the War of 1812. It is stated that the number of impressed Americans serving in British ships between the years 1802 and 1812 was seldom less than the total enlisted force of the United States navy at the time, and at the beginning of the war more than 2000 Americans were discharged into prison ships for refusing to fight against their own country. In the treaty of peace Great Britain did not formally give up her claim to the right of impressment as respected seamen in American ships, for the subject was not mentioned; but the claim of the United States was tacitly admitted, and no further attempts were made to impress men from American ships.

Impressment of horses, drivers, vehicles of all kinds, the rolling stock of railroads and of vessels, is, as has been said above, common in continental countries in time of war and may under certain restrictions be employed in Great Britain in accordance with the Army Act, 1881 (44 and 45 Vict., c. 58). The obligation to provide such facilities for the use of the state rests upon all persons enjoying its hospitality, resident or traveling aliens, as well as domiciled citizens. Consult C. M. Clode, *Military Forces* (London, 1869), and William Stubbs, *Constitutional History of England* (3 vols., Oxford, 1887–91).

IMPRIS'ONMENT (from *imprison*, OF., Fr. *emprisonner*, from *en*, in + *prison*, prison, from Lat. *prensio*, arrest, from *prehendere*, *prendere*, to seize). The restraint of a person's liberty for any cause whatever, whether by authority of the government or by a person acting without such authority. In the latter case it is "false imprisonment." Imprisonment does not necessarily imply a place of confinement, with bolts and bars, but may be exercised by any use or display of force, lawfully or unlawfully, wherever displayed, even in the open street. A man becomes a prisoner, wherever he may be, by the mere word or touch of a duly authorized officer directed to that end. Usually, however, imprisonment is understood to imply an actual confinement in a jail or prison employed for the purpose according to the provisions of law. The power to imprison is in many cases inherent in courts or magistrates, and in others conferred upon them by statute, and it may be employed in civil as well as criminal proceedings. Imprisonment for debt, once universal in this country, under the English common law, is now generally abolished by statute, except in cases where the action of the debtor is tainted by fraud, or where he is reasonably suspected of an intention to avoid his debts by concealing his property, or of removing it and himself from the jurisdiction of the court. (See DEBTOR.) Witnesses whose testimony is necessary for the conviction of a criminal may be imprisoned to prevent their escape from the jurisdiction of the court. Persons accused of crime are either confined till the day of trial or released on bail, according to the gravity of the offense with which they are charged. Courts have the power to imprison for contempt of their authority, and persons found guilty of crime are imprisoned for periods prescribed by statute or determined by the judgment of the court.

Imprisonment as a punishment for serious crimes (felonies) is comparatively modern and came into use on the breakdown of the harsh and inhuman penal system of the last century, under which practically all felonies were punishable with death. For minor offenses (misdemeanors) and for contempts imprisonment, usually coupled with a fine or as an alternative to a fine, was permitted at common law, and the length of the sentence was limited only by the discretion of the court. The terms of imprisonment imposed for such offenses were usually short, however, rarely extending to a year, and it was not until by statute imprisonment was substituted for penal servitude and transportation (which were themselves substitutes for the death penalty of the older law) as the punishment for felony, that prisons of the modern type came into being.

Imprisonment is now, in the United States as well as in Europe, the ordinary punishment for all felonies, and either fine or imprisonment or both for most misdemeanors, except when, in cases of willful murder, the penalty of death is prescribed without the alternative of imprisonment. Modern legislation has generally vested in the courts the power to add to imprisonment the further penalty of hard labor during the term imposed, but the courts have no authority to condemn a convict to hard labor except in cases coming clearly within the terms of the statutes to that effect. See HARD LABOR.

The earlier statutes prescribing the penalty of imprisonment for crime fixed the term of imprisonment, graduating it according to the gravity of the offense of which the convict was found guilty on the principle of "making the punishment fit the crime." Later a considerable discretion was vested in the court imposing sentence, a maximum and a minimum period being fixed by statute for each crime or class of crimes, leaving it to the court to determine the precise term of imprisonment within the limits so prescribed. More recently, as a result of modern scientific investigation and modern theories of penology, statutes have generally been enacted in America limiting this judicial discretion and requiring the imposition of sentences of imprisonment for an indeterminate period between fixed maximum and minimum limits. Under this system a convict is sentenced to a term, say, of three to 10 years, the actual limit of his imprisonment being determined by a board of parole or other authority, whose decision is based on a consideration of the prisoner's record before conviction as well as on his conduct during the period of his imprisonment. See INDETERMINATE SENTENCE; PENOLOGY; PRISON; PUNISHMENT.

A person who wrongfully or illegally deprives another of his liberty may be sued in a civil action for false imprisonment by the person aggrieved, or prosecuted as for a criminal offense. A prisoner claiming to be unlawfully detained is entitled to a writ of habeas corpus to obtain the judgment of a competent court as to the legality of his imprisonment. See FALSE IMPRISONMENT; HABEAS CORPUS.

IM'PROBA'TION (Lat. *improbatio,* disapproval, from *improbare,* to disapprove, from *in-,* not + *probare,* to approve, from *probus,* good). In Scots law, the title of a proceeding for setting aside a deed or other instrument, which is apparently valid and probative, on the ground of forgery or fraud. It belongs to the class of 'rescissory' actions and is equivalent to the jurisdiction exercised by the courts of equity in England and America in setting aside and canceling legal instruments and in removing clouds on title. See EQUITY; FRAUD; MISTAKE.

IMPROMP'TU (Lat., in readiness). In music, a short, extemporaneous composition. Also a title given to compositions for pianoforte that have little thematic development. The term was probably first used by Chopin, whose four impromptus are still the most remarkable works of that kind. Schubert's Impromptus, Op. 90 and 142, were entitled so later by the publisher.

IMPROMPTU DE VERSAILLES, ăN'-prôN'tü' *de* vâr'sà'y', L'. A play by Molière (1663), in which he attacked the critics of his *Ecole des femmes.*

IM'PROPE'RIA (Lat. nom. pl., reproaches). A series of antiphons and responses which are sung in the Catholic church on Good Friday, as a part of the mass of the presanctified. Ever since 1560 Palestrina's famous Improperia have been sung in the Sistine Chapel in Rome.

IM'PROPRIA'TION (from ML. *impropriatio,* from *impropriare,* to impropriate, from Lat. *in,* in + *proprius,* own). A term used in England, signifying the transfer to a layman of the revenues of a benefice to which the cure of souls is annexed, with an obligation to provide for the performance of the spiritual duties attached to the benefice. The spiritual duties are discharged by a clergyman, who is called a vicar, and who receives a certain portion of the emoluments of the living, generally consisting of a part of the glebe land of the parsonage, together with what are called the "small tithes" (i.e., tithes of hops, potatoes and the like farming products) of the parish. The custom arose upon the dissolution of the monasteries, when the rights which belonged to them were in some cases bestowed upon laymen.

IM'PROVISA'TION (from Lat. *improvisus,* unforeseen, from *in-,* not + *providere,* to foresee, from *pro,* before + *videre,* to see). The art of producing without previous preparation a poem or a musical composition. Oratory, although in its original form it is founded on spontaneous efforts, is not ordinarily considered under the head of improvisation; but poetry and music, while subject to inspiration, are rather dominated by their complexity, and improvisation in these branches represents a peculiar and unusual ability. Poetry and music, like the dance and music, were inseparable in their early history; the Egyptian priests chanted improvised hymns to their deities; while in Greece, the real home of improvisation in antiquity, it was customary for poets to recite impromptu verses to the accompaniment of the lyre. In later Roman times Archias, the friend of Cicero, Publius Syrus, Ovid, and Statius were famous improvisatori. But as in the course of centuries languages grew more compact, and as less license was allowed, improvisation almost died out among civilized nations. Among savage peoples it has always been practiced. From the decline of Rome to the ninth century improvisation as an art was practically unknown. Then, however, came the renaissance, and the troubadours, the trouvères, the minnesingers, and the meistersingers (qq.v.) followed each other in rapid succession. Italy was quick to take advantage of the adaptability of her language, and the courts of Naples, Milan, and Ferrara became poetical centres from which the new art spread throughout the peninsula. In Germany and in France improvisation was soon superseded by careful composition, but in Spain, and especially in Italy, it lingered long. Petrarch, in the twelfth century, gave a great impetus to improvisation, and down to the present day in Italy it has played an important rôle in the imaginative life of the poorer classes. Improvisation is by no means limited to brief poems of a few verses and of simple structure, but is often carried on in complicated metres and to great length. Some of the most famous of the Italian improvisatori have been the Venetian Leoniceno (died 1524); Serafino of Aquila (died 1500); Accolti of Arezzo (sixteenth century); Metastasio (q.v.), who, however, soon abandoned the art; and Tommaso Syrici (died 1836). In Corsica and Sardinia there are many women (improvisatrices) who improvise long

memorial poems at funerals. Among the best-known improvisatrices may be mentioned Magdalena Fernandez (died 1800), Signora Mazzei (born c.1800), and Giovannina Milli.

In music improvisation is the art of performing extemporaneously upon an instrument. A given theme or themes may be developed in strict form, or the performer may give himself up to momentary impulses and employ any number of themes in a free fantasia. The former, however, is a great art, and nearly all the masters, notably Bach and Beethoven, excelled in it. To improvise in a given form requires not only an unusual command over the technique, but also a marvelous power of concentration. Undoubtedly the improvisation of a strict fugue is the most difficult task imaginable. Bach was a master of this.

IMPSONITE, ĭmp′son-īt. A solid bitumen, resembling gilsonite (q.v.), which is found in the Impson Valley, Okla. An analysis gave C, 86.57; H, 7.26; N, 1.48; O, 2.00; S, 1.38; Ash, 1.31. See Bitumen; Asphalt.

IM′PULSE (from Lat. *impulsus*, incitement, from *impellere*, to incite, from *in*, in + *pellere*, to drive). The typical motive, or conscious condition of voluntary action. (See Action.) This action is at first unequivocally determined (see Determining Tendency); the organization of the individual is such not only that a given stimulus can bring about merely a given definite movement, but also that this particular movement must necessarily follow without hesitation or reflection. The primitive impulse is thus composed merely of perception of object and perception of movement, with perhaps an affective process; the primitive impulsive action is action upon presentation. After these first movements, however, ideas may play a part in the motive. The developed impulsive action is action upon representation, and the developed impulse is a simultaneous association (see Association of Ideas) of the above-mentioned factors with an idea of own movement, based upon previous experiences, and an idea of the end or result of movement.

The motives to forms of action other than impulsive may all be derived from the impulse. In selective action the motive is a conflict of impulses, some one of which ultimately prevails as actual motive over the potential motives, its rivals. The motives in sensorimotor, ideomotor, automatic, and reflex action are degenerate impulses, i.e., are impulses from which certain of the conscious factors in the fully developed impulse have, through repetition, been lost. The process of the decay of motive may be studied experimentally in the reaction experiment. See Reaction.

It is difficult to give an example of an impulsive action, for the reason that the "impulse" is a scientific abstraction. Its mark, as we have said, is the single determination; and in concrete experience determinations are difficult to demarcate; while it is only approximately that we may speak of a single determination. What is impulsive in one man's consciousness, then, may not be so in another's, and what is impulsive for a man now may not be so under other conditions. The strong swimmer may plunge impulsively, the weak swimmer only after a good deal of hesitancy and indecision. Signing one's name to a deed is the expression of a highly complex determination; yet during a tiresome lecture one may write one's name in the notebook again and again in a purely automatic way.

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IMPULSE WATER WHEELS. See Water Wheel.

IMPU′RITIES OF WATER. See Water Purification.

IM′PUTA′TION (Lat. *imputatio*, from *imputare*, to ascribe, from *in*, in + *putare*, to think, from *putus*, clear; connected with Lat. *purus*, pure, Skt. *pū*, to purify). One of the common technical terms of Christian theology. It denotes the transference of the *merit*, in a legal sense, of punishment or reward.

The two problems in connection with which the term is used are those offered by the universal prevalence of sin in the world, and by the forgiveness of men, which the New Testament teaches is for Christ's sake. The former problem arose in connection with the Pelagian controversies in the time of Augustine (see Pelagianism; Pelagius; Augustine), the latter in connection with the controversies of the Reformation. Paul's writings show that he held *some* connection between Adam's sin and the sinfulness of all men. (Cf. Rom. v. 12.) Augustine explained it by a theory of realism, that men sinned *in* Adam. By the time of the Reformation realism had disappeared as a living philosophy, and imputation took its place in theology. Calvinism taught that Adam's sin was *imputed* to his posterity, so that they were treated *as if* they had committed it, being held to the consequences of it in the form of disorder of nature and actual sin resulting therefrom. In the course of time several varieties of imputation were distinguished—immediate, the direct imputation of Adam's sin; mediate, the imputation of a corrupt nature which produces sin. In respect to the forgiveness of sinners for Christ's sake, imputation was originally applied by the Church of the Reformation only to Christ's passive obedience, or suffering on the cross; and when this was said to be imputed to us, nothing more was meant than that we are forgiven for Christ's sake. Later, by that scholastic tendency which always dominates in the period of systemization, distinction was made between the passive and the active obedience of Christ or His obedience to the law, and this was also said to be imputed to the sinner in the act of justification.

Modern theology, even when of Calvinistic descent, seeks to emphasize the internal and ethical aspects of the doctrine. The propagation of a sinful nature, instead of being explained by realism and imputation, is explained by the law of heredity. The difference is not so much that evolution has laid aside the story of the fall of Adam as that modern thought demands an explanation of the fact of moral evil which is at once scientific and ethical. The relation of Christ to the race has also been reconstructed. With the tendency to substitute moral-influence views of the atonement for the mechanical conceptions of older theology, the need of a doctrine of the imputation of righteousness has disap-

peared. Consult: W. G. T. Shedd, *History of Christian Doctrine* (2 vols., New York, 1864); G. B. Stevens, *Christian Doctrine of Salvation* (ib., 1905); W. P. Du Bose, *Soteriology of the New Testament* (ib., 1906); L. G. Broughton, *Salvation and the Old Theology* (ib., 1908). See ATONEMENT.

IMRU'LKAIS. See AMRU-'L-KAIS.

IMUS, ē'mo͞os. A town of Luzon, Philippines, in the Province of Cavité, founded in 1795. It lies 8 miles southeast of Cavité, a short distance from Manila Bay. It was formerly the headquarters of the Filipino chief, Aguinaldo. Pop., 1903, 12,912.

INACHUS, ĭn'ā-kŭs (Lat., from Gk. Ἴναχος). The Greek name of a river in Argos and also of the god of the river. When Poseidon and Hera disputed about the possession of Argos, and Inachus decided for Hera, Poseidon is said to have dried up the bed of the Inachus, so that no water could flow through it in summer. The name Inachus was ascribed also to the first King of Argos, and leader of the Argives from the mountains to the plains, whence Argos is called Inachian. In the legends this Inachus is especially celebrated as the father of Io (q.v.).

INAGUA, ē-nä'gwà, GREAT and LITTLE. Two of the Bahama Islands, West Indies, situated at the south end of the group (Map: West Indies, D 2). Great Inagua lies about 60 miles northeast of Cuba and occupies an area of over 665 square miles. It is only slightly elevated and is surrounded by reefs. The chief settlement is Matthew Town; pop., 1911, 1106. Little Inagua lies about 10 miles northeast of the larger island and has an area of about 36 square miles and but few inhabitants. Pop. (both islands), 1911, 1343.

INAJA PALM, ĭn-ăj'à (probably from the native name), *Maximiliana regia.* A South American palm, common in the countries near the Amazon. It has a massive stem, 15 to 20 feet high; very long, drooping, pinnate leaves, which are sometimes more than 15 feet long, with leaflets in groups of three, four, or five at intervals along the midrib, from which they stand out in different directions; numerous spadices; large woody spathes; and densely clustered elongate fruit, with tough skin and soft pulp, and hard stony seed. The spathes are used by hunters to cook in, and with water in them they stand in the fire well enough for the purpose. They are also used as baskets, and as cradles by the Indians, who also eat the fruit, which is particularly attractive to monkeys and some kinds of birds. The leaves yield a serviceable fiber that is used by the natives in the manufacture of ropes, hats, etc.

INAMA-STERNEGG, ē-nä'mà-stĕr'nĕg, KARL THEODOR VON (1843–1908). An Austrian economist and statistician, born at Augsburg. Educated at Munich, he became docent there (1867), professor at Innsbruck (1868), and at Prague (1880). In the following year he was made head of the Statistical Bureau in Vienna and professor of the University of Vienna. He was president of the Central Statistical Commission (1884) and in 1891 was named a life member of the Austrian Upper House. An economist of the historical school, he was editor of the *Zeitschrift für Volkswirtschaft, Socialpolitik und Verwaltung* (1892) and of many departmental publications. He wrote: *Verwaltungslehre* (1870); *Die Ausbildung der grossen Grundherrschaften in Deutschland während der Karolingerzeit* (1878); *Deutsche Wirtschaftsgeschichte* (1879–1901); the important *Zur Verfassungsgeschichte der deutschen Salinen im Mittelalter* (1886); *Sallandsstudien* (1889); "Abriss der deutschen Wirtschaftsgeschichte" in Paul's *Grundriss der germanischen Philologie* (1889); *Die persönlichen Verhaltnisse der Wiener Armen* (1889); *Neue Probleme des modernen Kulturlebens* (1908).

IN-AND-IN BREEDING. See CROSSBREEDING IN MAN.

IN'ANI'TION. See STARVATION.

INARCH'ING. A method of grafting (q.v.).

IN'ARTIC'ULA'TA. See BRACHIOPODA.

INBREED'ING. See CROSSBREEDING IN MAN.

IN'CANDES'CENT ELECTRIC LIGHT. See ELECTRIC LIGHTING.

INCANDESCENT GAS LIGHT. See GAS, ILLUMINATING.

INCANDESCENT LAMPS. See ELECTRIC LIGHTING.

IN'CANTA'TION (Lat. *incantatio,* from *incantare,* to enchant, from *in,* in + *cantare,* frequentative of *canere,* to sing). The employment of song for magical purposes. In consequence of the excitement awakened by rhythmical utterance, verse has from early times been supposed to possess a divine element. Vergil and Horace represent songs as able to bring down from heaven the moon and the stars; and such influence, in these poets only fanciful, was at an earlier period commonly ascribed to sacred verses. It was further believed that both gods and ghosts were placated by song; and it is a universal feature of worship that in all ceremonies chants are employed which have been handed down from antiquity, preserved with scrupulous exactitude, and supposed to exert supernatural effect. In ancient times every function of human life was accompanied with incantations, presumed to be as essential as were the natural means employed. Poetic formulæ, it was supposed, had power to summon and banish demons, to raise and disperse storms, to bestow sunshine and rain, to grant success in war and in love, to inflict and remove disease, to cause crops to grow, wither, or remove from one granary to another, to make cattle breed and bees swarm, to bring success to the fisherman and hunter, and so on indefinitely. Song, when used for magic ends, is often reënforced by appropriate motions and actions and frequently recited by a shaman (medicine man, magician). Thus, among Navahos the rite called the Mountain Chant, primarily intended for the cure of disease, constitutes an elaborate festival of nine days' duration. It is explained by a myth, to which the songs allude. These form sequences, of which the order must not be changed, and among them are prayers of a simple character, which recite the nature of the sickness, entreat that it may be healed, and end with an assertion that the work is accomplished. Similarly, ancient Babylonian formulæ of an exorcistic character, directed against diseases conceived as evil spirits, ordinarily begin with enumerating the effects of the malady or names of the hostile powers, express the desire of the suppliant for recovery, and conclude with an invocation to Heaven and Earth, who are besought to deliver the sufferer. These also were often associated with ritual, for the performance of which directions are given. Of course, with the songs are sometimes employed other agencies, as when in the *Odyssey* the hero, injured by a boar's tusk, has his hurt bound by the sons of Autolycus, who

then proceed to employ an incantation supposed to stanch the wound. In process of time the ceremonies employed in such cases fell into disuse, and the words of such charms became half intelligible or altogether meaningless. It seems to have been always usual that the miraculous healer should recite his rhymes in a low tone of voice, in such a manner as to be unintelligible to spectators, whose sense of mystery was thereby heightened. Considering the tenacity of tradition, it might be expected that some of these formulæ should have a long history. For instance, a German incantation recorded in the tenth century, and evidently of heathen origin, relates that, while certain deities were riding in the forest, a horse dislocated his leg, which the gods wished to heal; Woden was successful by means of an incantation. A similar charm at a later time appears in Christian form, Peter and John replacing the deities, and Christ taking the place of Woden as the healer. In the nineteenth century a form of this incantation was still in use in Shetland, but accompanied by an elaborate ceremony, every part of which was regarded as essential, and which included the use of a thread spun from black wool and having nine knots wound about the sprained part. At the present day the custom remains in force among simple peoples. In English nursery lore the habit of incantation survives in some simple rhymes of children and young people, as, e.g., in verses directed against rain, or those addressed to the moon and stars in order to obtain auguries as to the future mate. Consult the authorities referred to under MAGIC; also Grendon, "The Anglo-Saxon Charms," in *Journal of American Folk-Lore*, vol. xxii (Boston, 1909).

IN'CAPAC'ITY. In law, the state or condition of being incapable of incurring a civil or criminal liability. Incapacity to contract may be due to the infancy of a party, to his political or professional status, to lunacy or drunkenness, in the case of a woman to coverture, and in the case of a corporation to its artificial construction. A contract entered into by a person under such a disability may, as in the case of an infant, be merely voidable at his election, or, as in the case of a married woman at common law, absolutely void. The disability of coverture has, however, been almost wholly removed by statute, both in England and the United States, and the same is true of some of the disabilities resulting from professional or political status, as in the case of alienage; but the other grounds of incapacity, which are based not on an artificial status but on natural conditions, are still generally observed. See CONTRACT; COVERTURE; INFANT.

In criminal law children under the age of seven are conclusively presumed to be incapable of committing crimes of any nature, and boys under 14 are deemed incapable of sexual crime. See CRIME. For incapacity to contract marriage, see MARRIAGE; IMPOTENCY; PROHIBITED DEGREES; CONSENT, AGE, IN LAW; and, on the general subject, PERSON.

IN'CARNA'TION (ML. *incarnatio*, from Lat. *incarnari*, to be made flesh, from *in*, in + *caro*, flesh, Gk. κρεας, *kreas*, AS. *hrāw*, Skt. *kravya*, raw flesh). In Christian theology, the assumption of humanity, by the second person of the divine Trinity, by which He was both God and man in one person. The idea of the appearance of gods in human form is very frequent in primitive religions, in many of which the line between divine and human is not sharply drawn. In more developed religions the idea is often found, both in the belief that certain living men, often kings or saints, are divine incarnations, and in mythological stories of the incarnation of the gods. India and Egypt were specially rich in both these forms of incarnation in beasts as well as men. The Christian doctrine of incarnation differs from these in being ethical rather than physical in emphasis, conceived as occurring once only in the history of the world and for the purpose of the redemption of mankind. The proof of the incarnation of Christ lies, not in the story of the Virgin birth, which cannot be shown to be known by any New Testament writers except the authors of Matthew and Luke, but rather in Christ's harmony with the will of God. For all purposes of modern thought, absolute union of will with the will of God is the incarnation of God. Early speculations about the incarnation, however, were concerned with questions of substance—whether Christ was of the same substance with God. (See HOMOOUSION.) The mediæval theology laid great stress on the incarnation as furnishing the basis for an explanation of the atonement. Anselm (q.v.), in *Cur Deus Homo*, argues that an incarnation is necessary for atonement. Man has incurred the debt for sin, and man must pay it; but man cannot. Therefore the need of a God-man, who is almighty and sinless and can pay the debt, not only for himself but for all men. Modern theology still regards the incarnation as the central doctrine of Christianity, though not for the mechanical reasons of Anselm's theory. The incarnation is now interpreted rather as a revelation of the nature and character of God. Would men know what God is? God is like Christ. Christ's character is the model on which men who wish to be in harmony with God must build. The incarnation is necessary to the revelation of God, for only through a person could the character of a personal God be shown. The incarnation, then, is a necessity for the salvation of men, for it gives them a perfect example of what God requires for harmony with himself.

Bibliography. G. F. Baur, *Die christliche Lehre von der Dreieinigkeit und Menschwerdung Gottes* (Tübingen, 1841); Dorner, *History of the Development of the Doctrine of the Person of Christ* (Eng. trans., Edinburgh, 1861–63); Thomasius, *Christi Person und Werk* (Erlangen, 1874); Gore, *Incarnation of the Son of God* (London, 1891); Orr, *Christian View of God and the World as Centring in the Incarnation* (Edinburgh, 1893); Dix, *The Sacramental System Considered as an Extension of the Incarnation* (London, 1893); Harnack, *History of Dogma* (Boston, 1894–1900); Mackintosh, *Doctrine of the Person of Jesus Christ* (New York, 1912); Masterman, *Three Lectures on the Incarnation* (ib., 1913); Ottley, *Doctrine of the Incarnation* (London, 1896); Simon, *Reconciliation by Incarnation* (Edinburgh, 1898). See CHRISTOLOGY; KENOSIS. See also HINDUISM.

IN'CAS. See PERUVIAN ARCHÆOLOGY.

INCE, WILLIAM (fl. eighteenth century). An English furniture designer, whose chairs represented a transition from those of Chippendale (q.v.), which they most resembled, to Hepplewhite's (q.v.). Ince was most successful in some of his light boudoir furniture. Various details introduced by him set a style for several years. With Thomas Mayhew, for many years his partner in London, he published *The Universal System of Household Furniture* (c.1762),

whose 95 plates show more than 300 "designs in the most elegant taste." Consult, besides this work, the references cited under CHIPPENDALE CHAIRS and FURNITURE.

INCE-IN-MAKERFIELD, ĭns'ĭn-măk'ĕr-fēld. A town in Lancashire, England, 1 mile east-southeast of Wigan, on the Leeds and Liverpool Canal (Map: England, D 3). It has railway-wagon works, ironworks, blast furnaces, cotton works, and extensive coal mining. The town has owned its water works since 1871. Pop., 1901, 21,262; 1911, 22,034.

INCEN'DIARISM. See ARSON.

IN'CENSE (from OF., Fr. *encens*, Lat. *incensum*, incense, from *incendere*, to burn, from *in*, in + *candere*, to glow, connected with Gk. *καθαρός, katharos*, pure, Skt. *ścandra, candra*, shining, noon, from *ścand*, to be bright). A perfume the odor of which is evolved by burning. It was used in worship in Egypt, Babylonia, and Assyria, Persia, Greece, and Rome, in the later Hebrew religion, in Hinduism and Buddhism. In the Christian Church there is no positive evidence of its use during the first four centuries. The earliest authentic reference to it is in the Pseudo-Dionysius in the fifth century. In the Catholic church, both of the West and of the East, incense is used in public worship, in the solemn (or high) mass, in the consecration of churches, in solemn consecrations of objects intended for use in public worship and in the burial of the dead. The incense at present in use consists of some resinous base, such as gum olibanum, mingled with odoriferous gums, balsams, etc. There is no regular formula for it, almost every maker having his own peculiar recipe. The ingredients are usually olibanum, benzoin, styrax, and powdered cascarilla bark. These materials, well mingled, are so placed in the censer (q.v.) or thurible as to fall by sprinkling on hot charcoal, which immediately volatilizes them. In the reformed churches the use of incense was abandoned, but has been restored to some extent in the High Church branch of the Anglican communion; and the Catholic Apostolic (or Irvingite) church (q.v.) has always used it. Consult: Atchley, *History of the Use of Incense in Divine Worship* (London, 1909).

INCEP'TION. See ACT OR CEREMONY OF INCEPTION.

IN'CEST (OF., Fr. *inceste*, from Lat. *incestum*, incest, neut. sing. of *incestus*, unchaste, from *in-*, not + *castus*, chaste). Sexual intercourse between persons who are legally prohibited from marrying because of their affinity or consanguinity (q.v.). Incest is not a common-law offense, but in England is punishable in the ecclesiastical courts by excommunication and penance. It is said to be the only form of immorality which, in the case of the laity, is still punished by the ecclesiastical courts on the general ground of its sinfulness.

In the law of Scotland incest is a high crime by a statute (Scots Act, 1567, c. 14) which defines it by a reference to Leviticus (chap. xviii), and was till 1887 punishable with death. Incestuous marriages are absolutely void both in England and the United States.

In most of the American States incest is a criminal offense by statute, punishable by imprisonment for a term of years, usually not exceeding 10. In some States the marriage of persons within the prohibited degrees, even when not followed by cohabitation or accompanied by sexual intercourse, amounts to criminal incest. Consult: Blackstone, *Commentaries on the Laws of England* (1st ed., 4 vols., London, 1765–69); Stephen, *History of the Criminal Law of England* (ib., 1883); Phillimore, *Ecclesiastical Law* (2d ed., 2 vols., London, 1895); Bishop, *Statutory Crimes* (Chicago, 1901); Slater, *Manual of Moral Theology* (New York, 1908). See CONSANGUINITY; MARRIAGE; PROHIBITED DEGREES.

INCH. See WEIGHTS AND MEASURES.

INCH, JAMES ROBERT (1835–1912). A Canadian educator, born at Petersville, Queen's Co., New Brunswick, and educated at Mount Allison University. He was principal of the Mount Allison Ladies' College (1864–78); president of the University of New Brunswick (1878–91); superintendent of education and president of New Brunswick University, the two offices having been amalgamated by act of the Provincial Legislature. In 1895 he was elected vice president of the Dominion Educational Association; in 1906 he was made a member of the committee on union of the Presbyterian, Methodist, and Congregational churches of Canada, and in 1907 he was a delegate to the Imperial Educational Conference at London, England. He resigned as superintendent of education in 1909.

INCH'BALD, ELIZABETH SIMPSON (1753–1821). An English novelist, playwright, and actress, born at Stanningfield, near Bury St. Edmund's, Suffolk. She educated herself, mostly by general reading. After vain attempts to engage herself as actress, both in Norfolk and in London, she married, in 1772, the actor Joseph Inchbald. Later in the same year she made her first appearance on the stage at Bristol in the rôle of Cordelia. With her husband she performed in the provincial towns till his death (1779) and continued to appear for 10 years more. As an actress, she had the advantage of great personal charm, but an impediment in speech prevented the highest success. Beginning to write for the stage as early as 1782, she produced about 20 comedies and farces, which were well received at the London theatres. But of her literary work only her two novels have survived: *A Simple Story* (1791; with introd. by G. L. Strachey, Oxford, 1908), which, though ill constructed, did not lack real merit; and *Nature and Art* (1796), which was very popular. Mrs. Inchbald also edited three collections of plays: *The British Theatre* (25 vols., 1806–09); *Modern Theatre* (10 vols., 1809); and *Farces* (7 vols., 1809). She wrote her memoirs, but destroyed them. Consult: Scott's edition of her *Novels* with a memoir (London, 1880); Boaden, *Memoir* (ib., 1833); Elwood, *Memoirs of the Literary Ladies of England* (ib., 1842); J. Fyvie, *Tragedy Queens of the Georgian Era* (New York, 1909).

INCH'CAPE ROCK, THE. A ballad by Southey relating how the bell buoy on the reef of this name (see BELL ROCK) near Arbroath (q.v.), Scotland, was destroyed by a pirate and how he afterward lost his own life on the spot.

INCH'COLM, or ISLAND OF COLUMBA. A picturesque islet in the Firth of Forth, in the Parish of Aberdour (q.v.), Fifeshire, Scotland, separated from the Fife shore by Mortimer's Deep, a channel about a mile wide. It is half a mile long, with a maximum width of one-third of a mile, and is noted for its monastic ruins, which exhibit traces of the twelfth-century Romanesque architecture, but are chiefly in the early Pointed style of the thirteenth and fourteenth centuries. They consist of the remains

of an abbey of Austin Canons regular, founded by Alexander I in 1123, and include a vaulted oratory, and a chapter house with groined roof and three elegant sedilia. The Latin names of the islet are *Æmona* and Insula Sancti Columbæ, the latter derived from St. Colm, or Columba (q.v.), of Iona, who dwelt here in the sixth century. As St. Colm's Inch, it is mentioned in Shakespeare's *Macbeth*, Act i, Scene 2. The monastery was frequently sacked by the English during the fourteenth, fifteenth, and sixteenth centuries. Consult Simpson, *Æmona and the Islands of the Forth* (Edinburgh, 1861).

INCHKEITH, ĭnch'kēth. A small fortified island of historic interest in the Firth of Forth, Scotland, nearly midway between Leith and Kinghorn. It has a lighthouse, 220 feet above high water, visible 21 miles.

INCH'WORM'. See Measuring Worm.

IN'CIDENT (from Lat. *incidere*, to fall upon, from *in*, in + *cadere*, to fall). In law, a right, privilege, or burden inseparably annexed to an estate or tenure of lands. Thus, rent reserved upon a lease for life or years is incident to the reversion, or estate of the landlord, and passes with the latter upon its assignment; and a right to distrain is incident to a rent charge and attends it into whosesoever hands it may come; and a court baron is incident to a manor (q.v.), which, indeed, cannot exist without such a court. In the same sense the rights of inheritance, of free alienation, and of escheat are incidents of an estate in fee simple, and the right to take estovers (see Estover) is an incident of a tenancy for life or years, while dower and curtesy are among the incidents of estates of inheritance.

More specifically the term "incident" is employed in English law to describe a certain class of obligations attaching to the several forms of feudal tenure. Viewed from the standpoint of the lord of whom the lands were held, these were certain legally defined rights which inured to him by virtue of his superior or paramount title. They were due, as a matter of legal obligation, from all land held by such tenure, and not by virtue of any understanding or agreement—which fact distinguishes them from the *services* due from the tenant to the lord, which were entirely a matter of agreement.

The most important of these "feudal incidents," as they are termed, were *aids*, *reliefs*, and *escheats*, which were due from all secular tenures, and *wardship* and *marriage*, which were peculiar to the military tenures. These will be described under their appropriate titles. Though differing greatly in the kind and amount of the burden which they imposed upon the land, they had this in common, that they came to be regarded as the essential and distinguishing characteristics of the several forms of tenure to which they were appropriate. The military structure of the feudal system in England decayed rapidly after the Conquest, and the expression "military tenure," or "tenure in chivalry," was regarded not as tenure for which military service was in fact to be rendered, but tenure attended by the burdensome incidents of wardship and marriage; while socage tenure was not so much a tenure by a fixed and determinate service as one free from those incidents.

Most of the incidents of tenure were done away with by the famous statute which abolished military tenures (12 Car. II, c. 14), and only the right of escheat remains to remind us of the feudal origin of our land law. See Feudalism; Socage; Tenure; and the authorities there referred to.

IN'CIDEN'TAL MUSIC. By this term is meant all music written specially for the purpose of illustrating or intensifying certain moments of a spoken drama, such as fanfares, marches, dances, serenades, songs, etc., which are performed while the action is in actual progress upon the stage. Music played between the acts, even if it has some connection with the drama, does not come under this definition, but is classed as entr'acte music. Nor are concert overtures, inspired by a drama and portraying some mood or character, included. Such examples as Wagner's *Faust Overture*, Schumann's *Braut von Messina*, Goldmark's *Prometheus*, etc., come under the heading of programme music. They were not written for performance in connection with those dramas. On the other hand, such overtures as Beethoven's *Egmont*, Mendelssohn's *Midsummer-Night's Dream*, Schumann's *Manfred*, though frequently performed at symphony concerts, constitute part of the incidental music written for those dramas. From the scenic directions found in his plays it is evident that Shakespeare relied extensively upon the aid of music; but, strange to say, not a note of the original incidental music has come down to us. When Henry Irving assumed the management of the Lyceum Theatre in London (1878), he inaugurated the practice of staging every Shakespearean play, and almost every modern drama of importance, with new incidental music written for the occasion by the foremost English composers.

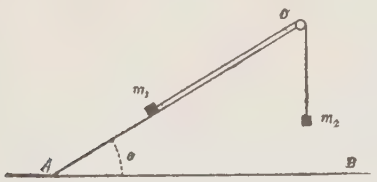
IN'CINERA'TION. See Cremation.

INCINERATION, Refuse. See Garbage and Refuse, Disposal of; Field Cooking.

IN'CLINA'TION, Magnetic, or Dip. The angle made with the horizon by the axis of a magnetic needle which swings freely in a vertical plane passing through the magnetic meridian (compass direction). It varies from point to point on the earth's surface, ranging from 90° at the magnetic poles to zero at the magnetic equator. The varying amount of magnetic inclination will be found indicated on the isoclinic charts accompanying the article Terrestrial Magnetism. The magnetic inclination was first definitely discovered by Robert Norman in 1576, and an instrument, the dip circle, was devised by him for measuring the amount. The phenomenon had previously been noticed by George Hartmann, in Nuremberg, as would appear from a letter written in 1544, but he failed to measure the amount of inclination accurately; he merely observed the dip of a compass needle which was not quite balanced. It should be carefully noted that the magnetic inclination, as above defined, is the *minimum* angle which a dip needle makes with the horizon at any given place. Thus, if the plane in which the dip needle swings is set at right angles to the magnetic meridian, then the angle of dip will be the maximum amount possible, viz., 90°; it is with the aid of this fact, indeed, that the vertical plane of the dip circle is frequently set in the magnetic meridian. Besides the dip circle an instrument known as the earth inductor is used to measure the dip. The magnetic inclination is subject to periodic and aperiodic variations, as is the magnetic declination. In order that an ordinary compass needle may swing in a horizontal plane, it is customary in northern latitudes to make the southern end of the needle slightly heavier; or

the same effect is secured by using a symmetrical needle which has been weighted with a small bit of brass on its southern half. See COMPASS; DECLINATION; DECLINOMETER; DIP CIRCLE; DIP OF THE MAGNETIC NEEDLE; ISOCLINIC; MAGNETISM; TERRESTRIAL MAGNETISM.

INCLINED PLANE. A smooth plane inclined to the horizontal plane at any point on the earth's surface. Imagine a plane section through this inclined plane and the horizontal one, perpendicular to their line of intersection. Let the plane be supported by an upright; and let two bodies of masses m_1 and m_2, joined by an inextensible string, be placed, as shown, one on the plane and one hanging freely, the string passing over a pulley. If the bodies are in equilibrium, the forces on the body of mass m_1, parallel to the plane, must balance each other. There is a force $m_1 g \sin\theta$ down the plane and a



INCLINED PLANE.

force $m_2 g$ up the plane; hence $m_1 g \sin\theta = m_2 g$; or, in general, the force up the plane equals the weight of the body on the plane multiplied by the sine of the angle of inclination of the plane. To produce motion up the plane of a heavy body requires therefore less force than its weight. The "mechanical advantage" is $\frac{1}{\sin\theta}$.

Another method for solving this problem is to consider as before the two bodies in equilibrium and to produce a small displacement; let the body whose mass is m_1 move up the plane a distance x_1, and the body whose mass is m_2 move vertically down, owing to this, a distance x_2. By the principle of energy $m_1 g \sin\theta x_1 = m_2 g x_2$; but $x_1 = x_2$; hence, as before, $m_1 g \sin\theta = m_2 g$. Inclined planes are still used daily for rolling up heavy weights. They were used by all ancient peoples for raising heavy stones for building purposes. The screw is nothing but an inclined plane rolled around a cylinder.

INCLINOMETER. A term applied to an instrument for determining the inclination of the magnetic needle, more properly known as a dip circle (q.v.). See INCLINATION; TERRESTRIAL MAGNETISM.

INCLOSED ARC LAMP. See ELECTRIC LIGHTING.

INCLO'SURE OF COMMONS. In English law, the freeing of wastes and common lands from certain common, or community, rights of user to which they may be subject. Commons, i.e., rights of common—as the right of villagers or the tenants of a manor to pasture their cattle on the waste land of the vill or manor—are among the oldest of English property rights. They were formerly very common and were doubtless a survival of primitive forms of community property, antedating the institution of private ownership. When, with the advent of the feudal system, the lands came to be regarded as the private property of greater or lesser lords, the accustomed use of the lands for pasturing cattle, cutting turf, and the like, survived as common, customary rights of the community exercising them. As such privileged use of the land prevented its conversion to ordinary agricultural purposes, it was necessary to extinguish the common rights before this could be effected. The process by which this was accomplished was the inclosure of the commons.

At common law the only method by which the right to inclose lands subject to common rights could be gained was by mutual agreement between all who had commonable privileges therein —a tedious and unsatisfactory method. The benefits of inclosure became evident centuries ago, and as early as the reign of Henry III a general act of Parliament, known as the Statute of Merton (1235, 20 Hen. III, c. 4), was passed, authorizing the "inclosure and approvement" of commons of pasture upon certain conditions. This was followed just half a century later by the Statute of Westminster II (13 Edw. I, st. i, c. 46), which gave greater precision to the methods by which inclosure should be effected. But the transformation of English agriculture was a slow process, and 500 years more were to elapse before the common rights in waste land became a serious obstacle to the economic development of the country. In 1801 the first general Inclosure Act was passed, and this was followed by the Inclosure Act of 1845, by which, with its amendments, the inclosure of commons and wastes is now regulated. All of this legislation has aimed at facilitating the division of commons, their conversion into separate and independent land holdings, the inclosure of such holdings, and the improvement of those portions that are retained for the common use of towns or villages. Consult: Elton, *Treatise on the Law of Copyholds and Customary Tenures of Land* (London, 1874); Williams, *Rights of Common* (ib., 1880); Scrutton, *Commons and Common Fields* (ib., 1887); Gonner, *Common Land and Inclosure* (New York, 1912). See COMMON.

IN CŒ'NA DOM'INI (Lat., at the Supper of the Lord). A celebrated papal bull, so called because designed to be read in the church of St. Peter's at Rome on every Holy Thursday, the day on which the Lord's Supper was instituted. It is not, as other bulls, the work of a single pope, but, with various additions and modifications, dates back to early times; some tracing it to Urban V, and others to Martin V, Clement V, and some to Boniface VIII. Its present form, however, it received from the popes Julius II, Paul III, and finally Urban VIII, in 1627, after which it continued for a century and a half to be published annually. Pius V, in 1568, decreed that it should be read every Holy Thursday until superseded. The contents of this bull have been a fertile subject of controversy. It may be briefly described as a summary of ecclesiastical censures, especially of those with which grievous violation of the faith of the Church, or of the rights of the Church or of the Roman see, are visited; excommunication being denounced against heresy, schism, sacrilege, usurpation of the rights of the Church or of the Pope, forcible and unlawful seizure of Church property, personal violence against ecclesiastics, unlawful interruption of the free intercourse of the faithful with Rome, the invasion of the Pontifical States, etc.—20 clauses in all. The bull, however, although mainly dealing with offenses against the Church, also denounced under similar censures other crimes, as piracy, plunder of shipwrecked goods, forgery, etc. This bull, being regarded

by most of the sovereigns of Europe as an infringement of their rights, encountered in the seventeenth century the determined opposition of nearly all the courts, even the most Catholic; and at length, in 1770, Clement XIV discontinued its publication, which has never since been renewed. Pius IX, on Oct. 12, 1869, abrogated it and issued a new constitution, *Apostolicæ Sedis*, in its place.

IN'COMBUS'TIBLE FABRICS. Much attention has been paid to the production of incombustible fabrics, and of solutions which may be applied to any fabrics to render them more or less fireproof. As typical of the first may be mentioned asbestos cloth when this fibre is used either wholly or in part to form the fabric. A drop curtain of such material at the proscenium arch is required for theatres in many cities. It is usually made of metallic asbestos cloth where a strand of asbestos yarn is wound with a strand of fine brass wire and the combination woven into a cloth usually of 36 inches width. While useful, these asbestos curtains have their limitations and fire engineers urge that too much dependence should not be placed upon them. Many salts possess the power of rendering fabrics which were immersed in solution of them incombustible; but some of these injure the fabric, spoil the color, or are so very expensive as to render their general use impossible. Three, however, viz., tungstate of soda, phosphate of ammonia, and sulphate of ammonia, produce the best results without injuring the fabric or color. The first of these acts physically by preventing contact with the air and does not interfere with the process of ironing and starching; it is therefore preferable for goods requiring washing. For fabrics which are used without previous washing, the other two are preferable. Soluble glass (silicate of soda) is a highly alkaline solution of minerals composing glass which is applied to textures, in theatres especially for curtains and scenery, to render them fireproof. Fire touching them melts the invisible minerals into a glaze which excludes air and prevents combustion. All these solutions, however, are likely to lose their efficiency if some time has elapsed since they were applied. Consult: British Fire Prevention Committee's *Red Books*, especially no. 129, "Fire Tests with Textiles" (1908), and no. 148 (1910); also *Journal of British Fire Prevention Committee*, "Fire Prevention in Paris," no. 8 (1912); various papers in the files of the *Quarterly of the National Fire Protection Association* (Boston, current), especially vol. vi, no. 2 (1902), "Fireproofing Cotton Goods." For further treatment of the subject, see FIREPROOFING.

IN'COME TAX. A tax upon the income of individuals. It may be levied directly upon the individuals receiving the income, or it may be collected from the income at its source in the form of a tax upon dividends, interest on bonds, etc. It may be uniform, taxing all incomes at a uniform rate, or progressive, increasing the rate of taxation with the amount of income received by the individual. An income tax may differentiate between various forms of income, as, e.g., between incomes from labor and incomes from property, or between permanent and temporary incomes. Differentiation may be attained either by levying a higher rate upon some forms of income than upon others, or by the imposition of a supplementary tax upon property or upon consumption which will in effect fall upon the incomes discriminated against.

In states which levy an income tax it is usually the practice to exempt small incomes, or that portion of the income necessary to mere independent existence or to the maintenance of the usual standard of life, and to levy the tax only upon the excess. The theory of such exemption is that the state should not take from the individual in the form of taxes what it will be obliged to return to him in the form of poor relief or otherwise.

In theory the income tax, more nearly than any other system, meets the requirements laid down in the most advanced canons of taxation. A man should be taxed according to his ability, or "faculty"; and income is the best test of ability. A graduated tax on incomes is popularly defended on the ground that it may be employed to bring about a more equal distribution of wealth. In the latest financial theory, however, graduated taxation is justified on the ground that a man's ability to pay taxes increases more rapidly than his income. Differentiation of taxation is advocated on similar grounds. One who receives an income from permanent property is in a more favorable position than one who receives an equal income from labor, since the latter is compelled to make provision against unemployment, while the income of the former is quite at his disposal. It is, therefore, in accordance with the faculty test that incomes from property should pay a higher rate than incomes from labor.

In practice it is found to be difficult to determine directly the magnitude of a man's income. This is especially true in countries like America and England, where it is the policy of government to interfere as little as possible in the business affairs of the individual. This difficulty is greatly reduced when the tax is levied, not directly upon the individual, but upon the source of the income. Under this system corporations may be required to withhold a part of the dividends for the payment of the tax as well as a part of the salary of employees. When the tax is levied at the source, however, it is difficult to graduate it so as to tax those who receive large incomes at a higher rate than those whose incomes are small.

The income tax was introduced in England as a purely fiscal expedient. The huge expenditure of the Napoleonic wars forced the adoption in 1799 of an income tax, which with a short intermission lasted till the close of the war. It was again revived in 1842, and, although in 1874 an attempt was made by Gladstone to secure the repeal of the tax, it has maintained its position to this day as an integral part of the British financial structure. The British income tax is levied on the source of the income and does not attempt to provide for graduation or differentiation. It has proved to be a very productive tax; and by changing the rate the government is enabled to increase or diminish its revenue so as to cover exactly fiscal needs. In Italy the income tax was introduced by the law of 1864 (amended in 1877), and the fiscal needs of France after the Franco-Prussian War forced it also to adopt a national tax upon the income of corporations and associations. By a law of 1891 Prussia introduced a direct tax upon incomes. The tax was graduated, but at first made no provision for differentiation. In 1893 an auxiliary tax was levied upon property, thus establishing differentiation in effect. In 1893 Holland adopted an income-tax law which provided both for graduation and differentiation. By this law corpora-

tions as well as individuals are subject to the tax, but the holders of corporate securities pay no additional income tax on the revenue from them. A similar law was introduced in New Zealand in 1893. Switzerland, Denmark, and Austria levy income taxes, as does also Australia.

In the United States an income tax was advocated during the War of 1812 by Secretary Dallas, and in 1862 such a tax was actually adopted, and remained in force until 1872, despite the opposition of the propertied classes. No satisfactory machinery was established for its application. Individuals were required to submit estimates of their incomes; and as there was no means of verifying these estimates, the tax was paid only by those who were scrupulous enough to admit that their incomes exceeded the untaxed minimum. In spite of the great increase in national wealth, the receipts from the income tax declined from year to year. In 1894 the income tax was again introduced as a part of the Wilson Tariff Bill, and was carried largely by the Western and Southern members, despite violent opposition from the cities of the East. The tax, however, was declared unconstitutional (May 20, 1894), because, although a direct tax, it was not apportioned among the States according to population.

On July 12, 1909, an amendment to the Constitution giving Congress power "to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration," was submitted to the States by Congress. On Feb. 25, 1913, the amendment was declared adopted, the necessary two-thirds of the States having ratified it. Under its authority a law taxing incomes was incorporated in the Tariff Act of Oct. 3, 1913. Under this law every single person with an income above $3000 is required to pay a normal tax of 1 per cent on the excess above such sum; every married person is required to pay a normal tax of 1 per cent on the excess of income above $4000. An additional tax of 1 per cent is levied upon income in excess of $20,000 and not above $50,000; an additional tax of 2 per cent on income in excess of $50,000 and under $75,000; 3 per cent on income in excess of $75,000 and under $100,000; 4 per cent on income in excess of $100,000 and under $250,000; 5 per cent on income in excess of $250,000 and under $500,000; and 6 per cent on income above $500,000. The principle of deduction at the source is employed extensively, in the case of incomes from corporate salaries, investments, etc.

Income taxes have been imposed at various times in 21 States, and in 8 States such taxes are still in force; but in no case have they been productive of large revenue. The Income Tax Law of Massachusetts dates from Colonial times and exempts incomes under $2000 as well as income derived from property already taxed. Consult: Hill, *The British Income Tax* (New York, 1889); Müller, *Die Einkommenbesteuerung in den verschiedenen Ländern* (Halle, 1902); Kinsman, *The Income Tax in the Commonwealths of the United States* (New York, 1903); Caillaux, *L'Impôt sur le revenu* (Paris, 1910); Kennan, *Income Taxation* (Milwaukee, 1910); Seligman, *The Income Tax* (New York, 1911); Bankers Trust Company, New York, *Federal Income Tax* (ib., 1913); id., *Federal Income Tax Regulations and Law, with United States Treasury Department Rulings* (ib., 1913); id., *United States Internal Revenue Regulations Relating to Deduction of Federal Income Tax at the Source, as Issued October 25, 31, December 4–16, 1913; December 20, 1913–January 3, 1914* (ib., 1913–14); H. C. Black, *Treatise on the Law of Income Taxation under Federal and State Laws* (Kansas City, 1913); L. F. Speer, *Federal Income Tax Law Affecting Individuals and Corporations, with an Analysis of the Act and Explanatory Notes* (New York, 1913); Cordell Hull, *Federal Income Tax Law, together with Synopsis of the Law* (ib., 1914); Roger Foster, *Treatise on the Federal Income Tax under the Act of 1913* (Rochester, N. Y., 1914); Foote and Tracewell, *Analysis and Interpretation of the Federal Income Tax Law* (Washington, 1914); A. H. Walker, *The Unconstitutional Character and the Illegal Administration of the Income Tax Law Demonstrated* (New York, 1914). See FINANCE; TAXATION.

IN'COMMEN'SURABLE. See COMMENSURABLE.

INCONNU, ăn'kô'nụ' (Fr., unknown). A fish, usually called the Mackenzie River salmon (*Stenodus mackenzii*), which is intermediate between salmon and whitefish, and weighs about 10 pounds, though sometimes it is much larger. It ascends all the rivers of Arctic America and Asia and is of much importance to the natives of their valleys, though the fish is oily. It was discovered by Alexander Mackenzie, whose followers named it.

INCONSTANT, THE; OR, THE WAY TO WIN HIM. A comedy by George Farquhar (1702), adapted from Fletcher's *Wild Goose Chase.*

INCOR'PORAT'ED SOCIETY OF AUTHORS, THE. A society organized in London, in 1884, by Sir Walter Besant, for the protection of authors and composers, and modeled on La Société des Gens de Lettres of Paris. Its purpose is to maintain the rights of authors, to advise them as to questions of copyright, to assist them in making contracts with publishers and in recovering money due under contracts. The society has also vigorously advocated amendments to the copyright law and had a large share in amending the laws of Canada and other colonies of the British Empire. The official organ is the *Author,* which is published monthly from the society's office. The society maintains a pension fund for the assistance of poor and unfortunate authors. The first president of the society was Lord Tennyson. The president in 1914 was Thomas Hardy.

INCOR'PORA'TION. The legal process by which a corporation is formed. As incorporation involves the creation of a new, artificial person, endowed by law with many of the rights of a natural person—as the power of holding and alienating property, the right of transmitting real estate by succession, the capacity of suing and of being sued as an individual, etc.—it is the exclusive privilege of the sovereign power. In England it is included in the royal prerogative, and the exercise of this power of the crown is known as a franchise (q.v.). In modern times it has come under the control of Parliament, and incorporation may be effected either by a special act or, more generally, under general statutes. In the United States the power to create corporations has never been a prerogative of the President or of the Governor of a State, but is vested exclusively in Congress and in the legislatures of the several States.

Thus, incorporation may be effected by royal

grant or charter, by special act of parliament, or a legislature, or by compliance with general statutes providing for incorporation for defined purposes and under defined conditions. The usual method employed in the United States at the present time is the last named, and the process is of the simplest character, consisting usually in the filing, with the Secretary of State, or other proper authority, of a duly executed certificate of incorporation, setting forth the name and objects of the proposed corporation, the area within which it proposes to carry on its operations, the names of the incorporators, the names of the directors for the first year, and the location of its principal place of business. Such certificate constitutes the charter of the corporation so created. In the issue of this charter the chief executive in some States has a wide authority, and in a few, as in Pennsylvania, the chief executive, on the advice of the Attorney-General, decides, subject to judicial revision, whether a given petition for a charter falls, in certain cases, within the general statute. In others, this power vests in the courts directly. Where incorporation is effected by special legislative act or by royal grant, the statute or grant creating it is itself the charter of the corporation.

The effect of the act of incorporation is to create the rights and liabilities which the law attaches to the form of corporation so created, so that future acts relating to the corporate body may affect that as a distinct legal entity instead of the individual by whom the corporation is represented or the individuals included in its membership. For a treatment of the various classes of corporations and the specific acts necessary to their creation, see CORPORATION; CHARTER; and the authorities there referred to.

IN'CORPO'REAL (from Lat. *incorporeus*, bodiless, from *in-*, not + *corporeus*, bodily, from *corpus*, body). In the common-law classification of real property, an estate, or interest, which is not accompanied by seisin, or possession. Present estates in land, such as freeholds and leaseholds in possession, are identified with the land itself, and are described as *corporeal*, i.e., as something substantial and tangible; while corresponding interests not in possession, such as future estates and rights in the land of others, are regarded as being of an unsubstantial and intangible nature and are accordingly described as *incorporeal*. The distinction has no scientific value, as the idea connoted by the terms "property" and "ownership" is always that of a legal right, and rights are always bodiless things and are equally immaterial and insubstantial, whether they relate to present or future enjoyment of land, and, indeed, whether they have to do with things or persons. But the distinction is a convenient one, nevertheless, and has had an important influence on the development of property law.

In our legal system the classification of property as corporeal and incorporeal is confined to interests in land. Though future interests in chattels and such property as shares of stock, patent rights, and copyrights are sometimes described as incorporeal, and though such eminent legal authorities as Sir Matthew Hale and Blackstone apply the term "corporeal" to jewels and other personal chattels, the distinction is of no value or importance in the law of personal property. On the other hand, the usual limitation of the terms "corporeal" and "incorporeal" to hereditaments, i.e., to such interests as descend to the heir of the owner upon his death, is too narrow, as a future leasehold estate, or an easement or profit *à prendre* (qq.v.) for a term of years, which passes, like other personal property, to the executor or administrator, is equally entitled to be described as incorporeal.

It was in the methods of conveyance employed in creating or transferring the two kinds of property that the distinction between them attained its principal importance. Corporeal interests being susceptible of seisin, of possession, were said to "lie in livery," i.e., to be capable of transfer by the method of livery of seisin, or delivery of possession; whereas the more intangible incorporeal property, not being susceptible of physical transfer, was said to "lie in grant," i.e., to be transferable only by the form of deed known as a grant (q.v.). With the abolition of conveyance by livery of seisin and the general adoption of the method of conveyance by deed for all kinds of property, corporeal and incorporeal, the distinction has almost wholly lost its importance. See HEREDITAMENT; REAL PROPERTY.

IN'CREMENT, THE UNEARNED. See SINGLE TAX.

INCROYABLES, ăN'krwä'yȧ'bl' (Fr., incredibles). A name applied to the Parisian dandies under the Directory, who made themselves conspicuous by their extravagance in dress, manner, and speech. One of their peculiarities was the omission of *r* in speaking, and they got their name from their favorite expression, *Ma petite pa'ole d'honneu', c'est inc'oyable* (Me wohd of honnah, it's incwedible). They were mostly Royalists. The type has been known at different periods in the history of France by various names: *Agréables, Gommeux, Merveilleux, Mirliflores, Lions, Muscadins, Muguets, Petit-maîtres*, etc. (See JEUNESSE DORÉE.) The term "Incroyables" is also applied to the exaggerated style of hats which they wore, which had two points and large brims in the front and back.

IN'CUBA'TOR (Lat. *incubator*, one who lies in a place, from *incubare*, to lie within, to incubate, from *in*, in + *cubare*, to lie). A term applied in poultry raising to devices used for artificial incubation or the hatching of eggs. Artificial incubation was successfully practiced in very ancient times in Egypt and China and probably other countries. The methods and appliances still used in China are quite simple and even crude, but are employed with great skill

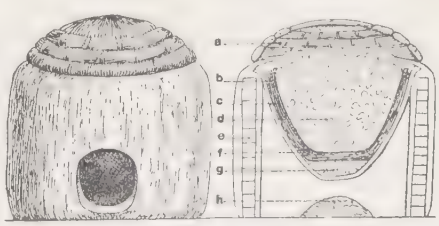


FIG. 1. CHINESE INCUBATOR.

a, cover; *b*, basket; *c*, jar; *d*, eggs; *f*, mat; *g*, ashes; *h*, charcoal.

and success. Réaumur, the eminent French physicist, used successfully a very crude form of incubator, consisting of a barrel heated with fermenting manure; but he encountered much criticism and opposition on the ground that chickens

so hatched "were unfit for human food because they tasted of the heating material, and that such chickens were absolutely sterile, and if the process were persisted in the race of fowls would necessarily die out." Similar prejudice against incubator chicks has persisted until within comparatively recent years; but artificial incubation has become so firmly established, and, the experimental stages having long been passed, the methods and appliances have been made so simple and practical, that it is considered absolutely necessary in the rearing of fowls in large numbers. There were, of course, many failures in the early attempts to devise a practical incubator, although in the first application for a patent on such a device in America, in 1847, some of the principles on which incubators should be constructed were stated with remarkable clearness and accuracy. Practical success with

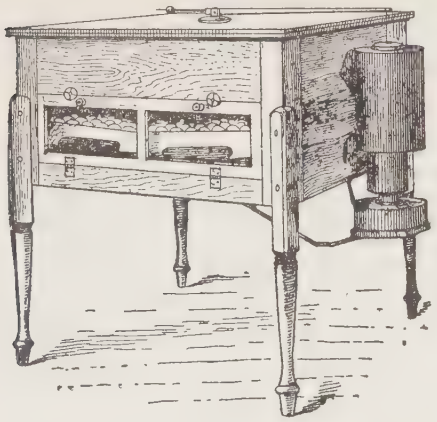


FIG. 2. MODERN INCUBATOR.

modern incubators may be said to date from the Paris Exposition of 1877, at which Rouillier and Arnoult exhibited their "hydroincubator." "This incubator," says Beale, "has a very large tank, holding about 14 gallons of water, which is divided into three horizontal compartments, each communicating with the others by means of a few small holes. This tank is placed in a wooden case, and surrounded on all sides save the bottom (under which is the egg drawer) by an inch or more of felt, or some other nonconducting material, tightly pressed down. When this tank is filled with hot water, it is found that the water loses only from two to five degrees every 24 hours, according to the temperature of the place where it is kept. If the water in the top compartment only be drawn off, and that in the lower ones be left undisturbed, the former being again filled with boiling water, the heat from this will gradually affect the [temperature of the] lower body and prevent its going down. By repeating this every 12 hours the heat in the egg drawer can be maintained at almost any degree of temperature, with a scarcely perceptible variation." Notwithstanding the simplicity and efficiency of incubators of this type, attempts to devise a practical automatic, self-regulating incubator were persisted in until incubators of this kind have been brought to a high state of perfection and have been generally adopted. Incubators of the automatic type are of two main classes—hot-water and hot-air. The advantages and disadvantages of the better makes of the two classes are very evenly balanced. There are hundreds of different makes of incubators on the market, many of them very efficient when properly handled. An average hatch of over 80 per cent of fertile eggs is secured by experienced poultrymen; but experience, skill, and careful attention to details are essential to such success.

The essentials of a good incubator are an egg chamber uniformly heated, preferably from above; a self-regulating source of heat, controlled by a thermoregulator, the actuating arm of which is situated in the egg chamber, and which is sensitive to 1°, or preferably ½°, above or below the desired temperature; and provisions for the ventilation of the egg chamber and for maintaining the proper degree of humidity therein. In addition to these, says Watson, "a convenient appliance for turning the eggs, positive in action, should accompany each incubator. This may be an extra tray that is to be placed bottom side up over the tray of eggs and held firmly in this position while both trays are turned, thus completely transferring the eggs from one tray to another without jar. The different machines have very different appliances for accomplishing this result." The object sought in artificial incubation is to imitate as closely as possible the conditions of heat, air, moisture, etc., which obtain in natural incubation under the hen. The temperature is carefully maintained at about 100° F. or only a few degrees above by placing the incubator in a basement, cellar, or other room where the temperature is stable, and by using a sensitive thermoregulator to control the heat applied; the moisture of the air in the egg chamber is carefully controlled, so that evaporation from the eggs proceeds as under normal conditions; and a sufficient amount of fresh air is supplied to the chamber to carry off the harmful gases which may accumulate and kill the incubating chick. The frequent turning of the eggs during the earlier stages of incubation is believed to have an analogy in the practice of the hen. However, it is not considered advisable to disturb the eggs after the eighteenth day, or to open the incubator thereafter until the hatch is complete and the chicks dry. As the success of incubation depends so largely upon maintaining the proper moisture conditions in the air of the egg chamber, some reliable means of controlling these conditions is essential. It has been proposed to use the normal loss of weight of eggs during incubation under brooding hens as a guide for this purpose. The West Virginia Agricultural Experiment Station found that the eggs which hatched under hens lost on an average 16.5 per cent of their weight in 19 days. The infertile eggs and those which did not hatch lost from 1 to 2 per cent less. The normal loss of weight of 100 eggs under natural incubation was found to be about 10 ounces in 6 days, 20 ounces in 12 days, and 31 ounces in 18 days. By weighing the eggs in the tray at the beginning of incubation, and at intervals during the process, the progress of evaporation (loss of weight) may be determined, and the ventilation and humidity so controlled as to make the loss of weight conform to the normal figures. Except in very dry climates there is said to be more danger of oversaturation than undersaturation of the air. A humidity of 45 per cent saturation is considered safe, as a rule.

If artificial incubation is practiced, some provision must be made for the care of the chicks when they leave the incubator. Variously artificially heated devices known as brooders are used for this purpose. These may be very simple and cheap or elaborate and expensive. Almost all manufacturers of incubators also make brooders, and there is consequently a great variety of forms to choose from. The requisites of a good brooder are that it should be: (1) warm (90°–100° during the first week, with gradually lowering temperature thereafter), and economical of heat, which is preferably applied mainly from the sides or above; (2) clean, dry, and well ventilated; (3) simple in construction and so arranged that the chicks may be seen. The brooder should be so constructed that the chicks may go out for exercise and return at will.

Bibliography. The literature of the subject is voluminous. All up-to-date treatises on poultry raising explain the processes of artificial incubation and describe methods and appliances.

Consult: Cyphers, *Incubation and its Natural Laws* (Boston, 1894); Beale, *Profitable Poultry Keeping* (New York, 1895); Stoddard, *The New Egg Farm* (ib., 1900); Watson, *Farm Poultry* (ib., 1901); Wood, *Incubation and Incubators* (United States Department of Agriculture, Farmers' Bulletin 236, Washington, 1905); G. Bradshaw, *Artificial Incubation* (Sydney, Australia, 1909); G. B. Hawks, *Incubation and Brooding* (Clinton, Wis., 1909); J. W. Hurst, *Successful Incubation and Brooding* (London, 1911); P. Cooke, *Successful Incubation* (Los Angeles, 1911); *Incubators and Chicken Rearers* (New York, 1912); J. H. Robinson, *Principles and Practice of Poultry Culture* (Boston, 1912). See POULTRY.

INCUBATOR. A laboratory device used in the study of bacteria (q.v.) to provide a container in which a constant and definite temperature can be maintained, for the growth and development of bacterial cultures. It consists usually of a metal case having double walls, the space between being filled with water and often, as an additional means of insulation, a layer of felt. The temperature may be maintained at any desired point by a bunsen burner placed beneath, automatically controlled by some thermostatic device, and the condition of the contents may be examined from time to time through a door of heavy plate glass within an outer heavily insulated door. Several designs of incubators are in use in bacteriological laboratories, depending upon the particular line of investigation or the temperature desired. They are also called *brooding ovens* and *thermostats*, though the last term is commonly confined to devices intended to *control* temperature. Consult Abbott, *Principles of Bacteriology* (Philadelphia, 1909). See *Bacteriological Technique* under DISEASE, GERM THEORY OF.

IN'CUBUS (Lat., nightmare). 1. A sprite or demon, thought to be the cause of nightmare. In the Middle Ages it was very commonly believed that the incubus had carnal knowledge of women while asleep, and that from this connection deformed children sprang. The *succuba* was the corresponding female sprite, supposed to consort with sleeping men. Consult Tylor, *Primitive Culture* (London, 1903), and Lehmann, *Aberglaube und Zauberei* (Stuttgart, 1908). 2. Metaphorically, a burden upon mind or spirit. 3. A genus of parasitic hymenopters of the family Braconidæ.

INCUM'BENT. In English law, the holder of a benefice or ecclesiastical living. An incumbency is created by the appointment of a person who has taken holy orders to a particular living which is at the disposal of the person making the appointment. The power of appointing to a living is known as an advowson and is itself a species of real property (classed as an incorporeal hereditament) which may be alienated by the holder or transmitted by descent to his heirs. A living comprehends the parsonage, glebe, and other church lands, and carries with it the right to take tithes from the parish for the maintenance of the church and living and the support of the incumbent. The incumbent is deemed to be seised of the premises comprised within the living as of an estate for life, and may be deprived of it for illiteracy, or sexual or other gross immorality, as well as for heresy or conviction of felony. While not, like other tenants for life, strictly subject to the law of waste, his estate was nevertheless liable for dilapidations occurring during his incumbency. See ADVOWSON; BENEFICE; DILAPIDATION; TITHE; and consult Phillimore, *Ecclesiastical Law* (2d ed.).

INCUM'BRANCE (OF. *encombrance*, from *encombrer*, to incumber, from *en*, in + *combrer*, to cumber, from *combre*, obstruction, from Lat. *cumulus*, heap). A generic term, including every kind of charge or burden upon land; every right to or interest in land, whether claimed as security for a debt or as an independent estate, which may be held by any one other than the real owner. Upon a conveyance of the land so charged, a real or common-law incumbrance runs with it, i.e., remains a burden upon it even in the hands of a purchaser or devisee, while an equitable incumbrance binds the land only in the hands of one who takes it without paying value therefor or a purchaser with notice. In the hands of an innocent purchaser for value the land is discharged from the burden and may thereafter be conveyed free from the incumbrance. The most frequent examples of legal (including statutory) incumbrances are afforded by judgments, leases, mechanics' liens, mortgages, easements, and similar burdens; of equitable incumbrances, trusts, equitable mortgages, and restrictive covenants.

A covenant against incumbrances is one of the usual "covenants for title" contained in a conveyance of land. As usually construed, it amounts to a contract of indemnity, securing the grantee against loss by reason of any incumbrance which may exist upon the land at the time of the conveyance. See COVENANT.

IN'CUNAB'ULA (Lat., cradles). A name applied to printed books published before 1500. Specimens of such works are generally rare, and sought after for their historical bearing on the art of printing and, as in first editions of Greek and Latin classics, for their scientific value. The number of incunabula is variously estimated, but is probably upward of 20,000.

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IND. A poetical form of India.

INDE'CENCY. In law, a general term for conduct of a lewd or obscene character committed in public. The term as commonly employed in statutes comprehends (1) the public exposure of the person, as by bathing without proper covering in a public place; (2) publishing or circulating written or printed matter or pictures of an obscene, lewd, or indecent character; and (3) sending such matter through the mails. The last of these is an indictable offense under the Revised Statutes of the United States cognizable by the Federal courts. The others are statutory offenses, classed as misdemeanors, in the several States. All are punishable by fine or imprisonment. In the absence of statute any indecent exhibition in public is indictable at common law as a public nuisance, if calculated to cause scandal, shock modesty, or corrupt morals. See IMMORALITY; OBSCENE.

INDEM'NITY (from Fr. *indemnité*, from Lat. *indemnitas*, security from loss or damage, from *indemnis*, unhurt, from *in-*, not + *damnum*, loss). An engagement, either express or implied, to make good a loss or expenditure. It is not a guaranty within the fourth section of the Statute of Frauds (q.v.), which requires a special promise to answer for the debt or default of another to be in writing. When the indemnitor performs his engagement, he may in so doing pay the debt of another, but the discharge of such debt is not what he promises to do; it is a mere accident of the situation. At times the engagement takes the form of a bond or other writing, but more frequently it is implied from the acts of the parties. Whenever a person asks another to become surety for him, the law implies the promise by the principal debtor to indemnify the surety for any loss that he may sustain by acceding to the request. So, if one joint debtor pays the whole debt, he can recover from his codebtor the latter's share, as where two or more persons become cosureties, there is an implied engagement on the part of each to indemnify the other to the extent of his share of the common loss. Fire and marine insurance policies are contracts of indemnity, the obligation of the insurer being not to pay the amount of the policy in any event, but only to save the insured harmless from loss in the event insured against. See INSURANCE. Consult the authorities referred to under GUARANTY; SURETYSHIP.

INDENT'ED (from *indent*, OF., Fr. *endenter*, It., ML. *indentare*, to notch, from Lat. *in*, in + *dens*, tooth). In heraldry, one of the partition lines of the shield notched similarly to dancette (q.v.), but with the notches much smaller and not limited in number. See HERALDRY.

INDEN'TURE. In English and American law, a deed executed by two or more parties having diverse interests, as by grantor and grantee of a deed of conveyance, obligor, obligee, and surety to a bond, etc. Most deeds, involving or creating an obligation by only one party or by several persons uniting in an identical obligation, or conveying an estate in which one or more persons have interests—as where husband and wife join in a conveyance of the husband's land—are not indentures but deeds poll. It is only where the other party, the grantee or obligee, assumes an independent obligation that an indenture is required. The name is derived from the fact that such deeds were formerly written in duplicate or as separate obligations on the same sheet of paper or parchment, and then torn or cut apart in a waving or indented line, so that their character as parts or duplicates of the same instrument could afterward be established by fitting them together. The single deed, not an indenture, was known as a deed poll because its edge was polled (shaved) or smoothly cut. Though the forms of the two classes of deeds are now identical, the fundamental distinction between them is still strictly observed. It is still the law that the grantee or obligee of a deed which purports to bind him to some payment or other act is not bound unless the deed is in the technical sense an indenture, i.e., is executed by him as well as by the grantor or obligor. See DEED.

IN'DEPEND'ENCE. A city and the county seat of Buchanan Co., Iowa, on the Wapsipinicon River, 39 miles north of Cedar Rapids, on the Illinois Central and the Rock Island railroads (Map: Iowa, F 2). It is in a farming and dairying region and has manufactures of gas engines and culverts. The city contains the State Insane Hospital for Northeastern Iowa, a fine high-school building, and a public library. The water works and electric-light plant are owned by the city. Pop., 1900, 3656; 1910, 3517.

INDEPENDENCE. A city and the county seat of Montgomery Co., Kans., on the Verdigris River, 165 miles southwest of Kansas City,

Mo., on the Atchison, Topeka, and Santa Fe and the Missouri Pacific railroads (Map: Kansas, G 8). It has a public library, two hospitals, Elks Home, a good system of parks, a fine courthouse and county high-school buildings. The city is a distributing point for an agricultural region, is situated in the centre of vast gas and oil fields, and has flour mills, planing mills, cracker factories, cotton mills, paper mills, sugar mills, a window-glass factory, vitrified-brick works, Portland-cement plants, an asphalt plant, a rubber refinery, machine shops, and ironworks. Natural-gas and oil wells are numerous in the vicinity. Independence has adopted the commission form of government and has municipally owned water works. Pop., 1900, 4851; 1910, 10,480; 1914 (U. S. est.), 13,296; 1920, 11,920.

INDEPENDENCE. A city and the county seat of Jackson Co., Mo., 10 miles east of Kansas City, on the Chicago and Alton, the Missouri Pacific, and the Kansas City Southern railroads (Map: Missouri, B 2). It is rapidly developing into a residential suburb of Kansas City. St. Mary's Academy is a private school situated here, and there are a fine Federal building, a sanitarium, and a public library. The industrial establishments include a large flouring mill, a planing mill, a foundry, an oil refinery, scale works, and manufactories of brooms, silos, Portland cement, insect powder, gas engines, drop forges, brick, and overalls. Fruit growing is carried on extensively in the surrounding territory, and there is a canning factory in the city. It is also a stock-breeding centre. Independence was settled and incorporated in 1827 and was organized as a third-class city in 1889, the charter of that year still being in operation and providing for a mayor, elected biennially, and a unicameral council. The electric-light plant is owned by the city. Pop., 1890, 6380; 1900, 6974; 1910, 9859; 1914 (U. S. est.), 11,088; 1920, 11,686; Independence was occupied in 1831–38 by the Mormons, who regard the city as the "Zion" where the chief Mormon temple will be erected on "Temple lot." About 2000 members of the Reorganized Church of Jesus Christ of Latter-day Saints, which disclaims belief in polygamy, now live in this vicinity. In 1849–50 Independence was a rendezvous and a starting point for emigrants to California, two of the great trails leading from here westward. In the summer of 1862, during the Civil War, a Federal garrison of 312 under Lieutenant Colonel Buel was captured here by a superior Confederate force under Colonel Hughes, and here, on Oct. 22, 1864, General Pleasanton attacked and defeated the rear of General Price's Confederate army.

INDEPENDENCE. A city in Polk Co., Oreg., on the Willamette River, 12 miles southwest of Salem, on the Southern Pacific and the Independence and Monmouth railroads (Map: Oregon, B 3). It is the hop centre of Oregon and carries on a trade in goats, wheat, barley, and oats. There are saw and flour mills, a creamery, and a foundry and machine shop. Pop., 1910, 1160.

INDEPENDENCE, Declaration of. See Declaration of Independence.

INDEPENDENCE DAY. July Fourth, the United States national holiday.

INDEPENDENCE HALL. An unpretentious brick building in Chestnut Street, Philadelphia, erected in 1729–34 and intimately connected with the birth of the nation. In it the Continental Congress met, Washington was made commander in chief of the American army in 1775, and the Declaration of Independence was adopted on July 4, 1776, and four days later read to the people assembled in the street. It is now a museum of Revolutionary and historical relics. See Plate of Philadelphia.

INDEPENDENCIA, ēn'dā-pān-dān'syȧ, or **FRAY BENTOS,** frī bān'tōs. A town of Uruguay, the capital of the Department of Río Negro, situated on the Uruguay River (Map: Argentina, H 4). It was founded in 1859 and is of modern construction, with wide streets. The principal edifices are the hospital, school, and court buildings. It is an important river port, being accessible to large ocean-going steamers. It is surrounded by a region devoted to stock raising and is an important centre of the meat-packing industry. The laboratories and stockyards of the Liebig's Extract of Meat Company, which are equipped with the most scientific and hygienic appliances, are located here. Its exports consist of meat products. Pop., 10,000.

IN'DEPEND'ENT CATHOLIC CHURCH IN THE UNITED STATES, The (Polish), known also as Old Catholics. An independent church organized among Polish immigrants in Chicago, with the hope of staying the progress of agnosticism among citizens of Polish descent who had become disaffected towards the Roman Catholic church. Its founder, the Rev. Anthony Kozlowski, attended one of the Old Catholic conferences in Europe and was there consecrated Bishop. A steady growth is affirmed of the church, both in the consciousness of actual reformatory tendencies and in numbers of adherents and strength of organization. It has established a hospital, a dispensary, an orphanage, and a Home for the Aged in Chicago, and has acquired a considerable property; primary, a grammar, high, and industrial schools have been established. All these schemes are connected and form integral parts of a central philanthropic institution, called St. Anthony's Home. In October, 1902, Bishop Kozlowski addressed a letter to the House of Bishops of the Protestant Episcopal Church in the United States asking for intercommunion. The subject was referred to a committee for consideration, but no definite action was taken. The estimates of members in the church vary. A careful computation gave it, in 1913, 32 ministers, 30 churches, and 16,000 communicants.

INDEPENDENT CHURCHES OF CHRIST IN CHRISTIAN UNION. See Christian Union, Independent Churches of Christ in.

INDEPENDENT METHODIST CHURCH. See Methodism.

INDEPENDENTS. Such bodies of Christians as claim the right of each individual church to administer its own affairs, free from ecclesiastical or civil authority. In history the name has been usually applied to the Congregationalists of Great Britain, who differ from the Congregationalists of America and other countries in laying less emphasis on the fellowship of the local churches. The first Independent church was organized in London about 1555, and the Brownists (q.v.), or Separatists, as the Independents were first called, steadily increased in numbers in spite of persecutions and emigration. They were prominent in the Westminster Assembly. See Congregationalism.

INDEPENDENT TREASURY. The name given to the system of keeping and disbursing

the public money without the intermediary action of banks, State or national, adopted by the United States in 1846. The Act of Aug. 6, 1846, provided, in brief, that the public revenues should be held, until actually paid out, in the vaults of the Treasury at Washington or in the several subtreasuries in the larger cities created by the act. Prior to this date the government receipts had been deposited in banks. The first Bank of the United States (see BANK, BANKING) was established in 1791, largely with the view of facilitating the fiscal operations of the government. In it or its branches were deposited the government funds, and from it were obtained temporary loans in anticipation of the revenue. When the bank charter expired, in 1811, the government funds were deposited in the State banks throughout the country. With the subsequent suspension of specie payments, in 1814, the government not only suffered with other creditors, but was seriously embarrassed by the fact that there was no standard national currency. In 1816 the second bank of the United States was chartered for a period of 20 years, and for the greater part of its existence it acted as the fiscal agent of the government. Its effort, beginning in 1829, to obtain a renewal of its charter led to a violent political contest, in which the opponents of the bank, led by President Jackson, won the victory. Though the charter did not expire until 1836, the President in 1833 ordered that no further deposits of government funds be made in the bank, and that the funds of the government be gradually withdrawn. This order for the "removal of the deposits" was made on the alleged ground that the bank was unsound and that the public money was in danger.

Beginning October, 1833, the government funds were deposited in State banks. Contracts were entered into between the Secretary of the Treasury and the several banks fixing the conditions upon which deposits were to be received. The refusal to recharter the Bank of the United States, together with the deposit of government funds in the State banks, led to an ominous expansion of these institutions. A speculative era, marked especially by enormous sales of public lands, and the deposit or distribution of the government surplus with the States (1837), now set in, which culminated in the panic of 1837. The government funds were tied up in the nonspecie-paying banks, and Congress was called together in September, 1837, to devise measures of relief. President Van Buren favored a complete separation of the government from the banks, the establishment of an independent treasury, and a requirement that all debts due the government be paid in specie. It was the latter provision which caused the defeat of the measure, as it appeared to the friends of the banks as a discrimination against the bank note. Towards the close of Van Buren's administration (June 30, 1840) the measure for which the President had fought valiantly was enacted into law, but not without the concession that in the first year of its operation only one-fourth of the government receipts need be in specie, a further fourth being added each year until the whole should be so payable. The victory was dearly bought, for the party went down to defeat at the polls in November. The new administration promptly repealed the law (Aug. 13, 1841), but in the fruitless controversy with President Tyler over the Bank Law failed to provide any substitute for it. Public officials were left to their own devices in the custody of the public funds, and it was not until a new political revolution had occurred that the independent treasury system was finally established by the Act of Aug. 6, 1846.

The spirit of the measure was an absolute divorce of the Treasury from the banks. The government was henceforth to keep its own funds, and to recognize only money issued by Federal authority, specie and Treasury notes, in the government operations. The vaults and safes provided for keeping the money of the government at Washington, and at such other places of deposit as were fixed by the law, were declared to constitute the Treasury of the United States. The Treasurer of the United States and assistant treasurers, and all other officials, were required to keep safely, without lending, using, depositing in banks, or exchanging for other funds, except as allowed by the act, all public money received by them or otherwise in their custody, until the same was ordered by proper authority to be transferred or paid out. In the early experience of the system some embarrassment was created by the failure to provide at once the necessary protection for the money in all the places where it was kept. But in general the system has worked well, and loss by theft or defalcation has been slight compared to the loss suffered through dealings with unsound banks in earlier years.

The isolation of the Treasury contemplated by the act soon proved illusory, and little by little inroads have been made upon the principle. The spectacle of the Treasury coming to the "relief of the money market" has become familiar. The "relief" thus afforded consists of placing in circulation money which the law accumulates in the hands of the government. Operating with a surplus of revenue over expenditure, the government balances may and do grow to such a size as materially to affect the volume of money in circulation. This, then, is a Treasury reserve which may be unloosed when a stringency in the money market occurs, and the fact that the Secretary of the Treasury is called upon for such relief is evidence of the futility of attempting utterly to separate the government's operations from all business affairs. The independent Treasury was not 10 years old before the possible dangers of an accumulation of funds were perceived, and in 1853 large redemptions of bonds were made to avoid them. In the panic of 1857 the government escaped unscathed, and this added to the popularity of the independent treasury system.

But with the fiscal necessities of the Civil War the principle of isolation was broken down. The banks became essential to the support of the government. The Secretary of the Treasury secured their aid in making the first loans of the war. He would not recognize their notes in the government operations, but soon brought forward his plans for transforming the banks into national institutions under Federal control, with power to issue notes of a kind which could be recognized by the government. When the national banking system was organized, in 1863, the banks were allowed to become depositories of the public money, except the receipts from customs, under regulations established by the Treasury Department. Customs receipts, being in specie, were excluded from the funds capable of

being deposited, since banks were not then paying specie. These deposits in the banks are secured by United States bonds deposited with the Treasury Department. The extent to which the banks have been used as places of deposit has varied with the state of the Treasury and the nature of its operations. When loans have been made, the money has been paid in through banks and allowed to remain there until expended. In the refunding operations of 1879 the banks sold nearly $400,000,000 worth of bonds and held at one time (May, 1879) as much as $279,544,645. On June 30, 1914, the deposits in national banks amounted to $93,388,666, as compared with $324,852,056 held in subtreasuries.

The idea of the Independent Treasury Law was that the banks should not interfere with the Treasury, while in its practical administration, with the enormous growth of government revenue, the problem has been for the Treasury so to conduct its operations that it shall interfere as little as possible with the banks and the ordinary course of business. In principle the government pays cash, demands cash, and keeps its funds in a strong box—a method of conducting business entirely at variance with the usual practice in mercantile life. The income and outgo of the government have not, moreover, the regularity which frequently characterizes mercantile affairs. Money accumulating in the Treasury in anticipation of future payments is withdrawn from circulation. Such withdrawal may accentuate a stringency, while the subsequent payment may aggravate a plethora. As an offset to these disadvantages of the system, it has been contended that it equalizes conditions by permitting the Secretary of the Treasury to come to the "relief" of the money market. This is a questionable advantage. The relief is contingent upon a plethoric Treasury; it is, moreover, largely in the discretion of one man, the Secretary of the Treasury, whose impulsiveness or conservatism may materially affect the relief afforded. Finally, when determined upon, it is not always as speedy as desired. The requirement that government deposits should be secured by United States bonds worked sometimes serious hardship in time of stringency, since such bonds commanded a high price and were not always immediately attainable. By an order of the Secretary, dated Oct. 4, 1902, banks were permitted, under certain conditions, to substitute specified State and municipal bonds for the national bonds hitherto required. It was hoped that in this way the Treasury would be able to give a larger measure of relief than formerly. In the Banking Act of Dec. 23, 1913, was incorporated a provision by the terms of which the independent Treasury may, in the discretion of the Secretary of the Treasury, be practically abolished. Moneys held in the general fund of the Treasury, with the exception of funds for the redemption of national bank notes and for the redemption of Federal reserve notes, may be deposited in the Federal reserve banks; and these banks may be required to act as fiscal agents of the United States. No deposit of securities with the Treasury against moneys thus deposited with the Federal reserve banks is required by the law. The Secretary of the Treasury may deposit funds in member banks also. Consult: David Kinley, *Independent Treasury System of the United States and its Relations to the Banks of the Country* (Washington, 1910); M. S. Wildman, "Independent Treasury and the Banks," in *American Academy of Political and Social Science, Annals* (Philadelphia, 1910); McLaughlin and Hart (eds.), *Cyclopedia of American Government*, vol. ii (New York, 1914). See FINANCE; BANK, BANKING.

INDERAB. See ANDERAB.

IN'DESTRUCT'IBIL/ITY OF MATTER. See MATTER.

IN'DETER/MINATE COEFFICIENT. See COEFFICIENT.

INDETERMINATE EQUATION. See EQUATION.

INDETERMINATE MULTIPLIERS. The use of indeterminate multipliers is well illustrated by Bézout's method of elimination in solving systems of simultaneous equations. For example, let it be required to solve the system of equations,

$$(1)\ 4x - 5y + 2z = 0.$$
$$(2)\ 3x + 2y + 7z = 28.$$
$$(3)\ x - y + 2z = 5.$$

Multiplying the members of the first equation by λ and those of the second equation by λ' and adding to those of the third equation, we obtain the equivalent system,

$$(4)\ 4x - 5y + 2z = 0.$$
$$(5)\ 3x + 2y + 7z = 28.$$
$$(6)\ (4\lambda + 3\lambda' + 1)x - (5\lambda - 2\lambda' + 1)y + (2\lambda + 7\lambda' + 2)z = 28\lambda' + 5.$$

Selecting for λ, λ' values such that

$$(7)\ 5\lambda - 2\lambda' + 1 = 0,$$
$$(8)\ 2\lambda + 7\lambda' + 2 = 0,$$

we find that $\lambda = -\frac{11}{39}$, $\lambda' = -\frac{8}{39}$, and hence, from equation (6), $x = 1$. Choosing next λ, λ' such that

$$(9)\ 4\lambda + 3\lambda' + 1 = 0,$$
$$(10)\ 2\lambda + 7\lambda' + 2 = 0,$$

we find that $\lambda = -\frac{1}{22}$, $\lambda' = -\frac{3}{11}$, and hence, from equation (6), $y = 2$. It may similarly be found that $z = 3$.

INDETERMINATE PROBLEMS. See DIOPHANTINE ANALYSIS.

INDETERMINATE SENTENCE. A sentence of a person convicted of crime to an indefinite period of imprisonment. Up to a very recent date the policy of the criminal law has been to prescribe for each crime committed a definite period of imprisonment or to leave it to the judge under whom the wrongdoer was convicted to fix the period within limits prescribed by statute. Under laws providing for the indeterminate sentence the judge no longer fixes the period of detention, but sentences the prisoners for an indeterminate time between limits prescribed by him within the limits fixed by law, as, e.g., for a term of not less than three nor more than 10 years.

The indeterminate sentence represents a new principle in penology, based on the view that the object of imprisonment is not punishment for the crime committed, but the reformation of the offender and his restoration to society as soon as he has demonstrated his fitness to lead a free and responsible life. This view is based on the principle which is slowly coming to dominate the thought of civilized society, that the sole aim of a rational penal system is the protection of society and not vengeance or retributive punishment. This conception involves the corollaries that no wrongdoer should be imprisoned longer than is necessary for the protection of the community, nor be released until he has

by his course of life demonstrated that he can safely be rehabilitated as a free member of the community. In order to make the indeterminate sentence an effective means of attaining these ends it is obviously necessary, first, that prison administration shall be such as to give the convict opportunity to demonstrate his fitness or unfitness for release, and, second, in the case of wrongdoers who have formed criminal habits, that they shall be enabled to work out their salvation under reformative conditions. Unfortunately neither of these conditions is realized in the present prison system, with the consequence that the indeterminate sentence has thus far failed to meet the expectations with which it was introduced. It has not, however, proved a complete failure, even under present conditions, and, having secured a foothold in the penal system, it furnishes a powerful incentive for the reformation of that system. In the meantime, coupled with the principle of conditional release and supervision of the discharged convict under probation, it has proved its value even in the case of inmates of the ordinary prisons, though it has naturally attained its greatest success in the case of young persons committed to institutions of a pronounced reformatory character. The system was first employed in connection with the celebrated Elmira Reformatory of New York in 1876, but it was not till 1889 that it was applied in a cautious, tentative way to commitments to the State prisons. Since that date it has gradually spread to other States and was in 1914 in force in 22 of them. It has not, however, been adopted in European countries. Foreign penologists approve it "in principle," but, except in rare instances, deem it inapplicable in their own countries for the reasons (1) that the prevailing conceptions of guilt and punishment, which are still largely based on the vindictive theory, are incompatible with the principle of the indeterminate sentence; (2) that for its successful working an individualized treatment of the offender is necessary, and that this is in practice, under present conditions, impossible to obtain; and (3) that the difficulties in the way of securing a proper and impartial administration of the function of discharging prisoners are too great to warrant the experiment. It is likely that it will be necessary for America, through the reform of her prison system, to make a more satisfying demonstration of the value of the indeterminate sentence in order to secure its acceptance in foreign countries.

Nowhere, as yet, has the principle of the indeterminate sentence been carried to its logical conclusion—of a sentence unlimited in duration, with no maximum or minimum limits imposed by law or by judicial discretion. This is the goal of the more advanced penologists and prison reformers, and it is evident that that system cannot fully accomplish the purposes which it is designed to effect without such extension; but it is not likely to commend itself to legislatures or to the public except as a part of a sweeping measure of prison reform. See IMPRISONMENT; SENTENCE; PUNISHMENT; PRISONS; PENOLOGY.

INDETERMINISM. See INDIFFERENTISM.

INDEX (Lat., indicator). An alphabetical list of names, topics, words, and the like, treated in a book, with indications of the passages in which they occur. The index usually comes at the end of the book; the analytical table of contents is normally placed at the beginning, except in the case of French, Italian, and Spanish books.

As books began to multiply after the invention of printing, the need of indexes was felt, and their value was recognized. Many books of the sixteenth and seventeenth centuries have well-made indexes of such fullness and value as put to shame the farcical substitutes issued by many modern publishers when they give any at all. Numerous authorities might be cited as to the worth of a good index in enhancing the value and usefulness of a good book. Long and loud have been and are the complaints against the publication of books of knowledge without indexes, emphasizing Carlyle's growl against "books born of Chaos, which want all things, even an index." Lord Campbell of England, and Horace Binney of Philadelphia, each advocated withholding copyright from any author who published a book without an index. "I have come," says the latter, "to regard a good book as curtailed of half its value if it has not a pretty full index. It is almost impossible, without such a guide, to reproduce on demand the most striking thoughts or facts the book may contain, whether for citation or further consideration." The value still put by many scholars on the old Delphin edition of the classics is based solely on its copious indexes. An incalculable amount of time has been lost to students and scholars in fruitless search for much wanted bits of information buried from sight in unindexed pages of books of value and authority. What the seeker demands is a complete index, and it is essential that this should not only refer to the letter, but should also embody the spirit of the work indexed. To this end the indexer must possess intelligence, quickness of perception, the power of analysis and condensation, and the ability to put himself en rapport with the author and his work, of the subject of which he must himself have a very considerable knowledge. Any index is valuable in proportion as it is concise in expression and accurately exhaustive, not only of the broader statements of fact or of opinion, but also of the small points of detail, the incidental and illustrative references contained in the book or volumes to which it aims to be the guide or key.

Minuteness of indexing must vary according to character and uses of books indexed. Before beginning to make entries, an indexer should read the entire book, usually in the "page" proof. He may then indicate by underlining words in the text or writing chosen headings in the margins against the topics to be indexed. Before entering on the actual work of preparing entries he must determine the general character of the index he is to make. For a book may require a general index of quite obvious subjects treated in it, as Bryce's *American Commonwealth;* a name or word index, as for atlases, botanies, genealogies, etc.; an index of ideas more or less difficult to reduce to alphabetic key words, as Emerson's *Essays,* Holmes's *Autocrat.* The indexer cannot be too careful in choosing headings or catchwords, which must not only represent the subject treated, but also be such as would occur to the seeker who has not the text before him. In form these should approach the subject headings in a good library catalogue, and the indexer should in the main be governed by the well-known principles

of subject cataloguing. Entries on the same subject should not be scattered among various synonymous headings. Each subject must be indexed every time it occurs, and related matter should be indicated by cross references. If entries under headings are few, it is sometimes advisable to repeat them under each heading needed to make reference easy and complete; if many, a single heading may be chosen for entries and cross references made from other possible headings. Entries should invariably be concise, definite, and specific. Scattered page references should not be massed under a heading without clew to the character of the information given. Where matter relating to a single subject is given consecutively and is brief, a single reference may suffice, but if extended it should be analyzed under headings. In a book on municipal affairs, e.g., the seeker must not be forced to examine several pages on the mayor of New York to ascertain his salary. Specific rather than general headings should be chosen; e.g., entry should be under potatoes, not tubers, sparrows rather than birds, cross reference being made only when necessary. In general, indexing under the main subject of the book should be avoided. This brings too great a mass together and renders the heading practically useless. The excellent index of Fiske's *American Revolution* has but seven entries under "Revolution." A work in several volumes should have a general index to all in the last one. Separate indexes to each volume (except for serials) are seldom afforded.

Each entry should be written on a separate slip, and the slips alphabeted in trays. Library supply houses make slips 5 × 7.5 or 7.5 × 12.5 centimeters, and trays to fit. Careful, final editing of entries is necessary to assure consistency, proper cross reference, clear punctuation, and absolute accuracy. Words alike in spelling but different in meaning should be repeated as headings. Entries like the following are to be avoided:

Lead, copper
metallurgy
kindly light
poisoning

Entries should be arranged in alphabetic order, following the rules for arrangement given in Cutter's *Rules for a Dictionary Catalogue*, or some other standard authority. When verified and edited, slips may be sent to the printer either pasted in order on large sheets, or numbered, punched, and tied together, or the entries may be copied on sheets. Great care is essential in verifying both the original entries and the printer's work, an index error being serious.

Bibliography. A paper on "Indexing," by J. B. Nichols, in *Library Journal* (New York, October, 1892), gives very excellent directions and suggestions for would-be indexers. H. B. Wheatley's *How to Make an Index* (London, 1902) is entertaining reading and valuable in suggestion; it contains the rules of the English Index Society. More recent treatises are: Petherbridge, *Technique of Indexing* (ib., 1904); Clarke, *Manual of Practical Indexing* (ib., 1905); Wheeler, *Indexing: Rules and Examples* (Albany, 1905; rev. ed., 1913); Kaiser, *Systematic Indexing* (New York, 1911).

INDEX, IN MATHEMATICS. See EXPONENT.

INDEX (more fully INDEX LIBRORUM PROHIBITORUM). A catalogue published by papal authority in the Roman Catholic church of books the reading of which is prohibited to members of that church, whether on doctrinal, moral, or religious grounds. A natural consequence of the claim of the church to authority in matters of religion is the right or the duty of watching over the faith of its members, and of guarding it against every danger of corruption from books believed to be injurious to faith or to morality. The earliest recorded exercise of this restrictive authority is the prohibition of the *Thalia* of Arius; and a council of Carthage, in the year 398, issued, even for bishops, a similar prohibition of Gentile books, although it permitted to them the reading of the works of heretics. The earliest example of a prohibitory catalogue is found in the decree of a council held at Rome (494), under Pope Gelasius, which, having enumerated the canonical books of Scripture and other approved works, recites also the apocryphal books, together with a long list of heretical authors, whose writings it prohibits. The mediæval popes and councils pursued the same course as to the heterodox or dangerous writings of their respective periods, and the multiplication of such books after the invention of printing led to a more stringent as well as more systematic procedure. Henry VIII of England published a list of prohibited books in 1526, and a larger one (containing 85 titles) in 1529, in which year Charles V published for the Netherlands his most noteworthy edict against dangerous reading, with a long list, which was included in that issued by the university press of Louvain in 1546 and again in 1550. Similar lists appeared by authority at Venice, Paris, and Cologne, and Paul IV issued in 1557 and 1559 what may be regarded as properly the first *Roman Index*. One of the gravest undertakings of the Council of Trent was a complete and authoritative enumeration of all those books the use of which it was expedient to prohibit to the faithful. A committee was appointed for the purpose and had made great progress in the work; but it was found impossible to bring the examination of the books to an end before the close of the council, and all the papers of the committee were handed over by the council to the Pope. When the work was completed, the result, known as the *Tridentine Index*, was issued with the bull *Dominici Gregis Custodiam*, by Pius IV in 1564. From this time the burning of dangerous books fell into disuse, and the church contented herself with warning her children against their use, under penalty of purely ecclesiastical censure. Further additions and certain modifications of the rules of this *Index* were made by Sixtus V, Clement VIII, Alexander VII, and Benedictine XIV. It was republished in 1595, and, with the addition of such books as from time to time it was deemed expedient to prohibit, in several subsequent editions, the most remarkable of which are those of Brasichelli (Rome, 1607); Quiroga, *Index Librorum Expurgandorum* (Salamanca, 1601); and Sotomayor, *Novissimus Index* (Madrid, 1648). In the intervals between the editions the decrees which make further additions to the *Index* are published at Rome and circulated in the various countries. The latest edition of the *Index* is by Leo XIII (Rome, 1900; reprinted under Pius X in 1904 and in 1907).

The prohibitions of the *Roman Index* are of two classes, either absolute and total or partial and provisional, until the books shall have been

corrected. The edition of Quiroga, mentioned above, gives a list of the latter class, known as *Index Expurgatorius*. The ground of the prohibition may be either the authorship of the work or its subject, or both together. Under the first head are prohibited all the writings of *heresiarchs*—i.e., the first founders of heresies—no matter what may be the subject. Under the second head are prohibited all books confessedly immoral, and all books on magic, necromancy, etc. Under the third are prohibited all books of heretical authorship treating on doctrinal subjects; all versions of the Bible by heretical authors; and all books, no matter by whom written, which contain statements, doctrines, or insinuations prejudicial to the Catholic religion. Formerly only books were examined against which complaint had been made, but in 1908 Pius X extended the care of the congregation to all published books that are likely to do harm. The preparation of the *Index*, in the first instance, was committed to the care of the Congregation of the Inquisition in Rome; but a special Congregation of the Index was established by Pius V and more fully organized by Sixtus V. This congregation consists of a prefect (who is always a cardinal), of consulters, and of examiners of books (*qualificatores*). Its proceedings are governed by rules which have been authoritatively laid down by several popes, especially by Benedict XIV, in a constitution issued July 10, 1753, which is the best and most authentic exposition of a subject on which much misconception exists. The edition of the *Index* by Brasichelli was reprinted, with an English preface, by Richard Gibbings (Dublin, 1837). By far the most elaborate study of its contents is by F. H. Reusch, *Der Index der verbotenen Bücher* (2 vols., Bonn, 1883–85). The same author also reprinted all accessible indexes of the sixteenth century in the *Bibliothek des Stuttgarter litterarischen Vereins*, vol. clxxvi (Stuttgart, 1886). Consult Haven, *Censorship of the Church of Rome* (New York, 1907), and Hurley, *Commentary on the Present Index Legislation* (Dublin, 1908).

INDEX, Cephalic, Cranial, Pelvic, etc. A term employed by anthropologists to mark the proportions of certain related parts of the human body, or skeleton, in order to distinguish racial varieties in mankind. An important one, and easy to obtain, is the ratio of the width of the head to the length, called cranial index for the skull and cephalic index for the living subject. To avoid the decimal point at the beginning of the index, the smaller measure of any two concerned in an index is multiplied by 100 and divided by the larger one. For the index of the skull or that of the head the formula would be thus: $\frac{\text{Width} \times 100}{\text{Length}} = \text{I}$. The extreme length of the skull is between the glabella (the protruding ridge of the forehead between and just above the orbits) and the extremum occiput (the most prominent portion of the occiput), and the width is the greatest breadth, wherever that may be. All appliances necessary for these measurements, and for all direct ones of the head or skull, are a set of calipers, a sliding scale, and a tape measure. The metric system has been adopted for all anthropological measurements. For the convenience of anthropologists, printed index tables have been compiled, from which indices may be read off without loss of time. The instruments for measuring other parts of the body, or skeleton, are of great variety and constantly undergoing improvements.

Three terms are applied by anthropologists to heads, according to these measures. Those having cephalic indices with a ratio below 77 are called dolichocephalic, those between 77 and 81.9 are mesocephalic, and those above 82 are brachycephalic. For crania, or skulls of the dead, the indices are about two points lower. In the numerous cases where a finer subdivision is necessary a quinary method of nomenclature is followed—the Germans adopting a series called the Frankfort Agreement; the French, the scheme of Broca, modified by Deniker, as follows:

	Cranial index	Cephalic index
Dolichocephals	below 75	below 77
Subdolichocephals	75 – 77.6	77 – 79.6
Mesocephals	77.7–79.9	79.7–81.9
Subbrachycephals	80 – 83.2	82 – 85.2
Brachycephals	83.3–84.9	85.3–86.9
Hyperbrachycephals	85 and upward	87 upward

Dolichocephalic skulls of exceptional length have reached an index of 58, the lowest limit, while brachycephalic examples have gone as high as 90 or even 100.

Before proceeding to other indices it should be stated that the cranial and cephalic indices just described are far from being a perfect guide to the classification of mankind, for the subdivisions of the human species have no governing rule and are not subspecies, but separate varieties and mixtures, as with domestic animals.

Again, the ratio between the width and the length of the skull does not give complete information as to its shape. The measurements therefore lead to uncertain conclusions, since precisely the same figures would be obtained from crania or heads of widely different cross section, so that one having an almost rectangular shape, an oval with a narrow end far in front, and a long ellipse would lead to the same index. Unless a large number of skulls among the same people are measured and give something like a uniform result, the measurements are an unsafe guide. Very little good arises from adding a small number of indices and dividing by a number of observations. The average result might be a number to which not a single head in the whole series measured would correspond. It is customary therefore to tabulate results by coördinates. Frequently, when such a plan is pursued, there arise several apexes, as in Italy, the higher number representing the brachycephalic northern Italians with Celtic blood in their veins, and the lower number the southern long-headed Mediterranean type.

The cranial and cephalic indices are not precisely coördinated with purely descriptive characteristics of the human body. It cannot be said that any one of the subspecies of man is either dolichocephalic or brachycephalic, but tendencies towards one or the other exist, as the following table of cephalic indices shows:

Caroline Islanders (black)	69.4
Kashmirians (yellow white)	72.2
Bakongo (black)	72.5
Hindus (white, mixed)	72.8

Karaya Indians, South America (red)	73.0
Australians (straight-haired blacks)	74.2
Norwegians (blonds)	76.0
Corsicans (white)	76.6
Spaniards of Valencia	76.8
British Isles	77–79
Parsis of Bombay (white)	82.0
Koreans (yellow)	82.6
Malays (brown)	82.8
Aissor, Transcaucasian (white yellow)	88.7
Aleuts (red)	87.8
Magyars (mixed)	87.8
Savoyards (white)	86.9
Sudanese (brown)	86.3
Piedmontese (white)	85.9
Burmese (yellow)	85.7
Armenians (white)	85.6
Tahitians (brown)	85.6
Negritos, Philippines (black)	84.7
Samoans (brown mixed)	83.7
Italians (white)	82.7
Arawaks, Guiana (red)	82.6
Saras, Chad basin, Sudan (black)	82.4
Walloons (white)	82.2
Votyaks (yellow)	82.0

Among the European whites the people of the British Isles are mesocephalic; of France the index is 78–88; of Italy, 75–87; of Spain, 77–80; Switzerland, 76–85, with two types, the long and the short head; Austria, 80–84.

Other indices than those expressing the relation of width to length are also employed. The facial index is the ratio of the width (greatest breadth of the malar bones) to the height, from the glabella or the nasion to the alveolar border of the upper jaw (prosthion) or to the chin point (gnathion), and separates skulls into brachyfacial and dolichofacial, or, according to the German classification, into chamæ-, meso-, and leptoprosops. The ratio of width to length in the orbital orifice separates crania into megasemes (90 and upward), mesosemes (80 to 84), and microsemes (below 84). While the French use the dacryon or lacrimale as medial measure point of the orbital width, the German school prefers the lacrimale or, of late, the maxillo-frontale, i.e., the point where the inner margin of the orbit is met by the sutura fronto-maxillaris. The classification then is thus: chamæconch, X to 75.9; mesoconch, 76 to 84.9; hypsiconch, 85 to X. The nasal index is the ratio between the width of the nose (greatest breadth of the nasal wings in the living or of the nasal aperture of the skull) and its height, giving rise to leptorrhine, or narrow-nosed, platyrrhine, or flat-nosed (wide aperture in the skull), with the intermediate term, mesorrhine.

The dental index is based upon the importance which naturalists place on dentition in the classification of mammals. Upon the ratio of the size of the teeth to related parts, Flower divides men into megadont, mesodont, and microdont; and this series bears a surprising relation to the three anthropometric types of man—Negroid, Mongoloid, Caucasoid.

SCHEME OF PRINCIPAL CLASSIFICATIONS ACCORDING TO INDICES

Skull	Dolichocephalic, long skulls. Mesocephalic, medium skulls. Brachycephalic, broad skulls.
Nose	Leptorrhine, narrow noses. Mesorrhine, medium noses. Platyrrhine, flat or broad noses.
Eyes	Megaseme (hypsiconch), round eyes. Mesoseme (mesoconch), medium eyes. Microseme (chamæconch), narrow eyes.
Teeth	Megadont, large teeth. Mesodont, medium teeth. Microdont, small teeth.
Jaws	Orthognathic, straight or vertical jaws. Mesognathic, medium jaws. Prognathic, projecting jaws.
Face	Chamæprosopic, low or broad face. Mesoprosopic, medium face. Leptoprosopic, narrow or high face.
Pelvis	Platypellic, broad pelvis. Mesopellic, medium pelvis. Leptopellic, narrow pelvis.

It may be stated that the methods of anthropological investigation are different with the different schools, but hardly to such an extent as to render results unfit for consideration in comparative work.

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The standard periodicals of anthropology in different parts of the world contain also numerous articles on special methods of research work in physical anthropology. Great interest is shown in a new field of research, that of Palæoanthropology, due to recent finds of the remains of early man (Schwalbe, Klaatsch, Schoetensack (Homo heidelbergensis), Boule, Woodward, and others). See MAN, SCIENCE OF.

INDEX EX'PURGATO'RIUS. See INDEX.

INDEX KEWENSIS, kū-ĕn'sĭs. A reference book of the names of flowering plants. It was conceived by Darwin, who, having experienced difficulty in definitely identifying many of the plant species with which he worked, provided the money for its completion. It was compiled by Benjamin Daydon Jackson (q.v.), under the direction of Sir Joseph D. Hooker, director of the Royal Gardens at Kew. The aim was to record every genus and species of phanerogamous plants published up to 1885; to follow Bentham and Hooker's *Genera Plantarum* as authority for the limitation of genera; to add to each name, whether retained or synonymic, a full reference to its place of publication, retained names being the earliest under which they were published in the recognized genus and not necessarily the earliest specific name; and, finally, to indicate the geographical distribution of each species. Three parts of the supplement which brings the work down to 1895 have appeared, a second supplement covering the period 1896–1900 was completed in 1905, and a third supplement covering the years 1901–05 was published in 1913.

INDEX LAWS. See EXPONENT AND EXPONENTIAL.

INDEX NOTATION. See NOTATION.

INDEX NUMBERS. An index number is a method adopted by statistical and economic writers to exhibit the course of prices of a group of commodities or of commodities generally.

A crude method of attaining this result is to add the prices of the various commodities together. The defects of such a procedure are apparent from the following simple illustration:

	1st date	2d date
Cotton, per lb.	$0.08	$0.07
Flour, per bbl.	3.50	3.25
Pig iron, per ton (2000 lbs.)	18.00	18.50
Total	$21.58	$21.82

If the sum be a criterion, it appears that there has been on the whole an advance in price of the group despite the fall in cotton and flour. A little reflection will show that had pig iron been quoted by the pound instead of by the ton the result would have been different, as follows:

	1st date	2d date
Cotton, per lb.	$0.08	$0.07
Flour, per bbl.	3.50	3.25
Pig iron, per lb.	0.009	0.00925
Total	$3.589	$3.32925

But even here there are still great differences in the initial prices, and the variations are measured on very different scales.

The index number avoids this difficulty by reducing the initial prices to common terms. It establishes the variation of each price from its own starting point and then determines the average variation. The assumed figures above given will serve the purpose of demonstration, and the following statement of relative prices is true for either of the series:

	Price at 1st date	Price at 2d date in terms of price at 1st date
Cotton	$100	$87.5
Flour	100	92.9
Pig iron	100	102.8
Total	$300	$283.2
Average	100	94.4

In this comparison, where each article has an equal weight in determining the result, there appears to have been a fall in price of 5.6 per cent; while in the first statement, where pig iron predominated, a rise in price of 1.2 per cent appeared, and in the second statement, where flour predominated, the fall in price appeared to be 7.2 per cent. It is obvious that the third statement or simple index number is a far better indication of the course of prices of these articles than the other two, where one article or the other dominates the result simply by reason of the fortuitous circumstance that its unit of measurement is relatively large.

The third statement is not, however, an absolutely exact measure of the total price change, since it is not of equal significance that flour falls and that pig iron rises. To the individual consumer no doubt a slight fall in flour is more important than an equal rise in pig iron. It may readily be assumed that he buys for his daily needs 10 times as many things affected by the price of cotton as are affected by that of pig iron, and perhaps four times as many affected by the price of flour as are affected by that of cotton. His relative consumption might be: pig iron, 1; cotton, 10; flour, 40. Hence the price changes noted affect him in varying measure, and this must be accounted for in estimating the significance of the total change. The calculations are as follows:

	Price	Units of importance	Product
Cotton	$87.5	10	875.0
Flour	92.9	40	3716.0
Pig iron	102.8	1	102.8
Total	$283.2	51	4693.8
Average	94.4	..	92.0

On the other hand, in the aggregate consumption of the nation the proportions of the different articles might be quite different, and hence also the significance of these combined changes in the wholesale market. Let us assume them to be: pig iron 1, cotton 2, and flour 4. We then have the following calculation:

	Price	Units of importance	Product
Cotton	$87.5	2	175.0
Flour	92.9	4	371.6
Pig iron	102.8	1	102.8
Total	$283.2	7	649.4
Average	94.4	..	92.8

We have now determined by these slightly different methods the price of the group to have been at the second date, compared with the first, as 94.4, 92.0, and 92.8 respectively are to $100, and we have in these results from assumed figures a fair illustration of the methods of index-number calculations, and the problems to which they give rise.

The problems of a general index number are not dissimilar. The first is the choice of articles whose prices are to be included. No definite statement of what articles should or should not be comprised in the index can be made except that they should be staple articles of general use. It would defeat the object of an investigation aiming to determine the course of general prices, to include specialties, or rarities, or objects of such restricted use as not to be subject to the ordinary influences affecting prices.

The character of the component price series being thus stated, how shall the number be fixed? It must evidently be large enough to include all the more important lines of staple commodities. No precise limit can be fixed. While it would seem obvious that in any effort to determine general prices the greater the number of commodities embraced in the comparison the more accurate the result, such is not the case, since, as the number multiplies, the pro-

portion of articles of limited demand which are more or less removed from the primary influences affecting prices generally increases.

The base line with which prices are compared is usually the average of a series of years, the purpose of taking such an average being to overcome any eccentricities of prices which might characterize a briefer period of time. This practice is not universal, and some well-known calculations have been based upon the prices of a single year. This method is justified on the ground that the prices so chosen were those of normal conditions.

In the combination of the price series into a general index of prices, the simple mean is the most frequent method employed, as illustrated in our first index calculation. This has been the subject of much criticism on the ground of the unequal importance of the objects concerned. To overcome this difficulty two sets of weighted averages have been proposed. The first was one which measured all articles by their importance in the national consumption as illustrated in the third calculation; the second measures articles by their importance in individual consumption as revealed by family budgets and typified in our second calculation. In applying national consumption as a test, we find that calculations of such consumption are very precarious and extend to comparatively few articles. In family consumption we can ascertain for certain groups of persons the proportions of expenditure which cover a much wider range of commodities. But the commodities covered by the family budgets are not the same as those covered by price statistics, since the former represent the retail, and the latter the wholesale markets. In the food products this makes little difference, but in textiles, metals, lumber, and the like there is no little adjustment needed to bring the prices and the relative expenditures into relation.

Those who have done the most to establish more rational and at the same time more complicated calculations have been the first to point out that the ultimate results differ but slightly from those obtained by the somewhat rough calculation of a simple average.

The index number of the London *Economist* is based upon the wholesale prices of 47 commodities which by combination are reduced to 22. The quarterly prices for 1845 to 1850 were arranged as a basis for calculation and the relative prices for subsequent years upon the January prices. The total price index for 1845 to 1850 was 2200, and for later years the price indices are also expressed as an aggregate, without reduction to 100. As in a few cases the full number of articles was not given, this was somewhat misleading. In the table opposite we give the results of this calculation as published by the *Economist*, together with a reduction to the scale of 100.

The general tendencies of price movements, the rising tendency till 1873, and the subsequent downward trend as shown in these figures are amply confirmed by other investigations. The enormous rise in the period of 1861 to 1865 was due not only to the extravagant prices for cotton paid in this period, but also to the fact that in the 22 series represented in the total as many as three were for cotton. This fact, and the prominence given to indigo, and the absence of so important a staple as coal, led to numerous efforts to improve the calculation.

Mr. R. H. Inglis Palgrave sought to remedy the defects by a system of weighing each article by its importance in the national consumption —a method already indicated.

Mr. Augustus Sauerbeck published in 1886 in the *Journal of the Royal Statistical Society* an index number which has been brought down to date in subsequent issues of that periodical, and which is in many respects an improvement upon the older calculation. His annual prices are based upon averages of the monthly, and in some important commodities weekly prices, and these are compared with the average prices of 1867 to 1877. The tables embrace 45 series of quotations; and while some commodities are repeated (in different grades), they have been chosen in such a manner that the total number of quotations for a group of commodities such as meats, textiles, iron, and steel represents approximately in its proportion to the whole number of quotations—45—the importance of this group in the commerce of the United Kingdom. The superiority of this calculation rests therefore on the more trustworthy character of its material and the breadth of choice.

In France similar calculations have been based upon the import prices of commodities, and in Germany (Soetbeer's) upon the import prices of goods at Hamburg. The latter are more comprehensive, since Hamburg was so long a free city that practically its entire trade was in commodities imported by sea and land. The calculations of Dr. Soetbeer for Hamburg, based on the average prices of 1847 to 1850, embraced 100 articles, to which were added 14 articles from the British trade returns. Neither the more limited French calculations nor those of Dr. Soetbeer developed any mode of combination other than the simple average.

"ECONOMIST" INDEX NUMBER

YEAR	Total as published	Reduced to scale of 100	YEAR	Total as published	Reduced to scale of 100
1845–50	2,200	100	1885	2,098	95
1851	2,293	104	1886	2,023	92
....	.....	...	1887	2,059	94
1858	2,612	119	1888	2,230	101
....	.....	...	1889	2,187	99
1861	2,727	124	1890	2,236	102
1862	2,878	131	1891	2,240	102
1863	3,492	159	1892	2,133	97
1864	3,787	172	1893	2,120	96
1865	3,575	163	1894	2,082	95
1866	3,564	162	1895	1,923	87
1867	3,024	137	1896	1,999	91
1868	2,682	122	1897	1,946	88
1869	2,666	121	1898	1,891	86
1870	2,689	122	1899	1,918	87
1871	2,590	118	1900	2,125	97
1872 *	2,835	129	1901	1,948	88
1873	2,947	134	1902	2,003	91
1874 *	2,891	131	1903	2,197	99
1875	2,778	126	1904	2,136	97
1876	2,711	123	1905	2,342	107
1877	2,715	123	1906	2,499	114
1878	2,529	115	1907	2,310	105
1879	2,225	101	1908	2,197	100
1880	2,538	115	1909	2,390	109
1881	2,376	108	1910	2,503	114
1882	2,435	111	1911	2,586	118
1883	2,342	106	1912	2,747	125
1884	2,221	101	1913	2,623	119

* Twenty-one articles only.

In the United States comprehensive statistics of prices for the period of 1840 to 1891 were published in the Senate report on wholesale prices, wages, and transportation. The report

based its calculations upon the prices of 1860 and furnished an index number comprising 223 different series of prices. These were combined by the method of simple average, and also by estimating the importance of the price series as measured by family consumption. As in previous instances when different methods of combination had been tested upon the same figures, the results of the two methods differed but little. This price index closed with 1891, but the United States Department of Labor in its *Bulletin* has furnished the material for carrying the study of price movements down to the present day.

It should perhaps be mentioned that this report applied the index-number principle to its statement of wage statistics—a procedure which had been previously suggested, but was carried here to execution for the first time. It is also applied effectively to the study of transportation rates. The methods of the report, especially as applied to wages, have been made the subject of searching criticism by the English statistician A. L. Bowley, who has effectively used the index principle in his investigations of the course of wages in England.

Bibliography. *Senate Report 1394* (Fifty-second Congress, second session, Washington, 1893); Mayo-Smith, *Statistics and Economics* (New York, 1899); Falkner, *Wage Statistics in Theory and Practice* (Boston, 1899); Bowley, *Wages in the United Kingdom* (Cambridge, 1900); id., *Elements of Statistics* (London, 1901); M. G. Mulhall, *Dictionary of Statistics* (4th ed., New York, 1903); W. C. Mitchell, *Methods of Presenting Statistics of Wages* (Boston, 1905); Howard, Bartels and Company, *Statistical Information Relating to Stocks, Cotton, Grain* (Chicago, annually); *Bulletin of Bureau of Labor, No. 59* (Washington, 1905); W. T. Layton, *Introduction to the Study of Prices* (London, 1912).

INDEX OF REFRACTION. See LIGHT.

IN'DIA. A region comprising the middle member of the three great southern peninsulas of Asia and a territory of nearly equal extent to the north, together with Burma, extending eastward as far as the Malay Peninsula. India in this sense constitutes the Empire of India—one of the members, and by far the most populous, of the British Empire. India proper, however, does not extend farther east than the head of the Bay of Bengal, nor does it include some of the northern or westernmost districts of the Empire. The name Hindustan was formerly frequently used instead of India, but it belongs more properly to the north-central portion of India, the land of the Hindus. The name India has been used in a very broad sense, but improperly, so as to embrace the great southeastern peninsula of Asia, which is still sometimes spoken of as Farther India. This article will treat of the Empire of India. Since British influence became predominant there, no other country of the mainland of Asia has been so diligently explored or is now so well known as India. In the form of a great triangle, the Indian Peninsula extends southward between the Bay of Bengal, on the east, and the Arabian Sea, on the west, through 15° of latitude to Cape Comorin (lat. 8° 5′ N.). On the north the peninsula unites with the continental mass in the lowlands of the Ganges basin and the great plains east of the Indus, which connect it with the mighty highlands of the Himalayas. India, within the official boundaries of the British possession (including the native states), stretches north and south through about 29° of latitude. Its east and west extension is across nearly 40° of longitude. The Empire has an area of 1,093,297 square miles of British territory, and together with the native states, which are more or less under the control of the Indian government, has a grand total of 1,802,657 square miles. These figures include Burma as a part of the British territory, while the area of the native states referred to is 709,583 square miles and includes about 700 small divisions governed by native princes, ministers, or councils under political supervision of a Resident, or agent, of the British government, and range in size from Hyderabad, with 82,000 square miles, downward to those consisting of a few small villages. Geographically Burma is not a part of the peninsula of India, but has been attached for purposes of government and is therefore included in this discussion of the Empire of India. (See INDIA, NATIVE STATES OF.) India is thus about half as large as the United States (inclusive of Alaska). It is a world in itself, for the great barrier of the Himalayas, the Hindu Kush, and the Suleiman Mountains shuts it off from land communications with the rest of Asia, except through very difficult mountain passes; the sea is the only means of easy approach. Thus guarded, though by no means completely, by mountain bulwarks and wide seas against intrusion, India was able to develop a civilization and social system peculiar to itself.

Topography. The coasts of India are comparatively little indented except at the mouths of the large rivers and along the northwest shores; and though there are many roadsteads and harbors for small vessels, there are only a few good harbors for large vessels, and they are in the deltas of the rivers or, as at Bombay, under the shelter of islands. The railroad system was therefore planned so as to connect all the leading trade centres of the interior with the largest seaports.

Three distinctly defined physical regions are recognized—the mountain districts of the Himalayas, the low plains of the three great rivers of north India, and the high plateau of the Deccan, extending from the plain of the Ganges to the south end of the peninsula. The colossal ranges of the Himalayas, 1500 miles in length, extend along the north part of the country in several parallel chains separated by deep valleys and table-lands. The most northerly of these ranges is the loftiest, and Mount Everest, the highest mountain in the world, rises to a height of 29,000 feet. In the west the Himalayan ranges are continued by the Hindu Kush, from which the Suleiman and Hala chains stretch to the south, along the western borders of India. The barrier presented by the Himalayas is far more formidable than those of the other ranges and can be crossed only by passes of 17,000 to 19,000 feet in height, above which tower many snow-capped summits. It was through the less difficult but still formidable passes on the northwest border that India was long subjected to invasion; and Burma was the victim of similar attacks through the passes on its north frontier. The mountain rampart has the greatest influence on climate and fertility, for it wards off the freezing winter blasts from the north and condenses the immense volume of water vapor

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SINKIANG
Afghan Turkistan
Hindu Kush Mts.
KABUL
Peshawar
NORTH WEST FRONTIER PROVINCE
KASHMIR
Srinagar
TIBET
Lanak Pass
Rupshu
Rudok
Demchok
Lankhar
Tottingmath
Lahore
Amritsar
Jullundur
Ambala
Meerut
UNITED PROVINCES
DELHI
Rampur
Moradabad
Bareilly
Agra
Lucknow
Cawnpore
Allahabad
Benares
Patna
Gaya
Darbhanga
Faizabad
Gorakhpur
Nepalganj
Palpa
KHATMANDU
Dhaulagiri
Mt Everest
Kanchanjanga
SIKKIM
PUNAKHA
TASHI
BHUTAN
Tassisudon
Dhirang Jong
Lachimpur
Gologhat
Tezpur
Nowgong
Gauhati
Goalpara
ASSAM
Shillong
Kohima
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Cherra Punji
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Baltistan
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Badrinath
Nanda Devi
Srinagar
Tehri
Debra
Dehra Dun
Saharanpur
Hardwar
Kotdwara
Almora
Naini Tal
Sil Garhi
Ranikhet
Bareilly
Rohilkhand
Shahjahanpur
Lakhimpur
Sitapur
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Gorakhpur
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Jaunpur
Mirzapur
Allahabad
Banda
Jhansi
Gwalior
Agra
Muttra
Alwar
Bharatpur
Dholpur
Karauli
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Kishangarh
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Nasirabad
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Jaisalmer
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Jeysalmer
Bikampur
Bikaner
Fatehpur
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Jacobabad
Kashmor
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Hazara
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Jhelum
Gujrat
Gujranwala
Sialkot
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Shahpur
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Montgomery
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Multan
Muzaffargarh
Khanewal
Mubarakpur
Bhatinda
Sirsa
Suratgarh
Rahtasil
Bhawani
Nohar
Dulmera
Delwa
Bikampur
Bikaner
Fatehpur
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Nasirabad
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Karauli
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Narsinghpur
Jubbulpore
Mandla
Seoni
Chhindwara
Betul
Hoshangabad
Itarsi
Harda
Khandwa
Asirgarh
Burhanpur
Nimbahera
Chitor
Udaipur
Partabgarh
Jaora
Ratlam
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Indore
Dewas
Sironj
Bina
Gwalior
Dholpur
Bhilsa
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Jubbulpore
Katni
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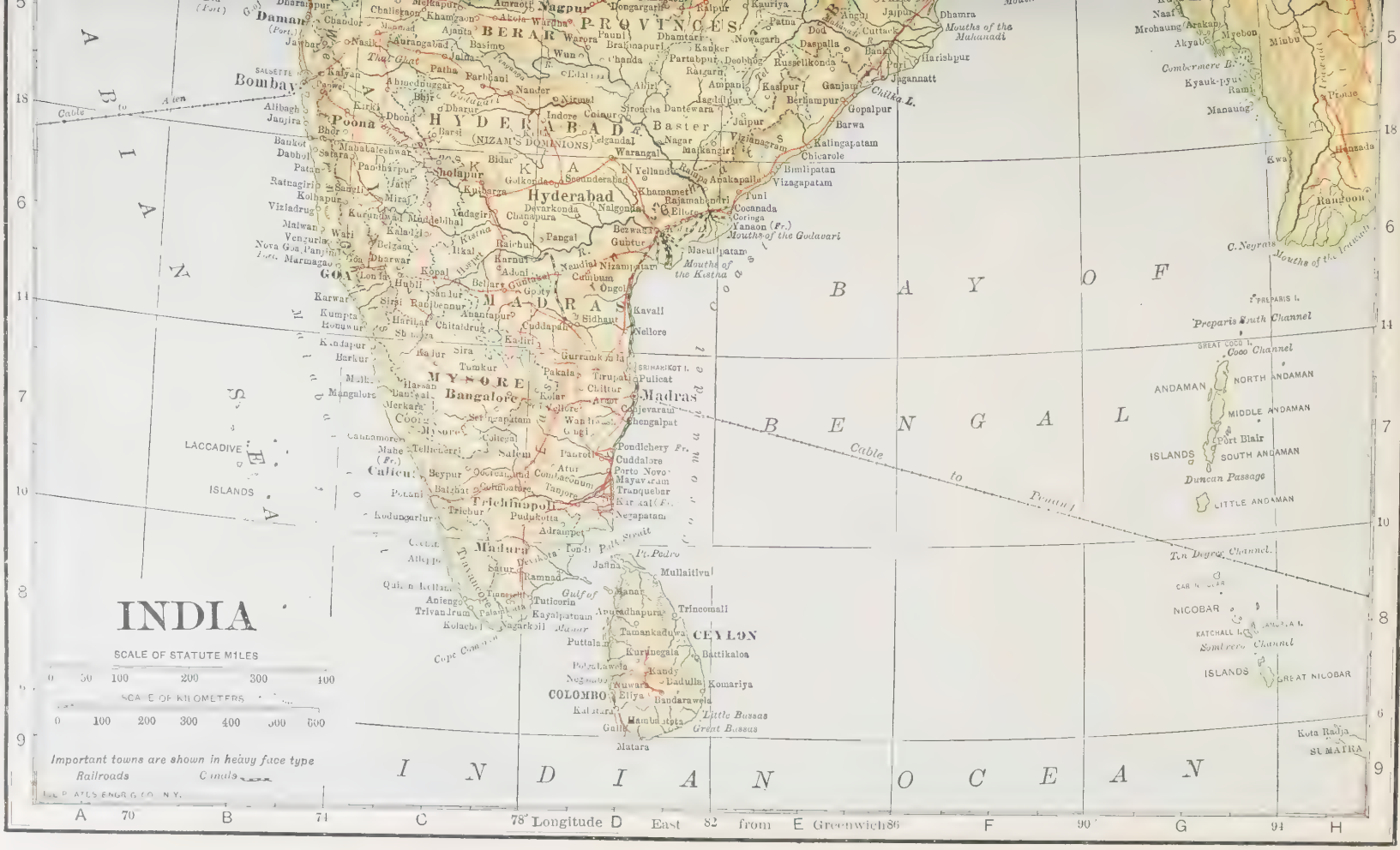
INDIA
SCALE OF STATUTE MILES
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SCALE OF KILOMETERS
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Important towns are shown in heavy face type
Railroads
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J. H. PATTISON ENGR'G CO. N.Y.
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
PROVINCES
BERAR
HYDERABAD
(NIZAM'S DOMINIONS)
MYSORE
MADRAS
GOA
CEYLON
COLOMBO
Bombay
Poona
Hyderabad
Bangalore
Madras
Calicut
Trichinopoli
Madura
Nagpur
Jabalpur
Mouths of the Mahanadi
Mouths of the Godavari
Mouths of the Kistna
Cable to Aden
Cable to Penang
LACCADIVE ISLANDS
ANDAMAN ISLANDS
NICOBAR ISLANDS
NORTH ANDAMAN
MIDDLE ANDAMAN
SOUTH ANDAMAN
LITTLE ANDAMAN
Port Blair
Duncan Passage
Preparis South Channel
Coco Channel
Ten Degree Channel
Sombrero Channel
GREAT NICOBAR
SUMATRA
Rangoon
Longitude East from Greenwich
A 70 B 74 C 78 D 82 E 86 F 90 G 94 H
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brought by the summer monsoon to vivify the plain below. The barren mountain slopes fall to the south in successive terraces down to the fertile plain teeming with animal and vegetable life. But while the higher slopes of the mountains are devoid of vegetation, some of the wide, high mountain valleys are exceedingly beautiful, most notably that of Kashmir, unexcelled for healthful climate and fertile soil.

The great river plains cross India in a wide belt from east to west, south of the mountains; and at their ends the plains are projected southward, where the Indus and the Ganges-Brahmaputra have advanced their deltas far seaward. On the alluvial lands are the densest population and the richest cultivation of the Empire; for density of population is determined in India, not by the temperature, but by the supply of water available for the farms. But there are waste and almost unpeopled districts also among these lowlands; and the rainless Desert of Thar or Indian Desert, to the east of the Indus delta, extends northeastward almost to the base of the Himalayas.

The third topographic division of the country is the peninsula, the great triangular plateau of the Deccan, from 1600 to 3000 feet above sea level. The north boundary of the plateau is the Vindhya Mountains, which join the plateau to the low plain. The Deccan triangle is further defined by the Western Ghats rising above the fertile and accessible Malabar coast, and in the east by the Eastern Ghats overlooking the Coromandel coast with a narrow coastal plain, difficult of access, for the harbors are few and very poor. No other part of the world testifies more eloquently than the Deccan tableland to the prodigious energy formerly displayed by plutonic forces. The greater part of this immense plateau was built up by outpourings of lava and basalt (trap), which in places are 6000 feet thick.

The coast line of Burma is not deeply indented except where the projecting delta of the Irrawaddy forms the Gulf of Martaban. The low coast and the flooded valleys make Burma the greatest producer of export rice in the world. Farther inland, to the east of the Irrawaddy and on both sides of the river in its upper course, the country is hilly and heavily forested. See BURMA.

Hydrography. The four great rivers of India are the Indus, the Ganges, the Brahmaputra, and the Irrawaddy, the last named in Burma. The heaviest rainfall is not on the plains or on the southern plateau, but on the slopes of the mountains, which pour their torrents into the great rivers below, with the result that the Ganges and the Brahmaputra carry to the sea a volume of water that is entirely out of proportion to their length or the area of their drainage basins. The Indus contributes to the basin of the Arabian Sea the waters derived from the Punjab (land of five streams) and from the plateau of Afghanistan. It is navigable for over 900 miles, but its value as a water highway is small on account of the impetuosity of its current. It is least important among the great rivers. The majestic and smoothly flowing Ganges is far more valuable for navigation than any other river of India. Both the Ganges and the Brahmaputra, which joins it near its mouth, are turbid with fertilizing silt from the mountains, which has formed the great Bengal delta. The Irrawaddy of Burma is navigable by steamers to Mandalay. The rivers of the peninsular part of India, though some of them are of considerable length, are not important for navigation. Among them may be mentioned the Nerbudda (Narbad) and Tapti, both flowing into the Arabian Sea, and the Mahanuddy (Mahanadi), Godavery (Godavari), Kistna (Krishna), and Kavery, which pour their waters into the Bay of Bengal.

Climate. On account of the great extent of India and its differing altitudes, the country has many differences of climate. The whole land may be described as more or less tropical except in the higher altitudes. Slopes of the Himalayas, as high as they are habitable, enjoy a temperate climate; neither is there for the natives an oppressive degree of heat on the high plateau of the Deccan. Among the Himalayas and the Nilgiris Europeans have established sanatoriums amid the most agreeable climatic conditions, where many of them take refuge from the prostrating heat of the hot months. The climate of India, except in the districts of jungle and marsh lands, is not, on the whole, unhealthful for the white race if the ordinary precautions required in all hot countries are observed. The most heated area is that of the northwest, in or about the region of the Indian Desert, where the mean July temperature exceeds 95° F.

By far the most important climatic element is the rainfall, upon which depends the very existence of the people. Throughout the country in general there are only two seasons, the dry and the rainy, also known as the season of the northeast monsoon and the season of the southwest monsoon. These names are derived from the direction of the winds prevailing in the Arabian Sea and Bay of Bengal during the two periods. They are really inapplicable, however, over a great part of India, where the winds are from directions nearly opposite to those indicated by the names of the seasons and are chiefly determined by the axial directions of the local river valleys. Thus, the winds in south Bengal are from the southeast, and in Behar from the east, during the southwest monsoon, and are from the opposite directions in the northeast monsoon. The two seasons in India might therefore more appropriately be called the dry monsoon and the wet monsoon, from their most characteristic features.

The dry monsoon, or season, usually begins in November or December and continues until May. Winds of land origin prevail more or less steadily in the interior, and hence the period is usually marked by great dryness of the air and little or no rain. The first three months of this period (December to February), characterized by a comparatively low temperature, are known as the cold-weather season; and the second three months (March to May), when the temperature increases rapidly and culminates in a period of excessive heat in May, as the hot-weather season. During the cold-weather season storms of large extent, the majority of which form in Persia, enter India from Beluchistan and traverse north India from west to east, distributing light rains in the Indo-Gangetic plains and heavy snow over the western Himalayas. The severity of the hot-weather season is occasionally relieved by the occurrence of thunderstorms and dust storms, which cool the air for brief periods. The characteristic features of the dry season are persist-

ent dry weather, with clear skies, and large diurnal range of temperature.

The rains of the wet season, or the southwest monsoon, set in suddenly on the west coast of India in the first week of June, and a little later (in the second or third week of June) on the Bengal coast, and extend more or less rapidly into the interior. The prevailing winds of this period are of oceanic origin and are, in fact, the northward extension of the winds of the southeast trades. The extension of these winds northward across the equator and into the Indian seas usually begins in the third week of May and gives a complete and permanent change of weather (lasting for five or six months), more especially over the land area of India. The winds due to the extension of these massive humid air currents usually begin to give daily rain to the Malabar coast in the last week of May and to the Bombay coast on June 4 or 5. The humid currents advance more slowly into the interior, but are usually established before the end of the month over the whole of India. Cloudy, showery, or rainy weather, with a moderately high temperature and small diurnal range of temperature, prevails during the next three months, which are in striking contrast with the excessively hot and dry weather that has prevailed during the previous two or three months. Over the mountain tracts of Assam and over the plains of Lower Burma the yearly rainfall exceeds 500–600 inches, and in one particular year the record of 805 inches was established.

Sometimes the wet monsoon is greatly delayed or has little strength, and this failure of an adequate supply of rain involves the direst tragedy. (See section on *Famines.*) India and the adjacent seas are often visited by the destructive hurricanes called typhoons, whose tracks are frequently traced by ruined towns and crops.

The soil, except on the steep mountain slopes, is of great fertility, being largely composed of alluvium throughout the plains and in the mountain valleys, and of disintegrated volcanic rocks, from which many rich soils are derived, on the southern plateau. The food demands of the enormous population make it necessary to maintain a high degree of fertility.

Flora. The very unequally distributed rainfall causes great differences in vegetation. The almost rainless region just east of the Indus has desert conditions of plant life, while the low-lying coast lands along the Gulf of Bengal have large areas of dense, wet jungle. The plains of the Deccan east of the Western Ghats have little rain, for it falls on these mountains instead of on the plains. Vegetation is therefore sparse where irrigation is not applied; while the lower slopes of the northern mountains, drenched with rain, are densely wooded; and far above the forests there is an arctic flora close to the glaciers and snow fields. The greatest possible area of plowed fields is needed for food production, and so a large amount of forest area has been cleared for cultivation. Timber supplies are chiefly derived from the mountain slopes, from the hilly lands of parts of the Deccan, and from Burma. Teak, the most valuable wood, is cut on the slopes of the Western and Eastern Ghats, in Lower Burma, and to some extent among the western hills of the Deccan. Sandalwood and blackwood are found in the teak-growing regions; sal, another hard wood, and cedars, on the slopes of the Himalayas; and the common woods are scattered, not profusely, over various parts of the country. The larger part of the plain has no forests, and in the irrigated districts there are few trees except in the watered gardens. The government has all the best timber areas under protection and applies forestry methods to their management. The bamboo, the mango, and the coconut, useless as timber but of incalculable popular utility, are widely distributed. One of the most distinctive of the Indian trees is the banyan. The forests of Assam, Malabar, and the lower slopes of portions of the Himalayas are luxuriant in the extreme and present a wealth and variety of vegetable forms which are equaled or surpassed only by the forests of tropical America. In the Himalayas is the home of the giant rhododendron. Orchidaceous plants are markedly numerous, and the upper floral zones of the mountain range have furnished the most valuable types to the floriculturist.

Fauna. The country forms a part of the Oriental Region (q.v.) of zoögeography. Although the plains of the northwest partake of the characteristics of Central Asia, India possesses the lion (in the northwest, but now nearly extinct), the wild ass, and sundry smaller mammals, birds, and reptiles that belong rather to the country westward. The massive ranges of the Himalaya also contain a peculiar montanic fauna, characterized especially by an abundance of wild sheep, goats, and of goat antelopes (qq.v.), such as the Charal Pulis sheep, the ibex, markhor, goral, and others elsewhere described. These, too, are more closely related to Palæarctic than to Oriental forms; but two or more species of goats exist on the Nilgiri Hills and other heights of the peninsula. The forests, swamps, and grassy plains of peninsular India support life in extraordinary profusion, and civilization seems to have little effect upon it because of the jungle fastnesses to which animals may everywhere retreat and be safe. The elephant (which is still met with in many parts in large herds), however, requires protection, and the wild cattle are becoming scarce. Several kinds of deer, including the sambur, axis, and swamp deer, and several kinds of antelopes are numerous, as well as very many of the minor mammals.

India is the home of the gallinaceous tribe of birds and is rich in many kinds of pheasants, partridges, and jungle fowl (to which is traced the origin of domestic poultry), besides a rich avifauna of the woods and fields. With this plenitude of prey, to which may be added a great variety of fresh-water and marine life, including many valuable food fishes, there would naturally be found carnivorous beasts, rapacious birds, and poisonous predatory reptiles. The tiger (which is probably indigenous to India), leopard, cheeta, and several lesser cats wander throughout the whole country, but are in greatest abundance in the sub-Himalayan forests, the marshes of the Gangetic delta, and the hill country of Central India, and are dangerous to man as well as beast. Other animals are the rhinoceros, gayal (or bison of the Ghats), bear, jackal, and various forms of ape. The true buffalo, as well as the camel, is domesticated and is largely used in the service of the field and farm. India is famous also for venomous snakes (see COBRA; ETC.), crocodiles, and sea snakes. The deaths of human beings by wild

beasts and snakes number thousands each year, and the loss of cattle reaches hundreds of thousands of dollars in value. On the other hand, India is one of the most attractive regions of the world for sportsmen, who annually distribute much wealth within its confines.

Geology. The topographic divisions of India with their characteristic features are based largely upon differences in geological structure. The main system of the Himalayas, so far as explored, has been found to be composed of crystalline strata—gneisses, schists, and igneous rocks of Archean age—which show the effects of upheaval and folding during the great crustal movements that elevated the ranges in late Tertiary times. In the southern flanking chains, or sub-Himalayas, the most prominent formation comprises Tertiary sandstones, conglomerates, and clays, in disturbed position. These strata (the Siwalik group) are enormously developed and contain a remarkable assemblage of fossil mammals. The great river plains of India occupy depressions in sedimentary strata, mostly of Eocene age. The Deccan plateau, especially in the north and west, is formed largely of basalt which poured out from great fissures during the Cretaceous period. These basaltic sheets occupy an area estimated at 200,000 square miles and attain a vertical thickness of several thousand feet. The Vindhya Mountains on the north have a gneissic axis, with Paleozoic sediments on the flanks. East and south of this range there is a large area underlain by sandstones and shales, to which the name Gondwana system (Mesozoic) has been given. This group extends probably from the Permian to the Jurassic period; its fossil fauna and flora are more nearly allied to the life forms of South Africa and Australia than to those of the Eurasian continent.

Mining. Considering the extent of area and the large population, the mining industry is strikingly insignificant, though the recent developments are beginning to give it some importance. Increased utilization is being made of the coal resources of the country, much to the advantage of the railroad and milling interests. The annual output of coal increased from 2,562,000 tons in 1893 to 14,706,000 tons in 1912. The provinces of Bengal, Behar, and Orissa produce over nine-tenths of the total product, the output having grown from 1,915,000 tons in 1893 to 13,432,500 tons in 1912. The increased production has resulted in the decrease of the imports of coal and coke, which amounted to £778,000 in 1913, and the increase in the exports of coal, amounting to £589,000 in 1913. Coolie labor is prominent in the working of the coal mines.

The mining of gold is important, the yield having steadily increased from 107,273 ounces in 1890 to 631,116 ounces in 1905, but has since declined to 590,555 ounces in 1912. The greater part of this is mined from the quartz deposits of Mysore, although some is obtained from river gravels in the Himalayas and elsewhere. A parallel growth is being made in the production of petroleum, the output in 1900 having been 37,729,000 gallons, and, in 1912, 249,083,500 gallons, the greater part of which was obtained from Upper Burma. The importation of mineral oil, which was in 1900 more than twice as great as the home production, amounted in 1912 to less than one-half of it (107,416,500 gallons). The government has long maintained a monopoly in the production of salt. It is obtained mainly by the process of evaporation, and the industry is carried on along the coast region and at some of the interior lakes. The annual yield is about 1,300,000 tons. Saltpetre is obtained in the plains, lead and copper are mined in the Himalayas, manganese ore in Bombay, and tin and rubies in Burma. India was long famous for its diamonds, but the output in the last century has shrunk into insignificance.

Agriculture. This industry, which has always been the principal source of subsistence for the people of India, is increasing in importance under British control. This is due largely to the increase in facilities for irrigation and for the transportation of agricultural products. Famines, which in the past resulted in an enormous loss of life, are now much less frequent and severe, owing to the increase in food supply and better facilities for distribution by rail and upon the rivers and canals. The same system of distribution has led to an increased supply of manufactures produced by the factory system of Great Britain and the manufacturing centres of India, and this has in turn increased the percentage of the population devoting its attention to agriculture. The land of India, though varying in composition, is generally fertile and is very productive, being aided by the tropical climate. The country is, however, in continuous danger of crop failure by the general uncertainty of rainfall. Practically the only districts exempt are the southwest Malabar coast, the deltaic district of the Ganges, Brahmaputra, and Burma. (See section on *Climate.*) In some regions, as in the lower Ganges valley, the precipitation is ordinarily quite heavy, rarely failing to meet the needs.

Irrigation. From remote times the inhabitants of India have sought, by means of artificial water supply, to protect themselves against the calamities of drought. Under British control the irrigation works have been enlarged, and new ones constructed on an enormous scale. In 1911–12 there were 40,679,000 acres, one-sixth of the total crop area, under irrigation. The area actually irrigated varies with the lack of rainfall from year to year, and the commercial value of irrigation schemes varies in different sections. In Sind and Lower Punjab irrigation is necessary every year. In the valley of the Indus the necessity for irrigation decreases with the distance from the Himalayas, but the system is used as a protection against drought years and to supplement the rainfall of average years. This is true also of the upper Ganges region. In the lower Ganges valley, as indicated above, irrigation becomes less and less necessary towards the deltaic region, in portions of which the danger of drought gives place to that of inundation. In Madras (except the west coast) and the Deccan or Central India region irrigation is a practical necessity as a protection against frequent droughts and to supplement the usual rainfall. On the east coast of Madras, especially where "wet crops" principally are grown, irrigation is an absolute necessity. In Orissa and Upper Bengal, though the ordinary rainfall is quite adequate and droughts seldom occur, the government has constructed irrigation works as a safeguard against dry periods. These works are considered indirectly profitable to the government, however, since they obviate the loss of land revenue and the expense of supplying a famine-stricken district with food

during a drought year. The Orissa and some of the other canals are also valuable for navigation.

The sources and methods of irrigation vary throughout the country. Before the British occupation wells were used chiefly, and have continued to increase in absolute, though not in relative, importance, because, where practicable, they constitute the cheapest method. They are generally employed by private enterprise and are still the largest source of irrigation in the United Provinces of Agra and Oudh, and Gujarat. Reservoirs, generally called tanks, have been used since ancient times to furnish water for irrigation and are especially adaptable to broken, hilly regions, where the construction of a long system of canals is impracticable. They are found chiefly in the eastern portion of Madras, where they vary in size, according to the supply of water and the irrigable area which they command. In many instances they are dry during a part of the year, and crops are sometimes raised in them. This tank system is also carried on by private enterprise. But since India has been in the hands of the British the greatest progress in irrigation has been accomplished through the general and uniform extension of the canal system.

This method also was used in ancient times, but some of the more important systems had fallen into disuse when the British took possession. Their construction requires heavy outlays of capital and presupposes a stable form of government. The numerous legal complications which rise out of such an undertaking, and the relation of the government to the land, together with the necessity of constructing certain systems having no remunerative financial value, have all led the British government to take the system almost wholly in its own hands. The execution of this method requires a fairly level area. The methods used for the application vary in different localities. In the Madras deltas dams are constructed across the rivers at their entrance to the delta region, and, since their beds are almost on a level with the surface of the land, water is easily diverted into artificial channels. They yield their main supply during the annual flood period, and the region dependent upon them is therefore limited to one crop. In the Lower Punjab and Sind the channel of the Indus River lies so far below the surface of the riparian country that its waters cannot easily be diverted by dams. Through the high banks deep cuts are made, and "inundation canals" are constructed, which convey the water of the river during the flood period. By this means the land is watered sufficiently to produce one crop a year. The valleys of the upper Ganges and upper Indus are also too deep and broad to admit of damming, nor would the inundation system of the lower Indus answer the purpose. Some of the crops that are commonly raised and require irrigation grow in those seasons during which the rivers are at their lowest. For their irrigation canals are dug so as to strike the rivers where they emerge from the mountains. The channels conduct the water along the watershed of the plains, finally reuniting with the main streams. Some of these canals are notable both for their great length and capacity. Many of them are remarkable feats of engineering, owing to the difficulties surmounted in their construction, such as the crossing of other streams. In no part of the world is the irrigation system so thoroughly developed or made to add so much to the producing power of the country as in India, and this has been largely developed under British rule. Of the 40,000,000 acres under irrigation nearly one-half is irrigated by canals and about one-fourth from wells. Over one-half of the area irrigated in 1912 was supplied from government works, and the value of the crops grown on irrigated lands was approximately $150,000,000.

A table herewith presented shows the area in the different provinces irrigated during the years 1911–12, the relative importance of the different sources of irrigation, and the proportion of irrigated land to the total crop area. It will be seen that the Punjab is the most, and Assam the least, dependent upon irrigation.

AREAS IN ACRES UNDER IRRIGATION IN 1911–12

ADMINISTRATIONS	Total area under crops	AREA IRRIGATED					
		By canals		By tanks	By wells	Other sources	Total area irrigated
		Government	Private				
Bengal	30,436,800	111,323	244,381	728,104	20,773	565,262	1,669,843
Behar and Orissa	32,955,600	797,679	334,455	628,894	625,858	1,458,083	3,844,969
Assam	6,167,760	978	119,093	.....	.....	196,613	316,684
United Provinces, Agra	32,760,757	1,971,333	20,521	48,555	2,974,843	1,308,378	6,323,630
United Provinces, Oudh	12,030,224	.....	.....	.....	899,940	712,544	1,612,484
Punjab	26,308,442	6,964,439	420,002	7,435	3,420,444	142,282	10,954,602
Northwest Frontier Province	2,688,888	221,087	439,344	.....	83,913	97,273	846,617
Upper Burma	5,017,166	419,792	204,484	135,786	8,104	80,848	849,014
Lower Burma	8,725,818	396	21,790	3,505	2,218	78,729	106,638
Central Provinces	20,294,576	12,813	1,879	427,768	58,796	23,185	524,441
Berar	7,069,777	.....	.....	238	31,882	521	32,641
Ajmer-Merwara	253,496	.....	.....	25,134	91,190	51	116,375
Coorg	142,135	2,610	.....	1,840	.....	.....	4,450
Madras	37,380,133	3,534,827	179,604	3,298,685	1,442,280	1,131,482	9,586,878
Bombay	23,499,345	146,705	15,936	58,256	696,365	87,920	1,005,182
Sind	3,263,325	2,636,845	66,939	.....	46,685	134,092	2,884,561
Pargana Manpur	7,509	.....	.....	.....	133	.....	133
Total	249,001,751	16,820,827	2,068,428	5,364,200	10,408,424	6,017,263	40,679,142

Crops. In 1911–12 the area actually cropped was 215,981,683 acres, and the current fallow 54,982,324 acres. The estimated area of the cultivable waste for the same year was 114,700,370 acres. There were 149,605,179 acres not available for culture, and 80,851,368 acres

under forest. For crop statistics, see accompanying table.

The kind of crops grown is determined largely by the amount of the water supply. In regions

CROPS, IN ACRES, UNDER CULTIVATION IN 1911-12 (ADD 000).

ADMINISTRATIONS	Rice	Wheat	Barley	Millets, jowar, bajra, and ragi	Maize	Pulse	Total food grains and pulses	Oil seeds	Sugar cane	Cotton	Indigo	Opium	Tea	Coffee	Tobacco	Total area cropped	Area cropped more than once	Net area dealt with according to survey
Bengal	20,961	143	95	23	95	177	22,910	1,888	223	34	1	...	146	..	306	30,437	5,506	49,646
Behar and Orissa	17,365	1,285	1,340	1,471	1,661	992	28,352	2,050	263	89	110	3	2	..	116	32,956	5,399	53,173
United Provinces, Agra	3,430	5,641	3,977	3,764	998	5,175	27,393	1,190	1,120	842	24	104	8	..	76	32,761	6,370	53,028
United Provinces, Oudh	1,844	1,995	1,238	941	796	1,697	10,959	337	221	60	6	111	..	..	18	12,030	2,830	15,307
Punjab	514	9,725	1,339	1,726	955	4,100	19,379	1,599	298	1,462	39	2	10	..	76	26,308	4,051	62,215
N. W. Frontier Province	47	1,199	296	129	410	174	2,355	105	32	56	..	..	..	..	12	2,689	404	8,438
Upper Burma	1,958	....	....	803	161	39	3,455	1,150	3	172	..	..	2	..	30	5,017	397	53,805
Lower Burma	7,937	....	....	....	21	1	7,987	68	11	20	..	..	..	..	59	8,726	6	54,994
Central Provinces	4,780	3,291	23	1,733	142	993	15,312	2,981	23	1,392	..	..	..	..	18	20,295	2,326	52,592
Berar	41	320	....	2,322	2	117	3,419	296	1	3,256	..	..	..	..	8	7,070	12	11,372
Assam	4,616	....	1	2	19	1	4,727	301	37	38	..	..	354	..	8	6,168	456	31,306
Ajmer-Merwara	....	27	63	39	44	2	213	4	1	28	..	..	..	43	..	253	33	1,771
Coorg	83	....	....	6	....	2	91	....	....	....	..	..	..	..	..	142	1	1,012
Madras	10,289	18	3	10,998	118	135	28,586	2,927	108	2,676	90	..	21	51	192	37,380	4,312	91,074
Bombay	1,682	984	38	11,309	165	422	17,364	1,357	67	4,107	..	..	..	..	68	23,499	593	48,629
Sind	1,089	368	19	805	2	76	2,591	240	4	336	5	..	..	..	10	3,263	322	30,257
Pargana-Manpur	....	2	....	2	1	1	6	1	....	1	..	..	..	..	..	8	....	31
Total	76,637	25,025	8,432	35,775	5,591	14,129	195,097	16,495	2,410	14,568	275	220	544	95	999	249,002	33,020	618,606

where the rainfall is excessive, or an abundant supply is readily obtainable, rice is almost the only crop. It is therefore confined largely to the deltaic regions and especially to the Bengal delta. Here the annual overflow of the rivers makes irrigation easy. From the accompanying table will be seen the great importance of rice in Bengal, Lower Burma, and Assam. The consumption of rice is, however, not nearly so universal in India as is popularly supposed. It is not the cheapest food, and in many regions only the wealthy classes can afford it, while even in Bengal there are great numbers of the lowest classes who use but little. Sir William Hunter estimates that it is the staple food of less than one-third the total population of India. The main crop is reaped in the early winter—November to January—but in Bengal there is also a summer crop. A considerable share of the rice crop is exported, the value of the rice exports in 1912–13 being nearly twice as great as those of wheat and showing a larger total than that of any other single product. Throughout the dry, nonirrigated portions of India millet is the commonest food crop and is the largest item in the food of the lower classes over the greater part of the country, being most used in the southern districts. Practically the whole crop is used for domestic consumption, whereas rice is exported in large quantities. The planting and harvesting periods vary with different sections; in some regions two crops are raised, and in others, especially in the northwest, but one crop is produced, the rainfall being the controlling factor. The acreage shown in the accompanying table represents the area sown, but the area cropped falls short of this. After rice and millet pulse is the most important food product. There are no available figures showing the acreage devoted to millet.

Wheat is confined largely to the northwestern part of India, being the chief crop in the Punjab. It is a very important factor in the agriculture of Bengal and Behar. While there was formerly much apprehension in the United States that the wheat crop of India would drive that of the former from the world market, recent developments have not justified such fears, since the increase in area devoted to wheat in India was much less in recent years than formerly. The wheat-producing area formerly varied widely from year to year. The average, including native states, for the last decade was about 30,000,000 acres, about half of which is subject to irrigation. The average yield per acre varies with climatic conditions—in the Punjab it is about 13 bushels. The harvest occurs during April and May. Potatoes and other root crops are grown successfully, but they are not so favorite a food in India as in European countries. A large variety of tropical or semitropical fruits are grown for local consumption. The coconut is the most important export from the southwest coast. There are several kinds of dates having a local and commercial importance. Throughout India the raising of oil seeds receives much attention, an average of about 14,000,000 acres being devoted to their cultivation. The product has been for a long time an important item in local consumption, and in the last half of the nineteenth century large quantities were exported to Europe—the foreign demand giving an increased impetus to its cultivation.

Sugar cane is grown in most provinces, especially in the United Provinces of Agra and Oudh, the Punjab, and Bengal. The crop requires irrigation and cultivation on a capitalistic scale, which tends to limit the development of the industry. The quantity of sugar produced in India is very large, about 6,000,000,000 pounds in 1913, but it is practically all con-

sumed in that country and is not sufficient to meet local requirements, the imports amounting to about 1,365,000,000 pounds in 1913 valued at 140,000,000 rupees. India is thus one of the largest sugar-consuming countries of the world, her consumption aggregating about 7,350,000,000 pounds against 8,250,000,000 in the United States. The production of coffee is mostly restricted to a limited area in the elevated region on the southwest coast, the coffee lands of Mysore, Coorg, the Madras district of Malabar, and the Nilgiris, comprising over 85 per cent of the whole area under coffee in India. The coffee exports amount to about 15,000,000 rupees annually. The culture of tea is due to the fostering efforts of the government. Tea culture was introduced about the middle of the nineteenth century and has continued to increase and is now one of the important crops of India. The quantity produced is about 350,000,000 pounds, and the quantity expended about 280,000,000 pounds. The value of the tea exports amounted to about 132,000,000 rupees in the fiscal year 1913, or nearly 10 times as much as the coffee exports. Requiring an abundance of water, it is best adapted to Assam and Lower Bengal and is largely confined to these two regions, being grown for foreign markets rather than home consumption.

Opium is a government monopoly, and its production is restricted to certain regions, principally Behar, the country around Benares, and Oudh. The poppy plant, from which the opium is obtained, requires irrigation and careful attention. The production, however, is rapidly declining, owing to the coöperation of the Indian government with that of China in the prevention of imports of opium into China. Some tobacco is grown in most parts of the country for local consumption. About half of the total product is grown in Bengal, and part of it is exported. The tobacco is generally inferior to that grown in other countries and therefore does not compete seriously in the European market. Indigo has ceased to hold its own even in absolute importance. The acreage for 1912 was but two-fifths of that for 1904. The industry has suffered from competition with in the production of fibrous plants—cotton and jute.

Cotton had long been raised, but had not been drawn upon to supply the foreign market to any great extent until the Civil War in America stopped the supply from there. A reaction soon followed its rapid and extensive development, and though it subsequently increased again, it now produces about 3,500,000 bales annually. Cotton cultivation is not confined to any distinct region, but is relatively most important about the centre of the peninsula in Berar. The soil of this and the surrounding country is called the "black cotton soil" and is noted for the remarkable extent to which it holds moisture. The cotton is a short-staple grade and therefore inferior to the American and Egyptian products. The exports average about 2,000,000 bales annually. The production of jute is more restricted in extent, the plant growing best in the flooded lands along the lower Ganges and Brahmaputra in Eastern Bengal. The average annual acreage for the last decade was over 2,000,000 acres, and in 1913 it was 3,354,000. Like cotton, the product is largely exported, though there is not so large a per cent of it exported in the raw state. The exports of jute in the raw state are about equal in value to those of the manufactured product. A considerable part of the product is shipped to the United States. Silk culture is important in the Punjab, Assam, and Lower Bengal.

The methods of cultivating crops in India are such as have prevailed for centuries. The natives show little inclination to take suggestions from the British. The efforts of the latter, however, to accomplish results by means of experimental farms have resulted in a considerable improvement in methods of cultivation and in some cases have increased production per acre. There are experimental and seed farms conducted by the Department of Agriculture, the introduction of new crops and new appliances, and especially the enlargement of the irrigated areas.

Stock Raising. While India has a larger number of cattle than any other country of the world, they are of a low value as compared with

LIVE STOCK IN 1911–12

PROVINCES	Cows, bulls, and bullocks	Buffaloes	Young stock: calves and buffalo calves	Horses and ponies	Mules and donkeys	Sheep and goats	Camels
Behar and Orissa	10,391,208	2,161,008	3,135,611	162,868	25,169	4,517,101	327
Agra	11,777,676	3,150,300	6,675,799	362,574	266,247	7,160,463	13,443
Oudh	5,248,633	1,100,401	2,469,947	144,337	47,283	2,847,193	3,100
Punjab	7,635,443	2,866,084	3,821,389	360,502	622,546	9,844,785	270,522
N. W. Frontier Province	758,946	162,509	294,414	26,790	121,737	1,198,084	40,574
Lower Burma	1,430,932	549,830	635,084	20,455	7	75,392	.....
Upper Burma	2,085,948	215,593	810,619	60,287	861	140,686	.....
Central Provinces	5,743,714	1,108,051	2,408,169	107,024	19,952	1,351,306	228
Assam	1,602,380	263,205	849,324	10,978	.....	591,630	.....
Ajmer-Merwara	171,767	35,584	55,399	2,436	6,254	464,298	1,500
Coorg	86,947	23,338	39,200	314	220	2,550	.....
Madras	11,164,958	3,450,161	5,474,278	53,425	135,375	18,178,212	45
Bombay and Sind	5,631,980	1,400,678	2,644,475	196,691	177,443	5,397,061	116,690
Berar	1,417,761	263,503	495,532	31,211	23,608	633,084	339
Pargana-Manpur	4,070	980	1,362	53	135	1,050	.....
Total	65,152,363	16,751,225	29,810,602	1,539,945	1,446,837	51,402,875	446,768

various substitutes, and with the product grown in Java. Bengal (particularly Behar), the United Provinces (Agra), and Madras lead in its production. Spices are raised and exported, but are of minor importance. During the past 60 years there has been a considerable increase

those of other countries and do not form an important factor in commerce. A number of conditions are responsible for the unsatisfactory state of stock raising. The people are given almost wholly to a vegetable diet. Religious or caste prejudices prevent the greater portion

of the Hindus from eating beef or pork. The period preceding the annual rains is characterized over a large portion of the country by a scarcity of both water and pasturage, and stock are generally reduced almost to starvation. This tends to make the breeds deteriorate. The disregard of proper methods in breeding has a similar influence. The grade of stock, therefore, is generally very inferior. Over the greater portion of British India cattle serve the same purpose that horses do in most countries. The breed of cattle is one that is unknown in this country, being of the humped variety. Buffaloes are also used as work animals throughout almost all India. They are somewhat hardier than cattle and thrive in districts climatically unfavorable to the latter. Mules and donkeys are about equal in number to horses and ponies, the former being raised in the largest numbers in the Punjab and the latter in Agra.

In the dry regions of the Lower Punjab and Sind camels are still the principal domesticated animals. In a few localities elephants are of great value in performing certain kinds of work, but their number and use are much more limited than is popularly supposed. The grazing industry is best represented in the raising of sheep and goats. These animals are valued chiefly for their wool. Pigs are raised, but their number is not recorded in the government reports. The table on page 64 shows the number of domestic animals by provinces for the year 1911–12, with the sole exception of Bengal, for which complete data are not available. Compared with the figures of a decade earlier a slight increase is found for almost every variety in most of the provinces.

Famines. From the earliest historical times India suffered often and terribly from famines, but this suffering has steadily decreased with better transportation facilities and the greater facilities for irrigation. Under British administration irrigation works have even been extended into districts where the rainfall is usually sufficient. Irrigation, however, sometimes fails, in cases where the precipitation may not be great enough to supply the reservoirs or keep the streams full enough to supply the irrigation canals.

The work of reducing the probability of distress from famines has constituted a large part of the work of the British government in India in recent years. Elaborate preliminary preparations are made in fear of their recurrence. The work is carefully systematized and officered. The country is districted, and in each district an examination is made of such matters as the water supply, the social condition of the people, the probable extent of need in case of famine, and public works. The budget makes annual provision for forest care and improvement and for the care and enlargement of the irrigation systems.

The loss of life from starvation is now much less than formerly, but deaths from diseases which so frequently accompany the famine are generally greater than by actual starvation. One of the most difficult tasks of the government during the famine period is to enforce necessary sanitary regulations. However, taking one year with another for the whole country, the loss of life from famines constitutes but a small per cent of the total death rate. The ravages of disease in India are not peculiar alone to famine periods. The climatic and sanitary conditions give rise to pestilences which at intervals carry desolation over the country. Hospitals, richly endowed and admirably regulated, supported by government as well as by private munificence, exist in all the large towns; and great efforts are constantly made to bring the benefits of medical skill and knowledge within reach of the poorer classes. In all parts of the country dispensaries have been opened where medicines are given out and patients advised. Several millions of persons are vaccinated annually in India. Mortality is aggravated by the passion of the people for pilgrimages. All ages and both sexes each year travel vast distances for their devotions and die by hundreds on the route.

Manufactures. For centuries India has been noted for its beautiful fabrics and metal work, made chiefly in the houses of the natives. But most native Indian industries are of a primitive type, and in a society so thoroughly impervious to the spirit of progress their modification and improvement have been impossible. Consequently the development of the factory system in England made it possible to manufacture products much more cheaply than could be done by the laborious methods of Indian workmen. In addition, improvements in transportation facilities have enabled European manufacturing centres to command a large part of the Indian market, with the result that in the home market in some localities, and in some outside markets, the Indian products have been almost entirely supplanted, and this has led to an increase in the number of people devoting their attention to agriculture. The enormous growth of the imports of cotton manufactures is suggestive of the extent to which the native industry has been supplanted. The value of cotton manufactures imported into India is now approximately $200,000,000 annually and exceeds by far the cotton-goods imports of any other country of the world. The exports of cotton yarn, however, amount to about $33,000,000 annually, mostly going to China and other Oriental countries.

The most important manufacture is that of the coarser grades of cotton. The average number of hands employed in the cotton mills increased gradually from 53,624 in 1883 to 112,000 in 1890 and 221,000 in 1912, while the number of mills increased from 62 in 1883 to 234 in 1912. About three-fourths of this industry centres in the city of Bombay. A similar increase was observed in the jute and hemp industry, which in 1912 employed 201,324 hands, as against 42,797 in 1883. It centres in the region about Calcutta. Among the other more important establishments are woolen, paper, flour, rice, oil, and lumber mills, the breweries, coffee works and indigo and sugar factories. The total number of factories liable to inspection under the Factories Act in 1911 was 2248, employing 629,227 men, 115,090 women, and 47,627 children. The Province of Bengal employed over a third, and Bombay nearly a third, of the total force. Among other manufactured Indian products are silk (including beautiful figured stuffs), various articles of luxury, such as highly wrought work in ivory, gold, silver, copper, and brass, cashmere shawls, etc. In weaving and in carving and inlaying wood and ivory the native artisans are unsurpassed.

Transportation and Communication. The network of railways to be seen on a map of India presents a decided contrast with the

sparsity of railway lines in other parts of Asia or the tropical world. The mileage for British India is three-fifths the total for all Asia. The development of the railway system was prompted by a number of motives and has been prolific and far-reaching in results. The military exigencies, development of the resources of the country, extension of British trade, and humanitarian sentiments or the desire to lessen the horrors of famine have each played varying parts in determining the location of lines and methods of administration. The results show that each of these efforts has been abundantly justified. Closely allied with the influence of the railway system as an economic factor has been its socializing influence—the beginning of the transformation of the native society, a lessening of the rigors of caste, and at least a portend of a reconstructed civilization along more modern and progressive lines.

Railway development in India has been in the main in harmony with a policy laid down as early as 1850 by Lord Dalhousie. This policy comprehended the construction throughout India of a system of grand trunk lines with a uniform gauge, connecting all the large centres of industry and population, and the construction of subsidiary or feeding lines with a narrower gauge and on a less expensive scale. The grand trunk lines were accordingly begun in the early fifties under a system of government guarantee. The constructing companies were guaranteed 5 per cent on the capital invested for a period of 25 years, and at the end of the contract period the government had the right under specified conditions to take possession of the lines. The policy attracted capital to the country and led to a more rapid railway construction than would have been secured by state construction. The guarantee, however, led to some extravagance in expenditure and became a heavy burden to the government. A new policy accordingly was taken by the government in 1863–64, under which assistance was advanced to new lines, which in turn obligated themselves to perform certain duties for the state.

A third policy was introduced in 1870 under which new lines were built and operated directly by the government. The widespread and disastrous famines a few years later made it evident that new lines should be constructed faster than the government could assume financial responsibility for their undertaking and forced it to fall back upon private enterprise. New lines were built without regard to a uniform policy, the government generally extending a guarantee, but for as brief a period as possible. Meanwhile the contract period of four companies had terminated, and new contracts were made for another 25 years, according to which the state, allowing certain concessions, was to share in the surplus income above 5 per cent. But subsequently, at the expiration of other contracts, the lines have been acquired by the state. Though no settled system has yet been adopted for the administration of railways, it will be seen that the greatest mileage is included in the lines belonging to the government but controlled by private companies. In 1912 a little more than half of the total mileage, or 18,107 miles, was represented by government lines operated by companies; 2159 miles were owned by native states and operated by companies; 7018 miles represented state lines operated by the state; 2039 miles were owned and operated by the native states; 4013 miles were owned and operated by assisted companies; 74 miles were owned and operated by unassisted companies, and there were 74 miles of foreign lines. The total mileage increased from 16,380 in 1890 to 27,565 in 1904 and 33,484 to Jan. 1, 1913. The total capital expended on Indian railways to the end of 1912 amounted to rx. 476,925,000 (£317,950,000). In 1911–12 the net profit to the state, after paying interest and other charges, was £3,787,770.

The number of post offices in 1912 was 18,801, which was an increase of over 75 per cent against 1895, when the number was 10,714. The number of letters handled during the same period increased 145 per cent. The Imperial system of telegraph and the railway system have been united, and there is a uniformity of telegraph charges throughout the whole system, including 78,862 miles of line and 311,034 miles of wire (1913). The mileage of wire increased 55 per cent in the last decade. There are three grades of messages—the urgent, ordinary, and deferred. The charges are less for the messages delivered with the less speed. For a period of 10 years ending in 1912 the government realized an annual average of 2.30 per cent net revenue (based on the capital sum employed) after allowing for all working expenses. The number of paid messages in this year 1912–13 was 15,449,000.

Commerce. From the earliest periods of history India has held high rank in the trade of the world, having been a large producer of commodities that were highly prized in general commerce. The attempts of Portugal, Holland, and France to secure the largest share of India's trade form an important chapter not only of its own history but of that of the world. The desire to find a short route thither by sea furnished much of the impetus given to the spirit of exploration during the fifteenth century, of which the achievement of Vasco da Gama (q.v.) affords a conspicuous example.

In 1600 an English trading company, the East India Company (q.v.), joined in the rivalry and opened the way for the extension of English influence and power over the whole country. For over two centuries trade between England and India increased slowly. After the English East India Company was deprived of its monopoly in 1834 there began an epoch of rapid trade development. The abolition of the inland duties, the assumption of control by the English government, the construction of the Suez Canal, and the improvement of inland transportation have been most influential factors in accelerating this trade movement. The magnitude of the increase since 1834, in which year the total foreign exports by sea were less than £10,000,000, is shown pro tanto by the first table on page 67.

In the year ending March 31, 1914, the imports of merchandise on private account were valued at £122,167,103, and the exports and re-exports at £166,041,434 (preliminary figures). The rate of increase has declined somewhat during the last decade. Since 1834, with few exceptions, the exports have annually exceeded the imports. A large proportion of the Indian foreign trade (about four-fifths of the imports and a little less than three-fifths of the exports) passes through the Suez Canal. Of this the greater share is with the United Kingdom. The figures for 1900 are: imports via Suez

Canal, £47,135,024, by other routes £9,413,838; exports via Suez Canal, £66,742,287, by other routes £33,013,762. Corresponding data are no longer published by the government. The accompanying table shows the amount of trade with other countries since 1869:

VALUE OF FOREIGN IMPORTS AND EXPORTS BY SEA, EXCLUDING GOVERNMENT STORES AND TREASURE

	IMPORTS			EXPORTS		
	Merchandise	Treasure	Total	Merchandise	Treasure	Total
1869–1870	£32,879,000	£13,954,000	£46,833,000	£52,471,000	£1,025,000	£53,496,000
1889–1890	46,000,000	11,600,000	57,700,000	69,300,000	1,010,000	69,310,000
1912–1913	107,327,024	34,132,003	141,459,027	163,909,589	4,697,193	168,606,782

once an important export, now far exceed all other imports and amount to one-third of the total imports. The exports have become pre-

VALUE OF PRIVATE MERCHANDISE TRANSPORTED TO AND FROM BRITISH INDIA BY SEA

COUNTRIES	IMPORTS		EXPORTS	
	1869–70	1911–12	1869–70	1911–12
EUROPE	£31,353,100	£71,123,777	£33,123,200	£85,992,491
United Kingdom	30,324,900	57,635,248	27,798,700	38,427,836
AFRICA	884,100	1,788,752	772,100	4,178,838
Egypt	* 48,500	162,200	* 1,128	1,137,334
AMERICA	105,200	3,529,682	1,629,200	13,194,239
United States	† 201,400	3,527,290	‡ 1,506,900	10,392,736
ASIA	13,719,800	15,209,391	17,919,500	42,173,436
‖ China	6,368,800	1,642,934	12,501,400	12,152,299
AUSTRALASIA	.....	.....	.....	.....
Australia, New Zealand	771,900	731,273	52,600	2,146,556

* 1871–72. † 1875–76. ‡ Western Hemisphere, not including West Indies. ‖ Including Hongkong and Treaty Ports.

It will be noticed from the table that the prcëminence of the United Kingdom in the trade with India is waning as to exports. They have been reduced to less than a third of the total exports, while the imports from Great Britain are almost two-thirds of the total imports. The increase in the exports from India has been largely to other Oriental countries. The amount of American products sent to India has materially increased, but is still insignificant. The exports accredited to Egypt are intended largely for the Mediterranean trade. Among continental European countries Germany, Austria-Hungary, France, and Belgium are in the lead, the former being first in the amount of imports from India. In Asia, Java, the Straits Settlements, and Japan have a large trade with India.

Two cities, Calcutta on the east and Bombay on the west, have the only good, large natural harbors on the coast, and about three-fourths of the entire trade passes through their ports; the former being more prominent in exports and the latter in imports. Adequate harbor facilities have been secured at great expense at Karachi, and it now serves as a port for the Indus valley region. A harbor has been constructed at Madras and another at Rangoon—the port for the Irrawaddy valley region.

The large increase in commerce during the last century has been accompanied by a radical change in the quality of the trade, and considered from this standpoint the increase has not meant a corresponding growth in the welfare of the country. A large proportion of the trade during the earlier period was in manufactured products, especially manufactures of metals and textiles. But the factories of Manchester and other foreign places have in a large measure supplanted the hand labor of India. Textiles, dominantly those of raw materials; the imports have become almost wholly manufactured products. As manufactured cotton leads in the imports, so raw cotton for a long time has held high rank among the exports. Cotton exportation received a great impetus during the Civil War in the United States, but it declined materially after the war. In recent years the exports have increased again; in 1913 rice alone surpassed cotton in value. Nearly all the cotton goods are imported from the United Kingdom, but that country receives only a small part of India's exports of raw cotton. The exports of India were formerly distributed among the European countries, but of late years the demand from Japan rapidly increased; in 1911–12 it amounted to £9,475,689. The importation of cotton twist and yarn increased two-thirds during the last decade, and there was a slight decrease in the exports of that article. These exports in 1912 amounted to £5,060,097, over four-fifths going to China and Hongkong.

The other leading imported commodities are hardware, machinery, iron, steel, and copper, mineral oil, railway plant and rolling stock, woolens, and sugar. Great Britain has a practical monopoly for India in the supply of railway material and machinery, and it supplies also the larger part of other metal products, Belgium, of the other countries, sharing most extensively in the trade. Mineral oil is the principal import from the United States, Russia now furnishing comparatively little. Among several exports of relatively great importance, rice—the only export upon which export duties are levied—is the most prominent and fluctuates

the least, reaching an average value in the last 10 years of about £12,000,000. Most of the rice goes to Egypt, the United Kingdom, Ceylon, and the Straits Settlements. During the last quarter of a century there has been a great increase in the exports of oil seeds to Europe, averaging for the last decade about £9,700,000. Exports of hides and skins, jute—raw and manufactured—and raw cotton increased very rapidly during the decade ending with 1913, reaching in that year values of £10,913,818, £33,281,187, and £18,740,816 respectively. Raw hides and skins and jute cloth constitute the principal exports to the United States. The amount of each increased enormously during the decade and far exceeds that sent to any other country. Exports of manufactured jute increased 150 per cent during the decade ending with 1912–13. Nearly all the tea exported (£8,630,952 in 1911–12) goes to the United Kingdom (£6,353,755 in the same year); it has become a formidable competitor with the Chinese product, the total exports of tea from India in 1912 being 279,230,000 pounds against 196,488,000 from China, 192,020,000 from Ceylon, 35,130,000 from Japan, and 23,668,000 from Formosa.

Opium, which is exported to China and the Straits Settlements, is decreasing in amount, the total value for 1913 being £7,481,088. This is largely due to the opposition by the Chinese government to its importation into that country. Exports of wheat fluctuate widely; the value for 1912, which was higher than for any year since 1905, was £8,898,972. Most of the product goes to the United Kingdom. From 1903 to 1913 exports of indigo declined from £803,788 to £146,755. Exports of coffee have also shown a tendency to decline, their value in 1913 being £1,043,503. Spices, which once were a large part of the exports, are now relatively insignificant. Treasure has long constituted one of the most valuable imports and has annually exceeded in amount the exports of treasure for more than half a century. The value for the period 1909–13 averaged over £27,000,000, nearly three-fourths of which was gold. Since the government stopped the free coinage of rupees in 1893 the net imports of gold have been gaining upon those of silver. The exports of gold and silver for the same period averaged over £4,900,000.

The imports and exports by land are not large, the totals for 1913 being respectively £6,919,558 and £6,330,715. Over two-fifths of the former and over one-fifth of the latter were to and from Nepal. The most important land imports were grain, pulse, timber, and provisions, while nearly one-half the exports were cotton goods. Native craft carry on an extensive coastwise trade, particularly along the coast of Bombay. The traffic along this coast amounts to over one-third of the total coastwise trade. The large inland trade increases with the development of means of transportation. The inland and the local trade are very largely in the hands of natives, there being certain sects or castes, as the Parsis of Bombay, who devote themselves especially to this branch of industry.

The foreign trade of India is done mainly in British vessels, the tonnage of these in 1912–13 amounting to 75 per cent of the total. In 1912–13 the total number of ships entered and cleared at the ports of India was 8737, with a tonnage of 17,452,000. This total was greater than that for the corresponding year of either of the two preceding decades. Germany and Austria-Hungary are the most important of the other nations represented.

Government. By an Act of Parliament which received the royal assent Aug. 2, 1858, Queen Victoria was declared sovereign of India, and various regulations were enacted for the better government of the country. In 1877, in virtue of an Act of Parliament passed in 1876, the Queen was proclaimed Empress of India. The Home Government of India is vested in a Secretary of State for India, who is a member of the English cabinet. He is assisted by an Undersecretary and a council of not less than 10 and not more than 14 members. The Indian Executive Government is administered by a Viceroy or Governor-General, appointed by the crown, and acting under the control of the Secretary of State for India. The Viceroy's term of office is usually five years, and he is assisted by a council of six ordinary members, appointed by the crown. Each of them has charge of a department of the executive. The Viceroy himself retains the oversight of foreign affairs and can overrule a majority vote of his council. The commander in chief is an extraordinary member of the council. This council, whenever it acts as a legislative body, is enlarged. It now has 68 members, 36 being official and 32 nonofficial. Within certain limits the council has power to make laws for all persons in British India, for British subjects in the native states, and for all native Indian subjects in any part of the world.

For purposes of administration, British India is now divided into 15 provinces. They differ in the method of their government. The three provinces of Madras, Bombay, and Bengal are under the rule of governors appointed by the crown and assisted by legislative and executive councils. The executive council consists of only three men. From 18 to 20 others are added to form the legislative council. These bodies communicate only with regard to important matters with the Home Government through the Governor-General. As regards affairs of minor importance, they correspond directly with the Secretary of State for India. The provinces of Behar and Orissa, the United Provinces of Agra and Oudh, the Punjab, and Burma are administered by lieutenant governors appointed by the Governor-General, subject to the approbation of the Secretary of State for India. These officers act without the aid of any executive councils, but have legislative councils of not more than 20 official members, nominated by the Lieutenant Governor on the approval of the Governor-General. There are a number of points upon which the local legislators in India cannot touch, and their proceedings are void if disapproved by the Governor or Lieutenant Governor, the Governor-General, or by the Home Government. The following divisions, viz., Central Provinces and Berar, Assam, Coorg, British Baluchistan, the Andaman and Nicobar Islands, the Northwest Frontier Province, Ajmer-Merwara, and Delhi, are under chief commissioners. There are no local councils for these provinces, such legislation as they may need being supplied by the Governor-General in legislative council. All the foregoing governmental divisions are subdivided into smaller divisions called districts, of which there are in all 267, varying both in size and population. The executive officer in each district is called

the collector, magistrate, or deputy commissioner. This office is remarkable in that its powers extend over every department of administration. The officer has charge of the collecting of the revenue, of education, roads, sanitation, police, and jails, and he is judge both of first instance and of appeals.

It has been the policy of the British government to try to awaken a sense of civic responsibility among the natives, and it has encouraged the creation of the necessary machinery for local self-government. Much difficulty has attended the effort, owing to the absolute dominance which class distinction holds over the social order, making almost impossible the development of the idea of a mutual community interest. Some progress, nevertheless, is being made. Every province of India has since 1860 secured laws which place the administration of municipal affairs in the hands of local bodies. In small places these bodies are nominated from among the townsfolk, but in large places they are mostly elected. Under specified regulations the local bodies may raise funds or receive grants of public money for local purposes. In 1912 there were 714 of these municipal towns, containing an aggregate population of about 17,000,000. The total income of these towns for the year mentioned was about £8,600,000. The rural regions have also been supplied with district and local boards for purposes of self-government. In 1912 there were 731 of these boards, including a total of 5780 elected members and 7098 ex-officio and nominated members. The income of these rural regions for the year mentioned was £3,430,000. The probability of the development of a national representative native government is scarcely conceivable. The idea of a common country or a national life does not exist. The masses are ignorant of even the geographical conception implied in the name India. There is, it is true, a national native congress, which meets annually, but it is scarcely representative in any true sense or indicative of any popular national tendencies.

There are high courts of jurisdiction at Calcutta, Madras, Allahabad, and Bombay, appointments being made to them by the Home Government. These courts have a general oversight of the lower courts and are courts of appeal, but there is an ultimate appeal to the judicial committee of the Privy Council in England. The Punjab has a chief court, and the Central Provinces and Berar, Oudh, Northwest Frontier Province, Coorg, Sind, Upper Burma, and Chota Magpur have each a judicial commissioner. Lower Burma has a chief court. The great majority of the magistrates in the courts of original jurisdiction and of the civil judges are natives. Europeans have certain privileges in court not possessed by natives.

Finance. In the consideration of Indian finance regard must be given to the denomination in which the estimates are made. If estimated in pounds, as in the table on page 70, there is an apparent decrease in most of the noncommercial items of revenue and expenditure. On the contrary, if estimated in rupees, most of them show a very decided increase. The depreciation in the value of the rupee, as measured in gold, accounts for this difference; but since the burden upon the taxpayer is determined by the local purchasing power of the rupee, the question of the effect upon the welfare of the native is a subject of dispute.

Leaving out of account the productive enterprises of the government, which are largely self-supporting, it will be seen that customs and excise play a minor part in the support of the government, while land revenue has contributed on an average considerably over a fourth of the total amount. The stamp, salt, and opium revenues also play a conspicuous part. The land revenue, however, is not absolutely nor relatively so important as formerly. This revenue partakes of the nature of a rent as well as of a tax. The rent varies with soil and the distance from the town, but averages about 1s. 10d. per acre for the total acreage of cultivated land. The opium revenues are secured mainly from the monopoly of the industry in east India, and the export duty collected in west India. An increase in the salt duties in 1888 established the rate of 2½ rupees per maund (see paragraph on *Weights and Measures* below), but the rate has since been reduced to 1 rupee (March 20, 1907). The collections from stamps are principally obtained from court fee stamps. The largest item in the excise revenue is that collected from the manufacture of spirits, but other sources, as, e.g., the monopoly for the sale of liquors and intoxicating drugs, help to swell the amount. The interests of British trade have determined the policy of keeping the import duties—especially those on cotton goods—at a minimum figure, though the natives have at the same time demanded tariff protection. The general customs duties of 5 per cent existing prior to 1882 were abolished in that year, except those on salt, opium, wine, beer, spirits, and arms. In 1894 a 5 per cent ad valorem was reimposed, except on machinery and a few other articles; but two years later the duty on woven cotton goods was reduced to 3½ per cent ad valorem, and cotton yarn was exempted from duty. A corresponding excise duty is levied on the products of Indian cotton mills. From 1886 to 1903 an income tax was assessed upon incomes exceeding 500 rupees; in the latter year the taxable minimum was raised to 1000 rupees.

In the last two decades of the nineteenth century the budget yielded a surplus for 12 years of the period and showed a deficit for eight years. The heaviest drain upon the Imperial Exchequer is made by the military charges. They are followed closely by the cost of the civil service. Both of these items, according to the consensus of native opinion, are unnecessarily burdensome upon the country. The army charges are irritating because the natives consider the army too large, and particularly because of the large proportion of British soldiers who monopolize most of the best positions, and whose salaries and pensions are largely taken or sent out of the country. The civil service excites native criticism because of the practical monopoly exercised by the English over the higher offices and the excessive salaries attached to them. A few English officers receive an aggregate remuneration considerably greater than that given to the numerous native minor officials. The control of the opium, customs, post office and telegraph, tributes, mint and currency, receipts and the expenditure under the heads of army and military works, political relations, public debt, and certain trunk railways, is retained by the central government. The management of all provincial revenues and some of the Imperial revenues is delegated to the local governments.

The accompanying table gives a statement of the average annual expenditure for the two decades indicated and the year 1911–12:

DETAILS	1881–90	1891–1900	1911–12
Direct demand on revenue	£9,198,111	£6,797,206	£8,670,174
Interest	4,600,546	2,480,488	2,037,735
Salaries and expenses of civil service	12,277,556	9,916,049	16,466,166
Miscellaneous civil charges (pensions, allowances, etc.)	4,597,045	4,441,431	4,898,823
Famine, relief and insurance (including construction of protective railways, etc.)	931,379	1,141,481	1,000,000
Buildings and roads, military works	5,279,111	3,862,520	6,814,433
Army services	19,484,591	15,585,835	19,536,546
Special defense works	275,255	152,685	4,706
Post office, telegraph, and mint	2,126,871	1,736,072	3,218,911
Railway revenue account	14,953,786	14,487,566	29,849,004
Irrigation	2,380,082	2,025,011	3,174,883

The total average in round numbers for each decade is respectively £76,300,000 and £62,600,000. The total for 1912 is £96,640,465.

The accompanying table shows the average annual revenues for each of the three decades indicated and for the year 1911–12.

DETAILS	1871–80	1881–90	1891–1900	1911–12
Land revenue	£21,100,759	£22,496,636	£16,869,344	£20,764,697
Opium	8,936,068	9,176,138	4,591,820	5,961,278
Salt	6,383,315	6,885,891	5,764,241	3,391,212
Stamps	2,802,489	3,643,720	3,063,493	4,815,129
Excise	2,463,086	4,088,094	3,638,876	7,609,753
Customs	2,558,202	1,504,890	2,283,491	6,468,567
Interest	520,793	792,203	608,327	1,448,741
Receipts by civil departments	981,740	1,468,413	1,115,376	1,238,131
Miscellaneous	457,045	1,076,186	525,298	813,076
Building and roads, military works	.....	605,741	447,953	490,615
Receipts by army department	.....	1,762,080	603,187	1,179,366
Provincial rates	575,946	2,948,487	2,426,251	548,680
Assessed taxes	527,345	905,669	1,198,645	1,652,878
Forest	594,910	1,071,281	1,115,425	1,952,179
Tributes from native States	720,079	721,006	552,748	595,005
Registration	.....	300,133	284,843	445,862
Post office, telegraph, and mint	1,278,055	1,911,061	1,951,095	3,588,804
Railways	2,519,049	12,997,363	13,922,181	33,636,774
Irrigation	552,189	1,677,791	1,838,804	3,980,052

The total average for the decade 1871–80 was £55,000,000; for 1881–90, £75,000,000; and for 1891–1900, £62,800,000. The total for the year 1912 was £100,580,799.

Debt. The permanent debt of India gradually increased from £33,577,414 in 1842 to £51,327,958 in 1857, when it rapidly grew in consequence of the Indian mutiny, and stood in 1862 at £97,037,062 and gradually increased to £276,295,677 in 1912. Of this last amount, £93,309,080 was held in India and £182,986,597 in England. The greater part of the debt in India bears interest at the rate of 3½ per cent, and about one-half the debt in England bears interest at the same rate, the remainder paying interest at the rate of 3 and 2½ per cent. Besides the above there were various special loans and other obligations assumed in India for savings banks, departmental and judicial deposits, etc., which brought the total liabilities up to £303,680,800 in 1913. The total interest for 1912, amounting to £9,884,812, was distributed as follows: railways, £6,664,210; irrigation, £994,235; ordinary debt, £1,435,152; and other obligations, £602,583.

Currency. In British India accounts are kept in rupees, annas, and pies—16 annas making one rupee and 12 pies making one anna. Beginning with the early seventies, the rupee was subject to great fluctuation in value, with a general downward tendency. The burden of taxation was greatly increased in consequence of the great fall in the value of silver, the Indian revenues being raised in silver, while the amount spent in Great Britain on account of India was paid in gold. This sum is disbursed in the payment of fixed charges, such as salaries and pensions of civil and military officers. The difference between the exchange value and the market value of the rupee became so great that the number of rupees raised by the government had to be increased by one-half. The financial embarrassment thus caused led the government in 1892, when the exchange value of the rupee sank to 1s. 1d., to consider a plan for the closing of the Indian mints to the coining of silver. In June, 1893, a law to this effect was passed, and the rate of 1s. 4d. for the rupee was established as the gold price of silver, provision being made that when the rupee rose to this value the mints should be reopened to the coinage of silver. The value of the rupee gradually rose, and, so far as the government was concerned, the financial conditions greatly improved. But complaint was made that the native growers and the European planters in India were suffering severely from the change. It was argued that these classes were obliged to pay labor on the old scale, in spite of the appreciation of the currency. Hence, while industrial expenses remained nominally the same, the employers received lower profits. Heavy losses fell also upon the natives, who as times grew hard were obliged to turn their hoards of silver into money. Finally, in the spring of 1898, a currency committee was appointed to investigate the monetary situation in India. This committee reported, in July, 1899, in favor of maintaining the gold standard and making it more effective; and to this end a law was passed in September

of the same year. Since 1899 the value of the silver rupee has been stable at the rate fixed—1s. 4d. (32.4 cents). The coinage of rupees, which for some years after 1893 almost ceased, became large in 1900–01, and the profit on the coinage was set aside as a special gold reserve fund to be used in maintaining the rate of exchange between Great Britain and India. There is a comparatively small amount of paper money in circulation in India. It is legal tender within certain limited districts. The amount outstanding in March, 1912, was 613,625,095 rupees, about two-thirds of which was in the districts of Calcutta and Bombay.

According to the Indian money system, 100,000 rupees equal 1 lakh, and 100 lakhs equal 1 crore. Hence a sum that would be read in terms of rupees only, according to the English method, would, according to the Indian method, be differently punctuated and read in terms of both the larger and the smaller denominations. To illustrate: the sum 37884517000 rupees would in English read 37,884,517,000 rupees, but in the Indian notation it would be written 3,788,45,17,000 and read "Three thousand seven hundred eighty-eight crores, forty-five lakhs, seventeen thousand rupees." In Indian money estimates sums are often given in tens of rupees, the abbreviation being rx.

Civil Service. The administrative offices are largely filled through civil-service appointments. Candidates taking the examination required to secure a position must be under 24 years of age. The successful candidate is then on probation for a year in England, during which period certain requirements are to be fulfilled, as, e.g., the learning of the Indian law.

Defense. The supremacy of the British sea power practically guarantees India from invasion by way of the sea, and the Himalaya Mountains perform a like service for a great part of the north frontier. The main interest in the defense of India centres about the northwest frontier, which is the historic gateway for invasions into India. In the last two decades of the nineteenth century the British adopted a more active frontier policy. They have established outposts and fortifications commanding the mountain passes that communicate with the west and north and more securely defend the Trans-Indus region. The British have a post of observation at Chitral and possess an "influence" at Gilgit which enables them to keep informed as to the Hindu Kush passes. Farther south the Swat valley is in the hands of the British. The important Khyber Pass (q.v.) is open, and the large garrison stationed at Peshawar serves to protect it. Continuing south, the Kuram and the Tochi valleys are controlled by the British, as are also the Gunal Pass and the Zhob valley. Quetta has been made a strong defensive point, as has also Sakkar—the city on the Indus where the railroad crosses to the westward. A number of posts along the earlier frontier line farther east are still maintained; others have been abandoned. The scheme of defense has led to the construction of railroads for military purposes, one of which extends to New Chaman, the farthest outpost on the Afghan frontier. These lines now make it possible quickly and easily to transport the soldiers to the different frontier strongholds.

The threatening approach of the Russians to the Indian frontier has established an excuse for the British to maintain a large army. The experience of the Sepoy rebellion has led them to increase the proportion which the British troops hold to the total military force, the intention being that the latter shall constitute one-third of the total number, and that the artillery shall be almost wholly British. The native soldiers are drawn largely from a few tribes, such as the Sikhs, Gurkhas, Rajputs, and Jats, who are the warrior races of the country and are much more efficient as soldiers than are the masses of the population. Class distinctions are recognized, and the different units in the army organization are composed of homogeneous elements. Through the improvement of sanitary conditions, and the exercise of greater caution in locating British soldiers, fatalities are of much less frequent occurrence than formerly. The native states still maintain military forces, but the British have succeeded in their effort to have their number reduced and brought more or less under their own control. For a statement concerning the organization and statistics of the army, see UNITED KINGDOM, *Army*.

Weights and Measures. The unit of weight commonly used is the maund, but it varies greatly in amount, being equivalent to 82 2/7 pounds avoirdupois in Bengal, only about 28 pounds in Bombay, and 25 pounds in Madras. The tola, a small unit, is equivalent to 180 grains. In Bengal there is a unit of measure called the gaz, equivalent to 36 inches. An Act was passed in 1871 to establish a uniform decimal system of weights and measures, but it has never gone into operation.

Population. India is one of the most densely populated countries, containing between one-fifth and one-sixth of the estimated population of the world. In 1911 the number of inhabitants per square mile was 175, as against 27.14 for the United States. The population is most unevenly distributed, nearly two-fifths being found in the valley of the Ganges. As shown in the table, the density is greatest in the Province of Bengal, 578 per square mile, and in Behar, 561. The density of the population corresponds in a general way to the capacity of the different regions to support life, yet there are noteworthy exceptions, as in Assam and Lower Burma, each of which could easily support a much more numerous population than it now does. In most districts the population presses closely upon the limits of the means of subsistence, and cannot increase greatly so long as agriculture continues to be almost the sole dependence. There has been generally an increase, and in many places a very marked increase, of population since the British took possession. Prior to that time numerous wars, together with famine, plague, and pestilence, tended to check augmentation. The instability of the government discouraged industrial enterprise, and much land possible to cultivate was left waste. Under British protection such land has been largely reclaimed, and the productive capacity of the country greatly increased.

The first attempt of the British to secure a complete census was made in 1872, when the total population was estimated to be 240,931,000. The returns for certain regions were only estimated, and were generally rendered uncertain through the lack of confidence on the part of the natives in the purpose of the government. In subsequent enumerations there have been

greater confidence on the part of the people and a corresponding increase in the accuracy of the returns. The total population for 1901 was 294,361,056; 1911, 315,156,396; 1921, 319,075,132. It should be remembered that certain additions of territory have augmented slightly this increase. The gain during the decade 1891–1901 was 4.7 per cent in the provinces, while the states showed a decrease of 5 per cent. The gain in the provinces of the last decade was 5.5 per cent; the population of the native states increased 12.9 per cent, including the new territory. Decreases were shown chiefly in the Punjab. The contrast shown above between one period and the other and between one region and another is largely attributable to the variable agricultural conditions.

The following is a table of the area and population of India and its dependencies:

	Area in square miles	1911	1901
Provinces (total)	1,093,074	244,267,542	231,605,940
Ajmer-Merwara	2,711	501,395	476,912
Andamans and Nicobars	3,143	26,459	24,649
Assam	53,015	6,713,635	5,841,878
Baluchistan	54,228	414,412	382,106
Bengal	78,699	45,483,077	42,141,477
Behar and Orissa	83,181	34,490,084	33,242,783
Bombay	123,059	19,672,642	18,559,650
Burma	230,839	12,115,217	10,490,624
Central Provinces and Berar	99,823	13,916,308	11,971,452
Coorg	1,582	174,976	180,607
Delhi *	557	391,828	.....
Madras	142,330	41,405,404	38,229,654
Northwest Frontier Province	13,418	2,196,933	2,041,534
Punjab (including Delhi)	99,779	19,974,956	20,330,337
United Provinces of Agra and Oudh	107,267	47,182,044	47,692,277
Native States and Agencies † (total)	709,583	70,888,854	62,755,116
Assam State	8,456	346,222	284,465
Baluchistan States	80,410	420,291	428,640
Baroda State	8,182	2,032,798	1,952,692
Bengal States	5,393	822,565	740,290
Behar and Orissa States	28,648	3,945,209	3,314,474
Bombay States	63,864	7,411,675	6,908,559
Central India Agency	77,367	9,356,980	8,497,805
Central Provinces States	31,174	2,117,002	1,631,140
Hyderabad State	82,698	13,374,676	11,141,142
Kashmir State	84,432	3,158,126	2,905,578
Madras States	10,549	4,811,841	4,188,086
Mysore State	29,475	5,806,193	5,539,399
Northwest Frontier Agencies	25,500	1,622,094	83,962
Punjab States	36,551	4,212,794	4,424,398
Rajputana Agency	128,987	10,530,432	9,853,366
Sikkim State	2,818	87,920	59,014
United Provinces States	5,079	832,036	802,097
Grand total	1,802,657	315,156,396	294,361,056

* Constituted as a separate province Oct. 1, 1912, formerly part of the Punjab.

† See article INDIA, NATIVE STATES OF.

Aden, on the Arabian coast, with an Arabian protectorate embracing 15,500 square miles, and Socotra, a dependency of Aden, are officially included within the Empire of India.

A striking characteristic of the population is that it is so largely rural. Estimates show that about nine-tenths of the total belong to this class. This is true of even the most densely populated regions. The largest city in the most densely populated division of Bengal (Patna) has but 136,000 inhabitants. It must be understood, however, that the rural population is everywhere gathered in villages which may contain only a few families or may number thousands. The country had not many large cities until the period of commercial development brought about by the British. Commerce has occasioned an immense growth in Calcutta and Bombay, but except these cities Madras and Hyderabad alone exceed half a million each. (See table below.) Another peculiarity is the large proportion of males compared with European countries. The great privacy to which the females are subjected, particularly among the Mohammedans, and the aversion to intrusion on their domestic privacy, may serve partly to account for this discrepancy. Statistics for famine districts show that in these regions there is a greater decrease in the male population than the female. It is generally accepted that women withstand the privations of famine better than men.

POPULATION OF THE LARGEST CITIES (INCLUDING IN MOST CASES CANTONMENTS)

CITIES	Total population in	
	1901	1911
Calcutta and suburbs	1,106,738	1,222,313
Bombay City	776,006	979,445
Madras	509,346	518,660
Hyderabad	448,466	500,623
Rangoon	234,881	293,316
Lucknow	264,049	259,798
Delhi	208,575	232,837
Lahore	202,964	228,687
Ahmedabad	185,889	216,777
Benares	209,331	203,804
Bangalore	159,046	189,485
Agra	188,022	185,449
Cawnpore	197,170	178,557
Allahabad	172,032	171,697
Poona	153,320	158,856
Amritsar	162,548	152,756
Karachi	116,663	151,903
Mandalay	183,816	138,299
Jaipur	160,167	137,098
Patna	134,785	136,153

Education. Education on the part of England in India has been carried on in the face of many serious obstacles and under complex conditions peculiar to the country. Social, religious, and racial distinctions, solidified in the system of caste, were so thoroughly interwoven with the whole of the life that they circumscribed the scope and modified the methods of English instruction. British education has never had to deal in India with the implanting of Western culture on an Oriental people having no culture of their own, but with the superimposing of one system of culture upon another more philosophically profound in its sphere, and upon a people who cherished an educational lore that antedated by far the one offered them in its stead. A system of education such as it was and restricted to the sanctioned castes—chiefly the Brahman—had never been wanting in India. When the English began to introduce the new system, a bitter dispute arose as to how much recognition should be given this ancient and native learning, e.g., whether the English classics should supplant the Sanskrit and Arabic, and whether the English or the vernacular should be used as a medium of instruction. These questions were finally decided in favor of European as against Oriental knowledge, and in favor of the vernacular as a medium, though English became prominent in advanced instruction, and generous provisions were made to bring it within reach of all who desired it.

This system, which was finally adopted and which in the main continues to-day, was outlined by Lord Halifax in 1854. An investigating commission, reporting in 1883, approved the system, but favored emphasizing certain features, such as the encouragement of native schools and of primary and female education, to the end that the masses might share more liberally in the benefits of learning. Religious instruction has never been permitted in the state schools—a policy different from that pursued by the English government in the schools of England, and which has generally been opposed by the clerical and missionary interests. At the same time the state advances financial aid to missionary schools without discrimination as to sect and endeavors to avoid competition with them by not establishing schools where the missionary schools already provide adequate facilities. Both missionary and state schools are under the supervision of state inspectors and must conform to certain regulations. Grants in aid consist of salary grants, results' grants, building grants, etc. The state educational system is complete in scope, including primary, secondary, and collegiate instruction, and is systematically organized and administered. Normal schools are maintained in every province. There are five universities—Calcutta, Madras, Bombay, the Punjab, and Allahabad. They consist of examining bodies only, but have a large number of affiliated colleges. The number of persons receiving instruction has greatly increased during the past half century. The field of education is, however, limited. The attendance is largely from the middle classes, especially in the state schools, and while the missionaries reach a larger proportion from the lower castes, the entire number is small in comparison with the number of persons to whom opportunities for education never come.

Two criticisms in particular have been urged against the present system. The first is the relative overemphasis of higher education. This emphasis has been in accordance with the "filtering down theory," under which it was thought that the masses could be reached best through the agency of a highly educated native class. This theory in practice, however, leaves the masses untouched. The other criticism is that too much attention is given to classical and not enough to industrial instruction, and that accordingly the pupils are not fitted to take an active part in the industrial transformation which the country needs.

In 1911–12 there were 2,245,468 pupils in public institutions under public management, 3,892,775 pupils in public institutions under private management (aided and unaided), and 657,728 in private institutions. Of these 4116 were in British Baluchistan. Of the total 6,791,855 in India proper, only 953,989 were females. The average daily attendance represents about 77 per cent of the total number of pupils, but the relation of the average attendance to the total enrollment differs greatly in the different provinces. The grand total of all pupils in public and private institutions increased from 3,692,000 in 1890 to 6,795,971 in 1912. Native Christian pupils numbered 197,481, Hindu 4,406,983, Mohammedan 1,562,007, Europeans and Eurasians, 34,958, and others (mainly Buddhists), 600,254 (data for March 31, 1912). In public institutions there were over 95 per cent of the pupils studying the vernacular language; the percentage of those studying the classical languages and the English language was small. Nearly 28 per cent of the proceeds used for education was derived from fees, the remainder being divided between provincial, local, and municipal funds and other sources. The total expenditure on public instruction increased gradually from £2,210,563 in 1894–95 to £5,250,922 in 1911–12.

Important changes of educational policy in 1913, apart from increased grants to elementary schools, were foreshadowed with respect to the universities. It was officially promised that a university at Dacca, with 11 constituent, residential, and teaching colleges, is to be organized as a type intended to supersede the existing universities, which consist of affiliated, nonresident examining colleges. This change would be an approximation to the lines on which Oxford and Cambridge universities are organized. Progress was also made in the work of giving native educational institutions of importance, such as the Mohammedan College at Aligarh, a university standing, and the establishing of universities also at Benares, Rangoon, Patna, and other places was discussed. In these attempts any design of interfering with religious prejudices has been entirely excluded.

RELIGION

From the earliest times India has been a land of numerous religions, and the creeds professed there to-day are almost as great in number as they are varied in spirit and character. The majority of the people acknowledge Hinduism or Brahmanism (q.v.) as their faith. In the census of 1911 their number is given as over 217,000,000. Next in proportion, claiming about a third of this number, is Mohammedanism, which was introduced into India in the eleventh century and spread with great rapidity. Its adherents claim no less than 66,000,000 souls throughout India, their numbers being largest in the north. Together these religions make up the faith of approximately 90 per cent of the entire population. The number of Buddhists is given at over 10,000,000; they are nearly all inhabitants of Burma. Statistics show that the number of nature worshipers, who are roughly classed under the head of animistic, is over 10,000,000, while the Sikh religion is professed by over 3,000,000 individuals. Besides these there is a large representation of Jains (over 1,000,000) and a scattering number of Parsis (about 100,000). The spread of Christianity among the natives has been extensive, for the number is considerably above 3,000,000 souls. There are nearly 21,000 Jews. Separate articles will be found devoted to the most important branches of Indian religions. (See BRAHMANISM; BUDDHISM; HINDUISM; JAINISM; MOHAMMEDANISM; PARSIS; SIKHS.) The results of the religious survey of India in the census of 1911 present the statistics on page 74. The first table is itemized by provinces for British India, with totals for native states and agencies. The second is for the summary of the Christian population.

For convenience of treatment, the religious development of India may be divided into the following periods: first, the Vedic era, or earliest religious beliefs of the Aryan Hindus; second, Brahmanism proper, or the faith incul-

cated by the priests in the religious books called Brahmanas, and in the philosophical Upanishads (q.v.); third, the period of the two great religious reforms, Buddhism and Jainism (q.v.), works known under the name of *Puranas* (see PURANA) and *Tantras* (see TANTRA); their commentaries and sectarian literature; the material for the developments after 1500 B.C. must be

ADMINISTRATIONS, PROVINCES	Hindus	Sikhs	Jains	Buddhists	Parsis	Mohammedans	Christians	Animists	Total *
Ajmer-Merwara	389,436	922	20,302	.....	262	81,035	5,432	3,979	501,395
Andamans and Nicobars	9,527	455	.....	1,597	.....	4,580	566	9,711	26,459
Assam	3,637,828	750	2,398	10,506	5	1,886,528	66,430	1,109,187	6,713,635
Baluchistan	26,511	5,290	10	14	166	377,333	5,030	.....	414,412
Bengal Presidency	20,380,700	2,217	6,206	240,854	610	23,989,719	129,518	730,182	45,483,077
Behar and Orissa	28,365,235	2,177	4,440	496	35	3,666,861	229,825	2,220,526	34,490,084
Bombay (incl. Sind and Aden)	14,922,965	11,887	212,309	691	80,980	4,024,485	233,246	170,355	19,672,642
Burma	389,679	6,693	495	10,384,579	300	420,777	210,081	701,473	12,115,217
Central Provinces and Berar	11,497,460	2,201	70,258	9	1,728	564,909	34,697	1,744,921	13,916,308
Coorg	138,922	.....	97	.....	34	13,143	3,553	19,227	174,976
Madras	36,806,978	7	26,995	693	488	2,740,408	1,191,259	638,463	41,405,404
Northwest Frontier Province†	119,942	30,345	4	.....	49	2,039,994	6,585	.....	2,196,933
Punjab	6,682,818	2,093,804	39,637	4,190	626	10,955,721	198,106	.....	19,974,956
United Provinces of Agra and Oudh	40,253,433	15,160	75,427	780	872	6,658,373	177,949	.....	47,182,044
Total, Provinces	163,621,434	2,171,903	458,578	10,644,409	86,155	57,423,866	2,492,277	7,348,024	244,267,542
Total, Native States	53,965,466	842,558	789,604	77,040	13,945	9,199,546	1,383,919	2,947,144	69,256,439
Grand total, all India	217,586,900	3,014,466	1,248,182	10,721,449	100,100	66,623,412	3,876,196	10,295,168	313,523,981*

* Jews, numbering 20,980, and minor sects, numbering 37,128, are included in this column.
† The religion of 1,608,556 people in the Northwest Frontier Province was not recorded.

both of which were a reaction against decadent Brahmanism; fourth, the newer Hinduism or Brahmanic counterreform, a wider and more catholic faith which sprang out of the schismatic reform movement; and, finally, the later

CHRISTIANS ACCORDING TO RACE AND DENOMINATION FOR ALL INDIA

DENOMINATIONS	Europeans	Anglo-Indian (Eurasians)	Natives	Total
Anglican	125,392	34,553	332,372	492,317
Arminian	1,135	30	33	1,198
Baptist	2,817	2,239	331,540	336,596
Congregationalist	735	289	134,240	135,264
Greek	522	17	1,130	1,669
Lutheran	1,469	188	216,842	218,499
Methodist	6,904	2,573	162,277	171,754
Presbyterian	15,149	1,911	164,068	181,128
Quaker	45	6	1,194	1,245
Roman Catholic	40,120	57,024	1,393,720	1,490,864
Romo-Syrian	2	6	413,134	413,142
Syrian	5	....	315,157	315,162
Salvationist	189	19	52,199	52,407
Total	194,484	98,855	3,517,906	3,811,245
Grand total, including other denominations and those not returned	....	....	....	3,876,196

Hindu sectarian outgrowths and the tendencies of the popular faiths. The *Rig-Veda* and *Atharva-Veda* represent the literature of the earliest period; the *Yajur-Veda* is nearer to the second religious phase, or the Brahmanism of the priests; the sacred books of the Buddhistic and Jainistic reformations are written respectively in Pali (q.v.) and Prakrit (q.v.); again, the great Sanskrit epic poems of the *Mahābhārata* and the *Rāmāyana* represent both the purer Brahmanic stage and the later sectarian tendencies; for the latter our chief source of information is that class of mythological gathered from various sources. With reference to the time of these eras we can only say in a general way that the Vedic period runs from a very early period down to about 1000 B.C. or a couple of centuries afterward, and merges into the Brahmanic age, which closes perhaps about 500 B.C. The age of Buddhism was from about 500 B.C. to 500 A.D., and the period of epic Hinduism, according to Hopkins, covers about the same centuries. From 500 to 1500 A.D. is the era of Brahmanic counterreforms and of sectarianism, while since that time unifying tendencies have been more operative than ever before. It is necessary at the outset, however, to guard the reader against attempting to connect dates with the earlier of these periods. It has not been uncommon for writers on this subject to assign thousands of years before the Christian era as the starting points of various phases of Hindu antiquity; others, more cautious, marked the beginnings of certain divisions of Vedic works with 1200, 1000, 800, and 600 years B.C. The truth is that, since Hindu literature itself is almost without known dates, owing either to the peculiar organization of the Hindu mind or to the convulsions of Indian history, the present condition of Sanskrit philology does not afford the scholar the requisite resources for embarking with any chance of success in such chronological speculations. The question of Hindu chronology will be more particularly considered in the article VEDA. In the meantime the utmost stretch of assumption which in the present condition of Sanskrit philology it is permitted to make is that the latest writings of the Vedic class are not more recent than the second century before Christ. A like uncertainty hangs over the period at which the two great epic poems of India were composed, although there is reason to surmise that the lower limits of that period did not reach beyond the beginning of the Christian era. The Puranic period, on the other hand, scholars are gen-

HINDU DEITIES

Krishna.

Indra.

Lakshmī.

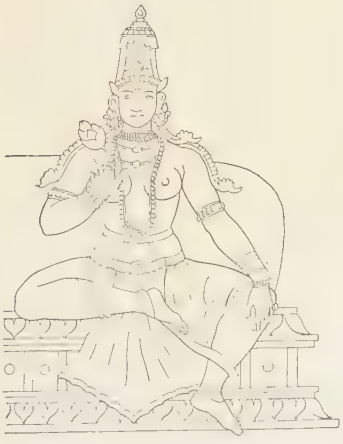
Ganēśa.

Agni.

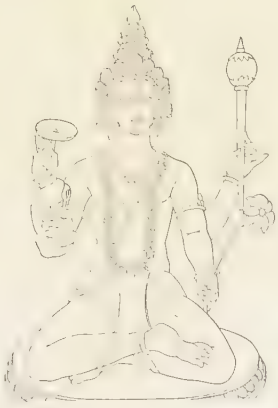
Hanumān.

Brahmā.

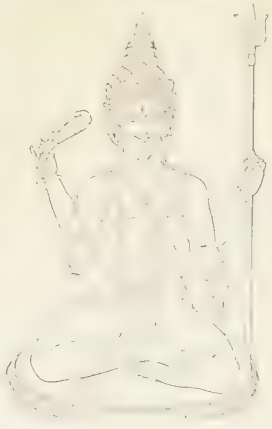
Brahmā.



Pārvatī.



Vishnu



Śiva.

erally agreed to regard as corresponding with part of our mediæval history, or roughly from 500 to 1500 A.D., although the material in these writings is often much older in its content.

Vedic Religion. If the Rig-Veda—the oldest of the Vedas, and one of the oldest literary documents in existence—coincided with the beginning of Hindu civilization, the popular creed of the Hindus, as depicted in some of its hymns, would reveal not only the original creed of this nation, but throw a strong light on the original religion of humanity itself. Unhappily, however, the imagination, indulging in such an hypothesis, would have little foundation to work on. There are, of course, numerous traces in the Rig-Veda of survivals of earlier animistic beliefs, of spiritism, fetishism, and ancestor worship; but the Hindus, as depicted in these hymns, are far removed from the starting point of human society; they may, in fact, fairly claim to be ranked among those already civilized communities experienced in arts, defending their homes and property in organized warfare, acquainted even with many vices which are found only in an advanced condition of artificial life. Yet, in examining the ideas expressed in the greatest number of the Rig-Vedic hymns, it cannot be denied that they are neither ideas engendered by an imagination artificially influenced nor such as have made a compromise with philosophy. The Hindu of these hymns is essentially engrossed by the might of the elements. The powers which turn his awe into pious subjection and veneration are: *Agni* (q.v.), the fire of the sun and lightning; *Indra* (q.v.), the god of the storm and the thunder; the *Maruts* (q.v.), or winds; *Surya* (q.v.), the sun; *Ushas* (q.v.), the dawn, whose hymns are among the most beautiful; and various kindred manifestations of the luminous bodies, and nature in general. He invokes them, not as representatives of a superior being, before whom the human soul professes its humility, nor as superior beings themselves, which may reveal to his searching mind the mysteries of creation or eternity, but because he wants their assistance against enemies—because he wishes to obtain from them rain, food, cattle, health, and other boons. He complains to them of his troubles, and reminds them of the wonderful deeds they performed of yore, to coax them, as it were, into acquiescence and friendly help; in fact, he seeks them more for his material than for his spiritual welfare. What we should call the ethical side is less pronounced. Sin and evil, indeed, are often adverted to, and the gods are praised because they destroy sinners and evildoers; but one would err in associating with these words our notions of sin or wrong. A sinner, in these hymns, is rather a man who does not address praises to those elementary deities, or who does not gratify them with the oblations they receive at the hands of the believer. He is the foe, the robber, the demon—in short, the borderer infesting the territory of the "pious" man. The latter, in his turn, may injure and kill, but, in adoring Agni, Indra, and their kin, he is satisfied that he can commit no evil act. Yet some of the hymns, especially those addressed to the supersensuous, transcendental god *Varuna* (q.v.), the guardian of order and right, seem to imply the strongest sense of moral obligation and of sin as we understand the word. On the whole, it may also be said that the internal condition of the Hindu community, the features of which may be gathered from the hymns, seems to bespeak union and brotherhood among its members; and the absence, in general, of hymns which appeal to the gods for the suppression of internal dissensions or public vices, bears testimony apparently to the good moral condition of the people whose wants are recorded in these songs.

It may be imagined that the worship of elementary beings like those we have mentioned was originally a simple and harmless one. It is true that the sacrifice of sheep and goats, bulls, and even horses, was known, but it was not general. By far the greatest number of the Rig-Veda hymns know of but one sort of offering made to these gods; it consists of the juice of the soma (q.v.), or moon plant, which, pressed out and fermented, was an exhilarating and inebriating beverage, and for this reason, probably, was deemed to invigorate the gods and to increase their beneficial potency. It was presented to them in ladles or sprinkled on the sacred Kusa grass. Clarified butter, too, poured on the fire, is mentioned in several hymns as an oblation agreeable to the gods, and it may have belonged to the primitive stage of the Vedic worship. There were no temples of the divinities and in early times no images. The altar, if used, was very simple. The gods easily gathered from the atmospheric region roundabout.

There is a class of hymns, however, to be found in the Rig-Veda which already depart materially from the simplicity of the conceptions we are referring to. In these the instinctive utterance of feeling makes room for the language of speculation; the allegories of poetry yield to the mysticism of the reflecting mind; and, the mysteries of nature becoming more keenly felt, the circle of beings which overawe the popular mind becomes enlarged. Thus, the objects by which Indra, Agni, and the other deities are propitiated become gods themselves; soma, especially, the moon plant, with its juice, is invoked as the bestower of all worldly boons. The animal sacrifice, the properties of which seem to be more mysterious than the offerings of soma or of clarified butter, is added to the original rites. Mystical allusions and symbolic expressions begin likewise to crop out in the later portions of the Veda, revealing the fact that the Hindu mind was no longer satisfied with the adoration of the elementary or natural powers, and giving evidence that the religion was beginning to deal with the problem of the mysteries of creation. In the tenth and last book of the Rig-Veda, speculations are found with regard to the origin of the universe, the whence and the whither, the who and the what. As soon as the problem implied by hymns like these was raised in the minds of the Hindus, Hinduism must have ceased to be the worship of only elementary powers. Henceforward, therefore, we see it either struggling to reconcile the latter with the idea of one supreme being or to emancipate the inquiry into the principle of creation from the elementary religion recorded in the oldest portion of Vedic poetry.

Brahmanism Proper. The development from the older into the newer, from the elemental and natural into the artificial, ritualistic, and philosophic, or from the early Rig-Veda stage of religion into Brahmanism, may be traced through the *Yajur-Veda*, or book of knowledge of the sacrifice and the ritual. The priestly

power of the Brahmans is supreme in this sacred book, and in the Yajur-Veda may be seen the beginnings of Brahmanism, as shown in its fuller development in the branch *Brahmanas* (see VEDA) and in the philosophical writings termed *Upanishad.* (See UPANISHAD.) In the Brahmanas—a word of the neuter gender, and not to be confounded with the similar word in the masculine gender, denoting the first Hindu caste—the mystical allegories which now and then appear in what we have called the second class of Vedic hymns, are not only developed to a considerable extent, but gradually brought into a systematic form. Epithets given by the Rig-Veda poets to the elementary gods are made the bases of legends, assuming the shape of historical narratives. The simple and primitive worship mentioned in the hymns becomes highly complex and artificial. A ponderous ritual, founded on those legends and supported by a far more advanced condition of society, is brought into a regular system, which requires a special class of priests to keep it in a proper working order. Some of the Vedic hymns seem to belong already to the beginning of this period of the Brahmana worship, for in the second book of the Rig-Veda several such priests are enumerated in reference to the adoration of Agni, the god of fire; but the full contingent of 16 priests, such as is required for the celebration of a great sacrifice, does not make its appearance before the composition of the Brahmanas and later Vedas. Yet, however wild many of these legends are, however distant they become from the earlier veneration of the elementary powers of nature, and however much this ritual betrays the gradual development of the institution of castes—unknown to the hymns of the Rig-Veda—there are still two features in them which mark a progress of the religious mind of ancient India. While the poets of the Rig-Veda are chiefly concerned in glorifying the visible manifestations of the elementary gods, in the Brahmanas their ethical qualities are put forward for imitation and praise. Truth and untruth, right and wrong—in the moral sense which these words imply—are not seldom emphasized in the description of the battles fought between gods and demons; and several rites themselves are described as symbolical representations of these and similar qualities of the good and evil beings, worshiped or abhorred. A second feature is the tendency, in these Brahmanas, to determine the rank of the gods, and, as a consequence, to give prominence to one special god among the rest; whereas in the old Vedic poetry, though we may discover a predilection of the poets to bestow more praise, e.g., on Indra and Agni than on other gods, yet we find no intention on their part to raise any of them to a supreme rank. Thus, in some Brahmanas, Indra, the god of the firmament, is endowed with the dignity of a ruler of the gods; in others, the sun receives the attributes of superiority. This is no real solution of the momentous problem hinted at in the Vedic hymns, but it is a semblance of it. There the poet asks "whence this varied world arose"; here the priest answers that "one god is more elevated than the rest," and he is satisfied with regulating the detail of the soma and animal sacrifice according to the rank which he assigns to his deities. See BRAHMANISM.

A real answer to this great question is attempted, however, by the theologians who explained the "mysterious doctrine," held in the utmost reverence by all Hindus, and laid down in the Upanishad (q.v.). It must suffice here to state that the object of these important works is to explain not only the process of creation, but the nature of a supreme being and its relation to the human soul. In the Upanishads, Agni, Indra, Vayu, and the other deities of the Vedic hymns become symbols to assist the mind in its attempt to understand the true nature of the one absolute being, and the manner in which this being manifests itself in its worldly form. The human soul itself is of the same nature as this supreme or great soul; its ultimate destination is reunion with the supreme soul, and the means of attaining that end is not the performance of sacrificial rites, but the comprehension of its own self and of the great soul. The doctrine which at a later period became the foundation of the creed of the educated—the doctrine that the supreme soul, or (the neuter) Brahman, is the only reality, and that the world has a claim to be noticed only in so far as it emanated from this being, is already clearly laid down in these Upanishads, though the language in which it is expressed still adapts itself to the legendary and allegorical style which characterizes the Brahmana portion of the Vedas. The Upanishads became thus the basis of the enlightened faith of India. They are not a system of philosophy, but they contain all the germs whence the three great systems of Hindu philosophy arose; and like the latter, while revealing the struggle of the Hindu mind to comprehend the one supreme being, they advance sufficiently far to express their belief in such a being, but at the same time acknowledge the inability of the human mind to understand its essence.

From the Brahmanic religion with its theology, its sacrifice, its stifling ritual, and widespread priestcraft, there was bound later to come a revolt. Premonitory symptoms of this are plainly to be seen in the Upanishads, which prepared the way for emancipation. The reform wave swept over India in the two great reactionary movements of Buddhism and Jainism. The character and extent of these reformatory movements are spoken of under special articles and need not be discussed here. The eastern part of India was the source from which they sprang, but Jainism gradually spread westward especially, and Buddhism expanded itself over other parts of India to Ceylon and far beyond the borders of Hindustan.

Hinduism. In spite of the reform movements the old Brahmanism was not destined to disappear. But it was forced to undergo changes which were largely due to the influence of the protesting faiths of Buddhism and Jainism. During the very time while they were flourishing it quietly but firmly held its own, was consciously or unconsciously being remodeled and adjusted to altered conditions and environments, and was gradually but surely changing into the newer Hinduism, with all that restoration meant. It is this changing Brahmanism and earlier Hinduism in its sectarian developments that is presented to us in the great Hindu epics.

The epic period of Hinduism is marked by a similar development of the same two creeds, the general features of which we have traced in the Vedic writings. The popular creed strives to find a centre round which to group its imaginary gods, whereas the philosophical creed finds

its expression in the groundworks of the Sankhya, Nyaya, and Vedanta systems of philosophy. In the former we find two gods in particular who are rising to the highest rank, Vishnu and Siva, the Vedic Rudra; for *Brahmā* (the masculine form of Brahman), though he was looked upon now and then as superior to both, gradually disappears and becomes merged into the philosophical *Brâhmă* (the neuter form of the same word), which is a further evolution of the great soul of the Upanishads. In the *Rāmāyaṇa* the superiority of Vishnu is admitted without dispute; in the great epos, the *Mahābhārata*, however, which, unlike the former epos, is the product of successive ages, there is an apparent rivalry between the claims of Vishnu and Siva to occupy the highest rank in the pantheon. It is one of the difficult problems of Sanskrit philology to unravel the chronological position of the various portions of this work, to lay bare its groundwork, and to show the gradual additions it received, which must be done before it will be possible to determine the successive formation of the legends which are the basis of classical Hindu mythology. A great deal has been done, however, and this much seems to be clear even already, that there was a predilection during this epic period for the supremacy of Vishnu, one of whose incarnations was the much-beloved Krishna (q.v.), and that the policy of incorporating rather than combating antagonistic creeds led more to a quiet admission than to a warm support of Siva's claims to the highest rank.

The philosophical creed of this period adds little to the fundamental notions contained in the Upanishads, but it frees itself from the legendary dross which still imparts to those works a deep tinge of mysticism. On the other hand, it conceives and develops the notion that the union of the individual soul with the supreme spirit may be aided by penances, such as peculiar modes of breathing, particular postures, protracted fasting, and the like; in short, by those practices which are systematized by the Yoga doctrine. The most remarkable epic work which inculcates this doctrine is the celebrated poem *Bhagavadgītā*, which has been wrongly considered by European writers as a pure Sankhya work, whereas Sankara, the great Hindu theologian who commented on it, and other native commentators after him, have proved that it is founded on the Yoga belief. The doctrine of the reunion of the individual soul with the supreme soul was necessarily founded on the assumption that the former must become free from all guilt affecting its purity before it can be remerged into the source whence it proceeded; and since one human life is apparently too short for enabling the soul to attain its accomplishment, the Hindu mind concluded that the soul, after the death of its temporary owner, had to be born again, in order to complete the work it had left undone in its previous existence, and that it must submit to the same fate until its task is fulfilled. This is the doctrine of metempsychosis (*saṃskāra*), which is a logical consequence of a system which holds the human soul to be of the same nature as that of an absolute God. The beginning of this doctrine may be discovered in some of the oldest Upanishads, but its development belongs to the epic time, where it pervades the legends and affects the social life of the nation. See METEMPSYCHOSIS.

Puranic Hinduism. The Puranic period, with its various cults, comprises the development of the newer Hinduism from about the sixth century of our era to the sixteenth century. The *Puranas* (see PURANA) and the *Tantras* (see TANTRA) represent this phase of the religion which succeeded epic Hinduism and supplanted Buddhism. The old Brahmanic vigor was not dead, but was ready to revive. In the eighth century Kumarila strengthened it on the ritualistic side, and the great Vedantist Sankara in the ninth century added to its power on the philosophic side. But the Puranic period of Hinduism was a period of decline, so far as the popular creed is concerned. Its pantheon is nominally the same as that of the epic period. Brahma, Vishnu, and Siva remain still at the head of its imaginary gods; but whereas the epic time is generally characterized by a friendly harmony between the higher occupants of the divine spheres, the Puranic period shows discord and destruction of the original ideas whence the epic gods arose. Brahma withdraws, in general, from the popular adoration, and leaves Vishnu and Siva to contest in the minds of their worshipers for the highest rank. The elementary principle which originally inhered in these deities is thus completely lost sight of by the followers of the Puranas. The legends of the epic poems relating to these gods become amplified and distorted according to the sectarian tendencies of the masses; and the divine element which still distinguishes these gods in the *Rāmāyaṇa* and *Mahābhārata* is now more and more mixed up with worldly concerns and intersected with historical events, distorted in their turn to suit individual interests. Of the ideas implied by the Vedic rites, scarcely a trace is visible in the Puranas and Tantras, which are the textbooks of this creed. In short, the unbridled imagination which pervades these works is neither pleasing from a poetical nor elevating from a philosophical point of view. Some Puranas, it is true—e.g., the *Bhāgavata*—make in some sense an exception to this aberration of original Hinduism; but they are a compromise between the popular and the Vedantic creed, which henceforward remains the creed of the educated and intelligent. They do not affect the worship of the masses as practiced by the various sects; and this worship itself, whether harmless, as with the worshipers of Vishnu, or offensive, as with the adorers of Siva and his wife Durga, is but an empty ceremonial, which here and there may remind one of the symbolical worship of the Vedic Hindu, but, as a whole, has no connection whatever with the Vedic Scriptures, on which it pretends to rest. It is this creed which with further deteriorations, caused by the lapse of centuries, is still the main religion of the masses in India. One of these causes of deterioration is the Yoga (q.v.), or belief in a supernatural state which individuals may enter by going through certain practices. Its most authoritative literary exposition is the *Yōga-sūtra* of Patanjali (q.v.).

The philosophical creed of this period, and the creed which is still preserved by the educated classes, is that derived from the tenets of the Vedanta philosophy. It is based on the belief in one supreme being, which imagination and speculation endeavor to invest with all the perfections conceivable by the human mind, but the true nature of which is, nevertheless, declared to be beyond the reach of thought, and

which on this ground is defined as not possessing any of the qualities by which the human mind is able to comprehend intellectual or material entity. See VEDANTA.

Hindu Sects and Modern Popular Faith. Under this designation may be comprised the sects which arose during the last period of Hinduism and the beliefs which are common to the Hindus to-day. These believers suppose that their religion is countenanced by the Vedas, but its source in reality is to be found in the Puranas and Tantras. They have in common a general sort of recognition of the Hindu trinity or triad—Brahma the creator, Vishnu the preserver, and Siva the destroyer—but in practice they are either Vishnuites or Sivites; for Brahma is little more than an abstraction and plays a very subordinate part to-day contrasted with his rivals. Sivaism may loosely be said to be more popular in the northeast and south of India; Vishnuism rather in the northwest, but also in the south. The wives or female energies of these two gods also receive adoration. (See VAISHNAVAS; SAIVAS; SAKTAS.) Common to them all are certain acts of worship, reverence for the cow, the offering of votive gifts, adoration in the temples, and the performance of special ceremonies, such as the fulfillment of vows by going on religious pilgrimages for the purpose of acquiring merit. The caste system also has a strongly religious bearing, although it tends to break down through association with Occidentals. (See CASTE.) Besides the great sects there are likewise some of limited extent and total insignificance, such as the worshipers of Agni, the god of fire; of Surya, the sun god; of Ganesa, the god of wisdom and remover of obstacles. Some of these latter sects were looked upon as partly unorthodox, partly heterodox, as early as the ninth and fourteenth centuries of our era. Regarding the sect of the Sikhs, which arose in the fifteenth century, reference may be made to the special article on that topic. Reform movements in India have been familiar since the early days of Buddhism and Jainism, down through Sikhism to the modern times. In the nineteenth century a special religious agitation was set on foot by Rammohun Roy (1774–1833) (q.v.), which resulted in the establishment of the Brahmo-Somaj (q.v.), a sort of national church of the Hindus. The movement has extended widely throughout India, and, like the Arya-Somaj, it is eclectic in its tendencies, seeking to combine the teachings of the Veda with the tenets of the Bible and the sacred books of other faiths. There are also in India some 20,000 believers in the Jewish religion, and allusion has been made above to the presence of some 100,000 Parsis, who made their home in India more than 1000 years ago. These topics are treated under separate headings. See also HINDUISM.

Christianity in India. With reference to the spread of Christianity in Hindustan, as mentioned above, it may be stated that India was one of the earliest fields of Christian missions. Tradition assigns it as the scene of the Apostle Thomas's labors and martyrdom. Whether this was the case or not, we find a Syrian church planted in Malabar in south India, which undoubtedly had a very early origin. The colonization of Goa by the Portuguese was followed by Franciscan and Dominican propaganda. The Jesuit missionaries, from the middle of the sixteenth century onward, had a large success in India. (See FRANCIS XAVIER.) The appointment by the popes of Vicars Apostolic led to a long conflict with the Portuguese clergy, which only subsided after the Concordat of 1886. The earliest Protestant missionaries in India came from Holland and Denmark. With the latter mission the eminent Schwartz was connected. England's first missionary effort was made by the Society for the Propagation of the Gospel, and the Christian Knowledge Society, which commenced in the beginning of the eighteenth century by aiding the Danish mission already established in south India. Subsequently the East India Company adopted the policy of excluding missionaries altogether from their territories; but since the beginning of the last century, when these restrictions were withdrawn, great activity has been manifested, in which all denominations are represented. In the proclamation to the princes, chiefs, and people of India, read in the principal cities, on Nov. 1, 1858, it was declared "that none shall be in any wise favored, none molested or disquieted, by reason of their religious faith and observances, but that all shall alike enjoy the equal and impartial protection of the law." The fullest toleration in matters of faith is the rule throughout British India. Fanaticism only, as when it sought to enforce the burning of widows or suttee (q.v.) or to offer human beings in sacrifice, is curbed by the ruling power. There is no exclusively endowed state church, but the government continues to pay the state grants made to Hindu temples and to Mohammedan mosques. Clergymen of the Church of England, the Church of Scotland, and the Roman Catholic church, are retained on the government establishment as civil or military chaplains. There are Church of England bishops at Calcutta, Madras, and Bombay. The number of Christians in India in 1913 was given in the census as 3,876,196, of whom 1,490,864 were Roman Catholics. The members of the Church of England numbered 492,317. The rest belonged chiefly to Protestant denominations.

For a study of the entire religious development of the Hindus, consult: Wilkins, *Modern Hinduism* (2d ed., London, 1887); Barth, *Religions of India* (3d ed., ib., 1890); Hopkins, *Religions of India* (Boston, 1895); Hardy, *Indische Religionsgeschichte* (Leipzig, 1898); Monier-Williams, *Hinduism*, in the series of "Non-Christian Religious Systems" (London, 1900); Winternitz, *Geschichte der indischen Litteratur* (Leipzig, 1908–); Moore, *History of Religions*, vol. i (New York, 1913).

Archæological Remains. The antiquities and the archæological remains in India are largely of an architectural character. (See INDIAN ART.) From the prehistoric age there are no monuments surviving beyond possibly some cairns and cromlechs; and the same is true of the Vedic period of Aryan India, because the structures were mostly of wood or of destructible material. Indian archæology begins practically with the age of Buddhism and Jainism. Connected with these faiths there are characteristic shrines, temples, and monuments in various parts of India, dating from 250 B.C. onward. Most famous from the standpoint of archæological research are the great cave at Karli, and also the caves at Ajanta, Ellora, and Lena, constructed with their assembly halls or churches (*chaityas*) and their monastic cells

(*vihāras*). Of like interest are the huge mounds or tumuli (*stūpas, tōpes*), like that at Sanchi, near Bhilsa, erected to contain in a shrine (*dāgoba*) some relic of Buddha. The balustrades about these structures are well known because of their artistic value and because of the light they throw on scenes connected with Buddhist life. (See GAUTAMA BUDDHA; JATAKA.) Of particular antiquarian interest, likewise, are the various columns or shafts (*stambhas, lāts*), set up in various parts of India by King Aśoka (q.v.). They show evidence of Persian influence. The inscriptions on these, like his rock-cut edicts, are of special importance. Under a slightly different category, but of similar antiquarian interest, are the famous Gandhara sculptures, representing incidents in Buddha's life. The influence of Græco-Bactrian art is plainly evident in these. Of a much later date, but quite Hindu in character, are the cave temples of Elephanta (q.v.), near Bombay, with their sculptured figures of Brahma, Vishnu, and especially Siva. These may not, however, antedate the ninth century of our era. The remaining groups of antiquarian remains, chiefly architectural, are grouped under the head of Dravidian architecture, the Bengali and Chālukyan style of temple structure, and the artistic building of the era of Mohammedan rule. For details regarding these, consult: Fergusson, *History of Indian and Eastern Architecture* (London, 1876; new ed. rev. by Burgess, 1910); Le Bon, *Les monuments de l'Inde* (Paris, 1893); A. Grünwedel, *Buddhist Art in India* (London, 1901); Fanshawe, *Delhi Past and Present* (ib., 1908); E. B. Havell, *Indian Architecture . . . from the Mohammedan Invasion to the Present Day* (ib., 1913); Vincent Smith, *History of Fine Art in India* (Oxford, 1911). In 1897 arrangements were made in connection with the International Congress of Orientalists to establish an Association for Archæological Research and Exploration in India, and special archæological work under the supervision of the French government has since been carried on in Cambodia, besides the researches conducted by various scholars individually in India itself.

Language. With its hundreds of millions of inhabitants, there is as great a diversity of languages in India as there is variety in the peoples themselves. By far the larger majority, over 220,000,000, speak languages or dialects belonging to the Indo-Germanic group of tongues, and related, though perhaps not by direct descent, to the ancient Vedic dialect. This Indo-Aryan division is therefore first in importance, and three periods or stages may be recognized in its historical development. The earliest of these is sometimes called the Old Indic speech and includes the Vedic dialect, Pali, in the broad sense now given to this term, and the literary or classic Sanskrit. The second period embraces the Middle Indian Prakrits. (See PRAKRIT.) The third, termed New Indian, includes the modern Indian vernaculars, which are in the main descended from popular Prakrit dialects, and are spoken largely in the north, east, and central provinces of India. Under this designation are comprised Punjabi, Kaśmiri, and Sindhi, the speech of over 21,000,000 people, on the north and west; next, the Hindi, spoken by 80,000,000, and called Urdu or Hindustani when admixed with Persian and Arabic; again, Gujarati and Marathi, the chief languages of the Bombay Presidency, and claiming over 27,000,000 speakers; furthermore, Bengali, the vernacular of more than 44,000,000 individuals in the east, together with Uriya and Behari, likewise in eastern India; also Nepali, the language of Nepal, and Assami, still farther to the east. Separate articles regarding the characteristics of these various Indo-Aryan vernaculars will be found under the individual names. Among the non-Aryan languages the most important family is the Dravidian (q.v.), the tongue of some 56,000,000 people inhabiting the peninsular portion of India. The Kolarian or Munda branch numbers about 3,179,000 speakers, while the Tibeto-Burman family has more than thrice as many. The Khasi group (Assam) and the Mon-Annam and Shan families aggregate together over half a million speakers. Gypsy dialects are spoken by some 350,000 people. These figures are those of the 1901 census. In addition to this the division of Iranian languages (q.v.) is represented on the borders of Afghanistan and Baluchistan. The linguistic statistics of India include, moreover, the languages, like English, German, French, etc., which are used by Europeans resident in India, and similarly such other languages as may be used by various Asiatics living at the time in Hindustan. See INDIAN PEOPLES. In addition to the bibliographical references given under the various separate articles, consult: Beames, *Comparative Grammar of the Modern Aryan Languages of India* (London, 1872–79); Cust, *Modern Languages of the East Indies* (ib., 1878); Hoernle, *Comparative Grammar of the Gaudian Languages* (ib., 1880); Constable, *Hand-Atlas of India* (ib., 1893); Baines, "The Language Census of India," in the *Transactions of the Ninth International Congress of Orientalists* (ib., 1893); Grierson, *Linguistic Survey of India* (Calcutta, 1903 et seq.); P. Schmidt, *Grundzüge einer Lautlehre der Mon-Khmer Sprachen* (Vienna, 1906).

HISTORY

The early history of India is wrapped in legend. Only by references in native or in foreign writings and by inscriptions can the story of the ancient period be reconstructed. The Indian mind is essentially an unhistoric one. We have, indeed, many sovereigns mentioned and even whole dynasties given in the Puranas (see PURANA), the epics, and other Sanskrit writings; but of history, in the real sense of the word, there is practically none. The accounts which are given are so interwoven with myth and fancy that they have almost no value to the historian. Indian history falls roughly into three periods: the National or Hindu period (c.2000 B.C. to 1001 A.D.), the Mohammedan period (1001–1757 A.D.), and the period of the establishment of European dominion (1757–).

National or Hindu Period. The Aryans (q.v.) entered the Punjab perhaps as early as 2000 B.C. They came from the Iranian country, apparently by two routes, through the mountain passes in southern Afghanistan and by way of Chitral, and, gradually forcing their way east and south, expelled or subdued the aborigines, such as the Dravidians, and occupied the entire territory north of the Vindhya Mountains. There are but few historic allusions in the earliest part of this period, although the Rig-Veda (q.v.) mentions a battle of 10 kings against

Sudas, King of the Tritsu clan, evidently a tribal war, and contains a number of references to Aryan victories over the aboriginal tribes. The epics of the *Mahābhārata* and the *Rāmāyaṇa* contain legends of wars which must have been of much importance. (See ARMIES, *Ancient Armies*, Indian.) The former epic narrates almost as its main theme the strife between the Kurus and Panchalas, both on the upper Ganges, while the latter tells of the war waged by the Kosalas of Oudh against the demoniac armies of Lanka, supposed to be Ceylon. By the close of the period described in the former epic there were 10 great Hindu kingdoms: Magadha (South Behar), Anga (West Bengal), Vanga (East Bengal), Kalinga (Orissa), Avanti (Malwa), Saurashtra (Gujarat), and the kingdoms of the Andhras (Deccan), the Cholas (Coromandel), the Cheras (Malabar), and the Pandyas (extreme south). Of these Magadha became the chief before the dawn of authentic history in India. The earliest historic Indian date thus far known is 557 B.C., the reputed birth year of Buddha. Bimbisara (q.v.) of the Saisunagar dynasty began to rule soon after this (died 485 B.C.), and this line reigned until the early part of the fourth century. The invasion of Alexander the Great was to be the forerunner of a long series of inroads, which were to end 2000 years later in the final surrender of India to the West. The stay of Alexander in India was short (327 B.C.); but the Maurya king Chandragupta, called by the Greeks Sandracottus (q.v.), who brought all northern India under the sway of Magadha, entered into an alliance with the Greek ruler of Persia and Bactria, Seleucus Nicator, whose daughter he married, and to whose ambassador, Megasthenes (q.v.), we are indebted for our earliest non-Indian information on Hindustan. The capital of the Maurya kings was Pataliputra (Patna). The great Maurya Sandracottus was succeeded by his son Bindusara in 291 B.C., and his grandson, Aśoka (c.272–232 B.C.), is famous as the royal promulgator of Buddhism. A series of weak kings followed, and the foreign influence in India steadily gained strength. A Græco-Bactrian invasion was followed (100 B.C.) by a conquering raid of the Sakas, a mixture of Iranians and Greeks. These fell themselves under the sway of the Yue Chi (q.v.) tribes. The most famous Yue Chi ruler was Kanishka, a great protector of the Buddhists. The date of his reign is not generally agreed upon—Fleet placing his accession at 58 B.C., while Vincent Smith dates his reign 85–125 A.D. The Kushan kings of the Yue Chi entered into diplomatic relations with the Romans. Both the Kushan and the native central Indian dynasty of the Andhras were supplanted by the Guptas towards the end of the third century. The name of Chandragupta I (about 319) is one of the most important in this dynasty. He made his house supreme over practically all northern India, and his son, Samudragupta, was equally powerful. During the Gupta period the Hindus flourished in arts and in religion. The tradition which connects this revival of Sanskrit literature with a king of Ujjain named Vikramaditya has no historical foundation. About this time Chinese travelers, notably Fa-Hien (400), Hiouen-Thsang (643), and I-Tsing (671), came to India seeking for a knowledge of Buddha's teachings in their purity, and the records which they left form the only non-Indian information on Hindustan which we possess from the time of the Greeks until the coming of the Arabs. The power of the Guptas was finally broken in the early part of the sixth century, having previously been weakened by the invasions of the Ephtalite Huns. In the first half of the sixth century Harshavardhana, who was the hero of the one historical romance in Sanskrit, extended his sway over all northern India, even conquering Nepal. From this time the Hindu power began gradually to decline. Of the succeeding dynasties the most important were the Chalukya and Chola of Deccan, but the day of native monarchy over India was past. Petty kings came and went, warred with each other, and by their lack of harmony helped to prepare the way for the second great epoch of India, the Mohammedan period.

The subject of early Hindu eras and dates is very involved, and only the chief epochs can be given here. Hindu chronology begins with the Kaliyuga (q.v.), an astronomical era, 3102 B.C.; Chandragupta established the Maurya dynasty, 315 B.C.; the Samvat (q.v.) era (attributed wrongly to Vikramaditya) begins 57 B.C. This is the chief era of north India. The Saka (q.v.) or Salivahana (the chief south Indian) era begins 78 A.D.; the Gupta or Vallabhi era, 319 A.D.; the Harshavardhana era, 606 A.D.; the modern Burmese era, 639 A.D. According to a new theory of Bhandarkar (not accepted by scholars generally), the Saka and following dates have to be increased by 200.

Mohammedan Period (1001–1757). *House of Ghazni* (1001–1186).—The Sultan Mahmud of Ghazni, founder of the house of the Ghaznivides (q.v.), was the first conqueror who permanently established the Mohammedan power in India, and the Hindu princes fell one by one before a succession of Mohammedan dynasties. The house of Ghazni succumbed to the *House of Ghor*, which was supplanted by the *Slave Kings of Delhi* (1206–88). One of these sovereigns, Altamsh, who ascended the throne in 1211, added the greater part of Hindustan proper to his dominions. He died in 1236. *The Khilji Dynasty* (1290–1320).—Under Ala-ud-Din (1295–1316), of the house of Khilji, the Afghan power in India reached its highest point. He crushed the Hindus in Gujarat, defeated the Moguls in several battles on their invading the Punjab, and, most important of all, invaded the Deccan. Like so many Oriental conquests, however, his success was but temporary. *House of Tughlak* (1321–1414).—Ala-ud-Din's descendants having been slain, Tughlak, Governor of the Punjab, seized the throne in 1321. The Tughlak dynasty was short-lived; and in 1398, during the reign of the last of the Tughlak kings, the Tatar Timur, or Tamerlane, sacked Delhi and proclaimed himself Emperor of India. Two short-lived and unimportant dynasties followed the Tughlaks, the *House of Sayyid* (1414–50) and the *House of Lodi* (1450–1526). To the kings of this dynasty succeeded the *Great Moguls of the House of Timur* (1526–1707). Baber (q.v.), a descendant of Timur, who had for 22 years been sovereign of Kabul, invaded India for the fifth time towards the end of the year 1525, and after defeating Sultan Ibrahim Ludi on the plain of Panipat (April, 1526) he entered Delhi in triumph, and established himself as Emperor of the Mohammedan dominions

to India. He died in 1530 and was succeeded by his son, Humayun. Akbar (q.v.), son of Humayun, one of the greatest of Mohammedan monarchs, became Emperor in 1556 and reigned for nearly 50 years. His son, Jehangir, ascended the throne in 1605, and his grandson, Shah Jehan (q.v.), at the beginning of 1628. Shah Jehan is celebrated as the builder of the Taj Mahal (q.v.) at Agra (q.v.), one of the most splendid monuments of Oriental architecture. In 1658 Shah Jehan was imprisoned by his son, the famous Aurungzebe (q.v.), who usurped the Imperial power. This remarkable man raised the Mogul Empire to the highest pitch of greatness and splendor. The death of Aurungzebe took place in 1707, and the decay of the Empire, which had begun a few years before, proceeded rapidly. In 1739 the Persian Nadir Shah invaded India, sacked Delhi, and carried away the famous peacock throne as well as a vast amount of treasure. Viceroys of the Great Mogul formed their provinces into independent states; while Hindu and Mohammedan adventurers carved out kingdoms with the sword. Of these the most important were the nizams of the Deccan, the rajahs of Mysore, the peshwas of the Mahrattas, and the Rajput and Sikh princes. The Mahrattas reached the height of their power about the middle of the eighteenth century, but in 1761 they sustained a crushing defeat at the hands of the Afghan ruler, Ahmed Shah (q.v.), in the battle of Panipat. The dismemberment of the Mogul Empire opened a wide field for admission and enterprise to the nations of Europe. The Venetians, the Genoese, the Portuguese (the first to reach India by way of the Cape of Good Hope in 1498), and the Dutch had by turns traded with India; and in 1602 the English appeared on the scene. See EAST INDIA COMPANY.

In 1653 Madras was erected into a presidency, and in 1668 the island of Bombay, which was the dowry of Charles II's Queen, the Infanta Catharine of Portugal, was transferred by the crown to the East India Company. The year 1686 witnessed the foundation of Calcutta. See GAMA, VASCO DA; ALBUQUERQUE; GOA; PONDICHERRY; CHANDERNAGAR.

British Rule (1757–). Great jealousy existed between the English and the French. The war for ascendancy began in 1745 and did not end until the Peace of Aix-la-Chapelle in 1748. (See DUPLEIX.) The struggle in the Carnatic continued with ardor under the pretext of supporting the claims of rival native princes to sovereignty. Clive (q.v.), one of the most famous persons in Anglo-Indian history, turned the contest in favor of the English. His memorable defense of Arcot in 1751 broke the spell of French invincibility. Five years afterward, however, Siraj-ud-Daula, Nawab or Governor of Bengal, attacked and captured Calcutta. The English prisoners, 146 in number, were confined in the small military prison known as the Black Hole, and only 23 survived till morning. Clive quickly took command of an expedition fitted out at Madras, recovered Calcutta (1757), and, assisted by Admiral Watson, prosecuted the war vigorously, till, after a hollow peace and a renewal of hostilities, he thoroughly defeated Siraj-ud-Daula in the battle of Plassy, June 23, 1757. This victory gave the English the provinces of Bengal and Behar, and from this year is dated by the English themselves the foundation of their Empire in India. From Mír Jafar, whom the East India Company appointed to succeed the defeated Nawab, they exacted vast sums of money. The government of an empire by a commercial corporation was a strange political experiment. Naturally the members had no thought of administering affairs for the benefit of their subjects, or even of far-reaching improvements in their own interest, but were guided throughout by the narrowest and most sordid selfishness. After the victory of the English at Baxar in 1764, over the united forces of Shuja-ud-Daula, Nawab of Oudh, and the Mogul Emperor (Shah Alam), the latter asked protection of the English. He confirmed the company in its possessions and granted it the collectorate (*dīwānī*) of Bengal, Behar, and Orissa, on condition of receiving the sum of £300,000 as tribute to himself from Bengal and £600,000 as an annual allowance to his Nawab. These enormous grants were soon cut down by Clive and were eventually repudiated by the company, which also failed to fulfill other engagements which it had entered into with Shah Alam. On the other hand, the cost to the company of maintaining its authority and standing army prevented it from undertaking public works and from developing the resources of the country. Clive purged the Indian government of oppression, extortion, and corruption; from the work he did during his last visit (1765–67) began a purer administration of the British Empire in the East. The Regulating Act, passed in 1773, substituted a new council of four at Calcutta in place of the far larger council which had hitherto managed affairs for the company. The new body was to assist and check the Governor-General, instituted in the same year. It was also given a limited control of the actions of the Madras and Bombay presidencies and was thus made the political head of the British possessions. To Warren Hastings (q.v.), the first Governor-General (1774–85), the new council was exceedingly hostile. Hastings, on his part, used unscrupulous means of replenishing the company's exchequer, but by his talent and energy he averted dangers which threatened the British supremacy in India. The powerful Mussulman sovereigns, Hyder (Haidar) Ali, ruler of Mysore, and the Nizam of the Deccan, assisted by French officers, combined with the Mahrattas against the English. Sir Eyre Coote broke up the confederacy, and defeated Hyder Ali in 1781. Next year the Supreme Court of Justice, which had always harassed the Governor-General, was deprived of its independent powers, and the policy of Hastings was successful, both in the council and in the field. In 1784 Pitt instituted the Board of Control under a cabinet minister. By this act the English government began to deprive the company of its monopoly of political power in India. Lord Cornwallis (q.v.), who succeeded Hastings in 1786, was both Governor-General and commander in chief. To check the corruption of the English revenue officials, he made the *zemindars* (native collectors of revenue) proprietors of their districts on condition of paying a fixed annual sum to the company. He also improved the judicial administration by forbidding a revenue official to act as a judge. These were his chief reforms. With the Nizam, the Mahrattas, and the Rajah of Coorg as allies, Cornwallis in 1790 made war on Tippu, Sultan of Mysore, who had invaded Travancore, then un-

der British protection. Terms were dictated to Tippu at his capital, Seringapatam, and he was compelled to cede half of his domains to the company. Cornwallis was succeeded by Sir John Shore (1793–98), whose rule was in no respect memorable. Shore was followed by the Marquis Wellesley (1798–1805). The British Empire in the East, like that of Napoleon I in Europe, could be maintained only by constant fighting. Tippu broke his faith by intriguing against the English, both with the French and with native princes. His bad faith cost him his crown and life; in May, 1799, Seringapatam was stormed and Tippu killed. The Hindu dynasty displaced by Hyder Ali was restored, and the administration was carried on successfully for the young Rajah by Sir Arthur Wellesley, afterward Duke of Wellington. In the famous battle of Assaye, in 1803, he defeated the Mahrattas under Sindhia, and the victories of Lord Lake in north India extended considerably the dominions of the company. As Lord Wellesley's policy was too aggressive to suit the views of the East India Company, he was superseded by Lord Cornwallis, who returned to India only to die. Lord Minto, who governed from 1807 to 1813, organized the districts conquered by Wellesley. This administration was peaceful—a reaction of the profit-seeking company against the ambitious policy of Minto's predecessor.

The Marquis of Hastings (1813–23) conquered the Gurkhas of Nepal, forced the Mahratta ruler of Indore to cede a great part of his territories, crushed the robber gangs called Pindaris, and made the British power supreme in India. The next administrations were those of Earl Amherst (1823–28) and Lord William Bentinck (1828–35). The first was signalized by the First Burmese War, the second by the suppression of suttee and the thugs. It was Bentinck, in fact, who introduced the idea of governing India for the good of the governed. The Earl of Auckland (1836–42) followed Bentinck. He is known chiefly by his unjustifiable and disastrous attempt to make British influence paramount in Afghanistan (q.v.). An unexpected insurrection in Kabul compelled the retreat of the British army, which was overwhelmed in the Kurd-Kabul Pass (1842). Auckland was succeeded by the Earl of Ellenborough (1842–44). The "army of retribution" proceeded to Kabul soon after Lord Ellenborough took the reins of government. Kabul was sacked and several public buildings razed to the ground, after which the country was evacuated and Dost Mohammed allowed to reoccupy his throne. The conquest of Sind by Charles Napier, followed by its annexation, also belongs to this administration. Lord Ellenborough having been recalled by the East India directors, from alarm at his martial tendencies, Sir Henry Hardinge (1844–48) was sent to take his place. The attention of the new Governor-General, however, was soon diverted from works of peace to battle with the bravest people of India. Ever since the death of Runjit Singh, the ally of the English in 1839, the Punjab had been in a state of disorganization. The Sikhs, uneasy at the conquests made by the British in Sind and Gwalior, resolved to invade British territory. The First Sikh War (1845–46) commenced on the part of the Punjab by the passage of the Sutlej, and was followed by the bloody battles of Mudki, Firozshah, Aliwal, and Sobraon, in which, after hard fighting, the Sikhs were defeated with great slaughter. The result of the war was that a British resident and British troops were stationed at Lahore, although the boy prince, Dhulip Singh, was acknowledged as Maharajah under a protectorate. The Cis-Sutlej States, the Jalandhar Doab, and the region between the Ravi and the Sutlej were annexed.

The administration of the Marquis of Dalhousie (1848–56), who succeeded Hardinge, is memorable for the commencement of superb public works, the introduction of cheap uniform postage, railways, telegraphs, improvements in government, and social progress generally; a second Sikh war, ending in the victory of Gujarat, Feb. 21, 1849; a second Burmese war, finished in 1852; and the annexation of four kingdoms—the Punjab, Pegu, Nagpur, and Oudh, besides lesser territories, such as Satara. The organization of the Punjab into a model province, soon to become notable for prosperity as well as for its faithfulness to England, was a splendid achievement, of which Dalhousie had reason to be proud. When Lord Canning (1856–62) assumed office, everything promised peace and prosperity. With the early days of 1857, however, came the first mutterings of the storm that was to sweep over a large portion of British India. At the commencement of the year cakes of flour were circulated mysteriously through the region of the upper Ganges; by this means the natives were concerting rebellion. Treasonable placards appeared at Delhi, and other suspicious occurrences gave warning of native disaffection or conspiracy. The chief causes of discontent seem to have been the annexation policy and the rapid introduction of modern European improvements, which, by threatening to destroy the whole native civilization of India, roused the fears and superstitions of Hindus and Mohammedans alike. At the same time the English civil and military officials failed to respect the religious feelings of their subjects. For instance, the Enfield rifle with its cartridge, greased with tallow and lard, was at this time put into the hands of the Sepoys without explanation or precaution; and General Anson, the commander in chief, disregarded caste and was against all concession to the "beastly prejudices" of the natives. It must be remembered that the Hindu considered the cow sacred, and he would lose caste by tasting anything prepared from its meat, while the Mohammedan was not permitted by his religion to eat pork. Suddenly the disaffection broke out into open revolt before the English were aware of the impending danger. On May 10, 1857, the Sepoy Mutiny began at Meerut, a town in the neighborhood of Delhi, with a frenzied uprising of the native troops, who had been exasperated by the imprisonment of a number of their men who had refused to handle English cartridges. The mutineers liberated their comrades and proceeded to massacre the Europeans. The British troops failed to act promptly, and the Meerut Sepoys rushed to Delhi to raise the standard of the fallen Mogul. His person, invested with the traditions of native sovereignty, naturally became the centre of rebellion. Delhi at once fell into the hands of the mutineers. Nana Sahib of Bithur, whose claims as the adopted son of the Peshwa of the Mahrattas had not been recognized by the British government, fanned the insurrection. At the end of June General Wheeler was forced to sur-

render to him at Cawnpore; and, in spite of the promise of safe-conduct to Allahabad, all the men were immediately massacred. The women and children were butchered on July 15, by order of Nana Sahib, when he heard of Havelock's march from Allahabad. Nana Sahib was unable to withstand Havelock, who entered Cawnpore. The Europeans in the residency at Lucknow were besieged on June 30. Four days afterward, the commandant, Sir Henry Lawrence, died of his wounds, and his place was taken by Inglis, who bravely held out till he was relieved, on September 25, by the heroic Havelock. The final relief was achieved by Sir Colin Campbell, and on November 17 the city was again in complete possession of the British. In the meanwhile, in September, Delhi was retaken by Gen. Archdale Wilson. By June, 1858, no city or fortress of any importance remained in the hands of the mutineers. Oudh was entirely reduced by the beginning of the year 1859. The able rebel leader, Tantia Topi, a Mahratta Brahman, was taken, tried by court-martial, and hanged. During the mutiny valuable assistance and protection were received from many native chiefs. On the other hand, it was the fate of the last representative of the East India Company to sentence the last Great Mogul and heir of the house of Timur "to be transported across the seas as a felon." He died in Pegu in 1862. The transfer of the government of India to the British crown (1858) was the immediate consequence of the mutiny. Under the system then inaugurated, the government of India is vested in a Principal Secretary of State, responsible to the crown, and assisted by a council sitting in London. Subject to this authority is the Governor-General, henceforth termed the Viceroy, aided by an Executive Council, corresponding to the old Council of Calcutta, and by a new Legislative Council, composed in part of nonofficial members, native as well as European. The first Viceroy was Lord Canning. The two following viceroys were the Earl of Elgin (1862–63) and Sir John Lawrence (1863–69). Towards the close of Lord Elgin's administration a Mohammedan rising in northwest India was apprehended, and it was considered most desirable that the new Viceroy should have practical experience of Indian affairs. Sir John (afterward Lord) Lawrence was accordingly appointed Viceroy. He conducted the government with prudence and zeal, but unfortunate events occurred during his term of office. A war in Bhutan terminated unsatisfactorily for England in 1865; and a dreadful famine in Orissa, resulting from a drought, caused the death of 1,500,000 people. He was succeeded by the Earl of Mayo (1869–72). This administration was inaugurated by a great demonstration at Ambala, March 27, 1869, when the Ameer of Afghanistan was received in state and given a supply of arms, and the first installment of a money subsidy of £120,000 a year. In returning from Rangoon to Calcutta the Earl of Mayo was assassinated by a convict (February, 1872). Lord Northbrook (1872–76) was the next Viceroy. The chief events of his administration were "the Bengal famine," which, however, was foreseen and provided for, and the visit of the Prince of Wales to India (1875). Northbrook was followed by Lord Lytton (1876–80). The most important events in the tenure of office of Lord Lytton were the proclamation of the Queen as Empress of India (1877), another famine, and the Afghan War (1878–80). The Marquis of Ripon (1880–84), the Earl (afterward Marquis) of Dufferin (1884–88), and the Marquis of Lansdowne (1888–93) were the next three viceroys, under whose administrations much was done for the improvement of the natives. In 1885 King Thebau of Burma was dethroned, and on Jan. 1, 1886, the country was formally annexed by the English. The Earl of Elgin became Viceroy in 1893. During his term of office the demarcation of the boundary between Afghanistan and India, as determined by the Durand Treaty of 1893, was practically completed. In 1895 the region called Bashgal, in the basin of the Chitral River, was taken from the British sphere of influence and annexed to Afghanistan. In 1897 there was a serious outbreak of the Afridis on the Afghan frontier. The administration had also to contend with famine and plague. Elgin made substantial progress in internal improvements. In 1898 Lord Curzon of Kedleston became Viceroy. He devoted himself with great energy to the task of combating the plague and famine from which the country was suffering. In 1899 the gold standard was established. In 1901 the Northwest Frontier Province was organized. In 1903 an expedition was dispatched to Tibet, which by treaty of the following year was opened to British trade. Reappointed in 1904, the Viceroy incurred great unpopularity among the natives because of the partition of Bengal (q.v.) in 1905. In the same year he entered into a controversy with Lord Kitchener, commander in chief of the army, over the latter's attempt to weaken the influence of the civil authorities in military affairs, and, finding himself unsupported by the home government, resigned. He was succeeded by the Earl of Minto.

Discontent and unrest increased during the administration of the new Viceroy. Secret societies, mass meetings, press propaganda were all used as vehicles to further Indian nationalism. The victory of Japan over Russia was a powerful stimulus in the same direction, for it demonstrated that an Asiatic nation armed with western knowledge and trained according to western methods of military organization could triumph over a first-class European power. Rioting was frequent, English officials were assassinated, and a boycott was declared against English goods. At no time since the great mutiny was British supremacy so vigorously challenged. Stern measures were taken by the British to quiet the unrest. At the same time reforms were introduced which gave the Indians a small measure of self government. In 1910 Lord Hardinge succeeded the Earl of Minto as Viceroy. On December 2, 1911, King George, accompanied by Queen Mary, came to visit India and to be crowned Emperor of India on Indian soil.

Despite these demonstrations of good will the Indians continued restless. The outbreak of the war in 1914 stilled them for the time being, and they gave their Emperor undivided allegiance. (See SUPPLEMENT.) During the first few years of the war mutinies of a minor and local nature occurred which were greatly exaggerated in the German press. Lord Hardinge was succeeded by Lord Chelmsford in January, 1916, much against the will of the natives, with whom the former was very popular.

In 1918, conditions became very serious in India. There were three chief reasons for the

new unrest which was undoubtedly the greatest since the great mutiny. The first of these was the passage of the Rowlatt law, which suspended civil rights and established martial law in any part of India where riots, uprisings, or disturbances of any description occurred. The Indians referred to this bill, which was passed in March, 1919, as the "Black Cobra" bill. A second cause was the so-called "massacre" at Amritsar, in the Punjab, in April, 1919. Three hundred Indians were slain by British troops, under the command of General Dyer, afterwards retired by the British government. This slaughter prolonged and greatly embittered the native hostility to British rule. The third cause of unrest was the Sèvres treaty which ended the war between Turkey and the Allies. Great Britain had continually promised the Indian Mohammedans that Turkey would not be despoiled of her holy places. By the terms of the treaty, however, Asia Minor and Thrace were handed over to the Greeks, the British occupied Constantinople, and the holy places in Mesopotamia were taken over by the British and those in Syria by the French.

The treaty of Sèvres (which subsequently lapsed, see SUPPLEMENT) brought about an alliance between the Mohammedans in India, led by the Ali brothers and the Hindus led by Mohandas Gandhi (q.v.). Gandhi started a policy of non-coöperation in 1920. This called for the renunciation of British titles held by Indians, for the boycott of British goods, courts, education, and public functions, and for non-coöperation in political life. Although many of Gandhi's followers were arrested he himself was unmolested until March, 1921, when he was arrested and sentenced to six years' imprisonment. Gandhi's non-coöperation campaign stirred up the Moslems throughout the entire world and for the time being completely overshadowed the Hindu nationalistic movement.

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INDIA, French. Possessions of France in India, comprising the five towns of Pondicherry, Chandernagar, Karikal, Mahé, and Yanaon (see these respective titles), with a total area of about 196 square miles. Pop., 1901, 273,185; 1909, 282,379. For history, see under East India Company, section *French East India Company;* Clive; Dupleix; La Bourdonnais.

INDIA, Further, or Farther. See Indo-China.

INDIA, Native States of. There are more than 600 native states in India which do not come under the administrative system of British India, but which have varying degrees of independence and are mostly governed by native princes. Their total area is 709,583 square miles, with a population of 70,888,854. The population is very heterogeneous, and in many of the states the ruler belongs to a minority or alien race and religion.

The early policy of the East India Company was to make alliances with the different states, recognizing the native princes as its equals. The plan did not prove satisfactory, as it was impossible to preserve harmony while the native princes were not subject to more positive restraint. The policy was then introduced of recognizing them as subordinates and limiting their military forces, the British themselves guaranteeing protection and taking charge of the external relations of these states. In the middle of the nineteenth century the policy of annexation was followed for a short time—Oudh, e.g., being annexed in 1856. But since the Sepoy Mutiny (1857) the policy has been to allow the states to enjoy a share of independence under native rulers. The extent to which the British authority is exercised varies greatly among different states and at different times in the same state. They are not permitted to make wars or to receive foreign consuls. The commercial treaties made by the British embrace also the native states, their interests being recognized as identical with those of the provinces. The guaranty of protection implies the right to establish such military forces within the native territories as the purposes of defense demand, and to have control of railroads and telegraph lines which are not "local," i.e., do not begin and end within the states. Each state is thus protected from external attack and internal revolt, and a large local army is not necessary.

Since the peace of the Empire is in danger of being broken by disputes over the succession to the rulership in any state, or the rule of certain candidates may be deemed prejudicial to the Imperial welfare, the British may intercede to determine the succession and prevent the choice of a prince objectionable to them. If flagrant and intolerable instances of misrule arise, the right of interference is presumed to follow as a further consequence from the rôle the Imperial government plays as guarantor of the protection of the states' general welfare. Under special circumstances, as, e.g., the murder of a British commissioner, the British have resorted to some extraordinary methods of interference. But ordinarily in the important states the rulers are given a free hand in determining the state policy and executing it. In the numerous small states the Imperial jurisdiction is usually much more extensive, and many of them are administered by a British officer in the name of the chieftain. The British at times have exercised absolute rule even in some of the larger states. Their rule in Mysore had extended over half a century when (1881) it was restored to native rule. Some of the states pay a tribute to the British, but it is always small, and usually by way of compensation for special services. In 1911–12 these tributes amounted to £595,005. The policy of allowing native states to exist alongside of British provinces has its advantages and disadvantages. Eminent Indian officials hold that as far as British interests are concerned it would be better to annex a number of the leading states. The fact that this is not done is assumed to be an evidence of the unselfish motives of the Imperial policy. The proximity of the native states causes such inconveniences as rise out of the different prevailing systems of currency, limitations in the development of the Imperial irrigation system, and violations of the regulations concerning the growing of the poppy. It also tends to render certain laws inoperative as, e.g., those against infanticide.

In order to facilitate the relations with the native states, to watch over the course of affairs within their territories, and be in a position to exert a needful influence, the British appoint "residents" or political agents. With rare exceptions the agent resides within the territory to which he is accredited. The agents to the principal states are under the immediate jurisdiction of the Imperial government. Hyderabad, the largest and most populous of the internal states, employs European officers and experts in the more important branches of administration. The general condition of affairs in the native states compares unfavorably with that prevailing in regions under British administration. The British claim that the burden of taxation upon the masses falls heavier in the states than in the provinces. At the same time the public is benefited much less, for the expenditure is largely for the unnecessary wants of the ruler and his coterie of adherents, while roads, irrigation, schools, and other public needs are sadly neglected. Education is progressing, but Mysore is probably the only one among the states whose educational system may be said to be on a high level. Freedom of the press is not tolerated. Laws are made or revoked as it suits the whim of the ruler. Mysore, the most progressive of the states, has a so-called "representative assembly," but its members have no

vote in making the laws or appropriations. This state has had a Legislative Council since 1907. In several other states such legislative councils have been established, while in others the chiefs exercise their authority through ministers. Rural boards have also been established in this state, but they have no money at their disposal. Consult the authorities referred to under INDIA, paragraphs *History* and *Government;* and for a more detailed statement concerning the different states, see the articles under their respective titles.

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INDIA, PORTUGUESE. Possessions of Portugal in India, comprising Goa, Daman, and Diu. (See these respective titles.) Area, 1638 square miles. Pop., 1881, 420,868; 1900, 531,798. For history, see under INDIA; EAST INDIA COMPANY; DÍAS; GAMA; ALMEIDA; CASTRO.

INDIA, PRIDE OF. See CHINA TREE.

INDIA, STAR OF. See STAR OF INDIA, ORDER OF THE.

INDIA INK. A black pigment, formed by mixing lampblack and glue, or size, or gum, into a paste and then pressing it into molds where it dries into sticks of various shapes. It was originally made in China and Japan, where it is said to have been invented some 2600 years B.C. The best grades are still produced in those countries, the common lampblack of Occidental countries being too coarse for many purposes. It is said that the Japanese collect the lampblack used in its manufacture from the oil of sesame. In China India ink is applied with a brush, both for writing and painting. In Europe and America it is chiefly used for black-and-white drawings, it being possible to regulate the depth of the shade by the amount of water used in mixing the ink. India ink is the only true black ink produced, all other grades having a tinge of some other hue. It is made specially prepared and ready for use by draftsmen, very few of whom now grind the sticks up with water, as was once the practice.

INDIA MUSEUM. A collection in London, illustrating the antiquities, history, and resources of India. In 1880 it was placed under the management of the South Kensington Museum and has been much enlarged.

INDIANA, ĭn'dĭ-ăn'ă, known as the "Hoosier State." One of the Middle Western States. It lies between Ohio and Illinois and between Michigan and Kentucky, spanning the space between the Ohio River and Lake Michigan. It is crossed by many east-west trunk lines of railroad and plays the part of a bridge or "midland gap." Its boundary lines, the meridians of 84° 49′ and 87° 32′ W., the parallel of 41° 42′ N., and the Ohio and Wabash rivers, inclose an area of 36,354 square miles.

Topography. Indiana may be included in the glacial-drift plain, only about one-sixth of it having escaped glaciation. The highest land in the State, nearly 1300 feet, is in Randolph County. Morainic hills in Steuben County reach nearly 1200 feet, and a small area in Brown County lies above 1100 feet. At the shore of Lake Michigan the elevation is 581 feet, at the southwest corner of the State 484 feet, and at the mouth of the Wabash River 313 feet. The average elevation of the State is 700 feet. There are three physiographic regions: *The Lake Plain.*—The area north of the Wabash River forms a part of the Lake Plain. It is traversed by massive marginal moraines, which form belts of drift hills especially rugged and lofty in Kosciusko, Whitley, Noble, Dekalb, Lagrange, Steuben, and St. Joseph counties. The valleys contain about 1000 small lakes, of which Turkey, or Wawasee, in Kosciusko County, and James, in Steuben County, are the largest. The irregularity of surface and the numerous lakes give to this region pleasing and picturesque scenery and render it attractive for pleasure and summer resorts. The shore of Lake Michigan is bordered by a belt of sand hills, blown up by the wind to a height in some cases of 300 feet. The basins of the Kankakee and Iroquois rivers comprise extensive plains of outwash from the ice sheets which once bordered them and formerly contained large marshes, now mostly drained. A part of eastern Allen County lies in the former bed of glacial Lake Maumee and is very flat and fertile.

The Central Plain.—The Shelbyville moraine, the southernmost marginal moraine in the State, marks an important physical division. It extends in looped curves through Vigo, Parke, Putnam, Morgan, Johnson, Bartholomew, Decatur, Fayette, Wayne, and Franklin counties, and marks the south boundary of heavy glacial drift. The area between the Shelbyville moraine and the Wabash River is a smooth plain underlaid by glacial clay from 100 to 300 feet deep and broken only by shallow-stream valleys and low moraine ridges of gentle slope. This is the richest and most densely populated part of the State.

Southern Indiana.—South of the Shelbyville moraine the glacial drift is thin or absent. Strata of alternately softer and harder rock, outcropping in north-south belts, give rise to escarpments, which divide the area into east and west lowlands and a middle upland. The surface is generally hilly, with smooth tracts on the softer rocks. A prominent feature is the Knobstone escarpment, an abrupt descent to the east, which extends from Floyd County to West Bartholomew County. It takes its name from the Knobs, or steep outlying hills, which occur along its south portion. It forms the east edge of the upland of resistant rocks, about 50 miles wide, which extends from the Ohio River to Brown and Monroe counties. Most of the upland surface has been maturely dissected into a complex system of valleys, ridges, and knobs, which attain their most rugged form and highest elevation in Brown County, sometimes called the Hoosier Switzerland. The middle portion of the upland, underlaid by porous and soluble limestones, is riddled by underground drainage channels, forming sink holes, "gulfs," and caves, among which Wyandotte and Marengo caves in Crawford County rival in extent and beauty the Mammoth Cave of Kentucky. The upland held back the edge of the ice sheet and, with the southern portion of the western lowland, is devoid of glacial drift.

Drainage. The Ohio River, as far down as

Cannelton, has a valley 1 to 2 miles wide, bounded by picturesque bluffs 300 to 500 feet high. Below Cannelton it crosses softer rocks, the valley widens to 5 to 10 miles, and the bluffs are lower. It is subject to great floods, the water at Lawrenceburg sometimes rising 70 feet. It is navigable for vessels drawing 6 feet of water. The streams flowing directly into the Ohio River are short and steep. The falls of Clifty Creek, near Madison, 70 feet high, form the highest cataract in the State. The Wabash River drains two-thirds of Indiana. Its headwaters, rising from the height of land near the Indiana-Ohio line and from the northeastern hills, are largely moraine-guided. Its valley has had a complex history and is quite variable, but its course is free from falls or rapids. Below Parke County it has a wide flood plain and resembles the lower Ohio. It is navigable to Terre Haute. The numerous forks of White River rise from the east height of land and, crossing the Central Plain and middle upland, discharge to the Wabash a volume of water which rivals that of the trunk stream. The Whitewater River flows from the height of land directly to the Miami and Ohio rivers and has a rapid fall. In the north the St. Joseph drains the moraine to Lake Michigan and furnishes valuable water power. The Kankakee and Iroquois rivers flow very sluggishly westward to the Illinois. In the northeast the St. Marys and St. Joseph unite at Fort Wayne to form the Maumee, flowing to Lake Erie.

Soils. The glacial clay of the Central Plain forms one of the most productive and enduring soils in the world. The soils of the Lake Plain are more variable, the sandy and gravelly tracts being less valuable than the clay. In southern Indiana the shale and limestone soils are generally good, while those of the knobstone and sandstone are distinctly poor. Throughout the State the wide river bottoms and terraces are unrivaled for corn and wheat.

Climate and Vegetation. The mean annual temperature varies from 48° F. in the north to 56° F. in the south. The average for July ranges from 74° F. to 79° F. and for January from 24° F. to 33° F. Extremes of 106° F. and — 20° F. occur. The period between killing frosts averages about 140 days in the north and east and 200 days along the Ohio. The annual rainfall varies from 36 inches in the northwest to 42 inches in the south. Indiana is not a prairie State, seven-eighths of its area having been originally covered with a heavy growth of hardwood timber.

Mining. The chief mineral products of Indiana are coal, clay, cement, and stone. In the production of coal, which is a principal mineral product, Indiana ranked seventh in 1913, with an output amounting to 17,165,671 short tons, valued at $19,001,881. The principal coal-producing counties—Greene, Sullivan, and Vigo —in the southwestern part of the State, embrace an area of approximately 6500 square miles. All the coal is bituminous. Along the east edge of the fields is a series of basins, some of which are but a few acres in area, which produce a variety of coal known as block or semi-block, of a very pure, dry, noncoking nature, suitable for use in its raw state as a blast-furnace fuel, though usually mixed with coke when so used. Cannel coal is mined at several places. The beds of bituminous coal range from 3 to 10 feet in thickness, and most of the mines are worked on 5 feet or more of coal. The record production of the State was made in 1909, when, as a result of long-continued labor troubles in Illinois, an abnormal demand was created for Indiana coal, and the production rose to 18,389,815 tons. The number of men employed in the coal mines in 1913 was 22,235; the average production per man was 706 tons for the year.

The erection of 560 coke ovens at Gary has caused Indiana to assume high rank in the production of coke. In addition to the Gary plant, there are retort ovens at Indianapolis and at Muncie. Production amounted to 2,727,025 short tons, valued at $13,182,136, in 1913. Pig iron produced in 1913 was valued at over $20,600,000. Natural gas is produced in large quantities, but the value of this product decreased from $9,404,909 in 1905 to $948,278 in 1913. The petroleum field is a part of the so-called Lima-Indiana oil field. Production in 1913 was only 956,095 barrels, valued at $1,279,-226, as over against 11,339,124 barrels in 1904.

The clay-working industries ranked third in importance among the mineral activities of the State in 1913, the value of these products being $8,498,646. Portland cement ranked second in value, and of this there were produced, in 1913, 10,219,492 barrels, valued at $10,218,867. The chief clay products are draintile, building brick, and vitrified brick. Cement is manufactured in the northern and southern parts. The principal quarry product of Indiana is limestone. The Bedford limestone quarried in Lawrence and Monroe counties is highly prized for structural qualities and is the principal stone product. Sand and gravel beds yield products valued in excess of $1,000,000 annually. Other mineral products are gems, lime, mineral paints, mineral waters, oilstones, pyrites, sand-lime brick, and sulphuric acid from zinc smelting. The value of the mineral products in 1913, exclusive of pig iron and coke, was $46,607,864. The total value was upward of $80,000,000.

Agriculture. The larger portion of the State is admirably adapted to agriculture. All the soils of the glacial upland are well suited to the production of corn, oats, winter wheat, and the grasses. The soils of the glacial lake region in the northwest are prevalently dark-colored, somewhat mucky loams and sandy loams, with extensive areas of peat and muck, where artificial draining has been installed. They constitute fertile land for the production of staple crops and for cabbages, onions, and celery. The silty soils of the nonglaciated region of the southern two-fifths of the State are better suited to the production of winter wheat, oats, and grass than to corn growing. Tobacco is chiefly grown upon the silty soils derived from the loess in the southwest and upon the river terraces and the glaciated upland soils along the Ohio boundary.

There was a decrease of 2.9 per cent in the number of farms and of 1.5 per cent in the acreage of farm land from 1900 to 1910. The total number of farms in 1910 was 215,485. Of an approximate land area of 23,068,800 acres, there were in farms, in 1910, 21,299,823 acres. The improved land in farms in 1910 amounted to 16,931,252 acres. The average acreage per farm in 1910 was 98.8. The total value of farm property, including land and buildings, implements and machinery, domestic animals, poultry, and bees, in 1910, was $1,809,135,238, and the

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Princeton
Vincennes
Terre Haute
Indianapolis
Richmond
Madison
Jeffersonville
New Albany
Louisville
Bedford
Seymour
Columbus
Greensburg
Rushville
Connersville
Shelbyville
Franklin
Brookville
Lawrenceburg
Aurora
Newport
Covington
Cincinnati
Hamilton
Dayton
Eaton
Paris
Marshall
Robinson
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Lawrenceville
Carrollton
Williamstown
Warsaw
Rising Sun
Burlington
Charleston
Mt. Carmel
Albion
Lagrange
Corydon
Brandenburg
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Hawesville
Tell City
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average value of land per acre, $62.36. Of the total number of farms, in 1910, 150,798 were operated by owners and managers and 64,687 by tenants. There were 805 negro and nonwhite farmers in 1910, as against 204,951 native and foreign-born white.

The following table shows the acreage, production, and value of the principal crops in 1914, as estimated by the United States Department of Agriculture. The total value of

CROPS	Acreage	Prod. bu.	Value
Corn	4,949,000	163,317,000	$94,724,000
Wheat	2,485,000	43,239,000	44,536,000
Oats	1,575,000	44,888,000	19,302,000
Barley	8,000	200,000	134,000
Rye	99,000	1,614,000	1,372,000
Potatoes	75,000	6,000,000	3,360,000
Hay	1,764,000	*1,764,000	24,372,000
Tobacco	13,500,000	†12,150,000	1,094,000

* Tons. † Pounds.

the crops in 1909 was $204,210,000. The general character of Indiana agriculture is indicated by the fact that about three-fourths of the total value of crops in 1909 was contributed by the cereals and about one-eighth by hay and forage. The remainder, representing in value about 13.4 per cent of the total, consisted chiefly of potatoes and other vegetables, forest products, and fruits and nuts. Orchard fruits are an important product; the total quantity produced in 1909 was 4,714,000 bushels, valued at $3,709,000. These consisted of apples, peaches, nectarines, pears, plums, prunes, quinces, and grapes. Nuts and small fruits are other important crops, black walnuts constituting the chief item of the former and strawberries of the latter.

Live Stock and Dairy Products.—The number and value of domestic animals on farms on Jan. 1, 1915, according to the estimates of the United States Department of Agriculture, were as follows: cattle, 693,000, valued at $24,394,000; horses, 854,000, valued at $97,356,000; mules, 86,000, valued at $10,062,000; swine, 4,167,000, valued at $42,920,000; sheep, 1,114,000, valued at $6,016,000; milch cows, 646,000, valued at $35,530,000. During 1909 194,736,962 gallons of milk were produced. From this 43,181,817 pounds of butter were made, valued at $9,402,994, and 63,619 pounds of cheese, valued at $7,800. The total value of dairy products sold in 1909 was $16,666,374. Poultry of all sorts on the farms, on April 15, 1910, numbered 13,739,109, valued at $7,762,015.

Forest Products.—Of the total number of farms, in 1909, 75,397 reported forest products, the total value being $5,603,322. These include firewood, fencing material, logs, railroad ties, telegraph and telephone poles, materials for barrels, bark, and naval stores. There were cut, in 1909, 556,418 M feet of rough lumber, 3600 thousand lath, and 7340 thousand shingles. Practically the entire output in 1909 was hard wood, 41.1 per cent of which was oak, the remainder being made up of numerous varieties, of which beech, maple, and elm were the most important.

Manufactures. From 1849, when Indiana ranked fourteenth among the States in the value of its manufactures, with a total value of products of $18,725,000, the State has in each decade shown a large increase. In 1909 the value of manufactured products amounted to $579,075,000, and the State ranked ninth. This growth has been dependent largely upon the natural resources. During the decade 1900–10 the supply of timber, petroleum, and natural gas fell off greatly, and some of the industries depending upon these materials showed a decrease in their output or less advance than in previous years. The manufacturing industries of the State as a whole, however, have continued to flourish; lumber has been secured from outside the State to supplement the local supply, while the increasing amount of coal mined in the State has compensated largely for the smaller supply of natural gas and has stimulated manufacturing in many lines.

In 1849 an average of 14,440 wage earners, representing 1.5 per cent of the total population, were employed in manufactures, and in 1909 an average of 186,984 wage earners, or 6.9 per cent of the total population, were so engaged. During this period the gross value of products per capita of the total population increased from $19 to $214. The proportion which the manufactures of the State represented of the total value of products of manufacturing industries for the United States increased from 1.8 per cent in 1849 to 2.8 per cent in 1909. The table on pages 90 and 91 gives the most important data relating to the manufactures of the State for 1909 in comparison with 1904. On account of limitations of space only those industries whose products had a value of $1,000,000 or more in 1909 are included in this table.

The value added to products by manufacture best represents the net wealth created by manufacturing operations. During the year $121,816,000 were paid out in salaries and wages. The average number of wage earners in 1909 was 186,984. Of these 163,698 were men and 23,286 women. There were employed 3612 children under 16 years of age. For the great majority of wage earners employed in the manufacturing industries the usual hours of labor in 1909 ranged from 54 to 60 hours a week. The totals presented in the table do not include the statistics for an establishment operated by the Federal government, the general depot of the Quartermaster's Department, located at Jeffersonville. In 1909 this plant employed an average of 590 wage earners, and the products, which consisted principally of clothing, were valued at $401,801.

The most important industries in the point of value of products are those connected with slaughtering and meat packing, the value of products of these industries amounting to $47,289,000 in 1909. Second in value are the products of the flour and gristmill industries, the outgrowth of the large crops of cereals grown in Indiana. The value of products in 1909 was $40,541,000. The most important output is that of white flour, amounting to $4,784,708 barrels in 1909. Industries connected with iron and steel, including steelworks and rolling mills, have shown increased importance. The value of the product in 1909 was $38,652,000. The establishment of large steelworks and rolling mills at Gary, in the northern part, on Lake Michigan, has been largely responsible for a gain of 800 per cent in value of product since 1889. The importance of the iron and steel industry as a whole is much greater than is indicated by the figures in the table, since the statistics of blast furnaces and for the manufacture of tin plate and terneplate can-

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE — ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands			
All industries	1909	7,969	218,263	186,984	$508,717	$95,511	$579,075	$244,700
	1904	7,044	176,227	154,174	312,071	72,058	393,954	173,447
Agricultural implements	1909	39	6,061	4,749	23,008	2,565	13,670	8,806
	1904	41	3,947	3,543	14,523	1,841	8,061	5,086
Automobiles, including bodies and parts	1909	67	7,753	6,797	16,722	4,131	23,764	8,769
	1904	11	921	816	1,194	496	1,639	815
Brass and bronze products	1909	21	534	468	878	292	1,379	605
	1904	9	118	101	119	55	175	90
Bread and other bakery products	1909	754	3,780	2,505	6,044	1,315	10,209	3,983
	1904	581	3,082	2,115	3,859	994	6,935	2,804
Brick and tile	1909	311	4,361	3,788	7,455	1,835	4,719	3,413
	1904	392	4,009	3,335	5,449	1,403	3,818	2,836
Butter, cheese, and condensed milk	1909	132	807	488	1,042	262	3,959	763
	1904	87	324	187	362	98	1,291	280
Canning and preserving	1909	134	3,952	3,406	5,572	879	8,758	2,813
	1904	110	3,750	3,426	3,982	862	5,894	2,320
Carriages and wagons and materials	1909	221	10,100	8,867	29,110	4,355	21,655	9,197
	1904	252	10,601	9,406	25,879	4,184	19,259	8,390
Cars and general shop construction and repairs by steam-railroad companies.	1909	34	13,745	12,884	9,942	8,081	17,128	9,252
	1904	44	12,020	11,348	5,147	6,664	14,515	7,509
Cars, steam-railroad, not including operations of railroad companies.	1909	7	4,449	4,084	14,884	1,991	9,498	3,189
	1904	6	3,341	3,252	5,304	1,928	10,036	3,192
Cement	1909	11	2,616	2,318	7,271	1,280	7,022	2,863
	1904	6	817	788	2,144	381	1,283	861
Clothing, men's, including shirts	1909	42	4,444	4,073	4,617	1,305	8,029	3,377
	1904	41	4,081	3,761	2,335	994	5,420	2,158
Clothing, women's	1909	18	1,403	1,291	851	449	2,058	1,001
	1904	27	1,781	1,606	906	484	2,109	1,121
Coffins, burial cases, and undertakers' goods	1909	19	824	669	1,494	313	1,448	747
	1904	17	575	494	1,194	217	1,107	635
Confectionery	1909	64	1,134	885	949	298	2,558	1,035
	1904	43	884	685	870	228	1,530	699
Cooperage and wooden goods, not elsewhere specified.	1909	57	1,016	891	1,476	382	2,398	899
	1904	59	1,139	1,022	1,397	433	2,777	993
Copper, tin, and sheet-iron products	1909	146	2,485	2,121	6,814	1,065	5,763	2,332
	1904	91	1,286	988	4,504	440	2,885	1,387
Cotton goods, including cotton small wares	1909	7	1,621	1,582	2,473	478	2,502	832
	1904	5	1,208	1,174	2,277	302	1,484	344
Electrical machinery, apparatus, and supplies	1909	42	3,723	3,073	6,857	1,361	7,718	4,025
	1904	34	1,813	1,416	3,175	664	2,857	1,790
Flour-mill and gristmill products	1909	563	3,508	2,298	15,857	1,216	40,541	5,539
	1904	566	3,464	2,289	11,907	1,091	36,474	5,132
Foundry and machine-shop products	1909	415	18,439	15,809	39,711	8,857	39,884	21,265
	1904	346	14,690	12,866	25,858	6,356	25,595	13,934
Furniture and refrigerators	1909	201	12,352	11,284	16,537	5,137	18,456	9,996
	1904	186	10,760	9,955	12,063	4,044	13,959	8,243
Gas, illuminating and heating	1909	53	1,390	928	23,550	508	3,147	2,045
	1904	43	826	621	11,972	289	1,839	1,268
Glass	1909	44	9,936	9,544	13,149	4,942	11,593	6,865
	1904	96	12,470	12,020	13,884	6,638	14,707	9,148
Glucose and starch	1909	4	944	866	4,265	480	5,750	1,068
	1904	4	510	462	1,187	249	2,048	549
Ice, manufactured	1909	85	765	563	3,318	304	1,311	985
	1904	66	547	391	2,204	199	748	587
Iron and steel, steelworks and rolling mills	1909	17	13,206	12,255	47,781	8,390	38,652	12,553
	1904	21	7,538	7,215	22,986	4,072	16,920	6,014

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
Leather goods	1909	118	1,582	1,240	3,108	527	3,406	1,404
	1904	90	1,107	911	1,457	388	1,998	900
Leather, tanned, curried, and finished	1909	10	440	398	2,213	205	2,311	598
	1904	13	301	265	1,248	134	1,051	287
Liquors, distilled	1909	14	527	428	5,556	269	31,610	26,898
	1904	18	394	337	1,820	190	20,520	17,522
Liquors, malt	1909	37	1,923	1,594	10,571	1,019	8,313	6,324
	1904	41	1,633	1,313	9,073	794	6,196	4,434
Lumber and timber products	1909	1,277	12,840	10,317	19,177	4,492	23,135	10,753
	1904	994	11,739	9,704	13,816	4,226	21,476	9,724
Marble and stone work	1909	200	3,811	3,283	7,441	1,943	5,756	3,969
	1904	128	2,466	2,157	3,193	1,129	3,399	2,222
Mattresses and spring beds	1909	27	644	553	1,456	257	1,287	596
	1904	26	523	458	743	170	854	417
Musical instruments, pianos and organs and materials.	1909	15	1,985	1,667	4,270	994	3,686	1,983
	1904	12	1,420	1,237	2,617	630	2,270	1,386
Paint and varnish	1909	18	297	200	841	74	1,108	425
	1904	14	140	81	580	42	748	311
Paper and wood pulp	1909	27	1,627	1,501	7,132	754	5,202	1,705
	1904	36	1,737	1,620	6,511	664	3,917	1,400
Paper goods, not elsewhere specified	1909	8	816	719	3,403	256	1,887	663
	1904	3	392	359	465	132	779	234
Patent medicines and compounds and druggists' preparations.	1909	113	1,481	801	2,858	354	4,344	2,884
	1904	100	1,211	813	2,274	292	4,410	2,956
Pottery, terra-cotta, and fire-clay products	1909	31	2,373	2,186	4,806	1,190	2,966	2,107
	1904	38	2,200	2,019	3,837	981	2,643	1,997
Printing and publishing	1909	892	9,600	6,756	11,844	3,522	14,356	10,331
	1904	865	8,295	5,819	9,449	2,941	11,473	8,298
Slaughtering and meat packing	1909	61	4,862	4,423	8,058	2,161	47,289	5,303
	1904	50	3,400	3,155	7,424	1,371	29,435	3,186
Stoves and furnaces, including gas and oil stoves	1909	24	1,609	1,362	2,853	723	2,751	1,730
	1904	23	1,210	1,070	1,704	589	2,030	1,223
Tobacco manufactures	1909	470	3,416	2,794	1,408	1,126	4,155	2,565
	1904	552	3,414	2,668	1,586	1,040	3,905	2,324
Wirework, including wire rope and cable	1909	31	834	689	1,192	314	3,161	819
	1904	25	589	472	1,059	209	1,696	560
Woolen, worsted, and felt goods, and wool hats.	1909	11	825	776	1,555	293	1,570	514
	1904	13	1,038	993	1,645	306	1,597	600

not be shown without disclosing the operations of individual establishments.

Indiana is one of the most important States in the manufacture of distilled liquors. The manufacture of automobiles has become of great importance. In 1899 there was but one establishment engaged in this industry; in 1909 there were 67 establishments, the value of whose products amounted to $23,764,000. These figures are not complete, for the manufacture of automobile bodies and parts is so interwoven with other industries that it is not possible to show how fully the statistics show the magnitude of the industry. Other important manufacturing industries are those connected with the manufacture of carriages and wagons, furniture and refrigerators, agricultural implements, and glass. In the last-named product the State ranks third. Its growth dates from 1886, when natural gas was discovered in the State, and it attained second place in 1899. The reduction of the output of natural gas checked its growth in the next decade.

Indianapolis is the most important city in the value of manufactured products. These were valued at $126,522,113 in 1909. The other ranking cities with the value of their products are South Bend, $27,854,527; Fort Wayne, $23,686,809; Evansville, $22,829,024. Cities the value of whose products exceeded $10,000,000 were Terre Haute, Hammond, Anderson, Mishawaka, and Richmond. The city of Gary is not included in this list. For further information in regard to manufacturing cities mentioned, see titles of these cities in other portions of this work. In all the manufacturing industries of the State combined, 29.7 per cent were in 1909 under corporate ownership. Of the total value of products, however, the establishments operated by corporations in 1909 furnished 85.6 per cent, as against 14.4 per cent for those under all other forms of ownership.

Transportation. The State has fairly good facilities for water transportation. The Ohio River forms the entire southern boundary, and its tributary, the Wabash, is navigable at high water as far as Lafayette. On the north is Lake Michigan. During the early history of the State the National Road, running east and west through the central part, was an important thoroughfare. Two canals—one the Wabash and Erie and the other the White Water—have been superseded by railroads. The railway facilities are exceptionally well developed. All lines from the East centring in Chicago pass through the State, as do most of the lines connecting the great commercial centres of the East with those of the West. There are in addition some important north to south lines. The total mileage of railways on Jan. 1, 1913, was 7359, and of this 4688 miles were main lines. There were on Jan. 1, 1913, 45 companies operating or leasing electric railroads. The general administration of railways is in the hands of the Railroad Commission of Indiana. Rates were made subject to its decision, and it is permitted to suspend any rate for 30 days. An Act also passed in this year deals with the liability of common carriers and includes a bill-of-lading law.

Banks. There were on June 4, 1913, 255 national banks, with capital amounting to $27,896,000 and deposits of $144,162,000. There were 348 State banks, with deposits subject to check aggregating $41,923,947 and savings deposits of $7,319,277. The savings banks numbered 5, with 33,205 depositors and deposits amounting to $13,001,084. There were also 134 loan and trust companies, with deposits subject to check amounting to $18,052,393 and savings deposits amounting to $39,036,937. The private banks numbered 194, with deposits subject to check amounting to $15,434,904 and savings deposits amounting to $1,483,195.

Government. The present constitution was adopted in 1851, and it is the second under which the State has been governed. Amendments to the constitution may be proposed in either branch of the General Assembly; and if agreed to by a majority of the members elected to each of the two Houses, in two successive sessions, it shall then be the duty of the General Assembly to submit them to the electors. If a majority shall ratify the same, the amendment shall become part of the constitution. An amendment must receive a majority of all the votes cast at the election and not merely a majority of the votes cast for or against the amendment. The Legislature of 1911 proposed a new constitution to be submitted to the people in 1912, but the method of drafting and adopting this instrument was declared unconstitutional by the State Supreme Court.

Legislative.—Legislative authority is vested in a General Assembly, which consists of Senate and House of Representatives. The Senate must not exceed 50, nor the House of Representatives 100 members. Senators are elected for a term of four years and Representatives for a term of two years. Enumerations for the apportionment of Senators and Representatives are held every six years. Such an enumeration was held in 1914. The sessions of the General Assembly are held biennially, commencing on Thursday after the first Monday in January. The Governor may by proclamation call special sessions.

Executive.—Executive power is vested in a Governor, who holds office for four years and is not eligible for election for more than four years in any period of eight years. The administrative officers are a Secretary, Auditor, and Treasurer. These are elected for a term of two years and are not eligible to office more than four years within a period of six.

Judiciary.—The judicial power is vested in the supreme court, appellate court, circuit court, and such other courts as may be established by the General Assembly. The supreme court consists of from three to five judges, who hold office for six years. The State is divided into as many districts as there are judges of the supreme court, such districts being formed of contiguous territory, as nearly equal in population as is possible. One judge, a resident, is elected from each district by the electors at large. The circuit courts each consist of one judge elected from the judicial circuits into which the State shall be divided from time to time. There is elected in each judicial district a prosecuting attorney, who holds office for two years. There are also probate, juvenile, and superior courts, the judges of which hold office for four years.

Suffrage and Elections.—Voters must be male citizens of the United States who have attained their majority and who have lived in the State six months immediately preceding the election, in the township 60 days, in the ward or precinct 30 days. Males of foreign birth who have declared intention of obtaining citizenship, conformably to the national laws of naturalization, are also eligible to vote. These qualifications are fixed by the constitution and cannot be changed by the Legislature. The general elections are held every Tuesday after the first Monday in November. Indiana is one of the States in which no provision has been made for direct primaries or direct nomination of candidates for office.

Local and Municipal Government.—As noted above, the county officers are a clerk of the circuit court, auditor, recorder, treasurer, sheriff, coroner, and surveyor. No person shall be elected or appointed a county officer who is not an elector of the county. The General Assembly has power to confer upon the boards doing county business powers of a local administrative character. This has reference to the boards of county commissioners which are the principal governmental agencies of the county. Indiana is one of the States in which the Legislature has no provision for a commission form of government in towns and cities.

Other Statutory Provisions.—Combinations in restraint of trade are illegal, and all persons engaged in such combinations are guilty of misdemeanor and are liable to a fine not to exceed $5000 and to imprisonment. A pure food law conforming in its essential provisions to the national law was passed in 1907 and revised in 1911. The employment of children under 14 years of age in other than farm work or domestic service is prohibited. There is a stringent employers' liability act. The selling of liquor is regulated by a city and township local-option measure, passed in 1911, nullifying the county option law previously in force. A remonstrance law, adopted in 1905, affords the people an opportunity to abolish saloons in townships also. The remonstrance feature also applies to city wards and the local-option feature to all municipalities. At the end of 1913,

of the 94 cities in the State 30 were "dry," and of 360 incorporated towns about 300 were without a saloon. Of the townships, which number about 1015, about 825 had voted "no license."

Finance. The report of the Treasurer for the fiscal year ending Sept. 30, 1914, shows that receipts for that period amounted to $12,545,007 and disbursements for all purposes to $12,273,314, leaving a balance of $629,964. The State debt at the end of the fiscal year was $1,470,163. Of this, $1,064,548 was domestic debt and $405,615 was foreign debt. The per capita debt in 1912 was only $0.49, compared with the per capita debt of the whole country, $3.52.

Militia. The total number of males available for military duty in 1910 was 647,449. The organized militia consists of one brigade of infantry, a battalion of field artillery, a company of signal troops, and a company of sanitary troops, including an ambulance company and a field hospital. The infantry brigade consists of three regiments of 12 companies each, and the field artillery of one battalion and three batteries. The number of enlisted men in 1913 was 2297, and the officers numbered 179.

Population. The population of the State by decades is as follows: 1800, 5641; 1810, 24,520; 1820, 147,178; 1830, 343,031; 1840, 685,866; 1850, 988,416; 1860, 1,350,428; 1870, 1,680,637; 1880, 1,978,301; 1890, 2,192,404; 1900, 2,516,462; 1910, 2,700,876. The estimated population on July 1, 1914, was 2,779,467; 1920, 2,930,390. Indiana has been much less affected by immigration than most of the other Middle Western States. A large percentage of the population came originally from the South—Kentucky, North Carolina, and Virginia—and was to a large extent unaffected by the Western wave from New England and New York. Of the total population in 1910, 78.9 per cent. were native whites of native parentage; 13 per cent were native whites of foreign or mixed parentage; 5.9 per cent were foreign-born whites, and 2.2 per cent were negroes. The population per square mile in 1910 was 74.9, compared with 70.1 in 1900. The urban population in 1910 was 1,143,835, compared with 876,294 in 1900. The rural population in 1910 was 1,557,041, compared with 1,640,168 in 1900. The male population in 1910 numbered 1,383,295, and the female 1,317,581. There were in 1910 five cities with a population of 25,000 or over: Indianapolis, 233,650; Evansville, 69,647; Fort Wayne, 63,933; Terre Haute, 58,157; South Bend, 53,684. Other important cities are Muncie, 24,005; Anderson, 22,476; Richmond, 22,324; Hammond, 20,925; Lafayette, 20,081. The city of Gary, which did not exist in 1900, had in 1910 a population of 16,802. There were, in 1910, 89 cities with a population of 2500 or over.

Education. The educational standards of the State have always been high, and the administration of the school system has rapidly improved in recent years. The Legislature has passed many excellent measures tending to keep up the high standard of the administration and instruction.

The proportion of illiteracy is low. In 1910 there were 66,213 illiterates over 10 years of age—a percentage of 3.1 per cent of the total population, a decrease from 4.6 per cent in 1900. The illiterates of native parentage form only 2.2 per cent of the population of 10 years or over. The percentage of illiteracy amongst the negroes was 13.7 per cent, a decrease from 22.6 per cent in 1900. In 1914 there were 766,383 persons of school age and an enrollment of 548,497. Education is compulsory; all children between the ages of 6 and 14 are obliged to attend a full term in a local school. The minimum school term is fixed by law as six months, and the average length varies from 140 days in township schools to 187 days in city schools.

There were, in 1912, 373 commissioned and 425 noncommissioned high schools. Secondary education has had an interesting development. Seminaries, established in each county by law in 1831, have gradually been superseded by the free public high schools, the first of which was organized in 1850 in Adamsville, and in 1873 the first step was taken towards their standardization. In 1907 high schools were defined as part of the common-school system and classified as commissioned and noncommissioned. The commissioned high schools were further classified to include noncommissioned schools reaching a certain standard. Vocational and industrial education has been an important part of the educational system, and in 1913 the General Assembly passed very good laws in this regard. Laws were also passed in this year relating to school sanitation and health supervision.

The consolidation of the rural schools has improved the system of grading and has established an advanced district high school. Several counties employ supervisors for the rural schools to overlook the work, advise and direct the teachers. The department of agriculture of Purdue University has in recent years carried on a campaign for the organization of corn, potato, and tomato raising and canning clubs for boys and girls.

A large proportion of the teachers have received a collegiate and normal-school training. The State has always been liberal in the support of schools. The common-school fund on June 1, 1912, amounted to $8,960,113, and the congressional township fund to $2,475,856. The total amount distributed for the support of schools in 1912 was $16,443,654. Of this $9,910,801 was expended for teachers. The average yearly salary of teachers of all grades in the high schools was $566.20 in 1912. The township institute is an important feature of the educational system; at least one Saturday in each month during the school term is devoted to township institutes or model schools for the improvement of teachers, the work being outlined each year by the State Superintendent of Education. This feature has been a powerful factor in rural education, being the means by which teachers with little supervision may exchange ideas and methods and coöperate for the advancement of education.

There are a number of special schools—for the education of the blind, for the education of deaf mutes, the Indiana Boys' School, the Indiana Industrial School for Girls, Soldiers and Sailors Home, the Indiana Reformatory, School of Letters, and the Indiana School for Feeble-Minded Youths. There are normal schools at Indianapolis, Terre Haute, Danville, Marion, Muncie, and Angola. The institutions of higher learning are Indiana University at Bloomington (coeducational), St. Joseph's College at Collegeville, Wabash College at Crawfordsville, Earlham College (coeducational) at Earlham, Concordia College at Fort Wayne, Franklin College at Franklin, Goshen College at Goshen,

De Pauw University at Greencastle, Hanover College at Hanover, Butler College at Indianapolis, Purdue University at Lafayette, Moores Hill College at Moores Hill, Taylor University at Upland, Valparaiso University at Valparaiso, and Vincennes University at Vincennes. The last-named 10 colleges are all coeducational. There are also St. Mary's College and Academy for Women, University of Notre Dame at Notre Dame, and St. Meinrad College at St. Meinrad. These three are under the auspices of the Roman Catholic church. The Rose Polytechnic Institute at Terre Haute is an important scientific institution.

Charities and Corrections. There were, in 1914, 17 State charitable and correctional institutions. These included the Central Hospital for the Insane at Indianapolis, the Eastern Hospital for the Insane at Richmond, the Northern Hospital for the Insane at Logansport, the Southern Hospital for the Insane at Evansville, the Southeastern Hospital for the Insane at Madison, the Soldiers Home at Lafayette, the School for Feeble-Minded Youth at Fort Wayne, the Village for Epileptics at New Castle, the School for the Deaf and the School for the Blind at Indianapolis, the State Prison at Michigan City, the State Reformatory at Jeffersonville, the Indiana Girls School at Clermont, and the Indiana Boys School at Plainfield. These institutions on Sept. 30, 1913, had 12,529 inmates, and for the fiscal year 1911–12 there were expended for their support $2,318,347, an average of $202.69 per inmate. In addition to maintenance expense the institutions spent $316,443, or a grand total of $2,634,791. Under a law enacted in 1909, all these institutions operate under a uniform plan of administration. A bipartisan board of four trustees for each institution is appointed by the Governor; these boards appoint their respective superintendents; the superintendents appoint and discharge their subordinates, who under the law must be selected on account of their fitness, without regard to political or religious affiliation. All these charitable and correctional agencies are under the supervision of the Board of State Charities, created by the Legislature of 1889. Its purpose is the supervision of the whole system of public charities of the State; its duties are to see that every inmate of every public institution receives proper care, that the public funds are properly expended, that the institutions are properly conducted, and that their management is protected from unjust criticism.

Religion. The Methodists from the pioneer days to the present have been the leading denomination, having more members in Indiana in proportion to the total State membership of all churches than in any other Northern State. In recent years the "Christian" church has had a phenomenal growth. The Roman Catholics are proportionally weaker than in any other Northern commonwealth. Altogether 55 different denominations are represented. Besides those mentioned, the most important are the Lutherans, Baptists, Presbyterians, United Brethren, and Friends.

History. French trappers and fur traders appeared within the present limits of Indiana as early probably as 1679. It is certain that La Salle, on his way to the Illinois Indians, crossed the northwestern part of the State by way of the Kankakee in 1680. The Miamis and Ouabachi (or Wabash) Indians then occupied the region and welcomed the French, who built Fort Ouatanon, on the Wabash, in 1720, and Fort Vincennes in 1727. The first permanent settlement was founded in 1734–35, by a number of families who made their home in the neighborhood of Fort Vincennes. The population increased slowly; but, owing to the richness of the soil, the inhabitants (French entirely, together with negro and Indian slaves) enjoyed ease and great plenty. The territory came into the possession of England in 1763, but the English occupation was too brief to effect any change in the people or the laws. In 1778–79 George Rogers Clark (q.v.), with a handful of men, wrested the country from Great Britain. Hostilities with the Indians, continuing from 1781 to 1795, when a peace was conquered by General Wayne, brought great distress upon the settlers at Vincennes. In May, 1800, the Indiana Territory was organized, comprising all that portion of the Northwest Territory lying west and north of Ohio. Michigan and Illinois were subsequently set off, reducing Indiana to its present extent. The capital was moved from Vincennes to Corydon in 1813 and to Indianapolis in 1825. In 1811 Gen. William H. Harrison (q.v.), at the head of a force of regulars and militia, crushed the Indian tribes under the brother of Tecumseh at the battle of Tippecanoe (q.v.). When the war with England broke out, the Indians renewed hostilities; but they were speedily subdued and nevermore troubled the settlers. As in the case of Illinois, a large proportion of the immigrants into Indiana came from the South, and before 1816 repeated attempts were made to legalize slavery in the Territory, in spite of the Ordinance of 1787. In 1816, the year of the State's admission into the Union, the question was definitely settled against slavery by the first constitutional convention, though a law prohibiting negroes and mulattoes from immigrating into the State remained in force till after the Civil War. The growth of the State in wealth and population was accelerated greatly by the construction of the National Road and the Wabash and Erie canals. Wild speculation in lands and railroads led to a general bankruptcy in 1837; but after 1846, when a compromise with the public creditors was effected, the economic and financial condition of the State improved steadily. Its prosperity since the Civil War has been due in great measure to the discovery of extensive coal, iron, and gas fields, and valuable deposits of building stone, in different parts of the State. Conditions have been monotonously peaceful, except for spasmodic eruptions of mob violence, notably in the years 1869 and 1888, and the disorders around Hammond attending the great railway strike of 1894, when strikers and Federal troops came into conflict. As a result of the strike, a board of labor commissioners was created in 1897 to act as a permanent tribunal of arbitration. In the same year an antitrust law and a factory-inspection law were passed, and primary education was made compulsory. For more than 20 years after 1878 the State balanced almost perfectly between the two great political parties, vacillating, in State elections especially, from side to side by minute majorities in a total vote of several hundred thousand. The opportunity for political manipulation was correspondingly great, and in national elections every device known to practical politics was brought into play to gain the electoral vote of the State.

Lawmaking was carried on frequently in a partisan spirit, and it was a favorite manœuvre with the minority in the Legislature, Republican or Democrat, whenever it was hopelessly outnumbered on an important question, to resign in a body, so as to prevent a quorum and thus block legislation. In national elections the State was Democratic up to 1860, excepting in the years 1836 and 1840, when it cast its vote for William H. Harrison, the Whig candidate. It was Republican from 1860 to 1872, Democratic in 1876, 1884, and 1892, and Republican again in 1880, 1888, 1896, 1900, 1904, and 1908. It was Democratic in 1912. The Governors, since its organization as a Territory, have been as follows:

TERRITORIAL

William H. Harrison	1800–11
John Gibson	1811–13
Thomas Posey	1813–16

STATE

Jonathan Jennings	Democrat-Republican	1816–22
William Hendricks	" "	1822–25
James B. Ray	" "	1825–31
Noah Noble	" "	1831–37
David Wallace	Whig	1837–40
Samuel Bigger	"	1840–43
James Whitcomb	Democrat	1843–49
Joseph A. Wright	"	1849–57
Ashbel P. Willard	"	1857–61
Henry S. Lane	Republican	1861
Oliver P. Morton	"	1861–67
Conrad Baker	"	1867–73
Thomas A. Hendricks	Democrat	1873–77
James D. Williams	"	1877–81
Albert G. Porter	Republican	1881–85
Isaac P. Gray	Democrat	1885–89
Alvin P. Hovey	Republican	1889–91
Ira J. Chase	"	1891–93
Claude Matthews	Democrat	1893–97
James A. Mount	Republican	1897–1901
Winfield T. Durbin	"	1901–05
J. Frank Hanly	"	1905–09
Thomas R. Marshall	Democrat	1909–13
Samuel M. Ralston	"	1913–17
J. P. Goodrich	Republican	1917–21
Warren T. McCray	"	1921–

Prior to 1908 laws were in existence placing definite restrictions on the licensing and conducting of saloons. In that year, at a special session, Governor Hanly obtained the passage of a county option law. The Democrats were victorious in the elections of that year, but failed in an attempt to have this law repealed, their object being the substitution of a local-option law. During the year 66 out of 92 counties voted no license. The election that year was hard fought, and though Taft was victorious by a plurality of 10,731 votes, a Democratic Governor and Legislature were elected. The vote was as follows:

PRESIDENT		GOVERNOR	
Taft, Rep.	348,993	Marshall, Dem.	348,493
Bryan, Dem.	338,262	Watson, Rep.	334,040
Debs, Soc.	13,476		

The Democratic Legislature resulted in the election, on Jan. 19, 1909, of B. F. Shively to the United States Senate. In 1910 Thomas Taggart, leader of the State Democratic organization, opposed John W. Kern, defeated candidate for Vice President in the past election, for nomination for the seat held by Senator Beveridge in the United States Senate. Though the majority of the delegates were pledged to Taggart, strong opposition arose, and Kern secured the nomination. The election of a Democratic Legislature insured his election on June 17, 1911. In January the Legislature repealed the county option law, substituting the township or ward as the unit of option. On February 26 the first election was held in 40 cities and townships under the new law. As a result, three cities—Martinsville, Connersville, and Wabash—changed from "dry" to "wet," and Crawfordsville, Tipton, Frankfort, Mitchell, and Bedford voted "dry." Governor Marshall's participation in the national campaign of 1912 as candidate for Vice President caused unusual interest. Ex-Senator Beveridge was a Progressive candidate for Governor, opposed to Winfield T. Durbin, Republican, and Samuel M. Ralston, Democrat. The result of the election follows:

PRESIDENT		GOVERNOR	
Wilson, Dem.	281,890	Ralston, Dem.	275,357
Roosevelt, Prog.	162,007	Beveridge, Prog.	166,124
Taft, Rep.	151,267	Durbin, Rep.	142,859
Debs, Soc.	36,931		

The Legislature was again Democratic. In the election of 1913, mostly for municipal offices, the Democrats swept the State. Indiana has 13 members in the House of Representatives. In November, 1914, Senator Shively was reëlected.

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INDIANA. A romance by George Sand (1832), and the name of the heroine, a young Creole.

INDIANA ASBURY UNIVERSITY. See DE PAUW UNIVERSITY.

INDIAN AFFAIRS. The position of the Indians still under tribal organization within the limits of the United States is anomalous. Strictly speaking, they are not a part of the body politic, but are regarded as "domestic dependent nations" and are officially spoken of as the "wards" of the nation. Their right to regulate their domestic affairs is conceded, but this right has been restricted by acts of Congress enlarging the jurisdiction of the Federal courts in respect to crimes committed by Indians. The Cherokees, Chickasaws, Choctaws, Creeks, and Seminoles, formerly known as the Five Civilized Tribes, developed well-ordered governments. Each nation had its own popularly elected executive, legislature, and judiciary. They were permitted to enact such laws for the regulation of their internal affairs as did not conflict with the Constitution and laws of the United States, while the decisions of their courts received the same recognition as to faith and credit as did those of the Territories. The title to land occupied by them was vested, not in the individual members of the tribe, but in the nation as a whole, and it could be alienated only with the consent of the United States government. The Supreme Court has held that an Indian born within the jurisdiction of a tribe can become a citizen of the United States only by naturalization. By an Act of Congress, however, passed in 1887, it was provided that Indians residing on lands allotted to them in severalty should be considered as citizens of the United States without the formality of naturalization. The immediate effect of the Act of 1887 was to confer citizenship upon 10,122 Indians to whom allotments had already been made

under special laws and treaties. Every year from 1000 to 2000 Indians signify their desire of becoming citizens by taking allotments. By Act of 1911 the property of the Five Civilized Tribes was allotted in severalty. The work of distributing the lands and of selling unallotted lands for the benefit of the members of the Cherokee nation was practically completed in 1914, and the tribe had ceased to exist as a political entity. In 1914 it was estimated that about two-fifths of the Indians of the United States were still living in tribal relations with property unallotted. The Constitution confers upon Congress the power to regulate commerce with the Indian tribes, and until the year 1871 the common method of dealing with them was by treaty through the agency of special commissioners. In that year, however, an Act of Congress abolished this practice and placed under the immediate control of Congress all commercial or diplomatic intercourse with the Indians.

From an early period it has been the practice of the government to conclude treaties with the Indians for the extinction of their possessory right to the lands occupied by them and for their removal to certain territories, known as reservations, specially set apart for their occupation. Whenever the United States sets apart an Indian reservation, whether within the territorial limits of a State or not, it has full authority to protect the Indians in their persons and property and to provide for the punishment of all offenses committed within the reservation. An Indian reservation lying within the limits of a State is, however, subject to its jurisdiction also except so far as concerns the government and protection of the Indians themselves, unless otherwise provided by treaty with the Indians. While all territory officially known as "Indian country" is subject to the jurisdiction of the United States, and while it belongs to Congress to enact laws for the regulation of intercourse of Indians with one another and with citizens of the United States, it is the policy of the government to leave to the Indians the regulation of their own domestic concerns as far as practicable. By acts of 1885 and 1890 Congress curtailed the jurisdiction of the Indian tribal courts. By the Act of 1885 the authority to administer their own criminal laws among themselves, so far as certain enumerated crimes committed by Indians are concerned, was withdrawn and vested in Territorial courts.

It is the policy of the United States to exercise a general supervision over the affairs of the Indians and to protect them from the encroachments of unscrupulous whites, as well as from the evil consequences of their own ignorance and improvidence. Many statutes have been passed by Congress to prohibit hunting on their lands, to prevent cutting timber from their lands or pasturing stock on them, to prevent the sale of intoxicating liquors to them, etc. Citizens of the United States of good moral character are permitted to trade with Indian tribes, upon giving bonds. The power of appointing and licensing Indian traders, as well as prescribing rules concerning the kind, quantity, and prices of goods to be sold, belongs to the United States Commissioner of Indian Affairs. This officer is further empowered to remove from Indian reservations all persons found there contrary to law or whose presence is deemed detrimental to the peace and good order of the Indians.

Until 1832 the supervision of Indian affairs was intrusted to a bureau in the War Department. In that year Congress authorized the President to appoint a commissioner charged with general superintendence of Indian affairs. He has the direction of eight inspectors and a large number of superintendents, agents, teachers, mechanics, etc. Since 1849 the business of Indian affairs has constituted a bureau in the Department of the Interior. The most numerous officials in the Indian service are the agents, appointed by the President for a term of four years, who are required to give bonds. Their duties are to superintend the intercourse among Indians within their respective agencies and to execute the orders of the commissioner. An important feature of the Indian service is the educational work. The President is empowered to employ capable persons to instruct the Indians in agriculture and to teach their children reading, writing, and arithmetic. By an Act of 1882 he was authorized to appoint an inspector of Indian schools. The schools under government control are the nonreservation training schools and the reservation boarding and day schools. Besides these there are contract schools under the supervision of religious associations which receive government aid. By an Act of Congress passed in 1890, provision was made for field matrons who organize sewing schools, weekly clubs, and Sunday schools among the Indians. In 1913 there were nearly 40,000 pupils in government Indian schools and between 7000 and 8000 in other schools receiving government aid. The policy now being pursued by the government will result in the incorporation of all Indians in the body politic as citizens, and with it the Indian reservations will disappear, the individuality of the Indian will be recognized, and the paternal care and control now exercised by the United States will cease.

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IN'DIANAP'OLIS. The capital and largest city of Indiana, and the county seat of Marion County, situated in the centre of the State, on the west fork of White River, 183 miles southeast of Chicago and 111 miles northwest of Cincinnati (Map: Indiana, C 3). It lies 700 feet above sea level, in a broad rolling plain, rich in agricultural and mineral resources and in forest trees of exceptional beauty. Large oil fields are in the vicinity; also coal lands 6500 square miles in extent, and deposits of building stone, marl, and other minerals. Wholly an inland city, Indianapolis relies on railways for its commerce, and its location within 60 miles of the centre of population of the United States for the past three decades has made it a great railway centre. Here terminate nine divisions of the Big Four system, six divisions of the Pennsylvania Railroad, one division of the Illinois Central System, the Lake Erie and Western, Chicago, Indianapolis, and Louisville, and the Cincinnati, Hamilton, and Dayton, besides 13 electric systems. The railways bring their passenger trains into a union

station and the interurban lines have erected a large union terminal station costing over $1,000,000. Freight passing Indianapolis is carried over a belt railway 15½ miles long, on which are situated 125 industrial establishments, including the Union Stock Yards. The street-railway system represents an outlay of about $9,000,000, with 144 miles of tracks, and a park (Fairview) containing 200 acres.

The city has broad streets, ranging from 40 to 120 feet in width and shaded mainly by maples and elms and crossing at right angles. In the heart of the city is a circular plaza, once known as the Governor's Circle, and now called Monument Place. The park system comprises 3000 acres and includes Riverside, extending for 5 miles along both sides of White River, Garfield, Brookside, Military, St. Clair, University parks. The motor speedway is one of the largest in the country. The most notable structure in Indianapolis is the Soldiers' and Sailors' Monument, designed by Bruno Schmitz, of Berlin. It was erected at a cost of $500,000 by the State to commemorate the part Indiana bore in the wars of the Union. The monument is a shaft of stone and bronze, 285 feet in height, surmounted by a figure of Indiana. About the base are allegorical groups in stone representing war and peace, and beneath these are two great fountains. Near the monument are four subsidiary bronze statues of Gen. George Rogers Clark, Gen. William Henry Harrison, Gov. James Whitcomb, and Oliver Perry Morton. There are also statues of Schuyler Colfax, Oliver P. Morton, and a bust of Robert Dale Owen, in University Park, and, in the Capitol Grounds, of Thomas A. Hendricks. In the County Court House grounds there is a statue of Gen. Henry W. Lawton. The buildings most worthy of note are the Capitol, 492 by 185 feet, built of Indiana limestone at a cost of $2,000,000; the United States Court House and Post Office; Tomlinson Hall; City Hall Building; Columbia Club; the Propylæum, a woman's building devoted to literary and social purposes; the Public Library, with 100,000 volumes; and the John Herron Art Institute. There are many large business blocks and hotels, e.g., the Merchants National Bank Building, the Odd Fellows', the Masonic Temple, the Fletcher Savings and Trust Company, the Terminal Station, the Hume Mansur, the Claypool Hotel, and the Severin Hotel. The Benjamin Harrison Army Post is north of the city. Six of the city's bridges possess more than ordinary beauty; they span Fall Creek at Illinois Street, Meridian Street, Central Avenue, College Avenue, and Thirtieth Street, and White River at Thirtieth Street. The public-school system includes the common schools with 70 buildings, three high schools, and a normal training school. The medical college in the city is a department of Indiana University. The Long Hospital is a part of this. In addition there are the Indiana Dental College, the Indiana Law School, Butler College, the Indiana Veterinary College, Indiana Central University (under control of the United Brethren church), the Art School connected with the John Herron Art Institute, and several schools of music.

The State has placed some of its institutions in Indianapolis. There are, e.g., the Indiana Prison for Women, with a correction department, the Central Hospital for the Insane, the State School for the Deaf, and the State School for the Blind. The hospitals are the Deaconess, Methodist, St. Vincent's, City Hospital, and many private institutions.

All religious denominations are well represented by 257 organizations with buildings. The Christian Associations have three centres—the Young Men's Christian Association, the Young Women's Christian Association, and the Colored Young Men's Christian Association.

There are many clubs, literary, social, and political. Perhaps the best known are the Woman's Club, the Indianapolis Literary Club, the Männerchor and Deutsche Haus (both with excellent buildings), the Marion, Columbia, Republican and Indiana Democratic clubs. The best known theatres are the Murat and English's.

The city government consists of a mayor, a council of nine members (elected at large), a city clerk, and a police judge, all elected by the people every four years. The members of the various boards are appointed by the mayor: board of safety and board of public works of three members each and board of health and park board of four each. The mayor also appoints the corporation counsel, city attorney, and city controller. The school corporation is independent of the city corporation and is composed of five members chosen by the people and serving four years.

Expenditures for 1912 are given as follows: finance, $206,366.20; public works, $1,199,510.16; public safety, $874,551.63; health and charities, $181,263.58; legal, $16,667.71—a total of $2,478,359.28. The park board expenditure should be added to this, $562,716.99. The disbursement for school purposes amounted to $1,519,198.74. The assessed valuation is $218,029,220; the bonded indebtedness, $3,403,300.

Pop., 1850, 8091; 1860, 18,611; 1870, 48,244; 1880, 75,056; 1890, 105,436; 1900, 169,164; 1910, 233,650. The population in 1910 included 19,767 foreign born and 21,816 negroes. United States estimate for 1914, 259,413; 1920, 314,194.

Indianapolis is a port of entry and a point for the receipt and distribution of foreign as well as domestic commerce. Its chief articles of trade are hominy, live stock, meats, and the output of its extensive manufactories—milling machinery, engines, drugs, automobiles, quartered oak veneer, furniture, bags, woolens, and starch. In 1914, there were 886 industrial establishments employing an average of 30,971 wage earners and whose value of products amounted to $39,700,016.

Settled in 1819, Indianapolis received its name in 1821 and became the capital on Jan. 1, 1825, the seat of government being removed from Corydon. The opening of the first railroad in the State from Madison, on the Ohio River, occurred on Oct. 1, 1847, and gave the little town its first impetus. The growth since 1889, when the introduction of natural gas revolutionized manufacture in Indiana, has been remarkable. Consult: *Indiana Gazetteer* (Indianapolis, 1849); Nowland, *Early Reminiscences of Indianapolis* (ib., 1870); Sulgrove, *History of Indianapolis and Marion County* (Philadelphia, 1884); Holloway, *Indianapolis* (1870); Dunn, *Greater Indianapolis: The History, the Industries, the Institutions, and the People of a City of Homes* (1910).

INDIAN ARCHIPELAGO, ĭn'kĭ-pĕl'ā-gō. See MALAY ARCHIPELAGO.

INDIAN ARMY. See UNITED KINGDOM, *Army;* EAST INDIA ARMY.

INDIAN ART. The chief art of India his-

torically is its architecture, though the decorative arts, sculpture, and mural painting, together with a highly developed art of designing in metal work, jewelry, miniature and other painting, pottery, and textile fabrics, have a peculiar value and interest of their own.

ARCHITECTURE

In the antiquity of its architectural monuments India cannot compare with a number of ancient nations, because the earliest constructions were made of wood and clay. In the remote period of Vedic times (see VEDA) the houses seem to have been built almost entirely of wood, as they still were as late as the end of the fourth century B.C., when Megasthenes was the Greek Ambassador of King Seleucus (c.300 B.C.) to the Mauryan court at Pataliputra; for Megasthenes then spoke with admiration of the vast wooden halls of the Indian King, with their richly adorned columns, embellished with gold and silver. From allusions in the ancient hymns of the *Rig-Veda*, it seems clear that the builder's art, besides erecting buildings, extended also to the construction of fortified inclosures, of use in war, consisting of earthworks strengthened by a stockade or occasionally reënforced by stone. Yet none of these early structures have survived, and it is doubtful if traces of this application of the builder's skill, prior to the sixth century B.C., can be found. Stone and brick came into general use in the third century B.C., in the time of Asoka (c.250 B.C.), and here architectural history begins. It falls into three main religious divisions: (1) Buddhist (300 B.C. to c.700 A.D.), in which period architecture commences to decline in the fifth century; (2) Jaina and Brahman, existing side by side in harmony with Buddhism in certain regions, from 600 to 1200 A.D., and then dividing the field with the (3) Mohammedan style, which began with the Afghan invasion in the early eleventh century. Since the English conquest Indian architecture has lost much of its vitality. There is no unity in India under these periods or styles. Local differences are enormous. The two main geographical divisions are north India, which was the earlier to develop, and south India. At the same time Indian art as a whole has certain common characteristics throughout its various local schools. It far excels in architecture at least the art of China and Japan, and it governs the art of neighboring regions like Tibet, Cambodia, Burma, and Siam, and islands like Java and Ceylon, which owe their civilization to India.

In seeking to explain the origin of Indian architecture, some traces of Greek influence have been found in the north, filtering through the Greek Kingdom of Bactriana, and visible in early monuments of Kabul and Kashmir, in the Ghandhara monasteries of Jamalgiri and Takht-i-Bahi, and in India proper at the Amravati Stupa; but the strongest early influence appears to have been that of Persia, which was flourishing when Indian art commenced. Yet whatever suggestions were received, they serve but to bring out the originality of Indian art, which stands at the antipodes of Greece in its exaggeration of forms, its multiplication of details, its love of complicated and confused lines, its lofty disregard of utilitarian considerations and of structural expression. At the beginning comparative simplicity reigned, and it was not until long after the Christian era that the richness of design was reached which remained characteristic. This was partly due to the use of brick, instead of stone or marble, in nearly all open-air structures before the tenth century A.D., which diminished the opportunity for elaborate surface ornamentation. To classify Indian architecture, to divide it into well-marked styles and periods, is impossible, because of the scarcity of the historical records, and the confusion and overlapping of races (Aryan, Dravidian, and Mohammedan) and the different religious needs. To a certain extent the dominance first of Buddhism and later of Jainism suggests natural divisions. But Buddhism has wholly disappeared as an architectural factor; while, since the tenth century the Jaina and Brahman faiths have existed side by side and the Moslem faith in addition since the twelfth. On the whole, as indicated above, Fergusson's system serves as well as any, and, slightly modified in nomenclature, will be followed here. Leaving the Moslem architecture to be treated under the article MOHAMMEDAN ART (q.v.), we assume five style divisions: the Buddhist, the Jaina, the Brahman in northern, central, and southern India. Thus the distinctions of style are partly chronological, partly religious, partly geographical.

Buddhist Period. Buddhism and Jainism (q.v.) appear to have arisen nearly at the same time (in the first half of the sixth century B.C.), but all the early monuments of India down to 600 A.D. belong to the Buddhist faith. They comprise *chaityas*, or chapels, *vihāras*, or monasteries, and *stūpas*, or shrines, usually of circular plan. The chaityas and viharas were almost all excavated in the rock between 250 B.C. and 600 A.D., the majority of them in the Bombay Presidency. The temples are large oblong halls, divided into nave and aisles by two rows of heavy columns, approached by a vestibule with an arched façade, richly carved, and have at the apsidal end a *dagoba* (dāgaba), or shrine, or sometimes a statue of Buddha. The earliest—at Bhaja—are the smallest and simplest. At Karli (78 B.C.) the nave has a stilted tunnel vault, and the heavy columns are octagonal, with elephant capitals, and the interior somewhat resembles a dark, tunnel-vaulted French-Romanesque church. Even more impressive are the largest cave temples at Ajanta, Nasik, and Ellora (q.v.), where temples and monasteries are multiplied side by side in the face of the rock. The sculptures and frescoes at Ajanta are of special interest. The monasteries, often grouped about these temples, consist each of from one to four courts or central halls surrounded by cells, all cut out of the rock. One of those at Ajanta has a court 65 feet square, supported by 20 pillars; the court of the great vihara at Bagh is 96 feet square, with 36 columns, and is preceded by a rock-cut colonnaded porch, 200 feet long. None of the early wooden viharas has survived. The third class (the *stūpas*, or *topes*) are great brick memorial mounds of circular form. They are of conical or of domical outline, surmounted by a little chapel or shrine, and surrounded by a marble rail or balustrade entered by four gates. They are found in groups, the most important at Bhilsa, Manikyala, and Amravati in India, and in Ceylon. The Sanchi tope is in splendid preservation and is remarkable for its elaborate and beautiful figured sculptures. The only structural (as distinguished from rock-

hewn) monument of the Buddhist period, Buddh Gaya, or Boddhi Gaya (c.100 B.C.), is in the form of a tower-like edifice in many stepped stories, upon a square base, at the corners of which rise four small pyramids. It is 52 meters high, and, like all the other early monuments, it is built of brick.

Jaina Style. The existence of a distinct Jaina style has been disputed by some authorities, like Vincent Smith and Coomaraswamy, who hold that the so-called Jaina style of architecture, as in Gujarat and elsewhere in the west, is not especially Jainistic, but is a local style, characterized by a free use of columns, richly carved, and other particular features. On the other hand, certain specialists, like Fergusson, claim that the Jaina temples previous to 1000 A.D. are easily distinguished from the Brahman, both by their plans and their details. While Jainism arose contemporaneously with Buddhism, it has left us few monuments earlier than 900 A.D., and its architecture ceased to be distinctive within a few centuries thereafter. The Jaina monuments, with the exception of a few caves, indistinguishable from the Buddhist caves, at Badami, Ellora, etc., are structural. The temples are elaborate edifices, set in courts surrounded by cells containing seated figures of Tirthakaras, or deified saints. The sanctuary is preceded by a *mantapam*, or porch, and surmounted by a lofty *sikhra*, or tower, its other portions being covered by domes built in horizontal courses. The architectural details of sculpture and carving are extraordinarily rich and intricate, and stone brackets, obviously derived from wooden prototypes, are notable features. The earliest and perhaps finest group is on Mount Abu (1032); others are at Girnar, Somnath, Gwalior, etc. In many cases, as at Khajuraho, the later Jaina temples are identical in style with the Brahman; in others they resemble the Moslem mosques in detail, though not in plan. Towers of Victory at Chittur are striking monuments of Jaina design. It is in the Jaina architecture that one first notes the tendency to stratification and endless multiplication of breaks, both vertical and horizontal, in exterior design—characteristics which became almost universal in the Brahman styles and to some extent in the Indo-Moslem. See JAINISM.

Brahman Styles. The Brahman, or Hindu, architecture comprises three quite distinct styles: the northern, the central, or Chalukyan, and the southern, or Dravidian. The monuments of the northern style are hardly to be distinguished from the Jaina temples, except by the absence of courts with Tirthakara cells and of bracketed domes. As in the Jaina temples, their most conspicuous feature is a *vimana*, or *śikhara*, topped with the *amalaka*, or melon-shaped ornament. They date chiefly between 600 and 1200 A.D. and are by some authorities subdivided into three groups: (1) in the northeast, Orissa; (2) in Bundelkhand and Rajputana; (3) in Gujarat.

The earliest monuments of the style are in Orissa, where it flourished for 700 or 800 years. The numerous temples at Bhuvaneswar are its highest expression. The tower of the larger temple (c.600 A.D.) is 180 feet high, and near it is the Black Pagoda, whose superb decoration marks a new era. But in general these temples are small. Much later (c.1200 A.D.) is the temple of Jaganath (Juggernaut), at Puri, which shows the decadence of this style.

Quite distinct is the contemporary school of Rajputana, whose ruined city, Khajuraho (Khajrao), with its miles of ancient buildings, is unsurpassed in India. Among its 40 temples, belonging to the Jaina religion and to both branches of the Brahman—the Vaishnavite and Shaivite—there is little or no distinction of style. Their plan is elaborated by the projection of wings and porches, and the elevation is enriched by the grouping of many subordinate spires around the central vimana. Each temple stands on a stone platform and ordinarily measures about 40 meters in height and 35 meters in width. Like the preceding, the remarkable temples at Gwalior date from the tenth to the eleventh century. Decorative and figured sculpture now spreads luxuriantly over every inch of surface. The interiors are small and dark, the supports heavy and broken, and the decoration of the pyramidal exterior by innumerable small repetitions of its own form has become the most effective part of the style. The famed Khandarya Mahadeo (c.1000 A.D.) is the most remarkable of this extraordinary group. At Brindaban is a fine ruined temple; at Kantannagar a very late temple of terra cotta in a mixture of the Brahman and Moslem styles (1704).

Chalukyan. Passing to the centre of India, we find few but important works. The temples of Ellora (q.v.), famous the world over, exemplify the fusion of Buddhism and Brahmanism. There are about 30 excavated in the rock over a distance of two kilometers. The earliest and greatest temple is that of Visvakarma, $26 \times 13 \times 10$ meters, divided into three aisles by 38 pillars. The temple of Indra is remarkably rich decoratively, but less so than the Kailasa (see ELLORA), which is a free-standing monolithic temple, cut out of a single mass of rock, and one of the most fantastic and brilliant creations of Indian art. Another group of subterranean temples is on the island of Elephanta (q.v.), dating approximately from the eighth century and easily visited from Bombay. The absorption of Buddhism by Brahmanism, seen during its earlier stages at Ellora, is almost complete at Elephanta, as shown by the sculptures and ritual. Some of the colossal statues are very impressive. These rock-cut temples, however, do not exhibit the characteristics of the structural temples of the so-called Chalukyan style, so named from the dynasty to whose reigns they belong. This style prevails in various centres between the Nerbudda and Kistna rivers and in the Province of Mysore to the southwest. The Chalukyan temples have shrines star-shaped in plan, and the vimana is a low pyramidal mass, not a lofty sikhra. All the details are extraordinarily rich. The temples stand on raised platforms, and their lower portions are deeply cut into stratifications, with successive bands of sculptured animals and carved ornament. Pierced stone slabs fill some of the intercolumniations. Some of the temples have double shrines, and a few are even triple. The earliest, dating from the tenth century, is at Buchhanapally, near Hyderabad; the most magnificent is the Great Temple at Halebid in Mysore; other examples are at Bailur, Hanamkonda, and Somnathpur. At Norangal is a remarkable gate, the Kurti Stambha.

Dravidian. In the south Buddhism never had a strong hold, though there are some subterranean rock-cut temples, the earliest monuments in the region. There are two groups, at

Mahabalipur and at Badami. At the former is a most interesting series of small monolithic temples in the open, similar to the Kailasa at Ellora, and apparently the prototypes of the later pagodas of the south. Both groups are thought to belong to the sixth century A.D. and are among the earliest-known Brahman temples.

Coming now to the distinctively Brahman monuments of the style which Fergusson has called the Dravidian, we encounter a gap of about four centuries in the art of the south, until we reach the earliest pagodas, or *gopurams*, which are characteristic of this region. These gopurams are rectangular truncated pyramids in several stories, forming towers or pylons over the principal gateways of the temples; the largest is about 50 meters high and has seven stories. The temples are not single structures, but aggregations of courts, pillared halls (choultries), porches (*mantapams* or *mandapas*), and corridors, the whole covering a vast area surrounded by walls pierced by gopuram gateways. As singular as their vast extent and the richness of their details is the lack of interior loftiness; the height of halls and corridors being usually between 10 and 30 feet. The plan of the Great Temple at Chillambaram is a rectangle of 500 and 400 meters. There is a large sacred pond (100 × 60 meters), and the main temple has 1000 columns and measures 103 × 60 × 13 meters. In contrast with the buildings of the north is the enormous horizontal scale of such monuments; the choultry of Tiramalla Nayak at Madura measures 100 × 32 meters; the corridors at Ramisseram are 220 meters long. At Tanjore (eleventh century) are a great gopuram tower in 15 stories directly over the sanctuary, the mantapam (or temple) of the sacred bull, an open colonnaded shrine in three aisles, and in one of the two courts the small but exquisite shrine of Soabramanya, with details curiously suggestive of the Renaissance styles. Another group of extremely sacred pagodas—inaccessible to Europeans—is at Tripatty, still another at Conjeeveram.

But the greatest group in the entire south is at Vijanagara (q.v.), which has remained a deserted city since 1565. Its monuments are comparatively late, dating mostly from the fifteenth and sixteenth centuries, and they belong to the culminating period of art in this region. The great pagoda of Liva and the temple of Vitoba illustrate the grandiose and monumental character of the buildings, although their taste is less pure than that of previous centuries. Still later is the great pagoda, or gopuram, at Madura, an immense and imposing composition (seventeenth century). One of the best portions is the present Bazar, or Puthu Mantapam, 100 × 30 meters, with a roof supported by an imposing avenue of 128 piers, mostly in the form of realistic monsters and divinities, in a style much used in the south, but never with such richness and lifelike detail as in this centre of southern architectural remains.

In the matter of size and imposing composition nothing equals the great pagoda of Srirangam, one of the most gigantic edifices in the world and situated in the Trichinopoly district. Here successive rulers added to the original inclosure until there are seven concentric rectangles, the outer one measuring 880 × 760 meters. Aside from its size, there is little merit in the pile, as it is bare or poor in detail and design.

Buddhist Style in Neighboring Lands. Passing now to outlying parts of India and neighboring provinces, we find in the sequestered Province of Nepal, between India and Tibet, an archaic style that explains some of the origins of Indian art and illustrates a connection with China. A first type of monument is that of the large circular domical stupas of earth and brick, set upon a simple plinth without a balustrade and dedicated to Buddha. These are the earliest (Svayambunath, Buddhnath). A second and far commoner type is that of the pagoda-like temples in brick and wood formed of several stories of superposed roofs, each one in retreat and raised at the corners, in perfect analogy to Chinese monuments (Bhatgaon, Patan). A third type is that of stone temples of quite a different style and of admirable design. Chronologically all these buildings are late—not more than two to five centuries old—but they represent earlier types in a region that remained in a prehistoric undeveloped condition. So the class of pagoda-like temples of brick and stone is of extreme interest. It is the same in Burma, where many monasteries were built of wood or brick.

Of even greater architectural interest is Cambodia, whose ruined cities have only recently been explored, with buildings dating between 950 and 1350. Here brick construction and stonework are very successfully combined. The ancient capital, Angkor, has a superb series of temples, particularly that of Nakhon Wat. Its inclosure measures about a mile each way, and the buildings are well composed. As in southern India, there is a large pond surrounded by courts, corridors, and temples. Grouped pyramids are used, in stories of decreasing size. Monumental staircases most effectively connect the buildings. The sculpture is exceedingly rich, but is symmetrically arranged, and the lines are not broken up, but compose simply in a manner quite un-Indian. The Renaissance character of some of the ornamentation is startling; it is undoubtedly a true Indian renaissance from traditions of classic Hindu influences. In quality of detail the Angkor buildings are unsurpassed in India.

In Java, also, there is an interesting offshoot of Buddhist art. Its chef-d'œuvre is the famous Boro Buddor (q.v.), built in the seventh century A.D., a perfect epitome of Buddhist art before its fall. It is a stupa or dagoba in seven stories, approached by five processional paths, along which are 72 small domes surmounting separate dagobas which surround the central one. Nothing like this remains in northern India among Buddhist monuments, so that for comparison one must go to Gandhara, in the northwest, to Jamalgiri and Takht-i-Bahi, which are its prototypes.

Still another region abounding in archæological remains is the island of Ceylon, which also contains a mass of Buddhist monuments. The ancient capital, Anuradhapura, is unique in having a series of Buddhist monuments built throughout nearly a millennium, and long after Brahmanism had displaced Buddhism on the mainland. There remain seven separate stupas, with processional paths, as in Java. Two of these stupas have three rows of high columns surrounding the central mound, monoliths about 26 feet high, suggesting the columns of Persepolis. There is but little sculpture used in the decoration, and in some of it the lines of

hieratic animals give additional points of resemblance to western Asia.

Mohammedan Style. The superb Mohammedan architecture of India is treated under MOHAMMEDAN ART. In some cases, as at Ahmadabad, the fusion with pure Indian art is so thorough as to leave only part of the credit to imported ideas from Persia and Bagdad. But at Agra, Delhi, and Bijapur the style is fundamentally foreign.

DECORATIVE ARTS

General Character. The religious character of Indian art is quite as prominent in other branches as it is in architecture. A knowledge of the intricacies of the Hindu pantheon (see Illustration under INDIA) is a necessary prerequisite to the study of the sculpture and painting, the pottery and even the lacquers, bronzes, and goldsmith work. There is little æsthetic value in most of the mediæval and modern representations of the human figure as such in India; they interest in the mass, as decoration, and because of their subject, as illustrative material for the study of Indian thought. Indian art is essentially symbolic and religiously idealistic. It employs form only as a vehicle for ideas. The Hindu ideal is the very opposite of the Greek inasmuch as form is made light of and moral elevation and meditation are more valued than mere beauty and force. Indian art is thus much nearer to the Byzantine and Gothic than to the Greek. While it is true that many Indian mediæval and modern productions are grotesque or hideous because of a symbolism which disregards æsthetic considerations, the fact must not be lost sight of that for 2000 years "during the so-called dark ages Indian and Ceylonese painting attained a degree of proficiency not matched in Europe before the fourteenth or fifteenth centuries" (V. Smith). The endless repetition of the same theme in the same monument is characteristic of its symbolic use, as it is, indeed, of the Oriental spirit. This impersonal character has favored the extraordinary tenacity of tradition and continuity of style still to be observed in the various provinces. This has been made possible by the hereditary nature and continuous life and organization of the different crafts, not only in the guilds of the cities, but especially in the groups of artisans which, organized as guilds, have for some 3000 years formed an integral part of the village communities of India, supplying its inhabitants by perpetual contract. The sumptuary arts fostered by the aristocracy naturally flourished in the cities and not in these village communities. Despite their adherence to tradition Indian workmen are capable of imitating with skill and success. Although originality vanished centuries ago, no fundamental damage had been inflicted on Indian arts until under British rule the incongruous architecture of Europe, and the degrading methods of machine manufactures came into fashion in place of the native methods of hand work. This tenacity makes it possible to study some of the methods of antique art in modern India, because the continuous overland trade during antiquity and the Middle Ages kept India in constant relations with Persia, Babylonia, and Assyria, Egypt, and the late Hellenic states after Alexander's time, and later with the Mohammedan powers. The stepped temples of Babylonia, the filigree gold jewelry of Etruria and Greece, the enameled tiles of Persia, the products of the looms of Mesopotamia, and, later, the arts of the Mohammedans of Egypt, Syria, and Persia, were all paralleled or echoed in India with greater or less purity. Yet there was always enough of a transformation to give an aspect of Hindu unity to whatever was borrowed. Indian art has always been full of a character of its own. Its greatest successes have been in its decorative work, both on a small scale and in masses, and in the imposing compositions of its architecture. Its failures are due to a poor sense of form both in line and composition.

Sculpture. The early Indian sculpture combines naturalistic modeling with ideal dignity of figure. It does not know the monstrous and grotesque which characterize the mediæval period of architecture. The earliest glyptic monuments are the famous pillar edicts of Asoka (q.v.) and the encircling marble rails belonging to the Sunga dynasty and found at Beshagar, Bharhut, Buddh Gaya, and Sanchi. The sculpture of the Kushan dynasty is not properly Indian but Græco-Roman. It reached its acme in the first two centuries of the Christian era in the remarkable Buddhist reliefs at Gandhara; they are carved on blue clay slate and exhibit traces of color and gilding. Other centres of Greek art are Mathura (Muttra), Sarnath (near Benares), and Amravati (in Madras). This foreign art does not seem to have exercised a lasting influence on the development of Indian sculpture. The monuments of the Gupta dynasty (inaugurated 320 A.D.) are thoroughly Indian. Excellent examples of Gupta workmanship are found at Ajanta, Bagh, Aurangabad, and other places. Neither this sculpture nor that of the succeeding centuries up to the tenth is marred by the introduction of the monstrous as decorative element. Southern sculpture, especially "remarkable for its enormous quantity, fantastic character, often degenerating into the grotesque, and marvelous elaboration, rarely, if ever, exhibits the higher qualities of art" (V. Smith). The three centuries before and the nine after the Christian era witnessed the development, under Buddhist influence, of the most artistic schools of sculpture that India ever saw. In certain parts of the north and northwest, especially, there are traces of Greek and Persian influences, as in several monuments of the region of Peshawar. They frequently show evidence of a realism which was lost later when the figure of Buddha became an object of worship and crowded out the other representations of the male figure. The Buddhist style was continued in Ceylon after it had decayed on the mainland, as is shown at Anuradhapura. The Ceylon sculptures are inferior to those of the mainland. A high degree of excellence is shown by the Boro Buddor (Java) sculptures of about the eighth century A.D., which are very remarkable for their execution as well as their elegant simplicity, directness, and sincerity. Most of these sculptures can be studied in the South Kensington Museum (London) or the Indian Museum (Calcutta) and in the British Museum and the Madras Museum.

The subordination of sculpture to architecture is evident even at this early period: the human figure, though used in colossal size in statues and high reliefs, especially in representations of Buddha, is usually in rather minute proportions and in confused and intricate composi-

tions. Line upon line of reliefs are superposed, in which architectural detail and decorative design play an important part. The rock-cut figures of the caves are hardly as delicate as the earlier sculptures of the rails or the later work on the open-air temples. The almost classic style of Muttra, of which echoes even survive at Amravati, is gradually replaced by one given to grotesque and exaggerated forms: the female figure especially is treated with undue emphasis, the breasts and hips being exaggerated and the arms disproportionately long. Much of the figure is, moreover, hidden by bracelets and other ornaments. Indian sculpture and painting seem to have been checked in their development by Buddhist asceticism. With the worship of Buddha's figure the ideal artistic type came to be the Yogi, an emaciated ascetic sitting cross-legged on a mat and lost in profound and pious meditation. This ideal the Hindus admirably succeeded in embodying in their art, and from this Buddhist point of view the material shortcomings of Buddha's representations—stereotypy, stiffness of the folds, schematic outline, want of anatomical details and of proportion—matter little as long as the transcendent religious idea is clear. Mahayana (q.v.) Buddhism merely multiplied these representations and combined them with symbolic elements which recall the exuberant fancy of the Puranas.

The relative scarcity of portraiture, the prevalence of wood-carving technique in sculpture, and the subordination of this art to architecture are due to its close connection with religious worship. Where religious preoccupation is absent, as in the representation of animals, realism asserts itself, and, especially in the minor decorative pieces, grace, force, and a limited amount of realism are met with. In the words of Mr. Percy Brown, "the very highest form of fine art in India is to be met with in the terra-cotta statuettes made at Lucknow," which are thoroughly realistic. These works of art are the strongest argument in favor of those who, like Havell, hold that the deficiency of religious art is not due to a lack of the æsthetic sense among the Hindus, but to a voluntary renunciation of beauty of form.

The Jaina period of the eleventh century, typified in the temples at Gwalior, Mount Abu, and Khajuraho, shows the existence of a style of exquisite delicacy and profuse richness. Every part of the surface of the temples at Mount Abu, both within and without, is carved, and the later style of Hindu sculptures finds here its prototype. Horizontal lines are emphasized: decorative design is given more importance than purely figured sculpture. Unfortunately the exaggerated deference to ritualistic prescriptions left no room to the artists' fancy. The Digambara sect makes use of the nude. Then and even earlier the art of sculpture received great development in outlying regions, in Kashmir, Tibet, and the French sphere of influence. There probably never existed a style of art in which sculptured ornament was so profuse as in the art of India and its neighbors. A second decadence came with the Mohammedan conquest: decorative design still flourished, but the Moslem dislike for the portrayal of the figure had its effect. Hindu traditions, however, were stronger than the Mohammedan belief: the recent sculpture of Delhi, Bombay, and Madras is directly derived from the eleventh-century style through intermediary stages. Martand and Avantipur in Kashmir, Madura, Ellora, Puri, and Khajuraho contain the foremost works of the old Hindu school. Vincent Smith's *History of Fine Art in India* gives a good classification of the sculptures. The three divisions of the Brahman style—Dravidian, Chalukyan, and northern Brahman—all afforded great scope for sculpture by the elaborate plans and colossal proportions of their sacred buildings. The most extensive and magnificent sculptured effects in the Dravidian style are found at the temple of Rameswaram, in the Chalukyan style (with great prevalence of animal and bird friezes) at that of Halebid, in the northern Brahman (Hindu) at Bhuvaneshwar.

The lack of æsthetic qualities in composition and form, which prevented monumental sculpture from reaching a high level of achievement, was not noticeable in the smaller branches of sculpture, such as carving in wood, marble, soapstone, and ivory, metal work, clay figurines, as well as inlaying and enameling. The naturalism and exquisite detail here appear to advantage. Work in black wood, ebony, and sandalwood is still carried on in many villages, for small objects, and in teakwood for the details of house decoration. Carved ivory is as popular as in China and Japan, both for statuettes and for reliefs of religious and genre scenes, hunts, animals, and birds.

Indian workmen are very adept at incrustations of varied materials—metal, ivory, ebony, etc.—on all sorts of objects. The fabrication of furniture is rather an industry than an art, and is chiefly produced for exportation, Hindu houses being, as a rule, furnished only with beds and trunks, as chairs and tables are for the use of strangers and found only in the reception rooms. The Bombay furniture with its closely carved surface is perhaps the best known. Mughal influence is visible in the decoration of doors and in the woodwork of perforated windows, which are often very artistic.

Painting. There is not the same continuity in the use of painting as in the other larger arts. The oldest example of painting was found in the Jogimira cave of Ramgarh Hill, in the Surguja State; it dates from the second or first century B.C. The wonderful frescoes of the Ajanta caves cover the period from 50 to 642 A.D. These paintings, which sometimes attain colossal proportions, exhibit scenes from the life of Buddha, remarkable for their lines, coloring, and power of expression. Other specimens of painting have been found at Bagh in Malwa. The explorations of Turfan (Chinese Turkestan), carried out since 1891 by Le Coq, Stein, and Grünwedel, have revealed the existence of fresco and distemper painting in which Indian influence is joined to Hellenistic, Persian, and Chinese, without its being possible at present to determine the share of India. On the other hand, Indian influence is clearly traceable in the Sigiri (Ceylon) frescoes of the fifth century A.D. and in the Buddhist art of Tibet, where it came from Nepal, of Cambodia, and of China. The latter country subsequently discharged its debt to India by indirectly influencing Indian miniature painting, though not so much as Persia and Central Asia. While the iconoclastic efforts of the Moslems are chiefly responsible for the absence of remains of painting in India for the nearly 1000 years elapsing between 642 (the close of the Ajanta series) and 1570 (the reign of Akbar), Indian tradition, combined with

Mughal influence, still survives in the Kangri paintings, of which there is an admirable collection in the Central Museum at Lahore. At later times painting was spasmodically employed and became popular in the decoration of sculpture. The identification of the numerous gods by means of their symbols or emblems, and the emblematic use of different colors in their dress, made color an essential element in statuary and relief work. The Mughals introduced the illumination of manuscripts from Persia, and miniature painting became popular, especially at Delhi. The Emperors Akbar and Jahangir are especially famed as promoters of this art. Excellent collections of miniatures are shown in the Calcutta Art Library, the Khuda Bakhsh Library at Bankipur, the Newcastle Library, etc. The Cochran collection in the Metropolitan Museum of Art, New York, contains a number of beautiful specimens. Colored facsimiles of fine miniatures may be seen in Havell, *Indian Sculpture and Painting* (London, 1908). A Bengali national school of Indian painting is a part of the *swadeshi,* or Nationalist, movement in India. Its chief representative is A. N. Tagore. Popular, religious, and mythological painting, too conventional to admit of individual treatment, was probably never absent from India. In it details are often brought out in relief, and gilt gesso and glass and sometimes pearls and jewelry are used to enhance the effect. The purely decorative religious symbols are frequently graceful and elegant of design.

Jewelry. Of all the smaller arts in India, jewelry is the most universally interesting and beautiful. The techniques of filigree and granular work, only recently rediscovered in Europe after antique models, were never lost in India. (See FILIGREE.) There are at least three very primitive types of jewelry: (1) the heavy gold wire twisted into collars, girdles, bracelets, anklets, and necklaces, used originally throughout India; (2) the chopped gold style, made of flat or cubic pieces, strung together and either solid or hollow, all of general use, but now most popular in Gujarat; (3) the flat beaten silver type of many primitive tribes, similar to early Celtic work. There evidently is great similarity between the Indian races and the Etruscans in the profusion of jewelry that was always worn, as is evident from the earliest literature, such as the *Rig-Veda;* and the sculptures show that its forms have remained unaltered for over 2000 years. The present schools are those of Ahmadabad, with its archaic style; of Mysore, Vijanagara, and other towns, in thinnest pieces of beaten gold; of Kashmir and the Punjab, for the use of gems and enamels in richest but always tasteful variety; of Sind and Baluchistan, similar but more solid and severe; of Oudh, formerly centred in Lucknow, similar to that of Delhi and Lahore; of Cuttack in Orissa, famous for silver filigree work; and a multitude of minor centres, like Dacca and Dinajpur in Bengal, the work of the last-mentioned place strongly resembling the primitive Indian. The Parsis of Bombay long held on to antique Persian forms, and the south used mythological subjects. The school of Trichinopoly, with very rich chains, necklaces, and bracelets, has long been a favorite one with Europeans. In short, India has sounded every extreme and form of jewelry, from the most simple and primitive to the richest and most elaborate. (See JEWELRY.) Goblets and other objects of gold and silver are made by jewelers, as the arts of jewelry and gold work are not separate in India.

Pottery. Even more than jewelry the pottery of India, especially in its unglazed varieties, preserves the ancient forms shown in the early sculptures and paintings. The potters of the villages have never changed these forms since very early times. In fact, the special preeminence of the best Indian pottery has always been the strict subordination of color and ornament to form and the conventionalizing and repetition of natural forms in the decoration. Unglazed pottery has been made everywhere in India, and still survives quite generally, especially in the Punjab. Decorative pottery for commercial purposes, painted, gilt, glazed, or even pierced, is made in special varieties in different provinces: e.g., the gilt pottery at Amroha, the black and silvery ware at Azimghar, whose meretricious art is in great contrast to the beautiful glazed ware of Sind (Hyderabad, Jatta, Jerruck, etc.), of Madura, and of the Punjab (Lahore, Delhi, Yang, etc.). The glazed ware of these three schools only is worthy of standing beside the beautiful primitive unglazed pottery. Their knop and flower patterns, and other favorite floral designs, imitate classic and even Assyrian, Persian, and Egyptian originals; the shapes of the vases recall the antique examples found in Oriental, Etruscan, and Greek tombs. The turquoise blue, golden brown, dark green, or purple colors are the most beautiful. The exquisite color tones and combinations can be studied even better in the glazed tiles which came into fashion with the Mohammedan conquest after the eleventh century. These encaustic tiles, when used to cover large wall spaces, or even entire buildings such as mosques, produce an unparalleled effect of splendor. Here especially is Persian influence predominant. The potter was also the image maker, producing innumerable painted clay figurines, mainly of the gods, to be worshiped in families and shrines. The Indians never fabricated porcelain.

The great skill of the Indian potter can be judged from the size as well as from the quality of the vessels he shapes on his wheel and afterward succeeds in baking. In Ahmadabad and Baroda are made jars for storing grain often 5 feet high; in Dacca, on the banks of Dol Samudra, jars of nearly a ton capacity; in Bengal, clay figures of Karthikeya, the Indian Mars, from 25 to 30 feet high. The sumptuous glazed pottery of Sind and the Punjab was probably introduced into India from China via Persia by the Afghan Moguls through the influence of Tamerlane's Chinese wife. Some of the unglazed water vessels still made in every Hindu village have the same forms as those represented on ancient Buddhist sculptures and paintings. The fact that the Hindus have a religious prejudice against using an earthen vessel twice, generally breaking it after the first pollution, causes an immense native demand for the cheap unglazed cooking pots, water jugs, and frying pans. The tiles made in India are inferior to, but resemble, Oriental tiles of the type that adorn the mosques of Egypt, Syria, Turkey, and Persia.

Metal Work. The best illustration of the skill of the Indians in foundry is furnished by the huge iron pillar at Delhi from the time of Chandragupta II (fifth century A.D.), the like of which European industry was not able to pro-

duce up to the latter part of the nineteenth century. Although wholly exposed to rain, it never rusted. A still larger one (over 42 feet in length) is found at Dhar. It dates from 321 A.D. Among the branches of artistic metal work that of the arms and equipment of the great chieftains is prominent. The Buddhist, Hindu, and Jaina sculptures show how antique are many of the forms still in recent use, but of actual works that are preserved the finest do not date back of the great Mahratta warriors. There are two main schools, the Hindu and the Persian. The Punjab and Rajputana have been among the main centres of the art. A comparison of the three great schools of the mediæval Orient shows that the most delicate and simple was the Arab, with its fine filigree work; richer and more highly colored was the Persian with its damaskeening, enameling, and carving; but richest of all was the Indian, which indeed sinned, perhaps, by excess of decoration, breaking the outlines and the color scheme by high relief, hammered and cut goldwork, and a multitude of gems. The collection of the late King Edward VII has the finest examples of damaskeened suits, of crusading blades carved in relief, and of early matchlocks. The use of carved ivory often gives added brilliancy. Diamonds, rubies, and emeralds are the principal stones used, and the designs are largely floral. The collection of the India Museum ranks next to that of King Edward VII. Of the chieftains' swords valued as heirlooms and state possessions, the finest are those of Sivaji, Sultan Chand, and Polygar Katabomma Naik.

Damaskeening (*koft*) in gold and silver wire is a process probably imported during the Middle Ages into India from Persia and Syria. It is practiced in Kashmir, the Punjab, and the Nizam's dominions, though originally of wider use. The ornamentation is in floral patterns, either naturalistic (Bider) or conventional (Purniah). The boxes, hookah bowls, vases, and caskets with this decoration often equal the best Mohammedan work of Egypt and Persia and are among the most harmonious of Indian industrial works for form and well-composed ornament. The relief work in metal is less chaste and admirable, whether in brass, copper gilt, bronze, or the precious metals, where the high relief technique and human and animal figures are often used. The gold and gilt work, however, is usually exquisite. The oldest examples are Buddhist pieces found in the Punjab and Afghanistan with Græco-Roman characteristics. The later work in chased parcel-gilt and gold sometimes pierced, especially that of Kashmir, is beautiful in shape, the gold being often given a ruddy hue or olive brown. Lucknow, Dacca, Cutch, and Gujarat have been famous goldsmith centres. The copper industry is especially flourishing at Tanjore and Madura. It is practiced by a special caste.

Images or idols of gold and silver, brass and copper, or of an elaborate alloy, have always been profusely used in private houses for worship. Some are of gold, as those of Krishna and Sarasvati; others of silver, as those of Sitala; others of copper, such as those of the sun Surya and the serpent Naga. The larger figures are always cast and finished by hand. Mention may also be made of the inimitable bronze statuettes from Vizagapatam, which are a part of the collection of King Edward VII.

Of especial merit are the champlevé enamels in red, green, and blue on gold, done at Jeypore by Sikhs whose ancestors were brought there from the Punjab by Maharajah Jeysingh. There still exist in India innumerable specimens of arms and armor, showing how important was the armorers' work until the *Pax Britannica* put an end to the constant wars between the native states and principalities. Damascus steel is still made at Samandrum, near the Dimdurti mines that have been a source of supply from time immemorial.

Carving. Anciently, elaborate wood carving adorned the thrones of rajahs and princes, the chariots of warriors, and the buildings of all classes. In the Punjab, the Northwest Provinces, Central India, and the Bombay and Madras presidencies, carved façades, doors, windows, balconies, partition screens, and furniture are still made, of high quality and in large quantity. In Burma the Buddhist monasteries and temples are mostly of wood elaborately carved. Carving in *black wood* is an art that has been especially developed in the Madras Presidency. Teakwood carving is also becoming common, as is *tarkashi* work that combines inlaid brass with carving. Sandalwood is a favorite material for fans, combs, rosaries, paper knives, etc. Ivory carving and lacquer work (q.v.) of high quality are produced in many parts of India. See INLAY; MOSAIC; RUGS, ORIENTAL; TEXTILE PRINTING.

Enamel. The extremely difficult art of enameling in champlevé is still practiced in greatest perfection by Sikh craftsmen at Jaipur in Rajputana, unique for the beauty of its ruby reds, coral reds, emerald greens, and turquoise and sapphire blues. Somewhat less perfect are the products of the schools of Lucknow, Benares, and Lahore. Gujarat puts out small objects. Indian enamels are combined remarkably with precious stones. Transparent enamels are used with success, and sometimes a thin plate of gold cut in elaborate scenes of figures and ornamentation and etched with a graver is superposed over an enamel ground melted on a gold back. Spoons, cups, vases, etc., of enameled gold are made at Jaipur, Merwara, Delhi, and Benares; Lahore, Hyderabad, and Lucknow excel in silverwork. The caskets of Pertabghar and the niellé copper objects of Muradabad and Kashmir enjoy a well-deserved fame. In lacquer work, especially as associated with Persia, Indian art is even more preëminent.

Woven Fabrics. The brocades, embroideries, woven tissues, laces, tapestries, and the like, so long one of the greatest prides of India, have suffered more than any other branch of art industry. Kashmir is the home of world-famous woolen shawls, rich in color, brilliant; Surat produces silk prints; while the most sumptuous brocades come from Ahmadabad, Benares, and Murshidabad. The gold-embroidered velvets for state canopies, housings, and caparisons are especially rich. But their designs are not so purely Oriental as are those of the appliqué work on cloth and the early rugs and carpets with their Persian compositions of birds and animals. The jail industry and the so-called schools of industry have done even more than the rush orders from Europe to degrade the quality—both material and artistic—of India carpets.

Textiles. India has long been famous for its silk and cotton textiles, printed and embroidered as well as loom-figured. Cotton fab-

rics of almost every kind are made in Lahore, Amritsar, Multan, and Ludhiana, the last-named city giving its name to the drills and checks produced there. The chintzes of Jaipur and Jodhpur are prized all over India for the purity, brilliance, and fastness of the dyes. At Benares are made gold-figured muslins, and at Bijnor the sacred gold cord and sacrificial thread of the Brahmans. The *bandana* fabrics of Gujarat and Rajputana in the Bombay Presidency are especially interesting on account of the method of dyeing. The cloth, while still in the natural, is tied up with thread into a pattern of tiny squares. When the knots are untied after dyeing, the red or blue ground is seen to be figured with tiny white squares which the dye could not reach. The centre of these squares is often painted yellow by hand. From this process *bandana handkerchiefs* got their name. Sometimes the process is complicated by a succession of tyings and dyeings and is then called *phul-wadi* (flower garden). The *wax-printed* cloths of Peshawar and Deesa are made by applying a mixture of melted lac and beeswax with a wooden stick. Finely powdered mica is then sifted over the design, and the mixture dries hard so that the cloth can stand washing and rough usage. The mica gives it a brilliant lustre. From Poona and Satara come gold-leaf prints, studded with tiny pieces of mirror glass. From Surat come *razais* (bedcovers) brocaded in small squares. The quantity of stuffs, part cotton and part silk, made in India is very great, the Mohammedans being forbidden by the laws of their religion to use pure silk. The brocaded *kincabs* from Benares, Surat, and Ahmadabad have been famous for centuries. From Surat and Madras come silk *sarees* with fancy edgings and trimmings worn by the Hindu ladies as gowns. Embroideries are part of the costume of almost every native in India. The most famous embroideries are those of Kashmir. Excellent in design and workmanship are the silk-on-cotton *phulkaries* from the Punjab and the Hazara frontier. The colors of the Cutch phulkaries are particularly attractive. The tinsel-embroidered stuffs of Delhi, Agra, and Madras, are used for gowns, draperies, bed and table covers, cushion and pillow covers. Rampore *chuddars* are made in plain texture from *pashm*, or *pashmina*, which is the fine, short, soft flossy underwool of the *Capra hircus*, a goat that lives on the lofty table-lands of Tibet. The reason for the name *chuddars* (ring shawls) is that one of them 6 by 12 feet can easily be passed through a finger ring. From this same *pashmina* are made the famous Kashmir shawls, some figured in tapestry weave, with the usual open slits left in tapestry weaving where colors meet parallel with the warp, as well as intricate embroideries in which the "cone" is a prominent feature. The making of pile rugs in the Persian fashion appears to have been introduced into India by the Mohammedans in the fourteenth century and became an important art industry in the sixteenth century. (On modern India rugs, see the article RUGS, ORIENTAL.) Among rugs for ceremonial use are those richly embroidered in gold and silver at Benares and Murshidabad, and those with silk pile made at Tanjore and Salem. Commonly used in India, and also exported to Europe and America, are *durries* (cotton rugs woven flat without pile) in great variety of designs.

During the last half of the nineteenth century the decline of the decorative arts in India was marked. Machine-made goods were imported from Europe in constantly increasing quantities to take the place of the beautiful native handmade draperies, furniture, clothing, and jewelry, that centuries of artistic development and inheritance had brought almost to perfection. Even the rajahs and the princes of India ceased to encourage domestic art, and the wealthy traders no longer purchased what they could no longer sell. Thousands of the most skillful artisans faced starvation, and many were compelled to obtain other employment. Finally the British government of India began to appreciate the situation and endeavored to remedy it by establishing art schools at Bombay, Madras, Calcutta, Rutnagiri, and Lahore. The native states opened similar schools at Jaipur, Alwar, Cutch, and Kolhapur. Large commercial firms, both native and European, began to exploit native Indian decorative goods in the markets of Europe and America, and the exhibit of Indian art at the Chicago Exposition in 1893 was noteworthy.

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further, Baden-Powell, *Manufactures and Arts of the Punjaub* (Lahore, 1872); Fergusson, *Tree and Serpent Worship* (2d ed., London, 1873); J. F. Watson, *The Textile Manufactures and Costumes . . . of India* (ib., 1866); id., *Collections of Specimens of Textile Manufactures* (2d series, ib., 1873–77); Mukharji, *Handbook of Indian Products* (Calcutta, 1883); id., *Art Manufactures of India* (ib., 1888); Coles, *Catalogue to the Objects of Indian Art in South Kensington Museum* (London, 1874); Hendley, *Memorial of the Jeypore Exhibition* (ib., 1884); id., *Ulwar and its Art Treasures* (ib., 1885); id., *Jeypore Enamels* (ib., 1886); Watt, *Indian Art at Delhi* (ib., 1903); Vincent Smith, "Archæology of Historical Period," in the *Imperial Gazetteer of India*, vol. ii (Oxford, 1907); Havell, *Ideals of Indian Art* (London, 1911); Coomaraswamy, *Mediæval Sinhalese Art* (Broad Campden, 1908), and his series of illustrations of Indian art, *Viśva-Karma* (ib., 1912 et seq.); Martin, *Miniature Painters of Persia, India, and Turkey* (London, 1913).

INDIANA UNIVERSITY. A coeducational institution of learning, situated at Bloomington, Ind. It was founded in 1820 as Indiana Seminary and was rechartered as a university in 1838. The university is an integral part of the State public-school system and admits pupils from commissioned high schools without examination. It maintains professional schools of law and medicine and confers the degrees of bachelor of arts, bachelor of science, bachelor of laws, doctor of medicine, master of arts, and doctor of philosophy. The university has a biological station on Winona Lake. The summer school, formerly privately conducted, is now a part of the university. The elective system was introduced in 1885. In 1914 the faculty numbered 125, and the attendance was 2530, including 168 in the law school. At the same time the university had grounds and buildings valued at $650,000, an endowment fund of $600,000, and an annual income of $500,000. The library contains 80,000 volumes. The president in 1914 was William L. Bryan, Ph.D., LL.D.

INDIAN BADGER, BUFFALO, ETC. See BADGER; BUFFALO, ETC.

INDIAN BEAN TREE. See Plate of CALABASH, ETC.

INDIAN BIBLE. An Algonquin version of the Bible made by John Eliot (1661–63). This translation was the earliest version of the Bible to appear in America.

INDIAN CAUCASUS. See HINDU KUSH.

INDIAN CORN. See MAIZE.

INDIAN CRESS. See TROPÆOLUM.

INDIAN EMPEROR, THE, OR, THE CONQUEST OF MEXICO BY THE SPANIARDS. A tragedy by Dryden, successfully produced in 1665. It forms a sequel to the *Indian Queen*.

INDIAN FIG. See CACTUS; PRICKLY PEAR.

INDIAN FIRE, or BENGAL LIGHTS. A bright white signal fire, consisting of a mixture of potassium nitrate 24 parts, sulphur 7 parts, and arsenic sulphide (realgar As_2S_2), 2 parts. The latter is often replaced with antimony sulphide. Slow-burning mixtures are produced by replacing the sulphur with ground shellac. Mixtures of collodion and magnesium powder are evaporated in thin plates; these burn with great brilliancy.

INDIAN HEAD. A town in Qu'Appelle district, Saskatchewan, Canada, on the Canadian Pacific Railway, 40 miles east of Regina, the capital of Saskatchewan (Map: Saskatchewan, G 7). It is situated in a rich grain-producing district. It possesses a fine park. Its industries include lumber yards and planing-mill factories. A Dominion experimental farm and forestry farm are located here. Pop., 1911, 1285.

INDIAN HEAD. The highest point of the Palisades of the Hudson, opposite Hastings, so called from its resemblance to the features of a human being.

INDIAN HEMP. A very strong bast fibre obtained from the perennial herb *Apocynum cannabinum* and used by the American Indians for weaving and for cards and nets. It is also sometimes called Canada hemp.

INDIAN INDUSTRIAL AND TRAINING SCHOOL. (Official title UNITED STATES INDIAN INDUSTRIAL AND TRAINING SCHOOL.) An institution for the industrial and academic education of Indian youth, founded in 1879 at Carlisle, Pa. The school resulted from experiments in Indian education made by Capt. R. H. Pratt, beginning about 1875. At that time the government schools which had in charge the education of Indians admitted also colored students. Captain Pratt, being convinced of the differing characteristics of the Indians and the negroes, resulting from conditions of their heredity and environment, wished to attempt the experiment of educating Indians alone. He considered best for the success of the venture that the school should be situated in the midst of civilization, in order that the students might become influenced, perhaps unconsciously, by the habits and customs of civilized white persons. The school was established at an abandoned army post at Carlisle, and the first pupils were 82 Sioux boys and girls. The school prospered, and Indians from more than 70 tribes have been received and graduated. One of the aims of the school is to develop the individuality of its students, and in order to familiarize them with conditions of life among white people, a system of placing students out in families and as farm laborers has been evolved, over 800 students each year being thus placed out. The school is composed of an industrial and an academic department. In the industrial department instruction is given in practical mechanics, and in the academic department the courses correspond in a measure to those of the common and high schools. Athletics have always been a prominent feature, and it has been found that the young men have special aptitude for football. The Carlisle football team has been for more than 20 years one of the most famous of college teams and has defeated at one time or another most of the large colleges and universities. There were in the school, in 1914, 995 students and 44 instructors. There is a library of about 2500 volumes. The supervisor is Oscar H. Lipps.

INDIAN LANGUAGES. The languages of India are both numerous and important. Cust, in his book on the *Modern Languages of the East Indies* (London, 1878), enumerates nearly 250 Indian languages and some 300 dialects. Of these languages divisions are: first, the group of Aryan tongues spoken throughout the entire northern half and central portion of India; second, the unrelated Dravidian group (see DRAVIDIANS) in the south; third, the Kolarian languages scattered here and there in central Hindustan; fourth, the Tibeto-Burmese family of non-Aryan tongues, distributed over

the vast area which the name implies; fifth, the Khari, an isolated language near Bhutan. To these may be added likewise two Indo-Chinese spoken families, viz., the Thaï, under which comes the Siamese, and the Mon-Annam family, which takes in the Cambodian and Annamite. It may furthermore be stated, for completeness, that the languages of the great Malayan family spoken in Sumatra, Java, Borneo, and the Celebes, and even in the Philippines, have certain Indian affinities or show the influence of the various tongues of India.

The Aryan group of languages in India has preëminence alike for the number and the character of the people that speak those dialects, and for the genius of the languages themselves, as well as for the long historical development of this branch and for the literature attached to it. In point of time the Aryan division of Indian tongues covers a period of culture extending from at least 1000 years before the Christian era down to the present time. Broadly viewed, these periods may be recognized in the history of this division of dialects: (1) *Old Indian*, comprising the earliest Vedic dialect and the historic form of the speech known as Sanskrit (q.v.); (2) *Middle Indian*, which embraces Prakrit (q.v.) and Pali (q.v.), both of which are descended rather from the Vedic dialect, or its kin, than from the classical Sanskrit; (3) *New Indian*, including the modern vernaculars of the more cultivated peoples of Hindustan. The general characteristics of the Vedic idiom, together with certain peculiarities of the epic speech, and the classical development of the language will be found in the article on SANSKRIT LANGUAGE. Under the Middle Indian or Prakrit group are comprised the Maharashtri dialect, or Prakrit par excellence, with its Jaina varieties, likewise the Māgadhī or Ardha-Māgadhī, the Saurasenī, which is found in the dramas, the Aphabhraṁśa and the Pāiśācī. The New Indian group, geographically arranged, takes in the vernaculars of Assam, Nepal, and Kashmir (the latter called Kasmiri), also Uriya, Bengali, Behari, Hindi, the dialects of the Punjab and of Sind, likewise Gujarati, Marathi, the Singhalese of Ceylon, Maldive, and Gypsy. See also INDIA, *Language*.

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INDIAN MADDER. See CHAY ROOT.

INDIAN-MEAL MOTH. One of the most familiar moths (*Plodia interpunctella*) that infest the cereals, Indian meal, dried yeast cakes, and dried fruits, nuts, etc. The moth has wings which are reddish brown on the outer two-thirds and dirty whitish gray on the inner third. It has a wing expanse of rather more than half an inch. The larva is white, brownish-headed, and wormlike. It spins silken tubes through the substance on which it is feeding, and its excrement and portions of the food adhere to this web.

INDIAN MILLET. A term applied to certain nonsaccharine sorghums. See MILLET.

INDIAN MUSIC. The music of the aborigines of North America, although never reduced by them to a written science, is nevertheless marked by distinct racial characteristics. Of the greatest importance to the Indian musician was the emotion to be expressed; to this everything was subordinated. As a result, the Indian songs can be divided into certain stereotyped classes (such as burial, love, war songs), in each of which the similarity of the different melodies is most marked. This monotonous character of their tunes is an outgrowth of the very elements which among civilized peoples have been skillfully blended to produce original and unusual effects; for preëminent in Indian music are complicated rhythms (many of them as intricate as those of Schumann and Chopin) and a frequent use of syncopation. When it is remembered that they had no strict forms to restrain them, it will be seen how these two strong elements came in time to dominate and confine their whole musical system. The strictly technical side of Indian music is of less interest. Their scale, like the Chinese, Hindu, etc., consisted of five tones and was for the most part major; their melodies generally ran from the top of the scale to the bottom; their conception of time was very exact; but they had no part singing, no way of determining pitch and consequently no universal key. Of most interest to the cultured musician are the wonderful transitions which we find everywhere throughout the native songs. The smoothness and rapidity of their changes from key to key are unsurpassed even in European music. The Indians had a sense of harmony, but, owing to the crudity of their musical science, it was never developed. Only by the use of wooden drums, tuned to different pitches, did they get a sort of crude bass. Besides the drums their instruments consisted merely of a flute (with a scale of seven notes), a whistle (with a scale of five notes), and a rattle, made of dry gourds, loaded with sand or pebbles. In recent years the study of Indian music has received considerable attention, and every effort is now made to collect and preserve as much of the aboriginal melodies as can be found. Some American composers, especially Victor Herbert in his *Natoma*, have made use of real Indian themes.

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INDIAN MUSIC. See HINDU MUSIC.

INDIAN MUTINY, or SEPOY REBELLION. See under INDIA.

INDIAN MYTHOLOGY. The mythology of India as found in the ancient hymns of the *Veda* deserves especial consideration, because it represents an earlier state of thought with regard

to mythological subjects than is found in any other literary monument of the Indo-Germanic peoples. The development of Hindu mythology down to the present is furthermore of interest because of the chance it gives for a long historical perspective. Attractive parallels may likewise be drawn between the oldest mythological figures of India and those in the pantheon of Greece and Rome, like Father Heaven and Mother Earth (Skt. *Dyāus Pitar, Prthivī Mātar*, Gk. *Ζεὺς πατήρ*, Lat. *Jupiter*); but they are often erroneous, dangerous, or misleading. Despite, e.g., the recognized possibility of kinship by reason of common Aryan or Indo-Germanic unity, such etymological equations as those between Lat. *Uranus*, Gk. *Οὐρανός* (Heaven), and Sanskrit *Varuṇa*, in Indian mythology, or again between *Κένταυρος* and *Gandharva*, or the fire myth of *Prometheus* in connection with Skt. *pramanthana*, the rubbing stick used in kindling fire, break down or become uncertain under the searching light of keen linguistic criticism. Nevertheless such comparisons are always interesting, and they are often instructive as showing how myths may develop independently or on grounds remotely associated or even disconnected. The mythology of India frequently helps to throw much light on such subjects. Myths abound in the *Rig-Veda;* they are the outgrowth of personifications of the powers of nature and meteorological phenomena. (See AGNI; INDRA; MARUT; MITRA; SOMA; SURYA; USHAS; VAYU; YAMA.) In later Hindu mythology the gods of the old régime gradually become replaced by the great Hindu trinity or triad, Brahma, Vishnu, and Siva, with all the beliefs and notions associated with each of these names. The later pantheon is occupied likewise by a band of minor deities, godlings or demigods, like Ganesa, Kartikeya, Kubera, and the goddesses Durga, Lakshmi, and Sarasvati. (See the articles under these names.) India of all ages has known also many myths, legends, or fables connected with the stars and planets, with sacred rivers, streams, and trees, birds, and animals. Consult: Dawson, *Dictionary of Hindu Mythology and Religion* (London, 1879); Macdonell, "Vedic Mythology," in Bühler, *Grundriss der indo-arischen Philologie und Altertumskunde* (Strassburg, 1897); W. J. Wilkins, *Hindu Mythology* (London, 1900); Viggo Fausbøll, *Indian Mythology According to the Mahābhārata in Outline* (ib., 1903). See BRAHMANISM; HINDUISM.

INDIAN OCEAN. One of the five grand divisions of the hydrosphere, bounded on the west by Africa and the twentieth meridian east of Greenwich (running through Cape Agulhas, the south extremity of Africa), on the north by Asia, on the east by the East Indian Archipelago, Australia, and the one hundred and forty-seventh meridian (running through the south extremity of Tasmania) (Map: World, Eastern Hemisphere, K 28). The south boundary is in an indefinite way assumed to be approximately the Antarctic circle, although many geographers prefer to call what is south of lat. 40° S. the Southern Ocean. In its broader sense it covers about 27,500,000 square miles. Gradually narrowing from south to north, the Indian Ocean forks at Cape Comorin into the Bay of Bengal on the east and the Arabian Sea on the west, the latter again branching off into two arms, the Persian Gulf and the Red Sea, which reach respectively the mouth of the Euphrates-Tigris and the neighborhood of the Mediterranean. These limitations exclude the waters of the Indian Archipelago, as belonging rather to the Pacific Ocean. From Africa it receives the waters of the Limpopo and the Zambezi, and from Asia those of the Irrawaddy, Brahmaputra, Ganges, Indus, and the Shat-el-Arab. It contains numerous islands, chiefly confined to the northern and western regions. Of these Madagascar and Ceylon are the only ones of considerable magnitude, the others being mostly small groups of volcanic or coral formation, the volcanic islands being usually surrounded by coral reefs.

The greatest depth of the Indian Ocean is found in the northeastern part, where, close to the southeast of Java, soundings have been made of 20,340 feet, and a basin, 50,000 square miles in area, of nearly this average depth lies to the northwest of the Australian continent. An elevated ridge running along the fortieth parallel has an average depth of 12,000 feet. Krümmel estimates the average depth of the ocean to be 10,970 feet, although it is generally given as about 14,000 feet. The surface temperature of this ocean is higher than that of the others, the mean temperature of the northern portion being considerably over 80°, while the bottom temperature, falling below 40° at the equator, indicates an undercurrent of cold water from the Antarctic region. The currents of the Indian Ocean depend to a great extent on the winds. North of the equator they reverse their direction with the annual change of the northeast monsoon to the southwest monsoon, while under the equatorial calm belt the equatorial countercurrent flows eastward. South of the equator, under the southeast trade winds a current flows west, bending south along the coast of Africa through the Mozambique Channel, and meeting the Atlantic westward current at the Cape, where it is turned back to the east towards the south coast of Australia. The winds over the Indian Ocean are, as a rule, gentle, with frequent protracted calms, though hurricanes occur occasionally. This ocean was the first to find a place in the history of commerce. As a commercial channel, it virtually maintained its superiority during 2000 years, being habitually traversed in a direct line between Arabia and Hindustan, while coasting voyages alone were known in the Atlantic. This comparatively bold navigation of the Indian Ocean was suggested and facilitated by the periodically alternating monsoons of the northern part.

INDIAN OIL TREE. See BUTTER TREE.

IN'DIANO'LA. A city and the county seat of Warren Co., Iowa, 22 miles by rail south of Des Moines, on the Chicago, Rock Island, and Pacific, and the Chicago, Burlington, and Quincy railroads (Map: Iowa, D 3). It controls a large trade in grain, butter, eggs, live stock, fruit, and vegetables. The city has a Carnegie library and Simpson College (Methodist Episcopal), opened in 1867. The water works and electric-light plant are owned by the municipality. Pop., 1900, 3261; 1910, 3283.

INDIAN PEOPLES. For the anthropologist India is of remarkable interest. On its soil may still be met all grades of culture, from the savagery of hill and swamp to the urban civilization born of river and plain, and all forms of human social aggregates, from the primitive family group or clan to the foreign-ruled provinces with their magnificent and luxurious capi-

tals. Here all forms of agriculture are to be found, from the burned-over forest plot to the terraced hillside of the north; in the west and south the utilization of the desert by canals and tanks; all varieties of human dwellings, from the primitive abode in tree and cave to magnificent palaces and temples; all forms of human government, from the primitive democracy and tribal anarchy to organized despotism of the civilized sort; all kinds of marriage, from polygamy to the strictest monogamy, and all varieties of both these systems and of polyandry as well; and also all forms of religion from the crudest animism and Shamanism to the agnosticism of certain developments of Buddhism. All these things have been invented, exploited, modified, improved, or degraded by members of the black, the brown, the yellow, and the white races of man for many thousands of years; so that nowhere else in the world have so many millions of human beings done so many things at so many times in so many ways as in India. Remains of the industry of Paleolithic man have been found almost everywhere throughout the peninsula, which makes India seem almost as old as the race of man itself. By far the most important peoples of India belong to the Aryan stock. They are responsible for a number of social and religious ideas and institutions, many of which are simply the expression of the mentality of the more northern and western Aryan in the process of, and after adaptation to, an Oriental and largely tropical environment. They never overcame the land by mere force of numbers, and their influence upon the pre-Hindu population was less racial than social and religious. Many primitive tribes who took over the culture of their conquerors have become assimilated to the Aryan type while preserving intact their aboriginal speech. The complicated caste system (see CASTE) is largely, if not entirely, the result of the contact of the Aryan invaders with the aboriginal population (Dravidian, Kolarian, etc.) of the peninsula, and of the efforts of the conquering race to preserve its purity as much as possible against miscegenation. It was very early dominated by religious ideas, but recent investigations have shown that the lines of caste are not nearly so coincident with racial distinctions as had been assumed to be the case. After the Aryans of India, the Dravidians (the civilized Tamils, Telugus, Kanarese, and Malayalams), the more or less civilized Kodagu, or Koorgs, and the tribes of the Nilgiris, Central India, Orissa, part of Bengal, etc., such as the Irulas, Kurumbas, Badagas, Todas, Kotas, Kader, Khonds, Gonds, Oraons, and Maler, are the most important peoples. The various tribes of this stock illustrate all grades of human culture, from the jungle-dwelling Kurumbas to the high developments of the civilized Tamils, who in literature, architecture, and other arts have shown great ability, and some of them notable capacity for assimilating both Hindu and Christian culture. The Dravidian area lies chiefly in southern India; but the Tamils have extended their influence over the north of Ceylon, forming a very important part of the population of that island.

Next to the Dravidians are to be considered the Kolarian peoples (Munda-Kols, Larka-Kols, Bhumij, Santals, Kharia, Juang, Saoras, etc.) of the Orissa-Bengal country and farther inland. The Santals represent the highest development of Kolarian culture, and the Juangs perhaps the lowest; while the others, except some of the Kols, are more or less primitive. Like the Dravidians, the Kolarians, who are looked upon by some as a people even older, have given to and taken from the ancient and modern Hindus and have also undoubtedly affected the physical type of both Dravidians and Aryans. In the Kolarians, as in the Dravidians, certain scholars detect traces of negroid intermixture, as well as much Aryan and some Mongolian blood. The Veddas of Ceylon, by some ethnologists classified as a separate variety of mankind, certainly are one of the most primitive peoples now existing. They have been thought to represent the oldest nonnegroid population of India, now disappearing. Some have sought to class the Todas of southern Hindustan as a peculiar people. The islands off the Indian coast present some interesting tribes. The Selungs of the Mergui Archipelago are classed by Deniker as Indonesians; but this is rather doubtful, and a like uncertainty exists regarding the inhabitants of the Nicobar Islands, the natives of the interior of Great Nicobar being savages of a rather primitive type. The Minkopis, or Andaman Islanders, are characteristic Negritos, whose extension must at one time have been much greater. In Assam, Burma, and the Malaccan possessions and protectorates of Great Britain, a great variety of peoples are to be found, chiefly of Indo-Chinese, Proto-Malay, and so-called Indonesian origin, besides the Sakai and Semang of Malacca, who are more or less Negritos. Among the most notable of these peoples, outside of the Burmese, Karens, etc., are the Nagas of Manipur, the Chins of Burma and Arakan, the Lushai tribes of Assam, the Shans of northern Burma, and some other tribes.

The anthropological history of India includes the following successions and impacts of races: pre-Dravidian and pre-Kolarian (with mixtures of Negrito and Proto-Malay); Aryan (invasion by the northwest as early as 2000 B.C. at least); Greek invasion, in the time of Alexander the Great (locally important in the Indus region, and more important as partly opening India to the Western world); Bactrian invasions of the northwest (following the Greek and of local importance); Mohammedan invasions (1000–1400 A.D.), resulting in the establishment of many dynasties in the northwest and west, including the famous Mogul Empire of Delhi and its successors of the eighteenth century, which were broken up by the revolt of the Mahrattas and Sikhs, who restored Aryan supremacy. Besides these must be counted the Pathan influence in the northwest at various times, the Mongol (Tibeto-Sinitic) influence from a comparatively early period in the Himalayan region, and Indo-Chinese and related influences in the northeast. Malayan elements also were present in the south and east, with the later Arabo-Persian, Dutch, Portuguese, French, and British commercial, missionary, and political achievements. The Parsis (Persians), who are settled chiefly in Bombay, are of great importance in spite of their limited numbers; the Jews have had some influence on the east coast; and the Chinese in Ceylon. Since coolie labor has been in demand, natives of India have found their way to Madagascar, the West Indies, Guiana, and Africa.

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1872); Sherring, *Hindu Tribes and Castes in Benares* (ib., 1872–81); Ibbetson, *Punjab Ethnography* (ib., 1883); Wise, *Notes on the Races, Castes, and Tribes of Eastern Bengal* (London, 1883); Herbert Risley, *Tribes and Castes of Bengal* (Calcutta, 1891); Baines, *India* (London, 1893); Thurston, *Bulletin of the Madras Government* (Madras, 1896); William Crooke, *Popular Religion and Folklore of N. India* (2d ed., London, 1896); Herbert Risley, *India* (Calcutta, 1903); William Crooke, *Tribes and Castes* (London, 1906); Thurston, *Ethnographic Notes on Southern India* (Madras, 1906); William Crooke, *North Western Provinces of India* (London, 1897); id., *Natives of Northern India* (ib., 1907); Herbert Risley, *People of India* (Calcutta, 1908); Thurston and Rangachari, *Castes and Tribes of Southern India* (Madras, 1909); Rose, *Glossary of the Tribes and Castes of the Punjab and N. W. Frontier* (Lahore, 1911); Baines, "Ethnography, Castes and Tribes," in Bühler, *Grundriss der Indo-Arischen Philologie* (Strassburg, 1912); Thurston, *Castes and Tribes of S. India* (London, 1912).

INDIAN PHYSIC. A genus of North American herbs. See GILLENIA.

INDIAN PIPE. See CANCER ROOT; ROOT PARASITES.

INDIAN POKE. See HELLEBORE.

INDIAN POPULATION. According to the latest census returns there are in the United States and Canada 400,570 Indians and Eskimo. This number includes a large number of mixed parentage. In the United States the Indian population is distributed as follows:

Oklahoma	74,825
Arizona	29,201
New Mexico	20,573
South Dakota	19,137
California	16,371
Washington	10,997
Montana	10,745
Wisconsin	10,142
Minnesota	9,053
North Carolina	7,851
Michigan	7,519
North Dakota	6,486
New York	6,046
Nevada	5,240
Oregon	5,090
Nebraska	3,502
Idaho	3,488
Utah	9,123
Kansas	1,853
Wyoming	1,486
Colorado	1,482
Mississippi	1,253
Total	255,463
All other States	10,220
Alaska	25,331
Grand total	291,014

In Canada:

Alberta	8,113
British Columbia	24,781
Manitoba	5,919
Nova Scotia	1,969
New Brunswick	1,903
Prince Edward Island	300
Ontario	23,156
Quebec	11,571
Saskatchewan	9,545
Northwest Territories	12,953
Ungava	1,246
Yukon	3,500
Total Indian	104,956
Eskimo	4,600
Grand total	109,556

INDIAN QUEEN, THE. A tragedy by Sir Robert Howard, in collaboration with Dryden, produced with great splendor in 1664.

INDIAN RED. An impure ferric oxide of a dark-red color, with a tinge of purple. It is used as a pigment. Indian red is prepared by calcining natural red ochre until most of the water of hydration is expelled. Occasionally soft red hematite of proper shade is obtained from deposits and requires no further treatment than grinding.

INDIAN RESERVATIONS. As early as 1786 the United States inaugurated the policy of setting aside certain lands and confirming the titles of Indians thereto. All such transactions were by treaty, thus recognizing to some extent the independence of the Indian tribes. At the same time control over the Indian was extended by conquest, so that in 1871 the government ordered that no more treaties should be made, but that all dealings with Indians should be under the immediate control of Congress. The administration of the reservations was, however, an executive function and, as such, delegated to the Department of the Interior, under which a distinct division was organized, Department of Indian Affairs. A reservation, as the name implies, is a tract of land reserved from settlement and held in trust for its Indian occupants. Such tracts were usually the residue of tribal claims after conquest or purchase. In 1887 the government adopted the allotting policy by which the lands of all tribes should be gradually divided with individual holdings and the surplus sold or thrown open to settlement, as the case required. Under this policy the reservations have been greatly reduced in size and number. Since under individual ownership the Indian becomes a citizen, it can only be a question of time when all such reservations shall have vanished.

The following is a list of the reservations existing in 1914:

ARIZONA

Reservation	*Tribes*	*Acres*
Camp McDowell	Yavapai	24,971
Colorado River	Chemehuevi, Kawia, Cocopa, Mohave	240,640
Fort Apache	Apache	1,681,920
Gila Bend	Papago	22,391
Gila River	Maricopa, Pima	357,120
Havasupai	Havasupai	578
Hopi	Hopi	2,472,320
Navaho	Navaho	12,115,283
Papago	Papago	27,566
Salt River	Maricopa and Pima	46,720
San Carlos	Apache	1,834,240
Walapai	Walapai	730,880
Total		19,554,629

CALIFORNIA

Reservation	*Tribes*	*Acres*
Digger	Maidu	370
Hupa Valley	Hupa, Yurok, Redwood	99,051
Mission (28 reserves)	Dieguenos, Kawia, Luiseños, Serranos	202,216
Miscellaneous bands:	Grindstone	80
	Potter Valley	16
	Upper Lake	144
	Guidiville	50
	Tachie	80
	Sherwood	230
	Trinidad	60
	Ruffys	441
	Coyote Valley	100
	Redwood Valley	80
	Eel River	20
Round Valley	Pomo, Pit River, Wailaki, Yuki	37,000
Tule River	Yokuts, Mono	48,551
Yuma	Yuma	45,889
Total		434,378

COLORADO

Reservation	*Tribe*	*Acres*
Ute	Ute	483,750

IDAHO

Reservation	Tribes	Acres
Fort Hall	Bannock, Lemhi, Shoshoni	447,940
Lemhi	Lemhi	64,000
Total		511,940

IOWA

Reservation	Tribes	Acres
Sauk and Fox	Potawatami, Sauk and Fox, Winnebago	2,965

KANSAS

Reservation	Tribes	Acres
Kickapoo	Kickapoo	398
Potawatami	Prairie Potawatami	500
Sauk and Fox	Sauk and Fox	24
Total		922

MICHIGAN

Reservation	Tribes	Acres
Isabella	Saginaw Ojibwa	2,373
L'Anse	Chippewa	1,029
Total		3,402

MINNESOTA

Reservation	Tribes	Acres
Mille Lac		61,014
Red Lake	Chippewa	543,528
Vermilion Lake	Chippewa	1,060
White Earth	Chippewa	78,178
Total		683,800

MONTANA

Reservation	Tribes	Acres
Blackfeet	Piegan, Chippewa	959,644
Crow	Crow	1,836,753
Fort Belknap	Gros Ventre, Assiniboin	497,600
Fort Peck	Assiniboin, Brulé, Santee, Teton, Hunkpapa, Yanktonai	1,774,967
Northern Cheyenne	Cheyenne	489,500
Total		5,558,464

NEBRASKA

Reservation	Tribes	Acres
Omaha	Omaha	12,421
Winnebago	Winnebago	1,711
Total		14,132

NEVADA

Reservation	Tribes	Acres
Duck Valley	Piute, Paviotso	312,320
Moapa River	Chemehuevi, Piute	1,000
Pyramid Lake	Piute	322,000
Total		635,320

NEW MEXICO

Reservation	Tribes	Acres
Jicarilla Apache	Jicarilla Apache	286,400
Mescalero Apache	Mescalero, Lipan	474,240
Pueblo villages:		
Jemez		17,510
Acoma		95,792
San Juan		17,545
Picuris		17,461
San Felipe		34,767
Pecos		18,763
Cochiti		24,256
Santo Domingo		74,743
Taos		17,361
Santa Clara		49,369
Tesuque		17,471
San Ildefonso		17,293
Pojoaque		13,520
Sia		17,515
Sandia		24,187
Isleta		110,080
Nambe		13,586
Laguna		125,225
Santa Anna		17,361
Zuñi		315,040
Total		1,699,485

NEW YORK

Reservation	Tribes	Acres
Allegany	Onondaga, Seneca	30,469
Cattaraugus	Cayuga, Onondaga, Seneca	21,680
Oil Spring	Seneca	640
Oneida	Oneida	350
Onondaga	Oneida, Onondaga, St. Regis	6,100
St. Regis	St. Regis	14,640
Tonawanda	Cayuga, Seneca	7,549
Tuscarora	Tuscarora, Onondaga	6,249
Total		87,677

NORTH CAROLINA

Reservation	Tribe	Acres
Cherokee	Cherokee	63,211

NORTH DAKOTA

Reservation	Tribes	Acres
Devils Lake	Assiniboin, Santee, Sisseton, Yankton, Wahpeton	92,144
Fort Berthold	Arikara, Hidatsa, Mandan	884,780
Standing Rock	Sihasapa, Hunkpapa, Yanktonai	1,847,812
Total		2,824,736

OKLAHOMA

Reservation	Tribes	Acres
Cherokee	Cherokee	70,070
Chickasaw	Chickasaw	803,108
Choctaw	Choctaw	2,590,043
Creek	Creek, Uchee	72,813
Osage	Osage, Quapaw	404,924
Ottawa	Ottawa	1,587
Ponca	Ponca	320
Seminole	Seminole	4,854
Wichita	Caddo, Delaware, Kichai, Towakoni, Waco, Wichita	1,511,576
Wyandot	Wyandot	535
Total		5,459,830

* NOTE. On allotted lands live the Arapaho, Cheyenne, Comanche, Iowa, Tonkawa, Kansas, Kickapoo, Kiowa, Modoc, Lipan, Oto, Missouri, Pawnee, Peoria, Shawnee, Quapaw, Seneca.

OREGON

Reservation	Tribes	Acres
Klamath	Klamath, Modoc, Piute, Pit River, Walpape	872,186
Siletz	Alsea, Coquille, Kusan, Shasta, Siuslaw, Umpqua	3,200
Umatilla	Cayuse, Umatilla, Wallawalla	79,820
Warm Springs	Des Chutes, Piute, Warm Spring, Wasco	322,108
Total		1,277,314

SOUTH DAKOTA

Reservation	Tribes	Acres
Crow Creek	Yanktonai, Lower Brulé, Miniconjon, Two-Kettle	111,711
Cheyenne River	Blackfoot-Sioux, Miniconjon, Sans Arcs, Two-Kettle	2,467,926
Lower Brulé	Lower Brulé, Yanktonai	175,471
Pine Ridge	Ogallala, Cheyenne	1,943,121
Rosebud	Miniconjon, Ogallala, Two-Kettle, Upper Brulé, Wahzhazhe	1,524,210
Total		6,222,439

UTAH

Reservation	Tribes	Acres
Uinta Valley	Gosiute, Pavant, Uncompahgre, Uinta	179,194

WASHINGTON

Reservation	Tribes	Acres
Colville	Cœur d'Alène, Colville, Kalispel, Okinagan, Methow, Nespelim, Pend d'Oreille, Sanpoil, Spokan	1,297,009
Hoh River	Hoh	640
Lummi	Dwamish, Lummi, Snohomish	598

WASHINGTON — *Continued*

Reservation	*Tribes*	*Acres*
Makah	Makah, Quileute	23,040
Muckleshoot	Muckleshoot	169
Port Madison	Dwamish, Lummi, Snohomish, Swinamish	1,375
Osette	Makah	640
Quileute	Quileute	837
Quinaielt	Quinaielt	176,650
Shoalwater	Chihalis	335
Snohomish	Dwamish, Lummi, Snohomish	8,930
Yakima	Klikitat, Paloos, Topnish, Wasco, Yakima	837,753
Total		2,347,976

WISCONSIN

Reservation	*Tribes*	*Acres*
Lac Court Oreille	Ojibwa	20,096
Lac du Flambeau	Ojibwa	26,153
La Pointe	Ojibwa	46,613
Menominee	Menominee	231,680
Stockbridge	Stockbridge, Munsee	11,803
Total		336,345

WYOMING

Reservation	*Tribes*	*Acres*
Wind River	Arapaho, Shoshoni	95,307
GRAND TOTAL		48,477,216

See INDIAN AFFAIRS; INDIANS, AMERICAN; TREATIES, INDIAN.

INDIAN RIVER. A long shallow lagoon on the east coast of Florida, varying in width from 4 miles to a few hundred feet and extending along just inside the coast from lat. 28° 48′ N. about 107 miles in a southerly direction (Map: Florida, F 3). For about 17 miles south of Cape Canaveral to Jupiter Inlet, in many places it is separated from the ocean only by narrow strips of beach, which in two places is cut by inlets. Indian River Inlet is about 60 miles south of Cape Canaveral; this is navigable through a channel about 5 feet deep.

INDIAN RUNNER. See DUCK, and Plate of DUCKS.

INDIANS, AMERICAN. The name applied first by Columbus and his immediate successors to the natives of the newly discovered islands and mainland of America, under the mistaken impression that these regions were a part of the outlying coast of Asia. The name most frequently used by scientific writers, especially in Europe, is simply *American, American Indian,* or *American Races.*

It is customary to classify the races in three ways—by language, physical type, and culture; and it is not until a given group of people has been characterized in these three aspects that their descriptive anthropology is regarded as known. The natives of both North and South America, however, present a great variety of linguistic, anatomical, and cultural characters, making it necessary to discuss them in groups and subdivisions. The best-known tribes are those of the United States and Canada, which we shall consider under one head, giving another section to Mexico and the Central American States and still another to South America. However, before proceeding with these divisions of our subject, we may note a few general points. Culturally the American race may be credited with decided individuality in the development of a few cultivated plants—maize, tobacco, peanuts, and cotton. On the other hand, they were weak in the domestication of animals, the dog being the only one of extensive distribution. They were also weak in navigation, for, though good canoeists, they did not develop sail vessels. While true bronze was developed in parts of South America, the race as a whole had made little progress in metals. Architecture existed only in the few specialized cultures of the south, where it reached an advanced stage, but is peculiar in the absence of the true arch. Basketry in the north and cloth in the south reached a high state of artistic perfection. Ritualistic religion was highly developed. The race as a whole showed a keen interest in natural phenomena, which, coupled with a poetic temperament, gives their mythology a highly symbolic character and a decided æsthetic charm. Perhaps this, more than anything else, has led to the extensive modern American use of Indian motives in art and literature.

The origin of so important a race must always be a matter of great interest. Though no definite solution to the problem has yet been attained, some progress has been made. The great linguistic diversity and independence seem to indicate a long period of isolation from the Old World. On the other hand positive evidence for the peopling of the Americas before the last Glacial period is wanting, necessitating the assumption that very little change has occurred in continental configuration since the Indian came. His ancestors must therefore have crossed from Asia to Alaska. Anatomically he resembles most closely the Mongolian and bears a striking resemblance to certain Siberian tribes. As may be inferred from the previous discussion, there is very little in American culture that can be directly connected with the Old World. A few things seem to have come from northern Asia—e.g., the sinew-backed bow—but they are unimportant. There are also some doubtful traces of Pacific Island culture in South America, but on the whole the cultures of the two hemispheres are so strikingly different that we must assume the crossing over to have been very long ago, while the cultures of Asia were exceedingly simple. These primitive folk must have spread over the entire New World, for the most advanced traits of American culture seem to have been developed later in two special centres, Central America and the middle Andean country of South America, from which cultivated plants, weaving of cloth, work in metals, painted pottery, etc., spread to other areas. The Eskimo, the numerous small stocks of the Pacific coast, in North America, and the Patagonians, Tierra del Fuegans, with many of the tribes on the Atlantic slope in South America, are now believed to represent in a degree the original cultures of the immigrant folk from the Old World, now surviving on the margins of the continents where they were pushed out by the more vigorous development of specialized cultures in the interior. During this long period, however, they have been so strongly influenced by environment and tribal contact that we are not justified in taking their cultures as we now find them as specific types of the original American culture, but can only infer simplicity and negative traits therefrom. See ARCHÆOLOGY, AMERICAN.

INDIANS OF THE UNITED STATES AND CANADA

According to the 1910 census there were living representatives of 280 Indian tribes in the various States, and in Alaska 21, with 45 additional Eskimoan tribes. No such complete enumeration of those in Canada is available;

AMERICAN INDIANS

ES-SEN-CE OR LITTLE SHELL, ALGONKIAN FAMILY. OJIBWA TRIBE
A FOREST INDIAN

NOM-PA-A-PA OR "TWO STRIKES," SIOUAN FAMILY. BRULÉ TRIBE
A PLAINS INDIAN

ARESO. KERESAN FAMILY. COCHITI TRIBE
A PUEBLO INDIAN

A SHAMAN. ATHAPASCAN FAMILY. NAVAJO TRIBE
AN INDIAN OF THE ARID REGION

OURAY. SHOSHONEAN FAMILY. UTE TRIBE
A MOUNTAIN INDIAN

CHIEF JOSEPH. SHAHAPTIAN FAMILY. NEZ-PERCÉ TRIBE
A COLUMBIA RIVER INDIAN.

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but, exclusive of the Eskimo, they certainly equal half the number in the United States. When America was discovered, the number of tribes must have been greater, for many of those enumerated in Colonial literature are now extinct; but this seems only true of New England, eastern Canada, and a narrow belt along the Atlantic coast and the Gulf of Mexico. A few tribes in California and elsewhere have become extinct in historic times, but the number is insignificant. One hundred is quite a liberal estimate of the number extinct, so that, contrary to the popular opinion, scarcely one-fourth of the original number of tribes have been wiped out by the whites. Further, such extinction was often political rather than otherwise, in that the survivors were assimilated by a kindred tribe or even by the whites. That extinction was not due entirely to Colonial wars is clear from the fact that the process is still operative and will no doubt continue until citizenship and dispersion among the white population bring about complete loss of identity. There is also archæological and linguistic evidence of the rise and extinction of tribes in prehistoric times, when the white race could not have been a factor; but there have been very few instances of the formation of new tribes since the Colonial period.

This does not imply that the actual number of individuals has not greatly decreased. No satisfactory estimate of the Indian population in 1492 can be made. In 1910 the census enumerated 291,014 Indians for the United States and Alaska, which is about the count of the Indian Office in 1870, indicating approximate stability in population. The present estimate for Canada is 115,000. Thus, in round numbers the total present Indian population north of Mexico is 400,000. James Mooney, United States government expert, estimates the total population in 1492 at 1,115,000. The chief factors in the causes for modern stability are the prevalence of European diseases, especially tuberculosis, and the lack of sufficient food, which result in a very high death rate.

Intermarriage between Indians and whites still continues, but with other races scarcely at all. In the United States proper 33 per cent of the total number of Indians in 1910 were of mixed white descent, while of negro and other mixtures there were less than 3 per cent. In Alaska 15 per cent report white blood, which is also about the estimated proportion for Canada. The thirteenth census of the United States makes it clear that both the fecundity and vitality of mixed white marriages are higher than for the full-blood Indian, as also marriage among mixed bloods. If this tendency continues, the full-blood Indian is destined to disappear and the whole race to be wiped out by assimilation.

In almost every case the survivors of the various Indian tribes retain their original language and, in more or less completeness, their former culture, to which is due our extensive anthropological knowledge of American peoples. For more than 20 years they have been under investigation by the Bureau of Ethnology at Washington, the American Museum of Natural History in New York, the Field Museum of Natural History in Chicago, the University of California, and other institutions whose numerous publications constitute one of the most important sources of anthropological data in the world.

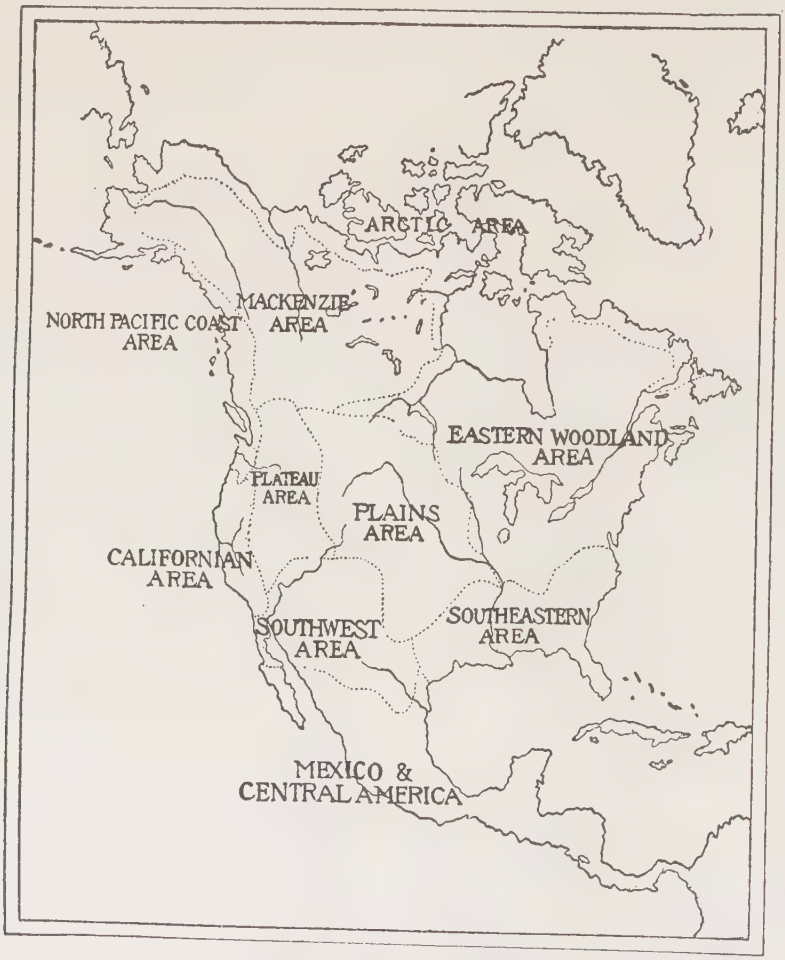
Culture Areas. The several tribes present varying forms of culture—some being quite identical, while others show all degrees of difference; hence it has been found desirable to group or classify them with respect to their customs and habits. Accordingly anthropologists recognize nine culture groups, which in a general way correspond to as many geographical areas, or culture areas. The approximate boundaries to these areas are indicated on the map on page 114. It should be noted, however, that the divisions on this map are relative rather than absolute, for rarely can a tribe be found anywhere that does not share in some measure the culture traits of all its immediate neighbors. Yet certain groups of tribes often have highly characteristic traits in common, whence they are said to be of the same general culture type. A culture area, therefore, does not imply absolute identity of tribal cultures, but agreement in most of the typical traits.

The Plains Area.—Geographically this area comprises the plains and prairies west of the Mississippi and was formerly the range of the largest herds of buffalo or bison. The typical plains culture is characterized by the following traits: buffalo hunting; the tepee (tipi); in historic times the use of the horse, formerly of the dog, with the travois; the camp circle; the soldier police; the sun dance and a highly individualistic geometric art. Woman's costume is also quite distinctive, as are the methods employed in dressing skins. The tribes having these traits in their most intense and exclusive form are the Assiniboin, Arapaho, Blackfoot, Crow, Cheyenne, Comanche, Gros Ventre, Kiowa, Sarsi, and Teton-Dakota. These tribes lived almost entirely upon buffalo meat, used the portable tepee, used skins instead of cloth, made no pottery, and did not practice agriculture. The horse was introduced from the Spanish settlements at an early date, probably before 1630, and reached the Blackfoot of the Far North before 1751, so that before their discovery by Europeans these tribes became nomadic horsemen. They also used dogs as beasts of burden, hitching them to A-shaped drag frames, or travois. A similar frame was later used for horses. This development of dog transportation suggests that these tribes were already nomadic hunters before the introduction of the horse.

Along the eastern border of the area lived the Arikara, Hidatsa, Iowa, Kansas, Mandan, Missouri, Omaha, Osage, Oto, Pawnee, Ponca, Santee-Dakota, and Wichita. These differed somewhat from the others in living in earth, mat, or grass covered houses in permanent villages, though using tepees when on the hunt; in the cultivation of small fields of corn (maize), the manufacture of pottery, and the limited weaving of baskets and bags. In most other respects they resembled the more typical tribes. To the northeast around Lake Winnipeg were the Plains-Cree and Plains-Ojibwa, divergent groups of larger divisions in the Eastern Woodland Area, and with a culture intermediate to the two areas. Again on the west are the Bannock, Nez Percé, Northern Shoshoni, Ute, and Wind River Shoshoni, who manifest some of the traits typical of the Plateau Area. Consult Clark Wissler, *North American Indians of the Plains* (New York, 1912).

The Eastern Woodland Area.—Geographically this area is a broad belt on either side of the Great Lakes, extending to the Atlantic Ocean.

Excepting the extreme western and northern borders, the entire area was forest. Recent investigations make it clear that this area is composed of several divisions, having much less in common than those of the preceding area. Thus, in the north between the Great Lakes and Hudson Bay and eastward, we have a subarctic forest in which range the Cree-Montagnais tribes, including the Naskapi of Labrador and the Northern Saultean west of James Bay. They live entirely by hunting and fishing, are quite nomadic, use a kind of tepee covered with bark or skins, the birch canoe, snowshoes, make no pottery, dress in skins, have a loose social organization and no complex ceremonies. They stand out in contrast to the remainder of the area in the absence of agriculture, pottery, and complex social, political, and ceremonial organizations. On the other hand, costume, folklore, certain religious concepts, and art seem to possess general similarities throughout. The Iroquois (q.v.) had a highly specialized form of this culture, as did the Delaware (q.v.) and Powhatan Confederacy (q.v.). The various New England tribes seem to have had certain decided individualities, though good data are lacking because of their almost entire extinction. On the southern borders of the Great Lakes is the Central Algonquian group; the Ojibwa, Menominee, Potawatami, Sauk (Sac), Fox, Kickapoo, Ottawa, and perhaps the almost extinct Illinois Confederacy (Piankishaw, Peoria, Kaskaskia, etc.). So far as the tribes of this Central Algonquian group have been studied, they may be characterized by intense clan organizations, highly developed religious concepts and ceremonies. Among the latter the most distinctive is the midewiwin (grand medicine society), a semisecret ritualistic order with four or more degrees, the purpose of which seems to be the preparation of the spirit for entrance into the "life after death." (Consult W. J. Hoffman in the *Seventh Annual Report of the Bureau of American Ethnology*, Washington, 1891.) As the name indicates, the tribes constituting this Central group are of Algonquian stock, but associated with them in culture are the Winnebago (q.v.) of Siouan stock.



CULTURE AREAS OF NORTH AMERICAN INDIANS.

Perhaps more than elsewhere, in this area this group made use of wild rice as a food. This grain was of great economic importance along the southern border of the Great Lakes and down the St. Lawrence, because of the climatic check upon agriculture. Its use is mentioned by French explorers, and the whole subject is fully

treated by A. E. Jenks in the *Nineteenth Annual Report of the Bureau of American Ethnology* (Washington, 1900).

In the Plains Area we noted certain culture differences among the tribes on its eastern border; these differences are chiefly due to the intrusion of Central Algonquian traits, and likewise among the Central Algonquian we find some traits from the Plains, especially among the Winnebago and Illinois.

The Southeastern Area.—This area includes the States of Tennessee, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, with the adjoining parts of Arkansas and Texas. The principal tribes were the Atakapa, Alibamu, Apalachicola, Apalachee, Catawba, Cherokee, Croatan, Upper and Lower Creeks, Chickasaw, Choctaw, Caddo, Carrizo, Karankawa, Kichai, Koasati, Kusa, Natchez, Quapaw, Seminole, Tutelo, Tuscarora, Timuquanan, Tunican, Towakoni, Tonkawan, Waco, and Uchee. A few of these are now extinct. In culture a general uniformity prevailed in intense agriculture, permanent villages, complex political organizations, social grades and slavery, head deformation, good pottery, weaving of cloth to a limited extent, the ceremony of the Busk, etc. East of the Mississippi the blowgun was used for small game, apparently an intrusive trait from South America via the West Indies. Some of the tribes built mounds to serve as house foundations and monuments. We also find permanent buildings for housing religious objects or shrines, which are in a way primitive temples, though very simple in structure. In all these respects the tribes east of the Mississippi stand somewhat apart from those west and must be classed with the very highest types of Indian culture north of Mexico. The Natchez and their neighbors made very fine cloth of mulberry fibre, and all the eastern tribes were noted for their netted cloaks of turkey feathers. The Busk, or green-corn dance, is in many respects one of the most interesting of all Indian ceremonies, and in its simpler form found its way into parts of the Eastern Woodland Area and even into the Plains. The complete ceremony requires eight days and is characterized by the kindling of new fire, the renewal of garments, the cleansing of houses, etc.—in short, the renewal of everything. Also enemies were forgiven and all malefactors absolved of their crimes. The famous "black drink," a powerful emetic, was also used to purify the priests of the ceremony. The underlying conception of the whole procedure seems to be a general thanksgiving for the fruits of the harvest as represented in the maize.

Very little is known as to the culture of the Carrizo, Karankawa, Tonkawan, and Atakapa skirting the coast of Texas, except that they were less advanced than the other tribes of the area. Consult C. C. Jones, *Antiquities of the Southern Indians* (New York, 1873), and J. R. Swanton, *Indian Tribes of the Lower Mississippi, etc.* (Washington, 1911).

The Southwest Area.—This area comprises chiefly the States of Arizona and New Mexico with adjacent parts of Texas, Mexico, and California. It is a warm arid region, but well adapted to certain kinds of agriculture. In it we find many prehistoric remains, some of which are undoubtedly the work of tribes still living, while others are farther removed. (See ARCHÆOLOGY, AMERICAN; CLIFF DWELLER.) The historic tribes comprise the true Pueblos (the Hopi, Zuñi, Acoma, Laguna, Taos, Picuris, San Juan, Santa Clara, Cochiti, Jemez, Sia, Santa Anna, San Ildefonso, Pojoaque, Tesuque, Nambe, Santo Domingo, San Felipe, Sandia, and Isleta), the Navaho, Apache (Jicarilla, Mescalero, Tonto, Lipan, White Mountain, San Carlos, and Chiricahua), the Walapai, Havasupai, Chemehuevi, Mohave, Yavapai, Yuma, Cocopa, Maricopa, Pima, and Papago, all within the United States, and in addition certain Mexican tribes (the Opata, Chihuahua, Tarahumari, and others). In a general way we have here two types of culture, pueblo and nonpueblo. The pueblo dwellers are clearly distinguished by their type of village (see Plate to ZUÑI), but have many other cultural characters in common, as the use of the kiva (q.v.), kachina dances, altars and sacred corn meal, tilling of the fields and weaving of cloth by the men instead of the women, a clan system and clan ceremonies, the domestication of the turkey. The Hopi are best known for the highly individualized ceremony of the snake dance (q.v.), not found among the other Pueblos.

The nonpueblo, or more nomadic, tribes are far less uniform in culture, the Navaho being in many respects the most specialized. All without exception made some efforts to cultivate fields—the Apache least of all, the Pima the other extreme. The latter, in common with the Hopi and a few other Pueblos, raised cotton, when first observed by the Spanish. The Navaho (q.v.) are now best known for their flocks of sheep and woolen blankets, the knowledge of which they acquired from the Spanish settlers. With the possible exception of the Navaho, Mohave, and Yuma, the nonpueblo tribes are fine basket weavers, those of the Pima, Chemehuevi, Yavapai, and Apache being especially prized by collectors. All without exception made some pottery, though quite inferior in quality and decoration to that of the pueblo tribes. Likewise their social and political organization was much simpler and more like that of the Plains Area.

In general, it may be said that all the tribes of the Southwest cultivated corn, made pottery, conducted more or less complex masked dramatic ceremonies, and depended far less upon animal than upon vegetable foods. Among the nonpueblo tribes we find a high development of basket weaving and in later times extensive use of the horse by the Navaho, Apache, and Papago; among the pueblo tribes, a high type of masonry, pottery, cotton cloth, masked ceremonies, and complex social organization. Consult P. E. Goddard, *Indians of the Southwest* (New York, 1913).

The Californian Area.—This area includes all of the State of California, except the extreme southeastern part, and a portion of southwestern Oregon. Within its bounds are found representatives of more linguistic stocks than in any other area and, in proportion to its size, a greater number of tribes. There are 21 of these stocks, all but three of which are not represented elsewhere; they are the Athapascan, Chimarikan, Chimmesyan, Costanoan, Esselenian, Karok (Quoratean), Lutuamian, Maidu, Miwok (Moquelumnan), Pomo (Kulanapan), Salinan, Shastan, Shoshonean, Washoan, Wintun (Copehan), Wiyat (Wishoskan), Yanan, Yokuts (Mariposan), Yukian, Yurok (Weitspekan), and Yuman. These stocks are each represented by one or more small tribes. In contrast to

this great diversity of ethnic groups there seems to have been very little migration or tribal differentiation within historic times, for even migration traditions are wanting, each group residing in its traditional habitat, suggesting that their distribution must have occurred at a remote period. There is also decided cultural uniformity. One of the striking characteristics is the almost entire absence of political organization, the small villages being the units, with the only bonds between them those of language and topography.

California culture was perhaps the crudest and simplest type to be found in America. Though the art of basketry was highly developed, perhaps superior to the basketry of other areas, other arts were quite primitive. Pottery was practically unknown, agriculture was nowhere practiced, though the chief food was vegetable. The acorn was the great staple, from which was produced a kind of meal, and in turn a bread. The seeds of wild grasses and roots were also used. Hunting of deer and small game and fishing were supplementary. Social organization was little more than the family unit, and while ceremonies were in some respects elaborate, they did not possess the complex rituals of other areas.

Certain minor cultural differences between the northern and southern parts of the State seem due to intrusive traits. For example, in the extreme north we find some rectangular houses of native planks, like those of the South Pacific Area. However, these differences are far less accentuated than those marking off the subdivisions in the culture areas so far discussed. Consult A. L. Kroeber, *Types of Indian Culture in California* (Berkeley, 1904), and id., *Religion of the Indians of California* (ib., 1907).

The North Pacific Coast Area.—From southern Oregon to the Alaska Peninsula we have a long stretch of country between the Pacific Ocean and the western slopes of the Cascade Range. In the south we have rather level open tracts, but in the north rocky coasts with deep valleys. The Indians throughout this long coast belt had many similar traits of culture. In the first place they were accomplished canoeists and fishermen. Their country was heavily timbered, in consequence of which we find work in wood highly developed. Especially in the north we find large rectangular houses of split planks, with picturesquely carved posts and totem poles (see Totemism). Dishes, bowls, and spoons were of wood. No pottery was made, so boiling was in wooden boxes and baskets by dropping in hot stones. No food plants were cultivated, but in a few localities some tobacco was planted. Costume was simple. A large woven umbrella-like hat was worn in rainy weather; the feet and legs were usually bare, and excepting a kind of cloak or mantle there was little in the way of body clothing. The social organization was rather complex, some of the tribes having not only numerous clans but also phratries. Each clan, or family, had a body of tradition and ceremonies, some aspects of which were objectified in the form of "crests," carved upon totem poles and house fronts. Society consisted of at least four grades —chiefs, nobility, citizens, and slaves. More than elsewhere in North America the sense of wealth was developed with extensive barter and forms of credit. As a part of this credit system, we have the famous potlatch celebration, which is in the main a conventional display of family riches. There are many religious societies, all of which have rather complex rituals.

The most typical tribes of this area are the Tlinkit, Haida, and Tsimshian of the north; next in order are the Kwakiutl, Nootka, and Bella Coola. In Washington and Oregon are the still less typical coast Salish (q.v.), the Chinook, and other small tribes. Consult A. P. Niblack, "Coast Indians of Southern Alaska and Northern British Columbia," in *Report of the United States National Museum for 1888* (Washington, 1889), and Franz Boas, *Tribes of the North Pacific Coast* (Toronto, 1906).

The Plateau Area.—As the name indicates, this comprises the highlands in Nevada, Utah, Idaho, Oregon, Washington, and British Columbia—a region in which the geographical conditions vary from the arid south to the rather mild forested north. However, almost the entire native population was found in the northern half. In the deserts of Utah and Nevada were scattered bands of the Gosiute, Pavant, and Piute, but from the Snake River northward were the Bannock, Snakes, Nez Percé, all the interior Salishian tribes, and the Kutenai. Their combined ranges covered the drainage of the Columbia River, which brought them into the great salmon area. This fish furnished the chief food, though the Snakes and Nez Percé made some use of the buffalo, the Salish of the north of the deer and bear. Vegetable foods, however, made up a large part of their menu, especially wild-grass seeds, roots, and berries. Pottery was unknown, except possibly to a few of the southern tribes; but basketry was highly developed, and some weaving of bark fibres was attempted. Cooking was in baskets and pits with hot stones. An underground house was used in the north, a brush shelter in the south. Social organization and ceremonies were relatively simple, though less so than those of California. Some of the tribes on the east, as the Nez Percé, Bannock, Flathead, and Kutenai, borrowed many traits from the Indians of the plains, while others on the west borrowed from the coast tribes. Consult A. B. Lewis, *Tribes of the Columbia Valley and the Coast of Washington and Oregon* (Lancaster, Pa., 1906).

The Mackenzie Area.—As may be seen from the map, this area comprises the Great Northwest, or the interior of northwestern Canada and Alaska. Unlike the preceding areas, its native inhabitants are of a single linguistic stock, Athapascan, passing under the general designation of Déné (see Athapascan Stock). Part of the area is mountainous and part subarctic. The winters are long and the conditions of life hard, perhaps even more so in the north than for the Eskimo, who live on sea food. In all these respects the environment is similar to that of the Cree and other extreme northerly tribes of the Eastern Woodland Area. The increasing severity of the climate from south to north naturally modifies the culture of the natives, which in Alaska and the Far North becomes generally similar to the Eskimo. Yet considerable uniformity prevails. We find a loose social and political organization, the unit being the band, or family group. For food the chief dependence is on the caribou, whose skins also furnish clothing and tents. Toboggans, snowshoes, and bark canoes are in general use. Utensils are of basketry and bark, and boiling is usually with hot stones. The chief tribal divisions are the Kutchin, Loucheux, Hares, Slavey, Dog-Ribs, Cop-

per-Knives, Chippewayan, Beaver, Carriers, Nahane, Sekanie, and Babine. Consult Samuel Hearne, *Journey to the Northern Ocean* (London, 1795), and A. G. Morice, "Notes on the Western Dénés," in *Transactions of the Canadian Institute*, vol. iv (Toronto, 1895).

The Arctic Area.—The territory included in this area is a narrow strip along the entire coast from the Alaska Peninsula to the Gulf of St. Lawrence, the Aleutian Islands, and all the inhabited Arctic lands between Banks Land and Greenland inclusive. It is occupied by tribes of the Eskimoan stock, whose culture has been discussed under the title ESKIMO.

General Cultural Characters. In conclusion, a few general points may be noted. As to foods, there is a tendency to make one food the main support for a considerable area; thus, maize, or corn, was the one important staple for the Pueblo Indians of the Southwest, all other foods being supplementary; in California it was the acorn; in parts of the Plateau Area, the seeds of wild grasses were important; in the southeastern and the southern two-thirds of the Eastern Woodland areas, maize, with wild rice along the northern border of the maize area. In the Mackenzie Area, the North Pacific Coast, the Eskimo country, and parts of the Plains Area, vegetable foods were a negligible factor. Of animal food, the typical Indians of the Plains depended upon the buffalo almost as completely as the Eskimo upon seals and caribou; the tribes of the Columbia drainage and northward depended upon salmon, and those of the Mackenzie Area, together with those in the extreme north of the Eastern Woodland, upon animals of the deer kind: of manufactured foods, chiefly those of pulverization—maize where grown, acorns in California, grass seeds and roots in the Plateau Area, even berries in parts of the Plains and Mackenzie areas. This process was also applied to animal food—as buffalo pemmican in the Plains, deer pemmican in the Eastern Woodland and parts of the Mackenzie Area, and in parts of the salmon area where the dried fish were pounded fine and stored. Another unique product is the maple sugar of the Eastern Woodland. The smoking of tobacco or other vegetable substances was associated with religious and social concepts among the Plains, Southeastern, Eastern Woodland, and adjacent parts of the Plateau and Mackenzie areas; while not unknown elsewhere, it was of minor importance. Tobacco was cultivated in the eastern part of the continent and by a few tribes along the Missouri and Columbia, not otherwise agricultural. Fishing was rare in the Plains and the Southwest, but common elsewhere.

The moccasin was worn in the Plains, Southeastern, Eastern Woodland, parts of the Mackenzie, Plateau, and Southwest areas. Many of the Indians of California and the North Pacific Coast went barefoot. The Eskimo and tribes of the extreme North wore boots. Nowhere except in the extreme North and Southwest was a hat or other head covering used as regular dress. Clothing was made of skins, except in parts of the North Pacific Coast Area and the Southwest. California, Plateau, North Pacific Coast areas, and part of the Mackenzie Area were the "stone boiling" region; i.e., food was boiled in baskets or boxes by dropping in hot stones. Aside from a limited use of hammered copper in a few localities, metals were unknown. Individual ownership of land was rare.

Slavery was a regular institution on the Pacific coast from Alaska to California, the slaves being prisoners of war, their children and descendants, who thus constituted a permanent slave caste within the tribe, condemned to hard labor, harsh treatment, sale, or death at the will of their masters. Slavery of a milder type seems to have existed among the South Atlantic tribes. In more modern times the Southern Indians followed the example of the colonists and became the owners of negro slaves.

Woman, while subject to her husband in ordinary affairs and debarred from certain societies and ceremonies, had yet well-defined rights of her own. She was complete mistress in household affairs, and among the Eastern tribes had either a voice or a representation in councils. With the Iroquois all important questions must be passed upon by a council of the women, who alone had power to declare war. The right of adoption, which meant the decision of a captive's fate, rested also with the women. In general her position was highest in those tribes where descent and inheritance were reckoned in the female line. In the division of labor most of the heavy work fell to her share, while the dangerous and arduous undertakings belonged to the man. Polygamy was recognized in most of the tribes.

The method of disposing of the dead varied, but was usually inhumation. Graves or pits were common throughout the greater part of the Southeastern and Eastern Woodland areas; scaffold burial was found in the Plains, and elevated canoe burial in parts of Washington and Oregon; cremation was the usual method in California and parts of the Southwest; elsewhere the body was placed upon the ground, variously protected. Thus, east of the Mississippi we have burial in the ground; in the remainder of the continent the body was usually placed on or above the surface.

Not all Indians were fond of war. The most warlike were those of the Plains and east of the Mississippi. Those of California and the Pueblos of the Southwest were least inclined to war. Among the former social position depended upon war deeds, but elsewhere in the continent they were of less importance.

Among extreme Northern tribes the principal weapons were the knife, club, and lance. To these were added farther south the bow and arrow and the hatchet or tomahawk. The bow and arrow were practically universal, but the lance and shield as a rule were used only by the equestrian tribes of the open plains and the desert Southwest, the timber people finding them a hindrance to active movement. Aside from the shield, defensive armor was not commonly used, excepting among tribes of the Alaskan coast, who had protective cuirasses of ivory plates, wooden slats, or of a very tough hide.

Service in any particular expedition was entirely a matter of individual choice, and the authority of the leader rested solely upon the voluntary obedience of his followers. On the plains the invitation was usually given by sending around a war pipe, which every volunteer was expected to smoke. The going and the homecoming were attended with numerous ceremonies, and a successful campaign was celebrated with the scalp dance, in which the women carried the captured scalps and sang the praises of the victors.

Indiscriminate massacre was the ordinary

rule; but prisoners were frequently taken, either for torture, slavery, or adoption. If adopted, the prisoner was taken into a family and became a full member of the tribe. If condemned to death, he met his fate with all the courage of his Indian training. On the plains captives were seldom tortured, but were more often taken into the tribe, being rarely, however, so completely admitted to membership as in the East. The practice of scalping the slain enemy was far from universal. In many tribes it was customary to feast upon the flesh of one of the slain enemy after a notable victory. However, all the native methods of fighting were greatly modified by the early introduction of guns and from experience with European antagonists.

The leisure of the Indian was taken up with athletic contests, games, dances, feasts, and story-telling. The ball play was the chief athletic game everywhere east of the plains, as well as among some tribes of the Pacific coast, the ball being handled with netted sticks somewhat resembling tennis rackets. From this game are derived the lacrosse and racquet of Canada and Louisiana. Next in importance in the East was the game known to the old traders as *chunky*, played with a circular stone disk or wheel and a pole curved at one end in the fashion of a shepherd's crook. The wheel was rolled by one of the contestants, while the other tried to slide the stick after it in such a way that the wheel would lie within the crook when both came to a stop. The plains tribes had a very similar game in which a netted wheel took the place of the stone disk. Foot-racing was common among the agricultural tribes and horse racing on the plains. Dice games were universal.

A favorite pastime of the plains women was the awl game, played with marked sticks which were thrown down upon a stone set in the middle of a blanket, tally being kept by advancing an awl along certain marks around the margin of the blanket. Shinny and football were also played by the women. Hunt-the-button games were played within the tepee during the long winter nights, the players accompanying the movements of the hands with songs intended to distract the attention of the other side.

Social dances, usually followed by feasting, were of great variety.

Musical instruments were the drum, flageolet or flute, eagle-bone whistle, rattles of various kinds, and even a notched stick rubbed in saw fashion with one end resting upon a gourd for a sounding board. There were songs for every occasion—lullaby, work, love, gaming, medicine, war, and ceremonials. See INDIAN MUSIC.

To most of the Indians every animal, plant, and object of nature was animated by a spirit, beneficent or otherwise, according as it was propitiated or offended. Certain of these were regarded as especially powerful or active, as the sun, fire, and water among the elemental gods, the buffalo, eagle, and rattlesnake among the animals, and the cedar, cottonwood, corn, tobacco, and peyote among plants. The number four was peculiarly sacred, as having reference to the cardinal points. Colors had symbolic meanings and sometimes also sex and local abiding places. Thus, with the Cherokee the red gods of victory lived in the Sunland, or east, while the blue spirits of disaster dwelt in the north. Spirits were propitiated and implored with prayer, sacrifice, vigil, and fasting, and the purificatory sweat bath usually preceded every important ceremony. There was no overruling "Great Spirit," excepting as certain gods were of more frequent importance than others. Among the plains Indians the spirit buffalo was all-important, while with the agricultural tribes of the Southwest the rain gods took precedence. The sun and its earthly representative, fire, were everywhere venerated. Certain tribes had tribal "medicine" or palladiums, with which the nation's prosperity was supposed to be bound up and around which centred their most elaborate ceremonial. Thus, the Kiowa had their Taime image of stone, the Cheyenne their sacred arrows, the Arapaho their "flat pipe." Each man had also his own secret personal medicine.

The priests were frequently organized into cult societies, and there were also brotherhoods bound together by certain secret rites. Great stress was laid upon dreams and sacrifice. Almost everywhere all religious sanctions and even detailed ceremonies are believed to have been handed down in dreams. Among the Pawnee, in former times, a captive girl was annually sacrificed to the goddess of fertility. The cannibalistic practices of the Eastern tribes after a victory, and the cannibal feasts of the Northwest coast, in which a slave was the usual victim, were also more or less sacrificial in motive. With these exceptions human sacrifice was rare, such bloody rites as those of the Aztecs being unknown in the North. There were special ceremonies for girls at puberty, and for young men on first taking rank with the warriors. Among the great religious ceremonials may be noted the green-corn dance of thanksgiving for the new crops, among the Eastern tribes; the sun dance and the more recent ghost dance of the plains tribes; the salmon dance of the Columbia region, and the celebrated snake dance of the Hopi of Arizona. To these may be added the peyote cult of the Southern plains. Tribal religions were sometimes subject to revival or revolution as new prophets arose from time to time. Thus, the religion of the ghost dance, which has practically superseded the old beliefs and ceremonial forms of the plains tribes, had its origin in Nevada towards the end of the nineteenth century. (See WOVOKA.)

Each tribe had its genesis tradition and its culture hero—usually a great trickster and frequently an anthropomorphic animal—together with giants, dwarfs, fairies, witches, and various monsters, as well as animal tribes and chiefs, concerning all of whom there was a great deal of myth and folklore.

Language. The first attempt at classifying the North American languages was made by Albert Gallatin in 1836, the relationships being established chiefly by a comparison of word roots. The beginning of regular systematic research dates from the establishment of the Bureau of Ethnology, under Major J. W. Powell, in 1879. The number of linguistic stocks north of Mexico, as at present recognized, is 56, as given in the tabulated list on page 120. While it is possible that further study may reduce this number, such reduction is highly improbable except in case of a very few minor stocks.

Some tribes had made fairly successful attempts at recording their history and mythic traditions by means of pictographs. Of these the best known are the Walam Olum of the Delaware, and the Kiowa calendars. Intertribal compacts were commemorated among the Eastern tribes by means of symbolic wampum belts.

The Cherokee alone had a literature recorded in an alphabet of their own invention. No accurate estimate of the number of distinct languages making up these stocks can be formed, but they probably exceed 200. To this should be added the dialects of all degrees of divergence to even a greater number. Among so many forms of speech we must expect great variety in structure, yet there are certain characteristics

MAP SHOWING THE LOCATION OF THE LINGUISTIC STOCKS OF NORTH AMERICA.

that serve to distinguish American languages as a whole. Of these, the most important are great complexity of grammar, because to a much greater degree than among the languages of other parts of the world American languages express ideas by grammatical processes instead of additional words; the expression of new ideas by affixes or even stem modification; rare use of gender for sex differentiation, the usual distinction of objects being animate and inanimate, good and bad, round and flat, etc.; and rarity of the plural even in the pronoun, its place being taken by ideas of collectivity and distribution. While there are other differences, these are the most obvious. Within the continent itself the 56 stocks enumerated in the table may be grouped according to certain special characteristics, which, however, show a tendency to conform to geographical areas and are therefore most likely due to historic contact.

Another point of interest is the distribution of these 56 stocks. Their great number in California has been noted, but if we take the whole Pacific coast belt we find in all 36 stocks. Again, we note that of the 20 remaining, 9 are small stocks skirting the Gulf and the Atlantic. The causes of this distribution have been the objects of much speculation, but so far nothing positive can be stated.

This diversity of language was a bar to political and social unity, but did not prevent all in-

tertribal communication. It was usual for some member of a tribe to learn the languages of neighboring tribes, some of which became by general consent the intertribal speech for their respective areas. In the Plains Area a peculiar sign language was developed to such a degree that it served all purposes. While this language seems to have been prehistoric, the well-known trade jargons were developed under the influence of European traders. See MOBILIAN TRADE LANGUAGE; CHINOOK JARGON.

The map on page 119 and the table on this page show the number and location of the North American linguistic stocks.

LINGUISTIC STOCKS	POPULATION	
	United States	Canada
3 Algonquian	40,975	50,000
12 Arawakan	.....	.....
2 Athapascan	34,322	18,890
16 Attacapan	.....	.....
14 Beothukan	.....	.....
5 Caddoan	1,863	.....
32 Chimakuan	306	.....
26 Chimarikan	31	.....
28 Chimmesyan (Tsimshian)	729	1,375
33 Chinookan	897	.....
15 Chitimachan	69	.....
56 Chumashan	38	.....
19 Coahuiltecan	.....	.....
33 Costanoan	17	.....
1 Eskimoan (Eskimo)	14,087	19,000
54 Esselenian	.....	.....
29 Haidan (Skittagetan)	561	400
4 Iroquoian	39,679	10,481
39 Kalapuyan	106	.....
18 Karankawan	.....	.....
41 Karok (Quoratean)	775	.....
22 Keresan	4,027	.....
21 Kiowan	1,126	.....
38 Kusan	93	.....
31 Kutenaian (Kitunahan)	538	553
36 Lutuamian	978	.....
49 Maidu (Pujunan)	1,100	.....
50 Miwok (Moquelumnan)	699	.....
9 Muskhogean	29,191	.....
25 Piman	8,607	.....
48 Pomo (Kulanapan)	1,193	.....
55 Salinan	16	.....
7 Salishan	7,833	10,264
35 Shahaptian	4,391	.....
44 Shastan	1,578	.....
8 Shoshonean	16,842	.....
6 Siouan	32,941	7,860
40 Takelman (Takilman)	1	.....
20 Tanoan	3,140	.....
11 Timuquanan	.....	.....
27 Tlinkit (Koluschan)	4,458	.....
13 Tonikan (Tunican)	43	.....
17 Tonkawan	42	.....
34 Waiilatpuan	329	.....
30 Wakashan	388	4,150
51 Washoan	819	.....
46 Wintun (Copehan)	710	.....
43 Wiyat (Wishoskan)	152	.....
37 Yakonan	55	.....
45 Yanan	39	.....
52 Yokuts (Mariposan)	553	.....
10 Yuchean (Uchean)	78	.....
47 Yukian	198	.....
24 Yuman	4,279	.....
42 Yurok (Weitspekan)	668	.....
23 Zuñian	1,667	.....

Anatomical Characteristics. In the first place, there is quite an obvious difference between the Eskimo (q.v.) and the Indian of the United States, though this difference becomes far less certain in Alaska and parts of Canada where mixture has occurred. Taking the Indians of the United States and Canada as a whole, we find them conforming to the general American type of straight black hair, chocolate-brown skin, prominent cheek bones, and tall stature. The forms of face and head differ greatly, but show tendencies to geographical rather than to linguistic or cultural distributions. Thus, low statures tend to prevail throughout the entire Pacific Coast and Plateau regions and again in the Southeastern Area, while the several types of cranial form are distributed less regularly. (Consult W. Z. Ripley, *The Races of Europe*, Boston, 1900.) Anatomical studies of the living Indians have, however, not advanced far enough for a definite classification of the various tribes, and, even if they had, it is doubtful if such grouping would have any particular significance. The various tribes show differences of feature and limb analogous to family characteristics among us, which are often so marked among small tribes that an experienced observer can identify typical individuals by this criterion alone.

INDIANS OF MEXICO, CENTRAL AMERICA, AND WEST INDIES

The tribes of Mexico and Central America exhibited every stage of culture from the brutish Cochimí and wild Guatuso to the civilized Maya, Tarasco, or Aztec, with their highly developed agriculture, architecture, and literature. From the Rio Grande to Panama some 30 linguistic stocks were represented, besides the Arawakan and Cariban tribes of the West Indies. From traditional and other evidence nearly all of the more important tribes of Mexico and Guatemala, including those of Piman, Nahuatlan, and Mayan stock, appear to have migrated from the north. The Otomí and Chinantec, however, appear to have antedated this movement and may properly be considered indigenous. There are shadowy traditions of earlier cultivated races, the Ulmec and Toltec, from whom the ruder Aztec acquired their first civilization, but it is difficult to decide whether these names belong to the domain of history or of myth. The roving tribes of the northern frontier seem to have been akin to the Apache, but have now so completely disappeared that even their affinity is not certainly established. The Comanche and Kiowa, as well as the Apache, made constant inroads from the north, penetrating as far down as Zacatecas. The destruction of the peaceable Carrizo tribes of the lower Rio Grande is chiefly due to these raids.

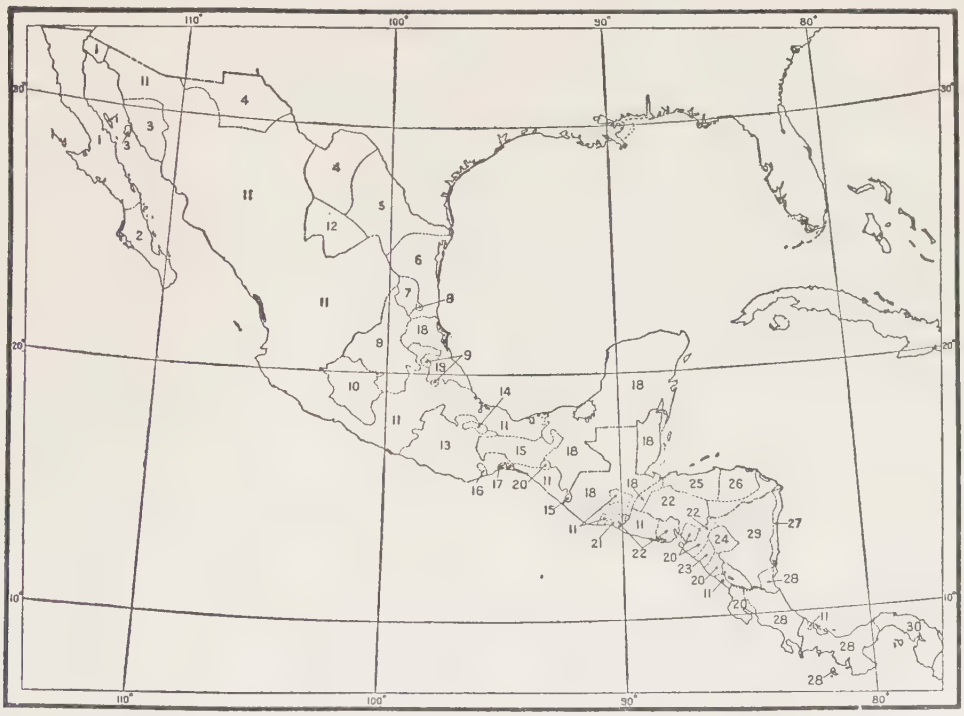
The tribes of the California peninsula, apparently of Yuman stock, were quite primitive. The Seri of Tiburon Island in the adjacent gulf were but slightly higher in the scale, but earned respect by their determined defense of their territory against all intruders. Their southern neighbors, the Yaqui, were as much noted for their fighting qualities as for their superior industry and reliability. The Tarumari and other Piman tribes of the Sierra Madre, as far south as Jalisco, differ but little in general habit of life from the northern Pueblos. Physically they are dark and rather undersized. The Otomí of the central plateau were but little inferior in culture to the Aztec, by whom they had been subjected.

The Nahuatlan tribes which constituted the nucleus of the ancient Aztec Empire dwelt chiefly in the present states of Mexico and Puebla, the Aztec proper having their capital on the site of the present city of Mexico. Detached offshoots of the same stock were found as far south as Costa Rica. The Empire included many tribes or nations of diverse stocks; but not all the cognate Nahuatlan tribes, even in the central

territory, were under the rule of the Aztec, their bitterest enemies in fact being their neighbors and kinsmen, the Tlascaltec.

By reason of their military importance the Aztec have been somewhat overrated. Their general culture, while high in itself, was not superior to that of the Tarasco or Zapotec and was inferior to that of the Maya. In their social organization they had passed the matriarchal stage and reckoned descent and inheritance in the male line. The national prosperity rested upon agriculture. Land belonged to the clan, and marriage was regulated by gentile laws. In architecture they had reached a high stage of advancement, the pyramid of hewn stone being one of the most characteristic features. They knew the secret of bronze, and were skillful exacted as an annual tribute from the conquered tribes. The characters were iconomatic, or partly ideographic, partly phonetic, upon the principle of the rebus. Their calendar recognized 365 days in the year.

In southern Mexico were the Tarasco, Totonaco, Zapotec, and Mixtec, all populous and civilized nations equal in culture to the Aztec, if not superior. They built houses of cut stone, brick, and mortar, planted fields and orchards, worked gold and copper—the Tarasco wearing complete body armor of wood plated with copper or gold—made beautiful inlaid pottery, and wove cotton garments and robes of bright-colored feathers. They had elaborate ritual religions, accompanied sometimes by human sacrifice, with calendar systems and hieroglyphic literatures



MAP SHOWING THE LOCATION OF THE LINGUISTIC STOCKS OF MEXICO AND CENTRAL AMERICA.

1 Yuman	6 Tamaulipecan	11 Nahuatlan	16 Tequistlatecan	21 Jincan	26 Payan
2 Waicurian	7 Janambrian	12 Laguneros	17 Huavean	22 Lencan	27 Mosquitoan
3 Serian	8 Olivean	13 Zapotecan	18 Mayan	23 Subtiaban	28 Chibchan
4 Athapascan	9 Otomian	14 Chinantecan	19 Totonacan	**24** Matagalpan	29 Ulvan
5 Pakawan	10 Tarascan	15 Zoquean	20 Chiapanecan	**25** Jicaquean	30 Cunan

workers in gold and copper; but stone implements continued in common use, particularly obsidian for cutting purposes. Their dress was of native cotton, woven and dyed in brilliant colors. They had an extensive pantheon with orders of priests and priestesses, and a ritual ceremonial, impressive but cruel and bloodthirsty in character, thousands of human victims being annually sacrificed to the god of war, and their flesh afterward eaten by the multitude. Children of the higher classes were educated in public schools, where boys studied military science, writing, history, and religion, and girls were taught cooking, household work, weaving, and morals. There was a large native literature preserved in books written upon parchment or maguey paper, 24,000 bundles of this fibre being like those of the Aztec tribes. The Totonaco, who practiced circumcision and head-flattening, claimed to have built the pyramid ruins of Teotihuacan, a few miles northwest from the city of Mexico. The wonderful ruins of Mitla are claimed by the Zapotec.

Passing by the ruder Zoque, Mixe, and Chinantec, and the more advanced Chiapanec, in Oaxaca and Chiapas, we enter the territory of the highly civilized Mayan tribes, who held the whole peninsula of Yucatan, with large portions of Tabasco and Chiapas and most of Guatemala, and had an outlying colony in the Huastec of Vera Cruz. Their principal nations, besides the Maya proper in Yucatan, were the Quiche and Cakchiquel of Guatemala. There is evidence that the ancient builders of Palenque and Copan,

already in ruins at the time of the conquest, were of the same stock. The Maya proper had at one time formed a powerful confederacy, which, however, had broken up into a number of independent states before the arrival of the Spaniards, by whom they were conquered in detail, the last free remnant being driven from their citadel of Chan Santa Cruz by Mexican troops only as late as 1900, after a stubbornly contested war of several years. The great cities Mayapan, Uxmal, and Chichén-itzá, in ruins when first discovered, were once flourishing centres of dense populations, which had attained the highest point of native American civilization. In government they retained a modified clan system, with an hereditary chief ruler, assisted by a council from his own clan. They were preëminent in architecture, building palaces, pyramids, and cities of cut and polished limestone, set in mortar and covered with figures and hieroglyphic inscriptions. Strange as it must seem, all this was done without metal tools, gold and copper being used only for ornamental purposes. Agriculture was the principal industry, the common lands being portioned out by the village chiefs. Honey and wax were obtained from domesticated bees, and an active commerce was carried on by sea along the southern Gulf coast as far as the island of Cuba, copper disks and cacao beans being used as currency. Their intricate calendar, with its cycles of 20, 52, and 260 years, has been the subject of much scholarly interest, as also their remarkable hieroglyphic records, written upon parchment or maguey paper, or carved or painted upon the walls of their ruined cities, and for which as yet there is no interpreter. The cognate Cakchiquel and Quiche were similar to the Maya in culture, differing only in dialect and extent of territory and influence. The great *Popol Vuh*, a native compendium of the ancient mythology and history of the Quiche, translated by Brasseur de Bourbourg, has been characterized as "one of the most valuable monuments of ancient American literature."

Honduras, Salvador, Nicaragua, and Upper Costa Rica were occupied by tribes of different stocks, some of them of considerable advancement, others, particularly along the east coast, mere savages. The Xinca, on the Guatemala-Salvador frontier, are believed to have been a remnant of the pre-Mayan tribes. The Carib, on the Honduras coast, were exiles from the Antilles. The Mosquito, Ulva, and Rama, farther south along or near the coast, were all wild tribes of different degrees of savagery. The Ulva also have the custom of head-flattening. The Guatuso of northern Costa Rica were an agricultural but brave and savage people, now near extermination, owing to the cruelties of the rubber gatherers. South of their territory were found tribes of higher culture grade, the northern outposts of the civilized Chibchan tribes of Colombia.

The whole of the West Indies, with the exception of a possible Tupí colony from Brazil in central Haiti, was held by tribes of the two great South American stocks, Arawakan and Cariban, the former being indigenous, while the latter were recently invaders, who at the time of the discovery had as yet colonized only the southern islands. The Arawakan tribes were peaceful and agricultural, skillful weavers, wood carvers, and stone polishers.

On page 121 are given a map and a list of the linguistic stocks of Mexico and Central America, so far as it is possible to classify them. Consult: H. H. Bancroft, *The Native Races of the Pacific States* (5 vols., New York, 1875–82); A. P. Maudslay, *Biologia Centrali-Americana* (London, 1889); W. H. Holmes, *Archeological Studies among the Ancient Cities of Mexico* (Field Columbian Museum Publications, Anthropological Series, vol. i, Chicago, 1895); Hartman, *Archeological Researches in Costa Rica* (Stockholm, 1901).

INDIANS OF SOUTH AMERICA

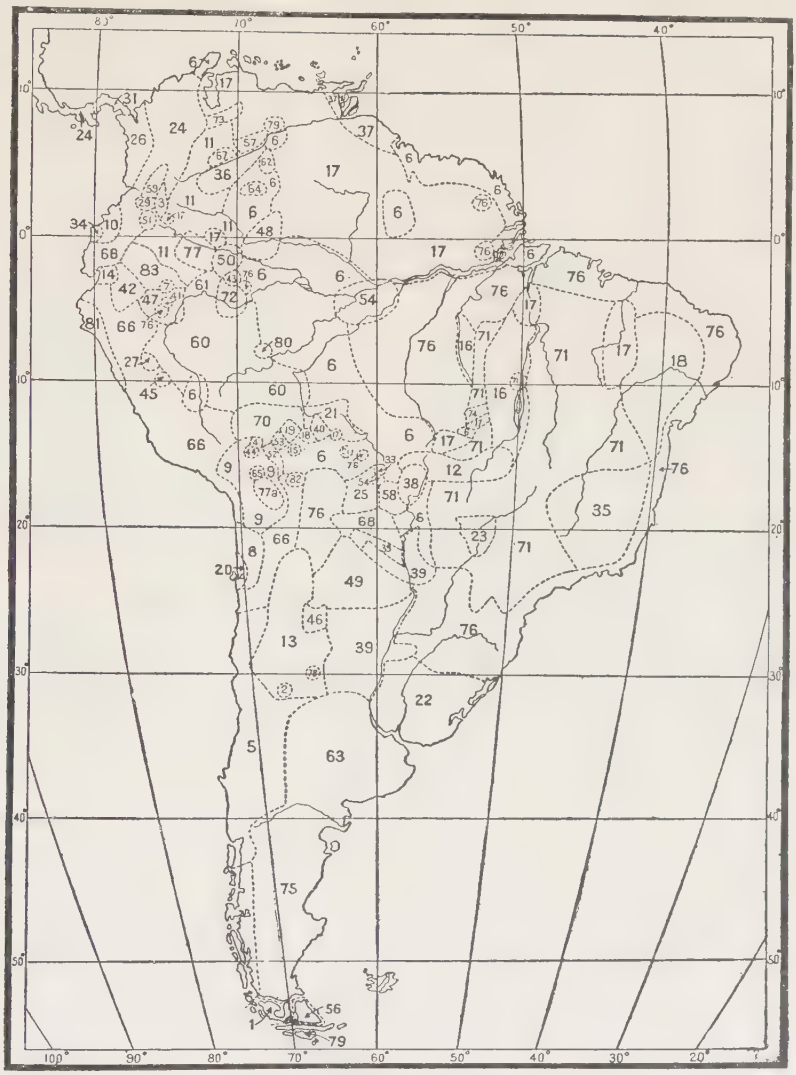
Our acquaintance with the ethnology of South America is still very imperfect, for the reason that vast areas are yet unexplored, while in some regions brought under Spanish or Portuguese dominion so much confusion has been wrought by the migration, disintegration, or complete extermination of tribes that the writings of early missionaries or travelers help little to clear up the difficulties. Here, as wherever else the uncivilized man confronts the European, we find the same steady march towards extinction, brought about originally by wholesale massacres and cruelties at the hands of the white conqueror and later by the new diseases which followed in his wake.

As in North America, we find also on the southern continent the phenomenon of vast areas occupied by tribes of some half-dozen linguistic stocks, differing little in habit and all upon nearly the same culture plane, with other areas of mountainous or otherwise difficult country held by a multitude of small stocks with habits almost as widely variant as their languages. In general we may group the tribes by three great regions, viz., the Andean, the Amazonian, and the Pampean—the first being the mountainous territory extending along the Pacific coast from the Isthmus to about 35° south, in central Chile; the second, the whole interior stretching eastward from the summit of the Cordillera to the Atlantic, with the exception of the Chaco; and the third, comprising the Chaco Forest and the grassy plains of the Pampas, between the Andes and the Paraná River, together with southern Chile, and stretching southward to Cape Horn.

In the Andean region we find the highest culture, represented by the Chibcha, Yunca, Aymará, and above all the Quichua, whose empire extended nearly 2000 miles along the coast and made its influence felt even among the wild tribes of the upper Amazon and the Chaco border. In nearly all these nations we find a firmly established system of government, with social distinctions clearly defined; careful and successful agriculture, including irrigation and the use of manures; superior pottery, with curious designs found nowhere else; weaving of cotton and the hair of domesticated animals; beautiful metal work in gold, silver, and bronze; and an architecture with such enduring monuments as the stupendous ruins of Gran Chimu, Paucartambo, and Tiahuanaco. So far as can be learned, the various governments were based upon the clan system, even in Peru, where the Inca himself was but the executive officer of a council of the gentes. Of the various religious systems the best known is that of the Quichua, whose great god was the Sun, after whom came their culture hero, the white and bearded Viracocha. The dead, usually wrapped in various garments and pieces of cloth, were buried in the

earth; often the grave was walled in with flat stones. Anything in the nature of a hieroglyphic system appears to have been unknown. The Quichua used the *quipu*, or knotted cords, in keeping their accounts. The descendants of

The tribes of the Amazon region, the Orinoco, and the Paraná, were all in various degrees of savagery, although nearly all sedentary and more or less agricultural in habit. Cannibalism prevailed extensively, the word itself being de-



MAP OF SOUTH AMERICAN LINGUISTIC STOCKS.

1 Alikulufan
2 Allentiacan
3 Andaquian
4 Apolistan
5 Araucanian
6 Arawakan
7 Ardan
8 Atacameñan
9 Aymaran
10 Barbacoan
11 Betoyan
12 Bororoan
13 Calchaquian
14 Cañarian
15 Canichanan
16 Carayan
17 Cariban
18 Caririan
19 Cayubaban
20 Changoan
21 Chapacuran
22 Charruan
23 Chavantean
24 Chibchan
25 Chiquitan
26 Chocoan
27 Cholonan
28 Chonoan
29 Coconucan
30 Corabecan
31 Cunan
32 Curucanecan
33 Enimagan
34 Esmeraldan
35 Goyatacan
36 Guahiban
37 Guaraunan
38 Guatoan
39 Guaycuruan
40 Itonaman
41 Itucalean
42 Jivaran
43 Jurian
44 Lecan
45 Lorenzan
46 Lulean
47 Mainan
48 Makuan
49 Matacan
50 Miranhan
51 Mocoan
52 Mosatenan
53 Moviman
54 Muran
55 Ocoronan
56 Onan
57 Otomacan
58 Otuquian
59 Paniquitan
60 Panoan
61 Peban
62 Piaroan
63 Puelchean
64 Puinavian
65 Puquinan
66 Quichuan
67 Salivan
68 Samucan
69 Sanavironan
70 Tacanan
71 Tapuyan
72 Ticunan
73 Timotean
74 Trumaian
75 Tsonekan
76 Tupian
77 Uitotan
77a Uran
78 Yahganan
79 Yaruran
80 Ypurinan
81 Yuncan
82 Yurucarean
83 Zaparan

these cultured Andean nations still number many millions, in fact constituting the bulk of the population over large areas; and although in theory accorded equal civil rights, they are yet, like aboriginal races elsewhere, in a state of practical vassalage to the dominant race of the conqueror.

rived from the name of the fierce Carib tribe. The custom still exists on some of the southern head streams of the Amazon. Living mainly under the tropics, many tribes went entirely naked, and tattooing and body painting, although occasionally found, were rare. Labrets were worn by a number of tribes. Scalping was un-

known, excepting in a portion of the Chaco territory, but several tribes preserved the heads of their slain enemies. (See HEAD-HUNTING.) The blowgun and poisoned arrow were general throughout the upper Amazon and Orinoco regions, curari poison constituting a chief article of intertribal trade. Government was of the loosest, and confederations were almost unknown. The prevailing religious form was a crude animism, apparently several degrees lower than that of the North American savages. Throughout this vast area the tribes which have not disappeared are still nearly in their primitive condition, excepting where devoted missionaries have gathered them into villages, chiefly in Peru, Bolivia, and Paraguay. The Jesuit missions among the Guaraní are recognized as the most successful ever established in America. At one time they contained over 300,000 Christianized Indians, the basis of the modern civilized states of Paraguay and Uruguay.

The tribes of the northern and central Pampean region, including the Chaco and Pampas sections of Argentina, are warlike equestrian nomads and hunters, living in tents of skin, subsisting almost entirely upon meat, and in other respects also very similar to the plains tribes of North America, but superior in the possession of herds of cattle and sheep as well as horses, and in a certain skill in ironworking. The Araucanians of southern Chile, an extension of one of the most important Pampean stocks, have successfully maintained their independence both against the Inca emperors and the conquering Spaniard. The Patagonians resemble their northern neighbors of Argentina, but represent a somewhat lower grade of culture. Like them, they are brave fighters and of fine physique. The natives of bleak Tierra del Fuego are in perhaps the lowest stage of culture found in South America, occupying the merest temporary shelters, going almost naked even in coldest weather, and having no apparent tribal forms or ceremonials. On the other hand, they are skillful hunters and daring fishermen.

On page 123 are given a tentative list and a map, after A. F. Chamberlain, of the existing South American linguistic stocks, so far as present very deficient knowledge permits a classification, Brinton being the chief authority.

Bibliography. The literature is voluminous, but there are few good general works. The special literature is cited in the separate articles for the different tribes, but for a general view the following may be consulted: H. H. Bancroft, *The Native Races of the Pacific States* (5 vols., New York, 1875); A. H. Keane, *Man: Past and Present* (Cambridge, 1900); D. G. Brinton, *The American Race* (Philadelphia, 1901); Livingston Farrand, *Basis of American History* (New York, 1904); Church, *Aborigines of South America* (London, 1912).

As special references for South American Indians, consult: Martin Dobrizhoffer, *An Account of the Abipones* (London, 1822); Im Thurn, *Among the Indians of Guiana* (ib., 1883); Von der Steinen, *Unter den Naturvölkern Zentral-Brasiliens* (Berlin, 1897); Max Schmidt, *Indianerstudien in Zentral-Brasilien* (ib., 1905); Koch-Grünberg, *Zwei Jahre unter den Indianer* (ib., 1909); A. F. Chamberlain, "Linguistic Stocks of South American Indians," in *American Anthropologist*, vol. xv (Lancaster, Pa., 1913).

INDIAN SARSAPARILLA, NUNNARI ROOT. The roots of *Hemidesmus indicus*, an East Indian shrub of the family Asclepiadaceæ, used as a substitute for sarsaparilla.

INDIAN SUBREGION. A zoögeographical district of the Oriental Region, comprising India from the valley of the Indus eastward to the delta of the Brahmaputra and southward nearly to its terminus, where it mingles with the Ceylonese Subregion, which includes Ceylon and the extremity of the Indian Peninsula. It is rich in animal life, which, as a whole, is Oriental in its affinities. The Mediterranean (Palearctic) Subregion seems to extend eastward to the arid valley of the Indus, and India thus possesses several Ethiopian forms, which have led some zoölogists to regard its fauna as Ethiopian rather than Oriental; but the weight of opinion has turned against this view. The eastern shore of the Bay of Bengal is the home of so mixed an animal population that it has sometimes been called an Indo-Malayan subregion, but this is not generally recognized. Northeastern India, along the midslopes of the southern Himalaya ranges, is very different, faunistically, from the peninsular plains or the low hot coastal regions, owing to its elevation, and forms a long westward-reaching tongue of the Indo-Chinese and Manchurian subregions (q.v.). Consult J. G. Bartholomew, *Atlas of Zoögeography* (New York, 1911). See maps under DISTRIBUTION OF ANIMALS; and the paragraph on *Fauna*, under INDIA.

INDIAN SUMMER. A short season of pleasant weather in the Central and Atlantic Coast States, usually occurring in October or November, more rarely in December, and characterized by an almost cloudless sky, calm or light airs, a hazy atmosphere, and mild temperature in the daytime, but rather cool at night. It may last one or two weeks and may recur two or three times during a season, but rarely more than twice. During Indian summer weather the barometer stands above the average, and the cloudless sky indicates that there is in general a descending tendency of the air at some distance above the earth. Balloons ascending to great heights show that there is very little horizontal movement in the air, but what there is is towards the east. At this season the leaves of most plants dry up and drop away, adding their débris to the dust in the atmosphere. Owing to the prevailing dryness, forest fires and prairie fires occur at this time, and the smoke adds to the intensity of the Indian summer haze, but is not necessarily the sole cause of it. Frequently such smoke spreads slowly eastward, gathers moisture to itself, and is followed by clouds and gentle rain. Precisely similar weather occurs in Germany, where it is known as the "Old Woman's Summer" and "St. Luke's Summer," and in England, where it is known as "St. Martin's Summer," or "All Hallow Summer"; these terms being applied to it according to the various dates on which it happens to occur in October or November. There are also many indications of its existence in China and Siam. The haze attending the African Harmattan in December and January appears very similar to that of Indian summer, but the diatom dust that characterizes the former has not yet been found in the latter.

As to the origin of this expression, Mr. Albert Matthews has shown that it does not occur anywhere either in printed books or manuscripts

until the year 1794; but at that time it was in use throughout the Atlantic States. The popular belief that Indian summer weather was predicted by the native Indians in conversation with the first European settlers finds no documentary corroboration, and the idea that the term "Indian summer" was employed by the early settlers seems to be a myth. In general, neither this term nor anything corresponding to it is to be found in any Indian language. The term "Indian summer" in its present usage was introduced into England from America. In 1778 Horace Walpole used the same expression, but he evidently had in mind the intense heats of the midsummer weather in India and the West Indies. For full information on the whole subject, consult the *Monthly Weather Review*, vol. xxx, pp. 19–29 and 69–79 (Washington, 1902). No material further contribution has been made to this interesting subject since that date.

INDIAN TAILOR BIRD. See Plate of PENSILE NESTS with article NIDIFICATION.

INDIAN TERRITORY. A former Territory of the United States, now included in the State of Oklahoma (q.v.). It was originally a part of the Louisiana Purchase, settled by the Creek Indians in 1827, and set aside by Congress for the use of the Indians living east of the Mississippi River in 1829. In 1890 the area was decreased about one-half by the creation of Oklahoma Territory from its western part. The Indian Territory as then formed had an area of 31,246.41 square miles. Because the Territory had been reserved for Indian tribes it long remained practically unexplored. According to late treaty provisions it belonged for a long time to the Five Civilized Tribes—the Cherokees, Creeks, Seminoles, Choctaws, and Chickasaws. The Five Civilized Tribes came to it under an agreement with the United States government which guaranteed their tribal authority. These tribes organized for themselves forms of government not unlike those of the States of the Union, having a Principal Chief, or Governor, and a Legislature consisting of a House of Kings and a House of Warriors, elected by popular vote, a national court, school system, and treasury. In the earlier period of its existence this system worked well, but with the influx of white population conditions altered. These whites found themselves without voice in the government and were unable to secure such privileges as were necessary for proper protection and the development of property. Accordingly enactments were passed by Congress having for their purpose the extension of Federal jurisdiction over the Territory, the extinction of Indian governments, the opening of the country to unrestricted white settlement, and the ultimate creation of a State. In 1893 Congress appointed a commission to the Five Civilized Tribes, known as the Dawes Commission. This was given authority to enter into negotiations with the Indians in the Territory for the allotment of their lands in severalty, or to procure a cession of their lands to the United States. This commission had by 1901 finally secured from each of the Five Tribes tentative agreements looking towards allotment and citizenship. In the following years the work of the commission was pushed forward with noteworthy rapidity, and by June 30, 1905, when the commission was discontinued, allotments had been practically completed. In 1897 an Act had been passed giving United States courts jurisdiction within the Territory, and in the following year the Curtis Act was passed, June 28, 1898 (30 Stat. 495), which had for its general purpose the transfers of the control of property rights from tribal authority to that of the United States. It provided, among other things, for the enrollment of citizens preparatory to the allotment of lands, for the regulation of town sites, and the incorporation of towns; and it gave the President a veto power over acts of the tribal governments. Before the preparations for the formal abandonment of communal ownership in favor of individual possession were completed, Congress provided, by an Act of April 26, 1906, for the indefinite continuance of the tribal form of government with certain modifications. By this act tribal taxes were abolished and schools outside of incorporated towns were placed under the control of the Interior Department.

The enrollment of the Five Tribes was definitely completed on June 30, 1907, and at that time the citizenship of the nations was as follows: Seminoles, 3119; Creeks, 18,712; Cherokees, 41,693; Choctaws, 26,730; and Chickasaws, 10,955. The total tribal membership was thus 101,209, of whom 26,634 were full-bloods. The citizenship rolls were closed by operation of Sec. 2 of the Act of April 26, 1906 (34 Stat. 137), on March 4, 1907. In 1914 the allotments were practically completed, although there remained considerable work in connection with the closing of final records and other details and the disposition of the remaining tribal property. In June, 1914, the Cherokee allotments were completed, and members of this tribe became citizens of Oklahoma. The property in possession of the Indians and administered for them by the United States government includes 431,080 acres of coal and asphalt and agricultural lands; 101,080 acres of this are leased, and the proceeds, during the fiscal year 1914 amounting to $250,504, are divided among the Indians for the support of Choctaw and Chickasaw Indian schools. Up to June 30, 1914, there were filed at the Union Agency, which has general charge of affairs of the Five Civilized Tribes, 31,866 leases, of which 29,820 were for oil and gas; 7701 oil and gas leases were approved; 56,201,000 barrels of oil were sold during 1914. There were collected during the year for individual Indians from oil and gas leases $1,449,252 on 12,571,321 barrels of oil, and for the Choctaw and Chickasaw tribes, as royalty from coal and asphalt leases, $250,504. The proceeds of lands sold in 1914 for Indians under the supervision of the agency aggregated $636,042.80. The total property of the Five Civilized Tribes was valued in 1913 at $175,292,444. In 1914 the tribal government consisted of a Principal Chief, or Governor, with such clerical force as is necessary. Practically no governmental functions are exercised, the principal duties of the officials being to look after the interests of the tribe generally and execute conveyances, etc., until such time as tribal affairs are finally closed and the tribal government can be dispensed with entirely. Congress makes annual appropriations to assist the public schools of the State of Oklahoma within the territory occupied by the Five Civilized Tribes for the reason that so much of the allotted land is not subject to taxation that sufficient revenue was not received from taxation

to maintain schools properly. About $300,000 is appropriated annually for the maintenance of about 3000 school districts, in which are enrolled about 25,000 Indian and freedmen pupils. The administration of the affairs of the Five Civilized Tribes is in the hands of the Interior Department, through the Commissioner of Indian Affairs.

The agitation for statehood for the Territory began in 1892. This led to the adoption of a constitution by a convention held in the summer of 1905. In November of that year, by an almost unanimous vote, the citizens of the Territory favored separate statehood. In line with these actions a bill was introduced in Congress providing for the admission of Indian Territory as a separate State. Congress, however, favored the joint statehood of Oklahoma and Indian Territory and in June, 1906, passed the Statehood Bill, and, Nov. 16, 1907, the Indian Territory became a part of the State of Oklahoma. See OKLAHOMA.

INDIAN TOBACCO. See LOBELIA.

INDIAN TREATIES. See TREATIES, INDIAN.

INDIAN TURNIP. See ARUM; JACK-IN-THE-PULPIT.

INDIAN YELLOW, or PURREE. A coloring matter highly esteemed by artists. It is exported from the East Indies and China in spherical masses, which are of a dark-brown color externally, but of a bright orange yellow in the interior. It is obtained in Bengal as a sediment from the urine of cows fed on decayed and yellow mango leaves. Its odor is peculiar and resembles that of castoreum. It consists chiefly of the magnesium salt of an acid termed *purreic,* or *euxanthic, acid* ($C_{19}H_{18}O_{11}$). Alkaline solutions dissolve this acid and form a yellow liquid. A solution of euxanthate of potash, when mixed with the solutions of the salts of the earths, gives brilliant yellow, sparingly soluble precipitates, and with acetate of lead it forms an insoluble yellow. Purree is fugitive as a water color and injures many lakes, but is unaffected by sulphur compounds. It is often found adulterated with chrome yellow.

INDIA RUBBER. See RUBBER.

IN'DICAN. A substance found in the blood and urine of man and the Herbivora. According to Abderhalden, the indoxyl of urine is wrongly called indican. It is chemically indoxyl potassium sulphate and is an oxidation product of indole in the fæces. It is believed to be formed by the oxidation of indole in the intestines, forming indoxyl, which latter substance combines in the liver with sulphuric acid and is eliminated as indoxyl-potassium sulphate, or indican. The occurrence of indican in the urine is thought by many to indicate putrefaction in the intestinal canal and to be significant of "intestinal autointoxication," but this theory has lately been shown to have little or no basis in fact. See INDIGO.

IN'DICA'TOR (Lat., pointer). In steam engineering, an instrument to measure and to record by means of a diagram the pressure of the steam in the cylinder of a piston engine. The indicator was invented by James Watt, of steam-engineering fame, and the modern indicator is merely a structural modification of Watt's original design. Concisely described, the modern steam-engine indicator consists first of a small cylinder having communication with the interior of the engine cylinder by means of a short pipe provided with a stopcock. In this small cylinder works a piston having a piston rod extending out of the top of the cylinder. This piston is normally pressed down to the bottom of the cylinder by a calibrated spiral spring; but when steam is admitted below the piston by

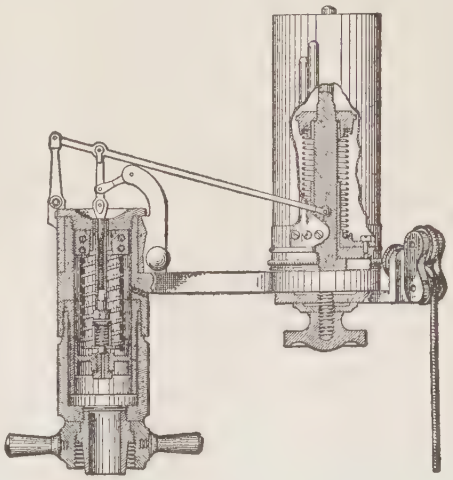


FIG. 1. STEAM-ENGINE INDICATOR.

opening the stopcock previously mentioned, the pressure forces the piston upward against the spring, compressing it a greater or less amount, according to the steam pressure and the resiliency of the spring, which is known and measured. The top of the piston rod is attached to a lever which carries a pencil at one end. This pencil bears against a slip of paper attached to a drum, which rotates back and forth on its axis for a distance and with motion which corresponds exactly to the stroke and movement of the engine piston. In operation the indicator piston rises and falls with the rise and fall of the steam pressure in the cylinder, and the pencil point is thus given a vertical movement whose magnitude corresponds to the intensity of the steam pressure and is measurable on the diagram when the compression of the spring and the motion of the pencil per pound of pressure are known. At the same time the rotation of the drum gives the paper a horizontal movement under the pencil point, corresponding in magnitude and speed to the engine-piston movement, so that the result of the two operations is the inscription of a closed diagram on the paper. These diagrams, being drawn to scale, enable the steam engineer familiar with their use to calculate the power of the engine, to examine and adjust the actions of the engine valves, and to make certain inferences concerning the transformation of heat into work, and the influence of the metal of the cylinder on that operation. Special forms of indicator have come into use with the high speeds and high temperatures which are met in the internal-combustion engine (q.v.). One of these is a maximum-pressure indicator, giving no diagram, but indicating by motion of a lever when and at what pressure the maximum pressure takes place. The other is called the manograph, and in it a flexible calibrated diaphragm receives the pressure, and a mirror reflects the double motion of pressure and

piston. (See MANOGRAPH.) A concise treatise on the subject of indicators and indicator diagrams is Peabody, *The Steam Engine Indicator* (New York, 1900).

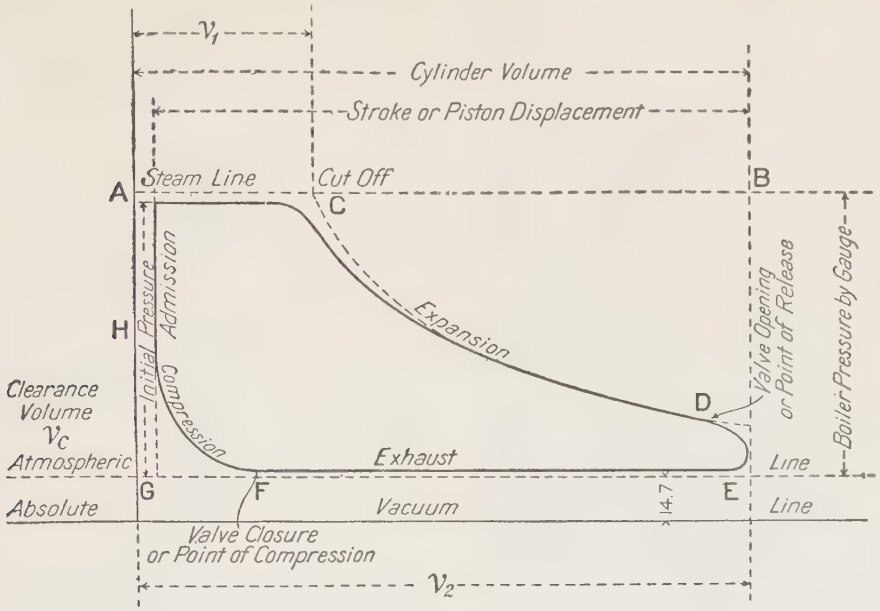


FIG. 2. INDICATOR DIAGRAM.

INDICTION, ĭn-dĭk′shŭn (Lat. *indictio,* imposition of a tax, period of 15 years, from *indicere,* to declare, from *in,* in + *dicere,* to say, Skt. *diś,* to show). A period or cycle of 15 years, the origin of which is involved in obscurity. It began to be used in reckoning time, chiefly by ecclesiastical historians, during the life of Athanasius; it was afterward adopted by the Popes, through whose influence it came to be so generally employed during the Middle Ages that the dates of charters and public deeds of this period are expressed in indictions as well as in years of the Christian era. See CHRONOLOGY.

INDICTIO PASCHALIS, ĭn-dĭk′shĭ-ō păs-kā′lĭs (Lat., Easter declaration). A custom that arose in the early Christian Church of Alexandria of announcing on Epiphany the days on which Easter would fall. Later this declaration was called the *Indictio festorum mobilium,* the announcement of the movable feasts, because the time when these should be celebrated depended upon the appointment of the days for Easter. The custom soon became general; the fourth Synod at Orléans (541) issued a formal order for the observance in its first canon.

INDICTMENT, ĭn-dīt′mĕnt (from OF. *enditer, endicter, inditer, indicter,* to accuse, Lat. *indictare,* frequentative of *indicere,* to proclaim, from *in,* in + *dicere,* to say, Skt. *diś,* to show). The formal written accusation of crime against a person, presented on oath by a grand jury (q.v.), and upon which he is tried by a petit jury. In Scotland an indictment is also the accusation on which a prisoner is tried; but it runs in the name of the lord advocate, addressed to the prisoner. In England a prisoner is not entitled, before trial, to a copy of the indictment or a list of the witnesses against him except in case of treason. An indictment differs from an information (q.v.) in that it is the act of a grand jury, while an information is the written accusation of crime by the law officer of the crown or of the state. It differs from presentment (q.v.) in that the latter is an accusation by the grand jury of its own motion, and without any charge of crime or any bill of indictment being laid before it.

In the United States persons who are accused of felonies or grave misdemeanors can be brought to trial only upon an indictment which a grand jury has declared to be "a true bill," the right to be prosecuted only on indictment by a grand jury "for a capital or otherwise infamous crime" being preserved by the Constitution of the United States (Amendments, Art. V) as well as by those of the several States. When a criminal court is convened, and the grand jury has been duly constituted and instructed, the State's attorney, or some other duly qualified officer, lays before them drafts of indictment against the alleged offenders and furnishes them with the names of the witnesses whose testimony is relied upon to support the accusation. These witnesses the grand jury examines ex parte, not to determine the guilt or innocence of the accused, but to ascertain whether there is or is not prima facie evidence of guilt sufficient to warrant their trial. If 12 or more members of the grand jury pronounce in the affirmative, the presentment, with the words "a true bill" indorsed upon the back thereof, is sent to the court; and, upon the charges therein contained, carefully set forth in the indictment subsequently prepared, the accused is put upon trial before a petit jury. The indictment is prefaced by a "caption," in which are set forth the name, term, and place of meeting of the court, the names of the justices, and the fact that the grand jury was lawfully constituted. Then comes a full and particular description of the alleged crime; the name of the accused must be given if known; and if not, he must be described in such a way as to make his identity sure. The time and place

of the commission of the crime must also be stated, though it is not always necessary to conviction that these particulars should be exactly supported as charged. In some cases, however, a failure upon this point is fatal to the indictment. In trials for perjury the exact day when the offense was committed must be named. To prove that the crime was committed on some other day will not avail. In cases of murder the death must be described as occurring within a year and a day of the time when the alleged fatal injury was inflicted. When several persons have been concerned in the commission of a crime, they may be indicted either jointly or separately. It is usual to describe the alleged offense in different ways, in what are usually called "counts," in order to cover any uncertainty that may exist beforehand as to the precise way in which it was committed. It is enough if the prisoner is convicted upon a single count. The indictment must charge explicitly whatever is necessary to constitute the offense. But though the offense of a prisoner may have involved the commission of two or more distinct crimes, as, e.g., arson, burglary, and murder, the indictment can charge only one of the crimes. The others must be charged in separate indictments. Formerly in England and to-day in some of the United States the drawing of an indictment is an exceedingly delicate and precarious undertaking because of the tendency of the courts, in the interests of the accused, to quash the indictment or even to set aside a conviction because of technical errors, even of the most trifling character, such as a mistake in spelling, the insertion of a superfluous word, the failure to dot an *i* or cross a *t*. This tendency had originally a certain justification when courts and juries were forced into a tacit conspiracy to defeat the harsh and inhuman penal law which prevailed in England in the eighteenth and early part of the nineteenth century, but its survival in American criminal jurisprudence is to-day only an abuse of justice. It is only fair to say, however, that in most American States as well as in England this reproach has been removed by statute or by the adoption of a more enlightened attitude by the courts. In many of the States the harsh rule of the common law which denied the right of a person accused of treason or felony to have a copy of the indictment has been abolished. Consult: Pike, *History of Crime in England* (London, 1876); F. Wharton, *Precedents of Indictments and Pleas* (4th ed., 2 vols., Chicago, 1881); Stephen, *History of the Criminal Law of England* (ib., 1883); Pollock and Maitland, *History of English Law* (2d ed., Cambridge, 1899); H. C. Joyce, *Treatise on the Law Governing Indictments* (Albany, 1908); also the authorities cited under CRIMINAL LAW. See GRAND JURY.

INDIF'FERENTISM (from *indifferent*, from Lat. *indifferens*, not different, from *in-*, not + *differre*, to differ, from *dis-*, apart + *ferre*, to bear). A term used in philosophy and ethics to designate the theory that the human will is absolutely indifferent to all motives. The doctrine is also called indeterminism, or the doctrine of the liberty of indifference, and is opposed to determinism. See FATALISM; DETERMINISM; ETHICS; FREE WILL.

IN'DIGES'TION (from Lat. *indigestio*, indigestion, from *in-*, not + *digestio*, digestion, from *digerere*, to digest, from *dis-*, apart + *gerere*, to carry), or DYSPEPSIA. A term somewhat vaguely applied to various forms of disease of the stomach or of the small intestines in which the natural process of digesting and assimilating the food is deranged. The common cause of indigestion, where organic disease is absent, is the eating of too much food, too rapidly, or without sufficient mastication.

The symptoms of indigestion are by no means constant in all cases. There is often *anorexia* (or want of appetite), but occasionally the appetite is excessive and even ravenous. Nausea not infrequently comes on soon after a meal; while in other cases there is no nausea, but after the lapse of a couple of hours the food is vomited, the vomited matters being very acid, and often bitter from admixture of bile. In severe cases the vomiting has been known to occur after every meal for several months. Flatulence, relieving itself in eructations, is one of the standard symptoms of this affection, the gas that gives rise to this symptom being sometimes evolved from undigested matters in the stomach. It is very apt to occur in dyspeptic patients if they have fasted rather longer than usual. *Cardialgia* (popularly known as *heartburn*), *pyrosis* (q.v.), or water brash, and *gastrodynia* (commonly designated *spasm* or *cramp* of the stomach, and coming on at uncertain intervals in most severe paroxysms) are somewhat less common symptoms of indigestion.

The treatment of indigestion is more dietetic than medicinal. All bad habits suggested above must be corrected. The quantity of food which can be digested by the gastric juice and intestinal fluids being limited (see DIGESTION, ORGANS OF), care should be taken to avoid excess; moreover, the meals should not succeed each other too rapidly. With regard to the nature of food best suited to dyspeptic persons, it may be safely asserted that a mixture of well-cooked animal and vegetable food is in general more easily digested than either kind taken exclusively. Each patient should be advised by his physician as to his dietary. The unquestionable benefit which dyspeptic patients often derive from a visit to a hydropathic establishment is due perhaps not so much to any specific action of the water as to the well-regulated diet, the withdrawal of the mind from personal cares, and the change of scene. The use of purgatives and remedies for indigestion is much overdone by the laity and lays the foundations of chronic gastric disorder that cannot be cured. See DYSPEPSIA and GASTRITIS, the chronic form of which is generally accompanied by indigestion.

INDIGIRKA, ēn'dyĕ-gēr'kȧ. A river of east Siberia. It rises in the Stanovoi Mountains, 400 miles east of Yakutsk, and, after flowing in a northeasterly direction for about 900 miles across a sparsely populated and frozen desert region, it empties through a large delta into the Arctic Ocean, 460 miles east of the mouth of the Lena (Map: Asia, Q 2). It is navigable during the summer months.

IN'DIGO (Sp. *índigo*, *índico*, from Lat. *indicum*, from Gk. *ἰνδικόν*, *indikon*, indigo, from *Ἰνδία*, *India*, India). A coloring matter first employed as a dyestuff in India, whence it was brought by traders to the Mediterranean countries. Europeans were not acquainted with its vegetable origin until the time when its importation assumed considerable dimensions, after the circumnavigation of Africa; and as the method of dyeing with woad did not present the

indigo in substance, the virtual identity of the two was not suspected. Of late years artificial indigo has been produced from coal-tar products and is seriously threatening the existence of the indigo plantations. For the history of artificial indigo, see COAL-TAR COLORS.

Most of the natural indigo of commerce is obtained from species of *Indigofera*, of the family Leguminosæ. The genus embraces about 400 species, widely distributed throughout tropical

INDIGO.

and subtropical regions. The best-known and most widely cultivated species, as well as the ones which supply nearly all the indigo found in the markets, are *Indigofera anil*, a native of tropical America, and *Indigofera tinctoria*, the original home of which is not positively known, although it is said to occur wild in the Bombay Presidency. *Indigofera argentea*, a native of Arabia and parts of Africa, is a source of much of this valuable dye. Indigo plants are extensively cultivated in the East and West Indies (especially in Bengal), in Central America, parts of Europe and Africa, etc. The plants are shrubby, attaining a height of about 6 feet, have pinnately compound leaves and usually pink or purple flowers. The pods of *Indigofera anil* are sickle-shaped, short, and compressed, while those of *Indigofera tinctoria* are straight, cylindrical, and many-seeded. When cultivated, the indigo plant requires a rich, friable soil, well watered, but not too wet. The seeds are sown in drills about a foot apart, and the plants are cut when beginning to flower. In the tropics this can be done at frequent intervals, and four or five crops a year obtained. After cutting, the crop is handled in various ways, fermented in tanks, as described below, and the indigo extracted. Although the plants are perennial, the greatest yields are obtained from annual plantings. In addition to the species mentioned above, at least half a dozen other species of *Indigofera* are known to produce indigo of good character. It is also produced by species of *Sophora*, *Baptisia*, *Amorpha*, *Tephrosia*, and *Galega*, all belonging to the order Leguminosæ. *Baptisia tinctoria* and *Amorpha fruticosa* are known as "false indigo" in the United States, where they are widely distributed. Plants of other families produce indigo, as *Isatis tinctoria*, a cruciferous plant which was cultivated in Europe during the Middle Ages and is still planted in southern France (see WOAD); *Wrightia* and *Nerium*, which belong to the family Apocynaceæ; *Marsdenia tinctoria* and *Gymnema tingens*, of the natural order Asclepiadaceæ; *Polygonum tinctorium*, of the order Polygonaceæ; *Strobilanthes flaccidifolius*, of the order Acanthaceæ; *Spilanthes tinctoria* (Compositæ), and *Scabiosa succisa* (Dipsacaceæ), as well as many others, representing widely separated orders of plants.

Neither the indigo plant nor *Isatis tinctoria* contains the dyestuff (indigotin) ready formed, but rather a colorless glucoside, indican (q.v.), which breaks up, by fermentative processes, into indigotin, and a glucose sugar called indiglucin. It is a curious fact that indican is a normal constituent of human urine and becomes very plentiful in certain diseases. Natural indigo is prepared for the market in the following fashion: The plants are cut down just before reaching the flowering stage and are thrown into vats, where they are steeped in water and allowed to ferment for 12 to 15 hours, practically out of contact with air. This produces the soluble *indigo white*, which is taken up by the water; the liquid is then drawn off into "beating vats," where it is violently agitated by machinery, in order to promote contact with the air, so that the indigo white is oxidized to the insoluble *indigo blue*, which forms a thick scum on the surface and then sinks to the bottom as a bluish mud. After settling, the clear liquid is drawn off, and the indigo blue is collected, squeezed between cloths, and dried in the air. It is sold in irregular lumps, which differ in tint, size, and texture according to the various localities in which they are produced. The amount of available dyestuff ranges from 20 to 90 per cent of the commercial product, some of the impurities being accidental, although intentional adulteration is common enough. This irregularity of composition in the natural product is one of the causes that have advanced the manufacture of artificial indigo, which is always chemically pure.

There are a large number of patented processes for the preparation of synthetic indigotin, chiefly held by the German color factories and largely based upon the researches of Adolf Baeyer, who showed, about 1880, what the exact chemical constitution of this substance is and indicated the general principles for its preparation from aniline derivatives. At present artificial indigo is manufactured by a process worked out by the Badische Anilin-und Sodafabrik at Ludwigshafen upon a basis furnished by Heumann. Naphthalene, an abundant ingredient of coal tar, is first oxidized by fuming sulphuric acid to phthalic acid, from this phthalimide is formed, and this converted into anthranilic acid. This latter reacts with monochloracetic acid to form a compound (phenylglycocoll-carboxylic acid) which fused into caustic soda is converted into indoxyl, which by atmospheric oxidation yields pure indigo blue. The working out of the artificial indigo manufacture brought in its wake the development of the new contact process for sulphuric acid and the production of electrolytic chlorine. In 1906 it was estimated that 80 per cent of the world's consumption of indigo was supplied by the artificial product, while the cultivation of the indigo plant has shrunken correspondingly. Natural indigo is still used, either with or without woad, in certain cases of cloth dyed for government consumption. Pure indigotin, whether extracted from natural indigo or prepared artificially, is crystalline, with a coppery

lustre and a very characteristic odor; when crushed, it forms a blue powder, and when fixed upon the fibre it constitutes a remarkably fast and brilliant "navy-blue" dye. Numerous compounds of indigo are now prepared as dyes, such as indigo red, indigo scarlet, and indigo yellow. In the first two indigo is combined with sulphur as Thio-Indigo Red B and Thio-Indigo Scarlet R; in the last the combination is with benzoyle chloride.

Dyeing with Indigo. As indigo blue is insoluble in water, it must first be converted into indigo white, which is soluble in alkaline liquids. This change is produced by the chemical addition of hydrogen, so that the blue, $C_{16}H_{10}N_2O_2$, goes over into the white, $C_{16}H_{12}N_2O_2$. This is effected in *cold* vats, which are employed for the dyeing of cotton and linen, by metallic reducing agents, such as sulphate of iron, zinc dust, and alkaline sulphites; while wool and silk are dyed in *warm* vats, where the reduction is caused by a fermentation of vegetable substances, preferably woad, in a manner analogous to that by which indican is converted into indigo white. These vats are always alkaline. When the reduction of the indigo is completed, the liquid is colorless, with a light bluish scum on top. The scoured materials are then drawn through the vats and exposed to the air while drying. The atmospheric oxygen immediately reconverts the white into the blue, by removing the extra hydrogen atoms. Indigo blue is also soluble in fuming sulphuric acid, forming "indigo-sulphonic acid," or Saxon blue, which was formerly known as a dyestuff, but has been replaced in modern practice by its sodium salt, *indigo carmine*. The solution of this carmine produces a blue precipitate upon the fibre with an alum mordant, but the color is neither as deep nor as fast as that of the unaltered indigotin from the reducing vats. With artificial indigo the final synthesis can be produced on the fibre itself, as when orthonitrophenylpropiolic acid and potassium xanthogenate are applied separately and the doubly impregnated cloth is then steamed.

Printing with Indigo. Indigotin is not suited to printing in pigment form, and figured goods are produced by dyeing processes. To procure a blue-and-white pattern, the whole fabric may first be dyed blue, and the white produced by printing on bleaching agents which will remove the color. Or the cloth may first be printed with a "reserve," or resist, a paste composed of gum, pipe clay, and copper salts, to prevent the deposit of indigo upon the spots which they protect, while the material passes through the vat. Artificial indigo can again be produced by printing one chemical upon the fibre and putting the other into the bath through which it is subsequently passed.

Bibliography. Baeyer's articles in the *Berichte der deutschen chemischen Gesellschaft* (Berlin, 1879–90); Benedikt, *Chemistry of the Coal-Tar Colors* (London, 1889); Nietzki, *Chemistry of Organic Dyestuffs* (ib., 1892); Sadtler, *Handbook of Industrial Organic Chemistry* (Philadelphia, 1895); Brunk, *History of the Development of the Manufacture of Indigo* (Berlin, 1901); Lachmann in the *Journal of the American Chemical Society* (Easton, Pa.) for 1901; F. H. Thorp, *Outlines of Industrial Chemistry* (2d ed., New York, 1911).

INDIGO BIRD. See INDIGO BUNTING.

INDIGO BUNTING. A North American finch (*Passerina cyanea*) of the eastern United States. It breeds as far north as Nova Scotia and Minnesota, but migrates southward in the fall to Central America, where it spends the winter. It is about 5½ inches in length, and the adult male is rich dark blue in color, variously tinged and shaded, the lores and angles of the chin velvety black. The female is gray brown. It frequents open places on the edges of woods and delights to sit on the top of a high tree singing a very sweet and peculiar melody, continued late into summer, after most other birds have stopped singing. It is easily domesticated. The nest is built of grasses, leaves, bark, and long hairs, in a little bush or on weeds near the ground. The eggs are three or four, pale bluish white, without spots. See Colored Plate of EGGS OF SONG BIRDS.

INDIGO SNAKE. See GOPHER SNAKE.

INDIRECT HEATING. See HEATING AND VENTILATION.

IN'DIUM (Neo-Lat., from Lat. *indicum*, indigo). A metallic element, discovered spectroscopically by Reich and Richter in 1863. It occurs in minute quantities in various zinc ores, especially in the zinc blendes of Freiberg, in some galenas from Italy, in the flue dust of zinc furnaces, and in various manganese ores. In the metallic state the element may be obtained by reducing its oxide in a current of hydrogen, or by fusing the oxide with sodium, or else by the electrolysis of its chloride, nitrate, or sulphate. The oxide itself is obtained by dissolving Freiberg zinc in weak sulphuric acid, precipitating the solution with metallic zinc, and separating out, from the precipitate, lead, copper, and iron. With oxygen indium forms an oxide of the formula In_2O_3. Its hydroxide, $In(OH)_3$, is similar to that of aluminium. A number of its salts have been prepared, but none of them has any economic value. In its salts indium may act as a univalent, bivalent, or trivalent element. Thus, it forms three different chlorides: InCl, $InCl_2$, and $InCl_3$. As a rule, only the salts of trivalent indium can be dissolved in water without being decomposed. Metallic indium is ductile, silver white, and lustrous. Its specific gravity is about 7.1, and it melts at 155° C. (311° F.). Its chemical symbol is In, and its atomic weight is 114.8.

IN'DIVID'UALISM (from *individual*, from ML. *individualis*, relating to an individual, from Lat. *individuus*, indivisible, from *in-*, not + *dividuus*, divisible, from *dividere*, to divide). The doctrine that society is only an artificial device, whose value is to be gauged by its conduciveness to the good of the several associated members or by some other standard set by these individuals. Individualism must be distinguished from egoism, with which it is often confounded. While individualism perhaps is generally egoistic in character, it is not always so. An individualist may maintain that the end which justifies all justifiable means is "the greatest good of the greatest number"; what makes him an individualist is his conception of the greatest number as composed of *independent* units, the happiness of each of which is to be reckoned as *a separate item* in the sum total of general happiness. Such being the nature of individualism, it is clear that in all the sciences which deal with man as a social being there may be individualistic tendencies. And as a matter of fact individualism has been a marked charac-

teristic of many prominent theories in political science, in economics, and in ethics.

In political theory the consistent individualist regards the state as a means to subserve individual ends. He may be an egoistic anarchist, desiring to remove all restraints which the state imposes upon his freedom of action. On the other hand, he may be an absolutist, believing that the restraints imposed by a supreme government are necessary to prevent the disastrous consequences which would follow from every man's acting upon his unregulated desires and thus involving himself in perpetual warfare with all his neighbors. Thus, we see that the sovereignty of government, which the individualist must deny in ultimate theory, he may stoutly maintain in practical politics. Hobbes, the prime individualist of modern times, was nevertheless one of the stanchest supporters of unlimited despotism when despotism was making its last stand against parliamentary government in England. Again, an altruistic individualist may, like the egoistic, be either an anarchist or a believer in government. The anarchism of our day is in large measure a reaction against absolutism, a reaction motived by a sincere desire to secure for mankind at large the blessings of freedom. The trouble with it is that it conceives freedom as license and regards license as in its nature humane when not irritated by authority. Other altruistic individualists, however, who do not share with the benevolent anarchist the optimist belief that man is by nature a saint and only by government a sinner, justify government as a necessary evil—an evil because individuality is more or less repressed by law, but a necessity because without some measure of such repression some individuals would make life intolerable or even impossible for others. It is thus clear that individualism as a political theory is quite compatible with acquiescence in and support of almost any form of government or even with revolt from all government. Practical individualism, on the other hand, may prevail to a large extent along with anti-individualistic theories, for it is quite logically consistent for a thinker to maintain that the true end of all government is the welfare of society as an organic whole, and yet that this welfare can best be served by allowing every individual to pursue his own ends.

In economics individualism has generally advocated the practice which is formulated in the well-known precept, *Laissez faire, laissez passer.* The state is to keep hands off of the economic machinery. Free competition, resulting in the survival of the economically fittest, is the individualistic ideal. Hence we find among individualists a tendency to oppose all sumptuary and other economic legislation. Compensation for service rendered is held to be a matter which concerns merely the parties immediately involved, and no general laws, it is urged, should control the unrestricted privilege of any man to buy labor as cheap and to sell it as dear as the relation between supply and demand allows. No minimum of wage, no maximum of hours, no restriction upon the age or sex of employees, no employer's liability except as specified by contract, no fostering of industries by tariff or subsidy, no political arbitration of economic disputes, no government ownership or operation of any industrial plant—in short, no state interference in production, distribution, or consumption—this is what absolute and unadulterated individualism is apt to hold before itself as the true type of the industrial life. But pure economic individualism is at the present day more a theory than a practice. Public policy has asserted itself against private license, and the struggle at present is not so much between state interference and free competition as between different views as to the points at which state interference is advisable. Individualism has become more of a war cry than an accurate designation of economic principle. The question is only as to the character of the limitations to be put upon the freedom of the individual in his economic relations.

In ethical theory individualism is not now so important a factor as it was a century or so ago. Pure individualism is often thought incompatible with morality as ordinarily understood. If each man's ideals are the measure of his morality, morality, it is claimed, ceases to have any general meaning. This is frankly recognized by some individualists; but some, on the other hand, still maintain the possibility of carrying their theory out logically without detriment to morality. The typical representatives of the latter view are to be found among those who claim for the individual conscience the right to pass definitively upon all questions of morals. "There is no such thing as an erring conscience," they say. In some thinkers, as, e.g., Kant, the individualism of the conscience theory of morals is offset by the universalism of the criterion of reason, which directs the conscience. One must see one's duty only in what can be duty for all. The combination of individualism and anti-individualism in an ethics of conscience is, however, a *tour de force* which can be successfully achieved only by those who unknowingly have a higher standard for morality than either conscience or pure reason. But when this higher standard is lacking, individualism gets the upper hand, and we have as the logical result the view that everything is right which a man thinks to be right. The individual with all his idiosyncrasies becomes the measure of the universe. Most ethical thinkers have come to see that this is the natural consequence of the contention that conscience is the supreme *arbiter morum*, while moral practice has always been controlled by other influences besides the conscience of the individual. Or perhaps it would be more correct to say that these other influences operate upon a man by giving character and direction to his conscience, so that while he is guided by his conscience, that conscience is not merely an individual peculiarity. It reflects with greater or less accuracy the ideals of his community—a community sometimes large, sometimes small, but, whether large or small, of decisive influence in determining the kind of conscience the man is to have. Hence, as conscience is not something ultimate and intuitive, but derivative, there is no reason for supposing that its dictates are infallible. The individual reflects the opinions, prejudices, superstitions, and sane judgments of a community and gives to them perhaps an individual coloring, especially in matters bearing on his own conduct. The result we call conscience.

Consult: M. S. Schmidt, *Der Einzige und sein Eigenthum* (Leipzig, 1845); Spencer, *Man versus the State* (London, 1884); Donisthorpe, *Individualism: A System of Politics* (ib., 1889);

Ritchie, *Principles of State Interference* (ib., 1891); Le Gall, *La doctrine individualiste et l'anarchie* (Toulouse, 1894); McKechnie, *The State and the Individual* (Glasgow, 1896); Tufts and Thompson, *The Individual and his Relation to Society, as Reflected in British Ethics* (Chicago, 1898); Lutoslawski, *Ueber die Grundvoraussetzungen und Consequenzen der individualistischen Weltanschauung* (Helsingfors, 1898); Wenzel, *Gemeinschaft und Persönlichkeit* (Berlin, 1899); Fournière, *Essai sur l'individualisme* (Paris, 1901); Biermann, *Die Anschauung des ökonomischen Individualismus* (Berlin, 1905); Huth, *Soziale und individualistische Auffassung im 18. Jahrhundert* (Leipzig, 1907); C. W. Eliot, *Conflict between Individualism and Collectivism in a Democracy* (New York, 1910); W. Fite, *Individualism* (ib., 1911). See SOPHISTS; GROTIUS; HOBBES; LOCKE; SPINOZA; QUESNAY; MIRABEAU; TURGOT; SMITH, ADAM; BENTHAM; BRIGHT, JOHN; MARX; SPENCER, HERBERT; NIETZSCHE.

IN'DIVID'UAL'ITY (ML. *individualitas*, from *individualis*, relating to an individual). Separate or distinct existence. There is some difference of opinion as to what constitutes individuality, the discussion being principally confined to the domain of natural history. Driesch, a modern vitalist, defines an individual living organism as a typical constellation of different elements, preserved in spite of metabolism, existing in numerous exemplars, exhibiting the phenomenon of development, and possessing as its most important properties the faculties of regulation, reproduction, and active movement. Such an individual, he maintains, is more than the sum of its inorganic parts; for its behavior, especially in morphogenesis, cannot be explained in terms of substance and causality, or matter and energy, but only through a new category, individuality, and in terms of entelechy—an autonomous factor which is not energy, and which does not deflect, but merely suspends or relaxes energy. Mechanists tend to define individuality less absolutely. They emphasize independence in the sense of ability to maintain a typical structural form in spite of minor changes and accidents, a typical chemical composition (protoplasm), and the ability to grow and to reproduce. Any substance which exhibits these characters they regard tentatively as an individual. In the concrete case the demarcation of individuality is often difficult. Certain crystalline forms, e.g., exhibit many of the characters of the living individual organism. Consult Driesch, *Science and Philosophy of the Organism* (London, 1908), and Huxley, *The Individual in the Animal Kingdom* (Cambridge, 1912).

Individuality, in the psychological sense, implies a unity of experience, which is socially effective and socially recognized, and which is constituted in the main by consistency of purpose and continuity of personal memory. (See MENTAL CONSTITUTION; SELF.) The problems which individuality presents to normal psychology are discussed under INDIVIDUAL PSYCHOLOGY. The term is also employed in psychopathology. Cases have not infrequently been reported where, as the result of hypnosis or of some form of disease, the memory-continuum has been broken off, and another (with different determinations) instituted in its place. A person thus affected loses all memory of previous existence, together with name, home, family, and friends, and begins a life so new and so different that he may be called another and different individual. Alternations of the two personalities may appear; and not only two, but as many as nine or ten personalities may exist, in the same body, in complete or partial independence of one another. See DOUBLE CONSCIOUSNESS.

Consult: Bourru and Burot, *Variations de la personnalité* (Paris, 1888); Binet, *Alterations of Personality* (New York, 1896); William James, *Principles of Psychology* (2 vols., ib., 1899); Podmore, *Studies in Psychical Research* (London, 1899); P. M. F. Janet, *L'Automatisme psychologique* (Paris, 1899); id., *Mental State of Hystericals* (New York, 1901); id., *Major Symptoms of Hysteria* (ib., 1907); Morton Prince, *Dissociation of a Personality* (ib., 1906); id., *The Unconscious* (ib., 1914).

INDIVIDUAL PSYCHOLOGY, or DIFFERENTIAL PSYCHOLOGY. That branch of psychology which deals with the minds of individuals and with the likenesses and differences between the minds of individuals. Differential psychology has sometimes been taken to include the study not only of these differences, but also of the differences between collective minds. (See SOCIAL PSYCHOLOGY.) Individual psychology differs from general psychology (see PSYCHOLOGY) as concrete from abstract, phenomenological from universal. For general psychology individual minds are important, because only through them is it possible to arrive at a knowledge of mind at large; they are important, i.e., not as such, but as manifestations of a general or typical mind whose uniformities are to be discovered. For the individual psychologist, on the contrary, individual minds are directly important. They are themselves the objects of investigation, units whose nature and whose differences it is his immediate task to describe.

The principal problem of individual psychology, as above defined, is (1) to determine the nature and the range of mental variations. This main problem may be subdivided into three subordinate problems. The individual psychologist must (*a*) investigate single processes in a large number of minds, thus determining the range and distribution of the various mental factors (theory of variations). He must (*b*) investigate a large number of factors in the single mind, determining the relations of the single factors to one another and their significance for the mind as a whole (psychography). And he must (*c*) investigate two or more factors in a number of minds, determining the general tendencies of the single factor to vary directly or inversely with the others or independently of them (theory of correlation). A limiting case of this problem appears when the number of factors is large, and the number of minds is reduced to two, the aim then being to determine the factor or group of factors to which the general or total difference of the two minds may be attributed (theory of comparisons). The results of these inquiries form the contents of individual psychology proper. We have, however, further to inquire (2) into the conditions of the variations which we have established; we must investigate the influence of heredity, climate, position in life, education, sex, age, etc. And lastly (3) we must examine, classify, and explain the expressions of mental difference in handwriting, physiognomy, characteristic gesture, literary style, etc.

The first of the three main problems is at present the most important. The theory of variations has led to the elaboration of a doctrine of psychological types, such as the temperaments and the memory types, the grades of intelligence, types of abnormality, etc. Psychography has thus far furnished us with the psychological portraits of a few eminent persons and with a programme of future work. The theory of correlation shows a vigorous activity. It is the most systematic of the three minor branches of individual psychology, and by its methodical range promises to contribute more both to science and to practice than the other two.

The special methods of individual psychology are three. The first is that of abnormal cases: we may take advantage of instances in which there is extreme enfeeblement (perhaps even loss) of some function to study the resulting modification of other functions. We may ask, e.g., how loss of memory affects imagination, attention, etc. The second is that of mental tests. (See MENTAL TESTS.) In theory we may find problems whose solution depends essentially upon the presence or the concernment of some single mental factor; and thus, by experimental means, we may measure directly the influence of single factors. In practice, however, such accurately diagnostic tests have been only approximated. The third method is that of correlation. Having measured a number of factors in a large number of individuals, the degree of correspondence between any two of the factors (technically called the index of correlation) may be mathematically computed and numerically expressed. A positive index means a tendency of the factors to vary directly with each other, unity expressing complete uniformity; a zero index means that the factors vary independently; and a negative index indicates a tendency of the factors to exclude each other.

Experimental work directly attacking the second main problem has for the most part borne upon the influence of heredity; the influence of age, sex, and other conditions has come to light rather incidentally in investigations undertaken with other purposes. The exact study of the third problem has hardly begun.

Consult: Kraepelin, *Psychologische Arbeiten* (Leipzig, 1896); Titchener, *Experimental Psychology* (New York, 1901); Stern, *Die differentielle Psychologie* (Leipzig, 1911), which contains an extended bibliography; Whipple, *Manual of Mental and Physical Tests* (Baltimore, 1914).

IN'DO-CHI'NA. A geographical term formerly designating the southeastern peninsula of Asia (Farther India), embracing Burma, Siam, French Indo-China, etc.

INDO-CHINA, FRENCH. See FRENCH INDO-CHINA.

IN'DO-CHI'NESE. The name applied as a general term to the great majority of the native population of Farther India, or Indo-China. It originally indicated that these peoples were related by speech and physical characteristics to the Chinese, but in part also somatically and culturally to the peoples of Hindustan. The Indo-Chinese peoples speak what are called tonic monosyllabic languages, forming, with the Tibetan and Chinese groups, the extensive and important Sinitic, or Tibeto-Chinese, stock or family. The chief Indo-Chinese peoples are the following: Burmese, Siamese, Annamese, Cambodians, Tonkinese, who have all in some respects reached the status of civilization. Related to the Siamese are the other Thaï tribes, Shans and Laos, who preserve (some of them, at least) the primitive type of the Thaï stock better than the Siamese and are likewise less civilized, though in the past they have created or have been the bearers of several half civilizations. The Cambodians, or Khmers, about whose linguistic and somatic relationship there is still some dispute, authorities crediting them with Aryan affinities especially as to physical characters, have behind them the more or less indigenous culture represented by numerous inscriptions and by the remarkable temples and monuments of Angkor-Vat, etc. The culture of the Indo-Chinese peoples has been largely influenced by both India and China, while the more primitive Malays have also had a not insignificant share in the physical and social complexes there existing. The Khmers have in earlier times borrowed not a little from Hindu sources, though this borrowing may not have been so great as has hitherto been assumed. The Burmese owe a good deal of their civilization to India; the Siamese almost as much, though more indebted to China than the Burmese; while the social life and culture of the Annamese is largely a reflection of Chinese. The Assamese of the Northwest, who speak an Aryan language closely related to Hindi, are probably a mixture of some of the more primitive tribes and Hindus. The exact relationship of some of the savage tribes of the northern parts of Farther India is not yet clear, but those not distinctly Thaï are more closely connected with the pre-Sinitic inhabitants of southern China and the Tibetan area. The Mois, by which general name a number of more or less primitive tribes scattered over the eastern mountains and tablelands are known, are an aboriginal race with perhaps a Caucasian strain. The Kuis of the Shan States are probably aboriginal, like the Mois; the Kuis of Cambodia have for some time been rapidly assimilating in speech and otherwise to the Cambodians. The Mons, or Talaing, of Burma, formerly had a much greater extension, but have been driven back by the more civilized peoples and the mixed races of modern origin. The Tchiam, or Chiam, who are the modern representatives of the people who founded the ancient Empire of Champa, are by some authorities thought to possess Malay linguistic affinities. The Karens of Burma, who have recently shown themselves to be so amenable to missionary influences, are related to the Burmese linguistically and physically, but are of a more primitive type. The numerous Chin tribes of the Northwest are probably closely related to the primitive Burmese, but some of them are of very mixed type. The Lushai tribes are perhaps similarly related in general; they, together with the Nagas of the mountains of Manipur, are now more or less mixed—some of them have been thought to have Malay affinities. The Indo-Chinese peoples as a whole are probably of Mongolian stock, with early and later admixtures of Aryans and non-Aryans from India, etc., Malays and possibly Negritos, besides interminglings with the more modern peoples of the Indo-Chinese area. Like Hindustan, Farther India has had a history of primitive occupation, indigenous culture evolutions, foreign conquests, native combinations and disputes, etc. The more civilized peoples have more or less exploited for agricultural, commercial, and labor purposes the less civilized; the Burmese and Siamese the

Shans, the Annamese the Mois, the Laos the wilder peoples of their country; and to this general exploitation the Chinese, whose coming into this area as colonists and traders antedates the Christian era, have added much. Back of the modern civilization of Burma, Siam, Annam, Cambodia, etc., lie older half civilizations of the more primitive tribes—Khmers, Shans, Laos, etc.—whose remains are of considerable importance and of great antiquity. Back of these, again, are the monuments of prehistoric man in this part of the world—the kitchen middens of Cambodia, the stone monuments of the Khasi country, etc., and, earliest of all, the chipped implements discovered by Noetling in 1894 near Yenangyoung, on the Irrawaddy, in Upper Burma, which are claimed to prove the existence of Tertiary man in this region. It is probably from some of the proto-Indo-Chinese or their closely allied predecessors that the Malayan stock has sprung. Some of the Indo-Chinese, however, exhibit closer somatic affinities with certain of the Mongolian natives of northeastern Asia, such as the Tchuktchi, etc. Consult: Von Helwald, *Hinterindische Länder und Völker* (Leipzig, 1880); Forbes, *Comparative Grammar of the Languages of Farther India* (London, 1881); Bastian, *Völkerstämme am Brahmaputra* (Berlin, 1883); Ehler, *Im Sattel durch Indo-China* (ib., 1894); H. C. Clifford, *Further India* (New York, 1904).

INDO-CHINESE SUBREGION. In zoögeography, a faunal district of the Oriental Region, comprising all that part of China south of the high mountains which carry the Himalaya Range eastward nearly to Foochow and form the watershed between the south coast and the valley of the Yang-tse; also all of Annam, Siam, Yunnan, Burma, and Assam, and a long, narrow extension westward along the southern slopes of the Himalaya, between the levels of about 2500 and 9000 feet. The name Himalayan or Himalo-Chinese is therefore sometimes given to this fauna and subregion. It is one of the richest faunas in the world and is especially distinct in its birds, of which more than 40 genera are peculiar, among which the pheasants are conspicuous. In the higher mountains Palæarctic forms mingle with it to some extent, but on the whole the affinities are distinctly Oriental. See Map under DISTRIBUTION OF ANIMALS.

IN'DO-EU'ROPE'ANS. A term frequently applied to the so-called Aryan race (see ARYAN; EUROPE), as being inhabitants of India and Europe. The word is, however, linguistic rather than ethnological. Even in linguistic parlance the term is no longer so frequently used by authorities, except among French and Italian scholars, having been replaced by "Indo-Germanic." See INDO-GERMANIC LANGUAGES.

INDO-GERMANIC LANGUAGES, often called INDO-EUROPEAN, ARYAN, or sometimes INDO-CELTIC. The name given to the great cognate group of tongues spoken by the kindred peoples of southern and southwestern Asia and Europe and extending from India as far as the people of Germanic blood have spread. (See ARYAN.) This great group is quite distinct from the Semitic family of languages, from the forms of speech spoken by the Mongolian tribes, and from the various other recognized groups of tongues which are distributed over the world. The question as to the situation of the primitive home of the Indo-Germanic peoples has been much discussed. The original Indo-Germanic habitat is now generally thought to have been in central or northern Europe rather than in Asia. Various theories have been advanced, especially a generation ago, to account for the present distribution of these languages. The genetic arrangement of the tongues in a genealogical tree by Schleicher and other scholars, or views as to migratory movements or dissemination, like Johannes Schmidt's "wave theory," will be found referred to in most books relating to linguistics and comparative philology. The present tendency is to regard these languages as the development of dialectal differences within the original Indo-Germanic mother tongue. In other words, the attempt is no longer made to "reconstruct" a unitary primitive tongue. On the other hand, the kinship of these languages has been scientifically proved by the family features and general likeness in their structure. In point of age they go back as far as the literary monuments of the Vedas.

The division of the Indo-Germanic peoples as represented by the various branches of speech is generally considered to be eightfold, as follows: (1) Indo-Iranian or Aryan proper, the ancient and modern languages of India and Persia; (2) Armenian, forming a sort of bridge between Asia and Europe; (3) Grecian or Hellenic, with its modern representatives in the tongues of northern Greece and the Peloponnesus; (4) Albanian, a more modern representative of the ancient Illyrian; (5) Italic, the Latin, with its modern descendants in the Romance tongues; (6) Celtic, or Keltic, originally occupying the west of Europe, but now confined chiefly to the British Isles, and of particular interest to the historical student of English and French philology; (7) Germanic, the important group to which the Anglo-Saxon, the English, the German, and other Teutonic tongues belong; and lastly (8), the Balto-Slavic group, the chief representative of which is the modern Russian. The various subdivisions of these language divisions, together with their branches or dialects, will be found under the respective titles. Besides these there are some sporadic traces or representatives of other Indo-Germanic idioms which are not included in the list because the fragments are too scanty or too scattered to allow a determination in detail of the real character of the speech. Such are the Phrygian, which has affinities with the Armenian, or again the Messapian, which may be connected with the Albanian, or, still further, the Macedonian, Gallic, Burgundian, or the like.

With reference to the general features, the Indo-Germanic languages are an inflectional group of tongues, sprung from a common ancestor no longer in existence. They have certain marked or distinctive features or variations of sound and accentuation that are more or less common to all, and they show a general similarity in structure as to roots, affixes, composite forms, with kindred variations of nouns, adjectives, pronouns, and verbs through eight cases, three numbers, including a dual, and a variety of moods and tenses, together with certain common phenomena in syntax and word order.

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1902–04); Edmonds, *Introduction to Comparative Philology* (Cambridge, 1906); Meillet, *Les Dialectes indo-européens* (Paris, 1908); Delbrück, *Einleitung in das Studium der indogermanischen Sprachen* (5th ed., Leipzig, 1908); Meillet, *Introduction à l'étude comparative des langues indo-européennes* (3d ed., Paris, 1912). For the primitive Indo-Germanic period, consult: W. C. Ripley, *Races of Europe* (London, 1900); Schrader, *Reallexikon der indogermanischen Altertumskunde* (Strassburg, 1901); De Michelis, *L'Origine degli Indo-Europei* (Turin, 1903); Sophus Müller, *Urgeschichte Europas* (Ger. ed., Strassburg, 1905; Fr. ed., Paris, 1907); Hirt, *Die Indo-Germanen* (Strassburg, 1905–07); Schrader, *Sprachvergleichung und Urgeschichte* (3d ed., Jena, 1906–07; Eng. trans., 1890); Brunnhofer, *Arische Urzeit* (Bern, 1910); Feist, *Europa im Lichte der Vorgeschichte und die Ergebnisse der vergleichenden indogermanischen Sprachwissenschaft* (Berlin, 1910); Schrader, *Die Indogermanen* (Leipzig, 1911). See ARYAN; INFLECTION; LANGUAGE; PHILOLOGY; PHONETIC LAWS; and also the articles on ALBANIAN LANGUAGE; ARMENIAN LANGUAGE AND LITERATURE; CELTIC LANGUAGES; GREEK LANGUAGE; INDO-IRANIAN LANGUAGES; ITALIC LANGUAGES; LATIN LANGUAGE; ROMANCE LANGUAGE AND LITERATURE.

INDO-IRANIAN LANGUAGES. A branch or group of the Indo-Germanic family of languages. It comprises the Indo-Germanic languages of ancient and modern India, Ceylon, Persia, Afghanistan, Baluchistan, Kurdistan, and the Ossetic portion of the Caucasus. Although the vowel system is meagre, the consonants, generally speaking, best represent the pre-Indo-Germanic conditions. In inflection this group is the most primitive and highly developed of all the Indo-Germanic language divisions, while the most ancient literature in Indo-Germanic is preserved in Indo-Iranian. See AFGHAN; AVESTA; BALUCHI; BENGALI LANGUAGE AND LITERATURE; CEYLON, *Language and Literature;* GUJARATI LANGUAGE AND LITERATURE; HINDUSTANI LANGUAGE AND LITERATURE; INDIAN LANGUAGES; INDO-GERMANIC LANGUAGES; IRANIAN LANGUAGES AND LITERATURES; KASHMIRI; KURDISH; MALDIVE LANGUAGE; MARATHI LANGUAGE AND LITERATURE; NAIPALI; OLD PERSIAN LANGUAGE; OSSETIC LANGUAGE; PALI LANGUAGE AND LITERATURE; PAHLAVI LANGUAGE AND LITERATURE; PANJABI LANGUAGE AND LITERATURE; PERSIAN LANGUAGE; PRAKRIT LANGUAGE AND LITERATURE; SANSKRIT LANGUAGE; URIYA LANGUAGE AND LITERATURE.

INDO-MALAYAN SUBREGION. See MALAYAN SUBREGION; INDIAN SUBREGION.

INDONESIAN, ĭn'dō-nē'zhan (from Gk. Ἰνδός, *Indos,* Indian + νῆσος, *nēsos,* island). A term, coined in analogy with Polynesian, Melanesian, Micronesian, etc., used by certain ethnologists to denote certain peoples of the East Indies and Polynesia who are neither Malays nor Papuans, but Caucasian in type. Such authorities would include under this head the Eastern Polynesians, certain tribes of Sumatra, Java, Borneo, the Philippines, etc. The differences between the so-called Indonesians and the Malayan stock are, however, neither so important nor so significant as these writers claim, and there is good reason for looking upon the former as only a more primitive Malayan type, or proto-Malays. The Indonesians and Malays are probably closely related, the former being really primitive Malays. The term Indonesian was introduced by Logan, who attributed a Caucasian (Indian) origin to the lighter-colored natives of some parts of the East Indies, and extended in meaning by Hamy and others, who enlarged upon this theory. The term Indonesia is used by some authorities to designate the Malay Archipelago, or island group of the East Indies.

INDOOR BASEBALL. This sport varies but little from the regular game of baseball (q.v.). It originated at Chicago in 1887 and is credited to George W. Hancock and fellow members of the Farragut Club of that city. It can be played by from seven to nine players in any hall of size which will permit of sufficient light and room for the diamond and fielding, the minimum playing floor measuring 40 × 50 feet. The rules are designed to equalize the difference of size and surroundings from outdoor baseball, as are also the implements of the game. Each side of the diamond is from 27 to 35 feet long, according to the floor space at command. The ball must be not less than 16¾ inches nor more than 17¼ inches in circumference, must weigh not less than 8 nor more than 8¾ ounces, and must have a white cover. The bat must be 2¾ feet long and 1¾ inches in maximum diameter. The bases are 15 inches square, and half filled with sand or other heavy substance sufficient to anchor them in place, and the rules of the National Indoor Baseball Association of the United States govern the game. Consult *Indoor Base Ball Guide,* "Spalding's Athletic Guide" (New York, 1914, and annually).

INDORE, ĭn-dōr'. A native Mahratta state of the Central India Agency (Map: India, C 4). It is traversed from east to west by the Nerbudda River and also by the Vindhya Mountains, their loftiest point within its limits being 2500 feet above the sea. Area, 9469 square miles. It has large forests of valuable timber, in which are found many wild animals. Wheat, rice, tobacco, sugar cane, cotton, poppy, and maize are cultivated. Some cattle are raised, and opium is one of the chief manufactures. The state owns and rents out all the land. The Bhils, one of the wildest and most savage of the aboriginal tribes of India, inhabit Indore. Besides the capital of the same name (q.v.), the principal towns are Rampura, Mehadpur, Bhampura, and Mhow. Pop., 1901, 850,690; 1911, 1,004,569. The Mahratta ruler bears the name of Holkar (q.v.).

INDORE. The capital of the native Mahratta state of the same name, India, situated at the junction of the Saraswati and Khan rivers, 440 miles east of Bombay (Map: India, C 4). It is 1738 feet above sea level. Indore was founded in 1767 and contains the palace of the Holkar, the Daly College for sons of Central India chiefs, government offices, barracks, and a mint. It has a modern drainage system, a good water supply, and maintains a public lighting plant, market, reading room, and dispensary. It has manufactures of cotton and a considerable trade in grain, tobacco, opium, cloth, and metal vessels. A suburban district (pop., 1911, 9195), assigned by treaty, contains a British residency, the seat of an agent and his staff, and the government opium depot of Central India. Pop., 1901, 86,686; 1911, 44,947.

INDORSED, or **ENDORSED.** See HERALDRY.

INDORSE'MENT (from ML. *indorsare,* to indorse, from Lat. *in,* in + *dorsum,* back). In

its broadest sense, any writing on the back of an instrument. As a technical term of the law, it denotes the writing of the holder's name upon a bill of exchange, check, promissory note, or other negotiable instrument, on transferring it to another. While this writing is ordinarily on the back of such an instrument (whence its name), it is equally effective if made on its face or on a paper annexed to the instrument. In order to convert the writing into a contract, it must be delivered with the intention of giving effect thereto, or it must find its way into the hands of a bona-fide holder. The contract obligation of an indorser is to pay the indorsed instrument, provided payment is duly demanded, and payment is refused, and due notice of the dishonor is given to him. If the payee or holder simply signs his name, the indorsement is said to be in blank, and the subsequent holder may fill out the indorsement to any one as indorsee or transferee. A special indorsement is one which specifies the person to whom or to whose order the instrument is to be payable, e.g., "Pay C. D. or order. (Signed) A. B." When personal liability as indorser is to be avoided, the words "without recourse" are added. Such an indorsement does not prevent the further negotiation of the instrument or cast any suspicion upon its validity. A similar restriction is made in England in the case of checks by "crossing" them. An indorsement which restricts further negotiation is called a restrictive indorsement, e.g., "Pay Corn Exchange Bank only." It is provided by modern legislation that when an indorsement is conditional a party required to pay the instrument may disregard the condition and make payment to the indorsee or his transferee, whether the condition has been fulfilled or not. This changes the old rule, under which an acceptor or maker paid a bill or note with such an indorsement at his peril if the condition was not fulfilled. That was thought to be unduly hard upon the party required to pay. See Bill of Exchange; Check; Negotiable Instrument.

IN'DRA. The great national god of Vedic India. Although Indra lost his supremacy through the rise of Brahma, Siva, and Vishnu, he is still preserved as a figure in the Hindu pantheon. As represented in the *Veda* (q.v.), he is primarily the god of the lightning and thunder, with the attendant phenomena of the storm, wind, and rain; by vanquishing the demons of drought and darkness he restores the sun to the sky, the light of dawn, and the day. The realm of his activity is the atmosphere; and the many hymns of the *Rig-Veda* that are devoted to his praise—far outnumbering those to any other god—are rich in meteorological imagery and poetic allusions to natural phenomena. Armed with the thunderbolt (*vajra*), his special weapon, and inspired by copious drafts of intoxicating *soma*, his favorite beverage, he goes forth to do battle with the demons, especially Vritra, who, wrapped like a choking serpent about the clouds, has shut up the waters as prisoners. One of the hymns that describe this battle and the god's triumph over the dragon (*Rig-Veda*, 1. 32) is an epic in miniature. As the god of battles, Indra is looked upon in the historical hymns of the *Veda* as the royal patron of the victorious Aryans in their conflicts with the aboriginal inhabitants of India. His supremacy during the whole Vedic period is unquestioned; the more ethical and transcendental Varuna is no rival to his prowess.

In the later mythology a change takes place; Indra gradually sinks to a secondary rank among the gods. His installation as god of the lesser divinities is described in the *Aitarēya-Brāhmaṇa;* and from that time onward he becomes rather a figurehead in the pantheon, and the type of a mortal king, than the former supreme lord of heaven. The Epic and Puranic periods distinctly show that he has ceased to enjoy the worship accorded him in Vedic times. He remains ruler of the atmosphere, it is true, and one of the eight world guardians, regent of the eastern quarter of the sky, wielding his thunderbolt and sending down rain, but his real power is gone. Instead of descriptions of him as the great god of battles, praises are lavished on the delights of his paradise or heavens, *Svarga*, with its heavenly musicians and enchanting nymphs, the *Gandharvas* and *Apsarasas*, and all the joys of this happy abode of the gods, faithful worshipers, and heroes slain in battle. Like the later writings, the epics bring to view the sensual side of Indra's character in his amours with Ahalya, the wife of a sage—a bit of scandal as old as the Brahmanas. In consequence of the curses of the outraged seer, the god was doomed to lose his virile power; the conqueror Indra ceases to be invincible; even a son of the demon Ravana vanquishes him, as told in the *Rāmāyaṇa*, and wins the title *Indra-jit* (victor over Indra) for his prowess. The *Purāṇas* likewise describe him as worsted by the rising god Krishna, an incarnation of Vishnu, and they name various successors of Indra as rulers in the different *manvantaras*, or ages of the world.

Among the Hindus at present Indra is little worshiped. In Bengal a single day of the year is consecrated to his service, and, on occasions of drought, he is prayed to in other parts of the country. In Nepal, too, his annual festival (*Indra-jātra*) is the occasion for processions and dances. Nevertheless Indra the mighty is no more. His golden chariot in the *Veda* is now replaced by an elephant on which he is generally represented as riding, and the thunderbolt is grasped in his hand. The face and body are sometimes portrayed as covered with figures resembling eyes, into which they are said to have been mercifully transformed from the thousand vile marks that came out upon his person in consequence of the curse brought upon him for his incontinency with Ahalya. (See Hinduism.) For a full description of Indra during the Vedic period, consult: Perry, "Indra in the *Rig-Veda*," in the *Journal of the American Oriental Society*, vol. xi (New Haven, 1880); Macdonell, *Vedic Mythology* (Strassburg, 1897); Bloomfield, "The God Indra and the Sārna-Veda," in *Wiener Zeitschrift für die Kunde des Morgenlandes*, vol. xvii (Vienna, 1903); id., *Religion of the Veda* (New York, 1908). For the later Indra, consult: Dowson, *Hindu Mythology* (London, 1879); Hopkins, *Religions of India* (Boston, 1895); Wilson, *Hindu Mythology* (new ed., London, 1900). See Plate of Hindu Deities in article India.

INDRANI, ĭn-drä'nē (Skt. *Indrānī*, Indra's wife). A name of the wife of the Hindu god Indra (q.v.) in the *Veda*. She is called Saci or Andri in the later legends.

INDRE, ăN'dr'. A river of France, rising on the northern border of the Department of Creuse (Map: France, N., G 6). It flows northwest through the departments of Indre and

Indre-et-Loire, past the towns of La Châtre, Châteauroux, and Loches, and joins the Loire 17 miles below Tours, after a course of 136 miles, for the last 40 of which it is navigable for small craft.

INDRE. A central department of France, the western portion of the old provinces of Berry, Orléanais, Marche, and Touraine, lying immediately south of the Department of Loire-et-Cher. Area, 2664 square miles, of which about four-fifths are in tillage and pasture (Map: France, N., G 6). Pop., 1901, 290,216; 1911, 287,673. The chief rivers are the Indre, the Vienne, the Creuse, and its tributary, the Anglin. The surface falls naturally into three parts, Boischaut, Champagne, and Brenne. The first two are level and fertile; the last was formerly marshland, but has been largely reclaimed. There are large crops of wheat and barley, but the principal resources of the department are its vineyards and its flocks. The principal manufactures are woolen and linen cloths, hosiery, scythes, paper, and porcelain. Iron mines are worked. Capital, Châteauroux.

INDRE-ET-LOIRE, å lwär. An inland department of France, part of the ancient provinces of Touraine, Orléanais, Pitou, and Anjou, lying northwest of the Department of Indre (Map: France, N., F 5). Area, 2377 square miles, of which more than one-half is arable. Pop., 1901, 337,916; 1911, 341,205. The department is watered by the Loire, the chief river, and by its tributaries, the Cher, the Indre, and the Vienne, all of them navigable. In the south, or Brenne district, the surface is hilly, but in the other parts it is undulating and fertile. Cereals are grown, but wine is the most important product. The chief manufactures are bar iron, woolen cloth, silk, rope, paper, and leather. Capital, Tours.

INDRI, ĭn'drĭ. A large, monkey-like lemur (*Indris indris*), of Madagascar, which is regarded as the most highly organized of the tribe and differs from other lemurs in several important particulars, such as having only 30 teeth, the large size of the hind limbs as compared with the fore limbs, the webbing of the toes, and the fact that only one offspring is produced annually. The coat is variable black and white curiously contrasted, and the ears look like hairy tufts. Unlike most lemurs, the indris are wholly diurnal, going about in the forests of the east coast, to which they are confined, in small parties, and subsisting mainly on fruit. Their voices are loud, and when angry or hurt the animals utter piercing shrieks or mournful cries. These howlings and other characteristics have led to many native superstitions in regard to the indri, which alone constitutes a subfamily of the Lemuridæ. See Plate of LEMURS.

INDUCED ELECTRIC CURRENTS. See ELECTRICITY; INDUCTION.

INDUCED MANIA. See IMITATIVE INSANITY.

INDUC'TANCE. See INDUCTION, 2.

INDUC'TION (Lat. *inductio*, inference, from *inducere*, to lead in, from *in*, in + *ducere*, to lead). The logical process of arriving at general principles from particular facts. In order to understand any fact or event, we need not only to be able to know its sensible qualities or constituents, but also to know in what relation it stands to other facts or events. Such relation is a general character, or, as it is called in logic, a universal relation. If, using some already discovered relation between some objects as a point of departure, we assume such a relation to exist between other similar objects, we are said to generalize or to make an induction. Induction may thus be defined as the universalizing of perceived relations or connections between objects. Among these relations one of the most important is that of antecedence and consequence. (See CAUSALITY.) This universalization is corrected or confirmed by further observation of these connections in other individual cases until at last often a valid judgment asserting unconditional connection is reached. Such a judgment is said to be valid when no known fact is at variance with it, but such a validity is theoretically always provisional; practically it has complete assurance. A valid induction is one which, starting from particular observations, thus reaches a valid universal judgment. Scientific inductions do not differ in principle from the naïve inductions we have already described; the difference is one of method employed, not of kind.

Looking now at inductions ascertained to be valid, we discover three stages in the process of arriving at certified results. The first stage is called *preliminary observation.* At this point actual coexistences and sequences or other relations are observed and form the data for the induction. The second stage consists in the generalization of some actually ascertained coexistence or sequence, or other relations. This is *induction* proper. The third stage is *verification,* the correcting or confirming of the validity of the generalization by further observation. Frequently the term "induction" is used to include all these three steps; in this case the second step is called generalization. Let us now take up these three steps in order.

I. Preliminary observation may be quite casual and accidental, or it may be intentional. A person may happen to see some connection between phenomena, or he may be intently looking for connections. In the latter case the observer may simply look at things as they offer themselves to his notice, or he may set about to interfere with the spontaneous course of events in order that he may the better observe the connection. The latter sort of observation is called an experiment. When experiment is possible, it is usually of great assistance in collecting data for generalization. Indeed, almost all the great advances in modern science have been due to experimentation rather than to mere observation. In intentional observation, whether it be simple or experimental, it is extremely important for the observer to know what he is to look for. Not every detail in the complex of details under observation is pertinent to the matter in hand; and yet no a priori rules can be given to direct an investigator. Much depends on experience and skill not subject to rules. But by analyzing successfully conducted inductions resulting in valid inductions, logicians are able to formulate several important rules of procedure, which thus are a posteriori. For our present purposes we can do no better than quote John Stuart Mill's canons of induction. These state the conditions under which generalization may be made. Hence the observer should be on the watch for the occurrence of these conditions.

The canons are as follows: First Canon, for the Method of Agreement: *If two or more*

instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree, is the cause (or effect) of the given phenomenon. Second Canon, for the Method of Difference: *If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ, is the effect, or the cause, or an indispensable part of the cause, of the phenomenon.* Third Canon, for the Joint Method of Agreement and Difference: *If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of instances differ, is the effect, or the cause, or an indispensable part of the cause, of the phenomenon.* Fourth Canon, for the Method of Residues: *Subduct from any phenomenon such part as is known by previous inductions to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.* Fifth Canon, for the Method of Concomitant Variations: *Whatever phenomenon varies in any manner wherever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation.* In all these cases what Mill calls a "circumstance" is assumed to be the cause if it precedes, and an effect if it succeeds, the "phenomenon." These are statements of the conditions under which scientific men make inductive inferences. Hence in our observations for the purposes of induction we should keep the following questions in mind: Is it the case that any instance in which the phenomenon under investigation occurs, and any instance in which it does not occur, have every circumstance in common save one? Is it the case that two or more instances of the phenomenon under investigation have only one circumstance in common? Is it true that two or more instances in which the phenomenon under investigation occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance? Is a part of this phenomenon under investigation known to be the effect of certain causes? Does the phenomenon under investigation vary in any manner whatever whenever some particular circumstance varies in some particular manner? In case any of these questions can be answered in the affirmative, an induction may be made. It must not, however, be supposed that an investigator sets about his work with only such general clews as are furnished by these questions. In any particular investigation a knowledge of exactly what has already been done by previous workers is indispensable. If he has this knowledge, the investigator is in a position to ask much more definite concrete questions than the five we have just mentioned. But, however much more definite his problem may be, it may always be reduced to general expression, and when so reduced it will assume the form of one of the five questions stated above, which give the headings for the treatment of the methodology of observation. Any more specific methodology can be worked out only on the basis of the practical experience of the expert in any particular line of research.

II. It has already been said that when any one of the five questions given in the last paragraph can be answered in the affirmative, we universalize the actually observed relation between phenomenon and circumstance. But now it will probably be asked what warrant there is for this universalization. The answer is somewhat as follows: To universalize is a natural, an instinctive tendency of thought. The child jumps at conclusions in very much the same way as the kitten jumps at a moving string. What the child does, the ordinary adult also does, and unless corrected by experience the probability is that every one would generalize every observed relation. But experience does check the tendency in a measure. The child who generalizes the observed connection between shape and reboundingness, or color and reboundingness, comes by later experience to find that his generalization is invalid. The truth of the universal judgment implied in his expectation is not borne out by later developments. But he is nowise daunted. He proceeds to generalize some other observed connection until at last he gets *a general law which is uncontradicted by experience,* and which he therefore accepts as true. The first generalizations are naïve, instinctive attempts to find uniformity in the world of experience. The attempt in any particular direction may be baffled, but only to be followed by an attempt in another direction. In other words, some attempts fail and others succeed. To succeed is to find that subsequent experience conforms and continues to conform to the expectation aroused by previous experiences. To fail is to find that subsequent experience disappoints this expectation, while in either case the expectation is, from the point of view of logic, an unreflective generalization. In later life consciousness becomes reflective; it looks back upon its own processes and finds that in cases of successful generalization certain conditions are present, while in cases of failure these conditions are absent. The same instinctive generalizing tendency which led to the generalization of the earliest connections discovered, now leads to the generalization of the connections between successful generalization itself and *the conditions under which the success is achieved.* These latter generalized connections are logical laws of thought. We now are in a position to see that there are two kinds of laws of thought, logical laws and psychological laws. The psychological laws are those which express the modes of thought behavior, whether the results of the behavior be ultimately satisfactory or not. The logical laws express the conditions under which the results of thought behavior are ultimately satisfactory to the thinker. Thus, it is a psychological law that an immature thinking consciousness generalizes instinctively, i.e., without any foresight of the results to be gained; it is a logical law that if the generalization is to be valid it must be made only under certain conditions, such as those stated in the five canons mentioned above. This logical law is itself validated by the fact that it is a generalization made in conformity with the law of which it is itself the expression. In other words, it is self-consistent and also consistent with all the known facts. A more stringent test of the validity of any law seems to be impossible. If now it is further asked whether we know that

the thought which conforms to the laws of thought thus discovered will continue to be successful in the future as it has been in the past, we can answer by saying that we have only one plausible reason to suppose it should not be successful, while every other reason that we know would lead us to believe that it will be successful. That one exception is the fact that in past experience, when we thought that we had discovered laws, we often found that we were in error. Hence it may be reasoned that it is possible that we may be in error now as to the logical laws of thought. But this argument has not the force that at first sight we might be tempted to ascribe to it. If we know that in the past we thought wrongly in many instances in which we thought that we were right, and if we now generalize this knowledge and say that therefore on the same principle we may now be in error and may always be in error, we are making an uncriticized induction; and such inductions our past experience has proved to us to be very precarious. If now our generalization as to the valid laws of thought is made in conformity with conditions lack of conformity to which made other inductions invalid, then the invalidity of those other inductions is no reason for attributing invalidity to these laws of thought. Past errors in induction should indeed make us very circumspect. We should use our utmost endeavors to avoid the causes which misled us; but having avoided the causes, we need not be timid as to the validity of an induction which in the past has never been impeached by experience, but, on the contrary, has been verified time and time again. A persistent objector may still argue that the fact of our having made errors in the past is still a good reason for doubting the validity of all inductions, and therefore for doubting the validity of the laws of thought which we have discovered by induction. A man who argues thus exposes himself to a valid form of the *argumentum ad hominem*. (See ARGUMENT.) He obliges us to remark that he assumes for the purposes of his argument the validity of the law he is assailing. He is assuming the right to generalize from experiences of error in the past. What he thus does he may not consistently decline to let others do. And further, he is generalizing from experiences of error and ignoring the experiences of success in valid induction, while his opponent discriminates between the two cases and bases his faith on the discrimination. In other words, the skeptic is credulous with regard to the possibility of error and incredulous only with regard to the possibility of truth. What is an appeal to the fact of past error in proof of the fallibility of all laws of thought? It is nothing but an *induction* from past experience. The correctness of the conclusion of this induction would carry with it the invalidity of all argument by induction, and therefore the invalidity of this argument which seeks to prove by induction the correctness of the conclusion. Here as elsewhere (see KNOWLEDGE, THEORY OF) we see that one cannot reason against the laws of reason without putting one's self out of court. In the last resort, however, all belief in general laws is an assumption.

III. Verification of an induction consists in testing it in new instances. Any newly made induction is presumably based on a limited experience, and it needs to be examined in its bearings upon other parts of experience. The question in the mind of a person verifying an induction is this: Does the universalized relation prove its universal character in all our experience so far as this experience is pertinent to the relation at issue? This question can be answered only by looking at our past experience and by getting further pertinent experience. No verification of a true universal can be exhaustively completed; but, as we saw under II above, it may be practically conclusive. There may be no reason left for doubting a proposition except the bare possibility that it may not be true in cases as yet beyond our ken, but a bare possibility is always an unreasonable possibility.

The relation of induction to deduction is treated under DEDUCTION. The question whether any general proposition can be arrived at without induction has often been affirmatively answered. (See A PRIORI.) But the tendency at present is to regard all general knowledge as the result of induction. Recent logic tends to be empirical. (See KNOWLEDGE, THEORY OF.) For instance, the geometrical axiom that things equal to the same thing are equal to each other is by empiricism regarded as derived from experience by induction. It is first seen in individual instances that individual things equal to the same individual thing are equal to each other. This relation is then universalized. So with the arithmetical judgment: "Two and two are four." Hegel and J. S. Mill are the great logical protagonists of this view. Mill's statement of the view is more familiar than Hegel's, but it is defective in that it is based on an atomistic view of experience (see ATOMISM), a view which makes against the validity of induction by reducing all induction to mere simple enumeration (*inductio per enumerationem simplicem*), or a bare telling off of isolated findings, and a summation of the results of these findings into a collective statement.

Consult the authorities referred to under LOGIC; especially to be named here are the logics of Hegel, J. S. Mill, Bain, Minto, Jevons, Ueberweg, Lotze, Wundt, Sigwart, Bradley, Bosanquet, Hibben, Bode, and Creighton; also Hobhouse's *Theory of Knowledge* (London, 1896); A. Schuyler, *Critical History of Philosophical Theories* (New York, 1913).

INDUCTION. If an electrified body is brought near an uncharged one—either conductor or nonconductor—the latter will exhibit electrical forces; it is said to be charged by induction. In general, if a charged body is surrounded by a uniform medium, such as air, and if a body of any other material than that of the medium is introduced, thus making the surrounding medium heterogeneous, there will be induced charges on the body introduced. The question as to the character of the charges on this body and their distribution depends upon the relative electrical inductivity of the body and the surrounding medium. (See ELECTRICITY.) Similarly, if there is a magnet surrounded by a uniform medium, such as air, and if a body of a different kind of material from the medium is brought near the magnet, it will exhibit magnetic forces and is said to be magnetized by induction. The character and distribution of this induced magnetization depend upon the relative magnetic inductivity of the medium and the foreign body. (See MAGNETISM.) If the body which is introduced is iron or any magnetic body, and if the medium is air, the induced magnetization is such as to produce attraction by the magnet; if bis-

muth is introduced, there will be repulsion. Electromagnetic induction is the phenomenon observed when the magnetic field of force included by a conducting circuit is altered in any way, viz., electric currents are produced in this circuit. These induced currents are due to the *changing* of the field of magnetic force and are in such a direction as to tend to neutralize the change; they last only so long as the field is changing. See ELECTRICITY.

Tubes of Electric Induction are tubes which can be imagined drawn in the medium surrounding electrified bodies by choosing any small closed curve in this medium and drawing lines of force through each point of it. A hollow tube is thus made which has one open end on a positively charged body and the other on one negatively charged. If this tube is made of such a cross section that it includes unit electrostatic charges as its two ends, it forms a Faraday tube.

Tubes of Magnetic Induction are tubes formed in the same manner in the field around magnets by drawing lines of magnetic force through the points of any small closed curve. Faraday conceived the idea of these tubes being continuous through magnets and all bodies, not ending on any surface; they form, therefore, closed circuits, like a rubber tube with the two open ends brought together. The tubes are conceived to be of such cross sections that the number leaving a north pole of unit strength is 4π, where $\pi = 3.1416$. See MAGNETISM.

Owing to an electric current in a closed circuit, there is a magnetic field of force inclosing it; the tubes of magnetic induction form closed curves around the conductor. The *coefficient of self-induction,* or the *inductance,* is the number of these tubes threading through the circuit when there is a unit current in the conductor. Some of these tubes of magnetic induction may also in their paths pass through a neighboring closed conducting circuit, and the number of those tubes which do so when there is a unit current in the first circuit is called the *coefficient of mutual induction* of the two circuits. It may be shown that if there is a unit current in the second circuit, thus producing tubes of magnetic induction of its own, the number of these which thread the first circuit is the same as in the last case. The coefficient of self-induction depends upon the shape of the circuit, the number of turns of the conducting wire, and on the surrounding medium; and the coefficient of mutual induction depends upon these properties for each circuit and upon their relative positions. If L is the coefficient of self-induction for a single turn of wire, and if there are n turns in the coil, the coefficient is n^2L. Similarly, if in one coil there are n_1 turns and in the other n_2 turns, the coefficient of mutual induction is proportional to the product n_1n_2. If the two coils are so placed that the currents in them are "parallel," the coefficient of mutual induction is positive; if the currents are in opposite directions, the coefficient is negative. It can be shown that inductance plays the same part in the phenomena of electric currents that inertia or mass does in the motion of matter. The practical unit of induction is the henry (q.v.).

INDUCTION BALANCE. An instrument to determine the presence or character of a piece of metal, which may be either concealed, as a bullet in a human body, or in the form of a counterfeit coin or alloy. It was originally devised by Dove in 1841, but was improved and constructed in a serviceable form by Hughes in 1879. It consists of two sets of induction coils in which the primaries are connected in a circuit that includes a battery and a microphonic or other circuit breaker, while the secondaries are in connection with a telephone used by the observer. The current traverses the primary coils in opposite directions, and the secondary coils are so arranged that the sound of the microphone or circuit breaker is not heard, owing to the inductive effect being neutralized completely. If a coin or other metallic substance is introduced into the vicinity of one of the pairs of coils, this equilibrium will be disturbed, as part of the induction acts upon the metal and gives rise to induced currents. This of course produces an audible sound in the telephone. The instrument has been used to measure hearing, and it then is known as an audiometer, the perception of sound being tested by altering the positions of the coils. An arrangement of the induction balance was devised by Prof. Alexander Graham Bell to locate a bullet in the human body, and apparatus based on the foregoing principle was employed and numerous different forms made and tested. It was used in an attempt to discover the bullet by which President Garfield was killed, but the presence of the metallic mattress interfered with the operation of the instrument. Instances, however, of its successful use are on record. This method, employing modern apparatus, was suggested for use in European hospitals during the Great War of 1914, and its possibilities were thoroughly discussed. Consult Bell, "Induction Balance," in *American Journal of Science* (New Haven, 1883), and Hopkins, *Experimental Science* (New York, 1890).

INDUCTION COIL. A form of electrical apparatus used for transforming an interrupted current of low potential or pressure into one of high potential and alternating in direction. The fundamental fact of electromagnetic induction was first stated by Michael Faraday in a paper presented to the Royal Society on Nov. 24, 1831, in which he derived the conclusion that any change in a magnetic field will induce an electric current in a conductor situated in it. This basic principle of electromagnetic induction underlies the construction and operation of the induction coil. As regards its construction, it consists of four essential parts: a bundle of soft iron wire, *AA* (Fig. 1), called the core; the primary coil, *BBBB*, of insulated copper wire wound on the iron core, which is usually made of comparatively large wire and short in length; a much larger secondary coil, *CC*, of longer, finer copper wire; and a device, *D* (Wagner's

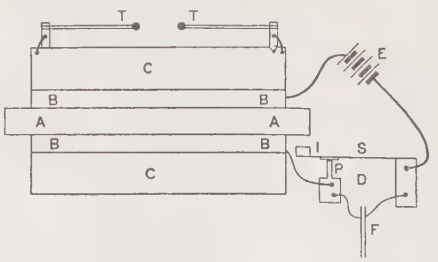

FIG. 1. DIAGRAM OF INDUCTION COIL.

hammer, 1839), called the rheotome or interrupter, which alternately makes and breaks the connection of an electric current through the primary coil. In dimensions they vary from a few inches in length and a fraction of a pound in weight to those of large dimensions used for wireless telegraphy.

The operation of the apparatus is as follows: The small spring *S*, being in contact with the point *P*, allows the current from the battery *E* to flow through the primary coil, converting it and its core into a powerful electromagnet. The production of this powerful magnetic field in and around the secondary coil induces in it a momentary current of high potential and opposite in direction to the primary. This secondary current is usually able to pass as a spark between the terminals of the secondary *TT*. When the core *AA* becomes magnetic, it attracts the piece of soft iron *I* on the spring *S* and draws it up, thereby breaking the connection between the spring *S* and the point *P* and interrupting the flow of current in the primary. Thereupon the electromagnet *AB* loses its magnetism, and, ceasing to attract the iron *I*, the spring returns to its original position, restoring the contact between *S* and *P* and again starting the current in the primary. The disappearance of the magnetic field on breaking the primary circuit induces a momentary current of high potential in the secondary coil in the same direction as the primary current, and hence in the opposite direction to the current induced in the secondary upon starting the current in the primary. The above cycle of operations repeats itself periodically, at a rate depending upon the spring *S*. Many modifications of the interrupter are used —some attached directly to the coil, as above described, some operating independently but still electromagnetically, others driven by an independent motor and purely mechanical, and still others of an entirely different type known as electrolytic interrupters.

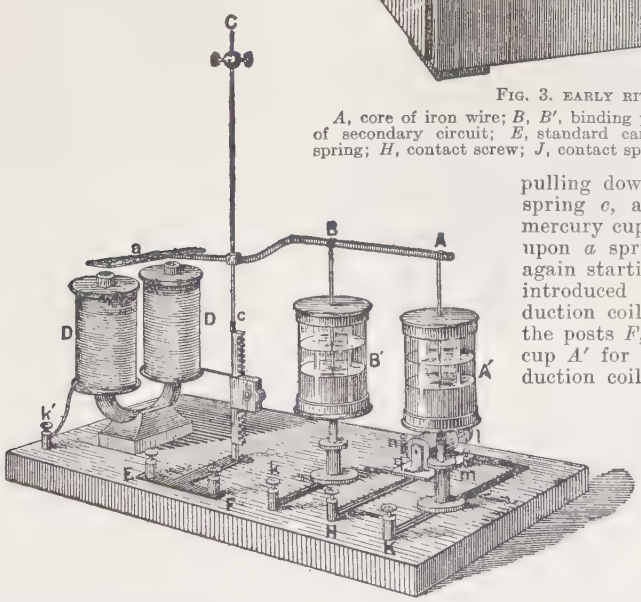

FIG. 2. FOUCAULT INTERRUPTER.

Figure 2 illustrates an early form of mercury interrupter due to Foucault. One circuit runs from the binding post *k′* through the magnet *D*, pulling down the armature *a* supported by the spring *c*, and lifting the wire *B* out of the mercury cup *B′*, interrupting the current, whereupon *a* springs up and *B* enters the mercury, again starting the current. This device may be introduced into the primary circuit of an induction coil, or the latter may be connected to the posts *F*, *H*, *K*, so as to use the wire *A* and cup *A′* for interrupting the current for the induction coil, while *B′* operates to keep the apparatus in motion. A commutator consisting of a hard rubber cylinder with metal contact pieces is shown at *I*, with binding posts at *n* and *m*. Figure 3 shows another form of interrupter attached to an early form of induction coil. Figure 4 shows a modern coil, with independent mechanical interrupter, capable of giving a 46-inch spark. In this an electric motor revolves a disk built up of conducting and insulated segments upon whose periphery a brush bears and makes and breaks the circuit.

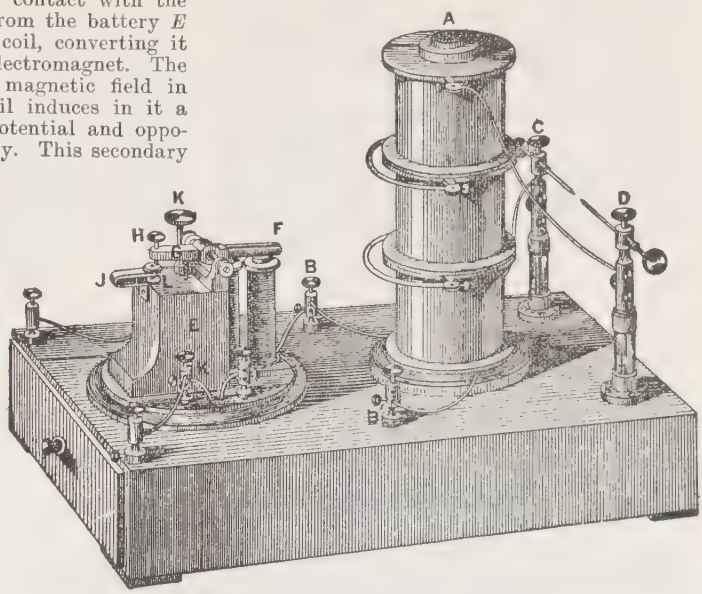

FIG. 3. EARLY RITCHIE INDUCTION COIL.

A, core of iron wire; *B*, *B′*, binding posts of primary circuit; *C*, *D*, binding posts of secondary circuit; *E*, standard carrying interrupter; *F*, armature; *G*, tension spring; *H*, contact screw; *J*, contact spring; *K*, binding post; *L*, contact point.

The mercury-jet interrupter is another type where a cylindrical block of steel, mounted on a vertical shaft and with its lower end immersed in mercury, has a vertical hole drilled part way through it and a lateral hole connecting with the vertical. On revolving the block rapidly, the mercury is drawn up through the vertical hole and then out of the lateral opening in the form of a jet, which impinges on a copper plate placed so as to be part of a circuit, which is closed on the passage of the jet from the block

to it. Accordingly the circuit is completed when the jet impinges on its target, and the number of interruptions may be controlled by the speed of the motor rotating the steel block. To prevent oxidation of the mercury, the revolution may take place in oil, alcohol, or coal gas. A modification of this device in a coal-gas atmosphere does away with the independent electric motor by providing an armature, acted upon by a coil, which serves to rotate the block and keep the pump in operation. There are various modifications of this and other types of mercury interrupters.

Quite distinct from the types of interrupters just described are the electrolytic interrupters, of which that invented by Dr. Wehnelt in 1899 is most frequently used. This consists of two fixed electrodes immersed in a bath of dilute sulphuric acid, containing about 20 per cent of

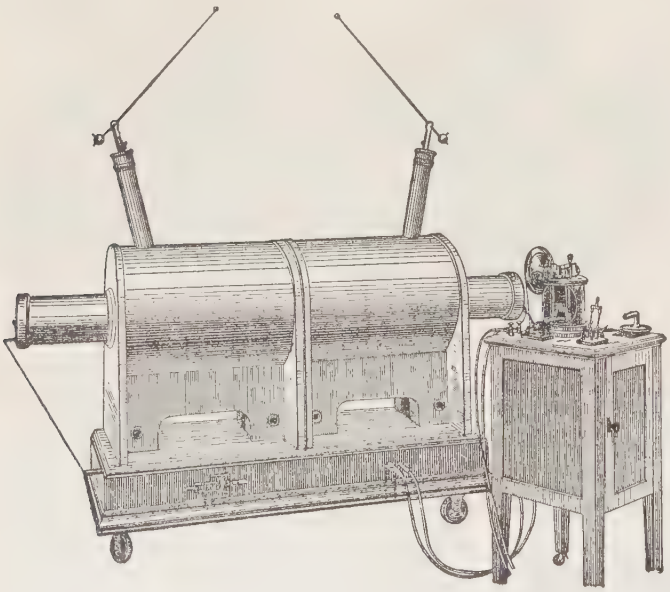

FIG. 4. A MODERN INDUCTION COIL.

acid. The anode is formed by a small platinum wire insulated by glass or porcelain, except at its extremity, while the cathode consists usually of a sheet of lead. Where the continuous electromotive force is applied to a circuit containing such an electrolytic cell and an inductive resistance, the resulting current is not continuous but is intermittent, several hundred interruptions occurring per second. For example, with 24 volts impressed upon a primary circuit, 450 interruptions per second will be secured when the electrolyte is circulated. No primary condenser is required in such a circuit, but there must be sufficient inductance. The resulting spark at the secondary is of a different character from that given by the hammer break. Modifications of this device have been introduced by Caldwell and Campbell Swinton. The electrolytic break has been used in connection with X-ray and electrotherapeutic apparatus, but has not been found as useful in radiotelegraphy.

In some cases an alternating current is used in the primary without an interrupter, as in the case of the Tesla coil, where an electromotive force of high frequency is required. Here there is a primary winding of a few turns, having a spark gap and shunted by a condenser. The alternating current of from 5000 to 10,000 volts sent through the primary charges the condenser until the voltage across the air gap breaks it down and the condenser is discharged. Accordingly an oscillating current is produced in the primary winding, which with the secondary is wound on an air core, and this induces a high-frequency electromotive force in the secondary which is sufficient to break down a long spark gap. When used with an alternating current the induction coil becomes practically a transformer, and the action is essentially the same as in apparatus of this class. See TRANSFORMER.

The quantity of electricity moved at the break is equal to that moved at the make in the primary circuit; but, owing to the fact that the magnetism in the core vanishes much more rapidly at the break than it builds up at the make, the effect at the break is more compressed, and the potential, or electrical pressure, much greater than at the make. The suddenness of the break is of the greatest importance, and most of the improvements in interrupters have been designed to make the break as sharp as possible. The important factors which affect the potential or length of spark produced by an induction coil are the relative number of turns of wire in the primary and in the secondary, the suddenness of the break, and the voltage or potential of the current used in the primary coil.

Pohl in 1835 made a very crude induction apparatus of a different style; but the first to make large coils of the above type were Stöhrer and Ruhmkorff, and from the latter, who in 1851 produced a famous coil giving a spark in air 2 inches in length, is derived the name Ruhmkorff coil, which is frequently used as a synonym of induction coil. In 1855 Poggendorff increased the suddenness of the break by so arranging the device that the interruption occurred under an insulating liquid or in vacuo. (The cups B', A' in Fig. 2 have alcohol over the mercury.) In 1857 Ritchie, of Boston, devised a means of winding the secondary coil in sections, like circular disks, which, laid together and connected, formed the cylindrical coil. This obviated to a great extent the danger of a spark jumping across from one turn of the secondary to another through the insulation. Ruhmkorff was so impressed with the superiority of a Ritchie coil exhibited in Paris that he adopted the Ritchie method of winding, and it prevails at present. Poggendorff proposed, and in 1853 Jean tried with good success, the use of a liquid as the insulation of the secondary, and at present most of the high-potential coils use liquid insulation. The advantage lies in the fact that, if a spark should jump over, the hole in the insulation would immediately close. Fizeau suggested a decided improvement in 1853, introducing a condenser

at the break, as shown at *F* (Fig. 1). This enables the extra current of the primary to run into the condenser for an instant, while the points *S* and *P* are first separating, and by the time that *F* is charged *P* and *S* are too far apart for the current to jump across. This gives an oscillatory electromotive force in the secondary winding and increases its value.

In 1869 a coil was built for the London Polytechnic Institute the core of which was 5 feet long, 4 inches in diameter, and weighed 123 pounds. The primary had 6000 turns of wire 0.095 inch in diameter and 3770 yards long, weighing 145 pounds. The wire of the secondary was 0.015 inch in diameter and 150 miles long. This coil gave a spark 29 inches long, while the modern coil shown in Fig. 4 gives a spark 46 inches long.

The induction coil is especially used in the study of the electric discharge in rarefied gases, as in Geissler, Crookes, and X-ray tubes; also in electrotherapeutics, for automatic gas lighting, gas-engine ignition, X-rays, and wireless telegraphy. Although transformers have supplanted the induction coil in the best X-ray laboratories, it still holds an important place in wireless telegraphy, though here also it was by means of such a coil that Heinrich Hertz carried out his brilliant researches which led to the discovery of electric waves, thus confirming the great theoretical hypothesis of Maxwell and laying the foundation for wireless telegraphy.

The size, design, and construction of an induction coil depend upon the purpose for which it is to be used; i.e., the ignition coil of a gasoline engine is much smaller and simpler than a coil used for the production of electric waves in radiotelegraphy or X-rays (q.v.). When used for radiotelegraphy, a coil capable of a 10-inch spark in the air gap of its secondary circuit can be employed most advantageously and represents about the largest apparatus of this type that can be used for this purpose. Such a coil would have a primary circuit of thick wire, generally No. 12, wound in 300 or 400 turns on a core formed by a bundle of soft iron wires about 2 inches in diameter and about 18 inches in length. The primary is inclosed in an ebonite tube slightly in excess of 2 inches in diameter. The secondary winding is usually of No. 36 copper wire covered with silk and aggregating a length of 10 to 17 miles. The secondary is wound in a large number of coils or sections between paper or ebonite disks, the ends of the various coils being connected together. The whole secondary coil is immersed in melted paraffin to exclude air and provide adequate insulation and is usually finished by being inclosed in a case of thin ebonite, with ends and supports of the same material. Some form of interrupter is provided, and a condenser is placed across the gap. Various modified forms of induction coil have been designed to secure advantages of one kind or other.

As employed in wireless telegraphy, a 10-inch induction coil takes a mean primary current of about 10 amperes and requires from 16 to 20 volts supplied from a battery or storage cells—in other words, about 150 watts or 0.2 of a horse power are required, which will afford sufficient energy for radiotelegraphy up to a distance of 100 miles. Beyond this point, however, more power is required, and some form of alternating current transformer must be used, as described under WIRELESS TELEGRAPHY.

Bibliography. Bonney, *Induction Coils: A Practical Manual for Amateur Coil-Makers* (New York, 1892); *Induction Coils: How Made and Used,* an American reprint of Dyer, *Intensity Coils* (ib., 1892); Alsopp, *Induction Coils and Coil-Making* (ib., 1896); Hare, *Construction of Large Induction Coils* (London, 1900); Norrie, *Induction Coil* (New York, 1901); Wright, *The Induction Coil in Practical Work* (ib., 1901); Armagnat, *Induction Coils* (Eng. trans. by Kenyon, with bibliography, ib., 1908); Marshall and Stoye, *Induction Coils: How to Make and Use them; a Practical Handbook on the Construction of Medical and Spark Coils* (ib., 1908); Collins, *Design and Construction of Induction Coils* (ib., 1909); Haller and Cunningham, *The Tesla High Frequency Coil: Its Construction and Use* (ib., 1910). All of the large manuals of experimental physics also devote considerable space to this class of apparatus, while new designs and improvements are described in the electrical and physical journals.

INDUCTION MOTOR. See DYNAMO-ELECTRIC MACHINERY.

INDUCT'OPHONE (from *induct* + Gk. *φωνή, phōnē,* voice). A form of apparatus consisting of coils of wire and a telephone receiver, designed to afford communication between moving trains and stations. The apparatus and system were devised by Willoughby Smith, of London, in 1882, but never have been practically applied. Signals were transmitted inductively from coils of wire placed along the line to other coils in the train and received by means of a telephone.

INDUL'GENCE (Lat. *indulgentia,* indulgence, from *indulgere,* to indulge). A term of Roman Catholic theology, signifying the authoritative remission of temporal penalties due to sin, the guilt of which has been forgiven. An indulgence is not a permission to sin nor a pardon for future sins. It does not remit guilt; only sacramental absolution avails for that; but it affects the punishment which would otherwise be inflicted in the regular exercise of ecclesiastical discipline. According to Bellarmine's statement, one who has been absolved from guilt in the sacrament may be released from penalty by an indulgence. It is an act, not of "order," but of "jurisdiction," based upon the power of the keys. (See KEYS, POWER OF.) So complete is this power held to be that the efficacy of an indulgence is believed, in a true sense, to satisfy divine justice, as well as to secure the remission of temporal penalties, whereby it is made to extend beyond this present life into the state of purgatory. The ground of this satisfaction is sought in the treasure of merit laid up by Christ and the saints, and always at the disposal of the Church whenever need requires. This *thesaurus meritorum* is fundamental to the fully developed theory of indulgences. The clergy are its duly appointed custodians; its beneficiaries are the adherents of the Church throughout the world who avail themselves of its virtues; the indulgence is its channel of communication.

The history of indulgences begins with Roman law, where the word *indulgentia* means the remission of a punishment or of a tax. From legal usage the word easily passed into ecclesiastical usage. A sovereign church, like a sovereign state, might exercise clemency, instead of exacting the full measure of punishment which the law required. But long-continued and some-

times bitter controversies indicate the doubts which many Christians felt as to the propriety of this contention, which finally led to the catastrophe of the sixteenth century, when Luther voiced the protest of a large section of Christendom against certain current abuses of the doctrine. The first important step towards establishing the dispensing power of the Church was taken in consequence of the Decian persecution, beginning 250 A.D., when the problem arose how to deal with the lapsed. These questions were answered by the beginnings of penitential discipline. It was held that the Church, which had the power to inflict discipline, had also the power to remit it in whole or in part. The main exercise of this power in the fourth and fifth centuries was in shortening the canonical periods of penance, evidence of which is found, e.g., in the teaching of Gregory of Nyssa.

By degrees a variety of substitutes for the canonical penalties were introduced. Fasting might be remitted in consideration of repeating a certain number of psalms, or of paying a fine (as by Theodore of Tarsus, Archbishop of Canterbury, in the seventh century). Almsgiving, pilgrimages, and holy wars came to be the most popular means of securing indulgences, especially in the period of the Crusades. (See CRUSADE.) The Council of Clermont (1095) asserted that the pilgrimage to the Holy Land took the place of all other penance. With the decline of the Crusades indulgences were offered for fighting against heretics, such as the Albigenses and Hussites (q.v.). The first great jubilee indulgence was published by Pope Boniface VIII in 1300. The fully developed scholastic theory upon which indulgences are based is found in Thomas Aquinas and Alexander of Hales. The importance there attached to the "treasure of merit" naturally led to a popular belief among the ignorant that pardon for sin and immunity from punishment were matters of ecclesiastical bookkeeping—that they could be bought and sold. It was in view of this popular impression, and the undoubted abuses which grew out of it, that Luther published his theses on indulgences in 1517, the event which marks the beginning of the Protestant Reformation. See LUTHER.

The Council of Trent, at its twenty-fifth session (1563), condemned those who assert that indulgences are useless, or deny that the Church has power to grant them; but in reaffirming its belief the Church decreed the abolition of all evil gains and other abuses which had grown up in connection with the indulgence system. Since that time the Church has attempted to guard against misinterpretations of the doctrine and to safeguard it from the criticisms to which it had previously been exposed.

From what has been said it will be evident that Roman Catholics do not understand by an indulgence a remission of sin itself nor a purchased benefit to an impenitent sinner. They hold that its benefits can be enjoyed only by a sinner who has repented and resolved to lead a new life, and they deny the charge that the indulgence system has introduced any laxity of principle into the Church.

The power to grant indulgences for the whole Church resides only in the Pope, but primates, archbishops, and bishops have power to grant them within their own jurisdictions. The indulgence may be either plenary or partial—the former remitting the whole of the temporal punishment, the latter something less than the whole. For example, an indulgence of 40 days is understood to remit as much as would have required 40 days of penance without it. Indulgences may be attached to certain articles (e.g., a crucifix) or to certain places (as a shrine). In these cases the original possessor of the article or the pilgrim to the shrine receives the benefit of the indulgence. A custom of granting indulgences for the dead grew up in the Middle Ages. The right and efficacy of such grants have been much debated; but the Church holds them to be salutary, even though their precise scope cannot be defined. As limited by Sixtus IV (Constitution of 1477), they are "only by way of suffrage," i.e., the Church does not assume direct authority over the dead.

Consult: E. Amort, *De Origine, Progressu, Valore, ac Fructu Indulgentiarum* (Augsburg, 1735); Palmieri, *Tractatus de Pœnitentia* (2d ed., Prati, 1896); H. C. Lea, *History of Auricular Confession and Indulgences in the Latin Church*, vol. iii (Philadelphia, 1896); Moritz Baumgarten, *Henry Charles Lea's Historical Writings* (New York, 1909); A. M. Lepicier, *Indulgences: Their Origin, Nature, and Development* (ib., 1909).

INDULGENCE, DECLARATION OF. See DECLARATION OF INDULGENCE.

IN'DULIN. See COAL-TAR COLORS.

INDULT' (Lat. *indultum*, indulgence, from *indulgere*, to indulge). A term derived from the Roman Imperial codes, and used in canon law to designate an exceptional concession or privilege granted by the Pope to one or more persons. The best-known examples apply to the privilege allowed in certain cases to kings and other rulers of nominating to bishoprics and ecclesiastical benefices; thus Francis I of France received this power when the Pragmatic Sanction was abolished in 1516. Indults were frequently granted in the Middle Ages allowing perpetual non-residence at the same time that the income was drawn; but this practice was abolished by the Council of Trent, except that canons who have a record of forty years' irreproachable service are dispensed by indult from further residence in the seat of their chapter. An indult differs from a dispensation in that the indult gives a permanent privilege, the dispensation applies to only a particular case.

INDUNO, ĕn'dōō-nō, GIROLAMO (1827–91). An Italian genre painter, born in Milan. He studied at the Milan Academy under Sabatelli and first exhibited at the Paris Salon in 1855. His pictures are mainly of military or humorous subjects. Among them are "Garibaldi's Soldiers," "A Vivandière," "Dancing Lesson in the Last Century," "A Souvenir of Rome," "The Musicians," "Entry of King of Italy into Venice," "Visit of Garibaldi to Victor Emmanuel at Rome." Girolamo and his brother Domenico were leaders about 1860 in the Naturalistic movement of the Lombard school.

IN'DURITE. See EXPLOSIVES.

IN'DUS (Lat., from Gk. Ἰνδός, from Skt. *śindhu*, river). The great river that bounds India on the west, separating it from Afghanistan and Baluchistan (Map: India, A 3). It is over 1800 miles long, and the drainage area of its basin is estimated at 372,000 square miles. It rises in the vicinity of the Manasarawai Lakes, 50 miles southeast of Gartok, an important trading centre in Tibet, its source being 15,000 feet above sea level, on the north side of Kailas, a Himalayan peak, 22,000 feet high. Its

general course, till it forces its way between the Himalaya proper and the Hindu Kush, is towards the northwest. It flows past Leh, the capital of Ladak; receives the waters of its important Trans-Himalayan tributary, the Shyok, from the north; and after a descent of 11,000 feet in a course of 500 miles, dividing the Mustagh from the Karakoram Mountains, through some of the grandest mountain scenery of the world, about 60 miles below Iskardo bends sharply southward, above the confluence of the Gilgit. It flows past Bunji, on the Kashmir-Kohistan border, and 20 miles below takes a western course to Kotgata, where again it turns southward, and at Darband emerges from the Kohistan Mountains into the plains of the Punjab. It becomes navigable for the native flat-bottom steamers at Attock (ancient Taxila), the scene of Alexander the Great's passage, 870 miles from its source. Here it receives the Kabul River (q.v.), its chief affluent on the right. Continuing past Dera Ismail Khan, Dera Ghazi Khan, and other minor towns, near Mithankot, about midway in its farther course of 940 miles to the Arabian Sea, it receives the waters of the Chenab, the Ghara, the Jhelum, the Ravi, the Beas, and the Sutlej, through the Panjnad (literally, 'five rivers,' which gives its name to the Punjab). Each of these rivers, as well as the Kabul, is practicable for inland craft to the mountains.

Below the confluence of the Panjnad the volume of the Indus, past Sakkar and Hyderabad, becomes gradually less. Through the arid, rainless, alluvial plain of Sind it divides into numerous channels, many of which do not return to the main stream, while others return much shrunken in volume. This wasting of the waters is not very apparent to the eye, owing to the gradual slackening of the current and the ascent of the tides. Miani, 8 miles north of Hyderabad and 75 miles from the sea, is the head of the delta which extends for 130 miles along the coast of the Arabian Sea. The chief outlets of the Indus are the Kori, Mal, and Yatho mouths. Until very recently the Puran carried the main waters to the Rann of Cutch, 70 miles east of the present mouth. The annual rise of the river, owing to the melting of the mountain snows, extends from May to August and is often attended by considerable inundations and changes of the deltaic channels, chiefly owing to the enormous amount of sand and clayey silt brought down by the current. Modern engineering has done much to obviate the inconveniences caused. The value of the Indus as a navigable route of traffic, never considerable, has been lessened since the building of railways through its valley from Karachi to Attock, and navigation is now confined to native craft. In a hot climate, where precipitation is almost nil, the river is more important as a means of irrigation, and the various works, especially the storage dam at Kasmur, towards this end inaugurated by the British government have led to a remarkable agricultural development throughout Sind. The river is spanned by several modern bridges, of which the chief is the huge cantilever bridge of Sakkar, and the northernmost an iron suspension bridge above Bunji. Fish of excellent quality abound in its waters and form the staple article of commerce and food of the surrounding country. The gavial, or long-snouted alligator, is the amphibious reptile of the river. The Indus is the "King River" of Vedic poetry.

INDUSIUM, ĭn-dū′shĭ-ŭm *or* -zhĭ-ŭm (Lat., tunic). In ferns, a flaplike outgrowth which covers the sorus or group of spore cases (sporangia). Indusia are exceedingly varied in structure and furnish characters for classification. Occasionally the sporangia are developed along the leafy margin which inrolls to cover them, as in the maidenhair fern and the common bracken. In this case the inrolled leaf margin is spoken of as a "false indusium." See FERN.

INDUS'TRIAL ACCIDENTS. See ACCIDENTS, INDUSTRIAL.

INDUSTRIAL ARBITRATION. See LABOR AND CAPITAL, RELATIONS OF.

INDUSTRIAL COMMISSION. A nonpartisan commission, created by Act of Congress, June 18, 1898, to investigate industrial conditions and to suggest Federal and State legislation for the better regulation and adjustment of conflicting industrial interests. The commission consisted of 19 members, of whom 5 were Senators, appointed by the President of the Senate, 5 Representatives, appointed by the Speaker of the House, and 9 especially qualified persons, appointed by the President with the consent of the Senate. The specific duties of the commission were, first, to investigate questions of immigration, labor, agriculture, manufacturing, and business, and, second, to suggest, on the basis of the facts ascertained, proper congressional legislation and also uniform State legislation, equitable at once to employer and employee, producer and consumer. The life of the commission was limited to two years, but this time was subsequently extended to Dec. 15, 1901, and to Feb. 15, 1902, successively. The work of the commission, owing to the inevitable preoccupation of its congressional members in their own and in public affairs, was largely carried on by the presidential appointees and by specially engaged experts. Of the latter may be mentioned: on strikes and arbitration, E. Dana Durand; on labor legislation, Frederic J. Stimson; on trusts and industrial combinations, Jeremiah W. Jenks; on transportation, William Z. Ripley; on agriculture, John F. Crowell; on immigration, John R. Commons; on taxation, Max West; on labor organizations, Charles E. Edgerton. The fact that no equally competent body of men, empowered to call for witnesses and documentary papers, had ever before examined American industrial methods and organizations, together with the fact that the period of prosperity succeeding 1897 brought industrial phenomena into accentuated relief and activity, resulted in the commission's bringing together a great body of new correlated and substantiated evidence concerning practically every phase of industrial life. Testimony was taken from nearly 700 witnesses, including heads of trusts, railroads, and mercantile establishments, public officials and leaders of trade-unions, and in addition the commission collected much valuable but hitherto scattered information from official, national, and State documents, from judicial decisions, and from the researches of experts. The *Report of the Industrial Commission,* completed Feb. 19, 1902, and issued as a government publication, consists of 19 volumes, as follows: Trusts and Industrial Combinations (2 vols.); Trust and Corporation Laws; Prison Labor, Transportation (2 vols.); Labor Legislation; Distribution of Farm Products; Capital and Labor in Manufactures and General Business (2

vols.); Chicago Labor Disputes; Agriculture and Agricultural Labor; Agriculture and Taxation; Capital and Labor in the Mining Industries; Immigration and Education; Foreign Labor Legislation; Labor Organizations; Labor Disputes and Arbitration; Railway Labor; Industrial Combinations in Europe; Final Report —Miscellaneous. See INDUSTRIAL RELATIONS COMMISSION.

INDUSTRIAL CRISIS. See CRISIS, ECONOMIC.

INDUSTRIAL EDUCATION. That type of education which seeks to prepare for the industrial occupations, and hence may in the broad sense be used to refer to the whole range of education from manual training in the elementary schools to professional technical education of university and college grade. The term is, however, coming to be used in the more restricted sense to apply to that type of specialized vocational education which is given to boys and girls between the ages of 14 and 18 preparing to engage in industries. The subject is treated fully under TECHNICAL EDUCATION, with which it is more closely related as one of the lower branches of specialized technical preparation. See also MANUAL TRAINING.

INDUSTRIAL EXHIBITIONS. See EXHIBITIONS, INDUSTRIAL.

INDUSTRIAL FRUITS. Such of the produce of the soil as is the result of cultivation during the year. The expression is of rare occurrence in English and American law (though it has been adopted into the law of Scotland), but it is not unusual in its Latin form. *Fructus industriales*, such as grain, vegetables, and the like, are distinguished from *fructus naturales* (natural fruits), such as the fruit of trees, growing timber and grass, which "grow from ancient roots" and are not the result of labor expended during the year. In legal effect the two classes of produce are sharply distinguished, industrial fruits being in many respects dealt with as personal property, or chattels, even before severance from the soil, while natural fruits under the same circumstances retain strictly the character of real property. Thus, industrial fruits may be attached or levied upon as the personal property of the occupier of the land, whether owner or tenant for life or years, while unsevered natural fruits remain a part of the freehold and are the property of the owner thereof, subject, of course, to the right of the tenant to gather them when ripe for his own use or for sale. For a special application of the distinction, see EMBLEMENTS.

INDUSTRIALISM. A term first applied by Saint-Simon and his followers to the "modern régime," but also to the peculiar systems of social organization which they advocated. In his *Data of Ethics* Spencer uses the term as descriptive of "a theoretically possible form of society purely industrial in its activities." Pure "industrialism" according to Spencer would be reached when men were scrupulously honest in the fulfillment of agreements, while yielding "to one another no advantages beyond those agreed upon."

The meaning to be attached to the term has not yet been definitely established. By some it is employed to characterize the modern industrial system in which manufacturing industries predominate; others employ it as a description of modern civilization as opposed to the "militarism" of preceding times. (See IMPERIALISM.) The definition which has been most generally accepted agrees in the main with Spencer's conception. This is exemplified by the deprecations of the "industrialism" of modern life, found in literature and religious writings.

INDUSTRIAL MANAGEMENT. A term used to describe the highly organized systems of conducting industrial and, particularly, manufacturing operations that have been developed in recent years. The movement towards systematic management took its rise in the last two decades of the nineteenth century, having been created by the growing complexity and increasingly large scale of manufacturing operations under the influence of which the old traditional methods of management began to prove inadequate. As usually understood, the term includes the activities of organization, administration, finance, purchasing, storage, and transportation of materials, provision and upkeep of buildings and machinery, design and manufacture of product, management and direction of men, determination and control of costs, and marketing of product.

The trend towards the new methods received its first considerable impetus from the introduction of F. A. Halsey's "premium system" (see PREMIUM SYSTEM) of rewarding labor in 1891. This was widely discussed and adopted both in the United States and also in England, where a modification known as the Rowan premium was put into use. Next in order came the publication of Slater Lewis's classical work, *The Commercial Organization of Factories*, in 1896, which, while emphasizing the necessity for accurate cost determination, also brought prominently into notice the fact that a modern manufactory is an organization in which all the constituents need equally careful attention. The studies of A. Hamilton Church on the expense burden, made public in 1901, further developed the idea that manufacturing was not a simple affair of labor and its direction alone, but that a stage had been arrived at where activity had become factorial or functionalized, and that each factor or function had its own separate cost and therefore its own separate efficiency.

During most of this time Frederick W. Taylor had been engaged in his experiments on high-speed steels, which afterward developed into the discovery that no less than 12 variables were concerned in the apparently simple work of cutting metals by lathe tools. From this discovery to the adoption of the idea that every step in the actual operative use of tools and machinery deserved study *before* expending time and money on the work itself was a natural deduction. Beginning as a method of rate fixing in connection with a special type of piece rate devised by Dr. Taylor, the idea developed until what is now known as time study (q.v.) and its further extension, motion study (q.v.), were ultimately worked out. Although unquestionably developed anew by Taylor, it is worthy of mention that the idea of carefully analyzing the ultimate elements of machine work is one that was developed quite early in the last century and afterward seems to have been lost sight of, probably owing to the vast rate of increase of manufacturing industry, which made intense production of more importance than extremely economical production.

In 1903 Dr. Taylor presented a paper entitled "Shop Management" before the American Society of Mechanical Engineers, in which for the first time the various devices and improvements

in method which had been accumulating for many years were exhibited as part of one working whole. This was followed by the publication in 1910 of H. L. Gantt's *Work, Wages, and Profits,* in which papers made public at various times since 1904 were collected and completed. (See TASK; BONUS.) The work of Harrington Emerson on *Efficiency,* issued in 1909, and of Gilbreth on *Motion Study* also belong to the pioneer literature of the subject.

It is unnecessary to dwell further on the historical development of industrial management, especially as the apportionment of personal credit for this development would involve controversial questions. It will be more important to enumerate the leading features of modern systems of administration, with some attention to the way in which they differ from the older methods.

It is often supposed, though it is wholly erroneous, that there is some one system which is par excellence "scientific" management and is universally applicable to all sorts and conditions of manufacturing enterprise. On the contrary, the new elements which have been injected into the old traditionary methods are not so much revolutionary as evolutionary. Nearly all of them have existed in more or less complete and recognizable form in the past, but they have been extended, improved, and given greater precision. The general direction in which they have been developed is that of setting up a more complete and exhaustive knowledge (1) of the aim in view, (2) of the materials and forces by which this aim is to be attained, and (3) of the detailed means by which the forces are to be applied to the materials to produce the effect aimed at. It should be remembered that some of these forces are merely physical, but, on the other hand, many of them arise from the efforts and the coöperation of living beings and hence involve much more subtle elements than any problem that deals with inanimate matter has to cope with.

Before anything can be made, the necessary equipment and organization for its manufacture must already exist. With equipment, as such, management has nothing to do. It may be good or bad, but in discussing problems of administration it must always be assumed that the equipment is the best that can be obtained under the existing circumstances, otherwise no datum line for discussion can be drawn. With the organization, on the other hand, management has everything to do, for the organization is the instrument by which the behests of the management are set in motion and produce results. We may therefore begin by considering some of the more important features of modern factory organization, and for this purpose machine-shop or engineering manufacture may be selected as typical.

In regard to the aim in view modern management makes a much more detailed study than was formerly customary. In both cases the aim in view (e.g., a machine or device to be manufactured in quantity) has to be designed, and reduced to a drawing, before manufacture can be attempted. Then material has to be purchased, stored until wanted, delivered at some machine, and worked on. The resulting work has to be passed on as satisfactory, and it has then to be worked on again, or passed to an "assembler," who will fit it to the other parts of the machine or device in due course. It cannot be said that the old and new methods differ materially in sequence of these perfectly necessary steps, but under the newer practice the process marches from first to last with greater precision, and with the elimination of errors, delays, wastes, and irregularities that are plentiful where modern methods are not yet introduced.

The difference between the old and new methods begins at the very outset, viz., in the preparation of the design and even in regard to what is properly to be considered as part of a design. The newer practice gives a much greater extension to the idea of design than was formerly customary. The acts of design frequently include to-day, not merely specification of the physical shape and materials of each piece or component, but also detailed instructions as to how it is to be made, what operative machines are to be used in its manufacture, and what accessory tools are to be employed in dimensioning it. Nor is this all. Closely connected with the specification of the method of manufacture is the question of the amount of time that should be consumed at each successive stage by the machines and operatives to be employed in making it. Where this is doubtful, time study is undertaken for each successive element of the operations, so that the final specification in advance contains not only predetermination of size, shape, and material, but a close forecast of what steps must be taken to realize the design in practice.

It will be obvious that all the foregoing is a specification of intention. It is a plan of operations and nothing more. When it is completed, the work of the organic function of design reaches no farther. Moreover, this plan of operations is confined to the making of one piece and has no bearing on other pieces. Hence at this stage another organic function of manufacturing comes into play—the function of control, which is the great coördinative influence that gathers up the specifications of innumerable separate pieces and sets in motion the materials and forces by which all these separate specifications are to be carried out at the right time, in the right place, and on the right material. It will be readily understood that in the modern plant the function of control is not only very important but also complex.

The first step in control has reference to material. All plants keep a great deal of material in stock, and this may run to many thousands of different varieties. Elaborate accounting methods are necessary to insure that none of these items shall be permitted to fall below a minimum quantity, depending on the call for the particular item. But more than this is necessary. Material, when ordered, takes time to arrive. Consequently arrangements must be made to forecast as far as possible the demand on material, so that no waiting is involved. This is accomplished by means of the specifications above referred to. As soon as any one of these is issued, the material required for it is tabulated, and the quantity of each item assigned to the material ledger account corresponding. If this sets up a future demand greater than the visible supply in hand or on order, steps are taken to order more to arrive before the demand matures. By this means one of the most serious sources of delay and trouble, waiting for material, is reduced to a minimum.

The next important step in control has reference to instructions or orders. The design or

specification already referred to is merely a plan. It does not of itself set anything in motion. In fact it may die still-born. The setting in motion of the forces of production must obviously be made in a certain sequence, having regard to the date at which delivery of product is required and to the expected deliveries of material. This is accomplished by the issue of orders, which are definite instructions to perform certain kinds and quantities of work on certain kinds and quantities of material on or before certain definite dates. Considerable coördination is obviously involved. The instructions, the material, and a machine and operative qualified to do the work and free at the moment to do it must all meet together, so that the piece may be processed and passed on to the next stage in regular order of sequence and also on time.

The assignment of orders for this purpose is frequently called "planning." In some industries it involves a somewhat complex organization. The element of time being involved, provision must be made to ascertain the "loading" of machines and operatives, i.e., the extent to which their capacity for turning out work is already committed, and the earliest day or hour at which they will be free for new work thus ascertained. This scrutiny must be carried out for every piece or component that is to be manufactured, since, if any one were neglected, it may happen that the assembly of parts into the finished product will be held up far beyond the promised date of delivery by the absence of some essential but comparatively insignificant piece.

Careful organization of the function of control, then, serves to set things in motion in a regular sequence and according to a predetermined time schedule. It secures that the material shall be at hand when required, it directs its movements from process to process, it keeps account of the capacity of the various production centres of the plant as regards their capacity already pledged, just as it keeps account of its stock of various materials and how far they are already pledged, and by means of these activities it keeps the stream of production flowing at a steady rate with an absence of annoying delays and untimely discoveries of matters which have been overlooked or forgotten that can be secured in no other way.

Alongside the function of control and to a large extent interwoven with it lies the function of comparison. It is not enough to specify in advance, nor is it enough to issue instructions and orders. It is also necessary to ascertain what has actually taken place and to compare the result with what was intended to take place. The function of comparison has two sides—one dealing with physical matters, commonly known as inspection, and one dealing with numbers and values, usually known as accounting. By means of inspection the intentions of design as regards shape, size, dimensions, and material are compared with the resulting piece. This frequently involves delicate measurements and is always a matter requiring great judgment and practical ability. The modern tendency to make the components of a product interchangeable has greatly developed the necessity for accurate inspection at every stage of the work. By means of accounting a wholly different class of results is compared with the original intentions, not only of design but also of control. The time taken to do work, the cost of material and labor, the actual movements of material as compared with their expected output, are all matters of accounting depending for their value on comparison with something previously planned.

In modern manufacturing the trend is towards setting up predetermined and fixed standards of effort, based on previous experience, on time and motion study and other careful observations, with which comparison may be made. Any falling short of these standards is termed "inefficiency," and a particular machine or class of work is then spoken of as 66 per cent or 75 per cent efficient, as the case may be. Unfortunately, in the present state of the art of management, the determination of reliable standards is exceedingly difficult, with the result that a good deal of charlatanry has masqueraded under the terms "efficiency" and "scientific management" with very harmful results. Generally speaking, however, it may be truthfully said that industrial management is passing from the qualitative to the quantitative stage. It begins to think in terms of quantity and number in every department, and although a great deal of its attention, possibly far too much, has been confined to the question of the quantity of labor in a given job—labor being the most obvious, though not always nor necessarily the most important factor in production—there are signs that the quantitative view is being applied to the other functions of management in increasing degree.

Bibliography. F. A. Halsey, *Premium Plan of Paying for Labor* (New York, 1891); F. W. Taylor, *Piece Rate System* (ib., 1895); J. S. Lewis, *Commercial Organization of Factories* (London, 1896); C. U. Carpenter, *Profit Making in Shop and Factory Management* (New York, 1908); A. H. Church, *Production Factors in Cost-Accounting and Works Management* (ib., 1910); Hugo Diemer, *Factory Organization and Administration* (ib., 1911); J. C. Duncan, *Principles of Industrial Management* (ib., 1911); C. B. Going, *Principles of Industrial Engineering* (ib., 1911); C. E. Knoeppel, *Maximum Production in Machine Shop and Foundry* (ib., 1911); F. W. Taylor, *Shop Management* (ib., 1911); id., *Scientific Management* (ib., 1911); Harrington Emerson, *Efficiency as a Basis for Operation and Wages* (ib., 1911); Frederick Parkhurst, *Applied Methods of Scientific Management* (ib., 1912); C. D. Hine, *Modern Organization* (ib., 1912); H. L. Gantt, *Work, Wages, and Profits* (ib., 1913); A. H. Church, *Science and Practice of Management* (ib., 1914).

INDUSTRIAL RELATIONS COMMISSION. A national commission created by virtue of an Act of Congress, Aug. 23, 1912, to inquire into the general condition of labor in the principal industries of the United States, including agriculture, and especially into those which are carried on in corporate forms; into existing relations between employers and employees; into the effect of industrial conditions on public welfare and the rights and powers of the community to deal therewith; into conditions of sanitation and safety for employees and the provisions for protecting the life, limb, and health of the workers; into the growth of associations of employers and wage earners and the effect of such associations upon the relations between employers and employees; into the extent and results of methods of collective bargaining; into any methods which have been tried in any State or in foreign countries for maintaining mutually satisfactory relations between employ-

ees and employers; into methods for avoiding or adjusting labor disputes through peaceful and conciliatory mediation and negotiations; into the scope, methods, and resources of existing bureaus of labor and into possible ways of increasing their usefulness; into the questions of smuggling or other illegal entry of Asiatics into the United States or its insular possessions and of the methods by which such Asiatics gain admission, the commission being required to make recommendations to prevent such smuggling and illegal entry. "The commission shall seek to discover the underlying causes of dissatisfaction in the industrial situation and report its conclusions thereon."

The commission consists of nine members, including at least three employers of labor, three representatives of labor organizations, and three representatives of the public at large, and is given extensive powers in the matter of holding public hearings and compelling testimony. President Taft, on Dec. 17, 1912, appointed nine persons as commissioners under the Act, but the appointments so made failed to give general satisfaction and failed of confirmation by the Senate. In the few months that remained of his administration President Taft made no further effort to put the law into effect, but left the matter to his successor. The commission was finally (June 26, 1913) constituted by President Wilson as follows: representing the public, Frank P. Walsh of Missouri (chairman), John R. Commons of Wisconsin, and Mrs. J. Borden Harriman of New York; representing employers, Frederick A. Delano of Illinois, Harris Weinstock of California, and S. Thurston Ballard of Kentucky; representing employees, Austin B. Garretson of Iowa, John B. Lennon of Illinois, and James O'Connell of Washington, D. C. These nominations were confirmed on September 10.

The commission has proved to be a very active body, holding public hearings in all parts of the country and conducting investigations covering a wide range of industrial relations. A partial report of its proceedings was submitted to the President in December, 1914. By the terms of its creation the life of the commission, unless renewed, will expire on Aug. 26, 1915.

INDUSTRIAL REVOLUTION. In the latter part of the eighteenth century and the early part of the nineteenth the economic life of England underwent a great transformation, which has aptly been called the Industrial Revolution. As late as 1760 the "open-field" system (q.v.) was the prevailing characteristic of British agriculture. Even in 1794, when the process of inclosing the commons and open fields had been progressing rapidly for a quarter of a century, out of 8500 parishes in England 4500 were still farmed in common. Great stretches of country lay quite unimproved; extensive bogs and heaths were found in all parts of the island. In many counties the miserable crops merely afforded sustenance to the agricultural population. The means of transportation were so defective that in one county surplus produce went to waste, while in an adjoining county scarcity prices prevailed. Industry was carried on by the domestic system, under which the manufacturer or merchant put out his materials to be worked up in the laborers' homes at piece wages. Exchange was still carried on largely by means of weekly markets, annual fairs, and through itinerant traders. British foreign trade was, however, increasing rapidly, and with the increased demand for goods prices of manufactures rose, affording the means of supporting a larger industrial population. The increased need for food rendered systematic agriculture more profitable, and the development of capital diverted much wealth to husbandry. A number of wealthy gentlemen turned their attention to the improvement of stock and the proper treatment of the soil (see AGRICULTURE) and demonstrated that agriculture could furnish returns rivaling those of trade, with the result that methods of agriculture were revolutionized. The continental wars enhanced the prices of agricultural produce and gave a great impetus to the adoption of the new methods. Between 1760 and 1843 nearly 7,000,000 acres of land were inclosed and put to intensive tillage.

At the same time the domestic system in industry was giving way to the factory system, as a result of the great mechanical inventions. In 1770 Hargreaves patented the spinning jenny; the water frame was invented by Arkwright in 1771; Crompton's mule was introduced in 1779. In 1769 Watt obtained his first patent for an improvement in the steam engine, and in 1785 it was successfully applied to the cotton manufacture. The effect of these inventions was enormously to increase output, the cotton manufacture trebling from 1788 to 1802. The iron industry, which had hitherto been relatively insignificant and was dwindling to still greater insignificance with the destruction of the woods, was revived by the employment of pit coal in smelting, rendered possible by the application of the steam engine to furnish power for the blast. The adoption in the woolen industry of the improvements in cotton manufacture extended the new system greatly. As a result of all these changes, English commerce, foreign and domestic, developed rapidly; shipping increased, good roads were built, and an era of canal building set in. Industry shifted from the rural towns to the large cities of the north of England, where labor was concentrated in factories, with the effect of improving the organization of labor and of making practicable numberless subsidiary labor-saving devices. Immense fortunes were made by those who were able to make use of the improved methods; population grew rapidly with the increased chances of employment. From 1791 to 1821 the population of England increased 43 per cent.

The period was, however, marked by a great deal of hardship to the working classes. The open-field farmers, displaced by inclosures, flocked to the cities and helped to reduce wages at times to a starvation level. The introduction of machinery deprived the hand workers of their means of livelihood; the crowding together of population in the large cities resulted in untold evils, moral and physical; the new life in the factory was not yet subjected to the regulations afterward found to be imperatively necessary. The employment in factories of women and children, with all its attendant evils, became common in all the manufacturing towns. The general effect of the revolution, however, was to give England a century's start over her rivals in the competitive race. The foundations for the prosperity of England to-day were laid by the thorough change in industry.

The rapid transformation from a low order of industrial organization to a higher order, that characterized the English Industrial Revolution,

made its appearance at a later period in other modern states. In the United States this transformation did not begin until near the close of the first half of the nineteenth century; its full effects were not in evidence until the second decade after the Civil War. In Germany the changes corresponding with those of the British Industrial Revolution took place after the formation of the Empire. In Russia and Japan similar changes occurred towards the close of the nineteenth century. In the case of England the necessity of waiting upon the progress of invention prolonged the period of change. Other countries were able to introduce technical processes already tried out in England and hence became industrialized in a relatively brief time. In every country the process has been accompanied by a rapid congregation of population in cities, with resultant moral and political problems; exploitation of the labor of women and children, finally requiring legislative intervention; and the development of an organized labor movement. Consult: Held, *Zwei Bücher zur socialen Geschichte Englands* (Leipzig, 1881); Gibbins, *Industry in England* (New York, 1897); Warner, *Landmarks in English Industrial History* (London, 1899); Cheyney, *Introduction to the Industrial and Social History of England* (New York, 1901); Toynbee, *Industrial Revolution* (6th ed., London, 1902); Cunningham, *Industrial Revolution* (Cambridge, 1908). See FACTORIES AND THE FACTORY SYSTEM.

INDUSTRIAL SCHOOLS. This term, now passing out of general use, has been variously and loosely applied to a large class of schools, mainly of a philanthropic, reformatory, or experimental nature, in which industrial work has been taught to boys and girls at a comparatively early age. This kind of school has been represented perhaps more fully than elsewhere in England, where the Ragged School was a prominent type. The primary purpose of such schools is generally other than industrial, and the aim of the industrial instruction varies from the mere desire to keep boys off the streets to the serious effort to teach a trade. These institutions have not, however, filled the purpose of real trade schools, mainly on account of the early age of the pupils and the short period of instruction. Simple operations like broom and brush making, chair seating, or basketry, have been prominent in such schools; tailoring, shoemaking, and wood working less so. Industrial classes, which represent the same characteristics as the above, are often a feature of orphan asylums or homes for juvenile defectives. On the whole, this type of school has not demonstrated any important function in training for industrial work, and its place in the social order, as has been pointed out, is mainly pathological. In the early discussion on the introduction of manual training into the common schools the term "industrial education" was very often applied to this subject. See INDUSTRIAL EDUCATION; TECHNICAL EDUCATION; MANUAL TRAINING: GEORGE JUNIOR REPUBLIC.

INDUSTRIAL WORKERS OF THE WORLD. A revolutionary labor organization, popularly known as the I. W. W. The origin of the I. W. W. may be dated from a meeting in Chicago, 1904, of a group of radical labor leaders of whom the leading spirits were Thomas J. Haggerty, editor of the official organ, and Clarence Smith, general secretary treasurer, of the American Labor Union. A second meeting of some 30 labor leaders was held in January, 1905, which issued a call for an industrial union convention. At this convention, held in Chicago, June, 1905, were representatives from unions with aggregate membership of 40,000 men. The most important of these unions were the Western Federation of Miners and the American Labor Union. The convention adopted the name of the Industrial Workers of the World and a platform radically opposed in sentiment to those of the conservative trade-unions. Daniel de Leon and a number of his followers, representing the Socialist Labor party, were denied recognition at the convention, and formed a second organization at Detroit, known as the Detroit Industrial Workers of the World. The two organizations, although apparently in agreement on fundamental revolutionary principles, have been implacably hostile to each other. Hostility between both branches and the Socialists is even more intense.

The radical character of the principles of the I. W. W. is indicated by the preamble of their platform: "The working class and the employing class have nothing in common. . . . Between these two classes a struggle must go on until the workers of the world organize as a class, take possession of the earth and the machinery of production, and abolish the wage system." The antithesis to the principles of trade-unionism is indicated as follows: "Instead of the conservative motto, 'A fair day's wages for a fair day's work,' we must inscribe on our banner the revolutionary watchword, 'Abolition of the wage system.'"

According to the I. W. W. view, the employer has ceased to be an historical necessity and is merely a pernicious parasite. There can be no agreement with the employer morally binding upon the employee; arbitration and permanent settlements are impossible. It is the duty of the worker to injure the employer wherever possible. In accordance with this underlying philosophy the tactics of the I. W. W. is that of guerrilla warfare. Whenever it is possible to take the employer at a disadvantage, as, e.g., when the rush season is on, or contracts with penalties attached have been signed, the I. W. W. tactics demand a strike. When it appears that further injury to the employer is impracticable, the strike ceases, and the workers return, not with the intention of abiding loyally by the results of the conflict, but with that of injuring the employer still further while in his employ. Such methods of injuring the employer are known as sabotage. Sabotage may consist in throwing the progress of production out of order through tampering with machinery, improper use of materials, or even systematic loitering at work. Among the most improved methods of sabotage are obedience to the letter of the employer's instructions to the prejudice of the employer's intent; the use of materials better and more costly than the conditions of the market demand; exposure of the employer's trade secrets. I. W. W. speakers and writers have indicated, with some detail, how various industrial processes can be made to turn to the employer's loss without risk to the employee. Destruction of industrial plant, buildings, etc., is, however, not approved by the I. W. W., since it is the hope of the organization to take over from the present capitalist owners an efficient industrial equipment.

The I. W. W. has little faith in achieving "the

emancipation of the working class" through politics. "Direct action"—i.e., the strike, sabotage, etc.—is held to be the only efficient means of expropriating the private owners of industrial property. In late years, however, there has been a growing feeling among members of the organization that it would be desirable to employ political means at least to the extent of insuring the "neutrality" of the police in conflicts between labor and capital.

The organization of the I. W. W. follows industrial lines. Its chief strength consists in industrial unions among textile, lumber, and marine-transport workers; but it has a scattering support in local industrial unions over a wide range of industry. Although on account of the activity of its leaders and the revolutionary nature of their doctrines, it has received much popular attention, its membership is small. According to Vincent St. John, general secretary treasurer of the I. W. W., the average paid up membership in the period March to August, 1913, was 14,310. With due allowance for members on strike and therefore exempt from the payment of dues, it would appear that the organization never has a bona-fide membership above 40,000, or 50,000 at most. Nevertheless it has been successful in conducting several spectacular strikes, of which the Lawrence strike of textile workers and the Akron strike of workers in the rubber industry are the most noteworthy. The effectiveness of the organization was due to its method of sending trained organizers to the scene of a dispute that had already broken out between employers and employees. In such conditions the I. W. W. is very successful in securing the enrollment of great numbers of the disaffected workmen, who however drop out, for the most part, after the dispute has been settled.

In both ideals and methods the I. W. W. bears a close analogy to syndicalism (q.v.). In its origin and development, however, it has been practically independent of syndicalist influence. Consult S. F. Brissenden, *The Launching of the Industrial Workers of the World* (Berkeley, Cal., 1913), and J. G. Brooks, *American Syndicalism: The I. W. W.* (New York, 1913).

INDY, ăn'dē', Paul Marie Théodore Vincent d' (1851–). A French composer and pianist, born in Paris. It was his mother who gave him his first practical instruction, and at 14 years of age he was reckoned a master of the piano. From 1862 to 1865 he studied under Diémer, after which he studied theory under Lavignac and attended the lectures of Marmontel. In 1870 he enlisted in the army and at the conclusion of the Franco-Prussian War took up his studies under César Franck. In 1873 he became a member of the organ class at the Conservatory. Afterward he was engaged as second kettledrummer and choirmaster of the Société des Concerts du Châtelet. In 1885 he took over the management of the Société Nationale de Musique, and when César Franck became president of it, he acted as secretary, together with Chausson, and practically managed all its affairs. After Franck's death, in 1890, he became president. Besides his appointment of inspector of music in the city schools of Paris, he received the decoration of Chevalier of the Legion of Honor and was given charge of various important choral societies. Together with Ch. Bordes and A. Guilmant he founded in 1896 the Schola Cantorum, which soon ranked with the world's most famous music schools. (See Conservatory.) In 1906 he made a very successful tour of the United States, when he conducted his own works with the Boston Symphony Orchestra. His creative genius finds its happiest expression in instrumental music, although two of his three operas, *Fervaal* (1897) and *L'Etranger* (1903), both on his own text, have met with more than average success. Berlioz, Franck, and D'Indy may be classed as the three preëminent instrumental masters of modern France. With Berlioz D'Indy shares a predilection for the classical forms, filling them with individual and very modern content; and a weakness in thematic invention skillfully disguised by a masterly, frequently dazzling technique. His music seldom makes an immediate appeal; it rather repels through bold and startling harmonies, to which one becomes only gradually accustomed. His principal works are: two symphonies, in G and B flat; the symphonic poems *Jean Hunyade, La forêt enchantée, Wallenstein* (a symphonic trilogy after Schiller), *Souvenir;* two orchestral suites, *Tableaux de voyage* and *Jours d'été à la montagne;* symphonic variations, *Istar;* a dramatic legend, *Le chant de la cloche;* a scene for baritone, chorus, and orchestra, *La chevauchée du Cid;* considerable chamber music; choruses; works for piano and for organ. As a writer, he published biographies of César Franck (1906) and Beethoven (1910), and in collaboration with A. Sérieyx a *Cours de composition musicale* in three volumes (1902–12). Consult: A. della Corte, *Profili di musicisti contemporani* (Rome, 1913); L. Borgex, *Vincent d'Indy; sa vie et son œuvre* (Paris, 1913); A. Sérieyx, *Vincent d'Indy* (ib., 1914).

INEBRIETY. See Intoxication.

IN'EQUAL'ITY (Lat. *inæqualitas,* from *inæqualis,* unequal, from *in-,* not + *æqualis,* equal, from *æquus,* even). The relation between two magnitudes which are not equal. If a 1–1 correspondence can be set up between the individuals of two groups, a, b, they are said to be equal. But if this correspondence extends to all of the individuals of a and to only a part of those of b, then $b > a$, and vice versa.

INER'RANCY. See Infallibility.

INERTIA, ĭn-ēr'shĭ-ȧ (Lat., sluggishness, from *iners,* idle, from *in-,* not + *ars,* art). A general property of matter of which we become conscious through our muscle senses whenever by our muscles we change the motion of matter, e.g., throw or stop a ball, open a door, stop a revolving wheel, etc. It is noticed that the intensity of the sensation depends both on the material body itself and on the *rate* at which its motion is changed, i.e., the acceleration. It is believed that, if there were nothing external to the moving body affecting it, it would continue to maintain its motion unaltered forever. Galileo was the first to advance this idea; and it is now assumed as one of the principles of mechanics. It is sometimes referred to as the "principle of inertia." On the other hand, if there is some external action on the body, it takes time to produce a change in its motion, and the change produced in a given time will vary inversely as the quantity of matter, i.e., mass; or, to produce a given change in motion, the external action required varies directly as the quantity of matter, i.e., mass. It is to Newton that we owe our ideas of mass as a measurable fundamental property of matter. Up to his time weight was the only property of matter used as a measure of the "quantity

of matter," although Galileo clearly understood the fact that matter had this property and made use of it in his discussions.

The article MECHANICS shows how numerical values may be given to the masses of bodies, and also that the proper measure of an external agency in producing acceleration is the product of the mass by the acceleration. Looked at in a different way, it may be said that "a material body offers opposition to having its motion changed," the numerical value of the opposition being the above product *ma*. This may be properly called the "force of inertia." See CENTRE OF INERTIA.

IN'ESCUTCH'EON (*in* + *escutcheon*, from OF. *escusson, escuçon*, Fr. *écusson*, escutcheon, from OF. *escut, escu*, Fr. *écu*, shield, from Lat. *scutum*, shield). In heraldry (q.v.), a single small shield charged on a larger one. When one's wife is an heir or coheir, the inescutcheon is used to display her arms. See ESCUTCHEON.

INES DE CASTRO, ē'nās dā kä'strō. See CASTRO, INEZ DE.

INEX'PIABLE WAR, THE. A war of extermination waged by Carthage against her unpaid mercenaries in 241–238 B.C. (See CARTHAGE; HAMILCAR, 7.) The scenes of this war are pictured in Flaubert's *Salammbô*.

INFAL'LIBIL'ITY (from ML. *infallibilis*, infallible, from *in-*, not + *fallibilis*, fallible, from *fallere*, to deceive, Gk. *σφάλλειν, sphallein*, to overthrow, AS. *feallan*, OHG. *fallan*, Ger. *fallen*, Eng. *fall*). The immunity from error, in definite dogmatic teaching regarding faith and morals, which is claimed by the Roman Catholic church and, at least as regards the past, by the Greek church, as represented in the decrees of the councils which the latter looks upon as ecumenical. The latter claim, however, which does not go beyond that of inerrancy, or actual exemption from error up to the present time, differs widely from that of infallibility as put forward by the Roman church, which involves not alone an actual historical immunity from error, but also such a positive and abiding assistance by the Spirit of God as will at all times both protect against the possibility of error and guide and direct in the faithful teaching of all necessary truth. The infallibility claimed by the Roman church is thus of two kinds, passive and active—the first (Matt. xvi. 18), in virtue of which the Church never can receive or embrace any erroneous doctrine, no matter by whom proposed; the second, in virtue of which she is charged with the function (Matt. xxviii. 19; Mark xvi. 15; Eph. iv. 11–16) of permanently teaching to the world the essential truths of God, of actively resisting every access of error, and of authoritatively deciding every controversy by which the oneness of belief among the faithful may be endangered. Catholics regard this gift as a necessary accompaniment of authority in the matters of faith. Catholic doctrine held from early times that the body of bishops throughout the Church, acting in common with the Pope, constitute the most perfect organ of the infallibility of the Church; and hence, that when they unite in any way, whether as assembled in a general council or separated in place, their judgment is infallible. Thus, if a doctrinal decree were addressed officially by the Pope to the whole Church and either expressly confirmed or tacitly accepted by the bishops, this decree was held to be infallible. In like manner, if a doctrinal decree, emanating even from a local council, as that of a national or even a provincial church, should be universally accepted by the Pope and the bishops, that decree also was held to be infallible. In a word, wherever there is found the united judgment of the Pope and the bishops, all agree in accepting it as the infallible judgment of the Church. Whether the Pope could judge without the bishops, was the great subject in dispute between the Gallican and Ultramontane divines—the latter affirming, the former denying, the papal judgment to be infallible, but all agreeing that it was not binding as an article of Catholic faith so long as it had not received the assent of the body of the bishops. The formal definition of papal infallibility as *de fide* dates from the Vatican Council of 1870. The minority of bishops who opposed the decree did so, as a rule, not because they disbelieved the doctrine, but because they considered its imposition as a necessary article of faith inexpedient. Those who refused to accept the dogma broke away and formed the Old Catholic church (q.v.). As formally declared, the definition is that the doctrinal decrees of the Pope teaching *ex cathedra*—i.e., when in discharge of the office of pastor and doctor of all Christians, by virtue of his supreme apostolic authority, he defines a doctrine regarding faith and morals to be held by the universal Church —are to be accepted as possessing the same infallibility which attaches to the teaching of the Church. See COUNCIL.

On the matter of subjects to which the gift of infallibility extends, Catholics are agreed in one principle, that it embraces all those subjects, and those only, which are necessary for the maintenance of divine truth in the Church. Hence, presupposing divine revelation, either written or oral, it embraces all questions of faith and morality, all subjects of general discipline, so far at least as to preclude the introduction, by authority of the Church, of any discipline which should be injurious to faith or to morality. On the other hand, it does not embrace questions of science, or matters of fact, or abstract opinions unconnected with religion. Thus, the popular misconception that the decision in the case of Galileo bears on the question of this strictly defined infallibility is seen to be baseless. It may be well also to point out that the Pope is not supposed to have the power to invent and enforce new doctrines, but can only declare and define those which have been held either implicitly or explicitly in the Church from the beginning. Consult: Hefele, *Honorius und das sechste allgemeine Konzil* (Tübingen, 1870); Rive, *Unfehlbarkeit des Papstes* (Paderborn, 1870); Salmon, *Infallibility of the Church* (London, 1888), a Protestant statement; Purcell, *Life of Cardinal Manning* (2 vols., ib., 1896); Foster, *Fundamental Ideas of the Roman Catholic Church* (Philadelphia, 1899); Wilfrid Ward, *Life of Newman* (2 vols., New York, 1912).

IN'FAMOUS CRIME (OF. *infameux*, from ML. *infamosus*, from Lat. *infamis*, infamous, from *in-*, not + *fama*, fame). An offense which is deemed to reveal such an absence of moral principle as to indicate that the culprit would totally disregard the obligation of an oath. Such crimes are punished according to their character, and the disabilities of infamy are imposed as an incident thereof. One of these disabilities was the incompetency of the convict

to testify in a court of law, but this consequence has been removed by statute in England (6 and 7 Vict., c. 85) and everywhere in the United States. At the common law treason, felony, forgery, and offenses tending to pervert the administration of justice by falsehood and fraud, such as perjury, conspiracy, and cheating, were included in this classification. The Constitution of the United States provides that "no person shall be held to answer for a capital or otherwise infamous crime unless on presentment and indictment of a grand jury." The Federal courts have included all crimes punishable by imprisonment in a State prison or penitentiary in this category, and most of the State courts have adopted this classification. See INFAMY. Consult the authorities referred to under CRIMINAL LAW.

IN'FAMY (from Lat. *infamia*, from *infamis*, infamous). The condition of legal disability imposed upon a person convicted of an infamous crime (q.v.). The term originated in the Roman law, under which system many derelictions of duty, such as a simple breach of certain contracts, as well as certain crimes, were punished with the civil and political disabilities of infamy. In the early English law the doctrine of attainder (q.v.) attached to the more serious crimes, and infamy only involved incompetency as a witness and incapacity to serve on a jury. The disabilities attaching to infamy are largely regulated by statute to-day, and in England and most of the United States all disqualifications on this account have been abolished.

IN'FANT. At common law, any male or female person under the age of 21 years. As the common law takes no account of a fraction of a day except when a question of property is involved, a person is held to become of age on the day before the twenty-first anniversary of his birth. It has always been the policy of the law to safeguard infants from the consequences of their own indiscretion by modification of many of the rules of law applicable to adults. Thus, an infant's contracts are voidable (not wholly void, like those of married women). That is, they are binding upon an adult contracting with an infant, but they may be avoided by the infant upon the ground of his infancy; but if the infant expressly or by implication ratifies the contract after he is of age, it cannot be afterward avoided by him. Whenever an infant disaffirms his contract he is entitled, upon principles of quasi contract (q.v.), to recover from the other party the reasonable value of the consideration or performance which he (the infant) has given under the contract, even though he has, before coming of age, squandered the consideration which he received. If, however, the infant have any money or property which he received under the contract, he must return it to the other party in order to be entitled to disaffirm the contract. While an infant is not bound by his contract, he is bound to pay for necessaries (q.v.) purchased by him, his liability being based on the theory of quasi contract. An infant may also pledge his parent's credit for necessaries upon the theory of implied agency if the parent does not supply them. See AGENT.

In general, infants are liable for their torts. Where, however, the effect of holding the infant for his tort is indirectly to enforce his contract, the courts have denied his liability in tort. The practical application of this rule involves some very nice discriminations. Thus, an infant who hires a horse, and so negligently cares for him that the horse is injured, is not liable for tort or upon his contract; but if the infant appropriates the horse to his own use by going to some place other than that specified in the contract, he is deemed to have abandoned his contract and to be liable in tort.

An infant who is a property holder is subject to the laws of taxation, and his land is liable to be taken from him by eminent domain as if he were of age. At common law a legal marriage might be contracted between a boy of 14 and a girl of 12. See AGE; CONSENT.

An infant of sufficient age and understanding to have criminal intent is responsible for any crime that he may commit. It is a rule of the common law, however, that this responsibility can never arise before the infant is seven years of age. After that period until he is 14 the law indulges the presumption that he acted without guilty intent. His capacity to understand the nature and consequence of his act must be proved by the prosecution in order to establish his guilt. After he has attained the age of 14 his position under an accusation of crime is that of an adult, with no presumption due to his infancy.

The parents of an infant are entitled to his custody during infancy, and they are also entitled to his earnings until this right is voluntarily renounced by them, when the infant is said to be emancipated. As between the father and the mother, the father was at common law absolutely entitled to the guardianship of the child, and he is still generally regarded as having the prior right, though the modern tendency of the courts is to accord the custody in case of dispute to the parent best able and qualified to care for the child.

In many States male infants of 18 years or over may be executors and administrators.

Infants are not permitted to sue in their own name and right either at law or in equity. The action must be brought by the infant's near friend (*prochain ami*) or guardian *ad litem* appointed for the purpose, who is a relative, a friend, or other proper person permitted by the court to prosecute the action in the infant's behalf. Courts of equity early constituted themselves the especial protectors of infants, giving them relief in various ways, particularly by appointing guardians over their person and property. The care of an infant's property by guardian is now generally regulated by statute (see GUARDIAN), the effect of which is to place the infant's property in the possession of a guardian appointed by the court, who is required to invest and care for the property as a trustee for the infant. See CHILD, GROWTH AND DEVELOPMENT OF; CONTRACT; DOMESTIC RELATIONS; PARENT AND CHILD; and consult the authorities there referred to.

INFANT, CARE OF. See CHILD.

INFANT, DEVELOPMENT OF. See CHILD.

INFANT BAPTISM. See BAPTISM, INFANT.

INFANTE, ên-fän'tå (Sp., Portug., infant). The title given in Spain to the princes of the royal family, with the exception of the heir apparent, and to the consorts of the royal princesses. The corresponding title of Infanta is given to the princesses and to the consorts of the infantes. Since the fourteenth century the heir apparent to the throne in Spain has been styled Prince of Asturias. The title was for-

merly used in Portugal, also, the heir apparent bearing the title of Prince of Brazil.

INFANTE, José Miguel (1778–1844). A South American statesman, born in Santiago de Chile. He played a prominent part in the revolution of 1810, was President of the Government Junta in Chile after 1814, and went on a diplomatic mission to the Argentine State in 1817. His patriotism was unselfish; he was opposed to arbitrary authority, and refused office when he thought his country in no need of his services. In 1821 he founded, and he edited till his death, the newspaper *El Valdiviano Federal*, in which he defended the federal idea. In 1843 he declined the position of Chief Justice of the Supreme Court, offered him as a mark of the nation's gratitude. He contributed greatly towards the emancipation of slaves in Chile and took active part in the establishment of the common-school system.

INFANT FEEDING. See Infants, Feeding of.

INFAN'TICIDE. The killing of an infant or newly born child; often, in a broader sense, the killing of an infant, whether entirely born, or in the act of being born, or of the matured fœtus in the womb.

As an institution or customary practice, infanticide has existed in most savage or semi-civilized races and still survives in many; as an occasional or abnormal act, it has existed in all times and among all peoples.

Some authorities, as McLennan, have claimed that the custom has been practically universal among primitive races; but the researches of other investigators, as Spencer and Westermarck, have shown it to have been much less widespread than this. Infanticide as practiced among early peoples is to be traced ultimately to conditions of hardship attached to the bringing up of children. Thus, among the Abipones, where the women often practice infanticide, the boy was generally sacrificed; for when a son grew up it was necessary to buy a wife for him, while a grown-up daughter could always demand her price. But this hardship more usually attaches to the bringing up of female children, and it is therefore the females who are usually killed rather than the males. This is said to be especially true of those tribes who maintain a precarious existence among enemies, and who are forced by their manner of living to lead a migratory life. The practice of killing female children among these people often left the primitive hordes with very few marriageable women, so that they were forced to prey upon each other for their wives. This by some has been considered to account for the rise and growth of exogamy; while others have (with less reason) attributed infanticide to the custom of exogamy. In Africa, where the warm climate and the abundance of tropical fruits make the conditions of existence easy, there are no well-authenticated cases of the custom of destroying new-born children.

The natives of two-thirds of the South Sea islands practice infanticide probably more extensively than any other peoples known to history. The chief reason is probably the fact that the islands are of very limited extent and are as thickly populated as they could be and support life by the natural products of the soil. In parts of Australia it is said that the *mother* destroyed all but two boys and one girl, while in Samoa and other Pacific islands and in some parts of Australia the custom is unknown. Generally speaking, therefore, infanticide is most commonly practiced among races living where the struggle for subsistence is most severe, or where custom imposes the most serious burdens upon those rearing children. The best-known instances of infanticide are those which existed in various forms through India, but which are now mostly suppressed in the territory under the control of the British government by a system of compulsory reporting of births and deaths and of police supervision in districts suspected of the practice. It was practiced among certain of the tribes of lower caste as well as among the Rajputs, although forbidden both by the Koran and the Vedas. Among some tribes it was due to hardship attaching to the procuring of the means of subsistence, and among others its origin, or the persistence of it, was due to artificial hardships attendant upon child rearing, as among the Rajputs, with whom it was dishonorable for a girl to remain unmarried, and the necessary expenses of her marriage were a ruinous burden upon the parents. A similar condition obtains among certain of the American Indians of the Northwest.

When infanticide has become established as a custom among a savage race, its practice, like all practices connected with birth or marriage, frequently assumes a sacrificial or religious import, and it is by some considered to be the explanation of the origin of the practice of sacrificing children to the gods. So, also, the method of killing becomes in many cases a matter of custom, as by casting into the Ganges in some parts of India (whence the reverence paid to the alligator, which fed upon the children), or poisoning with opium or datura smeared upon the mother's breast, or by sacrifice to some god. Where the practice survives as a sacrifice, it is usually the boy child that is killed. Any change in social conditions or habits which makes child rearing less of a burden tends to decrease or do away with infanticide. It may however, still be permitted or survive as a means of disposing of the weak or defective, as was the case in ancient Greece, where the killing of weak children was enjoined in the ideal systems of Aristotle and Plato and by the actual laws of Lycurgus and Solon.

Infanticide, as it exists among peoples whose laws or customs forbid its practice, is due to special abnormal causes, as extreme destitution, insanity, abnormal antipathy to the child, fear of disgrace, etc. The usual cause among modern civilized nations is the desire on the part of an unmarried mother to escape the shame of illicit childbearing or to escape the burden of caring for an illegitimate child. (See Illegitimacy.) In some cases, as in France, laws have been passed which aid the mother in supporting her illegitimate child without exposure or undue burden; and these laws are said to have reduced the proportionate number of infanticides, but to have increased the number of cases of illegitimacy.

The laws of all modern civilized nations treat infanticide as a crime, but they vary too greatly to admit of being specifically stated here. Some of them treat it as a special crime of less gravity than murder, restricting infanticide to the killing of an infant which is newly born (within the time limited by the law); and others make no distinction between infanticide and murder, the question as to when the infant was born

being immaterial. The latter is the case at the common law of England and the United States, where the unlawful killing of a fully born child is murder, as distinguished from the killing of an unborn child, which is abortion. See ABORTION; BIRTH.

Consult, for the full discussion of the law as to infanticide and much of the general history, the works referred to under MEDICAL JURISPRUDENCE, such as Taylor, *Principles and Practice of Medical Jurisprudence* (3d ed., Philadelphia, 1883); Wharton and Stillé, *Medical Jurisprudence* (4th Amer. ed., ib., 1884); *Manual of Medical Jurisprudence* (12th Amer. ed., ib., 1897). For the other aspects of infanticide, consult: Sir John Lubbock, *Origin of Civilization, and the Primitive Condition of Man* (3d ed., London, 1874); id., *Prehistoric Time* (7th ed., ib., 1913); McLennan, *Studies in Ancient History* (ib., 1876); Lecky, *A History of European Morals* (3d ed., ib., 1877); Westermarck, *The History of Marriage* (New York, 1891); and, for the history of the subject in India, consult Browne, *Infanticide: Its Origin, Progress, and Suppression* (London, 1857).

IN'FANTILE SORE MOUTH. See THRUSH.

INFANTILE SPINAL PARALYSIS. Acute anterior poliomyelitis. An acute febrile disease of children and young adults, due to a special but unknown microörganism. Flexner and Noguchi discovered in 1913 a minute organism which they believe to be the cause of the disease. The malady is characterized by inflammation of the gray matter of the spinal cord and medulla and results in paralysis of certain muscles or groups of muscles. The disease was first recognized by Heine in 1840. Vogt and Duchenne described the malady in adults in 1858 and 1864 respectively, but the large majority of cases occur during the first five years of life. Animal experimentation has established the fact that the specific bacteria finds lodgment and multiplies in the mucous membrane of the nasopharynx, and it is probable that the disease is disseminated by means of the secretions of the nose and throat. Efforts have been made to show that the virus is carried by the stable fly, but the evidence is not conclusive. The virus is easily killed outside of the body, but may persist for a long time in the mucous membrane even of healthy individuals, who may be the innocent cause of spreading the infection. A child attacked with acute poliomyelitis is noticed to be out of sorts, restless, without appetite, and may have a temperature of 100° to 103° F. The attack may come on with vomiting or convulsions. In the course of a day or two the legs or arms, or both, become paralyzed and tender to the touch. Complete recovery may take place, but usually one leg or an important group of muscles remain paralyzed and wasted. This results in lameness and various deformities, which have to be corrected by orthopædic appliances or operation. Treatment during the stage of recovery must be hygienic, massage and electricity helping materially in the cure. See POLIOMYELITIS.

INFANT MORTALITY. The mortality of infants is of interest not alone to the family but to the social worker and the statistician. About one-fifth of the total deaths are of infants under one year of age, and nearly one-quarter of all deaths are of two years or under; hence they constitute an important factor in mortality records.

The percentage ratios vary, depending upon whether they are based on census returns or upon records of living births. In France in the decade ending 1905 the infant rate per 1000 born alive was 149, while the rate per 1000 enumerated in the census was 172. The same differences in ratio prevail in all countries. It might be stated here that Ireland had the lowest rates, viz., 102 and 123, and that Bavaria had the highest, 249 and 321, on the same basis during the same years. There is a sex difference, the deaths of males ranging from 16 to 30 per cent higher than females. The younger the infant, the higher the mortality; one-third of the first-year deaths occur during the first month and one-half of them within three months.

There are many factors in infant mortality—prenatal causes, illegitimacy, heredity, race, climate, manner of feeding, manner of living (urban or suburban), overcrowding, season of the year, also specific diseases (general or infectious). It is claimed that from 20 to 25 per cent of pregnancies fail to mature, and it is certainly true that the birth rate is steadily falling in nearly all countries.

BIRTH RATE PER 1000 POPULATION

COUNTRIES	Years	Rate	Years	Rate
England and Wales	1851–60	34.1	1901–05	28.1
France	1851–60	26.3	1901–05	21.3
Germany	1851–60	35.3	1901–05	34.8
Italy	1871–80	36.9	1901–05	32.4
United States	1851–60	33.6	1901–05	*24.0

* Average of Connecticut, Maine, and Massachusetts (Webb, 1911).

Illegitimacy is an important factor. While all children may be born with equal health, the illegitimate infant is frequently neglected or sent to an institution and fed artificially. Their death rate is double that of legitimate births; e.g., Norway's rate of 89 legitimate *versus* 177 illegitimate per 1000, Italy 163 *versus* 239, France 149 *versus* 255. It is interesting to note that illegitimacy is declining. In England the rate is now 3 per cent instead of 6.5 per cent, as in 1860.

Heredity. The offspring of tuberculous or alcoholic parents are lacking in vigor and are more susceptible to disease. The alcoholic tend to be mentally defective.

Race. In New York City and Chicago the rate for colored infants is the same as for white, but in many of the Southern cities having a large number of colored people, many of them very poor, the colored rate is double that of the white, e.g., Washington with a rate of 105 for white and 244 for colored infants per 1000. There is reason to believe that this difference is due more to economic conditions than to race characteristics.

Climate and Season. The difference between a cool and a warm country is illustrated by the infant rate of Stockholm in 1910, 92; while Rio de Janeiro for the same year had a rate of 166 per 1000. In temperate climates it is well understood that the hot months are the hardest for the infants. Heat diminishes the activity of the digestive glands and lessens the desire for food. It causes increased watery evaporation from the skin and in general lowers the vitality. In July and August we also have

an increase in humidity and an increase in the likelihood of food decomposition. In Manchester it was noted that the death curve of diarrhœa in infants corresponded closely to the prevalence of flies. This gives a hint in favor of cleanliness. Another study showed that the death rate rose as the wages fell, which means more crowding of persons in small rooms. The same study showed that poor ventilation led to overheating and consequent high death rate. The death rate for all ages rises with increased density of population, but the rise is four times greater for infants than for other ages. The rural rate for diseases of early infancy in the United States registration area is about half that of cities; e.g., in 1907 the city rate was 82.2 and the rural rate 49.4.

Manner of Feeding. A study of 844 breast-fed infants in Westminster (London) in 1907–08 showed 84.8 per cent of them healthy, and that only 2.3 per cent died within one year. Of 140 bottle-fed babies 47.1 per cent were healthy and 12.1 per cent died in one year. Institution babies generally have a higher death rate than those outside. For example, New York City maintained an infant's hospital for 33 years. There the average rate for children with mothers was 10.8 per cent; bottle-fed (foundlings), 53; farmed-out, 35.3; wet-nursed, 17.7.

Special Diseases. Diarrhœa and enteritis head the list. According to the United States mortality statistics from 80 to 85 per cent of these occur under two years and chiefly during the months of July and August. Next come bronchitis and pneumonia, 48 per cent of the latter occurring under two years in 1910. Death rates have been falling steadily in recent years in all civilized countries, and it is a pleasure to note that it is especially true of infants. In New York City, e.g., the rate of 1880 was 288 per 1000 living infants, while in 1914 it was only 94.6 per 1000. There are many factors leading to these results. Modern boards of health have departments of infant or child hygiene. Day nurseries (see NURSERY, *Day Nursery*) are common—New York having 94 in 1914, Chicago and Philadelphia more than 30 each, other cities in proportion. Since 1911 New York has also had 79 milk stations for dispensing pasteurized milk free or at small cost, and a special force of 190 physicians and nurses to visit the tenement children during hot weather. There are numerous private charities in most of the large towns in this and other countries, all for the babies' welfare.

The American Association for Study and Prevention of Infant Mortality was organized in 1909 and maintains an executive secretary in Baltimore, Md. Consult: G. B. Phelps, *Statistical Study of Infant Mortality* (Boston, 1908); G. B. Mangold, *Child Problems* (New York, 1910); American Association for Study and Prevention of Infant Mortality, *Reports of Annual Meetings* (Baltimore, 1910–11); Registrar-General of Great Britain, *Annual Report, 1911; Mortality Statistics, 1913*, United States Bureau of the Census. See VITAL STATISTICS.

IN'FANTRY (Fr. *infanterie*, from Sp. *infantería*, from *infante*, child, boy, servant, foot soldier, from Lat. *infans*, infant; foot soldiers being formerly the servants and followers of knights). Soldiery serving on foot, as distinguished from cavalry; that part of a military establishment using small arms and equipped for marching and fighting on foot, constituting the oldest of the arms into which armies are conventionally divided, as a company, regiment, or brigade of infantry. The infantry forms the great bulk of any army; it is they whose means of transportation are their own feet, who carry their own weapons, ammunition, shelter, and food, and who on the march and in combat bear the heaviest burdens and losses. Beginning with the higher units, the infantry is organized into *brigades*, of three regiments each. The brigade is commanded by a brigadier general. The *regiment*, commanded by a colonel, is made up of three battalions. Each *battalion*, under command of a major, consists of four companies. The *company* is the command of a captain, who is assisted by two lieutenants; it is the smallest administrative unit, but for purposes of training and combat is divided into *platoons* and *squads* under the lieutenants, sergeants, and corporals.

Infantry is adapted for combat with firearms as well as with the bayonet, for attack as for defense, for action in close as in extended order. It can fight on any terrain which is at all passable and is more independent of weather and seasons than the other arms; it surpasses the other arms in endurance—a man, on account of his will power, bearing privations and exertions better than a horse.

According to Herodotus, when Greek met Persian at Plata, in courage and in strength the Persians were not inferior, but they were without armor, and moreover they were unversed in war and unequal to their opponents in skill. The Greek armies consisted almost entirely of infantry. The leaders fought either on foot, like the rest, or from chariots. The men were gallant, high-spirited, and intelligent, and well fitted to become distinguished soldiers. The Medes and Persians were highlanders, the bow was their native weapon, and as children they were taught to ride, to shoot, and to speak the truth; but Cyrus taught them to hold the foot soldier in little esteem, and it has always been true from very early times that infantry never reached a high standard where foot service was despised.

The Greek infantry played such an important part in all of the early wars that it is worth while to notice it rather carefully. It was divided into three classes. First were the heavy troops, called *hoplites*, or *hoplitai*, armed with spear, dagger, corselet, and a large oval shield. These formed the phalanx or main line of battle and were composed entirely of free citizens. Secondly, the light troops, armed with javelins, but carrying little defensive armor and no shields. These were destined for skirmishing and covering the movements of the phalanx. Thirdly, there were irregular light troops, carrying no defensive armor, but provided with javelins, bows and arrows, and slings and other things with which to harass the enemy. The best men were placed in the front rank, and for marching and manœuvring each man was allowed 6 feet both in breadth and depth, but ranks and files closed up for the fight and even locked shields. A battle was regarded as a duel, and the tactics were very simple—a direct advance and engagement along the whole line. All faith was placed in shock tactics, but there was always a tendency to drift to the right, each man seeking protection for his unshielded side, and this habitually led to the outflanking of the left of each army by the other. Fighting

over rough ground or breaking through obstacles was avoided, if possible, as disorder always resulted.

The phalanx was the basis of all Greek tactics; the number of men in each phalanx, and the number of phalanxes into which the battle formation was divided, varied according to circumstances, but from 2000 to 4000 men was about the usual strength of a phalanx. The weight of impact, both in the triangular and rectangular formations, was the great advantage of the phalanx, but this had to be sacrificed to a certain extent in order to obtain a more flexible machine.

It was likewise a Theban custom to fight in deep formations; at Delium (424 B.C.) their phalanx was formed in 25 ranks. Epaminondas modified their phalanx, forming it on a narrower front with greater depth and the soldiers standing so close together that they could not turn around. This formation gave more weight at the point of impact. The Theban column which crushed the Lacedæmonian phalanx at Leuctra (371 B.C.) and Mantineia (362 B.C.) was 50 ranks deep as compared with a depth of 8 in the phalanx of their enemies. In these battles, too, Epaminondas introduced for the first time the distinction of an *offensive* and *defensive* wing, which completely surprised his enemy and gave the Thebans a primacy which lasted until his death.

It is interesting to note that Philip of Macedon spent some years in Thebes while Epaminondas lived, and afterward turned to good account the lessons of his victories and the improvements in the military art which half a century of war had developed in Greece. The famous Macedonian phalanx which he created had a normal depth of 16 ranks, and the units were the file of 16 men, the section of 4 files, and the battalion of 64 files. The Macedonian hoplite wore a leather jacket with metal plates, light greaves, and a round hat. He had a short sword and a small shield; his spear was about 21 feet long, of which 13 feet were to the front and 8 feet to the rear of the hoplite when the spear was leveled. Hence five rows of spear points would show beyond the front of the phalanx. The 11 hinder ranks held their spears upward over the shoulders of the men in front of them to intercept missiles.

Upon Philip's death he left a standing army to his son Alexander, whose military genius enabled him to establish the largest empire the world had yet known. The infantry in the army which accomplished this result was divided into heavy and light armed, and the actual force with which Alexander crossed the frontier was 30,000 infantry and only 4500 cavalry. The Macedonian grand phalanx, as evolved by Alexander, numbered 16,384 heavy-armed infantry, and at Arbela (331 B.C.) his army consisted of two such phalanxes. In the wars of Alexander's successors armies were very similar in numbers and quality, and mobility lost some of its importance. The increasing use of elephants marked a decline in the use of infantry, as they made any advance and engagement of the foot troops difficult. The Macedonian phalanx was the crowning point of Greek military organization, but it lacked mobility, and as a result it went down before its Roman foe, which to a greater extent possessed that most valuable military asset.

The wonderful supremacy which Rome so long maintained had its foundation in the Roman legion, which was raised in the following manner: a township consisted of 10 wards (*curiæ*), each comprising 10 families (*gentes*) or 100 households. Each household furnished one foot soldier (*miles*), and each family one horseman (*eques*). However, in the earliest days the three tribes of Rome furnished three times that strength or 3000 foot and 300 horse. The legions were later greatly increased. The first three classes of Roman citizens furnished the heavy infantry, but only the first class was bound to be fully equipped with arms and armor. This class furnished the front ranks of the legions, which were drawn up in battle six deep in continuous line.

Owing to the disaster which befell them at the Caudine Forks (321 B.C.), however, the Romans made a fundamental change in their formation. Continuous lines were given up, and the legion was subdivided into thirty *maniples*, which were placed checkerwise in three lines called *hastati*, *principes*, and *triarii*, so that the maniples of the second line were opposite intervals in the first. This afforded a flexible formation which adapted itself readily to broken ground and at the same time afforded strong reserves. The maniples of the first two lines were normally 120 strong, those of the third line 60. The triarii were the oldest soldiers and generally formed the third rank. The principes were the best men; they were heavily armed and formed the two front ranks. The hastati were lightly armed with a spear or pilum; they were the youngest men and later came to be used in the front rank. The legionary infantry was armed with shields, body armor, and a short heavy spear or pilum; but the primary weapon of the Roman soldier was a straight two-edged sword which was used for thrusting rather than for cutting.

At Cynoscephalæ (177 B.C.) and at the battle of Pydna (168 B.C.) the legion proved the value of its tactical flexibility over the solid mass formation of the phalanx.

The Roman armies owed their extraordinary ascendancy to three principal causes—discipline, promptness in adopting military improvements, and, above all, to the care in selection, training, and exercise of the individual soldier. But under a succession of weak and profligate emperors all discipline was lost; the legions degenerated into a worthless militia and fell an easy prey to the daring tribes of the North.

During the Middle Ages the races which occupied north Germany and Scandinavia attracted considerable attention on account of their splendid infantry. So it was, too, with the Franks, whose infantry were so well practiced in war that they were able to turn back the tide of Saracen invasion at Poitiers (732 A.D.). This sturdy infantry, however, soon disappeared, and it was nearly 1000 years before French infantry recovered its reputation. It declined with the growth of feudalism, and foot soldiers became mere attendants for the mounted men at arms.

The army with which William invaded England not only included bowmen, but some mail-clad infantry armed with spears and swords. It was by the coöperation of archers and cavalry that the battle of Hastings was won, and from that time archers formed an important part of English armies, and archery was encouraged as a national sport.

The Crusader armies were largely composed of foot troops. The victories of Cœur de Lion were due to skillful coöperation of heavy cavalry and crossbowmen. But for infantry to recover its old position it was necessary to combine excellence in the use of missiles with excellence in hand-to-hand fighting, and it was the association of the English archer with the dismounted man at arms that gave the feudal military system its first real shock.

At the battle of Crécy (1346) the English army consisted of 20,000 men all told, but there were 10,000 archers, and although the French army was three times as large as the English, it was almost annihilated by the English longbowmen. The long bow with which this result was accomplished was about 6 feet long, and two shots a minute could be delivered from it with great accuracy to a range of 220 yards.

The French were taught at Crécy that they must be prepared to fight on foot, and while this instruction was being given to France, the Swiss were administering to the knights at Morgarten (1315) and at Laupen (1339) even stronger lessons, showing what determined infantry could do against mounted or dismounted foes; and when the Swiss infantry in the three battles of Granson, Morat, and Nancy defeated the Burgundian chivalry, the feudal military system was dealt a deathblow, and the great prestige which had been attached to mailed horsemen was forever destroyed. The idea that the wearing of armor and the use of weapons were reserved by God and nature for persons of quality was dismissed, and infantry regained the universal esteem in which it had been held in ancient armies, and that esteem has never again been lost.

Early in the sixteenth century the use of firearms became general, but many years passed before the pike was entirely supplanted. At the battle of Ravenna (1512) artillery played its first decisive part on a battlefield. The increased use of firearms, and especially of artillery, was a hard blow to the Swiss infantry shock tactics, as it has become to all troops in battle. The Swiss infantry, through neglect of proper training, rapidly declined, and at Pavia, owing to their behavior and the effectiveness of the Spanish infantry fire, Francis I was defeated and became the prisoner of Charles V.

The Swiss pikemen have been aptly compared to the Macedonian phalanx, and the Spanish sword-and-bucklermen to the Roman legionaries, and it is interesting to observe that in each case the infantry armed with weapons better suited for hand-to-hand fighting triumphed. The Spaniards made more use of defensive armor than the Swiss did, which gave the former a great advantage in close fighting.

Gonsalvo de Córdoba, Ferdinand's "Great Captain," was the creator of the magnificent Spanish infantry, which was originally modeled on the Swiss; it soon eclipsed the latter and became in turn the model for other nations. More heavily armed than the Swiss, it trusted, like them, to massive formations and the irresistible weight of its attack. During the sixteenth century it maintained its reputation, and it was not until the close of the century that its renown began to fade. Its success was largely due to the fact that its recruits were natives of the rugged provinces of the North, hardy, temperate, patient, and quick to learn the use of firearms; men of the highest rank were proud to command a company of infantry and often preferred it to a cavalry command.

EARLY ORGANIZATION

The regiment was created as an administrative unit, and battalions (*battaglia*, battle array) became the recognized tactical unit for infantry. The earliest infantry organization was the company and originally represented a group of men who followed a knight to battle. Maurice of Nassau, whose introduction of the intrenching tool necessitated tactical changes, favored small battalions (400 men), formed in three lines, thus creating a mobile force and at the same time units which could best assist and relieve one another. The three divisions of the infantry thus formed (van, battle, and rear) are, and in various crude forms have been always, recognized as the correct principle for infantry combat. The steady improvements in firearms necessitated more frequent changes in tactics; the dependence upon shock action came to be recognized as a dangerous thing.

Infantry played the chief part in the Dutch war of independence, and its fire action was greatly developed. The lance was practically laid aside, and shock tactics were superseded by fire tactics.

Gustavus Adolphus adopted a new tactical formation for his infantry, which was a modification of the Dutch order. His battalions consisted of four companies of 54 pikemen and 72 musketeers; he adopted a formation of 6 ranks instead of 10. The battalions were grouped by threes into brigades, the middle one being pushed forward beyond the alignment of the other two. The brigades were drawn up in two lines; this combination of line and column was valuable both in attack and defense. Gustavus equipped his troops with the most modern and effective firearms. At Lützen (1632) the Swedish infantry was put to the test, and it proved its worth and set a new standard for armies.

During the seventeenth century the firelock gradually succeeded the matchlock as an infantry weapon. A "charge" of infantry came to mean a fire fight at close quarters until one side gave way rather than a collision; still less use was found for pikemen, as there was little scope for them in attack and defense of intrenched positions and they were of little value in broken country. The bayonet was devised in order that infantry might fight cavalry without the aid of pikes. During the sieges of the Thirty Years' War infantry made considerable use of hand grenades.

Towards the end of the seventeenth century there were four kinds of infantry—pikemen, musketeers, fusiliers, and grenadiers; but during the War of the Spanish Succession these were practically reduced to one kind, all armed with firelock and socket bayonet. This simplified formations and tactics; ranks were reduced to four and sometimes to three. With three ranks the front rank knelt and often reserved its fire.

By the middle of the eighteenth century Prussia had taken the place which Sweden held a century before as the pattern of excellence for infantry. Frederick the Great was a strict disciplinarian, and for that reason he discouraged open fighting and aimed at mechanical precision. However, this precision was of very

TYPICAL INFANTRYMEN OF EUROPEAN ARMIES

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SHOWING EQUIPMENT CARRIED ON THE MARCH AND IN COMBAT.

great importance in rapid loading and firing, and Frederick's masterpiece in defeating the Austrians at Leuthen was made possible by the strict Prussian drill. In 1771 Frederick issued instructions for the guidance of his officers, in which he shows an appreciation of the effect of infantry fire as a means of winning battles, and to him is due the credit of initiating the use of horse artillery as an aid to infantry.

Henry Bouquet (q.v.) was one of the first men to recognize that light infantry was needed for American warfare and that much could be learned from the Indians. Lord Howe developed these views, and in the expeditions against Louisburg and Quebec light infantry played a leading part. As a result of the early Indian wars and the War of American Independence, the practice of forming infantry in two lines instead of three was introduced.

The period around the French Revolution (1792–1815) gave further proof of the value of light infantry, and the skirmisher played the leading part in the struggles of that memorable period. After the Peace of 1815 there was a reaction towards the rigid close-order drill of the old school; but this was for a short time only, and about 1850 the methods of skirmishing, the full development and maintenance of infantry fire, and its use in combination with the action of artillery and cavalry had become the chief military problem.

The Crimean War and the War of Italian Liberation were fought with better infantry weapons and further showed the value of infantry-fire action. During the great American Civil War the infantry on both sides was at first practically worthless, but experience wrought them into splendid fighting troops. The battalions were deployed, and attacks were made in line, covered by skirmishers. The infantry opened out as it advanced to the attack, and gained ground by rushes. Bayonets were rarely properly used, and the actions were almost always decided by infantry fire. This war showed plainly that, with arms of precision, looser fighting formations, advances by rushes, dismounted action of cavalry, and increased use of infantry intrenching tools were military problems of very great importance.

The Franco-Prussian War (1870) found Germany with perhaps the finest infantry that had ever been seen, and, although the French had by far the better rifle, their infantry had not been well trained, and the battle of Wörth, in which MacMahon was driven from the field with the loss of nearly half his army, was one of the conspicuous results.

The Russo-Turkish War (1877) afforded another means of judging of the effect of rifled breechloaders. The Turks were inferior in organization and numbers, but their infantry possessed the better rifle, and in the engagements around Plevna Russia suffered severe losses as a result.

The War in South Africa (1899) was a brilliant example of what men skilled in the use of small arms can accomplish. This war settled many doubtful points about infantry training. One thing, however, was clear, and that was the fact that the British infantry soldier was no match for the Boer as a skirmisher; it was plain that the extension of infantry would have to be carried much further than had ever before been thought necessary, and that the discipline should become less mechanical and more intelligent. It is interesting to note that "infantry training" was promptly substituted for "infantry drill" in the British army.

The French infantry drill regulations of 1902 and 1904 were aimed at simplification and the development of initiative in infantry training. Captains were allowed more liberty in training their men, and fire control was recognized as being of vital importance. During the Russo-Japanese War (1904) the fighting was done mainly by infantry, and this war further emphasized the necessity for simple and direct methods for infantry in combat and the great importance of individual training.

From the foregoing it will be seen that those armies which had their proper proportion of well-trained infantry were victorious generally in all ages. An army is nothing more than a machine composed of many parts, and in order to insure victory each part must do its proper share of the work. The infantry is recognized as the "backbone" of every army, and its importance increases with every improvement in arms; upon its training and efficiency depends the fate of practically every battle. Cavalry, artillery, engineers, signal troops, and all of the various others are but auxiliaries which work with a view to assist the infantry to close with the enemy and deal the decisive blow. The old idea, so prevalent in America, that it is only necessary to arm a man and send him forth to battle and count him a soldier, was long ago abandoned by those nations which have given to the subject proper thought. The idea, too, that comparatively little training is necessary to convert a recruit into a true infantryman has been discarded by most of the leading nations. Were further proof needed of this, it was found in the Great European War of 1914, and the prolonged drill and training which the British volunteers received before being sent to the front may be cited. Indeed, this war seemed to have many lessons in not only the training, but the equipment and employment, of the modern foot soldier, and the tactical changes and studies, which will be found treated in the military discussion under WAR IN EUROPE, should be consulted in this connection.

Modern combat demands the highest order of training, discipline, leadership, and morale on the part of infantry; it must take the offensive to gain decisive results, and in the local combats which make up the general battle that infantry which is the better trained in the use of ground, fire efficiency, and discipline will win. Infantry must have the tenacity to hold every advantage gained, the individual and collective discipline and skill needed to master the enemy's fire, the determination to close with the enemy in attack and to meet him with the bayonet in defense. Modern war requires but one kind of infantry—excellent infantry.

The Rôle of Modern Infantry in Battle. It is the business of modern infantry to win battles, and *decisive results can only be obtained when infantry is permitted to take the offensive;* the *defense* may repulse the enemy, but only the attack can annihilate him. On the offensive, combats are generally waged in accordance with the following *plan:*

1. It is necessary to attack the enemy vigorously with troops enough to compel him to take up a *defensive* position, force him to bring up his reserves and to disclose the weak points of his line; at the same time to withhold the

remaining troops under cover—a part for a general reserve and the rest for a powerful effort at the decisive point, keeping the enemy in doubt as to where the decisive blow is to fall. This is called the *preparatory stage;* it may last for hours, and in a great battle it may extend *through several days.*

2. To make a powerful effort at the decisive point with the forces withheld for that purpose. This constitutes the *decisive action,* or main attack.

3. To employ the general reserve to complete the action and with all available troops make a vigorous pursuit, or to avert disaster in case of failure. This is called the *final stage.*

The principal work during an attack is done by the *infantry.* Assisted by artillery, the principal duty of which is to support the infantry in the most effective manner, the infantry works its way from point to point towards the assigned objective. The infantry which is withheld for the main attack should be fresh, and its appearance as it begins the final advance a surprise. It is moved so as to escape observation, by night if necessary, and established under cover as near as practicable to the point from which the attack is to be launched. From this point (*position of rendezvous*) an *attacking line,* strong enough to form the necessary *firing line* and its *supports,* is sent forward. The remaining infantry forms a *reserve* to be used according to the exigencies of the situation. Until fire is to be opened, the attacking line advances in any formation that minimizes losses and occasions no unnecessary delay. The commander of the attacking line determines when fire is to be opened, and in order to secure and maintain a *superiority of fire* over the enemy, the firing line is made as dense as possible (about one man per yard) consistent with effective work *by each rifle;* the losses are constantly replaced from the supports which follow the firing line as closely as possible, and which, when fire is opened, constitute from *one-fourth* to *one-half* of the attacking line.

The infantry rarely opens fire until well within effective range of the hostile position (1200 to 600 yards), but from that moment its fire, assisted by that of the artillery and other infantry, firing over the heads of the attackers, must be superior to the enemy's fire or success cannot be assured; in fact, the defenders must be practically blinded by a hailstorm of bullets and fragments. This requires a constant, accurate fire from the advancing line.

In order to maintain this fire, avoid heavy losses, and at the same time *continue the advance,* ground to the front is gained by rushes of parts of the line, varying from battalions to individuals according to the intensity of the enemy's fire; but superiority of fire must be maintained during these rushes, as it is absolutely essential to the success of the attack.

The *reserve,* in close formation, follows the attacking line as long as it can find cover, and at the proper time from it a second line is sent forward in time to join the attacking line in the final assault and to secure the captured position. If the attacking line is temporarily checked, it hastily intrenches, and the intensity of the artillery covering fire must be increased to keep down the fire of the enemy. *Ground to the front once gained should never be abandoned until all hope of final success is gone.* As the attack progresses, part of the artillery is moved up to successive positions to render more effectual aid in keeping the enemy down, so that the attacking infantry may close with the enemy and, if need be, dislodge him in a hand-to-hand bayonet fight.

When the attacking line arrives within "charging distance" (somewhere between 25 and 100 yards of the enemy's position), it opens a rapid fire, bayonets are fixed individually, with the least possible interruption of fire, and the united lines charge with fixed bayonets to consummate the attack.

When the attacking line nears the enemy's position, it becomes necessary for the artillery to increase its range so as to impede the movements of possible hostile reserves and to spread confusion in rear of the enemy's position. Under favorable conditions the artillery can continue its fire on the enemy's position until the advancing infantry is about 300 yards therefrom.

When the attacking forces succeed in carrying the enemy's position, they will be at a disadvantage for a moment; there will be much confusion, the troops will be exhausted, and many officers will be gone. If the defender, reenforced by fresh reserves, takes advantage of this moment, he may be able to turn the tide of battle. Here the general reserve must be brought forth to clinch the victory and to prosecute a vigorous pursuit of the enemy, while the attacking troops should be promptly reformed, their ammunition supply replenished, prisoners removed, and the captured position made secure against counter attacks, and thus the *final stage* of the battle completed.

When the enemy's works cannot be reduced by artillery, the fire of that arm has little effect until the infantry advances and compels the defenders to expose themselves; and when his works cannot be captured by open assault, the infantry advances by slow and tedious siege operations.

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INFANTRY, MOUNTED. A general term applied to soldiers trained to fight on foot, but provided with horses, mules, camels, carts, bicycles, or other means of transportation, in order to give them greater mobility than regular infantry; nothing more than regular infantry provided with a more rapid means of transport. Although modern infantry is very powerful, it is very slow in its movements. It has long been recognized that a very great advantage will accrue to that side in a battle which can rapidly move a strong body of men to a decisive point and put them into action as infantry. Hence the idea of mounting infantry.

The absolute necessity for the dismounted action of mounted troops, or of foot soldiers

possessing a high power of mobility, has been felt in all ages, and under Napoleon especially, the constant endeavors to produce a "dragoon" for this service were very persistent, though little success was accomplished.

The Americans in 1862–64 were conspicuously successful in the use of mounted infantry; the so-called cavalry during the Civil War being in reality nothing more than good mounted infantry. It would appear that the dismounted action desired is the peculiar duty of cavalry alone, who are now trained to act on foot, and such is largely the case in the American army; but all that can be demanded of cavalry is that it should be able, when occasion requires, to render such services; cavalry can ill afford to be drawn into sustained combats, or attempt, when dismounted, to cope for any length of time with the enemy's infantry. By no process can cavalry compete with infantry under conditions favorable to infantry fighting.

It is imperative that mounted infantry should preserve their identity as infantry, as their great efficiency lies in their ability to ride only well enough to get over such ground as is required, and to make the very best use of their firearms on foot when collision with the enemy becomes necessary.

Few countries have given the subject of mounted infantry thorough attention. Gen. Sir Henry Havelock-Allan, an able English military writer, in 1866 classed the use made of mounted troops in the American Civil War as one of the three leading military questions of the day, and England was the first European country to raise a modern mounted infantry regiment. The Prussians to a limited extent followed suit. The Russian "dragoon" has by many been looked upon as a model mounted infantryman. However, the Boer War (1899) fully demonstrated the great importance of mobile infantry. The Boer skirmisher possessed mobility to a marked degree, while, on the other hand, perhaps the best army that had ever left British shores was practically paralyzed owing to its lack of mobility. This British defect was gradually overcome, and in the second phase of the war, when Lord Roberts advanced from Bloemfontein on Pretoria, three-tenths of his command consisted of cavalry or mounted infantry; his success was largely due to the fact that his mounted men did most of their fighting on foot, seizing points of vantage and holding them until reënforcements came up.

The rôle of mounted infantry is generally *offensive*. When an enemy has occupied villages, buildings, defiles, or bridges, which cannot be turned, when nothing can be effected by the mounted action of cavalry, mounted infantry may be usefully employed. The infantry soldier, with his magazine rifle and careful training in musketry, is able to deal with an enemy's infantry in a manner which cavalry, armed with carbine and equipped for mounted service only, could not hope to attempt.

The most important uses of mounted infantry may be summarized as follows: (1) to accompany the cavalry in rapid movements, in order to seize positions, threaten or attack flanks or communications, and to act with cavalry in the pursuit of an enemy; (2) to reënforce rapidly and at a critical moment infantry which is overtasked, or which has succeeded in gaining some vantage ground in the general line of attack, and which requires assistance to make good its footing; (3) to overtake a retreating enemy and force him to turn and fight; (4) to enable a commander to disengage his infantry from action. Mounted infantry is also very valuable in relieving infantry of much wear and tear in marching to and from outpost positions and of many fatiguing duties incident to advance-guard work.

Bibliography. E. T. H. Hutton, *Mounted Infantry: Its Present and Future* (Aldershot, 1889); B. L. Anley, *Practical Hints for Mounted Infantrymen* (London, 1902); H. H. Pall, *Further Training and Employment of Mounted Infantry and Yeomanry* (ib., 1902); W. J. Otley, *With Mounted Infantry in Tibet* (ib., 1906).

IN'FANTS, FEEDING OF. The proper food for a young infant is its mother's milk. The infant should be put to the breast a few hours after birth, for though the milk does not appear until the third day, the colostrum is quite enough for the child's needs. The colostrum is rich in fats and is also laxative, both wisely provided by nature. The infant will get from four to six ounces daily for the two days before the normal milk appears. Nursing is physiologically necessary for the mother and the child. The child should have no water, sweetened or otherwise, as it will lead to colic and indigestion besides lessening the vigor of nursing. Should the milk not appear on the third day or be insufficient in quantity, give the mother gruels of corn meal or oatmeal or some preparation of malt with hypophosphites of lime and soda.

Should the mother die or there be conditions that make nursing impossible, substitute feeding must be resorted to. Wet-nursing is no longer popular in America, owing to the possibility of the nurse bringing disease into the household, to say nothing of domestic discord. Moreover, the child of the wet nurse is likely to die as the result of neglect or unwise feeding. Should such a nurse seem essential, she should be subjected to the tuberculin test for tuberculosis and the Wasserman test for syphilis. Mother's milk is the perfect food and is found to contain fat 4 to 5 per cent, proteid 1 to 2 per cent, sugar 6 to 7 per cent, and 1½ per cent of salts or ash. Cow's milk is similar to human milk; but its ingredients are in different proportions, the fats and sugar being one-third less and the proteid twice as high. Moreover, the proteid is a compound body composed of casein and lactalbumen; the former predominates in cow's milk and the latter in human milk. The former is difficult of digestion, the latter is soluble and readily absorbed.

Milk is therefore "modified" to overcome the unlike features. This is easily done by diluting the top portion of milk allowed to stand in a quart bottle until the cream has risen. During the first week a suitable formula would be top milk 3 tablespoonfuls, i.e., an ounce and a half, milk sugar half an ounce, and pure water 10 ounces; divide in 10 bottles and feed every two hours. At one month use 9 ounces of top milk, 2 tablespoonfuls of milk sugar, and of water 23 ounces; divide in eight bottles and feed every three hours. At six months take 15 ounces of the top milk, 7 tablespoonfuls of milk sugar, and 17 ounces of pure water; divide in six bottles and feed every three hours.

The one-month formula contains fat 4 per cent, sugar 7 per cent, and proteid 1.5 per cent. That gives more than 600 calories as the daily

food allowance. The six-month formula also represents more than 600 calories. An infant requires 40 or 45 calories of fuel per pound weight each day. An adult needs about one-third as much per pound, it being true that the smaller the animal the greater the proportionate loss by radiation. A restless or crying baby consumes more food than a quiet one, but grows less. A well infant was found to radiate 30 to 45 grams of perspiration per hour, while a restless and crying one radiated five times as much. After all, only 9 per cent of the energy taken into the body is retained for growth; 80 per cent is eliminated.

An infant should be weighed twice a week while small and once a week when older, in order to know whether it is growing and increasing in weight properly, i.e., at the rate of an ounce and a quarter a day. The average weight at birth is 7.5 pounds, at one month 9 or 10 pounds, at six months 15 pounds, at one year 18 or 20 pounds. The following table, compiled from authoritative sources, shows approximately the composition of the more common artificial foods in use compared with milk:

COMPOSITION OF INFANT FOODS WITH CALORIC VALUE

	Proteid	Fat	Sugar	St'ch	Salts	Calories per oz.
Woman's milk	2.0	4.0	7.0	...	0.2	22
Cow's milk	4.0	4.0	4.5	...	0.7	22
Horlick's malted milk	16.5	9.0	68.0	...	3.9	135
Mellin's food	11.5	0.2	80.0	...	3.6	120
Eskay's food	6.0	1.0	68.0	21.0	1.3	128
Imperial granum	14.0	1.0	2.0	73.5	0.4	120
Nestle's food	11.4	4.4	51.3	28.4	1.7	120
Barley water	0.09	0.05	...	1.63	0.03	2.19
Mead's dextri-maltose	...	...	*51.0	†47.0	2.0	120

* Maltose. † Dextrin.

A study of this table shows clearly why some foods are not enough for some infants and how to remedy the matter. The proprietary foods are nearly all deficient in fats. This may be overcome by making up the mixture with milk or cream, especially for young infants. Occasionally milk preparations undergo changes and persist in causing indigestion so that they must be given up entirely for a time. In such an event barley water is substituted for a few days (barley two tablespoonfuls to one quart of water). When there is need of energy, but digestion is weak, dextro-maltose may be given.

The milk must be not only clean to look at, but free from disease germs and bacteria that cause fermentation or decomposition. In cities it is best to use "certified milk" or pasteurized milk. Pasteurizing is heating to 165° F. for 20 minutes. This will destroy the germs of diphtheria, typhoid fever, and tuberculosis, also the streptococci, staphylococci, and the lactic acid group of bacilli. Milk containing 100,000 bacteria to the cubic millimeter is unfit for use, 10,000 being all that should be allowed. Special milk is produced with less than 1000 to the cubic millimeter. After pasteurizing, the milk should be kept at a temperature near 41° F. to prevent the development of spores that may have escaped destruction during the heating.

There are numerous processes of modifying milk and many methods of computing ratios and values. These are too technical for this article, but may be found in the following books: Holt and Howland, *Diseases of Children* (New York, 1911); Pfaundler and Schlossman, *Diseases of Children* edited by Shaw and LaFétra (Leipzig, 1912); C. G. Grulee, *Infant Feeding* (Philadelphia, 1914).

INFANT SCHOOL. An educational or, rather, charitable institution which sprang up during the latter part of the eighteenth and early part of the nineteenth century, at first on the Continent and later in Great Britain and in the United States. The object was to care for neglected children of early age, especially those of factory women, who were left with few physical comforts and no moral oversight. Such children were gathered together during the day, and, in order to render their care less irksome, they were taught to march, to perform simple gymnastic exercises, to sing simple songs, to repeat the multiplication tables, names of the days of the week, and similar things, and in later years at some places to read and sew. The educational purpose was purely secondary, at least until the influence of the Pestalozzian ideas prevailed in the second quarter of the nineteenth century. There is no historic connection with the origin of the kindergarten (q.v.).

The first infant school was founded in 1780 by Oberlin (q.v.), the pastor of Walbach in France. He appointed women in his own parish to assemble the children between the ages of two and six and to interest them, by conversation, in pictures, maps, sewing, etc. In Great Britain the first infant school was opened (1800) by Robert Owen in connection with his communistic establishment at Lanark, Scotland. In 1827 the Glasgow Normal Seminary was founded by David Stowe to carry out this idea of the infant school. In 1819 a similar school was established in London in charge of Wilderspin, under the patronage of such men as James Mill, Zachary Macaulay, and Lord Brougham. Other schools soon followed, and in 1836 this movement was unified in the formation of the Home and Colonial Infant School Society, which contributed more than any other instrumentality to the extension of the infant school by training teachers and instituting model schools. Up to this time the movement had succeeded by keeping distinct the processes of training and instruction and by not attempting any educational work of the latter character. The society was the outgrowth of the influence of the Mayos, brother and sister, one of whom had been a student of Pestalozzi at Yverdon. Thereafter the work of the infant school was to include instruction after the Pestalozzian methods. Under the educational grants of Parliament many infant schools were established, and especially since the Royal Commission of 1858–61 they may be considered as a component part of the British school system. Within recent years the infant schools have undergone considerable reform, and in place of the formal work in the three R's the infant schools are absorbing slowly the spirit of the better type of kindergarten. In continental Europe it is the kindergarten built upon Fröbelian lines that is very generally established. In France, however, the public *crèche*, which is for children of two and three years of age, is very general. The *école enfantine* for children of four and five years of age is a kindergarten. Such schools, as distinct parts of school systems, will be described under the title NATIONAL EDUCATION, SYSTEMS OF. In

the United States the first infant school was established in Boston, in 1826, under A. B. Alcott. While this school was a marked success, and there were numerous similar attempts in various other American cities, there was no great demand for such institutions in a population not primarily urban and engaged in manufacture. Similar needs were met by the Sunday school and, before there arose any great need for the charity infant school, by elementary public schools with free tuition.

Consult: Wilderspin, *Infant System* (London, 1840); id., *Education of the Young* (ib., 1840); Gill, *Systems of Education* (Boston, 1887); England, Board of Education, *Special Reports on Educational Subjects*, vols. viii, xxii (ib., 1902, 1910); Salmon and Hindshaw, *Infant Schools* (ib., 1904); I. L. Kandel, *Elementary Education in England* (Washington, 1914). See, also, KINDERGARTEN; NATIONAL EDUCATION, SYSTEMS OF.

INFEC'TION (Lat. *infectio*, a dyeing, from *inficere*, to dye, mix, from *in*, in + *facere*, to make). The condition produced by the entrance into and multiplication within the body of pathogenic microörganisms, whether bacteria or protozoa. Every infectious disease has its infectious element. This element may be propagated by contagion from particles carried by the air, as where the virus of the disease clings to scales of epidermis in scarlet fever or smallpox; it may be propagated by contagion from fæcal matter in which the virus is discharged, as in typhoid fever or cholera. Whether microorganisms can be transmitted after elimination in the breath is yet uncertain. Probably they can be detached from mucous surfaces by the currents of the breath, freed by expulsive coughing. The mode of elimination of the virus from the body decides whether the disease be contagious or not. The significance of the question of the reproduction of infectious microörganisms outside of the body is great. Drinking water may be contaminated with typhoid-fever germs; milk may be contaminated with pus germs. The virus of some diseases may be carried by the air, as in the case of pulverized sputa of tubercular patients. Many protozoan diseases, such as malaria and yellow fever, are carried by insects. Actual contact with the agents of infection, however, constitutes the chief means of infection. Predisposition plays a secondary part as a factor in such causation. Race influences susceptibility to disease. The size of the dosage of bacteria is important, a large injection producing disease where immunity to small doses exists.

Auto-infection occurs where in a parturient woman, e.g., septicæmia occurs as a result of infection of the uterus with pathogenic germs which have gained entrance into the vagina. See IMMUNITY; CONTAGION; INSECTS, PROPAGATION OF DISEASE BY.

INFEC'TIOUS DISEASE. A disease which is communicated by means of bacteria or protozoa which enter the body. A contagious disease is propagated by means of virus carried from person to person upon mucus from the mouth or respiratory tract, upon scales from the skin, etc. Contagious diseases include measles, smallpox, scarlet fever, tuberculosis, etc. On the other hand, typhoid fever and cholera are not contagious. They are transmitted through the use of drinking water or food containing the germs of each disease. All the diseases mentioned are infectious, including those of the contagious class. See INFECTION.

INFECUNDITY. See STERILITY.

INFEFT'MENT AND SA'SINE. A Scottish law term, corrupted from the "feoffment" and "seisin" of the feudal law of England and employed to denote the formal act whereby the title to land was formerly conveyed. It consisted in the symbolical transfer of possession by handing over a twig or clod of earth in token of the land conveyed. The instrument of sasine was the notarial instrument, or deed, embodying the fact of infeftment. But now the necessity of a separate formality is unnecessary, it being sufficient to register a conveyance in the register of sasines in Scotland. In England there is no similar register for deeds, and the title is complete when the conveyance is executed and delivered to the purchaser. In Scotland an *infeftment in security* is a conveyance in the nature of a mortgage to secure payment of an obligation, and an *infeftment of relief* is a similar security to protect a surety or bondsman against his contingent liability.

INFEOFFMENT, in-fĕf'ment. See FEOFFMENT.

IN'FERENCE (ML. *inferentia*, inference, from Lat. *inferre*, to infer, from *in*, in + *ferre*, to bear). In logic, the process of so coördinating and systematizing one's knowledge that new knowledge is thereby gained. Inference may be induction or deduction. See INDUCTION; DEDUCTION.

INFERIOR COURTS. In England courts of common law over which the superior courts (formerly known as the courts of King's Bench, Common Pleas, and Exchequer, now by statute consolidated in the Supreme Court of Judicature) exercise a supervisory jurisdiction by writs of mandamus, certiorari, prohibition, or similar writs. These include local courts, such as borough and county courts, courts baron, the City of London Court, the Mayor's Court of London, the University courts, and many others of like character throughout the kingdom.

In the United States the expression is used in the same sense and comprehends usually magistrates courts and courts of special sessions as well as county, city, and other courts of a local character and of a limited jurisdiction, civil or criminal. See COURT.

INFER'NO, THE. See DANTE ALIGHIERI.

INFILTRATION. See DEGENERATION.

IN'FINITE (Lat. *infinitus*, boundless, from *in-*, not + *finitus*, bounded, from *finire*, to bound, from *finis*, bound, from *findere*, to cleave; connected with Skt. *bhid*, to split, Goth. *beitan*, OHG. *bizzan*, Ger. *beissen*, AS. *bītan*, Eng. *bite*). In philosophy, a term used in various senses, while at the same time there has been much discussion as to the reality of any object denoted by the term. The extended objects of our ordinary perception do not occupy all the span of our field of vision. They have outlines which mark off their area from circumjacent space. And so with temporal magnitudes. Objects last for a longer or shorter period, before which they were not experienced and after which they are no longer experienced. Their duration is finite, because set off by limits—i.e., by their initial and final moments. Intensive magnitudes also are conceived by analogy as finite. Thus, I hear a sound which is followed by a louder one. In this case the less is not marked off from the greater by limits. It is not a part

of the greater, although it may be that the space traversed by the vibrations of the air which cause the lighter sound is part of the space traversed by the vibrations which cause the louder sound. Whatever may be the reason that makes us use in the case of these so-called intensive magnitudes the same terminology (e.g., greater and less), there is no doubt that we do so speak of a "finite" intensity whenever we conceive of a greater intensity as possible, although here the less is not included in the greater, and therefore it is not marked off or limited within the compass of the greater. It is important to keep this distinction in mind, for corresponding to this distinction we have two senses at least of the word "finite" and of course as many possible senses of the word "infinite." 1. The infinite is that which is not an extended or enduring part of some larger extension or duration. Now, if this be the meaning of infinite, we may say there are possible two kinds of infinites, (*a*) those which, though spatial or temporal, are not parts of larger spatial and temporal wholes, and (*b*) those which are not spatial or temporal at all. The most promising candidates for inclusion under (*a*) are "infinite space" and "infinite time" and "infinite number." Under (*b*) would fall all intensive qualities. For instance, the loudness of any auditory sensation would be infinite in this sense, although the duration of the sensation and the distance at which the sound is heard are both finite.

2. The infinite is that which, having intensity, exceeds everything else in intensity. An infinite sound in this sense would be a sound which had a loudness surpassing that of all other actual or possible sounds. Infinite heat would be a heat-temperature sensation surpassing in intensity all other actual or possible sensations of like sort; and so with the affections and the emotions. Now, with given conditions—i.e., a certain sentient and affective organism in a given state—there is something that corresponds to this definition. A sound of a certain definite degree of loudness is the loudest sound a particular sentient being can hear. A greater wave length of air could not be heard. But no one seems disposed to call such a sound one of infinite loudness. Again, we can "bear" pain up to a certain point, differing in individuals. Beyond that point we become insensible.

3. Still another sense of the infinite is the unconditioned. Everything that appears in experience is conditioned; it is what it is because other things are what they are; but in contrast to these conditioned realities some philosophers of almost all ages have believed in a reality lying behind experience and having a self-subsistent character not defined by any qualities that appear in experience. Herbert Spencer's (q.v.) unknowable is an infinite of this character. Such an infinite is sometimes called an abstract infinite—abstract because it is without any definite positive quality, and because it is considered to have its essential being in separation from the concrete world we know.

4. Still another meaning of the infinite is the unattainable limit of an unending process of construction. This is well illustrated in the view taken by some idealists that time and space are constructed in the act of thinking them. This construction is conceived, not as complete, but as having no limit to the possibility of its continuance. Infinite space is thus the unattainable result of the unending process of constructing space. It is the fact that you can never come to the end of possible space construction. One species of the mathematical infinite seems to fall under this head. Thus, in the improper fraction $\frac{1}{x}$, as the value of x decreases by one-half, the value of the fraction is doubled. If the decrease is continued without end, the fraction is conceived as approaching infinity. Here, again, infinity is the unattainable result of the unending process of halving the denominator. This infinite differs from the infinite of space and time considered under (*a*) in that space and time are often regarded as existing apart from any construction on our part, while the former is considered simply as the algebraic expression of the fact that our construction can continue without end. It is not considered as an actual reality, but as an unattainable ideal, while infinite space and infinite time are by some realists considered to be actual facts.

5. Infinite in another sense is any member of an all-inclusive system of reciprocally determining members. Thus, according to Hegel, all reality is infinite. Hegel justifies the use of the term by pointing out that in a true system any member in being determined by the other members is really self-determined, because its systematic relation to the other members is an integral constituent of its own nature. These other members exercise no foreign compulsion upon it to make it what it is. They determine it only because it is part of its own being to be so determined. They do not set limits to it which it may not pass, but they give it opportunity to be itself. To take one of the apparently most refractory instances, the billiard ball is not infinite in sense 1*a*, because, though spatial, its place is only a part of a larger space from which it is marked off by definite boundaries. But the ball is something more than so much space. It is an object that undergoes various changes under certain conditions—e.g., when struck it rolls. This dependence of its changes upon the action of other objects is often considered another evidence of its finitude. But Hegel would have pointed out that it is only because it is the nature of the ball to roll when struck that it rolls at all. In rolling it does not succumb to external force, but it acts its own part. Though determined, it is self-determined. Though compelled, it is free. This free, self-determined nature of every member of any free system is what Hegel calls infinite. He considers the term "infinite" appropriate because the systematic conditions which determine the ball's action do not limit it in the sense of repressing its spontaneous tendency to act out its own nature. They simply give it a chance to show one side of its nature in a certain definite movement. There is no reason why the term "infinite" should not be employed in this case. But there is every reason to remember that this sort of infinitude is thoroughly compatible with finitude in another sense, e.g., spatial. When Hegel says that the finite is essentially infinite, he means that what is conditioned (*bestimmt*) is conditioned because it is its very nature to act in response to these conditions; that condition is not restraint (*Schranke*) of an inherent tendency by an external limit (*Grenze*).

6. In recent mathematics (see SERIES) the term "infinite" is applied to any series of terms such that for every term in the series there is a corresponding term in some part of the series. Thus, the series of number integers is infinite in this sense because, e.g., corresponding to every integer there is an *even* number in the series of even numbers, which series is a part of the larger series of integers. This definition of infinite, developed by such mathematicians as Cantor (q.v.) and Couturat, is now adopted by many philosophers.

A reader in philosophy must keep himself always on the alert to detect the various meanings of the word "infinite," and then he will be able to understand many paradoxes that at first appear to be logical contradictions. Whether the infinite really exists depends on the kind of infinite you mean. The existence of infinite 1*a* is discussed elsewhere (see NUMBER; SPACE; TIME); infinites 1*b*, 2 in at least certain cases, and 5 are unquestionable. Infinite 3 is, if it does exist, unknowable, and there is no positive empirical reason to assert its existence. Infinite 4 does not exist at any particular time from the very nature of the case, because it is an unattainable ideal. The infinite process is real at least in the case of time in the sense that the flow of time never ceases; but at no moment has it completed its unending course, and in this sense infinite time does not now exist, nor ever has existed, nor ever will. But when the present tense is used not specifically but universally, it is then true that there is infinite time. Any further treatment of the question of infinity would be out of place here.

Consult: Hegel, *Wissenschaft der Logik* (Berlin, 1841); Bolzano, *Paradoxien des Unendlichen* (Leipzig, 1851); Couturat, *De l'infini mathématique* (Paris, 1896); J. Cohn, *Geschichte des Unendlichkeits-Problems im abendländischen Denken bis Kant* (Leipzig, 1896); Moritz Cantor, in *Mathematische Annalen*, vols. xlviii, xlix (ib., 1896); Josiah Royce, *The World and the Individual* (New York, 1900–01); F. H. Bradley, *Appearance and Reality* (2d ed., ib., 1902); Geissler, *Die Grundsätze und das Wesen des Unendlichen in der Mathematik und Philosophie* (Leipzig, 1902); Russell, *Principles of Mathematics* (Cambridge, 1903); Whitehead and Russell, *Principia Mathematica* (ib., 1910–13); Bernard Bosanquet, *Logic* (2d ed., 2 vols., Oxford, 1911).

INFINITE SERIES. See SERIES.

INFINITY AND THE INFINITESIMAL (Lat. *infinitas*, from *infinitus*, boundless). A number conceived to be greater than any assignable number, however great, is called an infinite number. The symbol ∞, meaning indefinitely great, cannot be used in operations as a finite number; e.g., $\infty - \infty$ is not necessarily zero, and $\frac{\infty}{\infty}$ is not necessarily 1. A number that varies and becomes and remains smaller in absolute value than any assignable number, however small, is called an infinitesimal number. The use of the symbol 0 is also limited; e.g., $\frac{0}{0}$ is not necessarily 1. (See FRACTION.)

In modern geometry the notion of infinite points and infinite lines has led to great generalization and supplied the condition for continuity (q.v.) of many relations; e.g., for the statement "Two coplanar lines are concurrent or parallel" may be substituted "Two coplanar lines are concurrent in a finite or an infinite point." In modern analysis the infinitesimal has played an important rôle. From the time of Kepler mathematicians have struggled with the infinitesimal, especially as employed in the differential calculus, and some, notably Lagrange, have tried to avoid its use entirely. But through the efforts of Legendre, Gauss, Carnot, and especially Cauchy, the meaning of the propositions concerning infinitesimals has been established, and a safe foundation for the differential calculus has been laid. See CALCULUS.

INFIRM'ARY. See HOSPITAL; DISPENSARY.

IN'FLAMMA'TION (Lat. *inflammatio*, from *inflammare*, to set on fire, from *in*, in + *flamma*, flame; connected with *flagrare*, Gk. φλέγειν, *phlegein*, to blaze, Skt. *bhraj*, to be bright). A morbid condition characterized by altered function of the elements of the tissue involved, changes in circulation, derangement of local nutrition, and generally an exudation infiltrating the tissues affected. It is a process of extreme complexity, presenting variations depending upon the exciting cause and upon the kind of tissue in which it occurs. It is therefore impossible to define it satisfactorily. The most obvious symptoms or phenomena of inflammation, when it attacks an external or visible part, are pain, redness, heat, and swelling, together with altered function. The general characters of the process will be best understood by an assumed case. If a healthy man has a splinter of wood or any other foreign body embedded in any fleshy part, he begins to experience pain at the part, and this is soon succeeded by redness of the skin, a firm and extremely tender swelling at and around the spot, and a sense of abnormal heat. These purely local symptoms are succeeded, if the inflammation reaches a certain degree of intensity, by a general derangement of the vascular and nervous systems, to which various names, such as constitutional disturbance, symptomatic or inflammatory fever, pyrexia, etc., have been applied. If the foreign body is extracted, the probability is that all these symptoms will gradually abate, until the part at length regains its natural appearance and sensations. If, however, the cause of irritation is not removed, or if the intensity of the morbid process exceed a certain point, the following phenomena occur: The swelling assumes a more projecting or pointed form, the part becomes softer, and the skin at its centre, which is usually the most projecting part, becomes whiter. There is a sensation of throbbing pain, and if the skin be not divided with a knife it finally breaks, and a yellow, creamlike fluid, known as pus (q.v.), escapes, after which the symptoms rapidly abate. This process is known as *suppuration*.

If the original injury was very severe and the inflammation intense, there may be actual death of the part affected. In that case the red color of the skin becomes purple or greenish black, the pain ceases, and the part becomes dead and putrid. This is *mortification*. Under favorable circumstances this dead part, which is called a *slough*, spontaneously separates from the adjacent living parts by a process known as ulceration, and the cavity which is thus formed gradually fills up and heals.

The *pain* may vary from mere discomfort to intense agony. There is usually most pain in those parts in which the tension produced by the swelling is the greatest, as under the periosteum,

or beneath serous or fibrous membranes, etc. The pain occurring in inflammation is always aggravated by pressure, and by this means the physician can often distinguish between inflammatory and noninflammatory disorders. The *heat* is seldom so much increased as the sensations of the patient would lead him to believe; it does not rise above the maximum heat of the blood in the interior of the body. This increase of heat depends upon the increased flow of arterial (or highly oxidized) blood to the part. The redness depends upon there being more blood than usual in the vessels of the affected part. The *swelling* depends in part upon the distention of the blood vessels and upon the presence of various fluids, such as blood serum and pus, in the tissue of the affected part.

For the study of the details of the inflammatory process and of the sequence of the changes which take place, it is most satisfactory to observe their progress in living tissues. If the mesentery of a frog whose muscular system has been paralyzed by curare be exposed to the air, this unaccustomed exposure starts inflammatory changes which can be observed under the microscope. There is first seen to be an increase in the rate of blood flow through the capillaries; then the capillaries become somewhat dilated, and the blood current becomes slower than normal. White blood cells accumulate along the capillary walls and at various points stop and attach themselves to the endothelial cells. If these white blood cells be watched carefully, some of them may be seen to pass through the cement substance between the endothelial cells and in this way pass out into the surrounding tissues. Some fluid is also seen to accumulate in the tissues, this fluid having evidently come from the fluid elements of the blood. Also red blood cells in greater or less numbers may pass out of the vessels and be found in the surrounding tissues. These elements which leave the vessels and accumulate in the tissues during the inflammatory process are called exudates. Their passage from the vessels into the tissues is known as exudation, and this form of inflammation is often designated exudative inflammation. The passage of the blood corpuscles out into the tissues is called emigration, or diapedesis. The serum of exudation contains the fibrin-forming elements of the blood and so may lead to the formation of more or less fibrin in the tissues. The white blood cells die and disintegrate (as they are especially prone to do in the presence of certain forms of bacteria) and form with the serum the thick, opaque, yellowish fluid that is known as pus, the dead white blood cells being the pus cells. According to the way in which the elements of the exudate are associated and their relative proportion, the inflammation is known as serous, serofibrinous, seropurulent, or purulent. When red cells are present in unusual numbers, the inflammation is designated hemorrhagic inflammation. Such an inflammation as that described in the frog's mesentery may subside on the removal of the exciting cause. The serum is reabsorbed into the blood vessels or lymphatics, the living blood cells find their way back into the circulation, while those that are dead disintegrate and are absorbed. This process is known as resolution. The character of an inflammation is largely modified by the nature of the tissue in which it occurs. Thus, when an inflammation occurs in dense fibrous tissue there is little chance for much distention, and the amount of exudate is limited by pressure. In tissues of looser texture the amount of exudate is apt to be larger. Mucous surfaces such as those lining the gastrointestinal canal, the respiratory tract, and the genito-urinary tract, react to the inflammatory process by at first a decrease in the amount of mucus, following which there is a marked increase of mucous secretion. This being in many cases the dominant feature, the inflammation is designated mucous or catarrhal inflammation. On serous surfaces such as the pleura, peritoneum, and pericardium, the serofibrinous exudate often leads to an agglutination of the opposing surfaces and the formation of adhesions. These adhesions bind the surfaces together and materially interfere with the natural free motion of the parts. Such a condition obtains in the so-called fibrinous form of pleurisy. It is very common after inflammations of the pelvic organs in the female and after appendicitis. These adhesions may become organized by the development of blood vessels in them and so become converted into actual living tissue. In abdominal operations extensive adhesions resulting from present or previous inflammatory processes and binding together the different viscera often offer the most difficult problem with which the surgeon is confronted. In inflammation of the iris the pupil may be rendered irregular or immovable or may be even closed up by the formation of adhesions. In endocarditis, or inflammation of the membrane lining the heart, fibrin may be deposited in wartlike masses upon the valves, thus interfering with their functions and causing some of the worst forms of cardiac disease. See HEART, DISEASES OF.

During the progress of an inflammation, when minute particles of foreign substances are present in the tissues, or where there is decomposition of tissue elements, certain cells, derived probably mainly from the white blood cells, make their appearance. These cells are known as phagocytes and have the power of taking up these particles of foreign matter or of disintegrated tissues and either digesting them or carrying them off for deposit at other points.

The healing of wounds is, in a pathological sense, an inflammatory process. If after a clean-cut wound through tissues which have little vascularity the sides of the wound be closely approximated, there is a little oozing of serum which sticks the cut surfaces together, some of the more injured cells die and disintegrate, while of those which remain intact some proliferate and cross the line of the wound, new connective-tissue fibres are formed, and the whole becomes firmly united. Such healing is known as healing by first intention. If the injury to the tissues is greater, or if the wound is left open, healing takes place in a manner essentially the same as just described, but somewhat more elaborate. Serum is poured out upon the surface of the wound, and intermingled with the serum are red and white blood cells. If bacteria are present, pus is formed. After a varying length of time minute red points begin to stud the surface. These are known as granulations. Each granulation consists of loops of minute capillaries surrounded by newly formed connective-tissue cells. This tissue is called granulation tissue, and its new thin-walled vessels allow it to bleed easily. Over this granulation tissue—if the wound be not too large—the skin slowly extends by growth from

the edges of the wound, until complete repair takes place. Such healing is known as healing by granulation or healing by second intention. In some cases the growth of new blood vessels is in excess of the production of the connective tissue, and the tufts of new and easily bleeding vessels project above the surface of the wound. These are known as exuberant granulations, or proud flesh. Young granulation tissue is composed almost entirely of small round or oval connective-tissue cells and blood vessels, the intercellular substance being very small in amount. As the tissue becomes older, the connective-tissue fibres appear, the cells become fewer and more like adult connective-tissue cells. Finally, the cells may almost entirely disappear, leaving dense white fibrous tissue, to which the term "cicatrix," "cicatricial tissue," or "scar tissue" is applied.

Under certain conditions, whether due to increased nutrition of the parts or to some little-understood factor we do not know, there occurs an active increase in the connective-tissue elements of some of the organs of the body. This is known as productive inflammation. This production or new connective or interstitial tissue may be slight in amount. It may, on the contrary, be quite extensive. Its proliferation is always at the expense of the parenchyma or functionating elements of the organ and often results in considerable destruction of the latter. Not easily differentiated from this productive inflammation is the process known as replacement connective-tissue hyperplasia, in which the formation of new tissue is secondary to degeneration of the parenchyma and for the purpose of its replacement.

The significance of the inflammatory process and the relation which it bears to the normal physiological activities of the body are matters of extreme importance. If we exclude bacterial infection with the formation of pus and the production of large amounts of fibrin, which occurs in some cases—in other words, if we take such an example of inflammation as we studied in the exposed frog's mesentery—we note that all the phenomena observed are but exaggerations of normal physiological processes. Thus, in normal physiological activity the relations existing between the blood inside the capillaries and the tissues outside are extremely intimate, and serum and white blood cells, with probably some red blood cells, have more or less free access to the tissues. The action of phagocytes also occurs as a normal physiological process. We have referred to the pathological identity of wound repair and the inflammatory process. Such facts favor the consideration of inflammation, not as a destructive but as a conservative process, a reaction which healthy tissue presents against external irritation. Even in the case of bacterial infection with the formation of pus, the inflammatory reaction is essentially conservative, the white blood cells acting as distinctly germicidal agents, destroying bacteria themselves by their phagocytic powers, and when dead disintegrating and diffusing their germicidal substances throughout the serum or pus. We must thus look upon the inflammatory reaction of tissues in the presence of bacterial invasion as of the nature of a rising of the body forces for purposes of defense against the invasion.

Treatment. In acute inflammations all sources of irritation and all causes of the condition must be sought and removed; local action must be lessened, complications must be avoided or treated if present; pain must be relieved; and the patient's strength must be supported. Rest must be obtained. The patient in an exhausting case must be put to bed; inflamed parts must be supported with bandages, splints, slings, or cushions, securing proper position and slant. In many cases the application of cold is desirable, and this is secured by using an ice bag or ice coil, evaporating lotions, or irrigation with cold water. Heat may be desirable, to favor suppuration and encourage "pointing" of an abscess or a furuncle. But in the case of bacterial infection heat often does harm by lowering the resistance of tissue and inviting further spread of the microörganisms. Poultices especially offer rich ground for the propagation of bacteria. Local bloodletting may be desirable, by means of the artificial leech, cupping, incisions or scarifications, or punctures. Pressure, by means of gauze or rubber bandages, is occasionally indicated. Incisions may be necessary to relieve tension, as in erysipelas, where deep cuts in the axis of the limb relieve pain. Astringent and stimulating drugs may be used, such as belladonna, silver nitrate, tannic acid, hydrastis, zinc salts, etc. Counter-irritation is effectual in certain cases, in which the cautery, caustics, vesicants, or rubefacients are used. See BIER'S HYPERÆMIA.

Among the constitutional agents used in combating inflammation are bloodletting in certain cerebral or thoracic conditions; diet; drugs, including aconite, colchicum, belladonna, diuretics, iodide of potassium, opium, quinine, mercury, and purgatives. Stimulants, together with increased nourishment, may be demanded in exhaustion or in chronic cases. The measures appropriate to each disease in which inflammatory conditions arise are mentioned under the appropriate title. Consult A. H. Smith, "Intermediate Inflammatory Process," in *Transactions of the Association of American Physicians* (New York, 1900), and Delafield and Prudden, *Textbook of Pathology* (9th ed., ib., 1911).

INFLAMMATION OF THE BOWELS. An old and inexact term, which was probably used indiscriminately as a name for enteritis, gastro-enteritis, colitis, appendicitis, and peritonitis, before some of these ailments were differentiated.

INFLAMMATION OF THE BRAIN. An old and unscientific term, which has been applied to both cerebritis and meningitis, and which should be abandoned. Cerebritis, or inflammatory change of the brain substance, may occur in vascular portions of the brain after injury. See MENINGITIS.

INFLAMMATION OF THE KIDNEYS. An unscientific term applied indiscriminately to those diseases of the kidneys one of the symptoms of which is inflammation. See BRIGHT'S DISEASE.

INFLAMMATION OF THE LARYNX. See LARYNGITIS.

INFLAMMATION OF THE LUNGS. See PNEUMONIA.

INFLAMMATION OF THE MIDDLE EAR. See OTITIS MEDIA.

INFLAMMATION OF THE UDDER. See MAMMITIS.

INFLAMMATION OF THE VEINS. See PHLEBITIS.

INFLEC'TION (Lat. *inflexio*, a bending,

from *inflectere*, to bend, from *in*, in + *flectere*, to bend). The changes undergone by words to denote their varying relations to other words. This forms one of the main divisions of philology and is itself subdivided into conjugation and declension. It is a distinguishing mark of the Indo-Germanic and the Semitic languages, as compared with other language groups, such as the so-called agglutinative (q.v.) and the like. Broadly speaking, the line between inflection and agglutination is drawn by the individual intelligibility of the components of a word. While in many noninflecting languages each of the several formative parts has an independent meaning and existence, as Turk. *sevmek*, to love, *sevdirmek*, to cause to love, *sevdirilmek*, to cause to be loved, *sevdirilmemek*, to cause not to be loved, and so on, the components of an inflecting word no longer have any independent meaning, so that Lat. *agit* means "he drives," but neither *agi-* nor *-t* has any signification when used separately. This distinction, however, is a somewhat artificial and evanescent one and should be accepted only as a basis for rough classification. To all intents and purposes many of the so-called agglutinative, incorporating (or polysynthetic), or even analytic languages are as truly inflectional as those whose right to the term is undisputed. The phrase "inflectional" may nevertheless be used to denote the Semitic and Indo-Germanic groups if its somewhat conventional and inexact applicability be clearly understood. The inflections of the Semitic languages are relatively simple and will be treated in detail under the title SEMITIC LANGUAGES. In the Indo-Germanic family, on the other hand, they are quite complex, although far surpassed by many of the agglutinative and incorporating tongues. In general, the Vedic Sanskrit (see SANSKRIT LANGUAGE) seems to come nearest to the hypothetical pre-Indo-Germanic language type. It has two main declension systems, pronominal (see PRONOUN) and nominal (see NOUN). These were probably independent originally, although by the operation of analogy the two systems of declension frequently became confused, some cases of the noun being inflected pronominally (e.g., Skt. *tē*, Gk. *oi*, these, λύκοι, but Skt. *vṛkās*, wolves), and vice versa (as Oscan *Núvlanús*, citizens of Nola, *púis*, who? but Lat. *qui*, Skt. *kē*). The inflection of the pre-Indo-Germanic noun and pronoun was evidently far richer even than the Vedic Sanskrit, for a comparison of the Indo-Germanic languages shows a number of terminations for single cases —as, e.g., the instrumental singular Av. *vehrka*, Skt. *vṛkē-ṇa*, Armen. *gailov*, OChurch Slav. *vlŭkomi*, with a wolf. It is entirely possible, even though merely a hypothesis, that the four modes of formation of this case just cited, which would be in pre-Indo-Germanic **u̯l̥qō*, **u̯l̥qē*, **u̯l̥qobhi*, **u̯l̥qomi* (also **u̯l̥qebhi*, **u̯l̥qemi*), indicate an original differentiation of meaning; or, in other words, they were different cases. These cases, if this is true, later syncretized, a process for which the historic Indo-Germanic dialects furnish abundant analogies, as the Latin ablative, which unites the functions of the pre-Indo-Germanic locative, instrumental, and ablative, or the Greek dative, which comprises the primitive dative, locative, and instrumental. The inflectional terminations are, in general, ultimately the same for any given case throughout the various declensions. The apparent divergencies are usually due, except where nouns are inflected pronominally or pronouns nominally, to the phonetic laws of sound combination. (See PHONETICS.) The conjugation of the verb, likewise, was originally far more complex than it is now. The tense system, although the future was originally lacking, was rich, especially in aorists. The Vedic Sanskrit had three main varieties, the simple, reduplicating, and *s-* aorists, of which the first had two subdivisions and the third had four. Here, again, it is quite possible that these seven aorists originally had distinctive meanings, although even as early as the Veda they were, so far as now known, mutually equivalent. The moods were more numerous, the verb having the indicative, subjunctive, optative, imperative, and perhaps a mild imperative called the injunctive (in form the augmentless aorist, and later the augmentless imperfect). As inflection was twofold, so conjugation had a double system, primary and secondary. The primary conjugational terminations were found in the present, perfect, and, when a future was developed, in this new tense also; the secondary endings were employed in the tenses which denote past time.

The older writers on comparative linguistics devoted much attention to the original meanings of inflectional terminations. A deeper research has, however, led to less dogmatic views, and it would seem that in our present state of knowledge no conclusion as to the primitive force of inflections can be reached. It may be true that *s* is characteristic of the plural (as Goth. *wulfōs*, *wulfans*, Skt. *vṛkēsu*, *vṛkēbhyas*, *vṛkais*, wolves—nom., acc., loc., abl., instr.), but *s* is also a mark of the nominative masculine and genitive singular (as Lat. *lupus*, wolf, Gk. *ὄφιος*, of a serpent). It is just possible that the case endings were indeed originally independent words, which became stereotyped and meaningless terminations. A possible analogue is furnished by the modern Indo-Iranian languages as compared with the ancient, as Hind. *ghōṛake*, of a horse, corresponding to Prak. *ghōḍaassa kacchē*, Skt. *ghōṭakasya kakṣē*, at the side of a horse, or Pers. *šāhrā*, for the king, corresponding to OPers. *všāyaθiyahyā rādiy*, for the sake of the king. This, however, is a mere hypothesis, a suggestion of a process which may have taken place. In the case of the verbs repeated endeavors have been made to trace the endings back to the personal pronouns. Thus, the terminations of Skt. *bharāmi*, *bharati*, *bharāvas*, I bear, he bears, we two bear, may be compared with some plausibility with *mām*, me, *tam*, him, *āvām*, we two, but the other persons of the verb oppose such a hypothesis. It is true that many agglutinative languages seem to bear out the old view; but it is, notwithstanding this, too faulty a theory to be adopted as even plausible, much less probable. There is little doubt, however, that certain verb endings arose merely from the juxtaposition of an auxiliary to the original root. Thus, imperfects like the Lat. *amabam*, futures like the Lat. *amabo* and Gk. *δώσω*, and perfects like *amavi* and *duc-si* are composed of the verb "to be" (which is in Skt. *bhū* and *as*, in Lat. *fuo* and *esse*) joined to the principal verb. An example of a more recent formation of that kind may be found in the Fr. future *aimerai*, which is composed of *amare* and *habeo*.

Inflection comes only at the end of an Indo-

Germanic word, excepting in the reduplication of the aorist and perfect (as Skt. *ajījanam*, aorist of *jan*, to be born, *tutōda*, perfect of *tud*, to thrust, Gk. *γέγονα*, perfect of *γίγνεσθαι*, to become, Lat. *memordi*, perfect [aorist] of *mordere*, to bite, Goth. *haíhait*, preterite of *haitan*, to call). This reduplication is probably intensive in origin, as is seen in the intensive or frequentative and desiderative conjugations in Sanskrit. The separable initial letter used regularly in Sanskrit and Greek, and sometimes in Armenian, to denote past time when prefixed to a preterite tense (as Skt. *abharam*, imperfect of *bhar*, to bear, Gk. *ἔφερον*, imperfect of *φέρειν*, to bear, Armen. *ekaç* beside *kaç*, preterite of *kal*, to stand) does not properly belong to inflection, and the same exclusion holds true with regard to ablaut (q.v.).

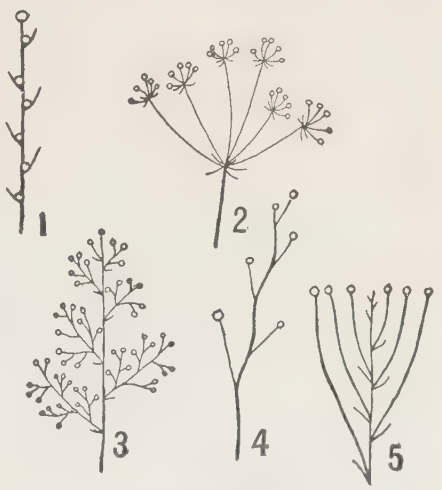
Inflection may, however, be internal and initial as well as final in Semitic. As examples from Arabic, which is the most highly inflected of all the Semitic dialects, may be cited *qatala*, he kills, *qutila*, he is killed, *yaqtulu*, he killed, *yuqtalu*, he was killed, *uqtul*, kill! *tuqātilūna*, ye fought, or *wajaba*, it is necessary, *ujibu*, I made it necessary, *nastawjibu*, we considered it necessary for ourselves.

The decay and loss of inflection has been constant from the pre-Indo-Germanic period to the present day. The analytic type of language (see PHILOLOGY) has steadily encroached on the inflectional, until we have such relatively inflectionless languages as the English and the modern Persian. It has been estimated that a Greek verb can have as many as 249 different forms without counting its infinitives and participles, whereas for the Sanskrit it may reach the astounding number of 891 different forms. If we compare with these the very limited number of verb forms in modern English, we can obtain some idea of the tremendous loss of inflections that has marked its growth. It is still a moot question whether the growth of the analytic type at the expense of the inflectional marks an advance. Certain scholars, notably Jespersen in his *Progress in Language with Special Reference to English* (London, 1894), have answered in the affirmative, for in an inflectional form, as Lat. *amaveram*, I had loved, we have the attitude of the speaker, the person of the speaker, the time of the action, and the verbal force all combined, which may be more elements than are necessary in some instances for the speaker's immediate purpose. On the other hand, the inflectional languages are more compact than the analytic. A fair answer to this problem may be that the surrender of inflection to analysis marks a linguistic loss but a psychological gain. Such a conclusion carries with it the implication that, as psychological requirements ultimately condition all but the mechanical (phonetic) side of language, the final balance is in favor of the analytic type of speech.

Consult: Bréal, *Essai de Sémantique* (4th ed., Paris, 1913); Mauthner, *Beiträge zur einer Kritik der Sprache* (2d ed., Stuttgart, 1906–13); id., *Die Sprache* (ib., 1906); Paul, *Prinzipien der Sprachgeschichte* (4th ed., Halle, 1909); Brugmann, *Grundriss der vergleichenden Grammatik der indogermanischen Sprachen*, vol. ii, part ii (Strassburg, 1913).

INFLECTION IN LIGHT. See DIFFRACTION AND DIFFRACTION GRATINGS.

IN'FLORES'CENCE (from Lat. *inflorescere*, to begin to flower, from *in*, in + *florescere*, to begin to flower, from *florere*, to flower, from *flos*, flower; connected with OIr. *bláth*, OHG. *bluoma*, Ger. *Blume*, Goth. *blōma*, Icel. *blōme*, flower, and with AS. *blōstm*, Eng. *blossom*). The manner in which flowers are arranged in a cluster; or sometimes simply a flower cluster. In many plants the flowers occur singly, either at the end of the stem or among the leaves; but when



INFLORESCENCE.

1, spicate raceme; 2, compound umbel; 3, panicle; 4, elongated cyme; 5, corymb.

a definite region of the plant is set apart for flowers, it is called an inflorescence. The arrangement of flowers in such clusters is very diverse, and numerous technical terms are employed to designate the different kinds of inflorescence. All kinds, however, are usually reduced to two categories—the indeterminate, or *botryose*, and the determinate, or *cymose*.

In the botryose type no flower stands upon the end of the axis, which therefore may continue its growth indefinitely (hence an indeterminate inflorescence). As a consequence, the flower buds continue to appear at or near the growing tip of the axis, and since the older flowers are below, this method is called *acropetal* or *ascending*. There are numerous forms of the botryose type, conspicuous among which are the following: *Raceme*, in which each flower, upon its own stalk, stands upon an elongated axis, as in spring beauty (*Claytonia*) and shepherd's purse (*Capsella*). Such an inflorescence is elongated, open, and spraylike. *Panicle*, a modification of the raceme, in which the flower stalks, especially the lower ones, branch, bear a small cluster of flowers, and together produce a general cluster more or less pyramidal in outline, as in the spraylike inflorescence of many grasses (as redtop). *Thyrsus*, a modification of the panicle, in which the flowers are so congested as to form a compact pyramidal cluster, as in the lilac and a bunch of grapes. *Spike*, a modification of the raceme, in which the individual flowers have no stalks, but rest directly upon the elongated axis (sessile), as in the common plantain and many grasses (e.g., timothy). Sometimes these sessile flowers are so close together as to cover the axis completely, in other cases they are more or less scattered along it. A *spikelet* is literally a

small spike, but the term is applied almost exclusively to the small spicate flower clusters which together make up the general spike or panicle of grasses. *Ament*, or *catkin*, practically the same as a spike or raceme, but with the subtending bracts so conspicuous as to conceal the flowers until pollination, as in the pussy willow, alder, birch, etc., which in consequence are often called amentaceous plants. *Spadix*, a modification of a spike, in which the axis becomes fleshy, as jack-in-the-pulpit (*Arisæma*) and calla. In this case the fleshy spike or spadix is more or less enveloped by a great ensheathing bract called the *spathe*, which is often conspicuously colored. In the calla it is waxy white and represents to most persons the "flower." This inflorescence is characteristic of the great family of Aroids. *Corymb*, in which the stalks of the lower flowers are elongated in such a way as to produce a more or less flat-topped cluster. In such a cluster the lower flowers are the outermost, and, as they bloom first, the order of blooming, while really ascending or acropetal as in the raceme, appears to be from the circumference towards the centre, or *centripetal*. Most of the so-called corymbs are cymes (see below). *Umbel*, in which the floral axis does not elongate. The flower stalks appear therefore to rise from the same point, like the braces of an umbrella. This also results in a flat-topped cluster, as in wild carrot, wild parsnip, etc. Since each flower stalk is usually subtended by a bract, in an umbel the bracts are thrown together in a rosette, which is called the *involucre*. Umbels very often become compound, i.e., each main stalk (ray) of the cluster bears another umbel, so that the general umbel is composed of a collection of small ones called *umbellets*, whose involucres are called *involucels*. This inflorescence is characteristic of the great family Umbelliferæ. *Head*, a modification of an umbel, in which the flowers are sessile (without stalks) and result in a compact, headlike cluster, as in sunflower, dandelion, etc. In this case also an involucre is a conspicuous feature, and in the great family Compositæ the whole head with its numerous flowers is commonly spoken of as a single flower.

In the *cymose* type of inflorescence the first flower appears at the end of the axis, which therefore ceases to elongate (hence a determinate inflorescence). As a consequence, the flower buds appear successively down the axis; hence this method is called *basipetal* or *descending*. There are several modifications of the cymose type, but the single term in most common use is *cyme*, which is a flat-topped cluster resembling a corymb. It may be distinguished easily, however, by the fact that the flowers begin to bloom in the centre (top) of the cluster, and the succession is towards the circumference, or *centrifugal*, as in elder and hydrangea. A *glomerule* is a cyme in which the flowers are so much crowded as to form a sort of head, as in some dogwoods. For bibliography, see references under BOTANY.

INFLUENCE LINES. See GRAPHIC STATICS.

IN'FLUEN'ZA (It., influence), EPIDEMIC INFLUENZA, or LA GRIPPE. An infectious disease due to a specific bacillus and characterized by great weakness and prostration, with mental depression, and generally by catarrh of the nasal and respiratory passages.

History. Authorities differ as to the first account of this disease as well as to the identity of epidemics occurring before 1580. A severe epidemic in 412 B.C., described by Hippocrates and Livius, is thought to have been influenza. Authentic epidemics of the disease have occurred frequently since 1173. In that year the disease spread over Italy, Germany, and England. The next epidemics occurred in 1239 and 1311, as far as available records show, though it is possible that the pestilence which devastated France in 1311 was of another nature. In 1323, 1327, 1387, and 1403 epidemics of *la grippe* certainly occurred, as well as in 1404, 1411, 1414, and 1427. The first pandemic of the disease reported appeared in 1510 and spread over all Europe, apparently rising in Africa. It was benign in character. In 1557 occurred a repetition of the experience, all Europe suffering, having been invaded by way of Asia, and spreading, some historians report, to America. The mortality from this epidemic was very large. In 1580 the second pandemic appeared, and it was characterized by special virulence. Epidemics followed in 1591, 1593, 1597, and 1626. In 1647 the influenza spread through the plantations of America and in the West Indies. Hubbard reports that there died in Barbados and St. Kitts 5000 or 6000 each. The years 1658, 1675, 1688, 1693, 1709, 1712, 1729, and 1732 were *grippe* years. In the last-named year the American colonies suffered, as also the West Indies, Mexico, and South America; Russia, Poland, Germany, Switzerland, Holland, England, Scotland, France, Spain, and Italy were attacked in about the order named. People upon vessels in the open sea were said to have been attacked. In 1737 and 1742–43 the dread disease reappeared. In accounts of the latter epidemic the terms "influenza" and "grippe" first appeared. In 1758, 1761, 1762, 1767, 1775, 1780, 1781–82, 1788–89, 1799–1800, 1802–03, the disease was reported in epidemic form, and from 1803 to 1830 it spread from country to country, disappearing and reappearing after short intervals. China is supposed to have suffered most in 1830–32, Upper Asia, Europe, and North Africa being invaded in 1833. From 1836 to 1848 it prevailed in various localities, as also from 1850 to 1889. In 1847–48 the influenza was pandemic, with a high mortality. The pandemic in which the present generation is most interested began in 1889, when the disease spread over the whole globe. Since that date the United States has hardly been free from influenza, for the epidemics of 1893–94 and 1905 must be viewed as recrudescences of the persisting epidemic, individual cases or small epidemics having been separately observed. The pandemic of 1889 originated in Central Asia. From Bokhara it was traced successively to Siberia, European Russia, Sweden, Denmark, France, Germany, Belgium, and England; Asia Minor, Italy, Turkey, and Greece being attacked simultaneously with Germany and England. Shortly thereafter it appeared in Tunis, later in Mexico, South America, and Australia. It invaded Boston at the same time London was attacked, and San Francisco contemporaneously with Buenos Aires. Human intercourse and especially commerce appear to be the determining factors in its dissemination. The mortality in later epidemics has been variously estimated at from 17 to 50 per cent.

Cause. The aërobe causing influenza is called *Pfeiffer's bacillus*. It was discovered in 1891 by

Pfeiffer, Kitasato, and Canon, working independently. It is a bacillus occurring singly, in pairs, or chains, or clumps, appearing as a straight rod with rounded ends, nonmotile, and not forming spores. It is best stained by a weak solution of carbol-fuchsin applied for at least 10 minutes. The bacillus grows best on glycerin-agar smeared with blood, at body temperature. The bacilli are found chiefly in the respiratory passages, mixed with other organisms, in the nasal mucus, or in the sputum from the bronchi, and even penetrating to the submucous stratum of the mucous membrane. They are occasionally found in the blood in small numbers. They are found in the secretion in grippal middle-ear inflammation and also in the exudate in cases of grippal meningitis. The chief symptoms of the disease are due to toxins resident in the bodies of the bacilli or produced by them as excretory matter, and absorbed by the victim from the respiratory tract. The bacillus has not been found in any other disease, but is always present in the secretions of the respiratory tract in true influenza. Experimental inoculation of monkeys has caused high fever, followed by death, no definite results being reached. But there is no evidence that any of the lower animals suffer from influenza under natural conditions.

Symptoms. The symptoms of a typical attack of influenza are headache with especially severe pain in the orbits and at the base of the occiput; fever, with a temperature of 102° or 103°, generally following an initial chill; great prostration and weakness with mental depression; pain in many of the joints and bones, and tenderness in the muscles; swelling of the mucous lining of the nasal passages with increased flow of mucus; cough, with expectoration of small masses of thick yellowish or greenish mucus, accompanied by tenderness in the region of the breast bone; rapid and generally weak pulse; buzzing noises in the ears; and slight tremor of the whole body. There is an inflammation of the throat, its mucous lining being congested and the palatal folds swollen and rigid. There may be sudden attacks of vertigo or of syncope, or of unconsciousness resembling that due to apoplexy. In some cases, in the place of severe catarrhal symptoms, an eruption, resembling an urticaria, appears on the body. In others the most severe symptoms are referable to the gastrointestinal tract; the tongue being coated, the breath foul, the abdomen very tender on pressure, vomiting occurring, and the action of the bowels being irregular. In still other cases the headache, backache, neuralgia (trigeminal, occipital, cervicobrachial, or intercostal), myalgia, insomnia, syncope, and vertigo are the most prominent symptoms. Influenza is peculiarly apt to attack the accessory nasal sinuses and the ears, empyema of these cavities and of the mastoid process of the temporal bone being a common complication. The predominance of sets of symptoms in certain classes of cases has led to the attempt by some physicians to divide influenza into respiratory, gastrointestinal, and nervous forms, of which the last has been fairly adopted. In all cases there is danger of pneumonia (q.v.). Both pleuræ and lungs are involved with surprising rapidity very early in some cases, with or without bronchial implication. The pneumonia is lobular in variety, disseminated in separate areas throughout the lungs, with irregular and atypical invasion. It resolves by lysis and not by crisis, and predictions of its termination are impossible. The grippe pneumonia is much more fatal than the ordinary lobar pneumonia. The only safe place for a patient with influenza is in bed, during the attack, lest myocarditis (q.v.) or pneumonia should suddenly appear, and the patient's life be actually jeopardized, and lest the effort to continue one's vocation in spite of undermined strength result in a protracted neurasthenia as a sequel to the attack.

Treatment. The treatment of epidemic influenza consists in rest in bed, as has been said, as soon as the prostration supervenes, or the temperature rises above the normal. Among drugs quinine occupies the front rank. It is of great value in every case, not in large doses and not necessarily prolonged. Other drugs of value, at different stages or in different types of the disorder, are antipyrin, phenacetin, salipyrin, salicylate of sodium, iodine, digitalis, benzol, carbolic acid, ipecacuanha, camphor, alcohol, and strychnine. Several of these remedies being powerful and dangerous drugs, they should not be indiscriminately used, or used at all without a physician's advice. A weak heart may be crippled by the unintelligent use of a depressant or an overstimulating drug.

Prophylaxis. The contagium of the disease is carried by the sputa and the nasal mucus, and precautionary measures should be employed, where possible, to limit the disease. *Grippe* patients in hotels, sanitariums, and schools should be isolated. Their table utensils and bed linen and body clothes should be disinfected with boiling water. Prevention should be secured of the deposition of secretions upon carpets or furniture. Gargles, nasal sprays, and mouth washes prevent infection by clearing out mucus that might form a nidus for the disease in a healthy mouth. Quinine internally is a good prophylactic. The bacillus has been found dead after two hours' exposure to sunlight or dry air, in nasal mucus. Infection of another may occur from the moisture in the breath of a patient who coughs out a spray of fine mucus into the atmosphere. Reinfection of a convalescing patient frequently occurs. Patients should therefore cough into a moist handkerchief; avoid kissing others; use separate utensils at table; sterilize these and all clothing of body and bed; spit into a cup containing water, this cup to be cleansed frequently with very hot water; or if in a school, hotel, sanitarium, etc., be isolated. Patients suffering with tuberculosis, bronchitis, pharyngitis, or nasal catarrh should avoid mingling with *grippe* patients.

Bibliography. Huxham, *Opera Physio-Medica* (Leipzig, 1874); Schweich, *Die Influenza* (Berlin, 1836); Wolff, *Die Influenza-Epidemie, 1889–92* (Stuttgart, 1892); Edson, *La grippe* (2d ed., New York, 1894); Tyson, *Practice of Medicine* (Philadelphia, 1913); Hopkirk, *Influenza* (New York, 1914). Lichtenstern's account in Hermann Nothnagel, *Handbuch* (Berlin, 1870), is very complete. See BACTERIA; EPIDEMIC; and SUPPLEMENT.

INFLUENZA (in animals), HORSE DISTEMPER, EPIZOÖTY, PINK EYE, TYPHOID FEVER, or BILIOUS FEVER (Fr. *grippe*, Ger. *Pferdestaupe*). An acute febrile, contagious disease of the horse, ass, and mule that occurs frequently in stables in an enzoötic form, the primary cause of which has not been established. Two forms are distinguished: one, the

catarrhal influenza, characterized by acute catarrh of the mucous membranes; the other, the pectoral influenza, characterized by severe inflammation of the lungs and pleura. The affection is characterized by stupor, alteration of the blood, great depression of the vital forces, and frequent inflammatory complications of the important vascular organs, especially of the lungs, intestines, brain, and laminæ of the feet. The animal becomes dull and indifferent to surroundings, has a rapidly developing fever, and stands with its head down. The eyes become puffed and secrete a watery discharge, and the mucous membranes of the eye and mouth become reddened or yellowish. Dropsical swellings may appear on the legs and undersurface of the abdomen. When the disease has run its course, which requires a period of six to ten days, the fever abates as rapidly as it began. Death may occur from extreme fever, failure of the heart's action, asphyxia following congestion of the lungs, etc., the disintegration of the red blood corpuscles. The most important complications of the disease are inflammatory processes in the lungs in about 50 per cent of the cases, in the brain, or laminar tissue of the feet. The majority of horses are susceptible to influenza, and it is fatal in many cases, even with the best treatment. One attack usually protects from future attacks, but not always. Since the red corpuscles are destroyed by the disease, bleeding should not be practiced except in strong subjects. It is important that the sick horse should be placed in a well-ventilated box stall, and that it consume a moderate quantity of nourishing food. The temperature may be reduced by injecting large quantities of cold water into the rectum. To reduce the temperature, antipyrin may be used with alcohol or strychnine. Quinine and salicyclic acid in dram doses will also lower the temperature. Mustard poultices, baths of alcohol, turpentine, and hot water are useful in relieving congestion of the lungs. Aconite has an almost specific action in congestion of the brain. Excellent results have been obtained during the last few years from the administration of salvarsan and neosalvarsan, but the high cost of these drugs has prevented a more general use. Consult: United States Department of Agriculture, *Special Report on Diseases of the Horse* (rev. ed., Washington); Hutyra and Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals* (Am. ed. from 3d rev. Ger. ed., 2 vols., Chicago, 1912); E. W. Hoare, *System of Veterinary Medicine* (ib., 1913).

IN FORMA PAUPERIS. See FORMA PAUPERIS, IN.

IN'FORMA'TION (Lat. *informatio*, outline, representation, from *informare*, to sketch, to inform, from *in*, in + *forma*, shape). In English and American law, a summary method of instituting criminal proceedings at the instance of the public authorities and without the process of indictment (q.v.). The free use of this proceeding under the Tudor and Stuart kings and its abuse by the Court of Star Chamber constituted one of the grave abuses of the royal prerogative at which the revolutions of 1645 and 1688 were aimed. The process was greatly restricted by Act of Parliament in 1641 (16 Car. I, c. 10) and 1693 (4 and 5 Wm. and Mary, c. 18). In theory the right to institute criminal proceedings by information was always limited to the class of offenses known as misdemeanors, but the distinction between misdemeanors and felonies was too indefinite to make this a complete safeguard of the liberty of the subject. The Constitution of the United States (Amendments Art. V) restricts the use of informations to crimes which are not capital or of an infamous character by requiring an indictment by a grand jury in all such cases. In practice, at the present time, in England an information filed by the Attorney-General or Master of the Crown Office is resorted to only in cases of such misdemeanors as tend to disturb the peace or affect the administration of the government, as libels on judges, magistrates, or public officers, bribery at elections, etc. This information is usually called a criminal or an ex-officio information, and the defendant is put on his trial in the same way as under an indictment. In form and substance it is precisely like an indictment, differing from it only in the fact that it is presented upon the official oath of a duly authorized officer of the government and not upon presentment alone by a grand jury.

There are other informations, such as those called *quo warranto*, to test the validity of an election or appointment to a public office, etc. An information by the Attorney-General in chancery is a suit on behalf of the crown as to any misapplication of a public charity or on behalf of an idiot's or lunatic's property. The term is also commonly used to denote the written statement made on oath before a justice of the peace, or committing magistrate, previous to the issuing of a summons or complaint against a person charged either with a crime or an offense punishable summarily. There are also informations in the Court of Exchequer to recover penalties for the breach of the revenue laws. The term is not now used technically in Scotland, except in cases of difficulty, when the court of justiciary orders informations—i.e., written arguments.

In the United States courts actions for minor offenses, such as attempts to evade the revenue laws, etc., sometimes proceed upon information. In several of the States all misdemeanors, except misprision of treason (q.v.), may be prosecuted upon information, but in the case of felonies indictment is everywhere necessary. Information is also the form of proceeding employed in certain civil cases. By this process a person filling a civil office may be brought into court to show by what authority he assumes to exercise the functions thereof, with a view to his displacement in case it can be shown that his authority is insufficient and that the office belongs to another. If an unincorporated association assumes corporate powers, it may be ousted by this process, while a legal corporation may be thus arraigned for a violation of its charter or any infraction of law. See the bibliography under CRIMINAL LAW, and consult Stephen, *History of the Criminal Law of England* (London, 1883), and Sir William Blackstone, *Commentaries on the Laws of England* (4th ed., 2 vols., Chicago, 1899).

INFORM'ER. In English and American law, a person who brings a criminal accusation against another. This term is not technically applicable to the officer of the government who presents an information (q.v.) against an offender, but to the person on whose "relation" the proceeding is instituted. As at common law

the prosecution of criminal offenses was generally left to private initiative, the informer played an important part in the enforcement of the criminal law. With the institution of a crown prosecutor in England and of prosecuting attorneys in the United States, the importance of the informer has gone. At common law the informer had no private interest in the proceedings instigated by him, but by statute in many classes of cases, especially in violations of the revenue laws, informers are given a right of action for a penalty imposed by the law. The term "informer" has thus come to be commonly employed to describe a person entitled to enforce such a claim or demand. In England, when the informer sues in such an action, it is called a penal or *qui tam* action; but, in general, the penalty is now recoverable before justices of the peace in a summary proceeding. In informations and suits in chancery, which require to proceed in the name of the Attorney-General, the informer is called a relator. In Scotland an informer is the party who sets the Lord Advocate in motion in criminal prosecutions; and the Lord Advocate is bound to give up the name of the informer, who is liable in case the prosecution instigated by him was without reasonable and probable cause. See MALICIOUS PROSECUTION; and consult the authorities referred to under CRIMINAL LAW.

IN'FRALAPSA'RIAN (Lat. *infra,* below + *lapsus,* p.p. of *labi,* to slip), or SUBLAPSARIAN. In theology, one who holds that God permitted the fall of man without positively foreordaining it and makes His election of certain men to salvation and others to condemnation dependent upon His foreknowledge of the fall. According to this view God determined to create the world, to permit the fall, and to elect from the mass of fallen men some to eternal life, and leave the residue to suffer the just penalty of their sins. Election is thus made from those fallen by their own act, and this act is not necessitated by the divine power. Opposed to this view is that of the supralapsarians, who hold that the fall of Adam with all its evil consequences was predetermined from eternity, and that election to salvation or reprobation precedes the purpose to create and permit the fall and has no relation to it. God's purpose in creating and governing the universe is to manifest His attributes and glory; and He decrees the fall and creates some to be saved and others to be lost to exhibit His grace and justice. John Calvin wrote some passages which seem supralapsarian, but in his later work he is infralapsarian. The terms themselves did not come into use until after his time. The Creeds of the Synod of Dort (q.v.) and of the Westminster Assembly are infralapsarian. Many Calvinists were supralapsarians, e.g., Beza and Edwards, but this is rather hyper-Calvinistic than Calvinistic. The distinction is not confined to Calvinists. It is found also among the Roman Catholics. See CALVINISM; ELECTION; FALL, DOCTRINE OF THE; FOREKNOWLEDGE AND FOREORDINATION.

INFRINGE'MENT (from Lat. *infringere,* to break, from *in,* in + *frangere,* to break; connected with Goth. *brikan,* OHG. *brehhan,* Ger. *brechen,* AS. *break*). In its most general sense, any violation of a law or invasion of a legal right which gives rise to a cause of action, in law or equity, in favor of the person injured thereby. The term is, however, more commonly employed in a technical sense to describe an unlawful appropriation of writings or works of art, inventions or trade-marks, when protected by copyrights, patents, or registration. The usual and proper remedy for an invasion of these rights is an action at law for the damages sustained, or a proceeding in equity for an injunction to restrain the infringement, thus securing an absolute enjoyment or monopoly of the inventions, writing, or trade-mark embraced in the work or device so protected.

Infringement of Patent. The manufacture, use, or sale of a thing, the subject matter of which is a patented invention, constitutes an infringement of the latter. To prove that an alleged new device incorporates the substance of an invention so protected, it is necessary to establish that the same result is accomplished, the same functions performed, and that the mode of operation is substantially the same. If these characteristics are present, a mere change in the form or in the arrangement of the parts of a patented article will not save the device thus constructed from being condemned as an infringement of the patentee's rights. See PATENT.

Infringement of Trade-mark. This consists in the unlawful use of a mark or device which another has registered to provide a means of identification of his goods for the general public. Any device which is so similar to a registered trade-mark as to deceive or mislead the public constitutes an infringement thereof, even though it would not be difficult to distinguish the two when closely examined. The usual remedy for such infringement is by injunction. See TRADE-MARK; TRADE NAME; LABEL. For the treatment of the subject of *Infringement of Copyrights,* see COPYRIGHT; LITERARY PROPERTY; and also ABRIDGMENT.

IN'FUNDIB'ULUM (Lat., funnel). A term used in anatomy to denote tubular passages that are somewhat funnel-shaped. The infundibulum of the brain is a hollow process continuous with the tuber cinereum and terminating in the pituitary body. The infundibulum of the nose, or infundibulum of the ethmoid bone, is a long cellular canal which passes from the frontal sinus through the anterior ethmoidal cells to the middle meatus of the nose. The infundibulum of the heart, or conus arteriosus, is that portion of the right ventricle of the heart which approaches the orifice of the pulmonary artery. The infundibula of the kidney are the three prolongations of the pelvis of the kidney, which are in turn subdivided into the calices.

INFU'SION (Lat. *infusio,* a pouring in, from *infundere,* to pour in, from *in,* in + *fundere,* to pour; connected with Goth. *giutan,* AS. *gēotan,* OHG. *giozan,* Ger. *giessen,* Gk. χεῖν, *chein,* Skt. *hu,* to pour), or INFUSUM. A term applied in pharmacy to an aqueous solution of a vegetable substance obtained without the aid of boiling. Such solutions are usually prepared by digesting in soft water (which may be either hot or cold, according to circumstances) the sliced or powdered substance in an earthenware vessel fitted with a cover. Cold water is preferable when the active principle is very volatile, or when it is expedient to avoid the solution of some ingredient in the vegetable which is soluble in hot but not in cold water. In most cases, however, hot water is employed. Infusions are preferred to decoctions when the active principle volatilizes at a boiling heat, as in the case of essen-

tial oils; or when ebullition readily induces some chemical change.

Infusions may also be prepared by percolation (q.v.), a process which is extensively employed in the preparation of tinctures. In all cases they should be prepared freshly for each day's consumption. Some pharmacists add less water than the stated amount in preparing an infusion by percolation, then add a considerable percentage of alcohol, and stock the preparation till demanded. When ordered, they add to this concentrated infusion enough water to equal the proportion in the fresh article. Four infusions are official in the United States Pharmacopœia, viz., cinchona, digitalis, *Prunus virginianæ*, and senna.

IN'FUSO'RIA (Neo-Lat. nom. pl., from Lat. *infusorium*, reservoir of a lamp, from *infusor*, pourer, from *infundere*, to pour in). The highest or most specialized class of Protozoa (q.v.). The name is of interest historically because originally applied to all those microörganisms which swarm in organic infusions, but it became gradually restricted to its present limits with the advancement of biological research. The name was first used about 1763, and the class Infusoria was removed from the Polypes by Lamarck in 1807. The name of Ehrenberg is, however, especially associated with the Infusoria, his epoch-marking work on them appearing in 1837. An excellent monograph of the group is that of W. S. Kent, *Manual of the Infusoria* (London, 1880–82). Consult S. T. Hickson, "The Infusoria," in E. R. Lankester, *Treatise on Zoölogy*, vol. i, part ii (ib., 1903), and M. M. Hartog, "Protozoa," in *Cambridge Natural History*, vol. i (ib., 1906).

INFUSO'RIAL EARTH. See DIATOMACEOUS EARTH.

INFU'SUM. See INFUSION.

INGALLS, ĭn'*g*alz, JAMES MONROE (1837–). An American soldier and authority on ballistics. He was born at Sutton, Vt., and served in the Civil War for a year and a half, at its close being promoted first lieutenant. Afterward he was engaged in reconstruction duty in the South until 1871. A year later he graduated from the Artillery School at Fortress Monroe, Va., where in 1882 he established the department of ballistics, and where he taught until 1898. He was promoted through the various grades to that of lieutenant colonel (1900) and was retired (1901); in 1904 he was made colonel retired. Besides contributing articles to Johnson's *Universal Cyclopædia*, he is author of *Exterior Ballistics* (1883, 1885, 1886); *Ballistic Machines* (1885); *Handbook of Problems in Exterior Ballistics* (1890, 1901); *Ballistic Tables* (1891, 1900); *Interior Ballistics* (1894; 3d ed., 1912); *Ballistics for the Instruction of Artillery Gunners* (1893).

INGALLS, JOHN JAMES (1833–1900). An American politician and publicist, born at Middleton, Mass. He graduated at Williams College in 1855, studied law, and in 1857 was admitted to the Massachusetts bar. In the following year, becoming interested in the "free State" movement in Kansas, he removed to Atchison in that State and began practice. He was a member of the State Constitutional Convention in 1859, was elected Secretary of the Territorial Council in 1860, and after the admission of Kansas to the Union in January, 1861, became Secretary of the new State Senate. The next year he was elected a member of the Senate, but failed to get the Republican nomination for Lieutenant Governor. From 1863 to 1865 he was editor of the Atchison *Champion*, and in 1873, after a sharp contest, was elected as a Republican to the United States Senate. In the Senate, to which he was reëlected in 1879 and 1885, he was a fluent and frequent speaker, brilliant at repartee, and was an excellent parliamentarian. He was a faithful champion of the various Republican administrations, and was president pro tempore of the Senate from 1887 until 1891, when he lost his seat as a result of the strength of the Democratic-Populist movement in his adopted State. He wrote much for newspapers and magazines on public topics and on farming. Consult Connelley, *Life of John J. Ingalls* (Kansas City, Mo., 1903).

INGALLS, MELVILLE EZRA (1842–1914). An American railroad official, born at Harrison, Me., and educated at Bridgton Academy, at Bowdoin College, and at Harvard University (LL.B., 1863). He practiced law at Gray, Me., and later at Boston, and was a member of the Massachusetts Senate in 1867. He became president in 1870 and receiver in 1871 of the Indianapolis, Cincinnati, and Lafayette Railroad, which he reorganized upon a sound financial basis as the Cincinnati, Indianapolis, St. Louis, and Chicago. Later, by the consolidation of this road with others, he formed the Cleveland, Cincinnati, Chicago, and St. Louis—the "Big Four System"; of this he was chairman until his resignation in 1912, and he served also as president of the Chicago and Ohio Railway Company from 1888 to 1900. In 1905 he was president of the National Civic Federation.

INGALLS, RUFUS (1820–93). An American soldier, born in Denmark, Me. He graduated at West Point in 1843 and served through the war with Mexico. In 1854–55 he accompanied Colonel Steptoe's expedition across the continent. During the Civil War he served with the Army of the Potomac, chiefly in the quartermaster-general's department, and was present at many of the most important battles, including Fredericksburg, Chancellorsville, Gettysburg, and the Wilderness. He was mustered out of the volunteer service on Sept. 1, 1866, with the brevet rank of major general both in the volunteer and in the regular army. In 1882 he was made brigadier general and quartermaster-general, and on July 1, 1883, was retired.

INGAUNI, ĭn-gą'nē. An ancient tribe dwelling on the mountains and seacoast of what is now the western Riviera of Italy. They were active in the wars between the Romans and the Ligurians and were allies of the Carthaginians in the Second Punic War. After the battle with Æmilius Paulus (181 B.C.), in which they lost 15,000 men, very little was heard of them. Their chief town was Album Ingaunum, or Albingaunum (now Albenga, q.v.).

INGE, ĭnj, WILLIAM RALPH (1860–). An English theologian, born in Crayke, Yorkshire, son of the provost of Worcester College, Oxford. He was educated at Eton and at King's College, Cambridge, of which he was fellow in 1886–88, being assistant master at Eton from 1884 to 1888. In 1889–1904 he was fellow and tutor of Hertford College, Oxford. He was repeatedly select preacher at Oxford and Cambridge, was Bampton lecturer in 1899 and Paddock lecturer (*Personal Idealism and Mysticism*, 1906) in New York, and was Lady Margaret professor of divinity at Oxford in 1907–11. In 1911

he was chosen dean of St. Paul's. Among his works are: *Society in Rome under the Cæsars* (1886); *Eton Latin Grammar* (1889; 3d ed., 1900), with Rawlins; *Christian Mysticism* (1899); *Faith and Knowledge* (1904); *Studies of English Mystics* (1906); *Truth and Falsehood in Religion* (1906); *Personal Idealism and Mysticism* (1907); *Faith* (1909); *Speculum Animæ* (1911); *The Church and the Age* (1912).

INGEBORG, ĭng'e-bôrg', or **INGEBURGE,** ĭng'e-bo͝or'ge (c.1176–c.1237). A French queen, born in Denmark. She was the sister of Canute IV of Denmark and married Philip Augustus, King of France, in 1193. About three months after this marriage the King repudiated her and tried to obtain a separation. Pope Innocent III supported the Queen's rights and excommunicated Philip, who had married Agnes of Meran (1196), and he put France under an interdict. Philip promised to reinstate the Queen; but she was kept in prison, and it was not until 1213, when Philip Augustus needed her aid, that she regained her rights. Consult Davidson, *Philip II, August von Frankreich, und Ingeborg* (Stuttgart, 1888).

INGEGNERI, ĕn'gâ-nyā'rê, Marco Antonio (c.1545–92). An Italian composer, born at Verona. He was a pupil of Vincenzo Ruffo and later the teacher of Monteverde (q.v.). Some time about 1575 he became maestro di cappella at the cathedral of Cremona, where he died. His work is of such excellence that for a long time his *Responsoria Hebdomadæ Sanctæ* was ascribed to Palestrina and even printed in Breitkopf and Härtel's complete edition of Palestrina's works, although as "opus dubium." The discovery by F. X. Haberl, in 1897, of a printed copy of this work, bearing the date 1588 and the name of Ingegneri as the composer, established the real authorship. Other works that have been preserved are two books of masses for five, six, and eight voices, a book of madrigals for six voices, five for five voices, and two for four voices.

INGELOW, ĭn'jê-lō, Jean (1820–97). An English poet and novelist, born in Boston, Lincolnshire. To the public she was unwilling to give the details of her life. Her first volume of verse, *A Rhyming Chronicle of Incidents and Feelings* (1850), published anonymously, excited considerable interest. Another volume, *Poems* (1863), which included "The High Tide on the Coast of Lincolnshire," possessed that kind of appeal which gave it immediate and instant success and sent it eventually into more than 20 editions. Subsequently she wrote *The Story of Doom, and Other Poems* (1867) and *Poems of the Old Days and the New* (1885). Her prose works include the novels *Off the Skelligs* (1872); *Fated to Be Free* (1873); *Sarah de Berenger* (1880); *Don John* (1881); *John Jerome* (1886); and also *Stories Told to a Child* (1865); *Mopsa the Fairy* (1869); *The Suspicious Jackdaw* (1871); *A Motto Changed* (1893); and others. Jean Ingelow is at her best in lyrics, especially those of a ballad nature. In her poetry there is the sweetness of her own character; but a something stilted and affected hurts her verse, as does also a certain tendency to improvisation. The charm of her poetry passed into some of her novels, notably *Off the Skelligs;* and *Mopsa* is a pretty tale of fairyland. Consult her *Poems* (Boston, 1892); selections from her poems with biographical and critical note, in *Warner's Library of Best Literature,* vols. xiv, xx (New York, 1896–99); and her collected *Poems* (London, 1898).

INGEMANN, ĭng'e-mân, Bernhard Severin (1789–1862). A Danish poet and novelist. He was born at Torkildstrup on the island of Falster, May 28, 1789, and was trained at the University of Copenhagen. His first *Poems* (1811) were of a dreamy and melancholy religiosity. *Procne* (1813) shows evidences of requited love; *The Black Knights* (1814) marks growing power, and the tragedies *Blanca* and *Masaniello* (1815) achieved a success of sentimental sensation. Ingemann received a government stipend, traveled, and on his return showed marked talent in narrative in *Fairy Tales and Stories* (1820). *The Magnetism in the Barber's Shop,* an unsuccessful comedy, closed his career as a playwright (1821). He now became lecturer on Danish language and literature at Sorö College, married, and wrote historic poems and novels voluminously, with a childlike faith that he was contributing to history (*Valdemar the Great and his Men,* 1824; *Valdemar the Victorious,* 1826; *Erik Menved's Childhood,* 1828; *King Erik and the Outlaws,* 1833; *Prince Otto of Denmark,* 1835; *Holger Danske,* 1837, and others). He wrote also a collection of very popular *Morning and Evening Hymns.* In 1846 he became director of Sorö College and retired in 1849. In the last decade of his life his work was almost wholly religious. His last book, *The Apple of Gold,* appeared in 1856. Ingemann's collected *Works* were published in 41 volumes (Copenhagen, 1843–65).

Bibliography. Ingemann's autobiography, edited by Galskjöt, *Min Levnedsbog* (Copenhagen, 1862); Heise, *Breve til og fra Ingemann* (ib., 1879); S. Grundtvig, *Grundtvig og Ingemann, Brevveksling, 1821–59* (ib., 1882); Nörregaard, *Ingemanns Digterstilling og Digterværd* (ib., 1886); Schwanenflügel, *Ingemanns Liv og Digtning* (ib., 1886); G. Brandes, *Essays* (1889).

INGENHOUSZ, ĭng'en-hous', Jan (1730–99). A Dutch scientist. He was born in Breda and studied and practiced medicine in his native country, but removed to London about 1765. Accident brought him an introduction to the Austrian Imperial family, whom he served professionally with such success that in 1768 he was made Aulic Councilor and body physician to Maria Theresa and to Joseph II. In 1779 he returned to London. He devoted much time and study to research in electricity and invented about 1760 the plate electrical machine which bears his name. Ingenhousz wrote several scientific treatises and essays, such as *Experiments on Vegetables, Discovering their Great Power of Purifying the Common Air in Sunshine, but Injuring it in the Shade or at Night* (1779); *Anfangsgründe der Electricität* (1781); and *Essay on the Food of Plants and the Renovation of Souls* (1796). A number of his papers were published in two volumes in Paris in 1785–89 under the title *Nouvelles expériences et observations sur divers objets de physique.*

INGERMANLAND, ĭng'ĕr-mân'lânt, or **INGRIA,** ĭn'grĭ-à. The old name for a region in northwest Russia, constituting part of the Government of St. Petersburg. It belonged originally to Novgorod, and from 1617 to 1702 it was held by the Swedes, who lost it again to Russia in the wars of Peter the Great.

INGERSOLL, ĭn'gĕr-sōl. A town in Oxford Co., Ontario, Canada, on the Thames River, 19 miles northeast of London, on the Grand Trunk

and the Canadian Pacific railroads (Map: Ontario, D 7). It is a great exporting point and has manufactures of machinery, woolen goods, agricultural implements, furniture, tools, flour, knitted goods, cheese, fertilizers, pork-packing products, hearses, fruit packages, pianos, baskets. Pop., 1901, 4573; 1911, 4763.

INGERSOLL, Charles Jared (1782–1862). An American lawyer, writer, and politician, the son of Jared Ingersoll (1750–1822), a framer of the Constitution. He was born in Philadelphia, entered the College of New Jersey, where he remained three years, then studied law, traveled in Europe, and was for a time attached to the United States embassy in Paris. In 1801 he wrote the tragedy *Edwy and Elgiva,* which was produced at the New Theatre in Philadelphia, and in 1808 he published a strong political pamphlet in defense of the Republican policy of Thomas Jefferson. Three years later appeared his *Inchiquin the Jesuit's Letters on American Literature and Politics.* He was elected to Congress in 1812, was for 14 years United States district attorney for Pennsylvania, and again served in Congress from 1839 to 1849. His most ambitious work was *Historical Sketch of the Second War between the United States of America and Great Britain* (4 vols., 1845–52), which deals with the events of 1812–13. Consult W. M. Meigs, *Life of Charles J. Ingersoll* (Philadelphia, 1898).

INGERSOLL, Charles Roberts (1821–1903). An American politician and public official, son of Ralph Isaacs Ingersoll. He was born in New Haven, Conn., graduated at Yale in 1840 and at the Yale Law School in 1844, and, after several terms in the Connecticut Legislature, was Governor of the State from 1873 to 1877. He was a Democratic elector in 1876.

INGERSOLL, Ernest (1852–). An American naturalist, born at Monroe, Mich. He studied for a time at Oberlin College and afterward in the Museum of Comparative Zoölogy at Harvard, where he was a pupil of Louis Agassiz. He went West as naturalist in the Hayden survey (1874 and 1877) and did much work with the United States Fish Commission. He became widely known as a writer of special magazine articles and of numerous guide books and as a popular lecturer upon scientific subjects. In 1901 he was lecturer on zoölogy at the University of Chicago. His books include: *Nests and Eggs of North American Birds,* parts i–vii (1880–81); *Oyster Industries of the United States* (1881); *Knocking 'round the Rockies* (1883); *The Ice Queen* (1884), and other juvenile novels; *The Crest of the Continent* (1885); *Down East Latch Strings* (1887); *Wild Neighbors* (1897); *The Book of the Ocean* (1898); *Nature's Calendar* (1900); *Wild Life of Orchard and Field* (1902); *Life of Animals: The Mammals* (1906; 2d ed., 1907); *Eight Secrets* (1906); *The Wit of the Wild* (1906); *Animal Competitors* (1911).

INGERSOLL, Jared (1722–81). An American politician, born in Milford, Conn., and educated at Yale College. In 1765, after the passage of the Stamp Act, he accepted, under Franklin's advice, the appointment as stamp agent for Connecticut, but soon, after undergoing the insults and personal abuse that fell to the lot of all Colonial stamp agents, was forced by the people to resign. In 1766 he published a pamphlet entitled *The Stamp Act.* He became an admiralty judge in 1770.

INGERSOLL, Jared (1750–1822). An American jurist, born in New Haven, Conn., son of Jared Ingersoll (q.v.). He graduated at Yale in 1766 and later went to London, where he studied law. His sympathies were with the patriot party in America, however, and at about the time of the signing of the Declaration of Independence he went to Paris, where he became intimate with Franklin, Izard, and other Americans then in the French capital. In the autumn of 1778 he returned to America and settled in Philadelphia, where he soon became well known as a lawyer. In 1780 he was elected to Congress and in 1787 was chosen a member of the Constitutional Convention. He was the first Attorney-General of Pennsylvania, was the Federal candidate for Vice President of the United States in 1812, and at the time of his death was presiding judge of the district court of Philadelphia County.

INGERSOLL, Joseph Reed (1786–1868). An American politician, born in Philadelphia. He was the son of Jared Ingersoll (q.v.), a framer of the Constitution; the grandson of Jared Ingersoll (q.v.), and brother of Charles Jared Ingersoll (q.v.). He graduated at Princeton in 1804 and after studying law began to practice in Philadelphia. He was a member of Congress from 1835 until 1837, and again from December, 1841, until 1849. In 1852 he was appointed Minister to England by President Fillmore, but returned to America the next year. His most important publication is a pamphlet entitled *Secession a Folly and a Crime,* which appeared at the outbreak of the Civil War. He also wrote a *Memoir of Samuel Breck* (1863) and translated Roccus's *De Navibus et Naulo* and *De Assecuratione* (1809).

INGERSOLL, Leonard Rose (1880–). An American physicist, born in New York City. He graduated from Colorado College (B.S., 1902) and from the University of Wisconsin (Ph.D., 1905), where he was instructor in physics (1905–08), assistant professor (1908–10), and associate professor after 1910. He participated in the Smithsonian expeditions to Mount Wilson, Cal., in 1905, 1906, and 1909. He published *An Introduction to the Mathematical Theory of Heat Conduction* (1913).

INGERSOLL, Ralph Isaacs (1788–1872). An American lawyer and statesman. He was born in New Haven, Conn., graduated at Yale in 1808, was a prominent member of the bar, and a leading Democratic speaker in the Connecticut Legislature (1819–25), earning the name of "Young Hotspur" from his political opponents. Ingersoll was a Representative in Congress (1825–33), then Connecticut State attorney, and from 1846 to 1848 United States Minister to Russia.

INGERSOLL, Robert Green (1833–99). An American lawyer and infidel writer and lecturer. He was born at Dresden, N. Y., Aug. 11, 1833, the youngest of the five children of a Congregational minister of liberal views. The family removed to Illinois in 1845, and there Robert studied law, was admitted to the bar, and entered politics as a Democrat. In 1857 he made his residence in Peoria, where he soon became recognized as an able lawyer, chiefly employed in railroad litigation. In 1860 he was nominated for Congress, but was defeated. In 1862 he went to the war as colonel of the Eleventh Illinois Cavalry and was taken prisoner, but exchanged. He returned to citizenship

a Republican in politics and was appointed Attorney-General of Illinois in 1868. In 1876, at the Republican Presidential Convention at Cincinnati, he delivered a fervid and vigorous speech in favor of the candidacy of James G. Blaine, which won for him a national reputation, and from this time he was recognized as one of the foremost orators of the country. He soon after entered the lecture field, where the matter as well as the manner of his discourse excited public attention. He became a pronounced opponent to Christianity and, adopting religious topics as his subjects, attacked the popular Christian beliefs with all the force of which he was capable and with the advantage of splendid rhetorical powers. Colonel Ingersoll was counsel for large corporations. His published works include: *The Gods, and Other Lectures* (1876); *Some Mistakes of Moses* (1879); *Great Speeches* (1887); *Lectures Complete* (1883); *Prose Poems and Selections* (1884). His complete works were published in New York, 1900, 12 volumes. Consult the biographical sketch by Hanford (Chicago, 1899); E. C. Smith, *Life and Reminiscences of Colonel Robert G. Ingersoll* (New York, 1906); H. E. Kittredge, *Ingersoll: A Biographical Appreciation* (ib., 1911).

INGERSOLL, Royal Rodney (1847–). An American naval officer, born at Niles, Mich. He graduated from the United States Naval Academy in 1868, served in various parts of the world, and became captain in 1903 and rear admiral in 1908. He commanded the *Supply* during the Spanish-American War and the *Maryland* in 1905, was chief of staff of the Atlantic fleet during its voyage from Hampton Roads to the Pacific, and later served on the General Board of the Navy. He was retired in 1909. He is author of *Text-Book of Ordnance and Gunnery* (1887; 4th ed., 1899); *Exterior Ballistics* (1891); *Elastic Strength of Guns* (1891).

INGHAM, ĭng′*am*, Benjamin (1712–72). An English evangelist. He was born at Ossett and graduated from Queen's College, Oxford, in 1734. He had, in 1733, become associated with the Wesleys and after his ordination, in 1735, accompanied them to Georgia. About 1737 he became a Moravian, broke with the Wesleyans, and founded in Yorkshire many Moravian congregations, which followed him when he separated from that sect. They were known as Inghamites until their head joined Sandeman, about 1760, when they broke up.

INGHAM, Charles Cromwell (1796–1863). An American portrait and figure painter. He was born in Dublin, Ireland, and studied at the Dublin Institution under William Cunning. He came to America in 1817 and settled in New York, where he became celebrated as a portrait painter of women and children and as a miniature painter. He is interesting as having been identified with the first efforts to promote painting in this country. He was one of the original members, in 1826, of the National Academy of Design, of which he was vice president from 1845 to 1850, and was one of the founders of the Sketch Club. Among his figure pieces are: "Death of Cleopatra," "Day Dream," the "White Plume." His "Flower Girl" in the Metropolitan Museum is illustrated in Isham's *American Painting*. Among his portraits of prominent men are those of De Witt Clinton, Lafayette, and Gulian C. Verplanck. His colors were pure and brilliant, and his details were finished with painstaking accuracy, but his work lacks strength and is inferior in composition.

INGHAM, Col. Frederic. The nom de plume under which Edward Everett Hale wrote *The Ingham Papers* (1869).

INGHAM, Samuel Delucenna (1779–1860). An American statesman and politician, born in Pennsylvania. Very little is known of his early life except that he had charge of a paper mill in New Jersey for a number of years. After serving in the Pennsylvania Legislature he was elected to Congress in 1813. He was a member of the House of Representatives till 1818 and again from 1822 to 1829. On March 6, 1829, he was appointed Secretary of the Treasury by President Jackson, a position which he held till Aug. 1, 1831. When the Portsmouth branch of the United States Bank was complained of as being conducted with partiality towards opponents of the administration, it was Ingham's correspondence with Nicholas Biddle, president of the bank, that resulted in its declaration of its intention to pursue an independent course and in the consequent struggle with Jackson.

INGHAMITES, ĭng′*am*-īts. A sect founded by Benjamin Ingham (1712–72), who, after visiting the German Moravians with John Wesley, endeavored to unite the chief features of the Moravians and the Methodists in a new body, called, after him, Inghamites. The organization had at one time a large number of adherents in England, but Ingham and the greater part of his followers at last went over to the Sandemanians, and the sect disappeared.

INGHIRAMI, ĕn′gē-rä′mē. An Italian noble family of Volterra.—Its earliest member of importance was the humanist, Tommaso (1470–1516), called Fedra, because of his success as Phædra in a presentation of Seneca's *Hippolytus* (or *Phædra*), but best known for his Latin orations, such as *Oratio in funere card. Ludovici de Podocataro; Oratio in laudem Ferdinandi Hispaniæ regis; Oratio in laudem Petri de Vicentia, episcopi Cesenatensis*, published by Galletti in Amaduzzi's *Anecdoti letterarii di Roma*, and for a few critical works in manuscript form on Horace and Plautus.—Francesco (1772–1846), an archæologist of the same family, was also born at Volterra. Originally intended for the navy, he early showed such love for antiquities that he soon abandoned the career of arms. He studied under Lanzi and was a friend of the famous Hackert. Director of the Volterra Public Library, which was rich in Etruscan relics, he devoted himself especially to Etruscan archæology, and when in 1811 the Marucellian collection was transferred to Florence, he moved to Fiesole, where he founded his *Poliografia Fiesolana* and later published his great work, *I Monumenti Etruschi* (1820–27). Some of his other works are: *Galleria omerica* (1827–38), *Pittura dei vasi fittili* (1831–37), and the incomplete *Storia della Toscana* (1841–45). He also helped in the publication of the *Museo Etrusco-Chiusino* (Florence, 1833).—Father Giovanni (1779–1851), brother of Francesco, a famous astronomer and mathematician, and greatly revered as a priest, was professor of astronomy and mathematics in the Ximenian Institute, director of the Florence Observatory, and member of the most celebrated academies of the world. His fame rests especially on the very simple method used by him in the compilation of his *Effemeridi di occultazione delle piccole stelle sotto la luna*

from 1809 to 1830. He also wrote: *Principii idro-meccanici, La statica degli edifizii* (1803–05); *Tavole astronomiche universali portatili* (1811); *Effemeridi di Venere e Giove ad uso dei naviganti pel meridiano di Parigi* (1821–24); *Carta topografica e geometrica della Toscana* (1830); and other minor works and articles.

INGLE, ĭng″l, RICHARD. An English seaman of the seventeenth century. He was engaged in the Maryland tobacco trade at the time of the Civil War in England and, taking the side of Parliament, drove Gov. Leonard Calvert out of the province in February, 1645. In December, 1646, Calvert returned at the head of a force of hired soldiers and regained control of the government. During his brief period of power Ingle behaved in a most lawless manner and on his return to England was called upon to answer charges preferred against him. He met this attack by presenting a petition to Parliament in which he said that his behavior had been dictated by conscience, and that he had plundered only "papists and malignants." He was especially exempted from the pardon extended to the other rebels by the restored proprietary government and last appears in history on Nov. 14, 1653, when he endeavored to secure a share in some prize money. Consult Ingle, *Capt. Richard Ingle, the Maryland Pirate and Rebel, 1642–53* (Maryland Historical Society Fund Publications, No. 19, Baltimore, 1884).

INGLEBY, ĭn′g′l-bĭ, CLEMENT MANSFIELD (1823–86). A Shakespearean critic, son of a solicitor, born at Edgbaston, near Birmingham, England, Oct. 29, 1823. He graduated from Trinity College, Cambridge (B.A. 1847; M.A. 1850), and was received into partnership with his father, but he gave up law and settled near London (1859), and died Sept. 26, 1886. Ingleby wrote for the magazines and published several books on scientific and metaphysical topics. He is, however, best known for his studies on Shakespeare, of which the most notable are: *A Complete View of the Shakespeare Controversy* (1861), a full exposure of J. P. Collier's fabrications; *Shakespeare Hermeneutics* (1875), textual criticism; *Centurie of Prayse* (1875; enlarged, 1879, and entitled *Shakespeare Allusion Book* and edited and revised by J. J. Munroe, 2 vols., New York, 1909), allusions to Shakespeare between 1591 and 1693; and *Shakespeare: The Man and the Book* (two parts, 1877, 1881).

INGLEFIELD, ĭn′g′l-fēld, SIR EDWARD AUGUSTUS (1820–94). An English admiral and Arctic explorer, son of Rear Admiral Samuel Hood Inglefield (1783–1848). Born at Cheltenham and educated at the Royal Naval College at Portsmouth, he went to sea when he was 12. He is known principally through his summer search for Sir John Franklin, in the *Isabel*, in 1852, when he broke through the "continuous land" of Smith Sound reported by the British Arctic expedition of 1818. (See ROSS, SIR JOHN.) All things considered, it was the most successful of modern summer voyages in the Arctic. He discovered the West Greenland Channel leading to the Polar Ocean, and on August 27 made the highest latitude to date in the Western Hemisphere, 78° 28′ N. In 1853 he went to the relief of Sir Edward Belcher and on his return was the first to announce the discovery by McClure of the northwest passage. He was second in command of the Mediterranean fleet in 1872–75, was knighted in 1877, and was promoted to the rank of admiral in 1879. Inglefield was the inventor of the hydraulic steering gear, a painter of marine subjects, and author of *A Summer Search for Sir John Franklin* (1853). Consult *Blue Books, Arctic Expeditions* (London, Dec. 20, 1852, and January, 1855).

INGLIS, ĭn′glĭs, CHARLES (1734–1816). An Anglican bishop of Nova Scotia, born in New York. After teaching school a few years he became a clergyman, and was appointed a missionary at Dover, Del. In 1765 he became assistant minister of Trinity Church in New York City. He was prominent as a controversialist and replied trenchantly to Thomas Paine's *Common Sense.* During the War of Independence he was a sturdy Loyalist and refused to obey Washington's command to omit from his church service the prayer for the King and royal family. He retired temporarily to Flushing, Long Island, after the Declaration of Independence, but returned to New York City after Washington's defeat and in 1777 became rector of Trinity Church. When the British evacuated New York City in 1783, he joined the United Empire Loyalist emigration and went to Halifax. In 1787 he was consecrated at Lambeth, London, as the first Bishop of Nova Scotia, with jurisdiction over the other British North American provinces, and was the first colonial bishop of the Church of England. Dr. Inglis was honored with academic distinctions by King's College (now Columbia University) and in 1770 became one of the governors of the college.

INGLIS, HENRY DAVID (1795–1835). An English author, better known by his pen name, Derwent Conway, born in Edinburgh. His books include: *Tales of the Ardennes* (1825); *Narrative of a Journey through Norway, Part of Sweden, and the Islands and States of Denmark* (1826); *A Tour through Switzerland and the South of France and the Pyrenees* (1830–31); *Spain in 1830* (1831); *The Tyrol with a Glance at Bavaria* (1833); *The New Gil Blas, or Pedro of Pennaflor* (1832), less successful than his travels; *Ireland in 1834* (1834; 5th ed., 1838); and *Rambles in the Footsteps of Don Quixote* (1837), illustrated by Cruikshank. He also edited the *British Critic,* a Jersey newspaper, for two years (1832–34).

INGLIS, JOHN, LORD GLENCORSE (1810–91). A Scottish jurist, born at Edinburgh. He was educated at Glasgow University and at Balliol College, Oxford (B.A., 1834), entered the Faculty of Advocates in his native city in 1835, and became dean of the same in 1852. He was a conservative supporter of Lord Derby, who made him Solicitor-General and then Lord Advocate of Scotland in 1852, Lord Justice Clerk, and a president of the Court of Session in 1858, and a member of the Privy Council in 1859. In 1867, as Lord Glencorse, he became Lord Justice General of Scotland and Lord President of the Court of Session. He was also prominent in educational matters, was made lord rector of King's College, Aberdeen, in 1857, and of Glasgow University in 1865, and was chancellor of Edinburgh University (1869).

INGLIS, SIR JOHN EARDLEY WILMOT (1814–62). A British soldier, born in Nova Scotia. He entered the army as ensign in 1833, took part in the suppression of the rebellion in Lower Canada in 1837 and also in the Punjab campaign of 1848–49. It was as one of the defenders of Lucknow at the outbreak of the Indian Mutiny in 1857 that his most notable service was ren-

dered. His regiment had taken refuge in Lucknow on July 1 of that year, and the city was besieged by the enemy in overwhelming numbers. When his superior officer, Sir Henry Lawrence, was wounded, Inglis took command and held out against the Sepoys until the relief of the city by Sir Henry Havelock. For this he was promoted to be major general. In 1860 he was appointed to the military command of the Ionian Islands, which at that time were in the possession of Great Britain.

INGLIS, Sir William (1764–1835). A British soldier in the Peninsular War. At the age of 15 he entered the army as ensign and in 1781 went with his regiment to America, where he remained for 10 years. In 1793 he returned to England. He took part in the campaign in Flanders and three years afterward served with distinction at the capture of St. Lucia. As commander of the First Battalion of the Fifty-seventh Regiment, he went with it to the Peninsula in 1809, where he participated in the battles of Busaco and Albuera. At Albuera he commanded the Fifty-seventh, which behaved with the utmost gallantry and suffered the loss of more than three-fourths of its number. Inglis was severely wounded, but afterward fought in several other engagements, including that at Ortez, in French territory, in 1814. After the war he was made a lieutenant general and was knighted.

INGOLDSBY, ĭŋ′gōlz-bĭ, Sir Richard (?–1685). A British soldier, born in Buckinghamshire. As a kinsman of Oliver Cromwell, he naturally espoused the Parliamentary cause at the beginning of the Civil War. In 1645 he commanded a regiment which took part in several actions and garrisoned Oxford. At that time he apparently sympathized with the radical faction, which was bent upon inflicting the extreme penalty upon Charles I. He was a member of the court which tried the King, and his signature was affixed to the death warrant. After Oliver Cromwell's death he at first heartily supported Richard Cromwell, but after the latter's short and weak protectorate was ended, Ingoldsby was quite willing to make terms with Charles II and, having loudly asserted his unwilling participation in the trial and execution of the King, was exempted from the punishment suffered by the other regicides. During the interval in which General Monk was dictator he arrested General Lambert and dispersed his soldiers. Charles II conferred knighthood upon him. Ingoldsby was a member of Parliament during part of Cromwell's régime, sat in the Protector's House of Lords, and was also member for Aylesbury during most of the reign of Charles II.

INGOLDSBY LEGENDS. A well-known collection of legends, written by the Rev. Richard Harris Barham, under the pseudonym of Thomas Ingoldsby, originally published in *Bentley's Miscellany* and republished in three series from 1840 to 1852.

INGOLSTADT, ĭŋ′gōl-shtät. An ancient fortified town of Bavaria, situated on the left bank of the Danube, 46 miles by rail from Ratisbon (Map: Germany, D 4). Its most noteworthy buildings are the fifteenth-century Frauenkirche, the old castle, and the old university buildings. The Jesuit University of Ingoldstadt was founded in 1472 by Duke Ludwig the Rich and by the end of the sixteenth century had about 4000 students. It was transferred in 1800 to Landshut and in 1826 to Munich. The town has a notable town hall, a theatre, a Franciscan cloister, and a fifteenth-century church containing the tomb of Dr. Eck, who opposed Luther. Ingoldstadt contains a number of establishments for the manufacturing of ammunition, weapons, and armor, and a school of military engineering. Soap, brushes, and beer are made. Pop., 1900, 22,207; 1910, 23,745, mostly Roman Catholics. Ingoldstadt existed as early as the ninth century. It received municipal rights at the beginning of the fourteenth century and was fortified in the first half of the sixteenth century. The town was besieged by Gustavus Adolphus in 1632, and its fortifications were destroyed by the French after a three months' siege in 1800. They were rebuilt during the first half of the nineteenth century.

IN′GOMAR THE BARBA′RIAN. A play by Maria Anne Lovell (1851), adapted from the German *Der Sohn der Wildnis* of Friedrich Halm.

IN′GOT. See Iron and Steel, Metallurgy of.

INGRAHAM, ĭŋ′gra-hăm, Duncan Nathaniel (1802–91). An American naval officer, born in Charleston, S. C., the son of a Nathaniel Ingraham who served under John Paul Jones in the *Bon Homme Richard.* In 1812 he was appointed a midshipman in the United States navy and served through the second war with Great Britain. In 1825 he became a lieutenant and in 1841 a commander. He was one of the officers in Commodore David Porter's expedition against the Caribbean pirates and during the Mexican War served in the blockading fleet of Vera Cruz and was present at the capture of Tampico. Soon after the close of the war he was placed in command of the *St. Louis* on the Mediterranean station. His firm stand against the attempt made by Austria to seize Martin Koszta, who had participated in the Hungarian revolution of 1848 and had taken steps towards becoming a citizen of the United States, was supported by the United States and aroused great popular enthusiasm. (See Koszta Affair.) In 1855 he was commissioned captain, but at the outbreak of the Civil War he resigned from the service and became chief of the Bureau of Ordnance, Construction, and Repair of the Confederate Navy, in which he rose to the rank of commodore.

INGRAHAM, Joseph Holt (1809–60). An American novelist, born at Portland, Me. He went to sea when he was a boy, served in South American revolutions, and after graduation at Bowdoin in 1832 became a teacher in Natchez, Miss. His *The Southwest by a Yankee* (1836) was a great success, and was quickly followed by sensational volumes like *Lafitte; Burton, or the Sieges; Captain Kyd; The American Lounger* (1839); *The Hunchback and the Roué* (1843). In 1855 he took orders in the Episcopal Church and settled at Holly Springs, Miss., where he wrote his popular biblical series, including *The Prince of the House of David* (1855), *The Pillar of Fire* (1859), and *The Throne of David* (1860).

INGRAILED. See Engrailed.

INGRAM, ĭn′gram, Arthur Foley Winnington (1858–). An Anglican bishop, born in Worcestershire, the grandson of Bishop Pepys of Worcester. He was educated at Marlborough College and at Keble College, Oxford, was a private tutor for three years (1881–84),

and from 1885 to 1889 was private chaplain to the Bishop of Lichfield. In 1889 he became head of Oxford House, Bethnal Green, in 1896 rural dean of Spitalfields, in 1897 canon of St. Paul's and Bishop of Stepney, and in 1901 Bishop of London and dean of the chapels royal. He visited America in 1907. He wrote: *Old Testament Difficulties* (1892); *New Testament Difficulties* (1893); *Church Difficulties* (1896); *The Men who Crucify Christ* (1896); *Work in Great Cities* (1896); *Christ and His Friends* (1897); *Banners of the Christian Faith* (1899).

INGRAM, John Kells (1823–1907). An English economist and Positivist, born in Donegal, Ireland, and educated at Trinity College, Dublin. He was fellow there (1846), professor of oratory and English literature (1852), regius professor of Greek (1866), librarian (1879), and finally vice provost. He wrote: *A History of Political Economy* (reprinted, 1888, from the *Encyclopædia Britannica*); *On the Present Position and Prospects of Political Economy* (1878); *Outlines of the History of Religion,* in which work he declares himself a Positivist; *History of Slavery and Serfdom* (in *Encyclopædia Britannica,* 1888; published separately, 1895); *Sonnets and Other Poems* (1900); *Passages from the Letters of Augustus Comte* (1901); *Practical Morals* (1904); and edited *The Imitation of Christ,* from the manuscripts of the first English translation at Dublin and Cambridge (1892).

INGRASSIA, ĭn'grȧs-sē'ȧ, or **INGRASSIAS,** Giovanni Filippo (1510–80). A Sicilian anatomist, born at Palermo. The plague at Palermo in 1575 was checked largely by his methods and through his work. He made discoveries of great importance in anatomy and described them in his *In Galeni Librum de Ossibus Doctissima et Expertissima Commentaria.* He published several other interesting works.

INGRES, ăn'gr', Jean Auguste Dominique (1780–1867). A French historical and portrait painter, a leader of the Classicists. He was born at Montauban, Aug. 29, 1780, the son of a sculptor. He soon became the most important pupil of David, whose school he entered in 1796. In 1801 he received the Prix de Rome with the picture "Achilles Receiving the Messenger of Agamemnon," now in the Ecole des Beaux-Arts; but, owing to the state of the national finances, he was compelled to remain at Paris. He occupied himself with drawings, portraits, and mythological subjects until 1806, when he was sent to Rome. There he learned to know the works of Raphael, who exercised a dominating influence upon him. He also studied the antique fresco and vase painting, and these new influences brought him into conflict with the strict Classicists. While he continued to execute large historical pictures, he was compelled to earn his living by drawing those admirable crayon portraits—300 in number—which are perhaps the most extraordinary of his works. In 1820 he migrated to Florence, laboring under the same difficulties until, in 1824, the brilliant success of his "Vow of Louis XIII" (now in Montauban Cathedral) caused him to return to Paris.

He soon became the head of a large school and the acknowledged leader of the Classicists, hard pressed by the Romanticists, under the leadership of Delacroix. In 1829 he completed his "Apotheosis of Homer," a decoration of one of the ceilings of the Louvre, which is considered his finest epic painting. Weary of the hostile criticism which this painting provoked, he gladly became director of the French Academy at Rome in 1834, remaining there until 1841. During his second stay at Rome he painted two of his most admirable works, "Stratonice" and "Cherubini Inspired by the Muse" (Louvre), which were received with the highest praise. On his return to Paris, in 1841, he was made Officer of the Legion of Honor, Commander in 1845, and Grand Officer in 1855; he was named Senator on May 25, 1862; and he was soon after appointed a member of the Imperial Council of Public Instruction. At the Paris Exhibition of 1855 a room was set apart for his pictures, and one of two grand medals of honor was awarded to him, Delacroix getting the other. "La source," sent to the London Exhibition of 1862 and now in the Louvre, showed powers unimpaired by age. He died in Paris, Jan. 17, 1867.

Ingres's greatest strength lay in his drawing. *Le dessin, c'est la probité de l'art,* was his motto. His consummate skill is very evident in his admirable crayon studies and drawings, of which the Montauban Museum contains the most valuable collection, left by the painter to his native town. To him more than to any other the French school owes that excellency of draftsmanship for which it is famous. His studies also show an incredible perseverance and sincerity of purpose. These qualities, however, were attained at the expense of color, which, when not almost monochrome, was coarse and hard. His works also show lack of originality. The figures, even of his best paintings, may be traced to models in works of Raphael, Michelangelo, or Greek vase painting.

Among the most important historical paintings of his first Roman period are: "Œdipus and the Sphinx" (1810), in the Louvre; "Jupiter and Thetis" (1811), Aix Museum; the "Sleep of Ossian" (1811) and "Romulus Conquering Acron" (1812), frescoes for Napoleon's palace on the Monte Cavallo; the "Odalisque" (1814), Louvre; "Virgil Reading the *Æneid* to Augustus"; "Pedro of Toledo Kissing the Sword of Henry IV" (1814); "Raphael and the Fornarina" (1814); "Aretino and the Envoy of Charles V" (1816); "Roger and Angelica" (1819) and "Christ Delivering the Keys to St. Peter" (1820), both in the Louvre. His later works include: "Martyrdom of St. Symphorian" (1834), Autun Cathedral; "Madonna with the Host," St. Petersburg; "Christ among the Doctors" (1842); "Birth of Venus" (1848); "Aretino Visiting Tintoretto" (1848).

Ingres is, perhaps, greatest in portraiture, where he stands in closest contact with nature. Among the best of his painted portraits are those of himself (1804); "Napoleon as First Consul" (1804), Liége Museum; "Napoleon Enthroned," Hôtel des Invalides (1806); "Lemoine" (1819); "Charles X" (1829); and especially "Bertin the Elder" (1833). The Louvre contains those of "Philibert Rivière and Wife" (1806) and of "Cherubini" (1843). Ingres also designed cartoons for the celebrated glass paintings in the chapel of St. Fernando, Paris. His works were admirably engraved, especially by Richehomme and Henriquel-Dupont. The most important of his large school of pupils was Hippolyte Flandrin (q.v.).

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INGRIA. See INGERMANLAND.

IN'GULPH, or **INGULF** (c.1030–1109). Abbot of Crowland, or Croyland, Lincolnshire. He is supposed to have been born in London and to have studied at Oxford. He became a favorite of Edgitha, the wife of Edward the Confessor; visited Duke William of Normandy at his court in 1051 and became his secretary. After a pilgrimage to the Holy Land he entered a Norman monastery. Here he remained till 1086, when he was invited to England by the Conqueror and made Abbot of Crowland, where he died Nov. 16, 1109. The *Historia Monasterii Croylandensis* (printed by Savile in London in 1596 and in more complete edition by Fulman, at Oxford, in 1684; translated into English for *Bohn's Antiquarian Library* by Riley, 1854) was long attributed to him. In 1826 Sir Francis Palgrave in an article in the *Quarterly Review*, and in 1862 H. T. Riley in the *Archæological Journal*, maintained by cogent arguments that the whole so-called history was little better than a novel and was probably the composition of a monk in the thirteenth or fourteenth century. These conclusions have been almost universally adopted. What few facts about him are known come from the *Historia Ecclesiastica* of Ordericus Vitalis (ed. Migne, Paris, 1855).

IN'HALA'TION (from Lat. *inhalare*, to inhale, from *in*, in + *halare*, to breathe). In medicine, a term used to signify the receiving into the lungs of vapors or gases for producing anæsthesia or for curative purposes. The ordinary manner of administering chloroform is as follows: Over a skeleton wire pan, the size and shape of a small deep saucer, a flannel bag is drawn. Chloroform is dropped on the bag, and the contrivance is inverted over the patient's nose and mouth. To give ether, a large square nose bag is made by folding fairly strong paper inside of a towel and then doubling the double fabric together and fastening it with safety pins. Less wasteful and more exact in the amount used, as well as vastly more elegant, are the regular inhalers, apparatus designed for the purpose and made of metal and rubber. Such an apparatus is necessary for the administration of nitrous oxide, or laughing gas. (See ANÆSTHETIC.) The vapor of hot water is employed in throat diseases, often affording great relief; and medicinal substances, such as benzoin and camphor, are sometimes used in conjunction, but it is often desirable to use the watery vapor without any combination. A very convenient and, in the absence of other apparatus, the only available way is to place a funnel over an open vessel containing hot water and inhale the hot vapor through the spout. A deep vessel, such as a two-quart earthen pitcher, may be used, containing a pint of boiling water—the patient breathing from the open mouth, putting his face close over the vessel, with care to moderate the heat of the contents. The vapor of carbolic acid is often beneficial as an inhalant and may be administered in a similar manner. The volatile oils, however, are most generally used. There are various kinds of apparatus for inhalation, with the common object of introducing vapor to the lungs in the proper strength or temperature and due admixture of air. Oxygen is administered by inhalation in many diseases, especially in anæmia and pneumonia. It is given from a cylinder, from which it escapes as regulated by a cork, passing through a "wash bottle" containing water before it reaches the tube, or inhaler, held in the patient's nostril or mouth.

INHAMBANE, ē'nyàm-bä'nā. An important seaport town in Portuguese East Africa, situated on Inhambane Bay, in lat. 23° 50′ S., long. 35° 25′ E. (Map: Africa, H 7). It has many fine European buildings, including a fort, churches, and a mosque. Its harbor admits vessels of 28 feet draft, and its trade in wax, copal, ivory, mafurra, nuts, and rubber amounts to about £250,000 ($1,250,000) annually. Pop., about 4000, of whom 100 are Europeans and 250 Asiatics.

INHER'ITANCE (OF. *enheritance*, from *enheriter*, *inheriter*, to inherit, from Lat. *inhereditare*, to appoint as heir, from *in*, in + *heres*, heir; connected with *herus*, master, Gk. χείρ, *cheir*, hand, Skt. *har*, to take). In a popular sense, the acquisition of property, either real or personal, whether by will or intestacy, through the death of the former owner. In the more restricted sense of the English and American law, however, the term is confined to the transmission of real property by descent only. The popular use of the term to describe gifts, whether of land or goods, by last will and testament is wholly inaccurate. Personal property does not in any event pass by inheritance, but upon the death of the owner intestate goes to his personal representatives for purposes of administration (q.v.) and distribution (q.v.).

Strictly speaking, therefore, inheritance is confined to certain kinds of interests in land which have come to be known as estates of inheritance. (See ESTATE.) These include the two classes of estates known as fee simple and fee tail (qq.v.). In the former the inheritance is unrestricted—or "general," as it is termed—being open to all persons standing in any degree of consanguinity to the decedent, collateral as well as lineal. In the latter the inheritance is restricted to the issue of the intestate, or even to a special class of lineal descendants, as to the issue of a certain wife begotten, or even to the male or the female issue. This quality of inheritability, now regarded as an essential attribute of the absolute ownership of real property, has not always been a characteristic of such estates, but, like the corresponding quality of alienability, was gradually added to the fee as that originally existed under the feudal system of land tenure. For the rules governing inheritance, see DESCENT; HEIR; HEREDITAMENT.

The term "inheritance" is also frequently employed to describe the property or estate acquired by descent. This may, in addition to the real estates of inheritance above described, include also certain privileged chattels, known as heirlooms. (See HEIRLOOM.) Consult the authorities referred to under DESCENT.

INHERITANCE TAX. A charge or assessment on the succession or devolution of property from a deceased person to his heirs or legatees

Such taxes were imposed in Rome over 2000 years ago and in some form have been a source of revenue in several of the continental countries of Europe almost since their organization as independent governments. In England Gladstone

called the various inheritance tax charges "death duties," and the name has since come into common usage. The self-governing colonies of Great Britain, particularly Australia and New Zealand, have followed her example, and death duties are one of the chief sources of revenue in those progressive commonwealths. Taxes of a similar character were imposed by the United States government as a part of its internal revenue system during the Civil War, but were repealed some time after its close. However, in some form or other, this form of taxation is imposed in a number of the United States.

The form, rates, and method of assessment and collection of such taxes vary considerably in different states and countries. There are, however, certain general characteristics common to most jurisdictions. Such laws sometimes provide for a progressive rate according to the amount of property of the estate, also a graduated rate according to the degree of relationship of the individuals entitled thereto. In some jurisdictions the portion to which a widow or minor children become entitled is exempt up to a certain amount, and lineal descendants are favored in preference to collateral relatives whenever any distinction is made.

The English death duties are graduated from 1 per cent to 10 per cent, according to the amount involved and the degree of relationship of the beneficiaries. The Canadian provinces have followed the English statutes closely, both as to rates and in other respects. On the Continent Germany, Austria, France, Switzerland, Holland, Russia, Italy, Spain, Portugal, Greece, Denmark, and Sweden have inheritance or succession taxes.

The laws imposing such taxes have occasioned a great deal of litigation in the United States. Their constitutionality has been attacked in several States, the contestants claiming that they do not provide a uniform method of taxation affecting all persons alike, as required by the constitutions of most States, but this contention has been repudiated by the courts of most of these jurisdictions. These decisions have proceeded on the ground that such a tax is equally imposed and properly apportioned upon all classes; that it is a tax on the succession or devolution of property rather than on the property itself and is therefore uniform in its operation and effect. Deathbed gifts, made obviously to escape such charges, are usually included within the scope of these laws. The justice and convenience of this form of taxation have appealed to most economic writers, and it is rapidly growing in popular favor. Consult: B. F. Dos Passos, *Collateral Inheritance, Legacy, and Succession Taxes* (2d ed., New York, 1895); Tristram and Coote, *Probate Practice* (London, 1900); University of Wisconsin, *Inheritance Tax: A Bibliography* (Madison, 1910); Lee, Higginson and Company, *Inheritance Tax of all the States* (Boston, 1911). See Death Duties; Inheritance; Succession; Tax and Taxation.

IN'HIBI'TION (Lat. *inhibitio*, from *inhibere*, to hold back, from *in*, in + *habere*, to hold). A term used in physiology to denote a prevention or restraining action. Inhibition in a nervous mechanism is a resistance to disordered or excessive action. An inhibitory nerve is one which controls the organ or other structure to which it goes, preventing undue functional activity.

INHIBITION, Writ of. A writ or process directed to an individual forbidding him to do some particular act. It is derived from the civil law, where it was employed by the courts of appeal to stay the execution of judgments by inferior courts during the pendency of the appeal. The writ was used in the early English law for the same purpose, but was later superseded by the writ of prohibition. The term survives only in ecclesiastical law and in the practice of the Roman and English churches. Consult Sir Walter Phillimore, *Ecclesiastical Law* (2d ed., 2 vols., London, 1895).

IN HOC SIGNO VINCES, ĭn hŏk sĭg'nō vĭn'sēz (Lat., In this sign thou shalt conquer). The legend on a flaming cross which, according to tradition, appeared in the sky to the Roman Emperor Constantine I before his battle with Maxentius.

IN'IA. A cetacean of the family Platanistidæ, and thus related to the susu of the Ganges, which inhabits the Amazon and its larger tributaries. Only one species (*Inia geoffrensis*) is known. It reaches a length of 8 feet and may be wholly pink in color or a varying mixture of black and pink. The Indians regard it with mingled fear and superstition, and it is hard to learn what are its true habits.

ÍÑIGUEZ. See García Iñiguez.

INIOMI, ĭn'ĭ-ō'mī (Neo-Lat. nom. pl., from Gk. *ἰνίον, inion*, muscle at the back of the shoulder + *ὦμος, ōmos*, shoulder). An order of teleost, soft-rayed, deep-sea fishes, which are closely allied to the Isospondyli, but lack the mesocoracoid and have an imperfect connection between the shoulder girdle and the cranium. It consists of several families of fishes dwelling in the oceanic abysses, most of which have phosphorescent light organs or photophores. (See Lantern Fish.) Consult Jordan and Evermann, *Fishes of North and Middle America* (Washington, 1896). See Isospondyli.

INI'TIATIVE. A political device, originating in Switzerland and which has recently gained a foothold in the United States, which aims to secure to the mass of the voters a more direct participation in legislation by requiring the submission either to the legislature or to popular vote of proposals for legislation initiated by one or more of such voters. In its developed form, as applied in some of the American States, the initiative may be regarded as an application of the "town-meeting" form of government to communities too numerous and complex to make that form of legislation strictly applicable, or as a device for making effective the right of petition. A petition addressed by a citizen or body of citizens to his or their representative legislature may be granted or rejected or wholly ignored. Laws providing for the initiative in effect forbid this last method of dealing with a petition asking for specific legislative action, by requiring the submission to a vote of such a measure if properly presented and supported. Historically, however, the initiative had its origin in the "direct democracies" (*Landsgemeinde*) of the smaller Swiss cantons—popular assemblies composed of all the voters of the cantons—where a single voter may require the submission of his proposal to popular vote. In the larger cantons the number of petitioners required for the initiation of a legislative measure varies from 70 in the Outer Rhodes to 12,000 in Bern. The principle has been adopted in all the Swiss cantons except Lucerne, Fribourg, and Valais, and was adopted in 1891 by the Confederation as a

method of proposing an amendment to the constitution.

The initiative made its first appearance in the United States through its adoption by the State of Oregon in 1902. It has since been adopted in some 20 States, and proposals for its adoption are pending in about a dozen other States. In some States it is restricted to the initiation of ordinary legislation, but in others it is applied to the amendment of the State constitution as well. The number of petitioners required to put it into effect varies from 25 per cent of the registered voters (Arizona) to 3 per cent (Ohio). In all the States it is coupled with the referendum, requiring the submission of the proposed measure to popular vote—either, as is generally the case, in the first instance or, as in Ohio, in case the legislature fails to approve the proposal. In the latter case there is a double initiative—first to secure the consideration of a measure by the legislature and then as a method of appeal from the legislature to the body of voters.

The initiative thus takes its place as one of a number of related political devices whose object is to obviate in some degree the misrepresentative character of the American representative system by giving to the people, by direct political action, a more immediate control of the business of government. Other devices of this sort, such as the referendum, the recall of elective officials, direct primaries, the presidential preference primary, the direct election by popular vote of United States Senators, woman suffrage, and the short ballot, are described and discussed under their appropriate titles. Of all these devices of popular government the most difficult to set up as a working institution is the initiative. The technical difficulties attending the drafting of legislative measures are coming to be understood even in a country where legislation has often been of a haphazard character and where the preparation of bills has usually been left to private initiative. But even the most slipshod measure, when subjected to legislative scrutiny, may be converted by amendment into a workable and effective piece of legislation. This is clearly impossible in the case of a measure proposed by the initiative, which may be put forth by any one who secures a sufficient number of signatures to the initiating petition.

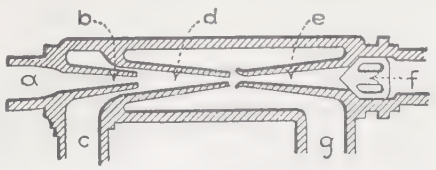
The "Wisconsin Plan," as it is called, seeks to obviate this objection by permitting any person, after securing the introduction of a bill in the legislature and not otherwise, to have the measure submitted, on a proper petition, to popular vote. As against this theoretical objection it is urged that, in those States in which the initiative has been in operation, the difficulty urged has not in practice proved to be a serious one, and that the system has demonstrated its efficacy by the good quality of the legislation which has resulted from it. However this may be, it cannot be doubted that the device is growing in popular favor, and that it is likely in the near future to be adopted in all the States of the American Union. It should be noted that both the Progressive and Socialist parties have adopted the initiative as a part of their programme of political reform. See LEGISLATION; PRIMARY ELECTION; REFERENDUM; RECALL; POPULAR GOVERNMENT; ELECTION; ELECTORAL REFORM.

INJALBERT, ăn'zhál'bâr', JEAN ANTOINE (1845–). A French sculptor, born at Béziers. He was a pupil of Dumont and won the Prix de Rome in 1874. At the Exposition of 1889 he won the Grand Prix and in 1900 was a member of the jury. In 1905 he was made a member of the Institute and in 1910 Commander of the Legion of Honor. His work shows powerful imagination and strong personality as well as great knowledge. Among his statues are "Hippomenes," at the Luxembourg; "Eve after the Fall," at Montpellier; "Sadi-Carnot," at Cette; "Love Conquering the Lion," "Fame," "The Laughing Child," and several others, at Béziers.

INJEC'TION (Lat. *injectio*, from *injicere*, to throw in, from *in*, in + *jacere*, to throw). A term applied in medicine to a fluid thrown into the passages or cavities of the body by means of a syringe or elastic bag. The fluids thus injected into the rectum or lower bowel are termed enemata. (See ENEMA.) The injection of a dilute solution of salt into the veins has been in use since about 1879 and has been found to be of great service in many diseased conditions. The injection of blood into the veins is described in the article TRANSFUSION OF BLOOD. See HYPODERMIC MEDICATION.

INJEC'TOR (Lat. *injicere*, to throw in). Specifically an apparatus for feeding water into a steam boiler by means of a steam jet from that boiler, acting through a tapering or converging nozzle upon the mass of water to be forced into the boiler. Generally an apparatus by which one fluid moving at high velocity through a tapering or converging nozzle can be made to set in motion another fluid upon which it impinges in its flow, in the direction of the flow of the fluid of higher velocity. The injector principle is used in the chimney stacks of locomotive or other boilers to cause draft, in the atomizers or spray apparatus of physicians and perfumers, and in the burners for liquid fuels under boilers. When the pressure against which the injector feeds is equal to or nearly that of the impelling or actuating jet, the device is an injector. When the resistance pressure is much lower than that of the impelling jet, it is called an ejector. With a given pressure of the impelling jet, ejectors deliver much more liquid against their low resistance than the injector working against a high resistance.

Injectors and ejectors are of two classes: in one the water to be impelled is at the level at which the injector is set up; these are nonlifting types. In the other the water has to be raised by atmospheric pressure from a level lower than the injector, and hence the latter must first create and then maintain at its suction end a pressure below atmosphere and sufficiently so to enable the water to be raised. These are lifting injectors. The lifting injector is the general case. The accompanying diagram is a schematic presentation of the essentials of such a device. Dry steam from the steam boiler to be fed with water in the specific type of boiler-feeding in-



jector enters through the pipe *a* at high velocity. The pipe *c* leads from the tank or supply of water and is full of air, as is the body of the instrument. The rapid flow of the jet of steam and the impact of its particles carry the air above the water in the pipe *c* out of the injector to the open air through the waste pipe *g*, and the flow towards *g* therefore reduces the air pressure in *c*, which is air-sealed at the bottom by the water it contains. Hence atmospheric pressure outside of *c* forces the water up until it meets the steam jet in the "combining tube" *d*. Here two things happen: the steam is condensed by the cooler water, and the rapidly moving jet imparts some of its previously high velocity by impact upon the water. The heat energy of the mass of steam is imparted to the water, raising its temperature; the kinetic energy or living force of the jet or mass of steam passing per second is wholly imparted to the water, but, by reason of the greater mass of the water, only a part of the original steam velocity is imparted to the water. Enough remains, however, to make the combined jet of steam and water jump past the break between nozzles *d* and *e* and rush with great energy of mass and velocity in the direction of jet motion and impinge against the check valve *f*, opening it against the static pressure on its back and allowing the water to pass into the boiler against such pressure. The rush of the water jet removes all air and steam in the waste pipe and in the body of the injector and maintains the necessary low pressure in the suction pipe *c*. If the velocity of flow in *a* falls below that necessary to impart kinetic energy to the jet of water, the injector "breaks," as it is called, and steam and water escape from the waste, the suction ceases, and the instrument must be cooled off and started again.

Modern injectors have simplified the practical operation of feeding by interconnecting the waste-pipe valve and the starting-jet valve. Double-tube injectors are also much in use—sometimes called "inspirators" as a trade name—in which there are two jets side by side in successive chambers. The first is the steam jet and inducing chamber; the second is the forcing chamber, taking the first jet of warmed water and using it as a further inducing jet for a second supply of water and forcing the latter into the boiler. The injector principle was first advanced by Henri Jacques Giffard, a French engineer and mathematician. Restarting injectors are such as will resume their function after a "break" in the flow without the attention of the operator. Injectors preheat the feed water and hence are much in use where this is an advantage. They are less efficient as movers of cool water than the ordinary power pump. They are light in weight, compact, and dispose of their own exhaust steam. For a history of the development of the injector and the principles of its action, consult Kneass, *Practice and Theory of the Injector* (New York, 1910), and for descriptions and illustrations and representative forms, consult Hutton, *Mechanical Engineering of Power Plants* (ib., 1909); Inchley, *Steam Boilers and Boiler Accessories* (London, 1912); Wakeman, *Practical Guide for Firemen* (New Haven, Conn., 1906); Hughes, "Injector Metal and Fittings," in *Journal of the Institute of Metals* (London, 1911); *Proceedings of the American Railway Master Machinists Association* (Chicago, 1913). For theory, consult Wood, *Thermodynamics, Heat Motors, and Refrigerating Machines* (8th ed., New York, 1899), and Peabody, *Thermodynamics of the Steam Engine and Other Heat Engines* (6th ed., ib., 1909); and for a brief discussion, Kent, *Mechanical Engineers Pocket Book* (8th ed., ib., 1913).

The ejector principle is used in steam-engine condensers, where the flow of condensing water meets the exhaust steam, as in the combining tube *d*, and by its condensation and its flow maintains a pressure less than atmosphere in the pipe *a* which leads from the engine cylinder. The outfall through *f* need only have a velocity sufficient to overbalance the tendency of atmospheric pressure to enter and establish itself from that direction. The injector principle is also used in many forms of blue-flame wickless gas stoves, where the jet of gas is the impelling jet, and the air for combustion is entrained with and by it.

IN'JIA. See Bouto.

INJUNC'TION (Lat. *injunctio*, from *injungere*, to command, from *in*, in + *jungere*, to join; connected with Gk. *ζευγνύναι*, *zeugnynai*, Skt. *yuj*, to join, and ultimately with Eng. *yoke*). A judicial writ or process of a court of equity, commanding a person or persons named therein to do or not to do a particular thing. It had its origin in the Roman law, under which system a somewhat similar process, known as an interdict, was employed. The idea was introduced into England and Scotland by the early chancellors, as a result of their search for remedies to modify the harshness of the common law and to supplement it where inadequate to meet the ends of justice, though it had at an earlier period been employed with considerable freedom by the king's court (*curia regis*). The scope of its use and application has greatly widened until to-day it is perhaps the most important remedy of an equitable nature.

The purposes for which an injunction may be employed may be described generally as follows: (1) to prevent the commission of certain wrongs of a civil nature; (2) to protect rights; (3) to compel the restoration of rights. The greatest proportion of injunctions fall under the two classes first named and are usually termed *preventive*, because they operate to prevent wrongs by restraining acts, while the third class, called *mandatory*, as descriptive of their purpose to compel the affirmative performance of an act, are more rarely used. A common example of a preventive injunction is one to restrain the continuance of a nuisance, such as generating unusual quantities of black smoke and cinders in a great city; whereas an injunction to compel the restoration of running water to its natural channel by a person who has wrongfully diverted it therefrom would be classed as mandatory. Some other important uses of preventive injunctions are: to prevent the violation of contracts; to restrain or prevent waste, or nuisance; to protect patent rights, copyrights, and trade-marks from infringement; and to stay proceedings in a court of law. The latter object is effected by enjoining one or both of the parties to the action from proceeding further in the cause. A court of equity will sometimes enjoin a party or parties within its own jurisdiction from prosecuting an action in another jurisdiction. A notable example of such exercise of power is where a United States court restrains all creditors prosecuting actions in State courts for the enforcement of their claims against a bankrupt from proceeding further in

their actions, thus leaving all matters relating to his estate to its own determination.

A court of equity follows the same rules in this summary method of procedure as in the exercise of its other functions, and therefore will only grant an injunction when the remedy at law is inadequate to give a party who is wronged the complete relief to which he is entitled. One reason for issuing an injunction is to prevent irreparable damage. Where, e.g., a person maintains an offensive nuisance which operates to keep away customers from a near-by shop, the shopkeeper could recover damages in a court of law; but, as a long delay may ensue before his cause can be reached, his business may be ruined in the meantime. His damages in that event would be hard to estimate and therefore that relief would be manifestly inadequate to protect him; whereas, if the nuisance is immediately abated, in compliance with an injunction order, he is saved irreparable damage. Much criticism and controversy have been occasioned by cases where the courts have enjoined striking laborers or others from inducing or coercing workingmen to strike for the purpose of forcing their employers to grant the concessions demanded. This use of the injunction has been stigmatized as "government by injunction" and has been denounced by labor organizations and some publicists as an unwarranted, new, and arbitrary exercise of power by the courts. Except in the case of certain extreme injunctions improperly granted, this contention is not supported by legal authority, as the right to conduct one's business without interference or molestation from others in any manner is a long-established principle of the common law, the violation of which is an actionable wrong at law, and a court of equity has jurisdiction to prevent wrongs and injuries to persons and their property and to restrain combinations and conspiracies for unlawful purposes. Of course the crux of the question in all these cases is, what legally constitutes an unlawful interference with another's business; and upon this point opinions are widely divergent. There has recently been considerable agitation in favor of legislation limiting the power of the courts to issue injunctions and punish for contempt in cases arising out of labor disputes.

The courts have not defined or limited the circumstances in which relief by injunction will be granted, but reserve the right to exercise their power whenever a novel state of facts may seem to present urgent equitable grounds for doing so.

With reference to the time when they are granted and remain in force, injunctions are also classified as *preliminary*, or *interlocutory*, and *perpetual*. Where there is danger that great damage will be done by one party to another before the questions between them can be determined on their merits, a court of equity, or judge thereof, may, on application of one party to him on the bench or at chambers, at any time of the day or night, and without notice to the other party, grant an injunction to prevent the continuance of the wrongs complained of during the pendency of the action, or, if no action has been commenced, to operate as a stay until an application is made to the court by the party enjoined to have it dissolved. Upon such application all the facts on both sides are presented to the court, and it may then dissolve the injunction or make it permanent. In order that the party thus summarily enjoined may not suffer damage if it is finally determined that he was within his rights in doing the acts complained of, the court or judge requires the party seeking the relief to give sufficient security that he will pay all damages that his adversary may sustain by reason of the injunction if it is thereafter dissolved for lack of sufficient legal grounds to sustain it. This temporary, or interlocutory, injunction may be made perpetual if the court later determines that the grounds advanced for its continuance are valid in law and have been sustained by the proof.

For many years the granting of the remedy of an injunction was the special prerogative of the courts of chancery in England and the United States. During the last century, however, the power of issuing injunctions in certain classes of cases was by statute conferred on the ordinary courts of common law in England and in several of the United States. The merging of the courts of equity and common law in a single tribunal in England and most of the United States has done away with the distinction. See CHANCERY; EQUITY.

Consult: Beach, *Treatise on the Law of Injunctions* (Chicago, 1895); W. W. Kerr, *Treatise on the Law and Practice of Injunctions* (4th ed., London, 1903); J. L. High, *Treatise on the Law of Injunctions as Administered in the Courts of the United States and England* (4th ed., Chicago, 1905); H. C. Joyce, *Treatise on the Law Relating to Injunctions* (3 vols., Albany, 1909); A. P. Thom, *Judicial Power and the Power of Congress in its Relation to the United States Courts* (Washington, 1912).

IN'JURY (from Lat. *injuria*, harm, from *injurius*, acting wrongfully, from *in-*, not + *jus*, right, law). In the legal sense, an actionable wrong; any act in violation of the rights of another of which the law will take cognizance by allowing the injured party an action against the wrongdoer to recover specific property or damages or both. In the practical sense the term may also be said to embrace actionable wrongs against the state, in which case the result sought by the action brought by or on behalf of the state is the punishment of the offender, usually by criminal process. Injury, in the legal sense, is to be distinguished from wrongs which are *damnum absque injuria*, i.e., acts resulting in harm to another for which the law gives no remedy.

An injury may also be *injuria absque damno*, i.e., an injury which, although a technical invasion of a right, is without actual damage to the injured party, in which case the injured party may recover nominal damages or, in rare cases, obtain an injunction restraining the wrongdoer. The principles governing the law of civil or private injury are discussed at length under TORT and under EQUITY, which exercised its preventive jurisdiction over torts. See also CONTRACT; TROVER; TRESPASS. The principles governing the law of public wrongs are discussed under CRIME; CRIMINAL LAW.

INK (OF. *enque*, *enche*, Fr. *encre*, Prov. *encaut*, It. *enchiostro*, ink, from Lat. *encaustum*, Gk. ἔγκαυστον, *enkauston*, purple ink, from ἔγκαυστος, *enkaustos*, burned in, from ἐγκαίειν, *enkaiein*, to burn in, from ἐν, *en*, in + καίειν, *kaiein*, to burn). Any colored fluid used in writing or printing. The use of ink for writing was known to the ancients, and papyri and manuscripts dating back to more than 4000

years ago are to be found in various museums. Many of these writing fluids were pigments, consisting chiefly of various forms of carbon, such as ivory black, lampblack, and soot mixed with gum, in order to avoid too great fluidity; others were apparently actual dyes of iron and acids, to which carbon was added. The liquor of the cuttlefish is reported by Cicero and Pliny to have been used among the Romans as a writing fluid. Elegant manuscripts, written in gold and silver inks, are well known, and among these may be mentioned the celebrated *Codex Upsal,* which is written in silver ink on violet parchment, the initials and certain passages being in gold. Some written wholly in red ink, made of vermilion, purple, or cinnabar, are still preserved, although red was more frequently used for the headings and initials of books, chapters, and pages. The emperors of Constantinople were in the habit of signing their acts in red ink, and the first secretary was guardian of the vase containing the cinnabar, or vermilion, which the emperor used. Green ink, though rarely found in charters, often occurs in Latin manuscripts, especially those of later years. It was also used by the guardians of the Greek emperors before their wards attained their majority.

Inks are commonly treated under the two heads of writing ink and printing ink.

Black Writing Ink. Ordinary black writing ink is a compound obtained by the action of ferrous sulphate on an infusion of nutgalls or any similar compound containing tannin and is essentially a ferroso-ferric gallate. Typical of this kind of ink is the one consisting of the following ingredients: nutgalls, 12 pounds; ferrous sulphate, 5 pounds; gum Senegal, 5 pounds; and 12 gallons of water. It is prepared by carefully selecting nutgalls, preferably the variety from Aleppo, as that contains a larger proportion of gallic and tannic acids than other varieties. They are then crushed and treated with distilled water for several days, after which the clear liquid is carefully drawn off, and to it is added a clear mucilage, made by previously dissolving the gum in hot water and filtering. Finally, the ferrous sulphate is dissolved separately and mixed with the foregoing solutions. Some recommend, instead of a solution of ferrous sulphate, that clean iron filings be added to a portion of nutgalls and gum and the liquid agitated until it becomes deep black in color. In either case the color is due to the oxidation of the iron salt and its combination with the gallic acid in the solution. It has been determined that the proportion of three parts of the galls to one part of the ferrous sulphate yields a satisfactory ink, but in actual practice more ferrous sulphate is usually added. In order to obtain a deeper black, logwood and indigo extracts are sometimes added. Runge in 1849 described a chrome ink which he made by adding 1 part of potassium chromate to 1000 parts of a solution of logwood, made by exhausting 1 pound of logwood with 6 quarts of boiling water. The potassium chromate is added gradually when the solution is cooled, the mixture being constantly stirred during the addition. This ink is cheap, permanent on paper, and unaffected by exposure to water or acids. The class of inks known commercially as alizarine inks as a rule do not contain alizarine at all, but are gallate of iron inks acidified with acetic acid to prevent the formation of sediment. The ink, however, acts upon a steel pen until a protective coating is formed upon the pen. The use of ammonium vanadate, with an infusion of nutgalls, produces an exceedingly black writing fluid, but the expense of the vanadium salt has prevented its common use. Certain aniline blacks, e.g., nigrosine, owing to their fluidity and the fact that they form no sediment, have been extensively used in fountain pens.

Red Writing Ink. Red inks are commonly prepared from brazilwood, cochineal, or carmine; those made from brazilwood are regarded as more permanent, while those from cochineal yield the most brilliantly colored fluids. An excellent quality of red ink may be had by boiling 2 ounces of brazilwood in 32 ounces of water, and by adding to that solution, after straining, ½ ounce of stannous chloride (tin salt) and 1 dram of gum arabic. Brazilwood inks have been almost wholly, and cochineal inks largely, replaced by aniline dyes. Magenta or aniline red and eosin are the chief dyes used. They are usually dissolved in spirit, which is then suitably thinned out with water.

Blue Writing Ink. Ordinary blue ink is a preparation of Prussian blue and may be made by triturating 6 parts of this substance and 1 part of oxalic acid with a little water to a perfectly smooth paste and diluting the mass with a sufficient quantity of distilled water. An excellent blue ink is made by dissolving soluble Paris blue ("cornflower blue") in alcohol.

Aniline Writing Inks. The general formula for making aniline inks is to dissolve 15 parts of any aniline color in 150 parts of strong alcohol in a glass vessel and, after allowing the solution to stand for three hours, adding 1000 parts of distilled water; the liquid is then heated gently for some hours, or until the odor of the alcohol has quite disappeared, whereupon it is mixed with a solution of 60 parts of powdered gum arabic in 250 parts of water. This formula may be followed for the ordinary violet or purple ink, as well as for the many other colors, such as green, yellow, etc., which are sometimes used.

Metallic Inks. Gold, silver, and similar metallic inks may be made by taking equal parts of the metal in leaf and triturating with honey until the metal is reduced to the finest possible state of division; then agitating with 30 parts of hot water, allowing to settle, decanting the water, repeating the washing several times, and finally drying the metal and mixing it with a medium consisting of equal parts of pure gum arabic and soluble potash glass in four parts of distilled water. Three or four parts of this medium will be found sufficient for one part of the powder.

Special Inks. Copying ink is made by adding a thickening substance, such as gum arabic, gum Senegal, dextrin, or glycerin, to ordinary ink. Hectograph inks, designed to furnish approximately 100 copies, consist of some strong soluble coloring matter in 10 per cent glycerin solution. An aniline blue is usually employed. Dyes insoluble in water or glycerin, such as magenta, are dissolved in alcohol before mixing with the other ingredients. The ordinary marking or indelible inks are made by dissolving a silver salt, usually the nitrate, in water and ammonia, to which a small quantity of gum is added. Such inks may be removed by treatment with potassium cyanide. More permanent inks may be made by using solutions of gold or platinum chloride.

Sympathetic or Secret Inks. These are fluids which produce colorless writing upon paper; but, when the latter is subsequently exposed to heat or proper chemical action, the writing becomes colored and clearly readable. Among the favorite secret inks may be mentioned solutions of lead acetate, whose invisible marks on paper turn black on exposure to sulphureted hydrogen, owing to the formation of sulphide of lead. Cobalt nitrate solution furnishes another favorite secret ink, its marks on paper turning blue on treatment with oxalic acid. A solution of either cobalt chloride or the nitrochloride will yield characters which are green when heated, but which disappear on cooling; also a weak solution of nickel and cobalt chlorides will produce green tracings.

Ink Powders. These are nothing but the common constituents of ink in a dry state. Black ink powder may be made by mixing 4 parts of powdered nutgalls, 2 parts of ferrous sulphate, and 1 part of gum arabic. The dry aniline colors may be similarly used.

Printing Inks. Any ink used in printing is essentially a pigment of the required color, mixed with an oil or varnish. John Underwood in 1857 before the Society of Arts described the properties essential to a good printing ink as follows: It must distribute freely and easily and work sharp and clean; it must not have too much tenacity for the type, but come off freely and adhere to the paper; it must dry almost immediately on the paper and not dry at all on the type or rollers; it should be practically proof against the effects of time and chemical reagents and never change color. The pigment used for the best black ink is lampblack, and the vehicle is usually linseed oil. Mineral pigments are generally used to produce the different colored printing inks. Details concerning the manufacture of printing inks may be found in any of the larger handbooks on printing. In lithography the writing ink for drawing on the stone may consist of equal parts of tallow, wax, soap, and shellac, mixed up with a sufficient quantity of Paris black. The printing ink used to take the impression of engraved plates, with a view to transference to the stone, may consist of equal parts of tallow, wax, soap, shellac, and pitch.

Consult: Spon, *Workshop Receipts* (London, 1883); Schluttig and Neumann, *Die Eisengallustinten; Grundlagen zu ihrer Beurteilung* (Dresden, 1890); Frazer, *Bibliotica; or, the Study of Documents* (Philadelphia, 1901); Lehner, *Ink Manufacture,* translated by Morris and Robson (London, 1902); Andes, *Schreib-, Kopier- und andere Tinten* (Vienna, 1905); Thorpe, *Dictionary of Applied Chemistry* (London, 1912); W. A. Melcher, *Mechanical Ink Marks* (Philadelphia, 1914).

INK'BERRY, or WINTERBERRY (*Ilex glabra*). An evergreen shrub, 2 to 4 feet high, which belongs to the holly family (*Aquifoliaceæ*), and which is found upon sandy soils in the United States from Massachusetts to Florida. The leaves are dark green, an inch or more long, wedge-lanceolate or oblong, smooth and shining on the upper surface; the sterile flowers in clusters of from three to six, fertile ones solitary and followed by small black berries. Its leaves and bark were formerly used as a remedy in intermittent fever. Its principal use is for decoration, for which purpose it is shipped to New York and Philadelphia from southern New Jersey. Sometimes it takes the place of the American holly (*Ilex opaca*), but it is not so ornamental.

INK CAP (*Coprinus atramentarius*). An edible toadstool. See MUSHROOM.

INKERMAN, ĭŋ'kēr-măn'. An elevated site in the Crimea, near the eastern extremity of the harbor of Sebastopol (Map: Russia, D 6), memorable as the scene of a battle of the Crimean War between an army of Russians about 40,000 strong and detachments of the allied forces, consisting of about 14,000 troops actually engaged. At about five o'clock on the morning of Nov. 5, 1854, the Russians, who had marched from Sebastopol, concealed by the darkness and a thick, drizzling rain, appeared crowding up the slopes of the plateau on which the allies were posted. Here a portion of the English Royal Guards made an heroic stand for six hours against a body of Russians that was probably five times as numerous. When victory seemed almost assured to the Russians, French reënforcements came to the aid of the British and by a splendid charge drove the enemy off the field.

IN'KLE AND YAR'ICO. A drama by George Colman the Younger, produced in 1787.

IN'KNEE. See KNOCK-KNEE.

IN'LAY'. A general word for decorative or picture ornament, usually flat, produced by the insertion or application on a hard surface of pieces of wood, metal, shell, ivory, tile, stone, or enamel (glass), in contrasting colors; mostly on furniture, walls, floors, and jewelry. In the Metropolitan Museum, New York, is an Egyptian stool, dating from about 2000 B.C., with legs and bottom cross rails terminating in ducks' heads, the eyes and markings on which are rendered by inlays of ivory and ebony. There are similar stools in the British Museum and in the Louvre. In the *Odyssey* Ulysses, describing to Penelope the bridal bed that he has made, says: "Beginning from the headpost, I wrought at the bedstead till I had finished it, and made it fair with inlaid work of gold and of silver and of ivory." Many of the bronze mounts of beds that survive from Pompeii have inlays of silver and of copper. Much of the jewelry (q.v.) of the Germanic tribes consisted of *plate inlay*—garnets or red glass jewels cut in slices and inlaid on gold plate. Other methods of jewelry inlay are cloisonné and champlevé. (See ENAMEL.) Other metal inlays are niello (q.v.) and damaskeening (q.v.). The Italian name for the famous Florentine colored-pebble inlays is pietra dura (q.v.). All inlays of small and comparatively uniform pieces of colored glass, marble, and other stone are grouped under the head of mosaic (q.v.). The Italian name for wood inlay is tarsia (q.v.). The French name for furniture inlays, especially thin wood or veneer (q.v.) inlays, and inlays of the type developed by André Charles Boulle (q.v.), is marquetrie. The name for floor mosaics of wood, large in scale and from ¼ to 1¼ inches thick, is parquetry (q.v.). Mosaic inlay of carnelian, jasper, agate, jade, lapis lazuli, and other beautiful stones, on white marble was introduced into India in the sixteenth century by the French artist who decorated the Taj Mahal (q.v.). Of this kind of work there is a splendid example in the Metropolitan Museum, New York, in the form of a pedestal of white marble, one of four that formerly carried the platform of the gorgeous peacock throne of the palace of Shah Jehan (reigned 1628–58) in

Delhi. Both base and abacus of the pedestal, that is 22½ inches high with capital 11 inches square, are inlaid with floral arabesque, and the short bulbous shaft is 16-sided and faceted into triangles and hexagons, each hexagon being inlaid with conventional flowers.

IN'MAN, HENRY (1801–46). An American portrait, genre, and landscape painter. He was born at Utica, N. Y., Oct. 20, 1801, and was for seven years an apprentice pupil of John Wesley Jarvis in New York City. He was the first vice president of the National Academy of Design. He excelled in portrait painting, but was less careful in genre pictures. Among his landscapes are "Rydal Falls, England," "October Afternoon," and "Ruins of Brambletye." His genre subjects include "Rip Van Winkle," "The News Boy," and "Boyhood of Washington"; his portraits, those of Henry Rutgers and Fitz-Green Halleck in the New York Historical Society, of Bishop White, Chief Justices Marshall and Nelson, Jacob Barker, William Wirt, Audubon, De Witt Clinton, Martin Van Buren, and William H. Seward. In the Metropolitan Museum, New York, are his "Martin Van Buren," "The Young Fisherman," "William C. Maccready as William Tell." During a year spent in England, in 1844–45, he painted Wordsworth, Macaulay, John Chambers, and other celebrities. He returned to America in failing health, and at the time of his death, Jan. 17, 1846, was engaged on a series of historical pictures for the Capitol at Washington.

IN MEMO'RIAM. A poem by Tennyson (1850), in memory of his friend Arthur Henry Hallam.

INN, in. An important tributary of the upper Danube, rising in the southern part of the Swiss Canton of Grisons, at an altitude of over 8000 feet (Map: Germany, E 4). It flows through the canton in a northeastern direction, traversing the valley of Engadine, and as a violent mountain torrent enters Tirol through the Finstermünz Pass. It maintains its northeastern direction through Tirol, where its valley is famous for its scenery, and turns north at Kufstein, a short distance below its entrance into Bavaria. At the town of Rosenheim the Inn increases considerably in volume, becoming broad and filled with islands, and it exceeds the Danube in length and volume down to the point at Passau where it enters. The total length of the Inn is about 320 miles. It becomes navigable at Hall, a short distance below Innsbruck, but its commercial importance is greatly detracted from by the rapidity of its course. It is largely used for floating timber rafts from above Innsbruck. Its chief tributaries are the Salzach and the Alz.

INN (AS. *inn, in,* house, chamber, from *in,* within, Goth., OHG., Ger., OIr., Lat. *in,* Gk. *ἐν, en,* in). The older English name of a place of public entertainment for travelers. In the early ages, when among all except the most savage peoples the law of hospitality was strictly interpreted, and when, owing to the unsettled condition of most lands, it was a necessity of existence, there was little need for public houses. The earliest approximation to what was later meant by an inn is found in the caravanserais (q.v.) of the East—unfurnished lodgings on the highroads which travelers might occupy on their passage. Such was the "inn" mentioned in connection with the birth of Christ. The temples of the ancient religions usually afforded shelter for pilgrims to their shrines. This custom has been kept up in pilgrimage places of a later time; thus, St. Philip de Neri had an immense hospice built to receive those who came to the jubilee of 1600.

Under the Roman emperors houses were established at the posting stations on the great roads, which began to approximate to the modern inn. These were not, however, open to all comers, but were at the service of Imperial messengers and of favored persons who could show an authorization known as *diploma tractatorium.* There were also lodging places for unofficial wayfarers, known as *diversoria* or *stabularia,* the latter affording accommodation to both man and beast. A classical description is that of Horace in his account in the *Satires* of his journey to Brundisium, where he characterizes the innkeeper in a spirit of modern protest as *perfidus caupo.* The city of Rome had many small inns, or rather lodging houses, which had a bad name and were daily inspected by the lictors of the prætor or ædile.

In Christian times, hospitality being named by St. Paul as a special duty of a bishop, the episcopal cities were the first to provide shelters for strangers; and the monasteries provided shelter and food for travelers throughout the Middle Ages. Some establishments of this kind remained celebrated even at a later date, such as those on the Alpine passes of the Great and Little St. Bernard, the Simplon, and Mont Cenis. The unusual amount of traveling brought about by the Crusades led to the establishment of brotherhoods specially devoted to the duties of hospitality, whether the recipients of it were sick or well. See HOSPITALERS.

The modern inn, at which entertainment was afforded as a matter of business, was of later growth. Erasmus gives a vivid and amusing picture of the crude provisions of the German inns in his time. Nowhere in Europe did these establishments so soon attain a recognized and respectable character as in England, where many of the old inns, with designations frequently adopted from the devices of powerful families, became famous—in London, e.g., the Angel, the Bell, the Belle Savage, the Bull and Mouth, and the White Horse. The older ones were usually built round a courtyard, entered from the street by a wide covered passage. This form, possibly a survival of Roman architectural methods, was common also in France and Italy. The English inns play no small part in the literature of the eighteenth and early nineteenth centuries; and where they still exist, in the smaller places, the friendly personal attention to the guest's comfort gives them an attractiveness seldom found in the more pretentious modern hotel (q.v.). The spread of railways all over the civilized world has given rise in great cities to a host of hotels of immense size and often palatial in their appointments, while the bicycle and the motor car have greatly increased the number and the quality of inns in smaller and less accessible places. See INNKEEPER.

Bibliography. Michel and Fournier, *Histoires des hôtelleries, cabarets, hôtels garnis, etc.* (2 vols., Paris, 1851); Jusserand, *Les Anglais au moyen âge* (London, 1884); Liebenau, *Das Gasthof- und Wirtshauswesen der Schweiz in älterer Zeit* (Berlin, 1891); Borchardt, *Das Gast- und Schankgewerbe in Vergangenheit und Gegenwart* (Greifswald, 1901); M. C. Crawford, *Among Old New England Inns* (New York,

1907); Maskell and Grègory, *Old Country Inns of England* (ib., 1907); Hackwood, *Inns, Ales, and Drinking Customs of Old England* (ib., 1909).

INNATE IDEAS (Lat. *innatus*, inborn, from *in*, in + *nasci*, to be born). Ideas which by some philosophers are supposed to form part of the actual equipment or content of consciousness at birth, or, if they do not appear till later, are supposed not to be due to any experience falling within the life of the individual. The difficulty of accounting for our universal and necessary judgments (see JUDGMENT; INDUCTION) gave rise to this theory of innate ideas. We find the first suggestion of this theory in Plato's (q.v.) doctrine of reminiscence, and a vigorous defense, and perhaps the most elaborate statement of it, in Leibnitz's philosophy. Kant advocated not innate but a priori conceptions, the a priori being distinguished from the innate in that a priori conceptions are not merely formed at birth but are transcendental. (See KANT.) Since Kant's day innate ideas have played small part in philosophy save in the Scottish school (q.v.), being replaced among evolutionary writers by inherited tendencies to think in certain definite ways.

INNER HOUSE. The name given in Scotland to the higher division, or chamber, of the great court of the kingdom, the Court of Session (q.v.). It exercises an appellate jurisdiction over the inferior division, known as the Outer House, though its original jurisdiction is in general coördinate with that of the latter.

INNER MISSION (Ger. *Innere Mission*). The name given in Germany to a movement originated by Theodor Fliedner (q.v.) and further developed by Johann Hinrich Wichern (q.v.), who gave it its name in 1848. It is intended to elevate the whole man, and so, besides specific Church work, such as Sunday schools, rescue missions for drunkards and prostitutes, meetings for sailors, railroad employees, and strangers, it supports deaconesses to nurse the sick, maintains asylums and homes of all kinds, and takes part in the Red Cross work. Underneath all this exertion is the idea that until the spiritual nature is aroused little can be done for permanent improvement. It is distinctively a Protestant movement. There is a central committee, but it does not exercise control of the local committees. Consult: H. Behm, *Die Innere Mission, eine kirchliche Reformbewegung des 19. Jahrhunderts* (Gütersloh, 1892); *Fünfzig Jahre der Inneren Mission* (report of the Central Committee, Berlin, 1898); Schaffer, *Kalendar der Inneren Mission* (Gütersloh).

INNER PERCEPTION. See INTROSPECTION.

INNER RHODES, or **INNERRHODEN.** See APPENZELL.

INNER TEMPLE. One of the four ancient guilds of lawyers known as Inns of Court in London, having the exclusive privilege of calling persons to the English bar. It, together with its sister society, which came to be known as the Middle Temple, derived its name from the fact that early in the fourteenth century it gained possession of the New Temple, erected a short time before by the order of Knights Templars, as its "hostel," or place of residence. See INNS OF COURT.

INNES, ĭn'ĕs, COSMO (1798–1874). A Scottish lawyer and antiquary, born at Durris. He was educated at the High School of Edinburgh and at the universities of Aberdeen, Glasgow, and Oxford. He studied law, but never had a large practice. He arranged the documents of Register House and edited *Rescinded Acts* and *Acts of the Scots Parliament, 1124–1707*. He displayed so great an interest in the pre-Reformation period that he was suspected of sympathy with Rome. From 1846 to 1874 he was professor of constitutional law and history at Edinburgh. His works, besides the editions mentioned and many chartularies of Scottish religious houses, were: *Scotland in the Middle Ages* (1860); *Sketches of Early Scotch History* (1861); *Lectures on Scotch Legal Antiquities* (1872); *Memoir of Dean Ramsay* (1874).

INNES, THOMAS (1662–1744). An historian of Scotland. He was born at Drumgask, Aberdeenshire, in 1662 and was educated in Paris, where he graduated, M.A., in 1694. He passed most of his remaining years in Paris, occasionally visiting England and Scotland, chiefly for historical research. The great object of his life was to refute the fabulous narratives of Scotland, which had been hitherto generally accepted by his countrymen, and to supply in place of fable a true history. The preparatory task he accomplished in his *Critical Essay on the Ancient Inhabitants of . . . Scotland* (2 vols., London, 1729). In the preparation of this work he examined all the manuscripts and other material relating to the subject which he could find in France, England, and Scotland. The task was extremely difficult, for in his time most of these manuscripts were wholly unknown except to a few antiquaries; but the success of his labor is admitted by all who are acquainted with this portion of Scottish history. The *Critical Essay* has been reprinted with a memoir of the author by Grub in his *Historians of Scotland*, viii (Edinburgh, 1879). After finishing the critical part of his task Innes began his constructive work in his *Civil and Ecclesiastical History of Scotland*. The first volume only was completed by the author, and the second, so far as he had progressed with it, reaches merely to the year 821 (ed. by Grub for the Spalding Club, Aberdeen, 1853). Besides these principal works he wrote many dissertations and letters and made valuable collections of manuscripts. His death occurred in 1744. In addition to his *Memoir*, by Grub, mentioned above, consult: Chambers, *Biographical Dictionary of Eminent Scotsmen* (Glasgow, 1837); Forbes, *Ane Account of the Familie of Innes* (compiled 1698; printed for Spalding Club, Aberdeen, 1864); Thomas Cooper, in *Dictionary of National Biography*, vol. xxix (London, 1892).

INNESS, ĭn'ĕs, GEORGE (1825–94). The greatest of early American landscape painters. He was born at Newburgh, N. Y., May 1, 1825, and passed his boyhood at Newark, N. J., whither his family had removed. He took his first drawing lessons when 14 years of age, but two years later entered a store. Soon afterward he worked for one year with a firm of map engravers, but delicate health forced him to relinquish this occupation. Following his natural bent, he studied and made sketches from nature near Newark, and two years later worked for a short time in the studio of Régis Gignoux in New York. There he opened a studio of his own, achieving material success; but, dissatisfied with his own work, he studied prints of the old masters, and finally, through a patron and friend, was offered a trip abroad. He spent 15

months at Rome, returning with a style still unformed. In 1851 he spent a year in Paris, acquiring and assimilating, but without imitating. He was associated especially with the painters of Barbizon, whose aims were similar to his own. Studying their works, he began to form the individual style by which he is chiefly known. On his return he first lived in Brooklyn, N. Y., then in Medfield, Mass., and in 1862 made his home in Eagleswood, near Perth Amboy, N. J. In 1868 he was elected to the National Academy and later to the Society of American Artists. He again went abroad in 1871, remaining four years, chiefly at Paris and Rome. The latter part of his life was spent in and near New York, and his last years at Montclair, N. J. While traveling for recuperation, he died at Bridge of Allan, Scotland, Aug. 3, 1894. He was a man of profound spirituality, much given to mystic and psychical speculation, and in later life became a Swedenborgian. He possessed high intellectual qualities and keen wit and was always ready to express his thoughts on art subjects with strong, clear statements.

Inness is justly considered the most prominent figure in early American landscape, by the excellence as well as the scope of his art and the versatility of his treatment. Although he preferred the rich tones of the autumn and the sunset, he was equally successful with gray days, witness his magnificent "Woodgatherers," in possession of Mrs. George A. Hearn. His subjects included the pageants of sunrise, high noon, sunset, and evening; each picture seeming to pulsate with luminous qualities and atmospheric charm. Their chief beauty is one of color, his line tends to be indistinct; but the poetic sentiment expressed is always profound. He was essentially a painter of moods and emotions. His works, as to style, may be classed into two periods. The first period includes his early years of conscientious study, when great importance was given to detail, and an intimate knowledge of all the forms of nature; the subjects of these paintings were often panoramic in character, although always good in composition and color tone. After 1878 his works were rather the interpretation of some passing effect or emotion; they were full of personality and expressed with great breadth and simplicity in technique.

In public collections Inness is best represented in the Art Institute of Chicago, which devotes to him an entire room, containing 18 pictures, among them the "Millpond," "Florida Pines," "Threatening," and "Rainbow after a Storm." In the Metropolitan Museum of New York are seven, including "Peace and Plenty," "Delaware Valley," "Autumn Oaks," and "Spring Blossoms"; the National Gallery, Washington, contains four fine examples, including "September Afternoon," the well-known "Georgia Pines," and "Niagara." Inness is represented also in the museums of Brooklyn, Boston, Worcester, Buffalo, Pittsburgh, Toledo, St. Louis, and other cities, and very extensively in private collections of American painting.

Bibliography. No satisfactory biography of Inness has yet been written. Consult, however, the charming appreciation by his pupil Elliott Daingerfield, *George Inness, the Man and his Art* (New York, 1911); id., *Fifty Paintings by George Inness* (ib., 1913). Consult also: A. Trumble, *George Inness, a Memorial* (ib., 1895); C. H. Caffin, *American Masters of Painting* (ib., 1902); and especially Samuel Isham, *History of American Painting* (ib., 1905).

INNESS, George, Jr. (1854–). An American animal and landscape painter. He was born in Paris, of American parentage, and was a pupil of his father, George Inness, in Rome and for a few months of Bonnat in Paris, afterward sharing his father's studio in New York. From 1895 to 1899 he had a studio in Paris, exhibiting annually at the Salon. He was elected a member of the National Academy in 1899. In 1913 he became connected with the *Century Magazine,* in which his work frequently appeared thereafter. His "Shepherd and Sheep" and "The First Snow at Cragsmoor" are in the Metropolitan Museum, New York. His animal pictures, such as the "Monarch of the Farm," the "Surf Horse," and the "Mother of the Herd," are vigorous and well drawn; his landscapes, such as "The Coming Storm" and "Morning on the River," resemble his father's latest work, having the same rich haze of color, with the light glowing through.

IN'NISFAIL (Ir., Island of Destiny). An ancient name applied by the bards to Ireland.

IN'NISKIL'LING. See Enniskillen.

INN'KEEP'ER. In point of law an inn is a public house of entertainment for travelers. An innkeeper is a person who holds himself out as engaged in the business of receiving and affording accommodation (including food, drink, and lodging) for travelers or other transient guests for compensation. A tavern, being a place where only food and drink are served, was not included in the term "inn"; but the more modern "hotel" is, in a legal sense, an inn.

From the earliest times the common law regarded innkeepers (like common carriers, wharfingers, and farriers) as persons engaged in a public calling and therefore as coming under peculiar obligations to those whom they served. The innkeeper is legally bound, so long as he has accommodations, to receive all proper persons applying for accommodation and is liable in damages for his failure to do so. He is not bound, however, to receive one who is drunk, disorderly, affected with a contagious disease, or who is otherwise obnoxious. The prospective guest is not entitled to select whatever accommodation the inn affords, and if he will not accept such reasonable accommodation as is offered the innkeeper may refuse to serve him. As an incident of his public calling, the innkeeper has a lien on the horse and carriage and goods of the guest for his bill or reckoning which entitles him to detain them until the bill is paid, even though they are not the property of the guest (see Lien), but he cannot detain the person of his guest to enforce payment.

While an innkeeper has his remedy by lien for his charges, he is under great responsibility for the safety of the goods of his guests. In general, he is absolutely liable for the safety of all goods which form a part of the traveling equipment or luggage of a guest, unless the loss occurs by act of God or the public enemy. Hence the innkeeper is liable to his guest for loss by fire or theft, although in a few American States the innkeeper is exempted by statute from liability for loss by fire not caused by the negligence of himself or his servants. The innkeeper is excused if the loss is caused by the guest's own negligence—as, e.g., by his leaving the door of his room unlocked or by his leaving a box

or package containing valuables in a public room of the inn without delivering the package to the innkeeper or his servants. An innkeeper cannot escape liability by posting a notice in the guest's room or other part of the house to the effect that he will not be answerable for such losses, such notice being contrary to the policy of the law which imposes the extraordinary liability on the innkeeper. He may, however, make reasonable regulations for protecting the property of the guests, as by requiring all valuables belonging to guests to be deposited in the innkeeper's safe; and if the guest after fair notice fails to comply with the regulation, the innkeeper is not liable for loss of the valuables, unless due to his own misconduct or that of his servants.

One who takes his meals in a public restaurant attached to an inn is not a guest of the inn itself, and his rights are merely those of a casual boarder. An innkeeper may entertain boarders living regularly in his house as well as transient guests or travelers; but as to these his liability is only that of a boarding-house keeper. Innkeepers are subject to various statutory regulations which, owing to the fact that the innkeeper is engaged in a public calling, do not violate any of the constitutional provisions guaranteeing the rights of citizens. Thus, he may be compelled to keep a regular register of his guests, provide safety appliances to avoid danger of fire, and he may even be subject to regulations as to food and accommodations. (See Public Callings; Boarding House; Lien.) Consult: J. Schouler, *Law of Bailments* (Boston, 1880); Pymar, *Law of Innkeepers* (London, 1892), a comparison of English and Roman laws; Jeff and Hurst, *Law of Innkeepers* (ib., 1904); J. H. Beale, *Law of Innkeepers and Hotels* (New York, 1906); *American and English Encyclopædia of Law* (ib., 1909–).

IN'NOCENT. The name of 13 popes.—Innocent I (Pope, 402–417), a native of Albano. His pontificate was one of the most important in the early centuries, in its development of the relations of the Roman see with other churches, both Eastern and Western. He seems to have extended, if not originated, the system of naming legates to represent the Pope. He maintained with a firm hand the right of the Roman Bishop to hear appeals from other churches, and his letters abound with assertions of universal jurisdiction. At the request of St. Augustine and the North African bishops, in 404, he induced the Emperor Honorius to pass laws for the protection of the Catholics against the Donatists. He strongly supported St. John Chrysostom against his opponents. His last years were full of trouble, owing to the attacks of Alaric upon Rome, which in 410 was pillaged, with the exception of the Shrine of the Apostles. His last two letters were written to encourage St. Jerome in his difficulties with the troublesome Eustochium and Paula and with the Origenists. The whole of his important correspondence is in Migne, *Patrologia Latina*, xx. Consult H. H. Milman, *History of Latin Christianity*, vol. i (New York, 1903), and Hartmann Grisar, *History of Rome and the Popes in the Middle Ages*, English translation edited by L. Cappadelta (3 vols., London, 1911–12).

Innocent II (Gregorio Papareschi). Pope, 1130–43. He was opposed by a faction among the cardinals, who set up an antipope under the title of Anacletus II. But Innocent was supported by Louis VI, the French bishops, and St. Bernard, and restored to Rome by Lothair, whom he crowned as Emperor. Anacletus still maintained possession of the castle of Sant' Angelo until his death, in 1138, and Innocent was obliged to absent himself from Rome during much of that time. In 1139 he held the second Lateran Council, which was attended by about 1000 bishops, and confirmed the condemnation pronounced by several councils on Abélard and the followers of Arnold of Brescia, and excommunicated Roger, the King of Sicily. In 1141 a conflict regarding the appointment of archbishops arose between the Pope and his former supporter, Louis VII, which resulted in an interdict covering any place where the King might be, and only removed by Celestine II. Consult: Mühlbacher, *Die streitige Papstwahl des Jahres 1130* (Innsbruck, 1876); Martens, *Die Besetzung des päpstlichen Stuhles unter Heinrich III. und Heinrich IV.* (Freiburg, 1886); H. K. Mann, *Lives of the Popes in the Early Middle Ages*, vols. ix, x (London, 1914); and the letters of Innocent II in Migne, *Patrologia Latina*, clxxix (Paris, 1844–64).

Innocent III (Lotario de' Conti). Pope, 1198–1216. This was by far the greatest Pope of the name, and under him the power of the papacy over temporal authority was more widely extended than ever before. He was born at Anagni in 1161 and made Cardinal by his uncle, Clement III, after a distinguished scholastic career in Paris, Bologna, and Rome. His election to the papacy at the age of 37, while he was still a layman, was looked upon with misgiving, which finds expression in a poem by the famous Walther von der Vogelweide: "O wê, der bâbest ist ze junc: hilf, hêrre, dîner kristenheit" (Alas, the Pope is too young: help, Lord, thy Christendom). But the combined strength and wisdom of his rule soon allayed these fears. His first success was the restoration of the papal authority in Rome and the States of the Church, but he soon extended his influence to every part of Europe. In Germany he adjudicated with authority upon the rival claims of Otho, son of Henry the Lion, and Philip of Swabia; and a second time he interposed effectually in behalf of his ward, Frederick II. In 1202 he affirmed in a decretal the right of the Pope to confirm or reject the election of the Emperor and to crown the Emperor when elected according to his will. In France he espoused the cause of the injured Ingeborg, whom Philip Augustus had attempted to repudiate in order to marry Agnes of Meran. Another interposition in favor of the sanctity of the marriage tie was that by which he disciplined Alfonso IX of León, who had married within the prohibited degrees. His legates crowned the Prince of the Bulgarians and the King of Bohemia, and even the King of Armenia received the investiture of his kingdom from them. The history of his relations with England (see John; Langton, Stephen) is no less noteworthy as an exhibition of the extent of his supremacy. That nothing might be wanting to the completeness of his authority throughout the then known world, the Latin conquest of Constantinople put an end to the shadowy pretensions of the Eastern rivals of his power, spiritual as well as temporal. As an ecclesiastical administrator, Innocent III holds a high place. He was a vigorous guardian of public and private morality, a steady protector of the weak against oppression, and

zealous in conflict with simony and other abuses of the time. He prohibited the multiplication of religious orders by private authority, but he lent all his influence to the furtherance of the remarkable spiritual movement in which the two great mendicant orders (see FRANCISCANS; DOMINICANS) had their origin. The celebrated fourth Lateran Council (q.v.), held in 1215, marked the zenith of his remarkable reign. In the following year, while busily engaged in promoting peace among the Italian cities, so as to remove obstacles to the Crusade, Innocent was seized with a fever and died at Perugia in his fifty-sixth year. His letters and decretals are in Migne, cxiv–cxviii.

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INNOCENT IV (Sinibaldo de' Fieschi, Count of Lavagna). Pope, 1243–54. He was born at Genoa, of a distinguished family, and was elected at Anagni by the cardinals who had fled from Rome, then occupied by the Emperor Frederick II. His first and most difficult task was to compose the strife which had long raged between this brilliant and vigorous prince and the holy see. Terms of peace were agreed to in 1244, the Imperial commissioner being Peter de Vinea (q.v.), afterward an antipope; but they did not agree upon the interpretation, and Frederick attempted to seize Innocent, who escaped to Genoa and thence to Lyons. To this city he summoned a general council in 1245 to deal with the questions at issue. (See LYONS, COUNCILS OF.) Innocent was unable to return to Italy until after Frederick's death, arriving in Rome in 1253. The conflict still continuing, he excommunicated the new Emperor, Conrad IV, on Maundy Thursday of 1254. Conrad died six weeks later, the power of the Ghibellines declined, and peace revisited Italy. Manfred, the natural son of Frederick, then took up arms again at the head of a Moorish army and inflicted a severe defeat on the papal forces on December 2. Five days later Innocent died at Naples. He was considered a man of great learning and did much to advance the universities of Paris and Bologna. He wrote a commentary on the Decretals of Gregory IX, which was first printed at Strassburg in 1477.

Bibliography. Masetti, *I pontefici Onorio III, Gregorio IX ed Innocente IV a fronte dell' Imperatore Frederico II* (Rome, 1884); Berger, *Les registres d'Innocent IV* (Paris, 1884); Weber, *Der Kampf zwischen Papst Innocenz IV. und Kaiser Friedrich II. bis zur Flucht des Papstes nach Lyon* (Berlin, 1900); H. K. Mann, *Lives of the Popes in the Early Middle Ages*, vols. ix, x (London, 1914). His English relations are discussed from a point of view favorable to the Church, in F. A. Gasquet, *Henry the Third and the Church* (London, 1905).

INNOCENT V (Pietro di Tarantasia). Pope, 1276. He was born in Savoy, entered the Dominican Order, and taught with great success in Paris. He was made Archbishop of Lyons in 1271 and Cardinal immediately afterward. His Pontificate lasted only five months, from January 21 to June 22, and was marked by endeavors to reconcile the Guelphs and Ghibellines and to reunite the Eastern churches with Rome. He left commentaries on a large part of the Bible and on the Sentences of Peter Lombard. Consult: Carboni, *De Innocentio V, Romano Pontifice* (Rome, 1894); Bryce, *Holy Roman Empire* (New York, 1911); H. K. Mann, *Lives of the Popes in the Early Middle Ages*, vols. ix, x (London, 1914).

INNOCENT VI (Etienne Aubert). Pope, 1352–62. He was born at Mont in the Diocese of Limoges, and elected Pope at Avignon, where he resided during his pontificate. He was a distinguished canonist and did much to reform ecclesiastical discipline. His influence was exerted for peace in many quarters of Europe, and he encouraged learning, inviting Petrarch to reside at his court. Consult: Ferdinand Gregorovius, *History of the City of Rome in the Middle Ages*, vol. vi (London, 1898); Ludwig Pastor, *History of the Popes*, vol. i (ib., 1906); *Innocent VI et Blanche de Bourbon, lettres du pape* (ed. Daumet, Paris, 1901); Bryce, *Holy Roman Empire* (New York, 1911).

INNOCENT VII (Cosimo de' Megliorati, a native of Salmona in the Abruzzi). Pope, 1404–06. He had distinguished himself by a knowledge of canon and civil law and by a holy life, so that he was made Cardinal in 1389 by Boniface IX, whose successor he was chosen amid the troubles of the great schism. Little else than these tumults distinguished his short reign, which was marked by nepotism. Consult: Ferdinand Gregorovius, *History of the City of Rome in the Middle Ages*, vol. vi (London, 1898); Mandell Creighton, *History of the Papacy*, vol. i (ib., 1904); Ludwig Pastor, *History of the Popes*, vol. i (ib., 1906).

INNOCENT VIII (Giovanni Battista Cibo). Pope, 1484–92. He came of a noble Genoese family; his father had been a Roman senator and Governor of Naples. He was a widower when he entered the clerical state and won the favor of Paul II, who appointed him Bishop of Savona, and Sixtus IV, who made him Cardinal. He strove to promote peace among Christian princes and to unite them against the Turks, who had not long before conquered Constantinople. He quarreled, however, with King Ferdinand of Naples over the payment of the customary tribute, excommunicated him, and transferred his kingdom to Charles VIII of France, whereupon Ferdinand yielded. His nepotism was marked; he gave his illegitimate son Franceschetto several towns near Rome and secured for him the hand of Maddalena, daughter of Lorenzo de' Medici. This son was born to Innocent VIII in his youth, before he began an ecclesiastical career. In compensation he made her 14-year-old brother Giovanni Cardinal and thus opened the way of the family to the papal throne. Consult: Serdonati, *Vita e fatti d' Innocenzo VIII* (Milan, 1829); Mandell Creighton, *History of the Papacy*, vol. iv (London, 1903); Ludwig Pastor, *History of the Popes*, vols. v, vii (ib., 1911).

INNOCENT IX (Giovanni Antonio Facchinetti). Pope, 1591. He was born at Bologna in 1519

and studied law. He was the first Bishop named by Pius IV and, after the close of the Council of Trent, was nuncio at Venice for six years. Gregory XIII made him Cardinal, and he held important offices under this Pope and his two successors, practically administering the papacy during the illness of Gregory XIV. His own reign, however, was cut short by death after two months, during which he had supported the League in France. He left a number of learned philosophical and political writings. Consult *New Schaff-Herzog Encyclopedia of Religious Knowledge*, vol. v (New York, 1909).

INNOCENT X (Giovanni Battista Pamfili). Pope, 1644–55. He was the candidate of the Spanish party in the conclave and thus opposed by the French. He was much influenced by his sister-in-law Olimpia Maidachini, but the insinuations of Gregorio Leti are characterized by Ranke as a baseless romance. In the bull *Zelus domus Dei* of 1648 (published in 1651) he condemned the Peace of Westphalia as injurious to the rights of the Church, and in 1653 he condemned the famous five propositions of Jansen. (See JANSENISM.) On this point consult Hergenröther, *Katholische Kirche und christlicher Staat* (Freiburg, 1872), and, for his life, Ciampi, *Innocenzo X Pamfili e la sua corte* (Rome, 1878); Leopold von Ranke, *History of the Popes*, vols. ii, iii (London, 1908–12); Bryce, *Holy Roman Empire* (New York, 1911).

INNOCENT XI (Benedetto Odescalchi). Pope, 1678–89. He was born at Como in 1611 and named Cardinal by Innocent X in 1645. Appointed Bishop of Novara in 1650, he devoted the revenues of the see to the poor and later resigned it to his brother, taking up his residence in Rome. He was a vigorous and judicious reformer, and his reign is entirely free from the stain of nepotism. In 1679 he censured as lax 65 propositions taken from various theological works, and by the constitution *Cœlestis Pastor* of 1687 condemned still more strongly 68 propositions of Molinos (q.v.). Although he owed his election to the French party, he was soon involved in conflicts with Louis XIV, which lasted throughout his pontificate. One arose over the claim of the French Ambassador in Rome to a right of asylum, which enabled him to shelter criminals not only in his palace but in the surrounding quarter. Precipitated by an alleged attack by the Corsican guards of the Pope, it led to a military expedition being launched against the holy see. A more serious conflict arose when the Pope attempted to put an end to the abuse of the King's keeping sees vacant, in virtue of what was called the *Droit de régale*, and appropriating their revenues. The resistance to this attempt drew forth the celebrated declaration of the French clergy as to the "Gallican liberties." (See GALLICAN CHURCH.) Innocent, as did Bossuet and Fénelon, disapproved of Louis XIV's methods of converting the Huguenots by force. On this point consult Gérin, "Le pape Innocent XI et la révocation de l'Edit de Nantes," in *Revue des questions historiques* (Paris, 1878); also consult, id., *Innocent XI et la révolution anglaise de 1688* (ib., 1876); Michaud, *Louis XIV et Innocent XI* (4 vols., ib., 1883); Gérin, *Louis XIV et le Saint Siège* (2 vols., ib., 1890); Immich, *Papst Innocenz XI.* (Berlin, 1900); Leopold von Ranke, *History of the Popes*, vol. ii (London, 1908).

INNOCENT XII (Antonio Pignatelli). Pope, 1691–1700. He was born at Naples in 1615 and, after filling important diplomatic posts, was made Cardinal by Innocent XI, whose reforming policy he set himself to imitate when raised to the papacy after a session of the conclave lasting nearly six months. He brought about a reconciliation with France, after the French bishops had retracted the "four articles," and abandoned the anti-French policy which, since Urban VIII, the popes had maintained almost without exception. Consult *Cambridge Modern History*, vol. v (Cambridge, 1908), and Leopold von Ranke, *History of the Popes*, vol. ii (London, 1908).

INNOCENT XIII (Michelangelo de' Conti, the son of Carlo II, Duke of Poli). Pope, 1721–24. He was born in 1655 and raised to the episcopate and the cardinalate by Clement XI. He chose his title as Pope in memory of Innocent III, who had belonged to his family. Like his predecessor, he strongly supported the Pretender, who was always recognized as James III in Rome. At the instance of the French court he very unwillingly made the Minister Dubois Cardinal, but he refused to recall the bull condemning Jansenism. Consult Mayer, *Die Papstwahl Innocenz*, vol. xiii (Vienna, 1874), and Leopold von Ranke, *History of the Popes*, vol. iii (London, 1912).

IN'NOCENTS, HOLY, FEAST OF (CHILDERMAS). A festival which commemorates the massacre of the children at Bethlehem (Matt. ii. 16–18). These children are referred to as martyrs by St. Cyprian and still more explicitly by St. Augustine; and it is to them that the exquisite hymn of Prudentius, *Salvete Flores Martyrum*, is addressed. The feast is first mentioned in the *Leonine Sacramentary* (c.485). In the modern Church this feast is celebrated as a special holiday by the young, and many curious customs connected with it prevail in some countries. One of these is that in private families the children are on this day privileged to wear the clothes of the elders and in some sort to exercise authority over the household in their stead. The Greek church keeps the day on December 29 (O. S.); the Latin, December 28. In the Roman Catholic church, the color of vestments (except when the festival falls on Sunday, when red, the usual color of martyrs, is employed) is violet, the color of mourning, since the innocents died before the completion of the work of redemption.

INNOCENTS, MASSACRE OF THE. See MASSACRE OF THE INNOCENTS.

INNOCENTS ABROAD. The best-known work of Samuel Langhorne Clemens ("Mark Twain") (1869). It is the account of a trip undertaken in 1867 by a party of Americans, who chartered the *Quaker City* and visited various countries of Europe.

INNOCEN'ZO DA IM'OLA. See IMOLA, INNOCENZO DA.

INNOM'INATE ARTERY (Lat. *arteria innominata*, artery without a name). The first large branch given off from the arch of the aorta at a distance, on the average, of 3½ inches from the aortic valve. It divides into the right carotid and the right subclavian arteries. It is separated by an interval of less than ½ inch from the left common carotid artery. Its calibre is large, and its average length is about 1½ inches. Its course corresponds to a line drawn from the middle of the sternum, or the point of junction of the manubrium and the gladiolus,

to the right sternoclavicular joint. Its relations are as follows: In front, the inferior cervical cardiac branch of the right pneumogastric nerve, the left vena innominata and right inferior thyroid veins, the thymus gland, and the sternothyroid and sternohyoid muscles; behind, the trachea; on the right, the pleura, the right vena innominata, and the right pneumogastric nerve; on the left, the left carotid artery and the thymus gland. Through the innominate artery flows all the blood to the right side of the head and neck and to the right upper extremity. Unsuccessful attempts have been made to cure aneurism of the right subclavian by tying the innominate; but they have resulted only in bringing out the fact that the collateral circulation established in such cases after the operation is ample. See AORTA.

INNOMINATE BONE (Lat. *os innominatum*, bone without a name). In human anatomy, the bone which forms the hip and is provided with the socket into which the head of the femur is received. There are two of these bones in the skeleton, and each is formed by the union of the ilium, the ischium, and the pubic bone. See SKELETON.

INNSBRUCK, ĭns'brŭk, in English often written INNSPRUCK. The capital and the most picturesque town of the Austrian Crownland of Tirol, situated in the Alps, at an elevation of nearly 1900 feet, on both banks of the Inn, in a region abounding in beautiful views (Map: Austria-Hungary, B 3). It lies in a broad valley, surrounded by high mountains, and has, despite its high location, a very moderate climate, the annual temperature averaging 47° F. The streets are spacious and the buildings attractive. Innsbruck comprises the old town on the right bank of the Inn and the two suburbs of Mariahilf and Sankt Nikolaus, connected with the old town by three iron bridges. In Innsbruck is found the oldest Capuchin monastery in Austria. It was begun in 1598. The Franciscan, or court, church (1553–63) is interesting. It contains a magnificent monument to Maximilian I, consisting of a bronze statue of the Emperor on a marble sixteenth-century sarcophagus, surrounded by 28 bronze statues of his ancestors and contemporaries. The sides of the sarcophagus are adorned with fine marble reliefs representing the principal events of the Emperor's life. The church possesses also a silver statue of the Virgin and several monuments to Tyrolese patriots. The Jesuit church, which is a seventeenth-century edifice in baroque style, not completed until 1902, surmounted by a dome of nearly 200 feet, and the parish church, with an altarpiece by Cranach, are worthy of mention.

The secular structures of Innsbruck are also interesting. The chief among them are a palace (about 1525), with a rich marble balcony, in late Gothic style, covered with a roof of gilded copper known as the Goldne Dachl (balcony and roof date from 1500); the Imperial palace, a rococo building of the eighteenth century, containing a spacious hall ornamented with splendid frescoes; the Ottoburg, dating from the thirteenth century; the municipal theatre; the Ferdinandeum, or Tyrolese National Museum, with a façade adorned with busts of eminent Tyrolese citizens; the new orphanage; the Triumphal Gate, erected in 1765, in honor of the reigning family; and the municipal buildings, possessing a collection of paintings and graced by the Leopoldsbrunnen in front of it. Innsbruck has a monument to Walther von der Vogelweide. First among the educational institutions is the university. It was founded in 1677 by Leopold I. It has four faculties—jurisprudence, philosophy, theology (under Jesuit control), and medicine. There are over 1300 students, 400 being theological. In 1912, the library contained 258,620 volumes. The university possesses valuable Tyrolese archives. Other prominent educational institutions are the national Gymnasium (founded in 1562), the municipal Oberrealschule, the commercial academy, and the military school. The Ferdinandeum contains, among its interesting collections, a picture gallery, and a library of about 30,000 volumes, including the works of all the Tyrolese authors. There are important hospitals. The chief industries are cotton and wool spinning, glass painting, and the manufacture of mosaics. There is a chamber of commerce. Innsbruck is the seat of the Court of Appeals for Tirol and Vorarlberg. Among the interesting features in the environs are the historic and beautiful Isel Mountain, with Natter's bronze statue to Hofer, and the famous mediæval Ambras Castle, with a celebrated collection of weapons. Pop., 1890, 23,320; 1900, 26,866; 1910, 53,194, chiefly German-speaking Roman Catholics. In ancient times the name of Innsbruck was *Œni Pons* or *Œnipontum*. The town received municipal privileges from Otho I, Duke of Meran, in 1234. From 1363, the year of the annexation of Tirol to Austria, until 1665, Innsbruck was for the most part the residence of the Tyrolese rulers of the house of Hapsburg.

INNS OF CHANCERY. Certain houses or sets of buildings in London, which were originally places of residence and study for the "clerks of the chancery," who prepared and issued the legal writs for suitors in the royal courts, and their students and apprentices; hence, also, the societies which occupied the buildings. These Inns of Chancery, which were formerly called *hospitia minora*, were formerly 8 or 10 in number and were attached to the Inns of Court, near which they were situated, from the fifteenth or sixteenth century to the eighteenth; but they now have no public function, though several of them still exist as societies, with corporate property. The chambers are occupied by solicitors and others. The last surviving Inns of Chancery were Clifford's Inn, New Inn, and Furnival's Inn. It seems that, in the fourteenth and fifteenth centuries, when the Inns of Court constituted a great legal university, the Inns of Chancery occupied the position of preparatory schools to the more dignified foundations and furnished elementary instruction in the drawing of writs and other legal papers. See INNS OF COURT.

INNS OF COURT. The four sets of buildings in London (the Inner Temple, the Middle Temple, Lincoln's Inn, and Gray's Inn) belonging to the four legal guilds or societies which have the exclusive privilege of admitting persons to practice at the bar; hence the societies themselves. The origin of the Inns of Court traces back to the mediæval inns of law, the origin of which is lost in antiquity, and their present importance is but a dim shadow of their former greatness. As early as the beginning of the fourteenth century they are known to have taken possession of the houses from which they derive their names and in the later Middle Ages

they became the seat of great schools of law, to which students resorted from all parts of England, and in which scholars, statesmen, and men of affairs, as well as the leaders of the bench and bar, were trained. To-day they are little more than clubs of barristers, which maintain lectures for law students and guard their admission to the bar. The distinction of the four principal inns of law (i.e., houses where law was taught), as Inns of Court, was fully established in the fifteenth century; but in earlier times, and sometimes later, the name Inns of Court, or its equivalent, seems to have included both the *hospitia majora* of the early period and the *hospitia minora*, or lesser inns, to which the Inns of Chancery (q.v.) belonged.

The four Inns are each governed by a committee or board, called the benchers, who are generally king's counsel or senior counsel, self-chosen, i.e., each new bencher is chosen by the existing benchers. Each Inn is self-governing and quite distinct from the others, all, however, possessing equal privileges; but latterly they have joined in imposing certain educational tests for the admission of students through the medium of a council of legal education, consisting of delegates appointed by each Inn from among its benchers. It is entirely in the discretion of an Inn of Court to admit any particular person as a member, for no member of the public has an absolute right to be called to the bar, there being no mode of compelling the Inn to state its reasons for refusal. But practically no objection is ever made to the admission of any person of good character. Each Inn has also the power of disbarring its members, i.e., of withdrawing from them the right of practicing as counsel. This right has been rarely exercised, but of late years there have been examples of persons abusing their profession and indulging in dishonest practices; in such cases the Inn has its own mode of inquiring into the facts affecting the character of a member and is not bound to make public the results of its investigation. By this high controlling power over its members a higher character is supposed to be given to the bar as a body than if each individual were left to his own devices, unchecked except by the law. The buildings of each Inn consist of a large area of houses or chambers, which are in general occupied exclusively by barristers, and sometimes by attorneys, and are a source of great wealth to the societies to which they respectively belong. The buildings of the four Inns are not marked by any general plan or uniformity in grouping or style of architecture, but represent the growth of many centuries. The Inner Temple has a fine hall of the time of Elizabeth, with an open-timbered roof of much beauty; the Middle Temple has a library which is a nineteenth-century building with a roof studied from that of Westminster Hall.

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INNSPRUCK. See INNSBRUCK.

INNUENDO, ĭn'ū-ĕn'dō (Lat., by hinting). In law, a clause in a declaration for slander or libel, in which the relation or application of the alleged slanderous or libelous words to the plaintiff is pointed out and explained. This clause is necessary only if their meaning or application is ambiguous. The term is used only in jurisdictions where common-law pleading prevails. See DECLARATION; DEFAMATION; LIBEL; SLANDER.

INNUIT, ĭn'nū-ĭt. A name sometimes applied to the American Eskimo. See ESKIMO.

I'NO (Lat., from Gk. Ἰνώ), or **LEUCO'THEA.** In Greek legend, the daughter of Cadmus and Harmonia, and wife of Athamas (q.v.), who reigned in Phthiotis, or Bœotia. He had previously wedded the goddess Nephele, who bore him Phrixus and Helle (q.v.). Ino also bore two sons, Learchus and Melicertes (q.v.), and in her jealousy plotted the destruction of her stepchildren, who were rescued by their mother. As Ino had cared for the infant Dionysus, son of her sister Semele and Zeus, Hera visited Athamas with madness, and in his frenzy he killed his son Learchus. Ino, fleeing with Melicertes in her arms and pursued by her husband, leaped into the sea and was received by Poseidon and the nymphs as a new goddess under the name of Leucothea. The worship of Ino-Leucothea and her son Melicertes-Palæmon was widespread. She aided the shipwrecked Odysseus and was in general regarded as the special helper of those in extreme distress and peril at sea. The story of Athamas and Ino is used with many variations by Sophocles and other Greek dramatists and by the Roman poets Ennius and Accius in their tragedies.

IN'OCAR'PUS (Neo-Lat., from Gk. *ἴς, is,* fibre + *καρπός, karpos,* fruit), *Inocarpus edulis.* The South Sea (or Tahiti) chestnut, an important tree to the inhabitants of the South Sea Islands for its fruit, a nut, which, while green, is gathered and mashed to supply a considerable part of their food. The tree is of stately growth and fine foliage; the leaves evergreen, of delicate texture, oblong, 6 or 8 inches in length. Instead of increasing uniformly in thickness the trees throw out buttresses to support the trunk. Small projections appear on the lower branches, which later become 2 or 3 inches thick, and extend sometimes 4 feet from the trunk at the bottom in nearly straight lines from the root to the branches. They look like plank buttresses covered with bark. The central stem may continue for many years only 6 or 7 inches in diameter. These natural planks are used for paddles of canoes and for other purposes. This tree has been extensively planted throughout the tropics. At Calcutta 10-year-old trees were reported 25 to 30 feet in height.

IN'OCER'AMUS (Neo-Lat., from *ἴς, is,* fibre + *κέραμος, keramos,* tile). A characteristic fossil lamellibranch (pelecypod) of the Jurassic and Cretaceous rocks. The valves have rounded outlines, with the surfaces broken by concentric folds, beaks low, and hinge line without teeth. These shells are very abundant in the Jurassic and Cretaceous rocks of the Western States, some of them attaining the diameter of 2 feet. See JURASSIC SYSTEM.

INOC'ULA'TION (Lat. *inoculatio,* from Lat. *inoculare,* to graft, from *in,* in + *oculus,* eye). Intentional infection of an individual with a disease by introducing its virus into the tissues

or fluids of the body. Inoculation of the lower animals is used in the study of bacteriology, for it is possible by this means to reproduce in animals, with some organisms, the pathological condition presented in the natural disease. Cultures are made of the microörganisms of the disease; or tissues, secretions, or excretions are obtained from the diseased body, to constitute the material for use. (See DISEASE, GERM THEORY OF.) The inoculation is either *subcutaneous*, *intraserous*, *intravascular*, or *intracerebral*, according as the injection is made respectively into the tissue under the skin, into a serous cavity like the pleura, into a vein, or directly into the substance of the brain.

Criminals have been inoculated with disease for experimental purposes, as well as volunteers for science' sake. Preventive inoculation is practiced in the case of several diseases, as rabies, plague, diphtheria, etc. Virus of disease which has become weakened (attenuated) by being passed through several animals is injected into human beings who have been or are to be exposed to the disease, and the desirable blood change, together with the development of antitoxin, is obtained. (See ANTITOXIN; IMMUNITY; SERUM THERAPY.) The first use of inoculation in human beings was probably the intentional transference of smallpox. From very ancient times the Hindus, and from as early as the sixth century the Chinese, inoculated persons with smallpox and then cared for them, with the result of a smaller mortality than if they had caught the disease during an epidemic. In 1717 Lady Mary Wortley Montagu, wife of the English Ambassador in Turkey, became convinced of the advantages of inoculation with smallpox, as practiced by the Greeks and Armenians there. In 1721 she caused her son to be inoculated in London. Six condemned criminals at Newgate were the next experimental cases; and, after the two children of Caroline, Princess of Wales, were also inoculated, the fashion became established among the wealthy and high-born. The mortality from smallpox in England at that time was one in five, while the mortality of the inoculated was but one in 3000. The Chinese used crusts, placed in the nostrils, or caused the children to wear the clothes of a smallpox patient. Following the Hindu method, the English made incisions in the arms, into which the pus from a pustule was introduced. In general, a milder course was taken by the disease resulting from inoculation, about 50 pocks appearing, it is said; but in some cases intense invasion followed with a fatal result. The disadvantage of the method appears from the fact that every inoculated person became a focus for the spread of the disease, and isolation was expensive. Besides, the percentage of deaths from smallpox, in spite of (or possibly because of) inoculation, increased till at the end of the eighteenth century one-tenth of the population of England died of the disease. After becoming very fashionable and spreading over the civilized world, inoculation fell into disrepute shortly after Jenner's introduction, in 1796, of vaccination, which he had discovered, in 1775, to be a preventive of smallpox. The entire efficiency of vaccination and its safety and ease caused its rapid supplanting of inoculation. Prussia in 1835 prohibited inoculation for smallpox, and Great Britain enacted laws against it in 1840. Inoculation is said by Plehn to be still practiced in certain parts of Central Africa, with few fatalities. It is said to be still in vogue in China and in Algiers. For many years vaccination was carried on by inoculation, the contents of the vaccinia pustules being transferred from patient to patient. Consult: Moore, *The History of Smallpox* (London, 1815); Collinson, *Smallpox and Vaccination Historically and Medically Considered* (ib., 1860); Carl Oppenheimer, *Toxins and Antitoxins* (Philadelphia, 1906); S. A. Arrhenius, *Immunochemistry* (New York, 1907); R. W. Allen, *Vaccine Therapy: Its Theory and Practice* (3d ed., Philadelphia, 1910); J. B. Citron, *Immunity* (ib., 1912); E. H. Schorer, *Vaccine and Serum Therapy* (St. Louis, 1913); H. T. Ricketts, *Infection, Immunity, and Serum Therapy in Relation to the Infectious Diseases of Man* (2d ed., Chicago, 1913). See VACCINATION; JENNER.

INOCULATION, IN PLANTS. A term rarely used in horticulture in the sense of budding (q.v.).

IN'OFFI'CIOUS TESTAMENT (ML. *inofficiosus*, contrary to duty, from Lat. *in-*, not + *officiosus*, dutiful, from *officium*, duty, from *opificium*, doing of work, from *opifex*, one who does work, from *opus*, work + *facere*, to do). In the civil law, a testament which makes no provision for the issue of the testator and assigns no reason for so doing. Such a will is deemed contrary to the duty which a parent owes to his offspring and is therefore wholly or partially void. This doctrine has been adopted into the legal systems of the Continent, of Scotland, of Louisiana, of Quebec, and of other states whose law is derived from that of Rome, but does not obtain in the common-law system of England nor in most of the United States. Where it exists it is now generally regulated and defined by statute. See HEIR; SUCCESSION; TESTAMENT. Consult the authorities referred to under CIVIL LAW.

IN'OSITE (from Gk. *ἴς, is*, fibre), or MESO-INOSITE, $C_6H_6(OH)_6 + 2H_2O$. A compound of carbon, hydrogen, and oxygen, extensively found in vegetables and sparingly in the muscles, lungs, kidneys, spleen, liver, and brain of man. It may be prepared by extracting unripe beans with water, boiling the extract with some acetic acid, filtering, adding normal lead acetate to the filtrate, again filtering, adding some ammonia and basic lead acetate to this second filtrate, separating the precipitate thus produced and dissolving it in aqueous sulphureted hydrogen, and finally mixing the sulphureted-hydrogen solution with alcohol and ether; the inosite is then obtained in crystalline form, viz., in the form of large rhombic tablets. The composition ($C_6H_{12}O_6$) and the sweet taste of inosite led chemists to mistake it for a chemical relative of the ordinary sugars (carbohydrates); it has, however, been shown to be a derivative of benzene, C_6H_6, or rather of cyclohexane, C_6H_{12}. (See HYDROCARBONS, *Hydroaromatic Hydrocarbons*.) The presence of inosite in a substance submitted for examination may be detected by mixing a small amount of the given substance with a little nitric acid, evaporating to dryness in a platinum crucible, and treating the residue with ammonia and a little strontium acetate. The presence of inosite is thus revealed by the formation of a violet precipitate and a greenish coloration. Inosite does not ferment with yeast, does not (like the true sugars) reduce Fehling's solution (q.v.), and when heated with strong hydriodic acid at 170° C., it yields such products as car-

bolic acid and its tri-iodo derivative, and some benzene—which indicates its relationship, already mentioned, not to the true sugars, but to substances of the aromatic and hydroaromatic series. It is also much less soluble than the true sugars. When anhydrous, it melts at 225° C. (437° F.).

This "ordinary" inosite, which is sometimes called *anti-* or *meso-inosite*, is optically inactive; i.e., its solutions do not rotate the plane of polarized light. There are, however, two modifications of inosite that are optically active; these are known, respectively, as *dextro-inosite* and *levo-inosite*, the former having a specific rotatory power of + 65°, the latter of — 65°, circular. Like meso-inosite, they do not ferment with yeast, do not reduce Fehling's solution, yield carbolic-acid derivatives when heated with strong hydriodic acid, etc. Either of them melts at 247° C. (476.6° F.), and they are somewhat more readily soluble in water than meso-inosite. Neither of them has been found in nature in the uncombined state. Dextro-inosite was obtained by Maquenne by the action of hydriodic acid upon pinite—a crystalline substance contained in the resin of *Pinus lambertiana*, a species of pine growing in Oregon and Nebraska. Levo-inosite was similarly obtained from quebrachite—a substance contained in quebracho bark.

Finally, the two optically active modifications of inosite just described combine, when mixed in equal amounts, giving what is known as *racemic inosite*, a substance which melts at a higher temperature than the other modifications, viz., at 253° C. (487.4° F.), and is much less soluble in water than the others. Optically it is, of course, inactive, the optical activity of each of its components neutralizing that of the other. That, however, unlike ordinary inosite, it is made up of two distinct substances is indicated by the fact that *Aspergillus niger*, a species of fungus occurring on damp plants, attacks its two components with unequal effect, the levo-inosite being destroyed more rapidly; so that, after the action has proceeded for some time, the components are no longer present in equal amounts, the dextro-inosite is present in some excess, and the substance as a whole rotates the plane of polarized light to the right. See STEREO-CHEMISTRY.

INOUYE, ē'nō-ōō'yā', KAORU (1835–1915). A Japanese statesman, born in Choshu. With his friend Ito (q.v.) he went to Europe in 1863 and studied in London. He returned in time to prevent his clansmen from fighting the allied squadrons at Shimonoseki (q.v.) in 1864. His progressive spirit and loyalty to the Emperor drew upon him the wrath of reactionary assassins, who wounded him with their swords and left him for dead on the snow. He recovered, however, and subsequently was made Vice Minister of the Treasury in Tokyo, in which position he was influential in having the chief thoroughfare of the city rebuilt in brick after the great fire of 1872. He was made Minister of Public Works in 1878 and of Foreign Affairs in 1881. After holding this office for seven years, he became Minister of Commerce and Industry, in 1892 Minister of the Interior, and in 1898 Minister of Finance. In 1884 he was made Count. After the war with China he went to Korea to inaugurate reforms, but his programme was marred by the assassination of Queen Min. He belongs to the group of elder statesmen whose influence was apparent during the war with Russia in 1904–05. Consult Arthur Lloyd, *Every-Day Japan* (New York, 1911).

INOWRAZLAW, ē'nō-vräts'läf. A town in the Prussian Province of Posen, situated 21 miles southwest of Thorn (Map: Germany, H 2). It has ruins of an eleventh-century church, a Kurhaus, a Gymnasium, and manufactures iron-work, machinery, sugar, flour, chicory, and bricks. It is a good market for cattle and finely bred horses. In the vicinity of the town are situated extensive government salt works. Pop., 1900, 26,141.

IN PAR'TIBUS IN'FIDE'LIUM. See TITULAR BISHOPS.

IN PERSO'NAM (Lat., against a person). In the classification of legal rights, a right in personam is one available against a particular person as distinguished from one maintainable against the whole world, known as a right in rem (q.v.). Rights in personam arise out of specific engagements entered into by individuals or out of duties imposed on individuals by the policy of the law. They thus comprehend all contract rights, the rights that arise out of the domestic relations or out of fiduciary or official position. Thus, the right to the performance of a contract, the right of a husband to the society of his wife, the right of a beneficiary against a trustee, in each case asserted against a determinate person, are all rights in personam. But by far the largest class of these rights is that which springs from the violation of other rights, whether rights in rem or in personam. A right once violated—whether a right of property by a trespass, or the right of personal security by an assault, or a contract right by a breach of contract—a cause, or right, of action arises, and this right of action, being limited to the person or persons committing the act complained of, is necessarily a right in personam. See IN REM; RIGHT; and consult Holland, *Elements of Jurisprudence.*

The phrase "in personam" is also employed in a narrower sense to describe the nature of the jurisdiction exercised by a court. The courts of chancery are said to act in personam, i.e., by ordering a person to do or to refrain from doing a certain thing, while courts of law, whose function is not to command, but to adjudicate controversies, are said to act in rem. See CHANCELLOR; CHANCERY, COURT OF; EQUITY.

IN'QUEST (OF. *enqueste*, Fr. *enquête*, from LL. *inquista*, from Lat. *inquisita*, p.p. fem. sing. of *inquirere*, to inquire, from *in*, in + *quærere*, to search). In early English law, a body of "lawful" men (*legali homines*) summoned and sworn to inquire into matters of fact of which the authorities desired cognizance and to report thereon under oath. Later the proceeding itself came to be known as an inquest, and this is the modern sense of the term. The process is one of great antiquity and was freely employed by the Norman and Angevin kings in England for a great variety of purposes, administrative as well as judicial. Domesday Book is the record of numerous inquests conducted by the Conqueror for the benefit of the royal exchequer. The chief interest of the inquest for modern lawyers lies in the fact that it is the direct progenitor both of trial by jury and of the inquiry into crimes and other matters which is the present function of the grand jury.

Specifically the inquest is still employed in English and American law under that name in

three classes of cases, all of them survivals from the period to which reference has been made. These are (1) the coroner's inquest, (2) the sheriff's inquest, and (3) inquest of office.

1. *The coroner's inquest* is an investigation conducted by the ancient official known as a coroner (so called because his original function was to maintain pleas of the crown, *placita coronæ*) into the cause or manner of death of any person who has been slain, has died suddenly, is found dead, or has died in prison. Where foul play is suspected, the inquest may develop into a quasi-judicial investigation into the culpability of the suspected person and may result in a finding which charges him with the homicide; but, as the proceeding is not strictly judicial nor in any sense a trial of the accused, the latter is not entitled to make a defense or be heard in his own behalf. In some of the American States the office of coroner has been abolished and a medical inspector substituted, but the procedure remains substantially the same. The jury in a coroner's inquest is known as a coroner's jury.

2. *The sheriff's inquest* is an inquiry conducted by the sheriff of a county and a jury to ascertain the amount of damages due a plaintiff under a judgment against a defendant in default. When a defendant fails to appear or answer in a cause, the plaintiff is entitled to judgment without proving his cause of action, which is deemed admitted by the defendant's default. But as he is, under his judgment, entitled only to the damages actually sustained by him, it is the practice in such cases for the court to direct an inquest for the purpose of ascertaining the amount. As the proceeding in the inquest is not a trial of the issue between the parties, no evidence need or can be given thereon, but the hearing will be confined to the precise question of the damages sustained by the plaintiff—a fact which must be determined in order that he may have execution. The defendant may be heard on this, as well as the plaintiff, and may summon witnesses to testify in his behalf. The practice still prevails in the United States as well as in England, but in New York and some other States the proceeding, still known as an inquest, is taken in court before any jury that may be in attendance. The sheriff's inquest is also employed in cases of attachment of goods, replevin, or garnishment, to determine which of two or more claimants is entitled to the possession of the property in controversy.

3. *Inquest of office* is an inquiry, now usually directed by the Attorney-General, to ascertain whether or not the crown, or state, is entitled to lands by escheat or to lands or goods by forfeiture. As the right of the state in such a case depends on certain facts, as the death of a landowner without heirs or, formerly, the conviction of a property owner of treason or felony, the duty of the inquest is to ascertain and report on these facts. As the proceeding is in England strictly a plea of the crown, the function of holding the inquest formerly belonged to the coroner. It is now in the United States generally exercised by a commissioner or other officer designated for the purpose by the chief law officer of the State. The procedure is also known as "office found" (q.v.).

In States where aliens are, as at common law, forbidden to acquire real estate, inquest of office is the appropriate process for ascertaining the facts on which the right of the State to take the property depends.

Consult: Blackstone's *Commentaries on the Laws of England;* Kent, *Commentaries on American Law* (13th ed., 4 vols., Boston, 1884); Thayer, *Preliminary Treatise on Evidence* (ib., 1898); Pollock and Maitland, *History of English Law* (2d ed., Cambridge, 1899); Holdsworth, *History of English Law* (4 vols., Boston, 1908–09). See CORONER; JURY; INQUISITION.

INQUILINE, ĭn'kwī-līn (from Lat. *inquilinus,* one dwelling in a place not one's own, from *incola,* inhabitant, from *incolere,* to inhabit, from *in,* in + *colere,* to cultivate). An insect which lays its eggs in a nest of some other insect, thus living parasitically at the expense of the host. The Inquilinæ form a group of gallflies called "guest gallflies," which are unable to produce galls themselves, since they do not secrete the gall-producing poison, though possessing a well-developed ovipositor. Hence, like the *Nomada,* etc., among bees, they are "cuckoo flies," laying their eggs in galls already formed, the larvæ feeding on the inside of the gall in company with the larvæ of their host. These inquilines strikingly resemble their hosts and are difficult to separate. There are several hundred species. The Inquilinæ, forming a section of the family Cynipidæ, are, according to Walsh, distinguished from the true gallflies by the sheaths of the ovipositor always projecting more or less beyond the "dorsal valve," which is a small hairy tubercle at the top of the seventh abdominal segment. This dorsal valve also projects greatly. In almost all the species the ovipositor projects from between the tips of the sheaths. Among the inquiline genera are *Synophrus, Amblynopus, Synerges,* and *Aulax,* which are "guests" of various species of Cynipides. The cuckoo flies (Chrysididæ) are all inquilines, laying their eggs in the nests of wasps and solitary bees; some are true parasites.

One of the eight species of British wasps is said by Sharp to be a guest wasp. Guest bees are not rare; they do not work, the organs for collecting and carrying pollen having been lost by disuse. Guest bees enter the nests of both solitary and social bees and lay their eggs, the young feeding upon the pollen stored up for the young of their hosts, but not directly destroying their young hosts. *Nomada* (q.v.) is a gayly colored bee which boards with species of *Halictus, Andrena,* etc. Packard states that there seemed enough food in the nest for the young of both host and boarder, as they were found to live harmoniously together, and their hosts and their parasites are disclosed both at the same time. The species of *Cœlioxys* live on the leaf-cutting bee (*Megachile*), those of *Psithyrus* on the bumblebee. In this guest bee the mandibles of the female are acute and two-toothed, their legs (tibiæ) are convex, so that they cannot carry pollen, while they have no pollinigerous organs. The habits of these guest bees afford interesting examples of the effect of change of habits on their structure. For the guests of ants and termites, see INSECT, *Social Insects.*

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INQUI'RY, COURT OF. See COURTS, MILITARY.

INQUIRY, WRIT OF. A common-law writ

or process issuing out of a court directed to a sheriff commanding him to empanel a jury for the purpose of assessing damages against a defaulting defendant. The proceedings under such a writ are termed an inquest. See INQUEST.

IN'QUISI'TION (Lat. *inquisitio*, inquiry, from *inquirere*, to investigate, from *in*, in + *quærere*, to seek), THE (*Inquisitio hæreticæ pravitatis*), called also the Holy Office. A tribunal in the Roman Catholic church for the discovery, repression, and punishment of heresy, unbelief, and other offenses against religion. The punishment of heresy by force arose after the Roman Empire became officially Christian. Soon after the Council of Nicæa (325) had formulated its creed Constantine attempted to repress all dissent, but it was not until 385 that any one was executed for heresy. (See HERESY.) From this time, in the East, persistence in heresy was legally punishable with death. In the West, however, among the more tolerant Teutonic tribes there was no tendency for several centuries to inflict the capital sentence for heresy. In the twelfth century there were some executions, but the Western church in general preferred milder measures. The ecclesiastical cognizance of heresy, and its punishment by spiritual censures, belonged to the bishop or episcopal synod; but the bishops seldom fulfilled this duty, because they were too fully occupied. No special machinery for the purpose was devised, however, until the spread, in the twelfth and thirteenth centuries, of certain sects reputed dangerous alike to the state and to the church—the Cathari, Waldenses, and Albigenses—excited the alarm of the civil as well as of the ecclesiastical authorities. At that time heresy was regarded as a crime against the state no less than against the church. An extraordinary commission was sent by Pope Innocent III into the south of France to aid the local authorities in checking the spread of the Albigensian heresy, and a council held at Avignon in 1209 directed that in each parish the priest and two or three laymen in good repute should be appointed to examine and report to the bishop all such offenses discovered within the district. The fourth Lateran Council (1215) earnestly impressed, both on bishops and magistrates, the necessity of increased vigilance against heresy.

So far, however, there was no permanent court distinct from those of the bishops; but by successive edicts, from 1227 on, a special tribunal for the purpose was instituted, the direction of which was confided chiefly to members of the Dominican Order (1232). The Inquisition thus constituted became a general instead of, as previously, a local tribunal; and it was introduced into Italy, Spain, and the southern provinces of France.

The procedure of the Inquisition deserves a brief notice. A person suspected of heresy or denounced as guilty was liable to be arrested and detained in prison, to be brought to trial only when it might seem fitting to his judges. The proceedings were conducted secretly. He was not confronted with his accusers, nor were their names even then revealed to him, but the suspect could make known his enemies, whose evidence would thereupon be excluded. The evidence of an accomplice was admissible, and the accused himself was liable to be put to the torture in order to extort a confession of guilt. Any such confession, however, had to be repeated afterward without torture in order to be accepted; but if the accused refused to repeat his confession he might be tortured again. As a punishment, the condemned were sentenced to make pilgrimages, to wear signs of infamy such as the yellow cross, or to imprisonment, and in extreme cases were condemned to death. This extreme penalty, however, could be inflicted only by the state, and out of 636 persons condemned between 1308 and 1322 only 40 were turned over to the state for this purpose. The state was required to enforce the laws of the church as a part of the ruler's duty as a Christian. If the ruler refused, he might be excommunicated or in extreme instances deposed. The Papal Inquisition had no standing in England and the northern countries, where all such matters were attended to either by the Bishops' Inquisition or, as in England, by the royal power. In Languedoc the Inquisition was very active for about a century, but by the end of the first quarter of the fourteenth century it had practically spent its force. In northern France the history of the Inquisition is more obscure, but by the end of the fourteenth century it is certain that it was decadent. Philip the Fair, however, made use of the Inquisition against the Templars and in 1312 made it a state tribunal. In most of the Italian cities except Venice it was very powerful. In Germany it had very slight influence.

It was in Spain, Portugal, and their dependencies that the Inquisition attained its fullest development. As an ordinary tribunal similar to those of other countries, it had existed in Spain from an early period. In 1237 the duties of the Inquisition were given to the Dominicans and Franciscans. Early in the reign of Ferdinand and Isabella, in consequence, it is said, of the alarms created by the alleged discovery of a plot among the Jews and the Jewish converts —who had been required either to emigrate or to conform to Christianity—to overthrow the government, an application was made to Pope Sixtus IV to permit its reorganization (1478); but in reviving the tribunal the crown assumed to itself the right of appointing the inquisitors and, in fact, of controlling the entire action of the tribunal. The establishment of the tribunal of the Inquisition was sanctioned by the Cortes at Toledo in 1480, and from this date the Spanish Inquisition became a state tribunal. In order to prove that the church generally, and the Roman see itself, was dissociated from that state tribunal, the bulls of Pope Sixtus IV, which protest against it, are cited. Notwithstanding this protest, however, the Spanish crown maintained its control of the Inquisition. The work of the Inquisition began in 1481, when Miguel Morello and Juan Martín, members of the Dominican Order, were appointed inquisitors for Seville. In 1483 the Inquisition was extended over Aragon and León, and the Dominican Tomás de Torquemada (q.v.) became the first Grand Inquisitor. The Inquisition asserted an independence not pleasing to Rome, and when Spain sought to introduce it into Naples also, Pope Paul III, in 1546, exhorted the Neapolitans to resist its introduction. However severe the weight of the Inquisition may have been on heretics and unbelievers, the number of its victims as given by Llorente, the antipapal historian of the Inquisition, is enormously exaggerated. His statements deserve no credence whatever, although he had excellent opportunities of learning the truth, as he was for a time the secretary of the Inquisition. He

was a violent partisan, and his errors and exaggerations have been exposed, especially by Hefele in his *Life of Cardinal Ximenes* (Eng. trans., 2d ed., London, 1885); Ranke does not hesitate, in his *Fürsten und Völker des südlichen Europas* (4th ed., Leipzig), to impeach his honesty. While Llorente gives the number of executions as 341,042, the Catholic authority Gams states 4000 to have been the total. Protestant writers have usually given figures varying between the lowest and the highest. Charles V (1516–56) and Philip II (1556–98) made attempts to transfer the Inquisition also to the Netherlands, but there is no question that here its object was political, intended to suppress a revolt rather than a heresy.

The Spanish Inquisition is condemned by Protestants and non-Spanish Catholics alike. Spanish Catholics, however, are inclined to defend it and hold that its form of proceeding was not as usually stated, but was fair and equitable, considering what a fearful crime heresy was and is in the eyes of the Catholic church. There is no doubt, moreover, that many of the crimes tried by the inquisitors in Spain were such as would now be brought into our ordinary civil courts.

The rigor of the Spanish Inquisition abated in the latter part of the seventeenth century. In the reign of Charles III it was forbidden to punish capitally without the royal warrant, and in 1770 the royal authority was required as a condition even for an arrest. In 1808, under King Joseph Bonaparte, the Inquisition was suppressed. It was revived under the Restoration, was again suppressed on the establishment of the constitution in 1820, but was partially restored in 1825, nor was it till 1834 that it was finally abolished in Spain, its property being applied two years later to the liquidation of the national debt.

From Spain the Inquisition was transplanted into all the Spanish-American countries, and it continued to exist in these countries until they became independent. From Portugal the Inquisition was extended to the Portuguese colonies in India. The rigor of its process, however, was much mitigated in the eighteenth century, and under John VI it fell entirely into disuse.

The Inquisition in Rome and the Papal States never ceased, from the time of its establishment, to exercise a severe and watchful control over heresy, or the suspicion of heresy, which offense was punished by imprisonment and civil disabilities; but of capital sentences for heresy the history of the Roman Inquisition presents few instances, and according to Balmes, *On Civilization* (6th ed., Madrid, 1875), that tribunal "has never been known to order the execution of a capital sentence" for the crime of heresy. The tribunal still exists under the direction of a congregation (*congregatio sancti officii*), originally founded by Paul III in 1542 and reorganized by Sixtus V, but as by its very constitution it must call upon the state aid to enforce its decrees, and as such state aid can nowhere be obtained at the present day, its action is limited to the imposition of spiritual punishments, such as excommunication.

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INQUISITION. The formal instrument in writing setting forth the verdict or decision of a sheriff's or coroner's jury as a result of their inquiry into the facts of the matter referred to them. It is certified and signed by each of the jurors and is usually required to be filed in some public office as a record of the inquest. It does not operate as a judgment, but is sometimes the basis of further proceedings in the matter. For example, if a coroner's jury summoned to inquire into the cause of the death of A find that he was killed by B under circumstances not justifiable by law, the proper authorities will cause the latter to be indicted. The inquisition is not evidence against him, being merely for the information of the public prosecutor.

The word is less frequently used to describe the proceedings at an inquest, but this leads to confusion and is not sanctioned by the best authorities. See INQUEST.

IN REM (Lat., in, or with respect to, a thing). In the classification of legal rights, a right in rem is a right of a general character, available against the whole world, as distinguished from a right in personam, which is a right against a determinate person (*in personam certam*). Rights in rem are not limited to things, i.e., to property, as the phrase might indicate, but comprehend all rights, whether in respect to person or property, which are claimed or asserted against all persons whatsoever, and not against any particular individual. Thus, the right not to be assaulted, the right to personal liberty and security, are rights in rem, as well as the right to be free from invasion of a property right. See IN PERSONAM.

The expression is also employed to designate a form of action in which the remedy sought is not damages against an individual, but the seizure and detention of specific articles. In such cases the thing sought to be recovered or charged with the claim of the plaintiff is personified for the purpose of making it the defendant in the action. Such proceedings are not common in our legal system, the ordinary process for the recovery of land or goods being really an action in personam against the person wrongfully withholding the property. But in admiralty practice such actions are common. They are brought for the enforcement of maritime liens against a vessel or cargo, for the recovery of salvage, to procure the forfeiture of property for a violation of the revenue laws, or to obtain possession of a prize in time of war. See MARITIME LAW.

I. N. R. I. The first letters of the Latin inscription placed on the cross by Pilate at the crucifixion of Christ: *Iesus Nazarenus Rex Iudæorum*, 'Jesus of Nazareth, the King of the Jews' (John xix. 19).

INSANE ASYLUM. An institution for the care and treatment of the insane. Monasteries appear to have been the representative of such retreats in the mediæval Christian times, but restraint and rigid asceticism characterized their management. Out of conventual establishments

grew the bethlems, or bedlams, with which the English of two generations ago were familiar. (See BEDLAM.) The vast majority of the insane must have been neglected; in some countries, reverenced as specially God-stricken; in others, tolerated or tormented or laughed at as simpletons or buffoons; in others, imprisoned as social pests, even executed as criminals. In a few spots, enjoying a reputation for sanctity, or where miraculous cures of nervous diseases were supposed to have been effected, such as Gheel (q.v.) and Saint-Suaire, communities were formed, of which lunatics, sent with a view to restoration, formed a large part, and resided in the houses of the peasants and partook of their labor and enjoyments. Asylums, properly so called, date from the commencement of the nineteenth century; and for many years after their institution, although based upon sound and benevolent views, they resembled jails, both in construction and the mode in which they were conducted, rather than hospitals. Until about 1880 a model erection of this kind was conceived necessarily to consist of one vast building, the centre of which was appropriated to the residence of the officers, the kitchen and its dependencies, the chapel, etc., from which there radiated long galleries, in which small rooms, or cells, were arranged upon one or both sides of a corridor or balcony, having at one extremity public rooms, in which the agitated or nonindustrial inmates, as the case might be, spent the day, while the more tractable individuals were withdrawn to engage in some pursuit, either in workshops, clustered round the central house, or in the grounds attached, which were surrounded by high walls. The population of such establishments, when they were appropriated to paupers, ranged from 100 to 1400 patients. These were committed to a staff composed of a medical officer, matron, and attendants, to whom were directly intrusted the management, discipline, and occupation of the insane, in accordance with regulations or prescriptions issued by the physician. A gradual but great revolution has taken place in the views of psychologists as to the provisions and requirements for the insane during seclusion, chiefly through Conolly's influence, in 1847 and subsequently. As a result of this change, asylums, especially for the wealthy classes, are similar in their arrangements to ordinary dwelling houses; while it is proposed to place the indigent in cottages in the immediate vicinity of an infirmary, where acute cases, individuals dangerous to themselves or others, or in any way untrustworthy, can be confined and actively treated, as their condition may require. In all such establishments, whether now entitled to be regarded as cottage asylums or not, the semblance and much of the reality of coercion have been abolished; the influence of religion, occupation, education, recreation, the judicious application of moral impressions, and the dominion of rational kindness and discriminating discipline, have been added to mere medical treatment, and substituted for brute force, terror, and cruelty. In fact, the word "asylum" has been supplanted by "hospital"; "keepers" have given place to "nurses" and "attendants"; and the insane are treated, especially in institutions in the United States, as sick people.

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INSAN'ITY (Lat. *insanitas*, from *insanus*, insane, unsound, from *in-*, not + *sanus*, sane, sound; connected with Gk. *σάος*, *saos*, *σῶς*, *sōs*, sound, safe), or LUNACY. A manifestation of disease of the brain characterized by a general or partial derangement of one or more of the mental processes, in which, while consciousness is not abolished, mental activity is weakened or perverted. This definition is modified from that given by Hammond and, like all attempted definitions of the term, is inadequate. Insanity is not mental disorder, although disorder of mind is always present in insanity. A person who mistakes red for gray has disordered mentality; but he is not insane, though color-blind. Defective reasoning, which leads a man, e.g., into a bad investment, is a disordered mental process, yet not insanity. Thus, it is a matter of extreme difficulty to define insanity so as not to include the conditions existing in sleep, or trance, or the common manifestations of general neuroses like epilepsy, hysteria, and chorea, the delirium of fever, acute intoxications, etc. There is no rigid line of demarcation between sanity and insanity. The conditions of each bear close resemblance. The processes of mental action in sanity and in insanity are of the same kind, although they differ in their origin and in the degree of their intensity. It is often said that every one is more or less insane. This is an absurdity, as insanity is a manifestation of disease, not merely a name for mental disorder. The notion, also, that one may be insane on one subject and otherwise perfectly sane is erroneous for the same reason. An insane person may betray his mental condition when drawn out by one line of thought, or when one topic is broached; but, if insane, he is diseased and in no respect sane, even if able to carry on his business or perform complex acts properly.

To understand insanity one must understand the normal action of the mind and have some knowledge of the physical basis of mental action, i.e., of the cerebral cortex and its association fibres. (See NERVOUS SYSTEM.) The functions of the cerebral cortex are: (1) to receive impressions from the organs of sensation (conscious perceptions); (2) to group these impressions into a unit, known as a concept; (3) to store up these concepts, for future recognition and recollection (memory), for gathering into novel combinations (imagination), and for use as a basis of thought; (4) to express thought in speech and action; (5) to experience emotion which accompanies mental activity; (6) to exert self-control over all mental action (Starr). This statement is true enough for the practical study of insanity and is made to avoid opening the subject of the connection between nervous and mental phenomena. While many alienists accept the anatomical basis and believe in a

transference of the mental into the material, others claim that the activity of the highest nervous centres is attended by a mental state, but is not in itself a mental state. (See MIND.) At all events, when areas of the cortex are diseased, one or more of the cortical functions named may be suspended, and mental disorder results. If changes in blood supply or in nutrition occur, or if disease affects the entire cortex, insanity may result; and, as a result, thought becomes illogical, emotion becomes excessive or arises without external stimulus, action is irregular or purposeless, and conduct is not properly adjusted to surrounding circumstances. In the insane person impressions from sense perceptions may be wrongly interpreted. An illusion is a falsely interpreted sense perception. For example, a chair may be mistaken for an animal; the rumble of a wagon may be mistaken for the angry voices of a pursuing mob. Ideas may arise without any sense perception. When quiet exists, the insane person may hear voices; he may see faces in an empty space; he may smell burning flesh when no odor is present. These false perceptions without external origin in sensory experiences are called hallucinations. A mistaken idea may be harbored by any one; e.g., one may believe that a stone is much larger than it is. Measurement and examination convince him of his error, and, if he is sane, he corrects his judgment. The insane man is not affected by logical methods and retains his erroneous idea in spite of demonstration and reasoning. A mistaken idea accepted without logical foundation is a delusion; if retained in spite of demonstration of its falsity, it is an insane delusion. Insane people frequently, though not necessarily, exhibit delusions, varying according to the bodily ills, the occupation or profession, the emotions experienced, or their surroundings. Certain forms of delusion are fairly constant in certain types of insanity. For example, in the depressed type of manic-depressive insanity or in involutional melancholia patients often declare that they have committed some great sin; in paranoia, delusions of persecution and of conspiracy are present; in manic states, delusions of identity or of being an important person are frequent; in alcoholic insanity the delusion of marital infidelity is common; in general paresis a number of grandiose delusions—of power, of wealth, of strength, of beauty—are present in one stage; and in early stages of dementia delusions of grandeur are also noticed, with less frequency. *Disturbances of emotional feeling* occur in insane people: depression, exaltation, languor, and absurd joy are noticed in different cases. Acting under the impulse of delusion or hallucination, the insane exhibit *disturbance in voluntary action and conduct.* Insufficient motive causes action, because of impaired intellectual power or impaired memory or subconsciousness. *Consciousness is impaired;* external objects are often ignored; changes of personality occur.

Besides these mental signs of insanity, there are many somatic, or physical, symptoms. These are generally divided into five classes: 1. Sensory symptoms, such as pain, hyperæsthesia (q.v.), or anæsthesia (q.v.). 2. Changes in reflex action, from disease or other cause, such as lessened knee jerk (q.v.) or dilated pupils. 3. Motor disturbances, such as loss of muscular control, shown in altered handwriting, altered speech, gait, attitude, etc.; convulsions or paralysis may also occur. 4. Changes in circulation and nutrition, such as pallor or flushing, loss of flesh, impaired digestion. 5. Disturbances of sleep, which occur commonly.

The study of disease affecting the mind is called psychiatry, less often (in Great Britain) mediopsychology. The specialists who give their attention to insanity and the treatment of the insane are called alienists.

An accurate classification of diseases affecting the mind is difficult. Various alienists have produced different tables, but very convenient is the classification of White of Washington, D. C., as follows:

1. **Paranoia and Paranoid States,** characterized by systematized delusions of persecutions and conspiracy or by extreme jealousy, usually with hallucinations of hearing, and evincing little intellectual impairment for years. See PARANOIA.

2. **Manic-Depressive Insanity,** including the old *mania* (characterized by an exalted emotional state, with psychomotor excitement and great flight of ideas), the old *melancholia* (characterized by a depressed emotional state, difficulty of thinking, psychomotor retardation), *hypomania* (a mild form of maniacal excitement, characterized by a disorder in the process of thinking, over activity, tiresome intenseness, good humor, increased self-esteem, occasional great aversion or impulsive anger), and *circular* insanity (alternating depression and exaltation).

3. **Paresis.** An organic disease of the brain with inflammatory and degenerative changes, caused by syphilis (often innocently acquired), involving both the brain and its coverings, and characterized by progressive mental deterioration. The patient often manifests "delusions of grandeur," as of great strength (although tottering and feeble), of great mental ability, or great wealth. Speech defects, lapses of memory, convulsions, hypochondriacal ideas, ataxia, occur during different stages. (See PARESIS.) The disorder is called progressive general paralysis of the brain, paretic dementia, and popularly, though incorrectly, "softening of the brain."

4. **Dementia præcox.** A disorder of adolescence or youth, resembling the dementia of the aged, and tending to progress to a hopeless terminal state, though often characterized by remissions. It often results from a hereditary factor, such as alcoholism, tuberculosis, age, or neurasthenia in the parent, or may be caused by sexual excess, excessive study, a sexual episode followed by intense worry, fright, or protracted or severe emotional strain. It may therefore be due to faulty mental hygiene and be of purely psychic origin. Failure of voluntary attention and lack of interest are early observed, orientation is preserved for a long time; but emotional deterioration is characteristic, and appears early in the case. After a precocious childhood the patient shows a shallowness, with fantastic delusions, making absurd statements often with marked incoherence. Emaciation, loss of appetite, and insomnia are common, and the parents may notice rapid heart action and blueness of the extremities. Hysteriform attacks frequently occur. Four forms of dementia præcox are observed, and there may be a fifth variety consisting of mixed forms. In one form, the catatonic, the patient presents at times rigidity and muscular tension, holding a limb for a considerable time in whatever position it is placed by the physician. In this

variety of case there is frequently a negativism, and senseless rhyming or repetition characterizes the patient's speech.

The course of dementia præcox is chronic, and the tendency is toward a deep dementia. The condition is usually permanent, but some of the cases have remissions lasting for years.

5. **Involutional Melancholia** occurs in women between the ages of 40 and 50, and in men usually after 50, being a psychosis of the involutionary period or climacteric. Commencing senile decay and arteriosclerosis are exhibited by most of the patients. Shock or other mental stress seems to be the precipitating factor in these instances. Heredity is a factor in about 60 per cent of the cases (White). This condition is characterized by deep depression, apprehension, and anxiety, often with agitation and confusion, and delusions of a hypochondriacal variety. Grandiose ideas are rare and appear late, if ever, in the course of the psychosis. Persecution, poverty, sinfulness, are the burden of the delusional thought for the most part. Constant vigilance is necessary to prevent suicide. The recoverable cases usually change for the better after three years of suffering, and these constitute about 40 per cent of the whole number.

6. **Senile Psychoses.** Virchow's aphorism, "A man is as old as his arteries," is very pertinent in the formation of a judgment of senility. A patient suffering from senile psychosis will exhibit vertigo, depression, anxiety, followed by gloom, moroseness, and seclusiveness, and later hypochondriacal delusions or persecutory ideas, irritability, lack of judgment, loss of memory, egotism, and a decided failure of the normal mental grasp. A corresponding physical change occurs. Persons suffering from this disorder frequently lose their way in familiar streets, attempt to will away property they do not own, contemplate new matrimonial alliances while the marital partner is still living, and often prowl about at night, attempting violence of various kinds. They do not improve and often demand custodial care.

7. **Infection-Exhaustion Psychoses** occur most frequently in parturient women or in postfebrile conditions. Delirium, confusion, hallucination of vision, and great fatigue characterize the cases. Where they are caused by prolonged anxiety, loss of blood, or severe mental shock, they may present collapse or a great degree of excitement with disorientation, incoherence, and finally stupor. About half of the cases recover.

8. **Toxic Psychoses.** This group consists of insanities caused either by poisons formed within the body (autotoxins) or by poisons introduced from without. The autotoxic condition may be caused by absorption of altered renal secretions or of poisons formed during diabetes, or by gastro-intestinal disturbances or thyroid disease, or may be due to alcohol, opium, cocaine, paraldehyde, iodoform, lead, etc. Of these, alcoholic insanity is by far the most frequent. It is characterized by flight of ideas, loss of propriety, lessened power of voluntary attention, thick speech, altered sight, and hallucinations of vision, with boisterousness or depression, if it be the psychosis known as *drunkenness.* If it be a chronic condition resulting from repeated inebriety, there may be added to the foregoing symptoms suspicions of marital infidelity, ataxia, muscular weakness, and mental enfeeblement, with possibly convulsions, possibly aural and visual hallucinations and persecutory delusions, far less often an amnesic state lasting many days. Of all insane men, about 30 per cent owe their insanity to alcohol, many to so-called "moderate" drinking. In a series of 960 patients in Manhattan State Hospital, Wards Island, New York City, whose entire history was well known, in 55 per cent of the men and 22 per cent of the women alcohol was beyond a doubt the precipitating cause.

9. **Psychoses Associated with Other Diseases.** This group includes phenomena that sometimes are found in hysteria, deliria, dream states (as in alcoholism), depressions and phobias of certain types of neurasthenia (a psychoneurosis), epilepsy, multiple sclerosis, chorea, syphilis, arteriosclerosis with brain softening, or mental states following injuries.

10. **Borderland and Episodic States.** This group is made up of obsessions, impulses, tics, phobias, delirium of contact, as Janet classifies them, and due to *lowering of the psychological tension,* to use his expression. Psychasthenia belongs here; likewise the periodical morbid desires known as dipsomania (q.v.), pyromania (q.v.), kleptomania (q.v.), and arithmomania, as well as the *formes frustres* of paranoia, whose component units are called "cranks"; and finally the varieties of sexual anomalies, including sexual inversion (instinctive desire for the same sex) and sexual perversion (abnormal gratification of sexual desire).

It will be seen that perversion of the will is present in almost every case of insanity. This fact led Hammond to incorporate in his definition of the term the statement that in insanity "mental freedom is weakened, perverted, or destroyed." Free determination of the will is presented by delusions, by inferences from delusions, by abnormal emotional states, by delirium, by incoherence of ideas, or by dementia. Often the mental processes of the insane are identical with those of the sane, but the premise from which the argument springs is false. In many forms of insanity the ego is preëminent. A lunatic may consider himself powerfully equipped, mentally and physically. He is expansive, elated, extravagant, arrogant, and garrulous. His condition is termed *hyperbulia.* Another may be depressed, dejected, apathetic, mentally slow and impeded, hopeless, and even suicidal. This condition is termed *abulia.* Fanciful subdivisions of the divisions of the older nomenclature have been made by some alienists, founded upon certain trains of thought or often recurring ideas, and terms have been devised to indicate the trend of imagination in patients experiencing these ideas. For example, *agoraphobia* denotes fear of being in an open place or street; *claustrophobia,* fear of being shut in a room or house; *mysophobia,* fear of defilement, pollution, or contamination; *pyrophobia,* fear of fire; *astraphobia,* fear of lightning; *anthropophobia,* fear of society. This list might be prolonged indefinitely.

Causes. The causes of insanity other than heredity, among 6061 first admissions, as ascertained in New York State by a complete and painstaking system of securing facts, were reported as follows for the year ending Sept. 30, 1913, by Dr. James V. May, medical member of the New York State Hospital Commission: alcohol, 15.2 per cent; syphilis, 14.8 per cent; drugs, 0.8 per cent; arteriosclerosis, 12.1 per cent; se-

nility, 10.6 per cent; inferior or defective constitution, 18.5 per cent; injury to head, 1.6 per cent; acute illnesses, 1.0 per cent; epilepsy, 2.8 per cent; sexual irregularities or difficulties, 3 per cent; death in family, 2.1 per cent; financial loss, 2.2 per cent; disappointment in love, 1.4 per cent; and childbirth, 3.3 per cent of the women. Dr. Pollock, the statistician of the Hospital Commission, presents the causation in illuminating tables which show the unequal proportions affected in the sexes and the principal causes of the psychoses.

CAUSES OF INSANITY IN MALES AND FEMALES

CAUSE IN NEW YORK STATE, 1912–13	PER CENT	
	Males	Females
Alcohol	22.6	7.6
Syphilis	21.1	7.8
Senility	9.3	12.1
Arteriosclerosis	13.2	11.0
Acute illnesses	0.5	1.6
Injury to head	2.6	0.4

Pollock comments: "The psychoses due to harmful indulgence and exposure are far more prevalent in men than in women, while those arising from bodily weakness are, as a rule, more common to women."

PRINCIPAL CAUSES OF CERTAIN PSYCHOSES

PSYCHOSES	Principal etiological factor other than heredity	Per cent
Senile	Senility	100.0
	Arteriosclerosis	57.7
Dementia paralytica (paresis)	Syphilis	100.0
	Alcohol	8.9
	Inferior constitution	6.9
	Arteriosclerosis	4.6
Dementia paralytica (paresis) with other brain or nervous diseases	Arteriosclerosis	63.3
	Syphilis	18.9
	Alcohol	8.7
	Inferior constitution	7.4
Alcoholic	Alcohol	100.0
	Inferior constitution	13.1
Dementia præcox and allied to dementia præcox	Inferior constitution	28.5
	Sexual irregularities	6.5
	Alcohol	4.7
Manic-depressive and allied to manic-depressive	Inferior constitution	14.4
	Childbirth (women only)	7.8
	Alcohol	5.7

Native and Alien Insane. Dr. Spencer L. Dawes, special commissioner by appointment of Governor Dix of New York State, corroborated the previous claim that there are confined and supported in this country a number of alien insane out of all proportion to the native born. In 1912 the foreign-born insane constituted 43.4 per cent of the insane in civil hospitals in that State against 30.2 per cent of foreign born in the general population. This excess imposes an immense expense upon the taxpayers, for their net cost to the State in that year was $2,579,902, Dawes reports, omitting all reference to hundreds of aliens removed from the State hospitals in 1912. If allowed to complete their average hospital residence, the probable net cost of the 9241 aliens (out of 13,728 foreign born) under care on Sept. 30, 1912, will be $25,412,038. The danger to the population from absorbing a deteriorated and degenerate foreign stock is apparent. The present law (1915) provides that an immigrant may be returned to his native country if he becomes insane within two years, from causes existing at the time of immigration, prior to landing. Economists are calling attention to the necessity of making the time of probation at least five years and of conducting a searching examination into the history and antecedents of all immigrants.

Prognosis. About 60 per cent of the cases of manic-depressive insanity recover. Many relapse, if similar causes operate. Terminal dements, paranoiacs, senile dements, syphilitic dements, and paretics never recover. The average number of recoveries of all kinds of cases, excepting the hopeless, is about 29 per cent. Most recoverable cases emerge during the first year of their illness; few recover after two years have passed. Early confusion of ideas, indecency, persistence of delusions, and obesity are unfavorable symptoms. Recurrence occurs in about 21 per cent of ordinary asylum patients. The offspring of insane parents are defective; therefore no one who has ever been insane should propagate children.

Treatment. The treatment of insanity is a matter of great complexity. There can be no magical removal of manifestations by specific drugs. All improvement is slow. Dietetics forms an important part of the regimen, as do regular exercise; judicious control or direction; diversion by means of games, music, or the play; occupation, which is of great importance; isolation from worry, care, noise, company, or habitual environment; and the contact with the healthy, hopeful, reasoning minds of nurses and physicians. Drugs are indispensable in many conditions of malnutrition, insomnia, disordered circulation, etc. Restraint by means of mechanical contrivances is almost abolished in well-ordered asylums, except the restraint of confinement and of regulations. But some form of mechanical restraint is necessary and very helpful in certain cases, such as absolute refusal to take food or determined attempts at suicide. Most cases require and are benefited by sanitarium treatment or custodial care.

Medico-Legal Aspects of Insanity. The plea of insanity as an excuse for crime has been fashionable at intervals. There are cases of imperative impulse under which the lunatic commits an act which would be a crime in a sane man, but for which the lunatic is irresponsible. No case occurs in which but one insane act is committed, while the person was well balanced before that act and remains well balanced forever after it. In authentic cases a well-marked history of insanity before the act can be elicited, and insanity continues thereafter. "Temporary aberration" in an otherwise sane person does not occur. Amnesic and irresponsible intervals occur in psychic epilepsy (see EPILEPSY), during which crime may be committed; but the preceding and continuing epilepsy will be established. The knowledge of right and wrong is an improper basis upon which to judge the mental condition of a criminal. With a keen sense of right and wrong, a desire to do the right, and a dread of punishment, an insane person may obey and commit a crime under the

all-powerful compulsion of an imperative impulse, in utter helplessness. But when insanity is established as the cause of a crime, the unfortunate perpetrator should be committed to a hospital and never, under any circumstances whatsoever, to a jail. Lunatics should be, in general, confined in hospitals or retreats. Their prospect of improvement or recovery is never injured by incarceration in a proper institution. Society deserves protection from their acts, fraught with danger to themselves or others. The physical and financial interests of their families deserve consideration. Their individual interests are advanced by confinement in the majority of cases. See next article.

Commitment of the Insane to Asylums or Hospitals. In many countries, and in most of the States in the Union, special safeguards are erected by laws to prevent the confinement of sane people in institutions for the insane, as well as to secure to the insane a full enjoyment of their rights. For instance, in the State of New York an alleged insane person may be committed to an institution legally licensed for the reception and care of the insane only after a complicated though not public process. In this State the word "asylum" exists no longer, but has been replaced by "hospital." There are no more "keepers," but trained nurses and instructed attendants have the immediate care of the mentally astray. A State Hospital Commission controls all matters relating to the insane. This commission is composed of a medical man of at least five years' experience in the actual care of the insane in an institution of some size and who has been in charge of institutions for the insane, a lawyer of at least five years' experience in his profession, and a layman, all three appointed by the Governor of the State. These commissioners issue or revoke licenses to physicians whereby they are permitted to conduct or forbidden to conduct institutions for the care and treatment of the insane. They also are charged with the duty of visiting all State and private institutions in which insane are treated and confined, supervising and in a sense directing their government. Any judge of a court of record may appoint as an examiner in lunacy a physician of whom he approves, who has been in the actual practice of his profession at least three years, and who is a permanent resident of the State. The commitment paper, as formulated by the New York State Commission, consists of five parts: (1) a petition, to be made by a member of the family of the alleged insane person, by a person living in the house with him, or by a county officer, setting forth the reasons of the petitioner for believing the person insane and asking the court to act in the matter; (2) a certificate made under oath by two examiners in lunacy, giving the results of their joint examination of the patient; (3) a waiver of personal service of the order of court upon the person in question, to be signed by the committing justice in his discretion, or a substitutional service; (4) an order for a hearing before the justice, if in his opinion this be necessary or desirable, or be requested; (5) an order of a judge of a court of record committing the alleged insane person to the chosen hospital or retreat, after officially declaring him to be insane. In the case of indigent lunatics, who are partially or totally a charge upon the State, a further statement is made by the justice concerning the patient's financial condition, as far as can be ascertained. This entire proceeding may be concluded, with the exception of the *hearing*, without publicity or violation of the privacy that should surround family matters; yet it prevents a conspiracy to incarcerate a sane man as insane.

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INSANITY. Technically, in law, a disease or disturbance of the mental faculties which may produce some effect on the legal character or quality of the insane person's acts. It may or may not render him non compos mentis, i.e., subject to legal restraint or control of his person and property. It may thus be distinguished from lunacy, which may be described as such mental unsoundness as to incapacitate the insane person for all legal transactions and justify the state through the proper agency in taking charge of his person and property.

The law takes cognizance of insane persons as such, chiefly for the following purposes: (1) to ascertain their responsibility for crime; (2) to ascertain their capacity to make contracts; (3) to ascertain their liability for their torts; (4) to ascertain their capacity to make wills.

1. **Responsibility for Crime.** The insanity of one charged with crime may preclude the existence of the criminal intent which is an essential element of the crime. When, therefore, the plea of insanity is set up on behalf of one charged with crime, the question raised is, Was the accused capable of forming a criminal intent at the time when he committed the act? The law on this subject was first fully considered, and a legal test of insanity in criminal cases adopted, in M'Naghton's case by the English House of Lords in 1843. M'Naghton, having killed another while under the influence of an insane delusion, was charged with murder, and the question of his responsibility under the law was put to the judges of the House of Lords. They answered in substance that mere insanity was not a defense; that to establish want of criminal responsibility it must appear that the party accused was laboring under such defect of reason as not to know the nature and quality of the act he was committing; that an insane delusion would not establish want of responsibility unless the delusion if true would justify the defendant in doing the act with which he is charged. Thus, one who killed another under an insane delusion that the other was threatening his life under circumstances of immediate danger to himself is not criminally responsible for the homicide; but an insane delusion that another was slandering the defendant would not excuse him for killing or even assaulting the supposed slanderer, assuming always that in other particulars the defendant knew the nature and quality of his act. M'Naghton's case still represents the law in England, and its rules have been adopted by the courts of most of the United States.

The effect of these decisions is to hold to full legal responsibility one who commits an offense under the influence of an insane, irresistible impulse if he knew at the time the nature and character of his act. And this is generally the law, although it is conceded that there can be no criminal act without a free agent, and there may be in a given case the strongest evidence of the existence of such an impulse. The courts of a few States, however, under the influence of the medical doctrine that such insanity does in effect rob the afflicted person of the power to act in accordance with his knowledge of the nature and quality of the contemplated act, recognize such a plea as a good ground of defense, but hedge about their ruling with the most stringent requirements as to proof of such mental defect. Idiocy or imbecility is also a defense to crime. The test adopted, viz., that one must have as much mental capacity as a child 14 years old in order to be convicted of crime, is not very satisfactory, but is probably the best possible. So-called moral insanity and emotional insanity have never been recognized by the courts as a legal defense to crime, though the former is not infrequently the real reason for the jury's acquittal of a person committing murder under such circumstances—a result popularly known as the application by the jury of "the unwritten law."

On the trial of a person for a crime, the prosecution is not in the first instance required to introduce evidence of sanity of the defendant. Upon the defendant's offering evidence to establish his insanity the burden of proving sanity is thrown upon the prosecution. Theoretically, since the effect of insanity is to show absence of criminal intent, the prosecution should be required to prove sanity beyond a reasonable doubt in order to establish criminal intent. In a few States this is the rule. In the majority, however, the defendant is required to prove his insanity by the preponderance of evidence, and in one or two to prove his insanity beyond a reasonable doubt. Insanity may also be a bar to the trial or punishment of one charged with a crime. The test of insanity in the one case is the defendant's ability to understand the nature of the charge and of the trial, and in the other the nature and purpose of the punishment.

2. **Capacity to Contract.** The contracts of a lunatic, i.e., one who has judicially been placed under control, are void, and no rights or liabilities are acquired under them either by the lunatic or the person dealing with him. The contracts of one who is insane, but who has not been judicially declared to be a lunatic, are in general voidable, i.e., they stand as valid until he or his legal representative set them aside. Formerly it was held that the law would not allow one to plead his own insanity in order to avoid his contracts, since he would by so doing stultify himself. This harsh and unjust rule no longer obtains. If the insanity is of a character such as to prevent an insane person from understanding and reasoning properly with reference to the contract and its terms, and the insanity is known to the person dealing with him, then the contract may be avoided at the option of the insane person or his legal representative. If, however, the person dealing with him does not know of the insanity, and he have nothing to put him on his guard, the weight of authority is that such a contract cannot be avoided unless the same party could be placed in statu quo. An insane person is absolutely liable for necessaries duly supplied to himself or his wife upon the theory of quasi contract (q.v.). See NECESSARIES.

3. **Liability for Torts.** Justice and public policy require that insane persons should be bound to pay from their property for damage caused by their torts to others, and it is generally the law that insane persons are liable for their torts. In the case of malicious torts, as libels and slanders, insanity may render the mind incapable of entertaining malice, in which case there is no liability, and for the same reason insanity of a defendant may be a ground for not awarding punitive or vindictive damages. See TORT; DAMAGES.

4. **Capacity to Make a Will.** Insanity does not necessarily render one incapable of making a will. It is declared by the best judges that so high a degree of mental ability is not needed to make a will as is requisite to the formation of a valid contract. The criterion of testamentary capacity in this respect, as stated by the New York Court of Appeals in the celebrated Parish will case (Delafield *v.* Parish, 25 New York, 9, 35), has been generally accepted and acted on in England and the United States. It is that the testator must be capable of understanding the nature of the business in which he is engaged, of summoning before his mind, without prompting, the property of which he wishes to dispose, and the persons who are the natural objects of his bounty, and of retaining them in his mind a sufficient length of time to arrive at a rational conclusion. The two salient elements of this requirement are a retentive memory and the capacity to form a rational conclusion. A person's mind may be greatly deranged or somewhat enfeebled and yet be sufficiently strong to meet this requirement. Insanity of a testator is also of importance in determining the question of undue influence which under certain circumstances may invalidate a will. See WILL.

An insane person is a competent witness to testify as to all matters about which he is not insane or mentally unbalanced. In dealing with questions of insanity courts concern themselves very little with the theories and speculations of psychologists and physicians, and no attempt is made to classify the various forms of insanity, except in the manner already indicated. The important question in every case is the mental competency, according to the well-settled rules of law, of the person upon whose acts judgment is to be passed regardless of the precise cause or nature of his disorder. The fact of insanity must be established by direct evidence and is usually, though not invariably, established by experts, who are allowed great latitude in giving testimony as to the mental capacity of the alleged insane person.

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garo, *Modern Problems in Psychiatry* (2d ed., New York, 1914). For the legal aspect; J. H. B. Browne, *Insanity Jurisprudence* (2d ed., San Francisco, 1875); John Ordronaux, *Judicial Aspects of Insanity* (Albany, 1878); H. F. Buswell, *Law of Insanity* (Boston, 1885); E. C. Mann, *Medical Jurisprudence of Insanity* (Albany, 1893); F. P. Hoffman, *Insanity Law of the State of New York* (ib., 1909). See EVIDENCE; LUNACY; PARANOIA.

INSANITY, IMITATIVE. See IMITATIVE INSANITY.

INSANITY, PUERPERAL. See PUERPERAL INSANITY.

INSATIATE COUNTESS, THE. A tragedy by John Marston (1603), sometimes attributed to Barkstead.

INSCRIP'TIONS (Lat. *inscriptio*, from *inscribere*, to write upon, from *in*, in, upon + *scribere*, to write). The name applied to writings upon durable material, such as stone or bronze or terra cotta. Ordinarily such writings are engraved, but they may also be painted. The number and variety of the inscriptions of the past are very great, and the term is of course applied with equal correctness to the records on gravestones or other monuments of the present. The far greater use of inscriptions in ancient times, and the large variety of subjects upon which they furnish information, have made epigraphy, or the study of this class of monuments, an important branch of the science of antiquity. For many peoples the inscriptions are almost the only source of our knowledge of their history, language, and customs. This is the case with Babylonia, Assyria, ancient Persia, and to a very great extent with Egypt; the Lycian, Phrygian, and Etruscan languages are known only through the records on the monuments, and these are only a few examples of languages whose peoples are revealed to us by inscriptions. Even where an extensive literature has been preserved in other forms, as in the case of Greece and Rome, the monumental records throw new light on the classic texts and add numberless details, which enable us to fill out the picture of ancient life, of which the literature so often preserves only the outline. Inscriptions in the widest sense include the picture writings of the North American Indians, the hieroglyphics of Central America and Mexico, and all the other forms in which man has endeavored to preserve his records upon indestructible materials. In many of these cases, however, the content of the record is either unintelligible or unimportant, and the interest centres in the form. These systems are therefore more appropriately described under WRITING. In cases where the inscriptions are the chief or only source for the life and history of their makers, or are noteworthy for the kind of writing employed, they are naturally discussed in connection with the lands from which they come or the characters used. Consult, therefore, the articles ASSYRIA; BABYLONIA; CUNEIFORM INSCRIPTIONS; EGYPT; ETRURIA; HIEROGLYPHICS; HITTITES; MINÆANS; SABÆANS; WRITING.

The most ancient inscriptions are those found in Mesopotamia and in Egypt, and these countries have furnished by far the largest number of these records of Oriental history and civilization; but in their form and contents they extend beyond the domain of epigraphy and are more properly treated under the special titles just mentioned.

Under Semitic inscriptions should strictly be included any inscription composed in a Semitic language. For practical purposes, however, the term is usually limited to such inscriptions as are written in the systems of alphabetic writing developed by Semites, and these systems furnish a convenient basis of classification. Two great groups may thus be distinguished: the North Semitic, employing an alphabet of which the Phœnician is the type, and including Hebrew and Aramaic together with Nabatæan and Palmyrene; and the South Semitic, whose alphabet is represented by the modern Abyssinian character (Amharic, Tigrina). The *North Semitic* group is divided into two principal sections:

1. The *Phœnicio-Palestinian*, including Phœnician (to which the Carthaginian, or Punic, both old and new, belongs), Hebrew, Moabitic, and Samaritan. 2. The *Aramaic*, which begins about the second century B.C. and later can be separated into Nabatæan, or Sinaitic, Palmyrene, Syriac, and Mandæan. Not all of these groups are of equal importance, for in some cases the scanty epigraphic material adds but little to what is known from the literature, while in general it may be said that only the early documents are of special interest either in language, contents, or form.

Though the published Semitic inscriptions are numerous, the great mass are brief records from gravestones, or isolated names, or graffiti, such as cover the rocks of the Sinaitic Peninsula. The immense variety that characterizes Greek and Latin epigraphy is lacking here, partly perhaps because so few sites have been systematically explored. Two of the most important North Semitic inscriptions, the Moabite Stone and the Siloam Inscription, are treated in separate articles. (See MOABITE STONE; SILOAM.) The most important Phœnician inscription is that on the sarcophagus of Eshmunazar, King of Sidon, now in the Louvre, which is probably from the end of the fourth century B.C. Earlier but shorter are the inscriptions of Eshmunazar's father, Tabnith, and of King Jechaumelech of Byblos, which may be as early as the fifth century B.C. The earliest evidence for the existence of a North Semitic language is furnished by the Tell el-Amarna Letters, which themselves belong in the fifteenth century before our era; while especially interesting is the Hebrew inscription found in the tunnel leading to the pool of Siloam. This inscription refers to the completion of the tunnel and probably dates about 700 B.C., when Hezekiah had in mind to supply Jerusalem with water. The earliest writing of this group is probably on the fragments of metal cups from Cyprus, which seem to be even earlier than the Moabite stone and may perhaps belong in the tenth century B.C. At a later date, in the fourth century and later, come many inscriptions from various places in Cyprus. An important Carthaginian document is the long inscription in Marseilles, containing regulations regarding sacrifices, including the fees to be paid by the worshiper and the division of the victim with the priest. An important group is formed by the Aramaic inscriptions, now in Berlin, of Senjirli, in northern Syria, some of which belong to the first half of the eighth century B.C. and throw an interesting light on the relations of these petty kings to Tiglath-pileser III of Assyria, their suzerain. The Nabatæan inscriptions, which are numerous, show a rather cursive type. At Palmyra many

inscriptions in the local alphabet have been found, for the most part mortuary and dating from the first three centuries of our era. Of especial interest is a long bilingual, in Greek and Palmyrene, of 137 A.D., containing the customs, duties, and tolls, which are recorded to obviate the frequent disputes between the caravans and the customhouse officials. Among the late inscriptions especial interest attaches to a bilingual, Syriac and Chinese, in western China, relating to the work of Nestorian missionaries in the region about 781 A.D. The North Semitic inscriptions are best discussed, and the important texts collected and illustrated in facsimile, in Lidzbarski, *Handbuch der nordsemitischen Epigraphik* (Weimar, 1898), which also contains a very complete bibliography; consult also Cooke, *Text-Book of North Semitic Inscriptions* (Oxford, 1903). The inscriptions are collected in the still incomplete *Corpus Inscriptionum Semiticarum* (Paris, 1881 et seq.), prepared under the direction of the French Académie des Inscriptions et Belles-Lettres.

The *South Semitic* group of inscriptions, though but little known until comparatively recent times, have furnished valuable information in regard to the early history of Arabia, and their study has developed into a most important branch of Semitic research. This group may be provisionally divided into four sections: the *Safaitic*, the *Lihjanian*, the *South Arabian*, and the *Abyssinian*. 1. The Safaitic inscriptions, found in the neighborhood of Es-Safa, south of Damascus, are chiefly epitaphs and contain little more than the names and genealogies of the deceased whose memory they preserve. Apparently they do not antedate the first century of the Christian era. Consult Halévy, *Essai sur les inscriptions du Safa* (Paris, 1882), and Littmann, *Zur Entzifferung der Safâ-Inschriften* (Leipzig, 1901). 2. *Lihjanian* is the name given to a class of inscriptions found in recent times at El-Oela, in northern Hejaz, because the King of Lihjan (an Arabian tribal name) is mentioned in them as the ruler of the district in which they occur. They are not numerous, and the mutilated condition in which most of them have been found renders their interpretation extremely difficult. Their date is somewhat doubtful, but they seem to be contemporary with the rule of the Ptolemies in Egypt. Consult D. H. Müller, *Epigraphische Denkmäler aus Arabien* (Vienna, 1889), and Nöldeke, *Die semitischen Sprachen* (Leipzig, 1899). Far more important than the two classes just mentioned are (3) the *South Arabian* inscriptions, found principally in the southwestern corner of the Arabian peninsula. These inscriptions, which are very numerous, refer chiefly to the dedication of buildings or the presentation of various objects to the gods, and they throw much light upon the religion of the ancient Arabians. They contain, moreover, many valuable historical and geographical allusions and enable us to reconstruct at least an outline of the history of the country for a period which until recent years has been involved in complete obscurity. The South Arabian inscriptions exhibit several dialects, each possessing marked grammatical peculiarities. The oldest inscriptions are composed in the dialect of the *Minæans*, whose kings ruled over a large part of Arabia at least as early as the fourteenth century B.C., their influence extending as far north as the borders of Palestine. About the eighth century B.C. their dominion passed into the hands of the *Sabæans*. In these two dialects the great mass of the South Arabian inscriptions are composed. The dialects of Katabân and Hadramaut, in the extreme southern part of Arabia, are represented by a few inscriptions. Both these dialects seem to have been more closely related to Minæan than to Sabæan. Of the large number of South Arabian inscriptions collected by various explorers, notably by the Austrian scholar Eduard Glaser, a very considerable portion yet awaits publication. Consult: Glaser, *Skizze der Geschichte und Geographie Arabiens* (Berlin, 1889–90); Winckler, *Musni, Meluhha, Ma'în* (ib., 1898); Weber, *Studien zur südarabischen Altertumskunde* (ib., 1901); id., *Arabien vor dem Islam* (Leipzig, 1902). Hommel, *Südarabische Chrestomathie* (Munich, 1893), contains a very complete bibliography of the subject, down to the date of publication. See also MINÆANS; SABÆANS. 4. The *Abyssinian* inscriptions, found at the ancient capital Axum, are few in number and belong to a late period. The earliest date from about 350 A.D. and are written in the Sabæan modification of the South Semitic alphabet. In inscriptions of a later date (about 500 A.D.) the Ethiopic system of writing, as used in the manuscripts, is found fully developed. Consult: Bent, *Sacred City of the Ethiopians* (London, 1893); D. H. Müller, *Epigraphische Denkmäler aus Abessynien* (Vienna, 1894); Glaser, *Die Abessynier in Arabien und Afrika* (Munich, 1895). For Semitic inscriptions in general, consult the *Corpus Inscriptionum Semiticarum*. See also ETHIOPIA.

In recent years considerable attention has been paid to the study of the *Hittite* monuments, which are found throughout Asia Minor as far west as Smyrna, though they occur most abundantly around the Bay of Iskanderun, in Cappadocia, in Cilicia, and in northern Syria. In 1899 a long Hittite inscription was found at Babylon, whither it had been conveyed as a trophy. The Hittite inscriptions employ a species of hieroglyphic writing, the individual characters representing parts of the human body, animals, birds, and other objects. In the older inscriptions the hieroglyphs are cut in relief, while in those of later date they are incised. Many attempts have been made to decipher these inscriptions, but so far with slight success. Professor Jensen of Marburg has at least made a beginning, and his identifications of ideographs and sign groups for various countries seem to rest upon solid grounds. He believes that the language belongs to the Armenian branch of the Aryan family, but the known facts are too scanty to warrant a definite conclusion upon this subject at present. Consult: *Corpus Inscriptionum Hettiticarum* (Berlin, 1900–06); Messerschmidt, *Die Hettiter* (Leipzig, 1902); A. H. Sayce, in the *Proceedings of the Society of Biblical Archæology* (London, 1903, 1905, 1907); A. T. Olmstead and others, *Travel and Studies in the Nearer East*, vol. i, pt. 2 (Cornell Expedition, 1911); D. S. Hogarth, "Hittite Problems and the Excavations of Carchamish," in *Proceedings of the British Academy* (Oxford, 1912). See also HITTITES; AMARNA LETTERS.

The old Persian inscriptions are exclusively regal. The longest and most typical one is that at Behistun (q.v.), which recounts the life and deeds of Darius I. The shorter inscriptions of

the same King, as well as of his successors, Xerxes I and Artaxerxes I, II, and III, are more occasional in subject. They are in the main dedicatory tablets, set up at Susa, Persepolis, Elvand, Naqs-i-Rustem, and Suez. Like the Behistun inscription, these minor texts express a deep and unfeigned religious spirit. In style the Old Persian inscriptions show in many phrases the influence of the earlier Assyro-Babylonian tablets, although the freer Aryan spirit is manifest throughout. The Old Persian inscriptions have been edited several times. The best editions are by Rawlinson, "The Persian Cuneiform Inscription at Behistun," in *Journal of the Royal Asiatic Society*, old series x–xi (London, 1846); Spiegel, *Altpersische Keilinschriften* (Leipzig, 1881); Tolman, *Persian Inscriptions* (New York, 1892); Weissbach and Bang, *Altpersische Keilinschriften* (Leipzig, 1893). Consult also the bibliography of CUNEIFORM INSCRIPTIONS.

Far more numerous than the remains of the Semitic peoples are the inscriptions in Greek and Latin. It was the custom of both peoples to record in this form all documents which it seemed desirable to bring or keep before the public eye. Hence almost any excavation on a large scale brings to light a multitude of inscribed stones. The number of these monuments is entirely unknown; in 1891 Larfeld estimated the Greek inscriptions alone at 50,000, and the intervening years have brought large increase. The Latin inscriptions are far more numerous, and any estimate must be merely conjectural.

Greek. Greek inscriptions are found upon various types of monuments; but of these the funerary monuments, or stelæ, are especially rich in inscriptional forms. But also of great frequency are the state documents which appear on separate stones or even upon the walls of buildings. There is evidence for the coloring of the letters. In the matter of form of the letters marked differences are to be observed as time progresses. The earliest inscriptions, if the primitive form of the letters does not mislead, are the rock-cut names of the island of Thera (Santorin), which may be dated in the seventh century. With these, though probably later, may be classed the rude names carved by the Greek mercenaries of King Psammeticus of Egypt on the colossi at Abu-Simbel. It is still a matter of dispute whether Psammeticus is the first (654–617 B.C.) or second (594–589 B.C.) of that name, but the analogy of other early inscriptions seems to favor the former date. The archaic inscriptions, written in local, or *epichoric*, alphabets, are tolerably numerous, but for the most part of interest and value chiefly for the history of the alphabet or the language, as they form one of the most important sources for the study of the Greek dialects. These early inscriptions are frequently written retrograde, i.e., from right to left, or *boustrophedon* (*βουστροφηδόν*), i.e., alternately from right to left and left to right. By the end of the fifth century the various local alphabets were generally superseded by the Ionic alphabet of Miletus, but the local dialects lived much longer. Progress of course varied with the locality. Crete, e.g., long retained the ancient forms, and the longest and most important of archaic inscriptions, the laws of the Cretan Gortyna, in alphabet and dialect appears so primitive that it is still placed by some scholars early in the sixth century B.C., though the weight of competent authority is in favor of a date in the last half of the fifth. The classification of Greek inscriptions is, in the first place, geographical. If the number of inscriptions from a locality is very great, or changes in the alphabet sharply marked, it is often found convenient to introduce chronological subdivisions. A good example is the arrangement of the collection of the Attic inscriptions, by which the first volume contains the inscriptions before 403 B.C., when in the archonship of Euclides the old Attic alphabet was officially replaced by the Ionian; the second volume includes the period from 403 to 31 B.C., the date of the battle of Actium, which was chosen for practical convenience rather than from any natural cleavage at this point, and the third embraces the inscriptions of the Roman Imperial period. Such elaborate subdivision was needed in this case because of the enormous mass of Attic inscriptions, which far exceed those from any other locality. Under the several localities, or periods, the inscriptions are grouped according to their contents. Two great groups may be distinguished, according as the inscriptions proceed from the governing body of the community or from private individuals or associations. The *public* inscriptions include decrees and ordinances of all kinds, treaties, lists of magistrates, and reports of official boards; they are naturally of the greatest value for the study of governmental institutions and ancient communal life. Thus, our knowledge of the details of the organization of the Athenian Empire, the assessment of the tribute, and the relations of the subject cities, rests in large part upon the records of the Hellenotamiæ and the decrees of the Athenian assembly. The *private* inscriptions are even more inclusive, as they touch ancient life at almost every point. Mortuary inscriptions naturally form the largest class, but we have also many honorary inscriptions and especially dedications to the gods. Here also belong the numerous records of manumissions, such as covered the wall of the portico of the Athenians at Delphi, in which the slave is by a legal fiction purchased by the god. An important group is composed of the records of private corporations, either business, religious, or social. Of great value for the history of art are the numerous signatures of ancient artists, usually on the pedestals which once bore their works. (Consult Loewy, *Inschriften griechischer Bildhauer*, Leipzig, 1885.) A curious example of a private inscription, which also illustrates the importance attached to this mode of publication, is furnished by Diogenes of Œnoanda in southeastern Caria, who recorded on the wall of a portico for the edification of his fellow townsmen a long summary of the teachings of Epicurus, with letters and other quotations from the writings of the master. (Consult *Bulletin de correspondance hellénique*, vol. xxi, Paris, 1897.) A detailed discussion of the characteristics of the several classes of Greek inscriptions does not lie within the scope of this article, but it will be well to add a brief notice of the material and the places used for these records. In general, stone, usually marble, is the material employed. Relatively very few of the Greek inscriptions are on bronze. In the case of graves, votive offerings, or honorary statues, the inscription is obviously an accessory, and the place is primarily determined by other conditions. For decrees, treaties, records of officials, royal letters, or any other documents

for which publicity was desired, the market place, or acropolis, of a city, or the precincts or even walls of a temple, were the favorite places. The great sanctuaries, such as the Acropolis of Athens, Delos, Delphi, and Olympia, were crowded not only with statues and works of art, but also with inscribed slabs of stone, often containing some vote of a distant community. The expense of private inscriptions was of course borne usually by the persons concerned, and public enactments were in like manner engraved at the expense of the state; but there are very many cases where the decree of a state or corporation honoring an individual was published in stone at the expense of the recipient, who in this way showed his appreciation of the honor conferred.

The value of these records as a source of information did not escape the ancient historians. Herodotus, Thucydides, and Xenophon, as well as the orators, refer to them, but do not, as a rule, quote them directly, unless perhaps in citing the terms of treaties. But the systematic collection and use of inscriptions seem to begin at the end of the fourth century. The records of the public games and dramatic contests were utilized in compiling lists of victors or in determining the chronology of plays. Attic inscriptions were collected by Philochoros (320–261 B.C.), while Polemo of Ilion, at the beginning of the second century, diligently gathered dedications, artists' signatures, and numerous other records from the Greek sanctuaries; his work is partly preserved in the guidebook of Pausanias. The Greek Anthology owes many of its poems to the collections of epigrams compiled from the monuments by earlier scholars. During the Middle Ages interest in Greek, and still more in Greek inscriptions, was almost unknown, and it was not till the fifteenth century that the study of Greek epigraphy secured the attention of scholars, who naturally were at first attracted by the more abundant Latin remains. Cyriacus of Ancona (q.v.) in his numerous travels in the Levant copied many inscriptions, but his zeal frequently outran his knowledge, and in many cases it seems only too clear that his ancient documents owe their origin to the classical authors rather than to the stones. It was not till 1603, however, that an attempt at a complete collection of inscriptions appeared in the *Inscriptiones Antiquæ Totius Orbi Romani* of I. Gruter (2d ed., in 4 vols., 1707, by Grævius). In this and a number of similar works which followed, the inscriptions were grouped in classes, while the language and chronology were wholly neglected in the arrangement. Naturally the Latin inscriptions were in a vast majority. During the seventeenth and eighteenth centuries the attention of epigraphists was given rather to the acquisition of new material from the gradually opening Levant, which was visited by scholars sent out by the French Académie des Inscriptions et Belles-Lettres and the English Society of Dilettanti, as well as by numerous independent travelers, than to the compilation of complete collections. The vast increase in the material rendered such a collection a necessity, and in 1815 the Berlin Academy intrusted the preparation of such a work to August Boeckh. After 10 years of labor the first part of vol. i of the *Corpus Inscriptionum Græcarum* appeared, and the complete volume, which contained first the oldest inscriptions, important for their alphabet, and then those of Attica, Megaris, Peloponnesus, Bœotia, Phocis, Locris, and Thessaly, in 1828. Vol. ii did not appear till 1843, nor vol. iii till 1853, while vol. iv, though partly published in 1859, was not completed by the addition of the indexes till 1877. Though this work labors under what would now be considered serious defects, it laid the foundation which alone made possible the development of the severely critical methods of modern epigraphists. Even before the appearance of the second volume the increase in the material resulting from the independence of Greece and the active exploration of Hellenic lands showed that new collections would be needed, and before the completion of the work it was obvious that the projected supplement would be entirely inadequate to a proper publication of the new inscriptions. In 1871, therefore, the Berlin Academy entered upon the preparation of a new *corpus*, which is still in course of publication. (See *Bibliography.*) Along with this gigantic collection of all the monuments there has gone on the publication of many lesser collections—either inscriptions in a single museum, as the British Museum, or from single places, as Olympia and Pergamon, or noteworthy for their age or dialect—while all the archæological journals devote much space to the new material which explorers, especially in Asia Minor, or excavators are continually bringing to light. In conclusion, brief mention should be made of the Greek inscriptions of Cyprus, which are written in part in a peculiar syllabic alphabet, wholly unlike the Greek, but possibly with affinities to some of the undeciphered syllabaries of Asia Minor, and of the use of Greek characters for inscriptions in non-Greek languages, such as Lycian, Phrygian, Carian, Pamphylian, and the unknown tongue represented by two inscriptions from Præsos on Crete. Though the values of the letters are generally certain, the languages themselves are not yet read with any certainty.

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scriptions in the British Museum, vols. i, iii, iv, 1 (Oxford, 1874 et seq.); *Olympia*, vol. v, *Die Inschriften* (Berlin, 1890); *Die Inschriften von Pergamon* (2 vols., ib., 1890, 1895). Consult also Le Bas and Waddington, *Voyage archéologique en Grèce et en Asie Mineure pendant 1843–44* (Paris, 1847–76), and Cauer, *Delectus Inscriptionum Græcarum propter Dialectum Memorabilium* (2d ed., Leipzig, 1882). For dialectic inscriptions, consult Collitz, *Sammlung der griechischen Dialektinschriften* (Göttingen, 1884–1905). For the archaic alphabets, the standard collection is Roehl, *Inscriptiones Græcæ Antiquissimæ præter Atticas in Attica Repertas* (Berlin, 1882), and a volume of facsimiles only, *Imagines Inscriptionum Græcarum Antiquissimarum* (2d ed., ib., 1894). Dareste, Haussoullier, and Reinach, *Recueil des inscriptions juridiques grecques*, i, ii, 1 (Paris, 1890–98), is important for Greek legal inscriptions. Useful collections for the student are: Michel, *Recueil d'inscriptions grecques* (ib., 1900); Hicks and Hill, *Manual of Greek Historical Inscriptions* (2d ed., Oxford, 1901); and, above all, Dittenberger, *Sylloge Inscriptionum Græcarum* (2d ed., 3 vols., Leipzig, 1898–1901). The metrical inscriptions have been collected by Kaibel, *Epigrammata Græca ex Lapidibus Conlecta* (Berlin, 1878), and (for the period before 250 B.C.) by Hoffman, *Sylloge Epigrammatum Græcorum* (Halle, 1893). A collection of the Greek Christian inscriptions has been begun by the French Academy.

Latin. The earliest Latin inscriptions cannot rival the antiquity of the Greek. The gold fibula, or brooch, of Præneste is probably of the sixth century B.C., and some have claimed an even greater antiquity for the broken column of the Roman Forum, though the best authorities consider it scarcely older than the middle of the fifth century. Another early example, the so-called "Duenos inscription" on a curious triple-bodied vase from the Esquiline, is very probably of the fourth century, but is still a puzzle to scholars. With very few exceptions, however, the Latin inscriptions are not older than 300 B.C. In its earliest forms the alphabet shows strongly its connection with the Greek, which reached the Romans from the Chalcidians of Cumæ and, like other early attempts at writing, is marked by crude and variable forms for the letters. Later were developed the large square and handsome monumental characters (*scriptura quadrata* or *lapidaria*), which were carefully carved after preliminary tracing and then colored, usually with red. Painted inscriptions, not carved, naturally show freer forms, and these were later often imitated in stone, as were sometimes the common cursive hands, which are found in wax tablets in graffiti and often on domestic utensils of various kinds. The inscriptions are usually divided into two great classes: 1. *Tituli*, employed to designate some definite object, giving the needed information to distinguish it from similar objects; such are mortuary, dedicatory, and honorary inscriptions. 2. *Acta*, or documents, which are engraved for purposes of publication. The former are far more numerous and show naturally a more stereotyped form. Among the mortuary inscriptions are noteworthy the many metrical epitaphs, often crude in metre and cold in expression, but also not infrequently showing tenderness and deep family affection. In general the classes of inscriptions are the same as recur in Greece, but one or two Roman customs may be mentioned. The person who erected a temple or any other public building was usually allowed to engrave his name upon it, and these *tituli* are a much more important class of monuments than in Greece, where this was not a usual habit. Such inscriptions are valuable sources of information as to the date and circumstances under which these works were constructed. The numerous milestones not only mark the course of the ancient roads, but show the distances and names of the chief towns and the dates when the roads were built or repaired and by whom the work was directed. For the *acta*, bronze seems to have been the favorite material before the time of Augustus, but later the Greek use of marble was commonly adopted. They include treaties (rare), laws, decrees of the Senate and, in great numbers, of various town councils and corporations, the edicts and letters of Roman magistrates and especially of the emperors, and the numberless documents relating to the service of the gods. Among the Imperial edicts belong the military diplomas, or formal discharges which conferred on the retiring veterans special privileges. In connection with the service of the gods belong the calendars which were prepared during the early Empire. Here may also be mentioned the *fasti*, or lists of consuls and other important magistrates, of which there are many remains. Among these religious inscriptions an important place is taken by the records of the Arval Brothers (q.v.), and the account of the great secular games of 17 B.C., with its mention of Horace's *Carmen Sæculare*. A special place is occupied by the great *Monumentum Ancyranum*, the account by Augustus of his deeds (*index rerum a se gestarum*), engraved in Greek and Latin on the walls of the temple of Augustus and Rome at Ancyra in Asia Minor, after the original bronze tablets on the mausoleum of the Emperor in Rome. (Consult Mommsen, *Res Gestæ Divi Augusti*, 2d ed., Berlin, 1883, and Fairley, *Monumentum Ancyranum*, Philadelphia, 1898.) The Romans do not seem to have collected inscriptions as did the Greeks, though references to them are not infrequent in the histories, as Livy or Suetonius, and in other writers, from whom no complete collection has yet been made. At the very end of the ancient time and the beginning of the Middle Ages, when Rome became a place of pilgrimage, during the eighth and ninth centuries, many of the inscriptions were copied by visitors, and several of these compilations have been preserved wholly or in part, the most celebrated being the *Anonymus Einsiedelensis*. After the ninth century came a long period of neglect of the classical remains, and one of the first to revive these studies was the celebrated tribune of Rome, Cola di Rienzi, who about 1344 prepared a description of Rome in which he used the epigraphic material at his hand. Another collection was prepared in the early fifteenth century by the enthusiastic student of the past, Poggio Bracciolini, and from that time collectors of inscriptions are numerous and at times decidedly unscrupulous. Latin epigraphy in the sixteenth century suffered from forgers, at whose head stands Pirro Ligorio, of Naples, and their work deceived many until its character was disclosed by the exact scientific criticism of the nineteenth century. The earliest printed collection seems to have been that of the inscriptions of Ravenna (1489). Gruter's great collec-

tion of 1603 has already been mentioned. (See under *Greek.*) It was followed by collections by Reinesius, Fabretti, and others, till Muratori published his *Novus Thesaurus Veterum Inscriptionum* (4 vols., Milan, 1739–42), which his lack of knowledge made of but little real service. The foundations for the modern study of Latin epigraphy were laid by the careful and minute investigations of Bartolommeo Borghesi (died 1859), who devoted his life to a study of the *fasti* of Roman magistrates. A *corpus* of Latin inscriptions had been planned by the Berlin Academy, and also suggested by the French Academy; but the project was first realized when after a long period of preparation there appeared in 1863 the first volume, edited by Theodor Mommsen and Wilhelm Henzen. Since then the work has steadily continued, though it is still incomplete and from the nature of the case is always likely to be in need of supplements.

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IN'SECT (Lat. *insectum*, insect, from *insecare*, to cut in, from *in*, in + *secare*, to cut). In its strict sense, a member of a group of six-legged arthropods known as the class Insecta or Hexapoda. Vulgarly the term is applied to almost any small crawling creature; and even among naturalists until comparatively recent years it was applied to the spiders and their relatives (Arachnida) and to the centipedes and thousand legs (Myriapoda). Insects constitute by far the largest group of living creatures and in fact form much the larger part of the land animals of the world. In number of species they are more numerous than all of the other groups of land animals together, while in number of individuals they are countless. The most conservative estimate places the number of species of insects in existence at 5,000,000, while the estimate of Riley, the famous entomologist, was 10,000,000. They are extremely variable in their habits.

Food. The great majority feed upon vegetation of one kind or another, and practically every part of every living plant is liable to insect attack. They feed not only upon living vegetation, but also upon dead plant tissue in every stage of decay, and even upon soil mold wherever it occurs, and are largely instrumental in the rapid disappearance of dead vegetation. Thousands of species also prey upon animals of different groups, from the warm-blooded vertebrates down to creatures of their own class and the other lower forms of animal life. They feed not only upon living animals, as parasites and predatory enemies, but also upon dead animal matter of all kinds, including excrementitious substances, as well as upon fabrics and other things composed of animal material. Although predominating so enormously on land, insects lose their preponderance in water, yet very many species are aquatic during the whole or some portion of their lives.

Economic Importance of Insects. It has been pointed out by the United States Department of Agriculture that the tax imposed by insects upon the agricultural and timber industries of the United States is greater than "the entire expenditures of the national government, including the pension roll and the maintenance of the army and navy." The damage done by insects is nearly 10 times that done by fire. Since before the plagues of Egypt man has had to contend with insect enemies, and, notwithstanding our increasing knowledge of the habits of insects and the inventions of new methods

INSECTS

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1 SIX-SPOTTED TIGER BEETLE - CICINDELA SEX-GUTTATUS
2 AMERICAN BUMBLEBEE - BOMBUS PENNSYLVANICUS
3 POTATO-BUG ENEMY - LEBIA GRANDIS
4 ACHEMON SPHINX-MOTH - PHOLUS ACHEMON
5 CLOAKED WASP - POLISTES PALLIPES
6 ICHNEUMON FLY - ICHNEUMON JUCUNDUS
7 SPOTTED LADYBIRD - MEGILLA FUSCILABR
8 GREEN CATERPILLAR-HUNTER - CALOSOMA SCRUTATOR
9 BORDERED PLANT-BUG - STIRETRUS ANCHORAGO

NOS 1 AND 8 SOMEWHAT ENLARGED; NO 3 ENLARGED NEARLY TWICE, NOS 7 AND 9 GREATLY ENLARGE

of controlling the injurious species, the economic loss from insects seems to be increasing.

The most destructive species are usually those which have been introduced from some other country, because it usually happens that parasites which kept these pests from multiplying to an excessive extent in their native land were not imported with them.

The *Hessian fly* (q.v.) is the most important enemy with which the wheat, rye, and barley growers must contend. It destroys from 10 to 50 per cent of the sowings. This damage amounts to about $75,000,000 annually in the United States alone. *Aphids* (see APHID) cause a further loss to the same crops of more than $15,000,000.

The Mexican *chinch bug* (q.v.) has cost the corn growers of America at least $400,000,000 in the last 50 years. It now levies an annual tax of more than $30,000,000. The Western corn rootworm, the ear worm, and other enemies doubtless make the total loss at least three times this amount.

Hay and forage crops are subject to the attacks of many insect enemies. The best known of these is the *army worm* (q.v.), which often costs the United States several million dollars in a single season. It is estimated that 10 per cent (worth about $65,000,000) of American hay crops is destroyed by insects every year.

In 1904 the Central American *cotton boll weevil* (see COTTON INSECTS) cost Texas, alone, $25,000,000. It has spread throughout much of the cotton district; but fortunately it is yielding to control measures, so that the annual damage done by it in America is only about $20,000,000. The cotton worm and minor pests bring the total annual tax levied by insects on the cotton industry up to about $85,000,000. The same sort of tax on tobacco amounts to about $10,000,000.

Insects decrease the profits of the truck farmer about 20 per cent; but, since there are no figures to show the total value of truck crops, it is difficult to say what the total damage is. It is probably about $60,000,000.

The fruit growers suffer greatly from insects. If a continual warfare were not waged against it, the European *codling moth* (q.v.), or *apple worm*, would entirely prevent the growing of marketable apples. The loss and cost of treatment come to about $20,000,000 annually in the United States. Another introduced pest, the *San José scale* (q.v.), has destroyed millions of trees. It costs, each year, from 10 to 25 cents per tree to keep it under control. There are, in all, about 300 species of insects which are more or less injurious to American fruit trees. With much difficulty and expense only about 80 per cent of fruit in the United States is saved from insects. It may be remarked in this connection that *Phylloxera* (q.v.), an American insect which is mildly injurious to grapes in the United States, found its way to France, where it destroyed the vineyards of whole districts.

In addition to eating the leaves of forest trees and sapping their vitality in other ways, insects bore into the standing timber and reduce its market value, sometimes even killing large numbers of trees. They also damage lumber after it has been made ready for the market. One hundred million dollars a year would not pay for these depredations. The introduced *gypsy moth* (q.v.) and *brown-tailed moth*, although still confined to New England, have become such a pest that fully $1,000,000 are spent in their control. This does not include the damage they do. The latter has recently shown itself capable not only of great damage to trees, but also of direct harm to human beings, actually causing serious illness in some cases. This brown-tailed moth (*Euproctis chrysorrhea* Linnæus, family Liparidæ) was accidentally brought from Europe to Massachusetts about 1890. It became established there and has since spread throughout much of New England. There is still a possibility of its reaching new districts, chiefly by being carried on nursery stock; but it is now so well known that there is no likelihood of its becoming a serious pest elsewhere.

The adult moth measures about 1 inch or 1½ inches across the white wings. The end of the abdomen is conspicuously brown, hence the common name. The adults appear in July, congregating in great numbers about lights. Each female lays a mass of 300 or 400 eggs, which she covers with brown hairs from the tip of her abdomen. These eggs are laid on the terminal leaves of almost any sort of deciduous tree. Caterpillars hatch in about three weeks and feed until cold weather, when they fasten a number of leaves together and to a twig with strong silk. Several hundred caterpillars, usually those which hatched from a single egg mass, gather in each hibernaculum thus formed and pass the winter. They emerge as the buds burst in the spring, and after feeding for a month or six weeks they spin thin cocoons of white silk, inside of which they pupate and complete the life cycle by appearing as adults in July.

The larvæ are very dark brown marked with patches of orange. They have numerous tubercles, which bear so many short brown hairs as to give the creature a velvety appearance. These hairs are barbed, and when they touch the human skin they enter it, causing a rash much like that produced by poison ivy. The larvæ are frequently so abundant that the air is filled with their hairs, and whole communities become affected by the rash. In addition to this they are one of the most destructive of the insect enemies of deciduous trees, frequently defoliating large areas.

Besides the damage done by insects to forest trees and other wild plant growths, neither harvested crops nor manufactured articles are free from insect attack. Various kinds of beetles and caterpillars feed on dried vegetable products as well as eat woolens. This damage probably amounts to about $200,000,000 annually.

Furthermore the dairymen and cattle raisers have important enemies among insects and nearly related creatures. The ox warble (see BOT), an immature fly which causes "grubby" cattle hides, causes an annual loss in the United States of about $25,000,000. Other species of bots attack horses and sheep. It is impossible to say how greatly the milk supply is decreased by the numerous flies which at first thought seem to be merely annoying to cows. It is estimated that the annual injury inflicted upon American live stock by insects and ticks amounts to the enormous total of $420,000,000.

All the estimates given above are very conservative. They are based upon most careful estimates and the best obtainable statistics. The total damage done every year in the United States by a few species of insects amounts to more than $1,250,000,000.

It is pleasant to turn now to the other side of the question. Although insects lessen our fruit crop by 20 per cent, we owe nearly all our fruits to insects, because fruit trees depend largely upon insects for pollination. All our most beautiful flowers seem to have been developed by the cross-fertilization (see POLLINATION) carried on by insects. Insects destroy 10 per cent of the hay crop, but we should have no clover were it not for them. It is safe to say that the earth would be uninhabitable in a few years if all the insects were suddenly exterminated.

Furthermore predacious and parasitic insects are the most efficient agents known for the control of injurious species. Aphids are greedily devoured by the immature as well as by the mature ladybird (q.v.) beetles. The army worm is rarely very injurious in the same locality in two successive seasons, because its increase one year is favorable to the increase of its parasites, which hold it in check the next year. The citrus industry of California seemed doomed because of a scale insect, but a predacious beetle was imported from Australia and saved the day. Had the parasites of the gypsy and brown-tailed moths been imported with them and become established, it is not likely that these moths would have been notably injurious. After all other methods of controlling them had failed, the United States government began the systematic importation of parasitic insects. There is great hope of ultimate success.

Certain insects furnish articles of commercial importance. The most notable are honey, silk, and lac. Honey is the surplus food laid up by the *honeybee* (see BEE) for winter consumption, and beeswax is the material which forms the comb. Silk is a substance produced by the caterpillar of the *silk moth* (see SILKWORM) for protection during its quiescent pupal stage, when the creature changes from a caterpillar to a winged moth. *Lac* (q.v.) is an exudation from a scale insect. Formerly the red body fluid of the *cochineal* (q.v.) scale insect was much used as a dye, but aniline dyes have now largely taken its place.

In order that injurious insects may be more successfully combated and beneficial ones more generally propagated, all civilized governments employ trained entomologists. The United States Department of Agriculture has a Bureau of Entomology which investigates and reports on entomological matters of national importance. These reports may be obtained from the superintendent of documents, either free or at a nominal charge. Each State also has an entomologist, whose office is usually in the State capital. Some of the State bulletins are very instructive, and queries concerning injurious insects should usually be addressed to the State entomologist. Quarantine against foreign insects which are or are likely to become injurious is carried on by both the Federal and State governments. Consult: O'Kane, *Injurious Insects and how to Recognize and Control them* (New York, 1912); E. D. Sanderson, *Insect Pests of Farm, Garden, and Orchard* (ib., 1912); Slingerland and Crosby, *Manual of Fruit Insects* (ib., 1914); *Journal of Economic Entomology* (Concord, N. H.); and the various State and national bulletins.

Insects and Disease. As annoying man himself, insects play an important part, since there are very few regions of the habitable globe where man is not troubled by them. Bedbugs, fleas, lice, mosquitoes, the screw-worm fly (see BEDBUG, FLEA, LOUSE, MOSQUITO, SCREW WORM), and many other species are troublesome. It is, however, as carriers of disease that insects are perhaps of the greatest importance. The filaria diseases of the East (elephantiasis, chyluria, and lymph scrotum) are transferred by certain mosquitoes. The Texas fever of cattle in the United States, the red-water diseases of Africa, and other cattle fevers are transmitted by certain ticks which are not insects but arachnids. The tsetse fly of Africa carries the microörganisms of disease; the purulent conjunctivitis of the Egyptians and Fiji Islanders is communicated by the house fly; the eye disease known as "pinkeye" in the southern United States is transported by minute flies of the genus *Hippelates*. Asiatic cholera and typhoid fever are carried by the house fly; and the bubonic plague is spread by fleas from rats. All forms of malaria are carried about by mosquitoes of the genus *Anopheles* (see MOSQUITO), and yellow fever by those of the genus *Stegomyia*. (See MOSQUITO.) It has also recently been claimed that dengue fever is in Syria spread by a mosquito of the genus *Culex;* that anthrax bacilli in malignant pustules in human beings are caused by the bite of flies of the genera *Tabanus* and *Stomoxys;* and that the famous "surrah" disease of cattle in Oriental regions is also carried by gadflies.

Poisonous Insects. Certain insects may be considered under this head which poison human beings in any one of several different ways: 1. They may have a sting which is a modified ovipositor, and which is connected with a specific poison gland, as with the bees, wasps, stinging ants, and certain other Hymenoptera. 2. There may be a modified salivary gland which has a poisonous secretion and is connected with a piercing beak, as with certain bugs of the order Heteroptera, and as with many dipterous insects like mosquitoes and other biting flies. 3. The hairs covering the body surface may be modified into sharp bristles, which may be simple or barbed, and which, when coming in contact with the skin of human beings, produce an urticating or nettling effect. Poisonous insects of this group are confined to the caterpillars or larvæ of certain moths, especially of the family Limacodidæ, and, to a much less marked extent, a few of the caterpillars of Bombycidæ, such as *Orgyia leucostigma, Euproctis chrysorrhea*, as well as to a few of the Saturnidæ, like the larva of the Io moth. 4. Certain beetles when crushed produce a blistering effect upon the skin. These are confined to the family Meloidæ, or blister beetles. See BLISTER BEETLE.

The poison of bees is formed by the mixture of the secretions of two glands, one of which is acid and the other alkaline. With the burrowing wasps the alkaline gland is absent or atrophied, and the poison consists only of the acid. The effect of the sting of these wasps is either to stupefy the prey or to kill it. In either case the insects stung remain in excellent condition as food for the larvæ of the wasps for a considerable length of time. (See WASP.) The severity of the sting of the aculeate Hymenoptera and the amount of poison injected into the wound differ with different species. The sting of our large mud wasp (q.v.) is especially severe, and as a rule the stings of wasps have a more poisonous effect upon human

beings than the stings of bees. There are cases on record where many bee stings on the same individual have produced death. Several instances have been well authenticated by medical men of the death of a human being from a single sting of a wasp, the sting acting as a very powerful irritant poison on the nerve centres of the patient. As a rule, such cases are confined to exceptionally nervous individuals, to those inheriting gouty tendencies, who are remarkably susceptible to the action of certain medicines. Persons handling bees and wasps become immune to their poison; the stings have little effect upon them. This immunity, however, disappears in the absence of continuous reinoculation. This fact is well known to beekeepers, and entomologists who collect wasps and other stinging Hymenoptera in large numbers have called attention to the same fact. The remedy for the stings of both bees and wasps is the immediate application of an alkali.

Many of the poisonous flies are treated of under MOSQUITO; GADFLY; BLACK FLY.

The true bugs which give a poisonous bite with a piercing beak, and which may attack man, belong almost entirely to the family Reduviidæ (see CONE-NOSE), to which the terms "pirate bugs" and "kissing bugs" are applied. The Eastern species are *Opsicœtes* (or *Reduvius*) *personatus*, *Melanolestes picipes*, and *Melanolestes abdominalis;* and the principal Southern and Western forms are *Rasahus biguttatus* and *Conorhinus sanguisugus*. (See CONE-NOSE.) The bite of these bugs is specifically poisonous, but the great inflammation which so often occurs is doubtless due to the entrance into the circulation of germs of putrefaction, since the bugs are attracted to dead animal matter. The Eastern species (*Melanolestes picipes*) is a shining black bug rather more than half an inch in length. The principal Western species (*Rasahus biguttatus*) is reddish in color with blue-black fore wings, each marked with a round reddish spot. This latter species is, according to Davidson, the cause of nearly all of the supposed cases of "spider bites" in the Southwest.

Ecology. As a class, insects are represented in practically all parts of the world. While flourishing more abundantly in the tropics, they are found in countless numbers in the temperate regions and are also very numerous in boreal regions. They abound inside the Arctic circle, and in the short Arctic summer many species of nearly all orders may be collected. As a rule, as with other classes of animals, the forms occurring in tropical regions are larger in size and more brilliant in color. Many groups are confined to the tropics; others have a wide geographic distribution. The value of the class Insecta in the study of the geographic distribution of life is very great with certain groups, while others have comparatively slight faunistic value. Civilization exerts a direct and destructive influence upon the insect faunas of large regions. Insects being largely dependent, directly or indirectly, upon vegetation, the destruction of the wild flora and sylva and the introduction of cultivated crops almost immediately change completely the characteristics of a given insect fauna. The rapid development of methods of transportation, and especially intercommunication between remote regions, by means of the constantly increasing number and speed of vessels, has resulted in the accidental introduction and acclimatization of many hundreds of species of insects into regions remote from their original homes, many of which succeed in establishing themselves. The facility of acclimatization varies greatly with different groups, and this facility is dependent upon the degree of simplicity of the life of the insect and upon the degree of simplicity of its natural environment. So great has become the danger of the introduction of injurious species from one country to another during late years that many nations seek to protect themselves by special quarantine measures.

From what has preceded, it is evident that insects, in spite of their small size and their consequent slight strength, have been remarkably successful in the so-called struggle for existence. They have a long geological history, and the insects of Tertiary rocks are in some instances almost generically related to living forms. Rapidity of growth and power of multiplication have been prime factors in this persistence, while the relations which exist between circulation and respiration have been almost equally significant. In many instances the growth from the egg to the individual occupies only a few days, while in some species a single female will lay several thousands of eggs. The functions of circulation and respiration are so related that nutrition can be carried on very rapidly and very efficiently. By the phenomenon of metamorphosis, growth and development are isolated from each other, allowing growth to go on unchecked and uncomplicated by development.

The social life of insects is very remarkable; organized societies are formed with many species, especially the Hymenoptera (bees, wasps, and ants) and the Isoptera (white ants, or Termitidæ). In these societies great numbers of individuals live together and are greatly modified in structure in accordance with the different functions which they perform in the community. See ANT; BEE; WASP; TERMITE; and *Social Insects*, below.

Reproduction. Nearly all insects undergo in the course of their lives remarkable changes in form. A few forms are ovoviviparous, i.e., bring forth living young, but the great majority lay eggs. (See EGG.) With some forms there is a development without metamorphosis, and in these the young insect just hatched from the egg is of the same form as the adult insect. With others there is what is termed an incomplete metamorphosis, i.e., where, although the young greatly resemble the adult, there is still a striking change of form during life. With others still there is what has been termed a complete metamorphosis (q.v.), in which the young just hatched is strikingly different from its subsequent stages. With the bees, butterflies, flies, beetles, and other insects, the form which hatches from the egg, and which is known as the "larva," is a "grub" or a "caterpillar." This, after reaching full growth, passes into another form, which is known as the pupa, and in which in the majority of cases the insect is quiescent, while from this stage there eventually emerges the perfect insect. Larvæ grow by molting; the skin is more or less hard and is composed of chitin; a new skin is formed beneath the old skin, which eventually bursts and permits the larva to emerge. The number of molts differs with the larvæ of different groups and ranges from two or three to as many as 12 or more. The phenomenon known as hypermetamorphosis

sometimes occurs. With certain of the blister beetles, e.g., the first larvæ which are born possess legs, by the aid of which they can cling to a bee and be carried to its nest, where they will live on the food stored by the bee; after a molt they lose their legs and become almost organless, floating about in the honey. Later still, another form of larva is found. See METAMORPHOSIS, IN ANIMALS; LARVA; PUPA.

Social Insects. A great many insects lead solitary lives. Others, either as larvæ or as adults, are gregarious, and in gregarious feeding and gregarious life we have the beginning of social communities. Many lepidopterous larvæ, or caterpillars, feed together in great masses, like the army worm (q.v.) of the United States, and more especially the larvæ of certain silk-spinning moths, like the European processionary moth (*Cnethocampa processionea*), and less markedly the American tent caterpillar and fall webworm (qq.v.). These tents or webs for community feeding are carried to a higher degree of perfection in the European tineine moths of the genus *Hyponomeuta*, and still more perfectly in the community nests of a tropical butterfly (*Eucheira socialis*). A number of moths make communal cocoons, but nearly all of these are tropical. The beginning of a true communal life is seen with the ambrosia beetles (q.v.) of the family Scolytidæ. These are beetles which make galleries under the bark of trees, apparently cultivating a fungus which they use as food, preparing a bed for its cultivation; they also carefully remove excrement from the fungus gardens and practically bury their dead. The most perfect socialism, however, occurs among the bees, wasps, and ants of the order Hymenoptera, and among the termites, or so-called "white ants," of the order Isoptera. Not all bees are social. A large group is composed of solitary bees. Among the social bees a more or less primitive social life is found with the bumblebees. Here there is a communal existence. Nests are made, cells are constructed for the young, the young are fed by the adults, and there is a separation into three castes, viz., females, males, and drones. There is also the beginning of a separation of the drones into two castes—the larger ones in general attending to the mending of the covering of the nests and to the ripening of the honey, while the smaller ones for the most part do the inside housework, such as the wax repairing and the nursing of the young. The community life of the hive or honey bee is much more complicated than that of the bumblebee, but the workers seem to be more uniform in their duties. The stingless tropical bees of the genera *Trigona* and *Melipona* form very large communities, some of them even exceeding in size those of the honeybee, but the social life is practically the same. See BEE.

The wasps are also both social and solitary. The social species belong for the most part to the genera *Vespa* and *Polistes*. Their communities are much like those of the social bees. They are, however, not so perfect and not so persistent as those of the true honeybee or the ants, but resemble more nearly those of the bumblebee. The communities of the bumblebees and the wasps are annual. Those of the honeybees and the ants, as well as of the termites, last for a number of years. Among the wasps is a form known as worker, just as with the social bees; and the workers here, as in the other cases, are undeveloped females. Here also, as with the social bees, these undeveloped females or workers may lay eggs which invariably produce males or drones. Most of the social wasps make paper cells and nests, using for this purpose a wood pulp composed of fragments of wood moistened with saliva and macerated in the mouth. The economy of the social wasps is not perfectly understood, doubtless owing to the difficulty of studying them, due to the irritability of the insects and to their poisonous stinging. The size of the communities varies at the season when they are largest, from a few individuals to many hundreds, as many as 1200 cells being found in a single nest. On the approach of winter the males and workers perish, and the fertile females crawl into such protected situations as crevices of walls and in the bark of trees and there pass the winter in the dormant state. At the opening of spring each surviving female founds a new colony. At first she performs the duties of both queen and worker. A small nest is made, eggs are laid in it, and when the larvæ hatch they are fed and cared for by the queen until they are mature. This first generation is composed entirely of workers. They relieve the queen of the duties which belonged to her, and from this time forth her only duty is to lay eggs. The workers are engaged in the enlargement of the nest, in the construction of new cells, and in the care of the young.

With the ants we come to a more complicated social life. Here not only do great numbers of separate individuals live together and adopt different functions, according to the positions which they occupy in the colony, but these individuals are also greatly modified in structure and in their physiological processes, in such ways as to fit them especially for the parts they have to play. With the different families of ants the character of the colony differs very considerably. For a general account of the community life of the higher families and the general phenomena of ant life, see ANT; also DRIVER ANT; FORAGING ANT; HONEY-MAKING ANT.

The family Poneridæ, as pointed out by Wheeler, constitutes a primitive and generalized group of ants, wherein the colonies consist of a comparatively small number of individuals like the incipient colonies of the higher families. These small colonies appear to be annual growths formed by swarming, as in bees, and not by single fertilized female ants, unaccompanied by workers, as in the higher families, and as described under ANT. Two and more colonies of the same species can be fused to form another colony without much difficulty, which is not easily accomplished with many species of the more specialized ants. Their architecture is of a primitive character, consisting of a few irregular and unfinished galleries. The queen and worker differ but little in size and structure. Ergatoid females, or forms intermediate between the queens and the workers, are of normal and comparatively frequent occurrence in some species. The habits of the queen and worker are very similar; the female is not an individual to whom especial attention is paid by the workers. The workers show no tendency to differentiate into major and minor castes. They are carnivorous and live by hunting, in contrast with the various harvesting, fungus-growing, honey-collecting, and aphid-guarding members of the higher groups. They do not feed one another

by regurgitation; nor are the larvæ fed by regurgitation, but are given pieces of insects, from which they suck the juices. It is fair to suppose that from such generalized beginnings the highly specialized and wonderful colonies of the higher groups of ants have sprung, and that the slave-making habits, the care of honey-producing insects, the differentiation of a soldier caste, the fungus-growing habit, and others have been developed by gradual evolution.

The phenomenon of polymorphism (q.v.) becomes very marked with ants, although it reaches a still higher development among the termites. The causes of the modifications seen in the different castes are still in dispute. Dewitz states that the caste is already determined in the insect before leaving the egg; Weismann associates the caste with some hypothetical rudiments existing at the very earliest stage of the embryonic process; Herbert Spencer and others believe that the character of the insect is determined by the nutrition of the larva, just as is the case with the honeybee. The chief forms of polymorphism in ants are the ordinary winged male, the ergatoid male, the winged female, the ergatoid fertile female (a form intermediate between female and worker), the soldier, the worker major, and one or more kinds of worker minor. In addition to these there are apparently cases of females with postmetamorphic growth in the Dorylides, but these have not yet been the subject of investigation. The fact that the social insects in which the phenomena of caste or polymorphism occur, though belonging to very different groups, all feed their young, is suggestive and lends weight to the theory that the differentiation is the result of character of the larval food. Emery accounts for this differentiation by assuming that it has been gradually acquired by numerous species, and that we now see it in various stages of development; also, according to Sharp, "that the variation in nutrition does not affect all the parts of the body equally, but may be such as to carry on the development of certain portions of the organization while that of other parts is arrested."

The so-called intelligence of bees, and especially of ants, has been a subject of wonder and comment on the part of many writers for hundreds of years. The observations of Lubbock, however, indicate that bees have not the high degree of intelligence with which many writers have credited them, and that in this respect they do not compare with the higher ants, which are ranked as the highest in point of intelligence among social insects. Riley, in his work entitled *Social Insects from the Psychical and Evolutional Points of View*, expressed himself as of the opinion that no one can doubt the possession by the social insects of intelligence, of conscious reasoning and reflective powers. He makes the statement, "We can never properly appreciate nor properly bring ourselves into sympathy with these lower creatures until we recognize that they are actuated by the same kind of intelligence as ours." Bethe (1898), however, in discussing the question as to whether or not we may ascribe psychical qualities to ants and bees, points out the danger of the observer injecting his own personality into the subject investigated. He shows, e.g., that, while we *see*, all we know about bees and ants is that they are influenced by the light, and that it would be most unscientific to say that they do anything as highly psychical as seeing, until it is proved. Some of the peculiar and apparently highly intelligent things which ants do, such as recognizing the enormous number of members of the same colony, and such as finding their way to their own nests and to food supplies and communicating intelligence of the location of food supplies from one to the other, have been carefully tested by Bethe, who concludes that he can find nothing in the phenomena exhibited by bees and ants to prove the existence of any psychical qualities. Lubbock thought that he had proved that ants communicated with one another, but Bethe used one of Lubbock's own experiments to show that it proved nothing. He concludes that they learn nothing, but act mechanically in whatever they do, "their complicated reflexes being set off by simple physiological stimuli." See facts under this head in article INSTINCT. For the best and most recent summary of facts and theories relating to the social life of the true ants, consult W. M. Wheeler, *Ants, their Structure, Development, and Behavior* (New York, 1910).

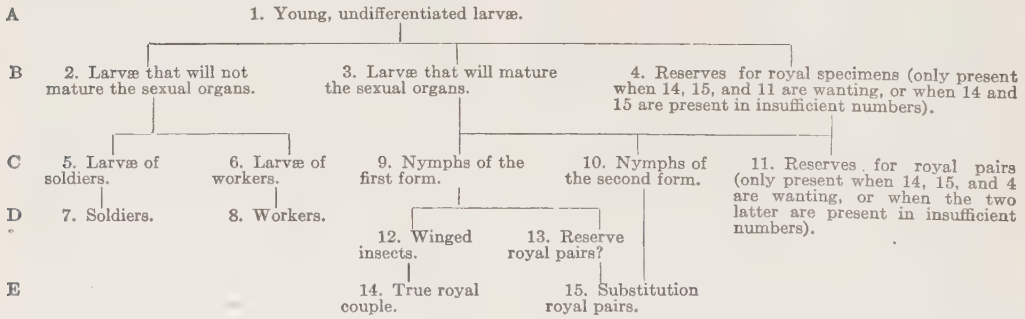
In the termites, or "white ants," we reach a very specialized form of the social or community life of insects. They reach their highest development in tropical regions; the females or queens grow to be of enormous size, the abdomen swollen with eggs sometimes becoming as big as a potato, or 20,000 or 30,000 times the bulk of a worker. The eggs may be laid at the rate of 60 a minute, or 80,000 a day. The species are all social, and communities consist of both wingless and winged individuals. The winged individuals are with most species excessively numerous, and as a rule they are divided into two castes, viz., the ordinary workers and the soldiers. The so-called soldiers also exist with the true ants, but they have not in these creatures become such a structurally well-differentiated caste as with the termites. In the latter the jaws have become enormously developed, and in some cases the soldier is five times the size of the worker. In some species some of the workers have branched off into another caste, the "nasuti," in which the head has become elongated into a long noselike process, at the tip of which is a hole through which is exuded a fluid which is used in making and mending the walls of the habitation. Although the social life of a termite colony is superficially much like that of an ant colony, the development of the social habit and the differentiation of forms have taken place along entirely different lines: the termites have an incomplete metamorphosis, the ants have a complete metamorphosis; the young of the termite is more or less capable of self-support soon after birth, whereas the larvæ of the bees and ants are entirely helpless during development and are fed by the adults. The fundamental difference between the two groups is that with the termites the workers or neuters, including the soldiers, are not undeveloped females, as with the workers and soldiers of the ants and the workers of the bees, but they consist of both sexes and are in reality the arrested or modified larvæ in which the sexual organs are imperfectly developed or are completely atrophied.

With the hive bee multiplication of colonies takes place by division, but the colonizing swarm carries with it a queen, and thus the foundation of a new colony is easy. With the higher termites multiplication of colonies also

takes place by division; but this is carried out by the workers and soldiers, which travel away and capture one of the royal pairs that wander about after they have swarmed and thrown off their wings. Many colonies of termites will be found in which there is no queen. Among the different species of termites there is a marked gradation from a simple to a more complex economy. The continuance of a termite community is entirely dependent upon the king and queen, which are the adult individuals of both sexes which have swarmed and lost their wings. There is usually but a single pair in a nest, and they are frequently inclosed in a cell which they cannot leave. In consequence of the disorganization of the community if anything happens to the king or queen, termites keep certain individuals in reserve in such a state of advancement that they can rapidly be developed into kings and queens should occasion require it. When such individuals, however, are developed to meet the emergency, they are generally immature in the anterior parts of the body. The termite queen differs in one respect from any other known insect, i.e., in actual growth after reaching the adult stage, this growth being confined to the abdominal region of the body and being due to the necessity for an extraordinary number of eggs.

The complicated character of a termite colony is seen from the following table (from Sharp), which indicates the numerous forms which exist in certain communities:

FORMS OF TERMES LUCIFUGUS. (After Grassi)


A
1. Young, undifferentiated larvæ.
B
2. Larvæ that will not mature the sexual organs.
3. Larvæ that will mature the sexual organs.
4. Reserves for royal specimens (only present when 14, 15, and 11 are wanting, or when 14 and 15 are present in insufficient numbers).
C
5. Larvæ of soldiers.
6. Larvæ of workers.
9. Nymphs of the first form.
10. Nymphs of the second form.
11. Reserves for royal pairs (only present when 14, 15, and 4 are wanting, or when the two latter are present in insufficient numbers).
D
7. Soldiers.
8. Workers.
12. Winged insects.
13. Reserve royal pairs?
E
14. True royal couple.
15. Substitution royal pairs.

These organs. Certain rove beetles occurring in termites' nests are fed directly by their hosts. Many of the guests are curiously modified so as to present a striking resemblance to their hosts. With those living with blind ants the form is not modified, but the structure and the hair growths have become similar to those of ants. Among these guest insects (which when occurring in ants' nests are known as "myrmecophilous" and in termites' nests as "termitophilous") there are representatives of no less than 31 different families of Coleoptera, seven families of Hymenoptera, several families of Lepidoptera, Diptera, Orthoptera, Neuroptera, Pseudoneuroptera, Hemiptera, Thysanura, and there are also living as guests in these nests certain curiously modified myriapods, scorpions, spiders, mites, and isopod crustaceans. See Inquiline; Termite.

Structure of Insects. The insects are most closely related to the myriapods and to the spiders and their allies (Arachnida). The body consists of not more than 21 segments, which are usually of unequal size and shape, arranged in three usually well-defined regions—head, thorax, and abdomen. The head is small and flattened or rounded, and is composed of not less than six segments, bearing eyes and at least four pairs of appendages, viz., one pair of antennæ and three pairs of mouth parts. The mandibles are one-jointed, without appendages. There are two pairs of maxillæ—the first pair separate, usually three-lobed, and with a palpus which is never more than six-jointed. The second pair unite to form the underlip and bear a pair of palpi never more than four-jointed. The epipharynx forms the roof of the mouth and bears taste organs. The hypopharynx is usually well developed and lies on the underside of the mouth just above the labium and receives the end of the salivary duct. There are a pair of compound eyes and usually from two to three simple eyes (ocelli). The thorax consists of three segments. There are three pairs of legs, each foot ending in a pair of claws; two pairs of wings, a pair to each of the two hinder thoracic segments. The wings are occasionally reduced or wanting in forms which, however, had winged ancestors. The abdomen consists at the most of from 10 to 12 segments, and there are no functional abdominal legs except in the Thysanura and in the larvæ of Lepidoptera. The genital openings are usually single, but are paired in some orders.

The digestive canal is highly differentiated in the winged orders. In larvæ it is a nearly straight tube extending from one end of the

A very remarkable feature of the life of social insects is the frequent occurrence, in the colonies of almost all species, of "guests," or inquilines. Insects of several orders live in ant colonies, and symbiosis (q.v.) presents itself here under various aspects, among which, according to Wasmann, real hospitality (myrmetoxenie and termitoxenie) and relations of friendship (symphylie) take first rank, and, as far as we can tell, are unequaled elsewhere in the animal kingdom. Wasmann has studied more than 100 different species of insects living in the nests of ants and more than 100 different species in the nests of termites, but states that these form but a fraction of those hidden in the nests of tropical ants and jealously guarded by their "jailers." New and interesting discoveries are constantly coming to light in the tropics. Certain of the beetles found in these nests possess certain peculiar tufts of hair and are licked by the hosts on account of the pleasant secretion which comes from them. The peculiarly shaped antennæ of the guests indicate that they summon the ant at feeding time by tapping it with

body to the other. In adult insects, however, it is usually much longer than the body and therefore is more or less folded. It is situated below the dorsal vessel and above the ventral chain of nerve ganglia. There are three main divisions, viz., the anterior, middle, and posterior. The anterior and posterior divisions are morphologically considered as invaginations of the extremities of the skin. The œsophagus is usually narrow, dilating behind to form the crop. Sometimes it dilates immediately behind the mouth, and this dilatation is known as "pharynx." It is followed by the "gizzard," or proventriculus. The true stomach, or chylific ventricle, is always present and is very variable in shape and size. Sometimes it is coiled like an intestine and sometimes bears pouches varying in number from two to very many. The intestine varies greatly in length, being smaller anteriorly and frequently widening to form a rectum. There are sometimes a cæcum and odoriferous glands. The alimentary canal has two coats of muscles, a longitudinal and a transverse coat. Salivary glands are present in many insects, discharge into the mouth, and vary greatly in their development. The silk spun by many larvæ comes from long silk glands similar in form and situation to the simple tubes of the salivary glands. Malpighian tubules are present in most insects in the hinder end of the body, opening into the alimentary canal usually at the junction of the stomach and intestine. They vary greatly in length and number.

The nervous system consists of a well-developed brain, and no more than 13 pairs of ganglia, which may be more or less confused in the specialized orders. The cephalic ganglia are placed above the œsophagus, while the other ganglia are ventral. There is an accessory sympathetic system which is complex and difficult of dissection. Respiration is carried on by means of a system of air vessels called tracheæ, which ramify through all parts of the body. These tracheæ connect with the outer air through a series of spiracles which are orifices at the side of the body, there being usually one pair for each segment. The tracheæ are elastic and consist of an outer cellular coat and an inner chitinous layer, the latter strengthened by a spiral fibre. With some insects, as with certain bees and locusts, the tracheæ expand in places to air sacs, and these sacs, as well as the finest capillary branches of the tracheæ, lack the spiral fibre.

Circulation is carried on through the dorsal vessel or heart, which is situated in the upper part of the body (just beneath the dorsal skin), extending from the head or thorax to the posterior extremity. It is an elongate tube consisting of a number of united chambers and is usually closed behind but open in front, having also several orifices at the side. There is a muscular layer with internal and external membranous layers. The blood is forced forward into the body cavity, receiving oxygen from the terminal branches of the tracheæ. The muscular system is extensive, nearly 4000 muscles occurring in certain caterpillars. See GILL.

Classification. According to the generally accepted classification, there are 19 orders of insects, as follows:

Thysanura, springtails and bristletails.
Ephemerida, May flies.
Odonata, dragon flies.
Plecoptera, stone flies.
Isoptera, white ants.
Corrodentia, psocids and book lice.
Mallophaga, bird lice.
Euplexoptera, earwigs.
Orthoptera, grasshoppers, crickets, etc.
Physopoda, thrips.
Hemiptera, true bugs, plant lice, scale insects.
Neuroptera, aphis lions, ant lions, etc.
Mecoptera, scorpion flies, etc.
Trichoptera, caddis flies.
Lepidoptera, butterflies and moths.
Diptera, true flies.
Siphonaptera, fleas.
Coleoptera, beetles.
Hymenoptera, bees, wasps, ants, sawflies, etc.

Representatives of these groups are illustrated by typical forms on the accompanying colored plate, which are described elsewhere, under their respective names. For a simpler arrangement of orders, see CLASSIFICATION OF ANIMALS. See also Colored Plates of BEETLES, BUTTERFLIES, DRAGON FLIES, and MOTHS.

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INSEC'TA (Lat. nom. pl., insects). A class of six-legged arthropods, equivalent to the Hexapoda. See INSECT.

INSEC'TICIDE (from Lat. *insectum*, insect + *-cida*, murderous, from *cædere*, to kill). A substance used by man to kill insects. Besides those materials properly included by this definition, however, there are many other agents of great importance as insect exterminators, of which the following may be classed as natural controls: changes of temperature at critical times in the life histories of insects; rain, flood; drought; forest and prairie fires; bacteria, fungi, mites, spiders, predacious and parasitic insects, and other invertebrates; fish, toads, reptiles, birds, anteaters, and other vertebrates. Though each of these exercises an important function in checking insect depredation, their offices are beyond the scope of the present article, which deals with artificial or man-applied controls.

For convenience of discussion the classification of insecticides may be made according to the two ways by which insects obtain food. Plant-feeding insects either chew plant tissue by means of movable jaws or else suck the juices through punctures in the epidermis made by their tubelike beaks. The chewing species may be subdivided into those that feed beneath the surface and those that feed in exposed positions. To the concealed feeders belong the leaf miners, which live beneath the epidermis of leaves, etc., and the borers in living and dead plants, timber, and grain. The only way these may be controlled is by poisonous gases (bean weevil), by drowning (peach borers, sometimes), burning infested parts (raspberry cane borer), or by digging them out (apple borer), the feasible method depending upon the habit of the species. To the exposed feeders belong caterpillars, grasshoppers, beetles, etc., which are usually controlled by stomach poisons, such as arsenical compounds, especially Paris green used at the rate of a pound in from 100 to 300 gallons of

water, or Bordeaux mixture. (See FUNGICIDE.) Another popular poison is arsenate of lead, which adheres to the foliage better than Paris green and may be applied in larger quantities with less danger of injury. Of the newer insecticides, zinc arsenite and lead chromate are considered valuable. Hellebore is most frequently used upon small plants, especially for the currant worm. Some soft-bodied chewing insects may be controlled in the same way as sucking insects.

Sucking insects, among which are some of the most destructive pests of crops, cannot be controlled by stomach poisons, because they obtain their food from beneath the epidermis of the plant. Because of their small size, insidious habits, enormous prolificacy, and capability of withstanding treatment, they are among the most dreaded crop pests. Some (e.g., the squash bug) have never been effectually and economically controlled by any method yet devised. In general the most feasible controls are such as either obstruct the respiratory passages of the insects (tobacco, insect powder, oils, etc.) or have a caustic action through penetrating their spiracles, or breathing pores, dissolving the fats and paralyzing the nerve centres (lime-sulphur mixture, miscible oils, oil emulsions, whale-oil soap, etc.). Substances used for this purpose are known as contact insecticides. Since kerosene can rarely be applied with safety to growing plants, it is emulsified by mixing and churning violently 2 gallons of kerosene with a solution of 8 ounces of hard soap in 1 gallon of hot water, and diluted when needed for use with from 5 to 10 times as much water. Experiments have been made with pumps that mix kerosene and water in definite proportions as they are drawn from two respective tanks by the one piston stroke. Miscible oils and lime-sulphur mixture have come upon the market in recent years and are being used quite extensively. Whale-oil soap is applied as a solution of 1 pound in 1 to 10 gallons of water. Certain insects, notably the San José scale, a serious pest of woody plants, and the chinch bug, an equally troublesome pest of cereals, have been experimented upon in a unique way; fungus parasites were spread among them, in the first case by means of infected water sprayed upon them; in the latter by infected insects. The results have not been particularly satisfactory in either case. Not so in the case of the cottony cushion scale, a pest on citrus trees in California. A ladybird beetle, imported from Australia, in a few years extirpated the pest. This is perhaps the most notable instance of man's utilizing a natural control and making it an insecticide in the narrow sense. See LADYBIRD. Much has also been done with insect parasites, notably in the case of the gypsy and brown-tail moths and sugar-cane fulgorid.

Certain species of insects (clothes moths and granary insects) may be best destroyed by suffocation in the fumes of carbon disulphide evaporated in shallow dishes placed at the top of the air-tight receptacle containing the material to be fumigated. An ounce to 50 or 75 cubic feet is the usual proportion, the box being kept closed for 24 hours or more. Since the fumes of carbon disulphide are very explosive, lights must be kept away. Hydrocyanic-acid gas is also largely used to suffocate insects, especially certain greenhouse, nursery stock, and citrus pests, particularly scale insects and the so-called white flies, or aleyrodids. The gas is generated from potassium or sodium cyanide (98–99 per cent pure) in a mixture of sulphuric acid and water, the proportions being 1 ounce cyanide of potassium, 2¼ ounces water, 1½ ounces sulphuric acid for each 100 cubic feet for nursery stock operated upon; 125 cubic feet for trees, granaries, flour mills, and rooms; and 250 cubic feet for greenhouses. The usual exposures are from half an hour to an hour for plants and trees, according to whether they are growing or dormant, and 12 to 24 hours for rooms, etc. Since both the gas and the salt from which it is made are virulent poisons, no person who is not both careful and competent should employ them.

The insects that attack domestic animals and man, though individually serious pests, form a numerically insignificant group when compared to the great group of plant-feeding species. Hogs and sheep may be freed from lice by greasy mixtures and tobacco or carbolic washes; infested horses and cattle should be thoroughly curried once a week until the animals are free, the brush being dipped frequently in kerosene emulsion diluted with five or six parts of water. Similar remedies apply to the related parasites of the human subject, vaseline or lard being substituted for the kerosene emulsion. For the body louse and the crab louse hard boiling of infested clothes for half an hour or longer is essential, since the eggs are very resistant. Poultry may be kept free from lice by a liberal supply of fine dust, and their houses by fumigation with carbon disulphide or hydrocyanic-acid gas and the frequent application of kerosene and whitewash. Carbolic soap is a standard insecticide against fleas in pet animals. With animals of all kinds, however, cleanliness is a great safeguard, since the insects which arrive first are destroyed before they have a chance to breed.

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IN'SECTIV'ORA (Neo-Lat. nom. pl., from Lat. *insectum*, insect + *vorare*, to devour). An order of placental mammals, containing about 250 species, arranged in two suborders: (1) true Insectivora; (2) Dermoptera. The former includes the hedgehogs, tenrecs, moles, and mole-like animals, elephant shrews, true shrews, and the like, and the latter the "flying lemur" (*Galeopithecus*). None of the Insectivora are of large size; most of them are small timid creatures, generally nocturnal in their habits, and useful in the economy of nature chiefly in preventing the undue increase of worm and insect pests. Although many of them are not exclusively insectivorous, all of them have the summits of the molar teeth beset with small conical tubercles, well adapted for breaking up the hard coverings of insect prey. Their dentition is characterized by a distinct tendency towards suppression of the milk dentition, but otherwise is variable. The legs are short, and the feet of most of them are plantigrade. The cerebrum is small and smooth and does not cover the cere-

bellum. The order is regarded as one of the inferior and among the most ancient of the mammalian groups; and, with the exception of a single genus (*Solenodon*, of Cuba), they are now confined to the Northern Hemisphere and to South Africa and Madagascar, i.e., to Artogæa. An excellent review of the order is Dobson, *A Monograph of the Insectivora* (London, 1886–90). Also consult W. D. Matthew, in *Memoirs of American Museum of Natural History*, vol. ix (New York, 1909).

IN'SECTIV'OROUS PLANTS. Plants that catch and digest insects as part of their food. See CARNIVOROUS PLANTS.

IN'SECT POWDER, PYRETHRUM, BUHACH, DALMATIAN or PERSIAN INSECT POWDER. A brownish-yellow powder obtained by grinding the dried flower-heads of two species of *Chrysanthemum* (*Pyrethrum*), a genus of plants of the natural order Compositæ. The species employed are *Chrysanthemum coccineum*, popularly known as *Pyrethrum roseum*, and often grown as an ornamental summer-bedding plant, and *Chrysanthemum cinerariæfolium*, also called *Pyrethrum cinerariæfolium*. From the flowers of the former, a Persian species, is made Dalmatian or Persian insect powder—better known in Europe than in America; from those of the latter, a Caucasian species, extensively cultivated in California, is manufactured the insect powder buhach or pyrethrum, common in the United States. When fresh, the powder made from each species seems to be equally effective; but since the volatile oil upon which their effectiveness depends is lost with age and also by exposure to air and heat, the California product is considered with more favor in America than the imported powder. *Chrysanthemum cinerariæfolium* is preferred in California, because its flowers may be gathered at approximately one time, whereas *Chrysanthemum coccineum* has an extended period of bloom. The volatile oil acts upon insects by asphyxiation; upon man and other animals it has no serious effect; workmen in the pyrethrum mills suffer no more inconvenience than millers do from the dust in flour mills. The plants are fed to horses and other stock after the flowers have been gathered. In California, where some large farms are devoted wholly to this plant, the industry commenced in 1870, and three years later the small product was sold at $16 a pound. In 1885 the price had fallen to $0.45 a pound and has never since risen to unreasonable figures. The seed is sown about half an inch deep in light soil during autumn or spring, and the young plants transplanted when a few inches tall to the field, 2 feet by 4 feet apart, given irrigation each month during the dry season, cultivated by horse, and kept free of weeds by hand. A partial crop may be obtained the first year after planting, but the crop of the third year is usually the largest. Generally the plants continue to bear profitably for six years. The flowers are combed from their stems by hand during May and June, sundried, and ground between burr stones similar to those of old-fashioned flour mills, and after bolting packed in air-tight tin cans. Insect powder is usually employed in household use as dust. When flies, mosquitoes, and other insects are numerous and troublesome, it is often heated in closed rooms and the stupefied creatures swept up and destroyed before they recover. It is similarly used in greenhouses. Frequently also it is applied as a solution in water (1 ounce to 2 or 3 gallons) or in alcohol (1 ounce to 4 ounces by weight). The former is applied as mixed; the latter, after daily shaking for a week or more, is filtered and the clear liquid applied with an atomizer. This decoction, if applied to plants, should be diluted somewhat. Pyrethrum is also sometimes mixed with kerosene emulsion or other insecticides. See INSECTICIDE.

INSECTS, FOSSIL. Of all animals the insects, with their aërial habits of life, would seem at first thought to be the least liable to entombment and preservation in a fossil state. They are, however, found in great abundance in several localities where the nature of the deposition was particularly favorable to their fossilization. These deposits are nearly all of fresh-water (lacustrine or marsh) or of estuarine origin, though some few are purely marine. As a rule, the embedding materials are finely grained shales or limestone concretions in shales, or fossil gums and amber; the amber has furnished by far the most perfect fossil insects known. The shale beds of the Oligocene Tertiary at Florissant, Colo., are also noted for the abundance and perfection of their insect contents. Other noted repositories of fossil insects are the Carboniferous coal-measure beds of Commentry, France, described by Brongniart; the Liassic beds of Schambelen, Switzerland, of Dobbertin, Germany, and of Gloucestershire, England; and the Jurassic lithographic limestone of Bavaria. The Tertiary localities, from which great numbers of insect remains have been derived, are the Baltic provinces of Germany and Russia, where they occur in amber; the shales of Aix, France, Florissant and the White River District of Colorado, and Oening, Radoboj, and Parshberg. The wings seem to be preserved as fossils far more often than other parts of the insect body, and in many formations these are the only parts found.

The known fossil insects do not present any great points of difference from those now living. Those found in the Mesozoic and Tertiary rocks can be readily placed in modern families; but all Paleozoic insects show a certain general resemblance, with here and there points of relationship to the orders of modern insects. These orders did not become fully differentiated until Triassic time, although ancestral forms are easily distinguishable among the earlier members of the class. The Paleozoic insects have on this account been grouped under the name of Paleodictyoptera, a synthetic group, and have been distributed, according to their resemblances to modern forms, among several orders—the Orthopteroidea, Neuropteroidea, Hemipteroidea, etc., which are directly ancestral to the Post-Paleozoic and modern orders of Orthoptera, Neuroptera, Hemiptera, etc. The Paleozoic insects are of more primitive type, as illustrated chiefly in the wing structure, than are the Mesozoic insects. As a rule, their front wings are membranous—i.e., they had not yet evolved hardened front wings, such as the elytra and tegmina, that serve as protective coverings for the more delicate hind wings of modern insects. Some of the early insects were of gigantic size, compared with their living descendants—*Meganeura*, an ancestral dragon fly found in the Carboniferous of Commentry, France, had a body 16.5 inches long, and its wings spread over 28.5 inches. Another point of interest is that the Paleozoic insect fauna was made up almost entirely of cock-

roaches. These must have swarmed in the woods and swamps of the Carboniferous and Triassic periods, for their remains are found in abundance in the shales and sandstones associated with the coal deposits of those ages.

The earliest insect remains are of a very fragmentary nature. A fossil from the Ordovician rocks of Sweden has been supposed to be a wing of an ancestor (*Protocimex*) of the bedbugs, but this is doubtful. Cockroaches probably appeared in the Silurian, and they were the predominating types in the Devonian and Carboniferous. The Carboniferous fauna consists principally of Orthoptera and Neuroptera, and of forms intermediate between these two orders, and also of extinct types intermediate between the Orthoptera and the Hemiptera, and it is interesting because of its large number of generalized or synthetic types. In the Triassic the beetles appear suddenly with their characteristic hardened front wings fully developed. This difference in the character of the front and hind wings is fully marked for the first time in all Triassic insects, and it has become more strongly marked since that period. In the Liassic epoch of the Jurassic period insects were abundant, as might be expected from the general extension of terrestrial conditions during that period. Beetles abound, and as they represent many families still living, they have been used to determine the conditions of life and climate during that period. Leaf and fungus eating beetles and dung beetles are known. The earliest ants; the first well-marked bugs, allies of the squash bug; the first flies, bees, and perhaps also the earliest moths, are found in this epoch. The Cretaceous insect fauna is small, but that of the succeeding Tertiary, beginning with the Eocene, is almost as well differentiated as that of the present day, for many of the genera are still members of the living insect fauna. In all about 3000 species of fossil insects are known, and these are distributed among the geological eras as follows: about 10 per cent are Paleozoic, 15 per cent Mesozoic, and 75 per cent have been described from the Tertiary formations.

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INSECTS, PROPAGATION OF DISEASE BY. Careful observation and patient investigation have resulted in establishing the fact that the transmission of disease, in many instances hitherto unexplained, has been due to the agency of insects. The most momentous medical discovery during the year 1899 was that of the cause of malaria in human beings. There are several scientists to whom credit is due in the matter; but the lion's share of it belongs to Patrick Manson, of Dublin, and Major Ross, a surgeon in the British army, stationed at Calcutta. During several years of laborious work they forged the links that completed the discovery. As long ago as 1807 Crawford, an American physician, suggested the possibility of the transmission of malaria to man by the mosquito. Again, in 1848, Nott, of New Orleans, referred to the part played by insects in propagating malarial fever. In 1883 A. F. A. King (q.v.), of Washington, D. C., reiterated the theory at some length. Laveran (q.v.), who in 1880 discovered the *plasmodium malariæ*, or *hæmosporidium*, the parasite of the disease, declared in 1891 his adherence to the mosquito theory, as did also Flügge in the same year. In 1892 Pfeiffer showed that certain protozoa, called *coccidia*, which are found as parasites in the rabbit, are capable of two cycles of development, one being exogenous. He mentioned that Koch (q.v.) had suggested that a similar condition might hold good for the parasite of malaria, and that exogenous malarial spores might be conveyed to man by the agency of blood-sucking insects. In 1894 Manson, of Dublin, appeared as a vigorous supporter of the mosquito theory as best calculated to explain the various conditions of the problem. He drew a parallel between the malarial parasite and the *filaria bancrofti*, which he had investigated very thoroughly. He suggested that the female mosquito fills herself with infected blood, deposits her eggs, and dies beside them. The water in which she lies becomes contaminated with the spores developing in her body and is then drunk by men, or the spores are inhaled with dust from dried puddles, or the larvæ after being hatched feed on the dead body of the mother and thus become carriers of infection, or the ground may become infected by the bodies of mosquitoes that die and fall upon it. Ross's work in his studies of malarial organisms in birds' blood is really monumental. He discovered that after a special variety of gray mosquito had fed on the blood of birds containing a certain mature organism called *proteosoma*, the stomach wall of the insect always contained certain pigmented *coccidia* two days later. After other changes had occurred on the eighth or ninth day, the coccidia ruptured and set free innumerable threadlike bodies which are distributed by the blood current of the mosquito through her tissues. Eventually these bodies are found in certain glands in the thorax of the insect, whose ducts open at such a point as to furnish secretion that lubricates the lancets of the mosquito. When she punctures the skin of her victim, this secretion, containing the threadlike bodies, is injected into the bottom of the wound. Manson and his pupil, Daniels, proved that these threadlike bodies, or germinal spores, develop into mature proteosomata in a bird bitten by the infected mosquito, thus completing the cycle. While Manson was conducting his experiments, Grassi, the distinguished Milanese, was completing his studies on the mosquitoes of Italy.

In 1898 he determined that *Anopheles claviger* was the variety that carried malarial infection. A man who had never been subjected to malarial infection was exposed to the bites of the mosquito *Anopheles claviger* and in a short time began to suffer from malarial fever. Quinine cured him of the attack. The Italian scientists Bignami, Bastianelli, and Grassi, working in conjunction, arrived at the conclusion that the malarial hemisporidia (which consist of small reproductive cells produced within a cyst) run through a cycle in man which is characterized by a long amœboid stage and an absence of the encapsulated phase, reproducing themselves a great number of times during the completion of this cycle, and also giving rise to forms which remain sterile in man, known as Grassi's gametes. These latter forms, taken into the stomach of the *Anopheles* with the blood she draws from an infected man, develop into sporozoa, and these in turn form sporozoites, delicate filaments which find their way to the salivary glands of the *Anopheles*. The saliva anointing the lancet of the *Anopheles* carries the infection to the next victim bitten. In East and Central Africa experiments were made by Daniels which led him to believe that *Anopheles funestus* (Giles) is the chief agent in distributing malaria in that country, and that man is the only intermediate host of the malarial parasites.

A practical confirmation of the mosquito theory resulted from the labors of Low, Celli, Grassi, and the Red Cross of Italy, which demonstrated in 1901 that the use of the mosquito net and the draining of stagnant pools prevented malaria in individuals living in notoriously malarious countries. Covering the surface of stagnant water with a pellicle of crude petroleum suffices in many instances to kill the larvæ of the mosquito, and decrease of malaria follows. A solution of permanganate of potash, 1 to 1500, was found to be as effective, though not as cheap, as petroleum. It has been ascertained that goldfish may be used as the agent for the destruction of the larvæ of mosquitoes, as they eat them eagerly. Ducks are said to be even more efficient destroyers.

Extensive and important studies in New Jersey established the facts that the most abundant species of mosquitoes in that State, *Culex sollicitans*, breeds not only in brackish and salt water, but also in water that is 25 per cent more salty than ordinary sea water; that it does not breed in fresh water at all; that adult mosquitoes may be found in great abundance from 20 to 40 miles from their breeding places; and that mosquitoes occur from 5 to 15 miles off shore, over the open ocean, at points to which they have been carried by the wind. *Culex pungens*, next in abundance to *Culex sollicitans*, was found breeding in every place where water is not salt. The breeding time for these mosquitoes is late in the fall, and the adults hibernate.

The mosquito is also accepted as the means of transmission in the case of yellow fever. This theory was first advanced by Dr. Carlos Finlay, of Havana, in 1881. Reed, Carroll, Agramonte, and Lazear, who formed the commission appointed in 1900 by the surgeon-general of the United States army to investigate yellow fever in Cuba, proved that the mosquito serves as the intermediate host for the parasite of yellow fever, and that the disease is propagated only through the bite of this insect. *Stegomyia fasciata* is the mosquito that acts as host for yellow fever. The mosquito has a part also in the dissemination of leprosy. Kaposi has instanced a case of this disease, easily traceable to a mosquito bite. The experiments of Alvarez, as quoted by Carmichael, support this theory of mosquito transmission in leprosy. It is admitted without reserve that filariasis is transmitted by mosquitoes. Corroborative experiments and studies in the development of *filaria nocturna* were made by Low, of Rome, Italy, in 1901. He found active filaria embryos in the thoracic muscles of *Culex territatus* between 12 and 24 hours after this mosquito had fed on a patient suffering from filariasis. In *Culex fasciatus* he found perfected filariæ in the head, neck, and proboscis. Elephantiasis has been transmitted by the mosquito. Its parasite was found in their bodies by the investigations of the Liverpool School of Tropical Medicine in Nigeria, Africa, in 1900.

The *fly* is properly charged with the transmission of many diseases. Nuttall fed the bacillus of the bubonic plague to flies and ascertained that they could convey the infection. Carmichael believes that leprosy is communicated by the same insect. The bacilli of anthrax (malignant pustule) have been found in flies. Grassi, of Milan, and, much later, Beale, of Calcutta, demonstrated that cholera was a fly-borne disease, and the germs of typhoid fever are carried by the same insect which swarms over fæcal evacuations. Hervieux, of France, ascribed the spread of smallpox to flies. Simond's investigations, carried on during 1899, together with the results obtained by Yersin, favor the theory of the spread of plague from rat to man by the *flea*. Bœck charges the *itch mite* (q.v.) with being an active agent in the spread of leprosy. Smith and Kilbourne established the fact that the *tick* propagates Texas fever among sheep.

Kobler's experiments led him to accuse the *ant* of carrying the infection of bubonic plague to man. From a sheep that died of anthrax in Cyprus in 1901, ants transmitted the fatal disease to a woman in a cottage near by. *Roaches* are believed to carry typhoid fever in the same way as do flies. The *bedbug* is responsible for the spread of leprosy (Carmichael), cancer (Moran), tuberculosis (Denevre), and relapsing fever (Titkin). Bubonic plague (q.v.) is carried by the rat flea, and sleeping sickness (q.v.) by two species of the tsetse fly (*Glossina palpalis* and *G. morsitans*). Dutton has proved that the house flea (*Pulex irritans*), the bedbug, the American cockroach (*Periplaneta americana*), and fruit fly may and often do transfer typhoid fever and other diseases. Typhus fever (q.v.) is now believed to be carried by the louse.

Insects, it is seen, propagate diseases in two ways: (1) as carriers, bringing infection to a wound or to food and drink on the surface of their bodies, after crawling over an infected spot, or bringing the infection in the form of bacilli in their intestinal tracts; (2) as intermediary hosts, bringing to the victim the infection in the fluids of their bodies and inflicting wounds through which the poison is introduced into the body of the victim. The mosquito is a true intermediary host. Flies are examples of carriers. Coplin, of Philadelphia, experimenting in the line of the researches of Sangres, caused roaches, flies, and bedbugs to walk over

cultures of various disease germs and then to walk over sterile agar plates, many hours later, having been kept in the meantime in large jars, under as natural conditions as possible. Examinations of the agar plates made subsequently showed active cultures of the various bacilli of infection. The feet, the ventral portion of the body, and the wings of insects carry infection and plant the disease organisms in rows and small colonies throughout the surface of the sterile plates. Forty-eight hours of continuous infectivity was shown in the case of many disease germs thus transmitted. In one case the typhoid bacilli carried on the body of a roach retained their virulence for 96 hours.

But one germicide has proved of avail in disinfecting bacteria-laden material, and this is formaldehyde. The great difficulty in rendering harmless the insect carrier of disease is easily appreciated, and the only effective way of dealing with such carriers is to destroy them, their hosts, and breeding places.

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INSID'IOUS FLOWER BUG. A minute heteropterous insect (*Triphleps insidiosus*) common in the United States. It belongs to the family Anthocoridæ, closely related to the bedbug family (Cimicidæ), is black with yellow-tipped wings, and is often found in flowers. It is predatory in its habits, feeding upon other insects, is a voracious foe of plant lice, lace bugs, and other minute creatures, and an important enemy of the grapevine phylloxera.

INSIG'NIA, MILITARY. See MILITARY INSIGNIA.

IN'SOLA'TION. See HEAT STROKE.

INSOL'VENCY (from *insolvent*, from *in-*, not + *solvent*, from Lat. *solvere*, to solve, relax, from *se-*, apart + *luere*, Gk. λύειν, *lyein*, to loose). As a legal term, the legal status (1) of any one who cannot pay his debts as they mature; or (2) of one who has been brought within the jurisdiction of the insolvency laws. The earliest insolvency statute in England is c. 20 of 22 and 23 Car. II, passed in 1670. Its preamble recites: "Forasmuch as very many persons now detained in prison, are miserably impoverished, either by reason of the late unhappy time, the sad and dreadful fire, their own misfortunes, or otherwise, so as they are totally disabled to give any satisfaction to their creditors, and so become, without advantage to any, a charge and burden to the kingdom, and by noisomeness (inseparably incident to extreme poverty) may become the occasion of pestilence and contagious diseases, to the great prejudice of the kingdom." It is apparent from this preamble that the cruel fiction that a person who failed to pay a judgment debt was guilty of a breach of the peace, and the inhuman practice, resulting therefrom, of arresting and imprisoning the debtor, had worked badly and threatened to produce a pestilence. Hence parliamentary interference, making provision for debtors' securing release from "durance vile," upon surrendering any remnant of property they might have and making an oath to their poverty and their honesty. This was the beginning of remedial legislation, which within the last century has resulted in abolishing imprisonment for honestly contracted debts.

From 1670 to 1861 insolvency statutes, insolvency proceedings, and insolvency courts were entirely distinct from *bankruptcy* (q.v.) statutes, proceedings, and courts. The leading features of English bankruptcy laws were: (1) that they applied to traders only; (2) that proceedings under them were instituted by creditors for the compulsory distribution of the debtor's assets; (3) that such proceedings resulted in the discharge of the honest bankrupt from his debts. On the other hand, insolvency statutes (1) applied to all debtors; (2) proceedings under them were voluntary, i.e., were instituted by the debtor; (3) they might result in discharging the insolvent from jail, but they left his future acquisitions liable for old debts.

In 1861 the bankruptcy statutes were extended to include nontraders, and insolvency proceedings were abolished. Since that date insolvency, as distinguished from bankruptcy, means that a man has ceased or is unable to pay his debts as they come due. In the United States the sharp distinction between the two terms which existed in England until 1861 has never been sanctioned by either legislative or judicial usage. Speaking in general terms, we may say that the term "bankruptcy" has been restricted to proceedings had under the several bankruptcy acts passed by Congress and to the status of the debtor who took advantage of those acts, while the term "insolvency" describes the condition of a person who is unable to pay his debts or one who has come under the operation of the State statutes relating to such persons. A third use of the term "insolvent" to describe one whose entire estate taken together is not sufficient to discharge his indebtedness appears in the present United States Bankruptcy Act.

Even prior to the Revolution the Colonies were accustomed to legislate for the relief of debtors; but their statutes, although providing at times for the discharge of the insolvent from all his debts, after the manner of bankruptcy statutes in the mother country, were called insolvency statutes. After the adoption of the Federal Constitution, with its grant of power to Congress to establish uniform laws on the subject of bankruptcies, it was natural that the Colonial nomenclature should be retained by the States, even when adopting comprehensive bankruptcy statutes, such as have existed for many years in a number of the States. These laws were not abolished by the Federal Statute of 1898; but their operation, so far as it conflicts with that of the Federal law, is suspended.

State statutes relating to insolvency have

been very divergent and from some points of view very unsatisfactory. They may be divided roughly into five classes, although in some States statutes falling within two or more of these classes will be found: (1) simple insolvency laws; (2) statutes regulating general assignments for the benefit of creditors; (3) those providing for the distribution of the estates of insolvents for their discharge from debts, in voluntary proceedings only; (4) those providing for discharge from debts under general assignments; (5) true bankruptcy statutes, applying to all debtors and providing for voluntary and involuntary proceedings. As the States are prohibited from passing any law impairing the obligation of contracts, and as, therefore, State legislation cannot operate to discharge a debtor from liabilities to creditors outside the State, without their consent, such legislation can never perform the functions of a Federal bankruptcy law. Consult: J. L. Bishop, *Treatise on the Law Relating to Insolvent Debtors* (New York, 1895); E. C. Brandenburg, *Law of Bankruptcy* (3d ed., Chicago, 1903); S. W. Jones, *Treatise on Law of Insolvent and Failing Corporations* (Kansas City, 1908). See BANKRUPTCY; DEBTOR.

INSOM'NIA (Lat., sleeplessness), or SLEEPLESSNESS. A condition caused by cerebral excitation, mental or physical exhaustion, toxic conditions (as from alcohol or from disordered digestion), grief, etc. It frequently accompanies febrile conditions. It is best treated by attacking and removing the cause, if this can be ascertained. Hygienic measures, as hot baths, massage, ingesting hot food, applying heat to the extremities, ventilating the sleeping apartment, etc., should be tried before resorting to drugs to overcome the condition. See HYPNOTICS; SLEEP.

INSPEC'TION (Lat. *inspectio*, from *inspicere*, to look in, from *in*, in + *specere*, to look; connected with Gk. *σκέπτεσθαι*, *skeptesthai*, Skt. *spaś*, *paś*, to look, OHG. *spehōn*, Ger. *spähen*, to spy). Military inspections in the United States army include every branch of military affairs. They may be divided into six general classes: 1. The *ceremony of inspection*, or simply "inspection," by which is meant the formal assembling of troops as prescribed in the drill regulations of the arm of the service to be inspected. Such inspections include a detailed examination of the arms, equipments, animals, and of the general appearance of the individuals and units composing the command. These inspections are usually made weekly and monthly by commanding officers of organizations and at irregular intervals, usually yearly, by officers of the inspector general's department. 2. *Annual tactical inspections* are made by brigade and division commanders, assisted by inspectors general of the arm to be inspected whenever practicable. Such inspections are made under field conditions and have for their object the determination of the preparedness of organizations for war service and the capacity of officers for the exercise, in the field, of command appropriate to their rank. Subjects included are camping, sanitation, marching capacity, cooking, the supply service, field fortification, firing problems, and field orders issued in the solution of a tactical problem simulating war. 3. *Annual garrison inspections* are conducted by officers of the inspector general's department during the period of garrison training, to determine the state of discipline and efficiency attained in garrison training and administration. This inspection includes an investigation of the money accounts of all disbursing officers. 4. *Special inspections* are made by inspectors general, of soldiers' homes, armories, arsenals, military academy and other service schools, depots, general hospitals, recruiting stations, prisons, cemeteries, money accounts of the War Department, army transports, etc. 5. *Militia inspections* of the organized militia are made by regular officers detailed for that duty by the department commander. 6. *Inspections of military civilian schools and colleges* at which a regular officer is on duty are made by selected officers of the general staff of the army.

INSPEC'TOR GENERAL. A military officer charged with the duties and responsibilities of inspection. In the United States army the title is officially applied to *all* the officers of the inspector general's department, no matter what their grade. The organization in 1914 included the inspector general of the army, with the rank of brigadier general, three inspectors general with the rank of colonel, four with the rank of lieutenant colonel, and nine with the rank of major. In addition to these there were four acting inspectors general of the following rank: one colonel, one lieutenant colonel, and two majors. Total, 21 inspectors general, including the inspector general of the army. All but three of the officers mentioned are detailed from the line of the army for a period of four years. Upon the retirement of the three permanent officers the entire department will be composed of detailed line officers. Normally inspections are made by officers of the arm of the service being inspected. Officers of this department are responsible for the proper inspection of troops, including their strength, efficiency, and equipment; stations; accounts of disbursing officers; irregularities or misconduct of officers; attempts to defraud the government; all matters pertaining to the supervision of the accounts of receipts and expenditures in connection with the National Home for Disabled Volunteer Soldiers; all depots, armories, arsenals, and public works of every kind under charge of officers of the army, except works of engineering conducted under the direction of the Secretary of War, and supervision of the chief of engineers. Inspections of engineering works cover the business and military administration and methods and do not include the scientific or technical character of the work. Inspectors general and acting inspectors general are required, in addition to the above duties, to make such suggestions as may appear to them practicable for the correction of any defect that may come under their observation in any command to which they may be assigned. When assigned to a military command, an inspector general is under the immediate direction of its commanding general; when not so assigned, he is under the orders of the War Department. They are also expected to designate from time to time the articles which in their opinion should be procured and kept for sale by the quartermaster corps to officers and enlisted men. The annual inspection of the Soldiers' Home in the District of Columbia is made by the inspector general of the army in person. In the English army there are an inspector general of the home forces and an inspector general of the oversea forces. The former officer

has under him an inspector of cavalry, of horse and field artillery, of garrison artillery, of engineers, and of infantry. He has also under him general officers commanding territorial districts, and other commands, who personally or through the officers of their staff inspect the component parts of their commands. In Germany, France, and continental Europe generally, the duties of the inspector general's department are carried out by the general staff of the army or of a territorial district. For further particulars, see ARMY ORGANIZATION; INSPECTION.

INSPECTORSHIP DEED. In English law, a deed executed between an insolvent person and his creditors, whereby they accept a part payment and allow the insolvent debtor to carry on the business under their supervision with a view to further payments. It derives its name from the fact that certain of the creditors named in the deed, as inspectors, assume the duty of supervising and controlling the subsequent management of the business by the debtor. The practice is not common in the United States. See INSOLVENCY.

IN'SPIRA'TION (Lat. *inspiratio*, from *inspirare*, to inspire, from *in*, in + *spirare*, to breathe). A theological term used to denote the divine action upon men by which the Bible has been produced. In its most general use it designates the whole of this process; but often a distinction is made between revelation and inspiration, according to which *revelation* denotes that divine activity by which the knowledge of the truth is supernaturally conveyed to the minds of chosen men, and *inspiration* that divine guidance by which the same men were qualified to write the existing Bible. Employed in the latter sense, the inspiration of the Scriptures signifies a special divine authority in the books of Scripture as depositories of religious truth. Properly inspiration (breathing in) is a personal term and applies to the influence of one person upon another. Divine inspiration, the influence of God upon man, is a term of far wider application than merely to the writers of the Bible. Its use in regard to a book, like the Bible, is secondary. It means that the writers were so divinely guided that they wrote words of special religious significance. The doctrine is not limited to the biblical religions. Brahmanism believed in the inspiration of the Vedas; Zoroastrianism, of the Avesta; and Mohammedanism, of the Koran—the last holding a more extreme theory than any church has ever propounded regarding the Bible.

The beginning of biblical inspiration was in the feeling of the prophets that God was speaking through them. From the writings of the prophets the conception extended to other books sacred for any reason—to the Psalms, used in worship, and at last to the religious histories of the nation and books of religious wisdom. Before the rise of Christianity the method of inspiration was already conceived in a mechanical way, as though man were only the passive recipient of a supernatural message from God. Christianity inherited its idea from Judaism. Tertullian and Athenagoras speak of the prophets as being lutes or lyres under the hand of God. The idea that inspiration preserved the Scriptures from all error is found in Augustine; but Chrysostom, Jerome, Theodore of Mopsuestia, and others recognize human elements in Scripture. Even in the time of the Reformation there was little discussion of this subject. In the writings of Calvin and Luther passages representing contradictory views can be found; but while both held to the fact of inspiration, Calvin recognized, and Luther emphasized, the human elements in the Bible. Neither held that inspiration involved perfect historical accuracy; nor has any Catholic or Protestant creed, except the Second Helvetic (see CREEDS AND CONFESSIONS), so affirmed. Various theories have been held by individual theologians.

1. The theory of *plenary* or *verbal* inspiration is that the whole letter of Scripture is inspired, that the words were immediately dictated by the Holy Spirit and are literally the words of God and not of man. The several writers of Scripture were nothing more than the penmen of the Divine Spirit. The inspired document is throughout faultless, equally in its form and in its essence, in its spirit and its letter. It admits of no gradation; all is equally divine, and therefore equally accurate, whether it relate to some ordinary fact or to some truth of the supernatural life. Those who hold this view do so on the a priori ground of necessity; such infallibility is held to be implied in the very idea of a revelation of the divine will; while those passages which seem inconsistent with the facts of science or of history, or with other parts of the Bible itself, admit, it is maintained, of satisfactory explanation. It is objected to this theory that it does not take account of the facts of the Bible, which show no such perfection; and that it would need to add an infallible interpretation, to insure the perfect knowledge of truth.

2. The theory of *dynamic* inspiration is that the writers of the Bible were so filled with the divine power that, while perfectly free in the employment of all their faculties, they were preserved from all error in conveying the truth which the Bible was written to convey, viz., that pertaining to the way of salvation. This theory has numerous forms, and any statement of it would fail to satisfy many who adopt its general conception of inspiration. Its most important form may be summarized in the definition, the inworking power of God preserved the writers of the Bible from all error in matters of faith and morals, but not necessarily from all error in matters of history and science. This theory attempts to meet the facts of the biblical narratives, as seen by modern biblical study. It is found that the Gospels in their accounts of the same event differ in various points. Not only is there an entire ignoring of scientific facts, but often statements which are inconsistent with them. The use of the Old Testament in the New is inaccurate and often violates principles of exegesis which modern scholars would feel compelled to observe. None of these errors, however, affect the main current of the biblical doctrine. They show that men wrote the Bible acting naturally as men act and under human limitations, but they do not impair the value of the Bible for its great purpose of bringing men into harmony with God.

3. A third theory is that of the school of Ritschl. It may be said to deny inspiration as a separate operation and lay all the emphasis upon revelation. We must maintain the supernatural communication of divine knowledge to men, it is said; but after they have this knowledge, they are left to communicate it according to their natural abilities, and the books they write are committed to the stream of history

to be borne where the providence of God may guide them, as all other books are. Thus, the human element in the books is large, and no infallibility of any sort, even in matters of faith and morals, is to be affirmed; but the truth of God is there as in no other book in the world. The evidence for the element of revelation in the Scriptures lies in the fact that the highest ideas which the mind of man has conceived have come from the Bible alone.

4. Another theory is based upon the facts of evolution as seen in history. It dispenses with not only inspiration but even special revelation. The causes operating in religion are, like all the causes recognized by evolution, immanent. It is not the supernatural enlightenment of chosen minds which we find here, but that enlightenment which comes in the course of all development under the operation of the laws of variation and the operation of environment, and which has given us the steam engine and other instruments of progressive civilization. In this human progress lies the real divine revelation. Thus, the Bible is a purely human book, but it is the greatest of all human books and should retain its place at the foundation of our religious structure.

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INSPIRED TINKER, The. A name sometimes applied to John Bunyan.

IN'STALLA'TION (Lat. *installatio,* from *installare,* to install, from *in,* in + *stallum,* place, from OHG. *stal,* Ger. *Stall,* AS. *steall,* Eng. *stall;* connected with Gk. *στέλλειν, stellein,* to send, and ultimately with Lat. *stare,* Gk. *ἱστάναι, histanai,* Skt. *sthā,* OHG. *stēn,* Ger. *stehen,* to stand). In the Anglican church, the ceremonial act or process by which a person presented and legally confirmed in a benefice is formally put into possession of his office, and by which he is fully empowered not only to exercise its functions, but to enjoy its honors and emoluments. The ceremonial form, as well as the name, differs according to the office which is conferred, as "enthronization" for a bishop, "induction" for a rector, etc. "Installation" properly regards the office of a canon or prebendary. (See INDUCTION.) In the nonepiscopal churches installation is used for the ceremony by which a pastor elect is formally placed in his office.

IN'STANCE, COURT OF. The branch of the English Court of Admiralty which exercised all the jurisdiction of that court in matters triable under the ordinary or municipal law (q.v.). This included all classes of cases to which the jurisdiction of Admiralty extended, except "prize" cases, which involved international law, and for the trial of which the court required a special commission authorizing it to act as a prize court. The entire jurisdiction of the Admiralty Court was transferred to the High Court of Justice by the Judicature Act (q.v.) in 1873. The above distinction in the exercise of jurisdiction has never prevailed in the United States. However, the term is still employed in England and the United States to describe the kind of jurisdiction exercised in cases involving exclusively the municipal law. See ADMIRALTY; MARITIME LAW; PRIZE COURTS.

IN'STAURA'TIO MAGNA (Lat., Great Renewing). A great work on the reorganization of the sciences, by Francis Bacon (q.v.). Almost all his philosophical writings actually form part of this vast scheme, or were intended to be included in it.

INSTERBURG, ĭn'stĕr-bŭrk. A town of Prussia, in the Province of East Prussia, situated on the left bank of the Angerapp, about 60 miles east of Königsberg (Map: Germany, J 1). It has several old churches with fine wood carving, a castle, a Gymnasium, a museum of antiquities, and a seminary for female teachers. It manufactures linen, machinery, stoves, cement, fertilizers, and shoes. Raising horses is an important industry. Insterburg had its origin in a castle of the Teutonic Knights built in the fourteenth century. Pop., 1900, 27,287; 1910, 31,627.

IN'STINCT (Lat. *instinctus,* impulse, from *instinguere,* to impel, from *in,* in + **stinguere,* to prick; connected with Goth. *stiggan,* AS. *stingan,* to push). "Instinct is one of those historical concepts which has been overgrown by meaning. It is so incrusted with traditional significance that it is almost impossible to use it for the exact descriptive purposes of science" (Yerkes). The greatest source of confusion lies in the use of the term in two distinct disciplines. Instinct is subject matter for both biology and psychology, and the successful synthesis of the meanings derived from the two contexts can hardly be expected. In general, instinct may be said to be the characteristic by virtue of which a living organism acts in accordance with a fixed mode of behavior that is determined prior to the lifetime of the individual. Thus, instinct is simply inherited behavior and is opposed to habits (see HABIT), which are acquired during the individual's life and may be based on its experience. Instinctive behavior is the sum total of inherited movements, but instinctive action implies the action consciousness and is a narrower term in that it is restricted to conscious instinctive movements, and a broader term in that it involves the psychological aspect of the action. Psychologically, the term "instinct" can refer only to the action consciousness involved (see ACTION).

Instinctive Movements. Biologically considered, any movement of which the form is inherited may be called instinctive. Thus, instinct includes both the unconscious reflex, like the wink or even the heartbeat, and also the more complicated conscious movements, like

nest building in the bird or the behavior expressive of the maternal instinct in the human being. The instinctive character of a movement as inherited may be attested by any one of three marks.

1. Behavior performed in the same general way by all members of the species is instinctive. Thus, we find spiders spinning webs and birds building nests in much the same way for the given species, but with slight differences according to individual or external conditions.

2. Behavior is instinctive which meets a need of an individual who can have had no previous experience of the need or of its mode of satisfaction. The solitary wasp places within the cavity that it has made for its egg a particular kind of prey which subsequently serves as food for the larva, and seals both food and egg in the cavity. Then it leaves, never to return. The experience of the wasp cannot explain its anticipation of the need of the larva for food.

3. Behavior is instinctive which meets a racial need that is of frequent occurrence in the species, though it may not constitute a need for the particular individual. Spiders sometimes steady their webs by suspending a pebble from the centre, and a spider may take this course for the first time when there is no especial need for the additional stress. In the individual case, the instinct may even be at fault and may result in harm. The creature which, surprised by the hunter, remains motionless may not blot itself out against the background, but furnish an easy mark.

In a narrower biological usage, instinct is not defined merely as inherited movements, but is separated from the simpler innate movements —the tropisms, differential sensitivity, and, in the complex organisms, the reflexes. (See Animal Psychology; Tropism.) The instinct represents a complication of the tropic reactions, while it is further often asserted to involve consciousness. This tendency to shift to a psychological criterion is doubtless responsible, not only for much confusion, but also, to a great extent, for the attempt to limit the concept of instinct. A distinction can, however, be made on purely biological grounds.

1. In the first place, from this point of view, the instinctive movement, unlike the reflex, is that which involves the whole organism. The animal crouches in fear, advances in anger, disports itself in play. The reflex affects a single organ or member of the body.

2. The widespread nature of the reaction assures us that it must be *complicated*. Moreover, the stimulus is complex. As in the emotion (q.v.), the animal reacts to a total situation. The movements expressive of parental love may be aroused by the call of one's own child in distress; the same sounds from a phonograph will not bring out the response.

3. Finally, instinctive behavior is characterized by *variability*. It is subject to inhibition or reënforcement in the same manner as are other determinations, and it thus combines with other determining tendencies, innate and acquired, in the formation of habits. We are told that certain instinctive movements in the chick occur earlier "if imitation be not excluded." If this is true, it is probable that one instinctive tendency is facilitated by another. The instinctive behavior is touched off, not only by its proper stimulus, but also by other like stimuli, which involve undoubtedly similar nervous excitations. Instinctive behavior is also subject to specialization; it is liable to become "systematically organized about certain objects or ideas," so that a very specific stimulus replaces the more general one. Lastly, the instinctive movements are often transitory, appearing only at a definite period in the lifetime of the individual. Insects in the larval stage exhibit a whole group of instincts which are later replaced by an entirely different set, and in man the instincts of play and of sexual love follow a course of growth and decay in the individual lifetime.

Definite, inherited forms of response, adapted to the needs of the species, appear in all animal forms, and in this sense instinct may be said to be coextensive with animal life. Instinct, as a widespread, complicated, and variable movement, does not clearly occur in the animal scale below the earthworm. The highest development of instinct is found in the very complex behavior of the social insects. (See Animal Psychology; Ant; Bee.) Among the vertebrates instinctive movements are numerous. In chicks, for example, we may note the following: pecking, walking, scratching body, preening down and feathers, stretching up and flapping wings, scratching the earth, squatting down and dusting body, scattering and crouching when alarmed, making the danger "churr." In man the instincts are very numerous, although they are less highly developed than in the insects, or at least less potent because of the greater plasticity of his nervous system. They include, on the one hand, movements which approximate the reflex: coughing, smiling, sneezing, swallowing, beating time to music; in the infant: sucking, biting, creeping, crying. There are, on the other hand, large general tendencies: the tendency which makes us take the world of perception as a world of real things; the empathic tendency, which makes us humanize our surroundings; the tendencies to imitate, to believe, to dichotomize. Certain movement complexes expressive of the emotions (see Expression, Expressive Movements) must also be considered instinctive.

The Instinctive Consciousness. Instinctive action implies an action consciousness, and it is to this consciousness that we must look for a psychological description of instinct. The instinctive action is in general like any other action, and its consciousness is of the form of every action consciousness. It is, however, primarily an organic consciousness. The widespread bodily reaction finds its echo in a mass of organic sensation. In this way instinct resembles emotion. It is apt to be highly affectively toned, as is usual with those consciousnesses which anticipate the satisfaction of an organic need. There is, in fact, no sharp psychological line of division between the instinct and the emotion. Fear, love, jealousy, rivalry, curiosity, pugnacity, repulsion, self-abasement, and so on have been called "instincts proper," but the names indicate emotive complexes equally well. If, in order to be psychological, we neglect the innate character of the determining tendency of the instinct, the instinct and the emotion appear in many cases to be practically identical. Both are predetermined consciousnesses, affectively toned and organic, set off by a total situation and following a given course.

The instinctive action, like impulsive action, may change upon repetition, degenerating into a "psychomotor" form or becoming enriched by association. The smile is an example of the former, the maternal instinct of the latter tendency.

A knowledge of the instinctive consciousness gives us a clew to the mental lives of those animals which are principally governed by instinct—the insects. In any given consciousness affective processes probably play initially an important rôle; yet we can hardly say that, in the average, these creatures lead highly emotive lives. For if we invoke the principle of analogy to show that the instinctive consciousness in the insect is, like that in man, similar to the emotive, we must also apply the principle still further and admit affective adaptation. The key to the insect consciousness lies, then, rather in the predominance of organic processes. The insect's experience must be a succession of nicely discriminated, complex, organic patterns, with intermittent flashes of true feeling. The insect, we might say, is "body conscious," where man is "object conscious."

Instinct and Intelligence. There is a popular belief that instinct is the peculiar property of the animal world and that in man it is replaced by reason. The animal acts "on instinct," but man "by reason." The distinction is not valid. We have already seen, on the one hand, how great a part is played by instinct in man; on the other hand, if intelligence (q.v.) is constituted by the individual's ability to profit by his own experience, one cannot deny intelligent behavior even to the lowest animal forms.

An attempt is also made to establish a hierarchy of actions. We are told of three grades of "mentality": the reflex action or tropism, the instinctive act, the act of reason. There seems to be little foundation, however, for the belief that intelligent action is in some way superior to instinctive. The one does not necessarily represent higher development than the other. The social insects are further advanced on the instinctive side than is man, who, conversely, represents a greater evolutionary devel opment with respect to intelligence. Of the insects, Yerkes says: "To compare them directly in their mental life with the human being is difficult, for in some respects they are more remarkable than the two-year-old child, while in others they are hopelessly inferior. With reason one might claim that certain of the insects are psychologically superior to man and represent a stage in the evolution of mind which, although strikingly different, is more advanced than our own. Rather we may conclude that the social insects represent the highest development of mind in one direction; and man, the highest development in another direction." It is not even true that intelligence is necessarily more efficient than instinct. The instinctive response to a strange environment may be no more wasteful, no less well adapted, than the intelligent response to a new situation. Instinct implies fixity of the nervous system; intelligence, plasticity. The plastic system, as it undergoes adjustment, is wasteful to the extent to which it is out of adjustment—an intrinsic wastefulness, but a constantly diminishing one. The fixed response eliminates the waste of adjustment, but is constantly inefficient in the degree that it is unsuited to the particular environment.

Some writers believe that in every act instinct and intelligence are present as concurrent factors, separable only by abstraction. For Morgan instinctive behavior is "congenitally determined" and "practically serviceable on the occasion of its first performance." It is not, however, perfect, and is subject to modification by intelligence. Intelligence, he argues, is distinct from instinct with regard to meaning, for the instinctive process in its first occurrence possesses "primary meaning," inherent in its mere succession. In the repetition of a process, on the other hand, there is an anticipation or "preperception" of phases, unrealized as yet, by a revival of the first occurrence—an anticipation which supplies "secondary meaning" and characterizes the behavior as intelligent. A vaguely conscious "preperception" may accompany the first occurrence of the performance; instinct and intelligence may thus occur together from the very first. Myers insists, on the contrary, that instinct and intelligence are merely different aspects of the single entity, "instinct intelligence." Instinct is characterized by mechanism, intelligence by finalism. "Instinct regarded from within becomes intelligence; intelligence regarded from without becomes instinct."

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IN'STITUTE (Lat. *institutum*, regulation, ordinance, from *instituere*, to set up, from *in*, in + *statucre*, to establish, from *stare*, to stand). In the land law of Scotland, the person who is designated in the instrument creating an entail (q.v.), and so "instituted" as the tenant of the entailed estate. The persons in whom the estate thereafter becomes vested by descent are described as substitutes. See ENTAIL; ESTATE; FEE TAIL.

INSTITUTE OF FRANCE. The official name for a group of learned societies in France organized at different times, but having for their object the fostering of some special branch in literature, art, the sciences, or philosophy. At present the Institute comprises five distinct bodies known as (1) Académie Française; (2) Académie des Inscriptions et Belles-Lettres; (3) Académie des Sciences; (4) Académie des Beaux-Arts; (5) Académie des Sciences Morales et Politiques. The first three academies, dating as separate institutions from the seventeenth century, were abolished by the Convention on Aug. 8, 1793. Two years later, under the title of Institut National des Sciences et des Arts, there was established by the Directory an association for the promotion of arts and sciences, which was divided into the three following classes: (1) physical sciences and mathematics; (2)

moral and political sciences; (3) literature and fine arts. In 1803 Napoleon I reorganized the body, dividing it into four classes—mathematical and natural sciences, French language and literature, classical languages and literatures, and fine arts—and giving it subsequently the name of Imperial Institute of France. After the Restoration it was again reorganized (1816) into four academies, comprising the first four bodies enumerated above, to which was added in 1832 the fifth academy, the name of the whole being changed at the same time to Institut de France. The Institute has always enjoyed great prestige, even under the consular and Imperial régime. In his Egyptian campaign Napoleon put, at the top of his proclamations, "Bonaparte, General in Chief, member of the Institute"—"so as to be sure," said he, "to be understood even by the very drum boys."

Each academy in the Institute has its independent government and the free disposition of the funds allotted to it, while an agency and secretaries, the library, and the valuable collections of the Institute are common to the five. Among these collections one of the most important is that of the château of Chantilly, which was presented to the Institute by the Duke d'Aumale in 1886. It comprises a great library and a magnificent art collection. The general fund is managed by a committee of 10 members, two from each academy, under the presidency of the Minister of Public Instruction. The members, of whom there are in addition to the regular members, honorary members, corresponding members, and foreign associates, are all elected by ballot, and the election is confirmed by the public authorities. Each member receives an annual salary of 1500 francs, and the perpetual secretaries are given 6000 francs. An annual meeting is held on October 25, when public announcements are made of the award of important prizes.

1. The Académie Française was founded by Cardinal Richelieu in 1635. The letters patent were granted Jan. 29, 1635, but were not ratified by Parliament before July, 1637. It had its origin in a small group of literary men, who as early as 1626 were accustomed to meet at one another's homes for the purpose of exchanging their views on various topics in literature, art, and science. They met particularly in the home of Valentine Conrart, a rich and learned man. Richelieu, on becoming aware of the existence of this informal society, offered them the royal protection if they would hold their meetings in public; and the society, after much hesitation on the part of the members, was thereupon constituted as the Académie Française. From 1793 to 1816 the Académie Française, as such, did not exist. (See above.) Within two years from the date of its formal authorization the membership of the Academy had risen to 40, at which number it has since remained. The members are popularly spoken of as "immortals." From the original 40 only a few have come down to us in literature: Balzac, J. Guez; Chapelain; Gomberville; Vaugelas; Voiture. Richelieu wished the Academy to be the final authority on all questions pertaining to language and literature. As early as 1637 the Academy had to pass formal literary judgment. In 1636 Corneille had written the epoch-making *Cid*. Immediately the quarrel of the *Cid* arose; the chief critic of Corneille was Scudéry, who was supported by Richelieu. The quarrel waxed warm, and finally, at Richelieu's command, the Academy appointed a committee of three to thresh out the whole question. After some delay a report was drawn up by Chapelain and submitted to Richelieu. The manuscript underwent several revisions and was finally published in 1638 under the title of *Sentiments de l'Académie sur le Cid*. The special function, however, of the organization was the improvement and conservation of the French language. For this purpose, at the suggestion of Chapelain, work was begun on a dictionary of the French language, which, however, did not see the light till 1694. (There have been seven editions of the dictionary—1694, 1718, 1740, 1762, 1798, 1835, 1878.) The original purpose of the Academy has not been forgotten. At the present day its chief business is still the revision of the *Dictionnaire de l'Académie Française;* but as a matter of fact in the intellectual world of France the French Academy holds a much higher rank than that of a mere lexicographical bureau. From an early date admission to the French Academy was sought as an honor, and for more than a century an election to a seat among the 40 "immortals" has been considered as the crowning glory to a successful literary career. The manner of election to the Academy has been changed. To-day the candidate who thinks that he has a chance presents his candidacy, and after an obligatory visit to all the members (called *visite académique*) he is nominated, and if elected it is by "absolute majority." Often the election is deferred when three ballots have shown no election; Casimir Delavigne, e.g., was elected only at the third attempt. At the general meeting, open to the public, the candidate about to become "immortal" is presented by a member of the Academy, who has been named his sponsor, or parrain. In his speech the sponsor sometimes, in a clever manner, criticizes rather harshly the prospective academician. When the candidate has undergone this baptism of eloquence with all the good grace at his command, his duty is presumably to eulogize and sometimes to criticize with veiled modesty his predecessor who sat in the "armchair" that he is about to occupy. By tradition a vacancy is filled from the ranks of the particular field that the late incumbent occupied. The Academy has laid itself open to reproach for a certain pettiness of spirit in shutting its doors on some of the greatest men in the history of French literature. The critics of the Academy have taken keen pleasure in counting the obscure names of some members. However, if one takes the list as a whole, it does seem as though membership has been representative. Those men upon whom literary criticism has put its stamp of approval and who have not become academicians are said to sit in the forty-first "armchair." Thus, it is that in the seventeenth century Descartes, Molière, Pascal, Scarron, were not members, but we find Boileau, Corneille, Racine, and La Fontaine. In the eighteenth century we do not find Diderot, Condillac, Beaumarchais, or Rousseau; fortunately we see Montesquieu, Voltaire, D'Alembert, and Marmontel. It is harder to explain why we do not see the name of the only really great poet perhaps of that century, André Chénier. In the nineteenth century we find Lamartine, Hugo, Vigny, Cousin, Villemain, Sainte-Beuve, Guizot, Thiers, Lacordaire, Montalembert, Cuvier, and other important names. We do not find, however, Béranger, Gautier, Comte,

Stendhal, Balzac, Daudet, Maupassant, Goncourt, or Verlaine. The influence of the Academy for good or bad has been for a long time a mooted question. It has been accused of impoverishing the French language. There is some truth in that accusation, but the Academy has maintained a certain distinction of expression and purity of form which have been invaluable. Besides its work on the dictionary, the Academy has been mainly occupied with the awarding of prizes for literary competitions. There are as many as 23 prizes a year, of which 17 are *prix littéraires* and 6 *prix de vertu*. Among the more important prizes are one of 2000 francs, awarded to the best poem or essay on a given subject; the Montyon prize of 22,463 francs, given as a reward for the most heroic deed done by a native of France; and one of 21,940 francs, given to a native of France who has written and published a work having the most valuable application to the arts; the Gobert prize for the most important work on the history of France, as well as a large number of other prizes. Its annual public meeting is held in November. See ACADEMY.

2. The Académie des Inscriptions et Belles-Lettres was founded in 1663, by Colbert, and has 40 ordinary, 10 honorary, and 50 corresponding members, and 8 foreign associates. It has for its principal objects the study of medals, inscriptions, monuments, antiquities, and ancient and Oriental languages. It has various prizes at its disposal and publishes *Mémoires*. Its annual public meeting is held in November.

3. The Académie des Sciences was founded in 1666, by Colbert, and has 66 ordinary, 10 honorary, and 106 corresponding members, and 8 foreign associates. Its prizes include an annual sum of 3000 francs, given alternately, for the best discussion of a subject in mathematics and physics; the Montyon prizes, six in number, having an annual value of 44,845 francs; the Laland prize, given annually, for astronomical work; and several others. This Academy publishes *Mémoires*. Its annual public meeting is held in December.

4. The Académie des Beaux-Arts was founded by Mazarin in 1648, and the subjects of painting and sculpture, music, and architecture were added respectively in 1664, 1666, and 1671. It has 40 ordinary, 10 honorary, 10 foreign associates, and 40 corresponding members. Besides the prizes in painting, sculpture, architecture, engraving, and music, awarded to the pupils of the Ecole des Beaux-Arts and the Conservatoire de Musique, it has under its charge the publication of the *Dictionnaire général des beaux-arts*. It also conducts the examination for the Prix de Rome in the various arts. Its annual public meeting is held in October. See ECOLE DES BEAUX-ARTS.

5. The Académie des Sciences Morales et Politiques was restored in 1832, through the appeal of Guizot to King Louis Philippe, after having been suppressed in 1803, and has 40 ordinary, 10 honorary, and 60 corresponding members, and 8 foreign associates; it is divided into five sections and has for its chief purpose the discussion of mental philosophy, law and jurisprudence, political economy and statistics, general and philosophical history, and politics, administration, and finance. It has the Baujour, Faucher, Halphen, Bordin, and other prizes at its distribution. It publishes *Mémoires*, and its annual public meeting is held in December.

The academies forming the Institute of France meet regularly in the Mazarin Palace, which is on the left bank of the Seine, at the Quai de Conti opposite the Louvre, and their meetings are attended with much ceremony. From 1795 to 1806 the meetings were held in the Louvre Palace. Since 1806 they have been held in the present quarters. Consult De Franqueville, *Le premier siècle de l'Institut de France* (2 vols., Paris, 1895).

INSTITUTES, LEGAL. An ancient term derived from Roman usage for a treatise, usually but not necessarily, of a comprehensive character. Among the most famous nonlegal works bearing that title is the reformer Calvin's *Institutes of the Christian Religion*, published in 1536. Among the legal treatises known as Institutes the most celebrated are the *Institutes* of Gaius, probably the earliest commentary on Roman law, written in the second century of the Christian era, which was lost for many centuries but recovered in 1816; the *Institutes* of Justinian, a comprehensive treatise on the civil law prepared for the use of law students; and Coke's *Institutes*, in four volumes, comprising an elaborate commentary on Littleton's *Tenures* (known as "Coke upon Littleton"), commentaries on the more important of the English statutes, and a treatise on the English criminal law. The term is little used in modern times except in Scotland, where legal treatises are still published under the title of Institutes, as Erskine's *Institute of the Laws of Scotland*. See CIVIL LAW; GAIUS; JUSTINIAN; COKE, SIR EDWARD; COMMENTARIES.

IN'STITU'TIONAL CHURCH, THE. A cross-sectional split among the 150 sects in the United States has developed ritualistic and institutional tendencies in the churches. The ritualistic churches lay emphasis upon the efficacy of certain beliefs, forms, sacraments, and a limitation of functions, and appeal to the economically superior classes. The institutional church, on the other hand, demands activity, apparent results, the amelioration of the outward as well as of the inward life of its members; it reaches out for the reclaimables in the social-debtor class, and it is identified with social rather than distinctly religious movements. The name "institutional church" was first used by President Tucker, of Dartmouth College, and applied to Berkeley Temple, Boston. Ever since 1840 some of the English churches have been taking on new functions, but the new church movement in the United States dates back hardly to 1880, and as a recognized movement it is scarcely older than 1890. It had its origin in the same impulses which created the university settlement, Christian socialism, and the Salvation Army—a feeling that the churches were not reaching the masses, and that each community had much work to be accomplished which could be done by the Church. The object is distinctly humanitarian. The institutional church becomes the centre and inspiration of the daily lives of its members, to whom it ministers according to their immediate needs, and has, as a result, reabsorbed certain functions (educational, medical, charitable) which had been assumed by the state and other organizations since the Roman Catholic church ceased to be the universal Church.

The characteristics of the institutional church are, in general, an adoption of secular methods. The platform of the Institutional Church League

states that it "stands for open church doors for every day and all the day, free seats, a plurality of Christian workers, the personal activity of all Church members, and a ministry to all the community through educational, reformatory, and philanthropic channels." The organization of such churches is very complete. The numerous committees have definite duties, such as welcoming strangers, house-to-house canvassing, visiting members, and superintending work of different kinds. The finances are placed in competent hands and managed upon business principles. The ushers for church services are carefully chosen. Subpastors, deaconesses, sisters, and nurses carry on certain features of the work. The distinctly religious work consists of attractive services; music, frequently by large choirs or choruses; well-organized Sunday schools; pleasant Sunday afternoons; prayer meetings with special features; open-air meetings in summer; and the encouragement of helpful associations, such as men's Sunday evening meetings, the brotherhoods of St. Andrew and of Andrew and Philip, and Christian Endeavor societies. The secular work aims at educational, social, and physical improvement. Some churches have established special schools and colleges, which give an opportunity to obtain or to supplement a rudimentary education; industrial classes are maintained; lectures, illustrated and university extension, are given; literary and debating clubs are encouraged; and provision is made for libraries, reading rooms, and recreation rooms, with billiards, bowling alleys, and games; gymnasiums, swimming pools, military drills, and athletic teams. The philanthropic work includes employment bureaus, aid to worthy poor, wood yards, dispensaries, hospitals, crêches, penny provident funds, and personal efforts to reach the vicious or intemperate. When funds are sufficient, special buildings have been constructed.

The denominations especially engaged in this work are the Episcopal, Congregational, and Baptist, although there are a number of Presbyterian, Roman Catholic, Unitarian, and Methodist churches which make use of the same methods. Some of the prominent institutional churches are: Ruggles Street Baptist and Parker Memorial, of Boston; Fourth Congregational Church, of Hartford; St. George's, St. Paul's, St. Bartholomew's, and Judson Memorial, of New York; Tabernacle, or People's Palace, of Jersey City; Grace Church (The Temple) and Bethany Church, of Philadelphia; Pilgrim Church, of Cleveland; Ninth Street Church, of Cincinnati; Plymouth Tabernacle, Institute, and People's College, of Detroit; People's Church, of St. Paul; the Tabernacle, of Denver; and, one of the oldest of all, Plymouth Church, of Indianapolis.

The Open and Institutional Church League was organized in New York in 1894. The League has given aid and counsel by correspondence; it published for three years a magazine, the *Open Church*, and it has held conventions in various cities. At present the League is doing little active work; but its secretary, in connection with the Federation of Churches in New York, has organized the National Federation of Churches and Christian Workers, which, in 1905, called a conference of the principal American Protestant churches to formulate a plan for united action upon matters of common interest, among them the prosecution of social work. The principles of the League have taken a strong hold on Church life, and many churches are adopting institutional methods.

Bibliography. Thwing, *The Working Church* (New York, 1888); Woods, *English Social Movements* (ib., 1891); Josiah Strong, *New Era* (ib., 1893); Mead, *Modern Methods in Church Work* (ib., 1897); A. R. Burr, *Russell H. Conwell, Founder of Institutional Church in America* (Philadelphia, 1905); Hodges and Reichert, *Administration of an Institutional Church* (New York, 1906); Rauschenbusch, *Christianity and the Social Crisis* (ib., 1907); id., *Christianizing the Social Order* (ib., 1912); Thwing, *The Working Church* (ib., 1913); Ede, *The Clergy and Social Service* (Milwaukee, 1913); Forbes, *Social Ideas of a Free Church* (Boston, 1913); Protestant Episcopal Church, Joint Commission on Social Service, *Social Service at the General Convention of 1913* (New York, 1914).

INSTITUTO HISTORICO E GEOGRAPHICO BRAZILEIRO, ēn'stĕ-tōō'tô ĕ-stō'rĕ-kô ā jā'ô-grä'fĕ-kô brä'zĕ-lyā'rô (Portug., Brazilian Historical and Geographical Institute). A society founded at Rio de Janeiro in 1839. Its organ, the *Revista Trimensal*, is devoted to the publication of historical and geographical documents.

IN'STRUMENT (Lat. *instrumentum*, tool, from *instruere*, to construct, from *in*, in + *struere*, to build). A term of law to describe any formal written document by which legal rights are created. Thus, a deed of conveyance, a last will and testament, a memorandum of agreement, a promissory note, a bill of lading, a bond, a mortgage, are all legal instruments; but the term is not properly applicable to an entry in a book of account, or to a memorandum made for the sake of evidence or for perpetuating testimony.

IN'STRUMEN'TALISM. A term applied in philosophy to a variety of pragmatism (q.v.) developed by John Dewey (q.v.) and his former colleagues of the University of Chicago. According to instrumentalism, thinking is an organic function whose aim is to restore experience to its smooth flow when this flow has been arrested by the presentation of a problem. A problem is always due to an interruption of immediate unreflective experience, caused by the fact that the habitual or instinctive modes of reaction no longer fit the present situation that confronts the agent. One way of meeting the difficulty is to think, and this is the characteristic way taken by intelligent beings. Intelligent beings are so called because they resort to this method when in difficulties. Thinking, or the experience of ideas, is the formation of plans of action, action not being restricted to overt bodily behavior, but extended to any reaction that is made to a situation. Plans of action are necessary when habitual action or instinctive action is not able to cope with the predicament in which the experient finds himself. Every idea that he entertains in such a contingency is a possible plan to escape the difficulty. Every idea means the presence of its object, but is itself a kind of presence of its object; for there are two kinds of presence. An object may be present as present or it may be present as absent. "We must not balk at a purely verbal difficulty. It suggests a verbal inconsistency to speak of a thing present as absent. But all ideal contents, all aims (i.e., things aimed at) are present in just such fashion. Things can

be presented as absent, just as they can be presented as hard or soft, black or white, 6 inches or 50 rods away from the body. The assumption that an ideal content must be either totally absent or else present *in just the same fashion* as it will be when it is realized, is not only dogmatic but self-contradictory. The only way in which an ideal content can be experienced at all is to be presented as *not present in the same way* in which something else is present, the latter kind of presence affording the standard or type of *satisfactory* presence. When present in the same way, it ceases to be an ideal content. Not contrast of bare existence against nonexistence, or of present consciousness over against reality of our present consciousness, but of a satisfactory with an unsatisfactory mode of presence, makes the difference between the 'really' and the 'ideally' present." In other words, in our experience some things are present in a way which is immediately satisfactory, and some are not. The difference between them is an immediate fact, just as much experienced as anything else. When experience does not run smoothly, in thinking beings there arises in experience an object present as absent, and this object is immediately there, but there in an unsatisfactory way. The subsequent conversion of this unsatisfactory presence into a satisfactory presence is a matter of the eventual course taken by the experience. The idea, or the unsatisfactorily present object, aims at its presence in a satisfactory fashion. This aim is its *meaning*, and if this aim is achieved, the idea *becomes true*. This aim is realized by the fact that the idea is an active reconstructive factor; it is an instrument for its own transformation into a satisfactory kind of presence. Knowledge is not a characteristic possessed by experience in any one cross section of it. It is a process. "An experience is a knowledge, if in its quale there is an experienced distinction and connection of two elements of the following sort: *one means or intends the presence of the other in the same fashion in which itself is already present, while the other is that which, while not present in the same fashion, must become so present if the meaning or intention of its companion or yokefellow is to be fulfilled through the operation it sets up.*" Thus, this view regards ideas and knowledge as instrumental in the development of experience, and having exclusively such a function. Hence it is called the instrumental theory of knowledge, or, briefly, instrumentalism. Consult: John Dewey, *Studies in Logical Theory* (Chicago, 1903); William James, *Pragmatism* (New York, 1907); id., *The Meaning of Truth* (ib., 1909); John Dewey, *The Influence of Darwin on Philosophy* (ib., 1910). See EMPIRICISM; KNOWLEDGE, THEORY OF; PRAGMATISM.

IN'STRUMEN'TAL MUSIC. A term applied to music performed exclusively on instruments, as distinguished from that performed by voices, or even voices with instrumental accompaniment. Even in ancient Greece purely instrumental music was known. In the sixth century B.C. Sacadas of Argos is said to have performed publicly on the *aulos* (flute) at the Pythian Games. In the same century Agelaus of Tegea won great distinction as a performer on the *kithara*. But instrumental music as performed by a number of instruments was unknown. The Greek orchestra served only to accompany the voices. Harmony being unknown to the Greeks, such accompaniment was nothing more than a performance of the vocal part in unison or octaves upon the instruments. With the use of stringed instruments played by a bow a new phase of instrumental music began. The *fiddle* was brought over from the Orient and soon became the instrument upon which the troubadours accompanied their songs. It was also adopted by the wandering fiddlers (*fahrende Spielleute*) of the Middle Ages. The oldest compositions written expressly for instrumental performance were dances. But the style of these is entirely vocal. It is during the sixteenth century that the first traces of an individual instrumental style are perceptible. It was the keyed instruments which contributed to a differentiation between the vocal and instrumental styles. As they were unable to produce sustained tones or chords, composers soon discovered that broken chords and figuration were better adapted to these instruments. Even in compositions for the organ this principle was adopted; and before long the new style of figuration, and rapid note progression, were also adopted for orchestral instruments. Three instruments have become prominent in the development of the instrumental forms, viz., the organ, violin, and pianoforte. The great organists took from the vocal style the fugue. The instrumental fugue reached its growth in the masterpieces of J. S. Bach, which to this day still are unrivaled. The violin and pianoforte developed the sonata form, which is regarded as the highest of all instrumental forms. The cyclical forms can be traced to two main sources, viz., the old dances and the Florentine musical drama. By uniting a number of dances (all in the same key) the *suite* originated. The older operas were opened by an instrumental prelude which originally was nothing more than a madrigal arranged for instruments. But soon a special instrumental composition took its place. The form of this *sinfonia*, as it was called, was taken from the aria, i.e., it had three parts, A, B, A, of which the third was a repetition of the first. Gradually the three parts were detached and appeared as separate movements. Composers paid special attention to the first movement, from which gradually the sonata form was evolved. A sonata was originally any instrumental work (chiefly performed on a keyed instrument with strings) as opposed to a vocal one. Then "sonata" was applied to a cyclical composition for piano. The great sonatists of the eighteenth century (though composing for the violin) retained the name. The form was finally established by Stamitz and filled with the loftiest contents by the genius of Beethoven. The symphony is nothing else than a sonata of large dimensions for orchestra. Trios, quartets, concertos, etc., are all sonatas for a particular group of instruments. Instrumental music today is divided into absolute and programme music. The former kind is music written for its own sake; the latter attempts to portray definite ideas according to a given programme. Consult: W. v. Wasielewski, *Geschichte der Instrumentalmusik im 16. Jahrhundert* (Leipzig, 1878); L. Torchi, *La musica instrumentale in Italia nei secoli 16, 17, e 18* (Turin, 1899); W. J. Henderson, *Orchestra and Orchestral Music* (New York, 1899); D. G. Mason, *Orchestral Instruments and What they Do* (ib., 1909); H. Botstiber, *Geschichte der Ouvertüre und der freien Orchesterformen* (Leipzig, 1913).

See Cyclical Forms; Overture; Programme Music; Sonata; Suite; Symphony.

IN'STRUMENTA'TION, or Orchestration. The art of arranging the parts of an orchestral composition for the various instruments. Although from the beginning of the sixteenth century composers wrote for various combinations of instruments, instrumentation has become a real art only in the last half of the eighteenth century. The Gabrielis, e.g., employed violins in their instrumental works, but had no idea of the true character of this instrument. They used it only, like the trombones, for sustained notes. Even the instrumentation of Bach and Handel is very primitive. Gluck seems to have been the first to use the various instruments with a conscious purpose and a knowledge of their peculiar character. Haydn and Mozart made scarcely any advance in instrumentation over Gluck. In the works of Beethoven we find for the first time each instrument speaking its own language, and with him a new epoch of instrumentation may be said to begin. Weber accomplished for the opera orchestra what Beethoven had done for the symphony orchestra. In the works of Wagner and Berlioz instrumentation reached its culmination as far as then existing instruments are concerned. Quite independent of each other, these two masters discovered every conceivable combination and effect. Wagner even had special instruments (tubas) constructed for his *Ring des Nibelungen.* By increasing the number of the wood and brass choirs and by introducing new instruments, especially the celesta and heckelphone (qq.v.), Richard Strauss was enabled to advance even beyond Wagner on the merely technical side. Just as there is a special style of writing for the pianoforte (*Klaviersatz*) so there is also one for the orchestra (*Orchestersatz*). It is not sufficient for a composer to know thoroughly the compass and peculiarities of each instrument. Effective instrumentation requires also the proper distribution of the separate tones of a chord among the various instruments. Thus, if a composer should write the C major chord for trombones in successive thirds, *c, e, g,* the effect would be a confused mass of sound; whereas the proper effect would be obtained by writing *c, g, e'.* The science of instrumentation teaches the pupil the compass and peculiarities of the different instruments as well as their combinations. But talent for instrumentation and orchestral writing is independent of purely creative talent, although all great composers since Beethoven, with the one notable exception of Chopin, have been masters of the orchestra. The best works on instrumentation are those of Marx, Lobe, Prout, and especially Berlioz (translated into German and enlarged by F. Weingartner) and Gevaert. Consult F. Volbach, *Das moderne Orchester in seiner Entwickelung* (Leipzig, 1910). See Orchestra; Score.

IN'STRUMENT OF GOVERNMENT, The. A written constitution for the Protectorate in England, set forth on Dec. 16, 1653. Since Jan. 15, 1649, the Agreement of the People (q.v.) had been nominally in force, its provisions being only partially carried out, but there was urgent need of some effective guaranty of civil liberty. The instrument provides for a constitutional government, administered by a Lord Protector, and a Parliament of a single house. An elective assembly is to be summoned on the 3d of September, 1654, and thereafter once in every third year. The distribution of county and borough seats in England and Wales is based on the schedule provided in the Agreement of the People, although there are important changes. For the first time provision was made for a parliamentary union of England, Ireland, and Scotland. With the exception of those who had engaged in the war against the Parliament since 1641, or in the Irish rebellion, or professed Roman Catholicism, the franchise and the right of being elected are conferred upon "persons of known integrity, fearing God, and of good conscience, and being of the age of twenty-one years," if seised or possessed of real or personal estate to the value of £200. There is no provision for the borough franchise, that being left apparently to the existing custom of each place. No Parliament was to continue longer than three years, and no Parliament was to be dissolved within less than five months after it was first convened without its own consent.

The extended powers of the Protector in foreign, military, and civil affairs are limited by the Parliament and the Council of State. A council of 15 members is appointed in the instrument itself. Other members may be added, but the number may never be more than 21 nor less than 13. Councilors are to hold office during good behavior. To fill a vacancy in the Council the Parliament is to nominate six persons, the Council to choose two out of these six, and the Protector to appoint one of the two. By the instrument Oliver Cromwell is created Lord Protector for life. His successors are to be elected by the Council. A veto upon legislation is not granted the Protector. All bills passed by Parliament must be presented to him; and if his consent be not given within 20 days, they become laws, unless he can convince Parliament that his objections are sufficient reason for rejection or that they are contrary to the Instrument. There is a responsible ministry. The "Chancellor, Keeper or Commissioners of the Great Seal, the Treasurer, Admiral, Chief Governor of Ireland and Scotland, and the Chief Justices of both the benches" are to be chosen by the consent of Parliament. All other appointments are apparently left in the Protector's hands. Religious liberty is guaranteed, except to "Popery or Prelacy," and to "such as, under profession of Christ, hold forth and practice licentiousness."

The Instrument of Government reveals the remarkable ability of its framers. The most serious defects are the lack of any provision for amendment and the failure to secure the national sanction. It broke down because the Parliament summoned under its provisions assumed the power of a constituent assembly. It was later amended in the *Petition and Advice* (q.v.). For the text of the Instrument, consult: Gardiner, *Constitutional Documents* (Oxford, 1889); and for discussion, id., *Commonwealth and Protectorate* (New York, 1894–1901); Masson, *Life of Milton,* vol. iv (London, 1873–94); Jenks, *Constitutional Experiments* (ib., 1891); Inderwick, *Interregnum* (ib., 1891).

INSTRUMENTS, Musical. See Musical Instruments.

INSUBRES, ĭn'sû-brēz. A Gallic people, a branch of the Ædui (q.v.), who crossed the Alps in the fourth century B.C. and settled in Italy north of the Po, between the rivers Adda and Ticinus and the Alps. Next to the Boii, they were the most powerful and warlike tribe

found in Cisalpine Gaul at the time this region first came in contact with Roman arms, in 222 B.C. By 194 B.C. the Romans captured their capital, Mediolanum (now Milan), and reduced the tribe to submission—a victory which completed the Roman conquest of all the country lying between the Alps and the Apennines in the western part of Italy. Consult Heinrich Nissen, *Italische Landeskunde*, vol. ii (Berlin, 1902), and the article "Insubri," in Lübker, *Reallexikon des klassischen Altertums* (8th ed., Leipzig, 1914).

IN'SULÆ ÆO'LIÆ. See LIPARI ISLANDS.

IN'SULÆ LIPARÆ'Æ. See LIPARI ISLANDS.

IN'SULA'TORS. See ELECTRICITY; CONDUCTOR.

INSUR'ANCE (OF. *enseurance*, from *enseurer*, to insure, from *en*, in + *seur*, sure, from Lat. *securus*, free from care, from *se-*, without + *cura*, care). Insurance must be differently defined according to the aspect of it which is under consideration. Every person who embarks his capital in any kind of industrial activity is obliged to make accumulations to replace that part of it which is used up in the productive operation. Some of these accumulations are made to meet losses which are certain and definite both in time and in amount. Such accumulations should be large enough to replace the capital used up and no larger. Other accumulations are made to meet losses of a more or less uncertain character. Such accumulations are, for the entire group engaged in any line of industrial activity, larger than the losses, and the excess of accumulation over loss varies directly as the degree of uncertainty. The accumulations of an individual to meet uncertain losses constitute his insurance fund, and so far as he makes such accumulations he may be said to insure himself. From this point of view insurance is the accumulation of funds to meet uncertain losses.

One person whose property is exposed to a risk of some kind may be able to transfer that risk to another person for a consideration. The latter person undertakes to make good to the former any loss which he may suffer from certain specified accidental causes. The person guaranteeing the reimbursement for such accidental loss may be said to insure against the loss. From this point of view insurance is the transfer of an existing risk from the person exposed to it to another person or group of persons.

When one person merely assumes the risk of some other person, there is little or no social gain from the transaction. Whatever accumulation the former would have had to make if he had carried his own risk, the latter must make after he assumes the risk. The burden which the risk imposes on society remains unaffected. If, however, the risks of many individuals are brought together in a group, a new principle is brought into play. The uncertainty as to the amount of loss to be expected steadily diminishes as the number of risks included in the group increases. Thus an insurance company, which has assumed the risks of thousands of individuals, is exposed to much less uncertainty as to the amount of loss it will have to indemnify in a given period of time than any one of the individuals is as to the amount of loss he would suffer during the same period if uninsured. The total amount of loss which the company experiences increases as the number of risks it is carrying increases; but the proportion of the total loss which may be considered as certain steadily increases and the proportion of uncertain loss diminishes. For the company the only uncertainty is as to how much the actual loss will differ from the average loss, and by the well-known law of averages the percentage of variation between actual loss and average loss diminishes as the number of cases increases. Now the insurance company under competitive conditions makes its accumulations under the same conditions as the individual. To meet definite losses it accumulates only the amount of the losses; to meet uncertain losses it accumulates in the long run an amount in excess of the losses, and this excess varies with the degree of uncertainty. It will be seen, therefore, that the company can carry the risks of 100,000 individuals on a much smaller accumulation than would be made by the individuals if each were carrying his own risk. This reduction in the cost of carrying risks is one of the economic advantages of commercial insurance.

The second advantage arises from the diffusion of loss. While it is true that for the entire group of persons engaged in a particular industry accumulations to meet uncertain losses will exceed the amount of the losses, it is equally true that some will suffer loss in excess of their accumulations, while others will make the accumulations and escape the loss. In other words, while the group as a whole will make extra gains on account of the existence of risks, these gains will be unequally distributed among the members of the group. Those who suffer the loss will be seriously crippled financially if not actually ruined, while those who escape the loss will reap all the advantage. If, on the other hand, the members of the group are all insured, the system of premiums and indemnities diffuses the losses actually suffered among all the members of the group. This causes such losses to fall on the least important part of the capital of all instead of being concentrated on a few unfortunate individuals. In this way the economic evils caused by the accidental destruction of property are greatly modified. From the social point of view, therefore, insurance may be defined as an economic institution for reducing the accumulation to meet uncertain losses and for lessening the evil consequences of the accidental destruction of property, through the combination of the risks of many individuals in one group. Accumulation to meet uncertain losses and the transfer of risk are both involved, and in addition the combination of many risks in one group. It is this definition of the term that covers the business of insurance as it is carried on in the economic world.

The Relation of the Individual to Uncertainty. If we turn now from the social aspects of insurance to consider it from the point of view of the insured person, we find that for him its chief characteristic is the substitution of certainty for uncertainty, of a certain and definite expense for the possibility of an uncertain loss. Every person engaged in any form of industrial activity is exposed to many chances of accidental loss. Some forms of danger may be practically eliminated through the adoption of measures calculated to reduce the possibility of loss. Such measures may be grouped under the name "prevention." It is to be noticed that the fact that it is possible to avoid the danger of loss in a particular case by the adoption of pre-

ventive measures does not prove that it is desirable to do so. Such measures may cost more than they save. Preventive measures, therefore, will be adopted only so far as they are found to be economically advantageous.

A person engaging in industrial activity finds himself exposed to the possibility of accidental losses from various sources and of various degrees of uncertainty. To protect himself he may adopt any one of three methods. So far as it is economically advantageous, a prudent man will adopt preventive measures which will reduce the danger of loss and so lessen the degree of uncertainty. Against some of the remaining risks he may, from necessity or by choice, protect himself by making accumulations to replace the capital accidentally destroyed. He may then be said to be insuring himself, although the term "self-insurance" is more commonly restricted to such conduct with regard to risks against which it is possible to purchase protection from the insurance company. Where the transfer of risks to a company is impossible, as in the case of the danger of a shrinkage in the value of a stock of goods through a change in human wants, the method of self-insurance is the only one that can be adopted. Finally, with respect to a limited number of risks, protection may be secured by transferring them to insurance companies and substituting the obligation to make fixed and definite payments to the company for the necessity of making individual accumulations. The choice between these three methods of preparing to meet uncertain accidental losses will be made by a prudent person on the basis of their relative cost. Where insurance in an established company is possible, the choice of self-insurance would never be justifiable if the cost of insurance in the company were as low as it could be made with entire safety. It is only because insurance companies fail to reduce premiums to the cost level that many large business concerns find it advantageous to carry their own risks. A large concern with many detached risks can do it where a small concern cannot, but under ideal conditions it would not be a profitable proceeding even for the former.

COMMERCIAL INSURANCE

Commercial insurance comes under the last of the three definitions given at the head of this article. It is an economic institution for dealing with uncertain losses. The study of it may be conveniently made under three heads: the relation between the insured and the company, including an examination of the nature of the insurance contract; the kinds of insurance companies and their characteristics, including their methods of operation; the relation of the government to insurance, including a discussion of what it ought to be, as well as what it is.

The Relation between the Insured and the Insurance Company. *The Risk.*—An insurance contract transfers a liability to uncertain loss of a more or less narrowly defined nature from the person insured to the insurance company. For the insured it is the substitution of a definite payment or series of payments for the possibility of an uncertain loss; for the company, conversely, it is the acceptance of an uncertain liability in exchange for a definite payment or series of payments. It may be noted in passing that in the case of the mutual insurance company there is in theory the transfer of only a part of the uncertainty. The insured, being also insurer, is still exposed to some uncertainty as to the amount of loss he will suffer in the form of assessments. In practice, however, the difference between insurance in a mutual company and in a stock company is very slight, and during the present discussion may be disregarded. (Further reference to this matter will be made in considering the different kinds of insurance companies.) The insurance company assumes the legal obligation of paying to the insured certain specified sums on the occurrence of certain specified events. It assumes these liabilities, however, with the certainty that in the great majority of cases it will not be called upon to make the payments. Its actual liability is much less than its full legal liability. The actual liability which the company assumes in granting insurance at any time is technically known as "the risk." The most important question in this connection is how the risk is determined. In seeking an answer to this question two things have to be taken into account—the amount which the company binds itself to pay and the probability that it will have to make payment. These two factors will be considered in turn.

The maximum amount for which the company renders itself contingently liable is usually expressed in the policy. This amount ought in all cases to be limited to the insurable interest of the insured, i.e., to the amount of loss he would actually suffer from the occurrence of the event against whose consequences he is insured. To promise a larger amount is to make it for the interest of the insured to bring about the occurrence of the event—a condition of things which is prejudicial to the welfare of the company and contrary to public policy. In the insurance of property the attempt is nearly always made to apply this principle. In life insurance, however, and in other forms of insurance against loss of income from labor, no such attempt is made in many cases. A life insurance company does not undertake to limit the amount of insurance which any man may take out on his own life to the capitalized value of his income-earning capacity, any more than it limits his choice of beneficiaries to those who are actually economically benefited by his living. It cannot be denied that the results of this policy are in some respects very unfortunate. It leads to an increase in the incentive to commit two kinds of crimes—suicide and murder—and to a certain increase in the number of such crimes actually committed. That the situation is not intolerable is due to the fact that other motives are at work which are sufficiently strong in most cases to overcome entirely the economic motive.

Insurable interest, then, fixes the maximum amount for which a policy should be made out. Insurable interest may be defined as any legal or equitable right or interest such that the contingency insured against will result in financial loss to the insured. This definition, while not complete, covers the greater number of examples of insurable interest. Thus a mortgagee or pledgee has an insurable interest in the property mortgaged or pledged. A vendee of property under an executory contract of purchase has an insurable interest in the property. A common carrier or other bailee has an insurable interest in the goods bailed. The carrier also has an insurable interest in the prospective freight upon goods actually laden upon his ship or other

vehicle for carriage. It will thus be seen that several different persons may have distinct insurable interests in the same property, and that these insurable interests may in the aggregate exceed the value of the property insured.

In general, no particular amount of insurable interest is necessary to make the insurance contract valid. It is enough if, at the time of effecting the insurance policy, the insured has some interest in the life or property insured. There is, however, one exception in the case of life insurance. Although in the case of insurance of the life of a relative the law does not require any limit to be placed on the value of the life insured, when the interest of the insured is purely financial, the insurance by a creditor of the life of a debtor, the amount of the insurance must bear some relation to the amount of the debt plus interest and the cost of insurance or it will be deemed void as a gambling contract.

One of the most important principles of the law of insurance is that the contract of insurance is a contract of indemnity only. It follows that in most forms of insurances the insurer must not only have an insurable interest at the time he effects the insurance, but that he must have an insurable interest at the time of the loss in order to recover on the policy, and the amount of the recovery will be measured by the amount of his insurable interest. The life insurance contract constitutes an exception to the rule. It is not strictly a contract of indemnity, but a contract to pay a fixed amount of money; and if the insured has an insurable interest at the time of effecting the insurance, so that the policy is then valid, he may recover the entire amount of the policy upon the happening of the loss, even though the insurable interest has then ceased. Insurance policies, known as "valued policies," are sometimes written in which an agreed value is assigned to the interest of the insured. In the event of loss the insured must still have his interest in the property insured, but the value of his interest is determined by the policy. In several States insurers against loss by fire are required by statute to issue only valued policies.

When there are several insurers of the same interest in the same property, their position in the event of loss is not unlike that of cosureties. If the amount of the several policies exceeds the value of the interest, the insured may not recover the full amount of property from the insurer, but each is required to contribute ratably to the loss; or, if the insured elects to recover the amount of the loss from any one insurer (as he may do in the absence of stipulation to the contrary in the policy), that one, on payment of the loss, may compel contribution pro rata by each of the other insurers.

In the case of marine insurance policies the insured is deemed to be a coinsurer with his insurer if the amount of insurance is less than the full value of the interest insured. The marine policy is therefore a policy of indemnity only if the property or interest insured is insured for its full value. If insured for less than its full value, the insured can recover on his policy only such proportion of the amount insured as the loss bears to the value of the whole interest of the insurance on the property.

The amount stated on the face of the policy is the maximum amount for which an insurance company may become liable. In some forms of insurance, as in life, accident, and sickness insurance, the amount stated in the policy is the amount actually paid if the specified event occurs, regardless of whether an equivalent loss is actually suffered or not. With most forms of insurance of property the situation is different. Whatever may be the face of the policy, the indemnity is not expected to exceed the loss actually experienced. If insured property is partially destroyed and the loss does not exceed the amount of the insurance, the amount of loss fixes the maximum amount to be paid as indemnity. In some countries in fire insurance any person who insures his property for less than its full value is held to be his own insurer for the difference between the value of the property and the amount of the insurance; and if the property is partially destroyed and the loss does not exceed the insurance, the indemnity actually paid is such part of the loss as the total amount of insurance in force is of the total value of the property. If, e.g., property insured for three-fourths of its value is partially destroyed, the indemnity actually paid will be three-fourths of the loss. The rest of the loss will fall upon the insured as coinsurer. In the United States this principle is not commonly applied except in marine insurance. In general, when insured property is partially destroyed and the loss does not exceed the amount of the insurance, the insurance company becomes responsible for the entire amount of the loss.

When the loss fixes the maximum amount of indemnity, it is clear that the amount stated in the face of the policy cannot be taken as the measure of the real liability which a company assumes in insuring a piece of property. It is true that there is an abstract possibility that every time a loss occurs it will be large enough to call for the full amount of the insurance, but there is a practical certainty that in many cases loss and indemnity will be less than the face of the policy. It is necessary, therefore, to calculate what is the probable ratio of the indemnity to the amount of insurance, or, in other words, to estimate the probable intensity of the loss. This can be ascertained, not by a study of the characteristics of the insured property, but only by the statistical analysis of the results of past experience. If it were shown by such analysis that for any particular kind of property the indemnity in a large number of cases had been on the average one-half the amount stated in the face of the policy, then the amount the insurance company would actually have at stake in a policy issued on property of that kind would be one-half the amount stated in the face of the policy.

Degree of Probability.—The determination of the probability of the occurrence of the event against whose economic consequences insurance is granted is a much more complex matter than the determination of the amount which the insurance company has at stake on a given policy. It is evident that this probability will vary with the length of time for which the insurance is to be in force; that, other things being equal, the probability of the occurrence of a chance event is twice as great for two years as for one year. It will be convenient to approach the problem by leaving out of consideration the element of time and assuming that all insurance is granted for a uniform period, say for one year. We may then consider what changes, if any, the introduction of the time element will involve.

It is to be noted in the first place that it is impossible to determine the degree of probability by the most exhaustive study of the individual risk. It is easy to see that there is more danger in one case than another—that, e.g., other things being equal, a wooden house is more likely to be burned than a stone house; but what the absolute probability is in either case does not appear. Whether either will be destroyed or not is a matter of chance, though with different degrees of probability. By this it is not meant that the destruction is uncaused, but that the forces at work are so complex that human knowledge is incapable of analyzing them completely.

As it is impossible to determine the degree of probability directly, the attempt is made to discover it in an indirect way. The method is the application of the theory of probability to the statistical results of past experience. The average of the past is the probability of the future. If the records show that for a series of years an event has occurred 10 times a year for every 10,000 opportunities for its occurrence, the degree of probability that it will occur in a future year, conditions remaining unchanged, is denoted by the fraction 10/10,000, or 1/1000. The actual number of occurrences in any one year may vary more or less from the probable number as indicated by the average. The probable degree of this variation may be determined from the character of the past series. The greater the fluctuations in the series in the past, the greater the variations of actual from average that may be expected in the future. But whatever the character of the past series, it will always be true that increasing the number of opportunities, provided they are all alike, diminishes the probable variation of the actual number of occurrences in any future year from the probable number as determined by past experiences. To state the same principle in a form more directly applicable to insurance, the greater the number of similar risks included in a group, the smaller the percentage of variation between the average number of losses for a series of years and the actual number of losses for any particular year.

The influence of time on probability under these ideally simplified conditions, i.e., on the hypothesis that all circumstances affecting the degree of danger remain unchanged, is very simple. The probability varies directly in proportion to the time. For n years the probability is n times as great as for one year. If, then, we represent by a the amount which an insurance company has at stake on a given policy, by p the probability of the occurrence of a loss within one year, and by n the number of years for which the company issues its policy, we should have the annual risk assumed by the company represented by the formula $a \times p$, and the total risk for the n years represented by $a \times p \times n$.

The real difficulties involved in the attempt to estimate risk have not yet been touched upon. They are practical rather than theoretical. The determination of future events by the application of the theory of probabilities to the results of past experience proceeds on the basis of two assumptions—that all the cases included, whether past or future, are alike in all essential respects and that the lapse of time brings no change in the factors affecting the degree of probability. Neither of these assumptions corresponds to the fact. As to the first we see that hardly any two lives or pieces of property are alike in all essential respects. In the case of fire insurance, e.g., the number of circumstances affecting the probability of destruction is very great. It is only by overlooking many minor points and assuming a degree of similarity that does not actually exist that the application of the statistical method is at all possible. The same considerations apply more or less to all other forms of insurance. The common practice is to group risks in classes, according to their more prominent elements, and collect data about the different classes from which to calculate the average. Each class has its own average and its own degree of probability. In estimating an individual risk the average of the class to which it belongs is used as a basis from which the particular risk is calculated by making allowance for any special conditions affecting it. The result is at the best a more or less close approximation to reality.

It is interesting to consider what the effect of the imperfect classification of risks is, both on the insuring companies and on the insured. To the companies it would make no difference of any kind if all adopted the same classification and applied it in the same way. A general underestimating of risks would, of course, lead to ruin. But an imperfect classification, as a result of which there were as many risks overestimated as there were underestimated, would do them no harm. An average of all kinds of risks would be perfectly safe for them, provided all kinds of risks were charged for according to the average. Thus, if there are 10 risks which, when properly estimated, amount to 1, 2, 3, and so on up to 10, the risk assumed by a company which insured them all would amount to 55; but the company is equally safe whether it charges each risk according to its proper value, 1, 2, 3, and so on up to 10, or charges each of them according to the average risk, which is 5½. Where there are competing companies, however, and one estimates risks more closely than the others, the result of imperfect classification is an unfavorable selection of risks. If one company assumed all risks from 1 to 10 at their proper valuation, while another assumed them all at the average valuation of 5½, the former company would get all the small risks, those from 1 to 5, and the latter the large ones, those from 6 to 10. We see, then, that where all insurance companies use the same classification, they have no incentive to perfect their system, but where one company introduces a more accurate classification, others are constrained to do the same or suffer from adverse selection.

The effect of imperfect classification of risks upon the insured is to cause a disproportionate distribution of the burden of insurance. In an ideal system this burden would be so distributed that each person would pay to the company in proportion to the risk he brought upon it. This ideal can never be reached, but the more nearly exact the calculation of risks, the more closely is the ideal approximated. The extent to which the attempt is made to estimate the risks accurately varies in the different forms of insurance. It is probably carried furthest in fire insurance, while in life insurance and other similar kinds comparatively little attention is paid to it. Most life insurance companies recognize only two classes of risks—those which come up to a certain standard and those which fall

below it. The latter are rejected, while the former are all accepted at equal rates for equal ages. Yet in many cases the examining physicians would have no hesitation in declaring that some of those accepted would in all probability live longer than others. The result of this imperfect classification of risks is like that already noted—that in the long run the stronger and healthier lives pay a part of the cost of insurance of those possessing less viability. This injustice is partially eliminated through the return to the insured of a part of their premiums in the form of dividends, of which the longer lives receive the larger share. But that can mean no more than that the premium rates are scaled so high that the excess paid by the stronger lives is sufficient to make up the deficiency on the weaker and leave a remnant to be returned as dividends.

The fact that most insurance companies refuse to insure lives that do not come up to a certain standard suggests the question, What is an insurable risk? The answer clearly is that any risk—i.e., any chance of loss depending on the occurrence of any uncertain event—is insurable, provided there are sufficient data to enable the degree of probability to be estimated, and provided it is of such a nature that the insured cannot too easily make use of the insurance for his own economic advantage. However hazardous the risk, it may be covered by putting the premium high enough. It is sometimes stated that only those risks are insurable which threaten a large number of individuals at the same time. The larger the number of risks, the more closely the degree of probability can be estimated; but it is possible to make some estimate of it on the basis of a very small number of risks and cover the high degree of uncertainty by a high premium rate. No more is it true that the danger must be of such a nature that the loss cannot actually befall a large proportion of the insured at the same time. Here again it is a question of putting the premium rates high enough and accumulating large reserves. If every one of the insured lost at the same time, the company could meet the loss provided it had estimated the risks correctly. Nor, finally, does it make any difference how great the danger of loss may be. It is simply a matter of adjusting premiums to risks. A life insurance company insuring only the lives of consumptives might be on just as sound a financial basis as one which made a specialty of insuring only extra-healthy lives.

But while the theory of insurance is equally applicable to all forms of uncertain losses, its actual extension is limited by practical difficulties. The chief one of these is the impossibility of inducing people to pay the high rates which would make it safe for a company to assume very hazardous risks. Unless there is considerable difference between the uncertainty to which an individual is exposed and that to which an insurance company is exposed from the same risk, the gain from insurance becomes very slight when the cost of conducting the business is added to the first cost of the insurance. It is evident, however, that many risks are still untouched by insurance companies which offer a fair field for their activity.

One other point in connection with the subject of risks deserves brief consideration. While it is the purpose of insurance to reduce the burden which chance losses bring upon society, one of its consequences is an increase in the actual amount of loss. This is due to the effect of insurance upon the mind of the insured. An honest man may become less careful in protecting his property, a dishonest man may even seek to destroy his for the sake of obtaining the insurance. The danger of the loss through the carelessness or misconduct of the insured is commonly referred to as "the moral risk." It constitutes one element in every risk that the insurance company assumes, and one which in general it is very difficult to estimate. It is for the interest of the company to reduce the danger as much as possible, and it is contrary to public policy to allow them to increase it unnecessarily. Various forfeiture provisions are inserted in policies for the purpose of compelling greater carefulness and reducing misconduct. The chief reliance, however, must be on the strict application of the principle of insurable interest. It may even be practically advantageous to limit the amount of insurance to a certain percentage of the insurable interest in order to create a positive incentive to carefulness and honesty. Serious as the moral risk in insurance is, there can be little doubt that it is exaggerated in the popular opinion. Of all fires in Massachusetts for the period 1906–11, 2.4 per cent proved to be of incendiary origin, and less than one-third of these were set for the purpose of obtaining insurance. Doubtless some fires apparently of accidental origin were really incendiary. Nevertheless, it is a safe estimate that fires for the sake of defrauding the insurance companies represent only between one and two per cent of the total fire loss.

The Premium.—The amount paid to the insurance company by the insured is called the premium. It consists of two parts—the "natural premium" and the "loading." The amount of the natural premium is determined by the risk, or, to speak more precisely, it equals the risk. The loading is the amount added to the natural premium to cover the cost of insuring the risk. In other words, the natural premium pays the losses and the loading pays the expenses. The insured in any company must pay all the losses and all the expenses of the company, interest on the capital invested in the business included. This cost of administration is distributed among all the insured, each contributing a certain proportion of his natural premium.

It is interesting to consider what part of the entire premium is natural premium and what part is loading. In life insurance natural premiums are actually calculated and loadings added to them. In many forms of insurance, however, no such division is made in practice, but the whole premium is estimated together. In such cases the proportion of loading can be discovered only by an examination of the expense account, which will reveal what part of the receipts from premiums has been returned to the policyholders and what part has gone for expenses. It will be found that the proportion of loading varies a great deal from one kind of insurance to another and from one company to another. In some cases the loading does not exceed 20 per cent of the natural premium, in others it is as high as 100 per cent.

While from the social point of view the loading represents the cost of insurance, for a person seeking insurance the entire premium constitutes its price. He is consequently interested in the question whether the competition of insur-

ance companies may be relied on to reduce the price to the lowest point consistent with absolute safety. It is evident that the competitive principle would operate in this field at a tremendous cost. Competition works through the elimination of the least efficient. The failure of an insurance company, however, may entail a far greater loss on the insured than it does on the insurers. The severity of the process of elimination has been greatly mitigated by the action of legislatures, many of which have provided for the compulsory winding up of the affairs of a company on the appearance of certain indications of danger, while the company is still able to take care of the insured by reinsuring its risks. Furthermore, the very uncertainty which constitutes an essential element of the insurance business makes unrestricted competition particularly dangerous. During a series of good years, when losses ran below the average, there would be an almost irresistible tendency to reduce the price of insurance to the level made possible by the prevailing favorable experience. If years of unusually high losses followed, as they naturally would follow, the company would find itself hard pressed to meet its obligations. Thus there is always the danger that competition would reduce the cost of insurance below the margin of safety.

Is competition the force that is actually regulating the rates of insurance? There is keen competition among the agents of different companies, but it does not manifest itself in a fall in rates. The agents have no authority to make reductions. There are occasional periods of actual competition between companies, but for the most part they retain schedules of rates founded on a basis reached by common agreement. The statute books of the different States contain many laws which were enacted for the purpose of preventing such agreements and securing competition, but they have accomplished little. The opportunities for secret agreements are too numerous. For the most part the companies do not seek to extend their business by lowering rates; they rely on the persistence of their agents and the attractive features of their policies.

The Insurance Contract.—The agreement between the insurer and insured constitutes the insurance contract. This contract is of a kind which in some respects resembles a wager, and a few writers have been misled into identifying the two forms. In both cases one party to the agreement binds himself to pay a certain sum on the occurrence of an uncertain event. The event may be the same in the two cases. Thus, a house may be insured by its owner and at the same time may be the subject of a wager between two disinterested persons, so that if the house burns, each of the two men receives the amount stated in the agreements. The illustration brings out the fundamental distinction between insurance and gambling. The one is the transfer of an existing risk from the person exposed to it to another party; the other is the voluntary creation of supposedly equal risks by two persons, neither of whom was before exposed to the risk. It is this principle that underlies the legal doctrine of insurable interest, in accordance with which the courts distinguish between insurance contracts and wagers. In the case of life insurance, as we have seen, this doctrine is very imperfectly followed.

The real subject matter of the insurance contract is security. The insured buys security by the payment of the premiums. The insurer performs his part of the contract just as much in the case of those of the insured who escape loss, and to whom consequently no indemnity is paid, as in the case of those who suffer loss and receive indemnity from the insurer.

The insurance contract is one of good faith. The insured is bound to reveal to the insurer all circumstances within his knowledge which have any bearing on the possibility of loss. The willful misrepresentation of any material fact, i.e., of any fact affecting the probability of loss, usually works the forfeiture of the insurance.

The insurance contract is a personal one; it is between the company and the person taking out the insurance. A transfer of the insured property does not transfer the insurance, but renders it void, since the insured no longer has the insurable interest. In practice, however, insurance companies frequently allow the transfer of insurance to be effected by indorsement. This personal character of the contract makes it possible to control to some extent the moral risk. If the insurance went with the property insured, the company would have no protection against the passing of the insurance into the hands of a person whose reputation showed him to be an undesirable risk.

The Policy.—The writing in which the insurance contract is set forth is called the policy. This consists of two parts—the application of the person desiring insurance and the agreement of the company to give it. The application is expressly stated to be a part of the contract. In it the applicant sets forth all the material facts about the risks which he desires insured. Some of the statements are representations, others are warranties. In many policies there is an express provision that every statement of the insured in his application shall be regarded as a warranty. A misstatement in a warranty, whether it is material or not, works forfeiture of the policy. A misstatement in a representation does so only when it concerns a material fact. A misstatement is material whenever it induces a company to enter into a contract which it would not have accepted if the truth had been known. Common forms of representations or express warranties are the statement that there is no other insurance upon the property, statements as to the location of the property, or as to the character of the business carried on in or upon the property, and, in the case of life insurance, statements as to business or condition of health of the insured. In contracts of insurance other than marine insurance, warranties must appear directly or by reference upon the face of the policy; but in marine policies there are three important warranties implied by law, irrespective of the terms of the policy. See Marine Insurance.

Waiver or Estoppel.—Growing out of the doctrine of representation and warranties is the important doctrine of waiver, or estoppel as it is somewhat incorrectly called. As the effect of misrepresentation or breach of warranty is to give the insurer the right to avoid the policy, the right itself may be waived either expressly or by the contract of the insurer. Thus the receipt and acceptance of a premium by the insurer with knowledge by him of a breach of warranty waives the breach and renders the contract valid.

Upon similar grounds, if the insured gives

imperfect or ambiguous answers to the questions asked by the insurer at the time of effecting the policy, the insurer is declared to have waived fuller or more specified answers and cannot avail himself of a defective answer as a ground for avoiding the contract. The question of waiver, or estoppel, has frequently arisen in cases where the written application for the insurance policy, which is made a part of the policy, is filled in by the agent of the insurer, although signed by the applicant. If the agent does not correctly transcribe the answers of the applicant for insurance, it is open to the insurer, in event of loss, to rely upon the untruth of the written answers as a breach of warranty avoiding the policy. In many States the courts have held that the insurance agent, although in fact doing an act expected of and attributed to the insured, remains the agent of the insurer, and that the insurer, through his agent having notice by the answers of the insured of the matter relied upon by the insurer as a breach of warranty, and having after such constructive notice issued the policy with full knowledge of the alleged breach of the written terms, is estopped from relying on the breach as a defense to his liability on the contract of insurance. While the doctrine undoubtedly works out substantial justice, it has been subject to severe criticism on the ground that it is not a true estoppel (see ESTOPPEL) and that it violates the parole evidence rule (see EVIDENCE) in permitting the insured to contradict the written answer contained in his application.

Life insurance policies are freely assignable, and if issued in good faith to one having an insurable interest, the assignee need not have an insurable interest in the life insured. Policies of marine insurance are also freely assignable; but as the marine policy is purely one of indemnity, it is necessary that the assignee should acquire the interest insured in order to recover on the policy. Fire insurance policies, owing to the importance of the personality of the insured, can be assigned only with the consent of the insurer.

The policy contains precise statements as to the conditions under which the insurance will be forfeited, the conditions under which the indemnity becomes payable, and the procedure by which the insured is to prove loss and obtain the indemnity. Sound policy would seem to require that all these conditions should be of such a nature that they would put no unnecessary obstacles in the way of honest insurance, and set forth so clearly that the insured could have no excuse for misunderstanding the exact nature of the contract he has entered into. The better class of insurance companies have undoubtedly aimed to give the insured fair treatment. In too many cases, however, companies have shown a disposition to take advantage of obscurities or technicalities in the contract to avoid paying honest losses. So prevalent has this practice been that the legislatures of many of the States have considered it necessary to come to the protection of the policyholders. For example, the practice of printing some essential feature of the policy in very small type so that it easily escaped the notice of the insured has been met by legislation prescribing the smallest size of type that may be used; the requirement of formalities in proving claims which in many cases the insured are unable to fulfill has been declared illegal and not binding.

In interpreting all the claims of the insurance policy it is a general rule that, inasmuch as the insurer in fact proposes the policy and fixes the terms, the terms of the policy will be construed most strongly against the insurer. Thus, a policy which stipulates that the building insured is "detached 50 feet," in the absence of express language to the contrary will be deemed to mean detached 50 feet from any building affecting the risk, and not from any building irrespective of the character.

Kinds of Insurance Companies and their Characteristics. *Public and Private Insurance.*—Insurance companies may be classified in various ways according to the characteristics on which the classification is based. Thus, with respect to the nature of the insuring body, public insurance may be distinguished from private insurance. Public insurance is insurance issued by a body politic, whether nation, State, or a minor civil division; private insurance is insurance issued by a private person or by a group of private persons. Public insurance will be discussed in the concluding part of this article.

Mutual and Joint-Stock Insurance.—Private insurance may be further subdivided into mutual insurance and insurance for gain, sometimes called commercial insurance. In its simplest form a mutual insurance company is based on an agreement entered into by each member to pay a share of the loss sustained by any other member from certain specified causes. The proportion to be paid by each member is based on the risks to which he himself subjects the company. Mutual insurance is seldom found except in the case of risks which are nearly uniform in character, so that the degree of risk varies almost invariably with the amount of insurance. Thus we find one class of mutual fire insurance companies insuring cotton mills, another insuring packing houses, a third insuring farm buildings, and a fourth confined to city dwellings. It is the comparative uniformity of the risks involved which has been partly responsible for the general application of the mutual principle to life insurance.

When the funds to reimburse losses are collected by assessment after the occurrence of the loss, the annual contribution of each member, i.e., the cost of his insurance, is more or less uncertain. As has already been pointed out, insurance in a mutual company collecting its funds in that way is the substitution of a smaller degree of uncertainty for a greater degree, of the prospect of making small annual payments varying within a comparatively slight range for a much smaller probability of a far greater loss. The more regular the loss from year to year, the less are the fluctuations in the assessments, and therefore the more advantageous the insurance on the mutual plan. The relatively great regularity of loss from year to year has made possible the application of the assessment principle to life insurance to a far greater extent than to other kinds.

Very few mutual insurance companies are now run on the pure assessment principle. In nearly all companies there is some accumulation of reserves which may be used to equalize the premiums in spite of considerable fluctuations in the amount of loss. Some of the older companies, especially in fire insurance, have thus accumulated very large reserves, which enable them to return to the insured in the form of dividends a part of the premiums collected.

It is in life insurance that the mutual principle is applied most extensively. The practical difference between the old-line mutual companies and the joint-stock companies is very slight. The capital stock of a stock company is of importance only so long as it constitutes a considerable part of the fund which serves to guarantee sufficient security for the protection of the policyholders.

From the point of view of the policyholder, a more important difference consists in the fact that the stockholders in a joint-stock company have a control over the investments of the company which may be exercised with little regard to the interests of the insured. (See LIFE INSURANCE.) The stockholders may, however, give a certain representation on the board of trustees to the policyholders. Thus, in 1906, the charter of the Equitable was so amended as to give the policyholders the right of electing a majority of the board of trustees.

Mutual companies are most numerous in fire insurance. These are small companies, usually confining their operations to a limited area and to some one or two classes of risks. The reason for their existence is usually to be found in the belief, whether justifiable or not, that the stock companies are not managed as economically as they ought to be, thus enabling the mutual companies to make a saving in the cost of management; and that the particular kind of property in question is improperly classified and the premium rate in consequence unjustifiably high.

Individual Underwriting.—Insurance for gain is most commonly issued by joint-stock companies, but sometimes by individuals. There is no reason why insurance issued by a single person might not be as secure as that issued by a joint-stock company, provided the insurer sets aside a sufficient guarantee fund. As a matter of fact, however, comparatively little insurance is written by individuals. Some of the States have gone so far as to prohibit the practice entirely, influenced largely by the constitutional and other difficulties in the way of exercising adequate supervision. In marine insurance, however, individual underwriting is still common. In the English Lloyds it is the prevalent form of insurance. Within recent years attempts have been made to establish an ostensibly similar form of underwriting in the fire insurance business in the United States. The promoters of the American Lloyds have claimed exemption from the jurisdiction of the insurance departments on the ground that they were not insurance companies within the meaning of the law. They still enjoy this exemption in a few States, but there is a general tendency to bring them under the same regulations as apply to joint-stock companies. Few of the Lloyds survive after their freedom of action is thus restricted. It is to be noticed, however, that the failure of so many of them is due, not to the practice of individual underwriting in itself, but to the fact that the ostensible reserve for the protection of the policyholders has usually been of little real value.

The most obvious classification of insurance companies is on the basis of the kinds of risks which they assume. Thus, we have fire insurance companies insuring against loss by fire, marine insurance companies against loss at sea, plate-glass insurance companies against the breaking of plate-glass windows, and so on. Some companies confine their business to one kind of risk, while others assume two or more kinds. This division of the field of insurance among different companies is purely a matter of practical convenience of administration. There is no a priori reason why one company should not issue insurance against all kinds of insurable risks; in fact, the theoretical arguments are all on the side of such action. So long as each risk is correctly estimated according to the principles already pointed out, the more risks the company assumes the more cheaply it can afford to grant insurance, since the element of uncertainty in the amount of loss to be expected constantly diminishes as the number of risks increases. The combination of fire and marine insurance on the one hand, and of life and accident insurance on the other, is by no means unusual, and outside of these forms the tendency seems to be for companies to extend the field of their activity. Thus the Fidelity and Casualty Company of New York has a charter authorizing insurance of "any contingent event whatever, life, fire, and marine risks excepted, which may be the subject of legitimate insurance." The company actually carries on the following kinds of insurance: accident, burglary, employers' liability, fidelity and surety, plate-glass, and steam-boiler.

By far the largest part of the insurance in force is for protection against loss through the destruction of property by the action of natural forces. This is the case, e.g., in fire, marine, plate-glass, tornado, steam-boiler, and elevator insurance, and in most forms of so-called agricultural insurance, such as insurance of live stock and growing crops. The chief differences between these various forms are connected with the technique of the business rather than with its general principles. Thus, the body of data from which to calculate average losses is much smaller in some kinds than in others; the difficulty of determining the amount of loss varies greatly from one kind to another; and the moral risk involved in the various kinds is very unequal.

The class of insurance which ranks next in importance is made up of those forms which undertake to give indemnity for the loss of income through the sickness, injury, or death of the person insured or his inability to obtain employment. Life insurance is treated in a separate article under that title. Other forms of insurance in this class deserve brief notice on account of their great social significance.

Sickness and Accident Insurance.—Sickness insurance and accident insurance are carried on under various forms. There are a number of joint-stock insurance companies in the United States and in foreign countries which issue accident insurance policies, and a considerable number which guarantee weekly indemnity in case of sickness from certain specified diseases. Many fraternal associations and trade-unions assure their members indemnity for loss of income through accident or sickness. Several large business corporations have established funds for the insurance of their own laborers against accident or sickness or both, in some of which membership is voluntary, in others compulsory. Finally, several European countries, following the lead of Germany, have introduced a system of governmental insurance of workingmen against certain contingencies, sickness and accident included. Private accident insurance was first introduced into the United States in 1863, though one or two railways had previously at-

tempted to sell tickets insuring travelers over their own lines. The development of the business was very rapid. It was taken up by many insurance companies and for a time by several railroads. Short-time insurance of travelers still constitutes a very considerable part of the business of accident companies, though general policies, usually covering a year, are now common. In many companies these policies are limited to accidents which result in death or total disability. Some companies, however, issue policies which cover also certain specified injuries of a permanent nature, such as the loss of an eye, a hand, or a foot. The indemnity varies with the nature of the injury and the amount of the premium.

Commercial sickness insurance is as yet offered by a small number of regular insurance companies in the United States. The policies generally guarantee a weekly indemnity during illness or for a limited period, in case of certain specified diseases. Sometimes the company undertakes to pay a stated lump sum for a permanent disability such as total blindness or paralysis.

The moral risk constitutes a very large element in both accident and sickness insurance, especially in the case of laborers with small incomes. Merely limiting the indemnity to an amount less than the wage of the laborer does not remove all incentive to simulate or even bring about the disability which entitles the insured to indemnity. He is comparing not merely daily indemnity with daily wage, but indemnity and idleness with wage and 8, 10, or 12 hours of work. Experience has shown that the moral risk can be much better controlled where the insurance is granted by a body like a trade-union or a lodge. Here the knowledge the members have of one another's affairs affords a more efficient check upon malingering than any which a regularly established insurance company is able to use. Hence it is not surprising to find that by far the largest part of the insurance of workers against sickness and accident, in those countries where the government has not taken up the business, is in the hands of these organizations of the laborers themselves. For the development of governmental sickness and accident insurance, see Workingmen's Insurance.

Employers' Liability Insurance.—Closely allied to accident insurance is the insurance of employers against claims for damages arising from accidents to their laborers, so-called employers' liability insurance. This form of insurance, like the preceding, originated in England. It was introduced into the United States in 1886 by a London insurance company. There are now a number of companies engaged in the business in America. They no longer confine their operations to the employer's liability for accident to his employees, but cover also liabilities for accidents to persons not in the employ of the insured. Railroad corporations, construction companies, manufacturing concerns, protect themselves in this way. The risk varies greatly in different occupations and there is a corresponding variety of premium rates. The schedule of classifications adopted by the companies embraces nearly 1000 different kinds of risks. The development of the business in recent years has been greatly accelerated through the general extension by statute of the liability of the employer for indemnity for accident which he was not obliged to indemnify under the common law.

Unemployment Insurance.—Insurance of workers against loss of income on account of lack of employment presents greater difficulties than those involved in accident insurance. The moral risk here becomes very great. Such insurance has never been carried on successfully by commercial insurance companies. Many of the trade-unions pay out-of-work benefits to their members, but the business is not run on scientific insurance principles. In none of the benefits paid by the trade-unions is there any attempt to correlate the risk and the assessment, nor is there any separation of the insurance fund from the other funds of the union. Unemployment insurance has been tried by some of the Swiss communes, but with poor success. It is an unfortunate fact that insecurity of employment, which constitutes such a serious evil in the life of laborers, is a form of uncertainty with which it is extremely difficult for insurance to deal. See Workingmen's Insurance.

Fidelity and Surety Insurance.—Of the remaining forms of commercial insurance two are of special interest—fidelity and surety insurance and credit insurance. Fidelity insurance, according to the distinction made by the New York State Insurance Department, consists in giving bonds for the honesty of employees and public officials, while surety insurance consists in going on the bonds of administrators and executors of estates. This kind of insurance is interesting as illustrating the regularity in human conduct to which Quetelet first called attention. It is only because of the comparative regularity in the annual number of defalcations and similar crimes that the insurance company is able to assume the risk of such occurrences for a premium small enough to make the business practicable.

Credit Insurance.—Credit insurance undertakes to indemnify merchants and business men who give credit for losses through bad debts. This form of insurance was first introduced into the United States about 1890. The successful prosecution of this form of underwriting is extremely difficult, owing to the high degree of moral risk involved. To guard as far as possible against the abuse of the system by the insured, a very ingenious method was adopted. The insurance applied only to credits given to persons with a rating in the mercantile agencies, and the amount of credit to be given to them was usually limited to 20 per cent of their lowest capital rating. Moreover, the insurance did not apply to any particular credit, but was based on the average loss for a year. The person applying for insurance was required to furnish a statement of the amount of his credits and the amount of his losses from bad debts for a number of years, and the average annual ratio of losses to credits was ascertained. The insurance applied only in those years when the ratio of loss to credits exceeded the average, and covered only the excess of the loss above the average.

There are many other interesting applications of the insurance principle which must be passed over without notice. As indications of its possible development may be mentioned the following instances. The saloon keepers in a particular city form an association which undertakes to pay an indemnity to any member who is unable to secure a renewal of his license; the

newspaper publishers of Finland enter into an agreement to indemnify one another for losses incurred through the suppression of particular issues of their papers by the order of the Russian government; finally, the manufacturers of Austria bind themselves to pay indemnities for losses occasioned by strikes instituted by workers in their factories.

Preventive Activity of Insurance Companies.—In comparing premiums and indemnities for the purpose of ascertaining the actual cost of the administration of the insurance business, it is necessary to bear in mind the fact that insurance companies carry on other forms of activity besides guaranteeing indemnity. One of the most prevalent of these forms is their preventive activity, under which name may be included all the efforts which the companies make to prevent the occurrence of the event against whose consequences they grant insurance. The relative amount of such activity varies greatly in the different kinds of insurance. There is very little of it in life insurance. In accident insurance we find the companies distributing books and pamphlets containing information as to the first aid to the injured. It is in the insurance of property, however, that such activity is most common. In the case of elevator and steam-boiler insurance a very considerable part of the expense of management is due to the systematic inspection of insured elevators and boilers which the companies carry on.

In the early days of insurance the distinction between insurance and prevention was not very sharply drawn. The early English fire insurance companies, e.g., laid special emphasis on the service which they rendered the community through the maintenance of fire brigades. A survival of this confusion of ideas can be seen in the legislation of many of the States compelling fire insurance companies to support wholly or in part the fire service of the cities. Whatever payments the companies make for such service are made out of the funds collected from the insured. The injustice of compelling a limited number of property owners, the insured, to support such an institution as the fire department, intended for the benefit and use of the whole community, seems too obvious to need argument.

While life insurance companies do little or nothing to prevent the occurrence of loss, only a small part of their activity can be strictly called insurance. A very large proportion of the premiums they receive are rather in the nature of investment. The relation between the two forms of activity is discussed in the article on LIFE INSURANCE.

Reinsurance.—The custom of reinsurance which prevails to a great extent among insurance companies may be briefly described. To avoid the possibility of being called upon to pay excessive indemnities at any time, insurance companies are accustomed to limit the amount of insurance that they will carry on any one risk. The maximum risk carried by one company may be $10,000, that of another company $50,000. If a company insures a piece of property for more than the maximum risk it carries, it protects itself by reinsuring the excess in another company. The practice of reinsurance is naturally seldom found among mutual companies, but it is very common among stock companies. Many of the latter have from 10 to 20 per cent of the risks they have assumed reinsured, while occasionally one is found with three-fourths of its risks so protected. Conversely, there are companies which devote themselves entirely to the practice of reinsurance, issuing no policies directly to property owners.

Relation of the Government to Insurance. The economic and social value of insurance can hardly be overestimated. The application of the insurance principles in the production of wealth reduces materially the cost of commodities and services; the proceeds of life insurance policies keep many families from want or charity; while the peace of mind which insurance creates is certainly of great value. It is therefore of great importance that the system should be widely extended and that as many people as possible should enjoy its advantages. It is pertinent to inquire whether the management of insurance by private companies is as efficient as it ought to be; whether there are any a priori reasons for expecting better results from governmental management; and what has been the experience of such governmental insurance offices as have been already established.

The first requisite of a satisfactory system of insurance is security. In this respect no criticism can be brought against the older companies in the established lines of insurance. It must be admitted, however, that while many companies have of their own initiative adopted such methods as are calculated to secure their stability, many others have been reckless or even dishonest in their management. The total amount of money collected in the form of insurance premiums by companies which have failed to make the agreed returns to the insured is very large. The general high level of security in the insurance business in the United States is due to no small extent to the stringent requirements of the insurance departments in the various States.

The second requisite of a satisfactory system of insurance is cheapness, premium rates as low as is consistent with safety. In this respect the results of private underwriting leave much to be desired. As already pointed out, unrestricted competition would be both an imperfect and an extremely costly method of regulating rates. As a matter of fact, in the United States, competition has comparatively little influence in fixing rates or compelling economies of management. In all lines of insurance the rates are fixed by agreements, and the attempts of the legislatures of various States to reinstate competition by legislative fiat accomplish practically nothing. It may be true that in many cases the rates are none too high to cover losses and expenses as insurance companies are at present managed, but in many cases losses and expenses are unnecessarily high. It is one of the advantages of unrestricted competition that it forces the adoption of economical methods. In the insurance business, however, such competition as survives does not result in cheaper methods and a lower cost of insurance, but rather in the expenditure of larger sums in the attempt to secure new business, and in the presentation of more attractive but more expensive methods of settling policies. Moreover, altogether aside from the question of cost within a single company, large numbers of companies, and the consequent multiplication of managers, agents, and material equipment, greatly increase the cost of insurance. There is no other line of economic

activity in which the gain from production on a large scale is so great as in the insurance business.

With respect to security, governmental insurance clearly has the advantage. Nothing could be more secure than the insurance policy guaranteed by the government. With respect to cheapness the case is not so simple, though the advantage would probably be with the government office. The possible saving in the actual management of the business would be enormous, and the large scale on which governmental insurance could be carried on would greatly reduce its cost. It would be unnecessary for the government to accumulate large reserves when the number of the insured had become so great that the amount of loss was practically uniform from year to year. The only reason why there can be any uncertainty as to the comparative economy of governmental insurance and private insurance is that the government is generally a wasteful manager; but in this particular case the opportunities for economy are so numerous that it seems hardly doubtful that the net cost of insurance would be lower if the entire business were in the hands of the government. The difficulties in the way of governmental insurance are of a political nature, and that they are very serious cannot be questioned. The business would present unlimited opportunities for the manifestation of favoritism for the purpose of furthering personal and political ambition; so that while an ideally managed governmental insurance would be far preferable to the present system of private underwriting, the political evils which would result might be so great that they would overbalance the economic gain.

The experience of the governmental offices already established does not afford conclusive evidence either for or against public insurance. Public fire insurance offices have been maintained for many years by some of the Prussian towns and by some of the Swiss communes. All sorts of methods have been tried—governmental monopoly with compulsory insurance, governmental monopoly with voluntary insurance, compulsory insurance with choice of public or private office, and voluntary insurance with the same choice. The experience of the public offices is, on the whole, unfavorable to governmental insurance. The governments have generally found it necessary either to introduce a large amount of formality and supervision, thus rendering the business unpopular, or to adopt a loose classification of risks, which, in cases where the competition with private companies was allowed, resulted in the better risks going to the private companies with a more accurate classification and the poorer risks going to the government office. Finally, all these public offices are on so small a scale, generally limited to a single town or commune, that they have failed to realize the great advantage which comes from a large number of well-distributed risks, viz., the relatively slight fluctuation in loss from year to year.

The English government has for nearly 50 years offered life insurance to its citizens through the Post Office Department. It has made no attempt to develop the business, either through personal canvassing by its agents, after the manner of private companies, or through advertising. The amount of business written has been very small. This experience, however, is not conclusive as to the results of a similar experiment in the United States, where the habit of insurance is more thoroughly established than in any other country, except possibly New Zealand.

New Zealand furnishes the only example of a thoroughly successful governmental life insurance office. In this case, however, the success of the office has been largely due to the deliberate adoption of the methods of private companies, especially the solicitation of business through agents paid by commissions. This has prevented the office from realizing any great economies of management, and its rates do not differ much from those of private offices. New Zealand is said to have a greater per capita amount of life insurance than any other country, and a little over half the business is taken out through the public office.

The only feasible alternative to governmental management of the insurance business is governmental regulation of private companies. This is the method actually in use in nearly all civilized countries. The degree of regulation and supervision varies greatly from one country to another. There is as little of it in England as in any country, and as much of it in the United States as anywhere. In the latter country each State regulates the business within its own borders and imposes such restrictions on the activities of the companies as it sees fit. The most general provisions are the requirements of annual reports from the companies, exhibiting in detail the business for the preceding year, and the requirement of a reserve bearing a certain ratio to the amount of insurance in force. Some of the States have shown a disposition to impose vexatious conditions upon the companies, the only effect of which is to increase the cost of insurance within their borders. But however reasonable the laws of each State, considered by themselves, may be, the variation in the requirements of different States and the multiplication of reports and examinations impose a great deal of unnecessary expense on the companies, all of which in the end must come out of the policyholders. Insurance men and State officials alike join in the attempt to bring about greater uniformity among the requirements of the different States. It would be a great gain in this respect, as well as for other reasons, if the national government would take over the regulation and supervision of the insurance business. Unfortunately, the United States Supreme Court, in the case of Paul *v.* Virginia, has ruled that the business of insurance is not commerce; that consequently it is not interstate commerce when an insurance company incorporated in one State carries on business in another; and that, therefore, the regulation of the business is reserved to the individual States.

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zig, 1905). The work which, when it is completed, will undoubtedly be the most erudite and exhaustive in any language is the *Handwörterbuch des gesammten Versicherungswesen*, edited by Baumgartner, the first volume of which was published in 1897–98 (Strassburg). The annual *Cyclopedia of Insurance in the United States*, published by the Insurance Journal Company of Hartford, Conn., contains valuable digests of the insurance legislation of the various States and of judicial decisions affecting insurance, and also descriptions of the forms of policies issued by the different life insurance companies. Ehrenzweig's *Assekuranzjahrbuch* (Vienna, 1880) gives information about insurance in European countries. For statistics of the United States the best source of information is the *Reports* of the insurance departments of the various States. Among the more valuable of these reports are those of Massachusetts, New York, and Ohio. The *Spectator Year-Book* (New York, 1869 et seq.) gives full information about fire insurance in the United States. Consult also Martin, *History of Lloyds and of Marine Insurance in Great Britain* (London, 1876); Hugo Schramm-Macdonald, *Feuerversicherungswesen* (Dresden, 1883); Gow, *Marine Insurance* (London, 1895); Griffin, *Library of Congress List of Works Relating to Government Regulation of Insurance* (Washington, 1906); Richard, *Théorie mathématique des assurances* (Paris, 1908); Manes, *Einführung in die Versicherungspraxis* (Tübingen, 1908); Huebner, *Property Insurance* (New York, 1909); Gephart, *Principles of Insurance* (ib., 1911); id., *Insurance and the State* (ib., 1913). See Accident Insurance; Fire Insurance; Life Insurance; Marine Insurance.

INSURANCE OF TITLES. See Title Insurance.

INTAGLIO, ĭn-tăl'yo, *It. pron.* ēn-tä'lyō (It., incising, cutting into). The opposite of cameo (q.v.). While the design of a cameo rises above the background, that of an intaglio sinks below it. (See Gems.) In other words, a cameo is a relief (see Relief Sculpture), an intaglio is a hollow. In making a wood engraving (q.v.) background is cut away, leaving the part that is to print in relief like the design of a cameo; in making a copperplate the surface is *cut into* with burin or acid, leaving the design hollowed out like that of an intaglio. (See Engraving.) In order that seals (see Seal) may be in relief, the matrixes of the signet rings or stamps from which the impressions are made on wax or lead or clay, or in ink on paper, are cut intaglio.

INTAR'SIA. See Tarsia.

IN'TEGRAL CAL'CULUS. See Calculus.

INTEG'UMENT (Lat. *integumentum*, covering, from integere, to cover, from *in*, in + *tegere*, Gk. στέγειν, *stegein*, to cover; connected with OHG. *dah*, Ger. *Dach*, Icel. *pak*, Eng. *thatch*). The external coating or skin of animals. The term "integument" is also sometimes used synonymously with cell membrane, a product of secretion which serves for the support or protection of the cell.

Lower Orders. The cell integument found in certain Infusoria consists of a chitinous or cellulose membrane, which may even harden into a shell by the impregnation of carbonate of lime. In *Difflugia* this membrane becomes a case by its union with small foreign particles. The integument or body epithelium (epidermis) of the Cnidaria consists of one layer of epithelial cells. These cells may be ciliated or flagellate, and in this layer occur the stinging cells or nematocysts (q.v.). These stinging cells may be grouped in masses, in which case they are known as stinging knobs or stinging batteries. Moreover, in the ectoderm sensory, nerve, muscle, gland, and pigment cells may arise. In the flatworms a body epithelium occurs among this type only in Turbellaria. It is ciliated, and in it are glands, the so-called rods or rhabdites. In trematodes and cestodes its place is taken by an elastic cuticular membrane, usually perforated by fine pores. In nematodes and *Sagitta* it is a single layer, in some species ciliated. The entire outer surface of mollusks is covered by a single layer of epithelium which may be ciliated in regions not protected by a shell. In this layer are many unicellular glands or the ducts of others that have sunk below the surface of the epithelium. The shell of mollusks is a calcified cuticle. Stinging cells may occur in the integument of gastropods, although the pigment usually occurs in the deeper cutis. The integument of cephalopods is a cylindrical epithelium, and is made up of deep-lying connective tissue which contains contracting and expanding pigment cells, the chromatophores. The integument of echinoderms consists of a unicellular epithelium, and beneath it a layer of connective tissue of mesenchymatous origin. In the latter the skeletal structures develop. In some forms (Crinoidea, Ophiuroidea), particularly in adult stages, there is no sharp line of distinction between epithelium and cutis. The epithelium is covered by a cuticle, and in Asteroidea and Echinoidea it is ciliated over the whole surface; in other forms usually the food groove alone is ciliated. Unicellular glands and pigment cells also occur in the epithelium; while sensory cells, nerve ganglia, and fibres differentiate out of it. The integument of annelids consists of the hypodermis or body epithelium and an outer cuticle. The latter may be thin, with pores for cilia to pass through, or it may be a thick protective covering and offer support for the attachment of muscles. It may be chitinous or even calcified into a hard shell, and is either produced by gland cells in the hypodermis or else it is a product of the metabolism of these cells. The hypodermis may be so much reduced as to be little more than a strong cuticle, as in the case of the Polyzoa, where it is hardly recognizable. A basal membrane sometimes underlies the hypodermis.

Arthropods. The chitinous secretion of the hypodermis is still more strongly developed in arthropods than in worms. It covers the whole surface of the body and appendages, and is known as the exoskeleton, and to it the muscles are attached. As its presence is a barrier to the increase in size of the animal, it is thrown off from time to time, and its place is taken by a soft, flexible coating which has developed underneath it. The new coating soon hardens when exposed on the surface. See Molting.

Vertebrates. The integument or skin of vertebrates is an organ of much extension, but of little thickness. Physiologically it is one organ because its parts are closely united together and act together, and in most vertebrates they are easily separable from underlying tissues. The integument functions as an organ of support and protection to internal tissues and as an organ of secretion and excretion. Morphologically it is made up of organs of widely

dissimilar origin and histological character. It is divisible, however, into two layers. The outermost of the two is derived wholly from the ectoderm and consists of an epithelium of cuboidal or flattened cells. The inner layer is derived from mesenchyme and consists chiefly of fibrous connective tissue in which there is a large amount of secreted substance. The outermost layer is called the epidermis, the innermost the derma (or dermis), also corium or cutis. Each of these parts contains other organs.

Three types of epidermis may be distinguished: (1) that of *Amphioxus;* (2) that of fishes; and (3) that of the Amniota. The Amphibia occupy a middle ground between the second and third, in that their epidermis is at first fishlike and later similar to that of the Amniota. In the first type the epidermis consists of a single layer of cuboidal cells—the condition of the epidermis in all invertebrates. This type may be called unistratous. The second and third types differ from the first and agree with each other in that they possess more than one layer of cells; hence they may be called multistratous. The epidermis of fishes consists of many layers of columnar or cuboid cells, the more columnar ones lying at the base. There is a cuticle over the free surface provided with fine pore canals. From the essential similarity of the epidermal cells throughout, the epidermis cannot be divided. This type may therefore be called homostratous. The epidermis of animals that live in the air (Amniota) has become modified to withstand desiccation. There may now be distinguished in man, e.g., two regions in the epidermis—a deep one composed of active cuboidal cells and a more superficial one of flattened cornified cells. The first is known as the stratum mucosum, the second as the stratum corneum. These cornified cells have become such through gradual flattening of the deeper-lying cells, accompanied by a change in chemical constitution by which the cells are metamorphosed into keratin. These cells are gradually worn off and are replaced from the layers below.

In seeking a knowledge of the origin of the many-layered epidermis we must study the comparative ontogenetic and phylogenetic development of epidermis. At the time of gastrulation the ectoderm of mammals, from which alone the epidermis is derived, is unistratous. In this condition it is like the epidermis of all invertebrates. In this condition, too, it persists in *Amphioxus* to an adult stage. Quite early in the embryonic development of mammals, however, the nuclei arrange themselves in two layers as though forced to do so by pressure. Such a condition prevails in the human embryo of two months. (See EMBRYOLOGY, HUMAN.) The more superficial layer consists of flattened, transparent, hexagonal elements—the deeper layer of smaller cells; so that already a separation into a "stratum corneum" and "stratum mucosum" has appeared. This partly differentiated condition of the epidermis occurs in the amphibian larvæ. In the adult Amphibia the epidermis may become many-layered. The outer layer is cast from time to time in one piece in Amphibia and Reptilia. In birds and mammals the cornified cells are being constantly shed. In Amphioxus and fishes the epidermis is provided with a cuticula, while in some larval forms and in certain regions of adults it is ciliated. The epidermis is separated from the cutis by a basement membrane.

Types of Derma. The derma is composed of connective tissue and is derived from mesenchyme. This is a more compact layer than the looser subdermal tissue that lies still deeper. Three types of derma may be distinguished: (1) that of *Amphioxus*, consisting of a layer of flat cells, together with a gelatinous substance which they have secreted from their outer surfaces; (2) that of fishes and amphibians, in which the bundles of connective tissue run in two directions, parallel and perpendicular to the surface; (3) that of birds and mammals, in which the above-described distribution of connective tissue bundles is lost, and the boundary between derma and epidermis is no longer straight, but strongly corrugated. The derma sends up projections or papillæ into the epidermis. The derma of man belongs to this type, but in its ontogenetic development it passes through stages much resembling the first two.

Within the integument various structures are differentiated, such as pigment in granules or specialized cells; glands, both unicellular and multicellular—scutes or scales of reptiles, feathers of birds, hair, nails, hoofs, and claws; and dermal bones and teeth.

Dermal bones and teeth of higher vertebrates have probably been derived from the dermal bones or bony scales and the tooth structures of fishes. Neither *Amphioxus* nor cyclostomes possess any trace of an exoskeleton. Longitudinal and transverse rows of small denticles are present in selachians. Each denticle consists of a basal plate and a spine. The dentine of this scale is formed by the mesoderm, while the ectoderm forms the enamel which covers the denticle. The first impulse towards tooth formation seems to reside in the derma. The teeth of fishes are fused with the tooth cement. The teeth of some reptiles lie in sockets in the bone. The teeth of selachians lie in several rows upon the upper and lower jaws. Only one or two of these rows are functional at a time. The outer rows are replaced from time to time by the younger and inner rows. In mammals the process of replacement of teeth is limited in most cases to one occurrence, and the number of teeth is also limited. The gap in the number of teeth in selachians and mammals is bridged by the gradual reduction occurring in intermediate forms. Between scales and the teeth of selachians also intermediate forms occur. The dermal bones such as occur in the vertebrate skull, or in the pectoral arch of fishes, are homologous with the basal plates of the dermal denticles of selachians. They are probably formed by a fusion of such plates. The dermal skeleton is phylogenetically older than the endoskeleton, but it tends gradually to disappear the higher we ascend in the animal scale. Consult: Arnold Lang, *Text-Book of Comparative Anatomy* (2 vols., New York, 1895–06); T. H. Huxley, *Manual of the Anatomy of Vertebrated Animals* (ib., 1898); R. E. E. Wiedersheim, *Comparative Anatomy of Vertebrates* (3d ed., ib., 1907).

INTEGUMENT, IN PLANTS. A general term, but technically applied in seed plants to the specially developed coat of the ovule. The integument is usually not absolutely complete, leaving at the apex of the ovule a small opening through which the pollen tube enters, known as the micropyle, and at the opposite end of the ovule (chalaza) it is not distinguishable as a layer. The number of integuments varies in an

interesting way through the great groups of seed plants. In general the ovules of Gymnosperms have a single massive integument. Among Angiosperms the Archichlamydeæ and the Monocotyledons usually have two integuments; while the Sympetalæ, the ranking group of Angiosperms, are characterized by the single massive integument. The evolutionary history of the integument, therefore, is a single massive integument at the beginning, later two integuments, and finally a return to the single massive integument. It is usually in connection with the tissues of the integument that the hard seed coat (testa) is developed. See OVULE.

IN'TELLECT (Lat. *intellectus*, understanding, from *intellegere*, *intelligere*, to perceive, from *inter*, between + *legere*, to choose, gather). The common name for mental processes concerned in the function of cognition. The division of mind into intellect and desire (*νοῦς* and *ὄρεξις*), made by Aristotle, was retained by later thinkers to the time of Tetens and Mendelssohn, who introduced the threefold division into cognition or intellect, feeling, and conation or will. This classification, first clearly defined and expounded in English by Hamilton, has since remained current and fundamental in the psychology of common sense. In the older psychology a further distinction was drawn, in various ways, between higher and lower forms of cognition (see FACULTY), and intellect was thus marked off from sense or from sense and imagination. Kant's "pure intellect" is, similarly, an intellect freed in its operations from the intermixture of sense.

In structural psychology (see PSYCHOLOGY) the word "intellect" is employed, in rough accordance with historical usage, as a classificatory term covering the doctrine of sensation and its derivatives; its treatment involves the study of the formation of perception and idea, the association of ideas, memory and recognition, imagination, thought and reasoning. The word "intellection" is sometimes reserved for the formation of concepts and judgments and for reasoning. (See the discussion of these processes under LOGIC.) Functional psychology marks off and subdivides the intellectual functions in various ways; but the classifications appear to depend rather upon logical analysis than upon direct observation of mind, and no proposed grouping has found universal acceptance. In animal psychology and in applied psychology the parallel concept of intelligence betrays a similar lack of definiteness.

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IN'TELLEC'TUALISM (from *intellectual*, from Lat. *intellectualis*, pertaining to the understanding, from *intellectus*, understanding). The philosophical theory that the intellect, rather than the affections or the will, is the fundamental process of consciousness and therefore, on an idealistic interpretation of reality, the ultimate basis and support of all existence. It stands opposed to voluntarism and to certain forms of mysticism (q.v.) which emphasize the epistemological and metaphysical importance of the affections. In very recent philosophy pragmatism (q.v.) and Bergsonism (see BERGSON) represent strong protest against intellectualism.

INTEL'LIGENCE (Lat. *intelligentia*, discernment, from *intellegere*, *intelligere*, to perceive, from *inter*, between + *legere*, to choose, gather). In general, the capacity to cognize or understand, and, as such, synonymous with intellect (q.v.). In current usage, however, the terms are roughly differentiated. The intellectual man possesses special ability in dealing with the abstract and theoretical, while the intelligent man is efficient in concrete situations and practical affairs. So we speak of animal intelligence, in the sense of an ability to profit from sensory experience, and we refuse to speak of animal intellect, as seeming to imply a power to deal with abstract ideas.

Some writers on applied psychology (see PSYCHOLOGY, *Applied*) maintain that intelligence is essentially involved only in the higher mental processes. Accordingly we find it defined as "the capacity for thinking and judging," or as "the general capacity of an individual consciously to adjust his thinking to new requirements." Sometimes only the synthetic side of thinking is emphasized, and "the activity of intelligence" becomes "the activity of intuitive synthesis." Degree of intelligence is supposed to be measurable by the success achieved in certain mental tests. See MENTAL TESTS.

It is, however, an open question whether this general ability has any real psychological status. Some experimenters have found high correlations between the ranks of individuals in a group as assigned by very different mental tests, and also between ranking based upon tests and ranking based upon school marks or teachers' estimates. They have concluded that "all these performances, however different, depend partly upon a general common factor," viz., general ability or general intelligence. But good will on the part of the subject, ready understanding of instructions, and the like, may account for the consistently high rank attained by certain individuals; and the assumption that a number of identical simpler functions rather than a single general function is concerned, may explain the appearance of high correlations. Indeed, another experimenter "is tempted" to state that "there is *nothing whatever* common to all mental functions, nor to any half of them." In the face of such disagreement we can only say that the existence of a simple or separate "general function of intelligence" has as yet been neither proved nor disproved, though there is no reason to suppose that refinement of method may not ultimately lead to a definite result.

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INTELLIGENCE IN ANIMALS. The ability of an animal to profit by individual sen-

sory experience. (See INTELLIGENCE.) Thus, the ability of an animal to learn is usually taken as a measure of its intelligence. (See LEARNING IN ANIMALS.) Learning is most rapid in the presence of the free idea, since the immediate modification of behavior in accordance with a given end implies the presence of that form of experience. Thus, the free idea marks not only a high degree of mental development, but also a high degree of intelligence. (See ANIMAL PSYCHOLOGY; MEMORY IN ANIMALS.) Inferential imitation, which is a rapid form of learning, involving the free idea, is therefore a criterion of intelligence. See IMITATION IN ANIMALS.

Intelligence is frequently opposed to instinct by the opposition of the individually to the racially acquired, or of the finalistic to the mechanistic, or of the preperceived to the perceived. For a discussion of this topic, see INSTINCT, *Instinct and Intelligence*, and the references there given.

INTEM'PERANCE. See ALCOHOLISM; INTOXICATION; DRUNKENNESS; TEMPERANCE.

INTEN'SION OF A TERM. See CONNOTATION.

INTEN'SITY OF SENSA'TION (from Lat. *intensus*, p.p. of *intendere*, to stretch out, from *in*, in + *tendere*, to stretch, Gk. *τείνειν*, *teinein*, Skt. *tan*, to stretch). One of the five attributes of sensation, the others being quality, clearness, extent, and duration. Theoretically every sensation must possess a certain intensity in order to enter consciousness. In the sphere of vision, however, there exist certain facts which make it advisable, according to some psychologists, to eliminate the attribute of intensity. Variation of the amplitude of vibration of the stimulus acting upon the retina means in every case (so they declare) a qualitative change in sensation;

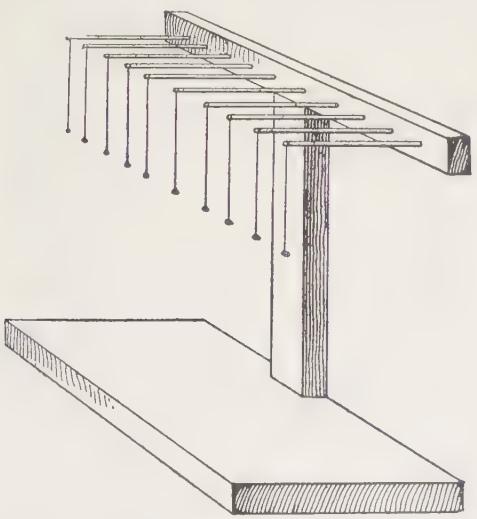

FIG. 1. APPARATUS FOR TESTING SENSITIVITY TO TOUCH.

The rack bears rods with cork pellets of different weights depending from them. The weight of the lightest of these cannot be perceived by the normal subject.

so that in this department of sense intensity merges in quality. This is the position of Hering and Hillebrand. König, on the other hand, maintains that there are two places in the spectrum (the one in the red and the other in the violet) where the qualitative change cannot be remarked. G. E. Müller has, furthermore, sought to overcome the difficulty by defining intensity as the distance of a sensation from its zero point. If two visual stimuli are both reduced, that sensation which reaches the zero point first has the less intensity. Müller also offers a theoretical

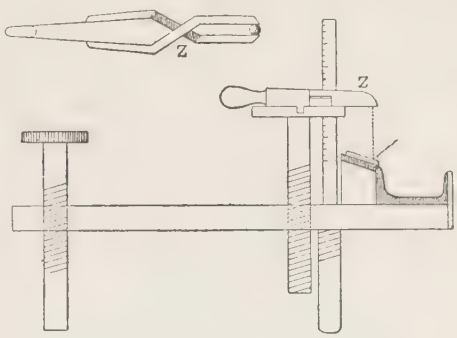

FIG. 2. APPARATUS FOR DETERMINING THE LIMEN OF SOUND INTENSITY.

The forceps *Z* containing a leaden ball is placed on the head of a micrometer screw. The ball is released by pressure of the forceps and falls, along the dotted line, on the slanting surface, which is covered with cloth and on which is laid a glass or copper plate. If all other conditions remain the same, the height of the fall regulates accurately the objective intensity of the sound stimulus.

explanation of the interdependence of visual quality and intensity. See VISUAL SENSATION.

The main problems of intensity are two: (1) that of the minimal intensity of sensation, and (2) that of the change in intensity of stimulus which is just noticeable in sensation. There must be, accordingly, a determination for each sense department of the intensive limen (q.v.) and of the intensive sensible discrimination.

The liminal intensity of *pressure* depends upon the place stimulated. With cork pellets as weights, it has been found to be 2 mg. upon the forehead, temples, and back of forearm and hand; 5 mg. upon the nose, hip, chin, and abdomen; 10 mg. upon the fingers; and 1 g. on the nails. By stimulating individual pressure spots with fine hairs, Von Frey obtained much lower values, averaging for the calf 1.44 gr. mm. and for the wrist 1.28 gr. mm. (where gr. denotes the pressure exerted by the hair, and mm. denotes the radius of its cross section). The *pain* limen, as recorded by the hair method, gives the following values in gr/mm², where mm² denotes the area of the cross section of the hair: over the epicondyle of the humerus, 30; over the radius, 20; over the kneepan, 49; over the olecranon of the ulna, 40; on the conjunctiva of the eye, 2 to 7. On account of the variation of the actual temperature of the skin, or the physiological zero point, the examination of the intensive sensitivity to *temperature* presents great difficulties. The sensitivity is greater over the lateral surfaces of the body than in the median plane; and, as a rule, it increases from the periphery towards the trunk. The values for both cold and warmth vary from 0.2 to 1.1° C., measured from skin temperature. The liminal intensity for *taste* depends not only on the concentration of the solution, but also on the area stimulated, the amount of movement within the buccal cavity, and the general condition of excitability of the taste nerves prevailing at the time. Furthermore, the tip of the tongue is most sensitive to sweet, the base to bitter, the

sides to sour, and the body to salt. The average limens have been found to be represented by the following figures, based upon a solution in 100 parts of distilled water: salt, 0.24; saccharine, 0.49; hydrochloric acid, 0.0063; sulphate of quinine, 0.00005. The intensity of *olfactory* sensations is likewise dependent upon the rate and manner of breathing, the rate of diffusion of the odorous vapor, and the general condition of the olfactory organs, as well as upon the amount of saturation of the air with the minute particles of the odorous substance. Current figures show that the limen is very low for some qualities; e.g., musk, 1/2000000 mg.; sulphureted hydrogen, 1/5000 mg.; bromine, 1/600 mg. In *audition* the existence of absolute silence is to be doubted. Most authorities agree that we can never get free from the noises caused by the pumping of the blood through the ears. Closing the ears, or standing with open ears near any reflecting surface, only intensifies the sound. The liminal intensity for *noise* may, then, be regarded as that intensity which is just perceptible above this internal sound. A cork pellet weighing 1 mg. and falling through 1 mm. upon a glass plate can just be heard at 91 mm. from the ear. A *tone* from a pipe giving 181 vs. per second is audible when the air particles set in motion by it possess an amplitude of excursion of only 0.00004 mm., and the mechanical work done by it upon the ear is 0.0033 mg. mm. Other investigations have placed the latter value much lower. The sensitivity to high tones is in general greater than that to low tones. The investigation of the limen of *light sensation* reveals a difficulty analogous to that cited in connection with the auditory limen. The existence of the "idioretinal light" precludes absolute sightlessness, as the "idioaural noise" precludes absolute silence. For external stimulation, the limen may be put at the illumination of black velvet by a stearin candle 9 meters distant. It has also been estimated (though incorrectly; the estimate is too high) at 1/300 the light of the full moon. In one-half second this light exerts upon the retina the energy required to raise 1/15 mg. of water 1/000000000000 of a degree C. For the liminal sensitivity to *articular* sensations, see MOVEMENT, PERCEPTION OF.

The investigations of the intensive sensible discrimination are included under Weber's law, a uniformity which may be stated thus: under constant conditions of experimentation, the ratio of the increment of stimulus, necessary to give a noticeably different sensation, to the existing stimulus is constant. The problem is, then, to discover whether this principle of the constancy of the relative difference limen is applicable to every sense department, and to ascertain the numerical value of the constant in those departments in which its applicability is established. E. H. Weber himself determined the constants for *pressure* as follows: with simultaneous application of the weights to both hands, 1/3; with successive applications to the same hand, 1/14 to 1/30; with simultaneously lifted weights (involving both pressure and strain sensations) 1/15 to 1/20; with weights lifted successively with one hand, 1/40. These figures have been modified by subsequent investigators; and indeed, since the limen varies with variation of experimental conditions, it is clear that all such measures have but a very rough significance unless accompanied by a statement of the circumstances under which they were obtained. The discriminability of *temperature* intensities varies with the part of the body tested, and especially, it seems, with the thickness of the epidermis. It varies also with the extent of the skin surface stimulated. With the whole hand involved, moderate temperatures differing by 1/20° C. may be discriminated. The region of finest discrimination seems to be that between 26° and 39° C. Cooling is noted sooner than warming, in the proportion of three to two. Of *taste*, little is known save that Weber's law holds approximately for bitter and salt. The phenomenon of "taste contrast" is a source of unavoidable disturbance in this field. A careful survey of the olfactory sense has confirmed the applicability of Weber's law to *smell*, and established the constant at 1/3 for 36 per cent of the substances tested and at 1/4 for 26 per cent. Most successful results are those obtained in audition. The relative sensible discrimination for *nōise*, tested by the gravity phonometer or the sound pendulum, remains constant at 1/3 within a wide range of intensities. Technical difficulties impede the observation of *tones*, but enough has been done to show that, at least within the central part of the scale, variations in tonal intensity follow the law. Work with *light* is subject to many sources of error—difficulties in securing standard conditions of adaptation, accommodation, etc. The many investigations which have been completed do not, therefore, concur as to the constant, which is variously estimated at 1/60, 1/100, 1/120, to 1/230. The value 1/110 may be assumed as a fair average. Of interest in this connection is an apparatus which can be employed to demonstrate the existence of the constancy or to indicate its numerical value. "Masson's disks" are white disks, on one radius of which a number of heavy black sections are marked. Upon rapid revolution there is produced a series of concentric gray rings decreasing in darkness towards the periphery. The same ring remains, within certain limits, just visibly gray when the illumination is changed.

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INTENT' (Lat. *intentus*, purpose, from *intendere*, to stretch, intend, from *in*, in + *tendere*, to stretch; connected with Gk. τείνειν, *teinein*, Skt. *tan*, to stretch, and ultimately with Eng. *thin*). In law, the purpose or design with which an act is done. Ordinarily the legal consequences which flow from acts are entirely independent of the intent or motive with which the acts are performed. This is true of all violations of the general rights, known as rights in rem, more commonly described as property and personal rights. Thus, the right to be free from trespass and the right to be se-

cure from violence or from arbitrary arrest do not depend in the least on the motive or intent of the person violating them. It is only in those cases in which the rights claimed flow from the engagements of a party, or in which the law has, from motives of its own, attached consequences to the intent with which an act is performed, that intent acquires any legal significance. Obviously any rights claimed under a will, a deed, or a contract flow from the intent of the person executing it, and, in certain classes of torts, a malicious or fraudulent motive may constitute the gravamen of the offense complained of.

But in all of these cases it is not the actual and secret motive, but the expressed intent which determines the legal character of the act in question. This is the real meaning of the rule which forbids the introduction of parol evidence to contradict or vary the terms of a written instrument. The grantor of land is not permitted to show that he intended to convey another and different parcel of land. He must stand by the intent as expressed in his deed. So, in a will, a legacy to A cannot, by proof of a contrary intention on the testator's part, be converted into a gift to B, nor can one who has sold a horse for $100 show that he intended to charge $150 for the animal. Analogous to this principle is the rule applied in those wrongs in which intent is an element, as in malicious mischief and certain cases of defamation and negligence. The person committing the injury is held to have intended the reasonable and probable consequences of his acts, and cannot exonerate himself from liability by showing that his intention was really of an innocent or benevolent character.

There are other classes of cases, however, in which the actual intent with which an act was performed is a proper matter for judicial inquiry. This is especially so in cases where the wrongful intent is the gist of the wrong, as in crime, deceit, and, under certain circumstances, in fraudulent conveyances. See CRIME; MOTIVE; DECEIT; FRAUDULENT CONVEYANCE; INTERPRETATION; and the authorities there referred to.

IN'TERAC'TION. The relation between two or more things or systems which mutually influence one another, and especially the theoretical relation of mind and body which involves such influence. Consult, for a typical statement of the theory of interaction, R. H. Lotze, *Microcosmus* (Leipzig, 1856–64; trans., Edinburgh, 1898). See BODY AND MIND; PARALLELISM.

INTERAM'NA. The name of several cities in ancient Italy. 1. Interamna Nahartium. (See TERNI.) 2. Interamna Prætuttianorum. (See TERAMO.) 3. Interamna Lirenas, 5 miles southeast of Aquinum, near the modern Pignataro Interamna. This town was founded as a Roman colony, in 312 B.C., to serve as a base of operations against the Samnites. On its site Roman ruins and ancient inscriptions have been found.

INTER'CALARY. A supplementary day or month. See CALENDAR; BISSEXTILE; LEAP YEAR.

IN'TERCEL'LULAR SYSTEM (from Lat. *inter*, between + Neo-Lat. *cellula, cellule*, dim. of Lat. *cella*, cell). The system of spaces in plants, often continuous, between the cells. They may be formed by the splitting of cell walls (schizogenously) or by the breaking down of masses of tissue (lysigenously). Spaces formed by splitting are found only in the higher plants and do not occur at all in plants below the mosses. When a tissue is very young, its cells are angular and in such close contact that there are no intercellular spaces; but as the cells grow older, they may become rounded, and the common walls may split at the angles, thus producing intercellular spaces of various extent. When the spaces are very large, as in the stems of water lilies (*Nymphæa*), they are called air chambers. Smaller intercellular spaces are almost universal in the spongy parenchyma of leaves, in the pith of stems, and in older parenchyma generally. To this category belong many glandular passageways, like the resin ducts of conifers, the mucilage ducts of cycads, the gum-resin ducts of the umbellifers, etc. Spaces formed by the breaking down of masses of tissue give rise to the hollow stems of grasses and many other plants. The cavities in the leaves of quillworts (*Isoetes*) and many other plants are also formed in this way. The oil glands of the orange and lemon, many glands on leaves which appear to the naked eye as "pellucid dots," the gum cavities in the tissues of cherry trees, are all examples of lysigenously formed glands. See MORPHOLOGY; AËRATION.

IN'TERCES'SION, DOCTRINE OF (Lat. *intercessio*, from *intercedere*, to intervene, from *inter*, between + *cedere*, to go). A doctrine of theology, based on certain passages of Scripture which are held to represent Christ, after having finished His redemptive work on earth and ascended into heaven, as pleading with God on behalf of those whom He has redeemed (Rom. viii. 34; Heb. vii. 25; 1 John ii. 1). It was not meant to imply, however, that God needs to be interceded with, as if He were still reluctant to forgive men, or that Christ's intercession makes Him more merciful than before. The intercessory work of Christ is to be regarded rather as His activity in behalf of all men, and especially of His followers. The doctrine of the intercession of Christ is held alike by Protestants and Roman Catholics; but the latter, in addition, believe in the intercession of the Virgin and the saints, on which see SAINT. Islam also has a doctrine of the intercession of Mohammed for his followers on the day of judgment.

IN'TERCOLUM'NIA'TION (Lat. *inter*, between + *columnar*, column). The clear space between two columns, measured where the diameter is greatest, sometimes, but incorrectly, used of the spacing measured from axis to axis. In classic and neoclassic architecture names are given to certain spacings according to Vitruvius (bk. iii, chap. 2) as follows: *picnostyle*, to an intercolumniation of 1½ diameters; *systyle*, of 2 diameters; *eustyle*, of 2¼; *diastyle*, of 3; *arœostyle*, of more than 3 diameters. See ORDERS OF ARCHITECTURE.

IN'TERDICT (Lat. *interdictum*, prohibition, from *interdicere*, to forbid, from *inter*, between + *dicere*, to say, Gk. δεικνύναι, *deiknynai*, Skt. *diś*, to point out; connected with Goth. *gateihan*, to tell, OHG. *zīhan*, Ger. *zeihen*, AS. *teon*, to accuse). An ecclesiastical censure or penalty in the Roman Catholic church, which deprives the faithful of certain sacraments (q.v.), of participation in the celebration of the divine offices, and of ecclesiastical burial. Interdicts may be of three kinds—personal, local, and mixed. When the censure affects only some designated individuals, it is called a particular personal interdict. When it affects a whole community or

corporation, it is called a general personal interdict. A local interdict affects only such individuals as are present in a designated place and can be avoided by removing from the place. A particular local interdict affects only a single monastery, church, or seminary. A general local interdict applies to an entire parish, city, province, or kingdom. In such general censures certain churches are usually excepted. Lastly, mixed interdicts affect both a locality and all its inhabitants wherever they may go, or a person and any place in which he or she may be. The last is called an ambulatory interdict. The principle on which this ecclesiastical penalty is founded may be traced in the early discipline of public penance, by which penitents were for a time debarred from the sacraments, and from the privilege of presence at the celebration of the Eucharist. It grew out of excommunication (q.v.) and at first was called a general excommunication. Then it usually deprived the persons who dwelt in the excommunicated place of all sacraments. From 375 on, there are instances of such general excommunications. But the interdict proper took its peculiar form, although not its name, in northern France in the ninth century. It was adopted by the Popes about the middle of the eleventh century, and the term "interdict" was used in its technical meaning by 1031. It came into use as an ordinary Church censure in the frequent conflicts of the ecclesiastical and civil power. It was designed to awaken the popular conscience to the nature of the crime, by including all alike in the penalty with which it was visited. In this way public pressure could be brought upon the rulers who had offended. The most famous interdicts are those laid upon England in 1208, upon France in 1200, and on Venice in 1606. The description of England under the interdict named, as detailed by some of the contemporary chroniclers, presents a striking picture of the condition of a country where the interdict was obeyed. It would be a great mistake, however, to suppose that during the continuance of an interdict the people were entirely destitute of spiritual assistance. The severity had been greatly lessened by the middle of the eleventh century; it was permitted to administer baptism, confirmation, penance, and the Eucharist in all cases of urgency; privately to confess and absolve all who were not personally the guilty participators in the crime which the interdict was meant to punish; to celebrate marriage, with only the witnesses present; and to confer orders in cases of necessity. Gregory IX allowed mass to be said once a week, behind closed doors, in order to consecrate the host for the use of the sick; Boniface VIII permitted the offices to be said in the churches, but the laity were to be excluded; public celebration of services was allowed on Christmas, Easter, Pentecost, the Assumption of the Blessed Virgin, the festival of Corpus Christi, the festival of the Conception, and a few other occasions. The Council of Basel enacted very stringent rules as to the use of this penalty, and in later times the general interdict has been entirely disused. The interdict on Venice in 1606 is often cited as the last one pronounced, but occasionally, in very special circumstances, and to mark the horror of the church for some enormous crime, later instances are recorded in which a particular place or church has been visited with the penalty of a local interdict. Interdict differs from *excommunication*, in that those under the censure are not given over to eternal damnation. It differs also from *suspension*, which applies only to ecclesiastics.

Consult: Ducange, *Glossarium ad Scriptores Mediæ et Infimæ Latinitatis* (3 vols., Paris, 1678; ed. by Favre, 10 vols., Niort, 1884–87); Kober, "Das Interdict," in *Archiv für katholisches Kirchenrecht*, vols. xxi, xxii (Mayence, 1869); Hinschius, *Das Kirchenrecht*, vol. v (Berlin, 1895); E. B. Krehbiel, *The Interdict: Its History and its Operation* (Washington, 1909).

INTERDICT. In the civil law, a judicial process analogous to the injunction of English and American law. In its earliest form in Roman law it was a peremptory decree of the prætor, restraining any interference with property the right to the possession of which was in dispute. It seems still, in the modern civil law, to be generally restricted to prohibitions as to the possession of property, though in Scotland the term is applied to any process of the Court of Session restraining the performance of an unlawful act. An interdict is not, however, limited to the prohibition of contemplated acts, but may also be employed to compel the restitution of property of which a person entitled to possession has been forcibly deprived, and to compel the presentation, or "exhibition," of an account. Interdicts are accordingly classified, according to the purpose sought to be effected, as prohibitory, restitutory, and exhibitory. See INJUNCTION; and consult the authorities referred to under CIVIL LAW; and John Erskine, *Institute of the Law of Scotland* (Edinburgh, 1773; new ed., 1898).

INTERDIC'TIO A'QUÆ ET IG'NIS. See EXILE.

IN'TERDIC'TION. A process of the civil law employed for the purpose of depriving a person who is *non compos mentis* of the control of his property and, on occasion, of other civil rights. The process is analogous to the inquisition in lunacy (q.v.) of English and American law, whereby the incapacity of a person to manage his own affairs may be inquired into and the management of his interests committed to a guardian or trustee. The jurisdiction thus exercised is as old as the Twelve Tables, but it was originally employed only to restrain prodigals from dissipating their estates. By modern codes it is generally confined to cases of imbecility and lunacy. In such cases interdiction may be only partial, the interdicted person being forbidden to sue, to borrow, to pledge or hypothecate his property, or to make any conveyances without the consent of the court; or it may be complete, in which case a guardian or curator is appointed and the management of the affairs of the interdicted person committed to him. The practice in Scotland, Louisiana, and Quebec is substantially the same as in the continental states, whose legal systems are borrowed from that of Rome. Consult the authorities referred to under CIVIL LAW; also John Erskine, *Institute of the Law of Scotland* (Edinburgh, 1773; new ed., 1898).

IN'TERES'SE TER'MINI (ML., interest in a term). At the common law, the interest which a tenant for years has in the lands leased to him, before he has entered upon them. The lease is regarded as conferring only an inchoate title or

estate, which requires an entry by the tenant to perfect it. But though the *interesse termini* falls short of being a complete leasehold estate, it is yet more than a mere chose in action (q.v.) or right of entry (q.v.). It is a true interest or estate, a right in rem (q.v.), capable of alienation and of transmission upon the death of the tenant to his personal representatives, and generally in the United States the same remedies are available for its protection and recovery as in case of the perfected estate. The principal common-law disability of the tenant for years who had not entered into possession was that he was incapable of acquiring the full legal title by release from the lessor. See LEASE; LEASEHOLD; RELEASE.

IN'TEREST (OF. *interest*, Fr. *intérêt*, interest, from Lat. *interest*, it concerns, 3d pers. sing. pres. ind. of *interesse*, to concern, from *inter*, between + *esse*, to be). A certain profit or premium for the use, forbearance, or detention of money. In spite of the natural feeling that the payment of interest was a hardship, and that to exact interest from a borrower was to take an unfair advantage of his necessities, all the chief peoples of antiquity recognized that interest might lawfully be stipulated in connection with a loan and might be awarded in the discretion of the court even when no such stipulation had been made. Babylonian tablets show ordinary loans at moderate interest, and also maritime loans, in which the claim of the creditor for his principal was extinguished by the loss of the ship and on which a much higher rate of interest was exacted. It was very common among the ancient Hebrews, and the Mosaic law contains a prohibition against the taking of usury (or interest, as it should have been translated) from the Jews, but permitted it as to all other races. The Greek and the Roman laws recognized interest. The Romans called it payment for use (*usura*) and assimilated it to the natural yield or increase derived from organic nature by classing it, with rent, among civil or legal fruits (*fructus civiles*). They did not limit it to the loan of money exclusively: any generic or fungible things, like wheat, wine, or oil, could be stipulated.

Aristotle speaks of it, but condemns it as vicious, holding that money is "naturally barren" and that to make it "breed money" is preposterous and a perversion of the end of its institution, which, he declared, was to serve as a medium of exchange and not for purposes of increase. Through a misconstruction of the real intent and purpose of the law of Moses, which was clearly a political and not a moral precept, and following the curiously narrow philosophy of Aristotle on this subject, the Christian Church and laymen early condemned the custom and held any interest to be usury and against good morals. The secular law in Christian nations naturally followed the ecclesiastical in those times, and the taking of interest was forbidden in England from the reign of King Alfred in the ninth century to the time of Henry VIII. The prohibition of interest led, of course, to many evasions; and to one of the most ingenious and successful of these the word "interest" owes its modern technical meaning. At Roman law, interest (*quod actoris interest*, the difference to the plaintiff) meant damages. The Church itself did not deny that one from whom money was wrongfully withheld was entitled to damages. Contracts for the repayment of money loaned were accordingly so drawn as to insure a technical default on the part of the borrower, and the damages to be paid on default were stipulated in advance. The prohibition of interest led also to the development of new legal institutions like the *commandita*, or silent partnership, in which payment for the use of money took the form of a share of profits. The prohibition of interest was generally rescinded by secular legislation before or at the close of the Middle Ages; in Germany, however, not until 1577. By the Statute of 37 Hen. VIII, c. 9, in 1545, interest to the amount of 10 per cent per annum was permitted. This was accomplished in a negative manner by simply providing penalties for taking more than that amount, thus giving only an indirect sanction to taking it at all. By Statute of 12 Anne II, c. 16, 5 per cent was fixed as the maximum amount of interest which could be demanded. In the United States the demand of interest on money due has always been recognized as just. However, the right to interest exists only by virtue of such statutes or by agreement of parties and does not follow necessarily as a legal right from the mere fact that one has another's money in his possession or owes him money by contract. For example, in the absence of statute or agreement, if A loans B $100 to be paid on demand, A may demand payment five years hence, but is not entitled to interest for that time; and even under such statutes interest does not begin to accrue until money is due and payable, because not until that time is there an unjust detention from the owner. Previous to the debt becoming due, the matter is, in contemplation of law, regulated by agreement of the parties.

The statutes in most jurisdictions provide that interest shall be allowed at a fixed rate on all sums when they become due, as on a debt for goods sold and delivered when the period of credit has expired. It is not customary, however, to exact interest in such cases unless the creditor is forced to sue on his claim. In some States and in England interest is allowed in certain tort actions on the amount of the damages awarded from the time the claim accrued, but this is not the general rule.

A distinction is usually made between the rate which will be allowed by law, usually called the legal rate, where it is not agreed upon by the parties or where allowed by operation of law, as on a judgment, and the maximum rate which may be stipulated for by contract, sometimes known as the conventional rate. For example, in Ohio the statutes provide that 6 per cent shall be allowed on all sums on which interest is chargeable by operation of law, as on a judgment after its entry, and on sums due where no rate is agreed upon by the parties, whereas 8 per cent may be legally demanded if provided for by express contract.

In Great Britain, after the existence of rigorous measures against excessive interest for centuries, all statutes against usury and fixing rates of interest were repealed by the Act of 17 and 18 Vict., c. 90 (1854). The power of the court of equity to relieve against unconscionable bargains as to interest still exists; and in 1900, by the Money Lenders' Act, special provision was made for setting aside a contract made with a professional lender of money where an oppressive rate of interest is charged. In France the legal

rate is 5 per cent, but more may be demanded by contract.

The following are the rates of interest fixed by law January, 1914, in the States and Territories of the United States:

STATES AND TERRITORIES	Legal rate per cent	Rate allowed by contract per cent
Alabama	8	8
Alaska	8	12
Arizona	6	10
Arkansas	6	10
California	7	any
Colorado	8	"
Connecticut	6	6
Delaware	6	6
District of Columbia	6	10
Florida	8	10
Georgia	7	8
Idaho	7	12
Illinois	5	7
Indiana	6	8
Iowa	6	8
Kansas	6	10
Kentucky	6	6
Louisiana	5	8
Maine	6	any
Maryland	6	6
Massachusetts	6	any
Michigan	5	7
Minnesota	6	10
Mississippi	6	10
Missouri	6	8
Montana	8	any
Nebraska	7	10
Nevada	7	any
New Hampshire	6	6
New Jersey	6	6
New Mexico	6	12
New York	6	6
North Carolina	6	6
North Dakota	7	12
Ohio	6	8
Oklahoma	6	10
Oregon	6	10
Pennsylvania	6	6
Rhode Island	6	any
South Carolina	7	8
South Dakota	7	12
Tennessee	6	6
Texas	6	10
Utah	8	12
Vermont	6	6
Virginia	6	6
Washington	6	12
West Virginia	6	6
Wisconsin	6	10
Wyoming	8	12

These rates are occasionally changed by statute, but there has been comparatively little variation in recent years. An interesting fact is that several Eastern States, as Massachusetts, have removed all limitations on rates by contract, and in New York any rate may be charged by contract on loans exceeding $5000 payable on demand, and known to the financial world as call loans.

The usual method of calculating interest is to compute it on the principal sum originally due for the period which has elapsed at the time of computation, but by agreement compound interest may be allowed; i.e., the arrears of interest for each year are added to the principal sum and interest for the following year is computed on this accumulation, and so on, thus giving the investor interest upon interest. It is customary to compute interest in this manner upon deposits in savings institutions.

In popular usage interest is the payment made by a borrower for the use of a sum of wealth for a definite period of time; it is expressed as the ratio which that payment bears to the value of the wealth loaned—the principal. In economic theory the term "interest" is used in a broader sense and signifies the return for the use of capital, whether the employment of capital is made directly by its owner or by another person to whom it has been loaned. In the latter instance it appears as a sum paid by the borrower over and above the amount received in loan. It is calculated at a certain percentage of the capital to be paid annually. Economists distinguish from interest that part of the gross product which is necessary to replace the original capital, and the extra return to capital which appears in enterprises involving risk of loss, as well as chance gains and the abnormal return due to superior management. The last three forms of income are usually classed under the head of profits (q.v.).

Loan or contract interest may be paid for wealth for immediate consumption as well as for wealth which is employed as capital. In the earlier stages of industrial development, when little capital was used, loans normally assumed the former character. Money was loaned to those persons who were in temporary distress or to spendthrifts who desired to anticipate future revenues. In either case the repayment of the principal was a hardship and the additional payment of interest, usually calculated at a high rate because of uncertainty of repayment or because of the necessities of the borrower, was peculiarly vexatious. This fact is a partial explanation for the canonical and civil prohibitions of interest mentioned above. This was the case in ancient and mediæval nations, and much the same attitude survives in backward communities of the present day. With the development of capitalistic production the gain to the borrower who invests the wealth borrowed in productive enterprise became so obvious that the opposition to interest declined and no longer exists among business men.

In competitive industry there is a close connection between loan interest and the return to capital. It is obvious that a justification for loan interest lies in the fact that had the owner of the capital employed it himself he could have secured a return from its use. When he turns it over to some one else he foregoes this return and must be compensated for it. It is immaterial whether the lender would have used his capital in productive enterprise or whether the borrower does so. The fact that it might be so used establishes a claim for compensation. Such an explanation does not make it clear why the owner of capital secures a return for its use, but admitting that in the present economic order he does so, it explains why the borrower pays interest upon a loan. It also serves to indicate certain limits upon the rates of interest under normal circumstances. Lenders cannot demand more, nor can borrowers expect to pay less than the return normally expected from the employment of capital in productive industry.

Explanation of the phenomena of interest must be sought in the laws which make it possible for capital to produce a net return. A large number of theories have been advanced to explain the existence of net return to capital. (See POLITICAL ECONOMY.) We may notice here three theories which have attained the largest following: (1) the *abstinence* theory, which regards interest as a reward for the abstinence which the capitalist exercises in em-

ploying his wealth for productive purposes instead of consuming it unproductively; (2) the *productivity* theory, which lays emphasis upon the fact that capital represents an instrument which greatly increases the efficiency of labor, and therefore normally entitles its owner to a reward; and (3) the *exploitation* theory, which regards labor as the sole source of wealth, the income known as interest being merely a tribute to the capitalists who hold a monopoly of the opportunities for employment.

In recent economics a variety of the abstinence theory has gained a large following under the leadership of Professor Böhm-Bawerk, who explains interest as a result of the universal undervaluation of future goods as compared with present goods. The productivity theory finds its foremost champion in Prof. J. B. Clark. In his view capital, as a limited agent capable of increasing the output of industry, is productive in the same sense in which labor is productive, and the measure of this productivity is the loss to industry which would result if the least important portion of capital were withdrawn. In explaining the laws which govern interest Prof. Alfred Marshall and his followers take a position midway between the productivity and abstinence schools. The rate of interest depends upon the relations between the demand and the supply of capital. The demand for capital varies with the opportunity for its productive employment; the supply varies with the readiness of individuals to postpone consumption to a future date. If productivity is high, the inducement to save is correspondingly great, and consequently the supply of capital increases. With increase in supply of capital, its productivity declines, until no reason exists for further creation of capital. The rate of interest, therefore, tends to become fixed at the point where the productivity of capital is just sufficient to compensate those who save for the disadvantages which attend the postponing of consumption, or "waiting."

In Böhm-Bawerk's theory the productivity element is admitted among the causes for the undervaluation of future goods. Since present goods can be used to institute fruitful productive operations requiring a long time for their consummation, present goods are "technically superior" to future goods. The theory of Böhm-Bawerk, stripped of all productivity implications, serves as the basis of the interest theories of F. A. Fetter and Irving Fisher. In the view of these economists, preference for present goods is the sole possible explanation of interest.

Bibliography. Eugen Böhm-Bawerk, *Kapital und Kapitalzins* (2 vols., Innsbruck, 1884–89; trans. by William Smart, New York, 1890–91); Marx, *Capital* (London, 1887); Marshall, *Principles of Economics* (3d ed., ib., 1895); Clark, *Distribution of Wealth* (ib., 1899); Fetter, *Principles of Economics* (ib., 1904); Gonne, *Interest and Saving* (ib., 1906); Fisher, *The Nature of Capital and Income* (ib., 1906); id., *The Rate of Interest* (ib., 1907); Eugen Böhm-Bawerk, *Positive Theorie des Kapitales* (Innsbruck, 1912).

INTEREST, IN PSYCHOLOGY. An affectively toned attention, or a relatively permanent susceptibility to that state. We say popularly that an accident or a mysterious event "excites" our interest, or that a person whose attention goes easily to chess problems and coins "has" or "shows" an interest in chess or in numismatics. The psychologist, however, must keep the two meanings of the term separate.

The problem of interest, in the first sense, is the problem of the relation of affective processes to the clearness of sensory processes in attention (q.v.). Several views as to the nature of this relation have been held. It has been said, e.g., that feeling is a condition of (or an incentive to) attention. But, if that were the case, feeling would necessarily precede attention; and since the verdict of introspection is directly against such a sequence, this view cannot be accepted. It has been said, again, that feeling and attention are merely two aspects of the same state; feeling is the "reaction of apperception upon sensory contents." The universal concomitance of feeling and attention is here affirmed, and the existence of a state of attentive indifference is denied. The contention seems plausible. We are wont to think of attention as a sporadic and occasional matter; we are now attentive, now inattentive; and when we attend, it appears, we always feel. Attention, however, defined psychologically as clearness, is not an occasional, but a normal, state of mind; what is popularly called inattention is, in fact, only an indication of attention to "something else." If we recognize this fact, and if we distinguish carefully between feeling and the organic sensations with which it is likely to be confused, we find that states of attentive indifference are in reality frequent. This second view, therefore, must also be given up. A third view, which admits a close relation between feeling and attention without maintaining their universal concomitance, is still possible. We may suppose that, originally, attention did imply feeling; the conditions of primitive attention were conditions of a powerful impression of the nervous system; and such conditions are very likely to lead to the arousal of feeling. But the attentive consciousness, like the action consciousness (see ACTION; IMPULSE), seems to have become simplified in the course of development; so that we now have what we may call a mechanized or reflex attention, without affective concomitant. Interest, in fine, arises only when the conditions both of attention and of feeling are given, and then only when the balance is poised between the attentive indifference with which we meet the habitual and customary, and the dominance of consciousness by emotion. See EMOTION.

Taken in the second sense, interest sets for psychology the problem of the conditions of special susceptibility to emotively tinged attention. Why does one man delight in mechanical, another in artistic, objects and activities? The conditions of such an interest are to be found in mental constitution (q.v.), in the inherited and acquired determining tendencies which facilitate and inhibit associations. (See DETERMINING TENDENCY; ASSOCIATION OF IDEAS.) Herbart and his followers have made this sort of interest of primary importance in the theory of education. The child, they say, cannot learn things entirely new, but only such things as can be assimilated to his present stock of ideas. (See APPERCEPTION.) Interest is most easily aroused where an object has many relations to past experience. Instruction, therefore, should build carefully on the foundations of knowledge

already present and in the direction of preëxisting interests. A correct theory of education, however, must take into account the fact that natural interests are not necessarily the most valuable, and that voluntary attention is a necessary stage of mental progress. There is, moreover, at times a pedagogical advantage in confronting the pupil with statements which are wholly novel, and perhaps even contradictory of his previous ideas; for these ideas may well be incorrect, and novelty of content tends to make a statement impressive.

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IN'TERFER'ENCE (from *interfere*, from OF. *entreferir*, to exchange blows, Fr. *interférer*, to interfere, from Lat. *inter*, between + *ferire*, to strike). In any medium capable of transmitting waves the effect at any point when two trains of waves are passing simultaneously is the sum of the effects which each wave by itself would produce, provided that the amplitudes of the waves are small compared with the wave lengths; so that the resultant motion is the combination of the two waves. This is called interference. The interference of two trains of waves on the surface of water is often seen. The phenomenon of beats in acoustics (q.v.) is due to interference. Waves in all media, air, water, the ether, etc., can be made to interfere; and, conversely, if interference phenomena occur in connection with any physical action, it is evident that this action must be due to wave motion. One of the most important illustrations is the formation of "stationary vibrations," or "standing waves," e.g., the vibrations of air in an organ pipe, Lippmann's method of color photography, etc. The first application of the principle of interference in the explanation of physical phenomena was made by Newton in his *Principia*, in accounting for a remarkable tidal effect described by Halley in the *Philosophical Transactions* for 1684. The next applications were made by Thomas Young in 1800 in explaining various phenomena in acoustics, notably that of beats. Young almost immediately extended the principle to many observations in the field of light. He was convinced that light was due to waves in the ether and devised several new experiments in order to test his theory.

One of the simplest cases of interference is when two identical trains of waves are sent out from two vibrating sources close together. At any point whose distances from the two sources differ by half a wave length, by three half wave lengths, or by any odd number of half wave lengths, the action of one train of waves is permanently neutralized by that of the other; whereas, at any point whose distances from the two sources are equal, or differ by a whole wave length, or by any number of whole wave lengths, the action is twice what it would be, due to either train of waves by itself. Thus, let light of one definite wave length, i.e., of a definite color, e.g., yellow, be passed through a narrow slit in an opaque screen and fall upon a second opaque screen in which there are two other narrow slits parallel to the first and at equal distances from it; if this pair of slits are close together, and if the light from them falls upon a distant screen of some kind, there will be bands of colored light upon it, separated by dark bands where the action of the waves from one slit is neutralized by that of the waves from the other. The device of having the two slits illuminated by light coming from the first slit is in order to secure two *identical* sources of waves; for if the sources were to send out different waves, or waves without any definite phase relation, there could be no permanent interference. In a perfectly similar manner waves in the air produced by whistles may be made to give "interference bands" of silence and sound. The distance apart of the bands in any case evidently varies directly as the wave length of the trains of waves. (See LIGHT.) This experiment was devised by Thomas Young in order to test the nature of the agency causing light.

Another case of interference is seen in the beautiful colors of soap bubbles, of thin films of oil on water, etc. These colors are due to the fact that, when white light falls upon the thin transparent film, some is reflected at the first surface, and of the light that enters the film some is reflected at the second surface and the rest transmitted. There are, of course, a series of internal reflections, and, looking at the film from either side, the eye receives waves which have passed over paths of different lengths. There is also a difference in the character of the reflection at the two surfaces of the film, which is equivalent to a difference of path. If the difference in phase is such as to amount to half a wave length or any odd number of half wave lengths of waves of any definite wave length, they will be absent from the light received by the eye. But white light from which any train of waves is absent will appear colored, having the color complementary to that of the absent waves. Since energy cannot be destroyed, the colors seen on viewing the film by reflected and by transmitted light will themselves be complementary, assuming that the film itself does not absorb any light.

INTERFERING. See HORSE.

IN'TERIM (Lat., in the meantime). The name given to three attempts made in Germany during the Reformation to draw up a formula which might serve as a basis of agreement between Catholics and Protestants until the points of difference could be decided by a general council. The *Ratisbon Interim* was the result of the deliberations of a commission appointed during the Diet of Ratisbon in 1541, of which Eck, Pflug, and Gropper were the Roman Catholic, and Melanchthon, Bucer, and Pistorius the Protestant members. On the greater number of doctrinal points the commission found it possible to agree on terms which might be deemed consistent with the views of both parties; but as to the sacraments and the power of the Church, the differences were irreconcilable. At the next Diet at Augsburg in 1548 a new interim at the command of the Emperor, Charles V, was prepared by Pflug, Helding (Sidonius), and Agricola. It is called the *Augsburg Interim*. In it the use of the cup by the laity, the marriage of priests, and some other minor things were conceded to the Protestants; but it met with very general opposition, particularly in the north of Germany, and was revoked in 1552. By

the exertions of the Elector Maurice of Saxony, a third interim, the *Leipzig Interim*, or the *Great Interim*, was adopted at the Diet of Leipzig, Dec. 22, 1548, which guarded the Protestant creed, but admitted great part of the Roman Catholic ceremonial and recognized the power of popes and bishops when not abused. It was the work of Melanchthon, Bugenhagen, Cruciger, Major, Eber, and Pfeffinger. It proved no more satisfactory than those which had preceded it and gave rise to the adiaphoristic controversy. (See ADIAPHORISTS.) Consult: Druffel, *Briefe und Acten zur Geschichte des 16. Jahrhunderts* (Munich, 1875); Beutel, *Ueber den Ursprung des Augsburger Interims* (Dresden, 1888); T. M. Lindsay, *History of the Reformation*, vol. i (New York, 1906–07).

INTE'RIOR, DEPARTMENT OF THE. One of the 10 executive departments of the United States government, whose chiefs constitute the President's cabinet. It was organized in 1849. At its head is the Secretary of the Interior, whose salary is $12,000, and associated with him are two assistant secretaries whose salaries are $5000 and $4500 respectively. The scope of this department is wide and diversified. It has supervision of Indian affairs; of the public lands, including mines; of pensions; of patents; of the census, when directed by law; of the geological survey; of education; of the custody and distribution of public documents; of railroads which have received subsidies from the United States; of the Territories; of national parks and reservations; of certain charitable and penal institutions in the District of Columbia; of the returns office in which are filed returns of contracts made by the Secretary of War, the Secretary of the Navy, and the Secretary of the Interior, and of some other miscellaneous business. Most of the bureaus into which the department is divided are presided over by commissioners, appointed by the President by and with the advice of the Senate; but the Secretary's office is the great clearing house of the department, and the various commissioners are subject to the Secretary's directions in the performance of their executive duties.

INTERIOR BALLIS'TICS. See BALLISTICS.

INTERIOR DECORA'TION. The art of decorating and furnishing the interiors of a building, especially the important rooms of a residence. The purpose of the present article is to supply the historic and decorative background likely to be of special service to those who buy, install, or make furniture, rugs, wall paper, draperies, lamps, etc. The styles treated are: Gothic, Renaissance, Elizabethan, Jacobean, Louis XIV, Louis XV, Louis XVI, Empire, Charles II, William and Mary, Queen Anne, Georgian, and Adam. For the other historic styles, see ARCHITECTURE; FURNITURE.

Classic v. Romantic. In the world of decorative art, as in the world of literature, two principles strive for mastery, the classic and the romantic. The soul of the classic is balance and proportion and perfection of form; of the romantic, enthusiasm, mystery, and life. The former is exquisitely measured; the latter is beyond measurement. The most perfect of the classic styles is Greek; the greatest of the romantic styles is Gothic. Other classic styles are Egyptian, the mother of Greek; Roman, the daughter of Greek; and Renaissance, the granddaughter. Other styles properly classed as romantic are Persian, Chinese, Japanese, and Art Nouveau. Byzantine, Romanesque, and Rococo are mixed styles, partly classic and partly romantic. This distinction between classic and romantic is vital in interior decoration. Once apprehended, it makes easy the lesser distinctions between Louis XIV and Louis XV, Elizabethan and Jacobean, Georgian and Adam.

Gothic. Of the nonclassic styles, the most important is Gothic, that in the last half of the twelfth century began to be created in northern France out of Romanesque, and that flourished in western Europe for three centuries—the thirteenth, fourteenth, and fifteenth. In Gothic the long process of transformation that had orientalized Roman into Byzantine, and out of Byzantine and Roman had developed Romanesque, was completed. Decoratively as well as architecturally Gothic is the antithesis of classic. Most of the Gothic furniture, tapestries, and other interior decorations that have been preserved, date from the fifteenth century or the first few years of the sixteenth, so that, from the decorative point of view, the Gothic of the fifteenth century, particularly that of the territory controlled by the dukes of Burgundy—not only the Duchy of Burgundy in east central France, but also and especially the Netherlands and a strip of northern France including such prosperous cities as Arras and Lille—is of prime significance. The Burgundian court was the richest and most fashionable in Europe. For Philip the Good (1419–67) and his son Charles the Bold (1467–77) were made by their own subjects the richest costumes, the finest furniture, the most beautiful tapestries, the most brilliant paintings, and the most exquisite illuminated manuscripts. The King of France they regarded as an inferior, and the King of England and the Emperor they met on equal terms. After the defeat and death of Charles the Bold, in 1477, ensued a splendid efflorescence of late Gothic and Gothic-Renaissance decorative arts in Flanders and the rest of the Netherlands under the suzerainty of the Emperor, and in France under Charles VIII (1483–98) and Louis XII (1498–1515). During this period were woven at Brussels the Mazarin tapestry now in the New York Metropolitan Museum, and the numerous similar pieces in the Royal Spanish collection. (See TAPESTRY.) The museums that best illustrate Gothic interior decoration are the Cluny and the Louvre (Musée des Arts Décoratifs) in Paris, the Victoria and Albert in London, the Metropolitan in New York, the Kunstgewerbe in Berlin, the Bavarian National in Munich, the Germanisches at Nuremberg, the National at Copenhagen, the Cinquantenaire at Brussels, the Rijks at Amsterdam, the Steen at Antwerp, the Trimolet at Dijon.

Of a Burgundian banquet hall, 140 feet long by 70 wide and 60 high, built to celebrate the marriage of Charles the Bold to Margaret of York in 1468, Olivier de la Marche has left us a most picturesque contemporary account. He says: "In this hall were three tables, one of which was placed across the ends of the others. This table, higher than the others, stood upon a platform. The other two tables were placed on the two sides of the hall, occupying the whole length; they were very long and very handsome, and in the centre of the said hall a high and rich buffet in the form of a lozenge was placed. The top of the said buffet was inclosed with a

balustrade, and the whole was covered with tapestries and hung with the arms of Monsieur le Duc; and above rose the steps and degrees on which were displayed many vessels, the largest on the lowest, and the richest and smallest on the top shelves; that is to say, on the lowest shelves stood the silver-gilt vessels, and above them the vessels of gold garnished with precious stones, of which he had a great number. On the top of the buffet stood a rich jeweled cup, and on each of the four corners large and entire unicorn's horns. . . . These vessels of parade were not to be used, for there were other vessels, pots and cups intended for service."

Of a Burgundian bedchamber, that of Isabella, first wife of Charles the Bold while he was still only Count of Charolais, Aliénor of Poitiers, whose mother was maid of honor to the third wife of Philip the Good, gives us an account. She says that it was very large and contained two beds, about 5 feet apart, beneath a canopy of green damask, from which hung curtains of satin that could be drawn to completely screen the beds when desired. The curtains and the lambrequin of the canopy had a green silk fringe. On each bed was an ermine counterpane, with very fine violet lining. The show feature of the room was the *dresser*, "of four beautiful shelves, filled with vessels of crystal garnished with gold and precious stones, and some of fine gold." In the corner near the dresser was a little low table containing the cups and saucers in which something to drink was served to callers after they had been offered a dragée from the drageoir or bonbonnière that stood on the dresser.

Gothic is the antithesis of classic. In Gothic the vertical is accentuated at the expense of the horizontal, the number of spire shapes and nearly perpendicular lines being vastly increased, while the number of horizontal lines and bands like those of the classic entablature is diminished, and the effect of those that remain is weakened by breaking them. This is what gives Gothic furniture as well as Gothic cathedrals and stained-glass windows such an uplifting effect—an effect that is much closer to nature than that of Greek and Roman, and that even suggests the lines and shapes of some of the more symmetrical lofty caves and mountains and trees produced by nature. Gothic columns are totally unlike classic columns, being far slenderer—attenuated by comparison—so that the vertical impression they give is extreme, whether they stand singly or grouped in piers. Their capitals are not the classic ones, but have necks of oak leaves and other domestic foliage—sometimes supplemented by quaint animal or human heads at the corners—naturalistically carved, with a slender molding below, and a round, square, or polygonal cap above, formed of an expanding series of moldings. These moldings as well as those on the bases are exceedingly decorative, but totally unlike the classic ones, being much sharper and slenderer. The most obvious feature of Gothic is the pointed arches that not only frame gables and the tops of doors and windows, but repeat themselves over and over again, combined with columns and circles and trefoils and quatrefoils, in the tracery work of stained-glass windows. Duplicating the outlines of this tracery work, perhaps borrowed from it, are the carvings, sometimes pierced, that adorn the panels of furniture and other woodwork. Based upon this ornament and developed in sympathy with it, are the patterns of Gothic damasks and brocades and embroideries, while slender and fancifully jeweled columns and arches are often used to divide and subdivide the different scenes of picture tapestries. So that between Gothic architecture and the other decorative arts of Gothic there is a peculiar sympathy, despite the fact that all the ornament of Gothic tapestries and embroideries and decorative painting, and most of that of Gothic stained-glass windows, is absolutely flat, without shadows to force forms into realistic relief. This fact is, of course, closely associated with the tiny scale of Gothic decoration, details being minute and infinite in number, but all adequately portrayed. The attempt to show them in high relief would have obscured them by the blackness of the shadows, making it necessary to work on a larger scale, as was illustrated later in the development of Baroque.

Renaissance. Renaissance was the rebirth of classic—a reaction from the then modern to ancient, from Gothic to Roman. Banished was the lofty and aspiring perpendicularity of pointed arches, and restored was the horizontal solidarity of round arches and low pediments, of heavy entablatures and square lintels. Once more flourished Doric and Ionic and Corinthian capitals and columns and pilasters, together with ornamental shapes like the egg and dart, the bead and fillet, the Greek fret, the anthemion, and the acanthus leaf in its numerous developments—all employed to enrich interiors as well as exteriors.

The home of the Renaissance was Italy. In Italy the Renaissance of the classic decorative arts began a century earlier than in France, the Netherlands, England, Germany, and Spain. In the latter countries it was of the sixteenth century only and much mixed with survivals of Gothic, Romanesque, or Moorish. In Italy it was of the fifteenth century as well as of the sixteenth. Not difficult was it for the Italians to discard Gothic that they had never completely assimilated. Easy and natural it was for them to revive the style of their ancestors, actual examples of whose architecture they saw all around them, and actual examples as well as illustrations of whose interiors they found in buried palaces, like the Golden House of Nero, which at the beginning of the sixteenth century taught so much to Raphael and his pupils—chief among them Giulio Romano, some of whose designs for tapestries illustrate so brilliantly the Grotesque ornament of ancient Rome. The great names of the Italian Renaissance are Brunelleschi, Alberti, and Bramante of the fifteenth century, Palladio and Vignola of the sixteenth. Alberti achieved fame, not only by his buildings, but also by the posthumous publication of the first *printed* book on architecture, accompanied by illustrations and based on Vitruvius, the Roman architect of the time of Augustus, a manuscript copy of whose *De re ædificatoria* had been discovered a few years before. It was one of a long series of such books, the best known of which are those by Palladio and Vignola, which for centuries served to guide youthful students towards the shrine of classic art. Alberti's book was in Latin, the latter two in Italian. The invention of printing in 1453 had a profound and far-reaching

effect upon Renaissance art, both decorative and pictorial. It enabled forms and figures originated in sculpture, wood carving, painting, fresco, stained glass, and tapestry to be spread broadcast inexpensively on paper. In other words, it popularized knowledge about art at the expense of knowledge of art and tended to substitute book knowledge for first-hand knowledge. But the immediate result was brilliant, for it brought book knowledge to those already equipped with knowledge practical and concrete, so that of all the periods in decorative art the richest in many respects is that 50 years before and after 1500.

Elizabethan. The Elizabethan style (1558–1603) is not a simple style. It is a style for show rather than for comfort. Elizabethan mansions were planned for the purpose of displaying to the world the wealth and culture of English landed proprietors. Nor is the Elizabethan style a pure style. There are many traces of Gothic, and the Renaissance part is by no means of the purest Italian type. Nevertheless, of all the English styles, it is in many respects the most interesting. Like Elizabethan literature, it is so full of affectations as to seem natural because so frankly parading them. Like Shakespeare, it borrowed materials from every available source, transforming them into vivid and spirited though seldom altogether classic works of art. During the reign of Elizabeth's father, Henry VIII (1509–47), there had been no real amalgamation of Renaissance with English Gothic. The new Renaissance mausoleums and other buildings produced in England were designed and erected by imported Italian artists and artisans. But when Elizabeth ascended the throne, all this was changed. English workmen learned to execute the details of the fashionable imported style. English architects, trained by travel in Italy and France and by study of engraved plates and illustrated books, learned to supply home-made plans for English Renaissance residences. What contrasted Elizabethan Renaissance with continental Renaissance and particularly with Italian Renaissance, was the English Gothic that survived as part of it. The general arrangement of houses remained English, with the spacious and often stately hall as the main apartment. But the elaboration of the other rooms was on a scale far more magnificent than before. A point to be especially noted is that Elizabethan mansions were not fortified castles but peaceful country houses. The settled conditions of life during the reign of Henry VIII had rendered fortification no longer necessary. And the suppression of the monasteries had turned all the building resources of the kingdom into the creation of homes for noble families, so that on domestic architecture and decoration was spent the money that previously had gone to construct and equip churches and convents. A prominent feature of Elizabethan mansions is the windows mullioned in the Gothic fashion with small panes of clear or stained glass, and with square instead of pointed top, sometimes filling the whole façade, as at Hardwicke Hall. Another prominent feature is the fireplaces—prominent for service as well as decoratively—framed elaborately and with elaborate overmantels of stone or wood. Here the influence of German and Flemish books of design made itself felt in ornate strapwork and coats of arms, and in statuettes of the Virtues or Scientia or Arithmetica or Geometria. An especially interesting Elizabethan chimneypiece is the one found in the hall of "Losely," a mansion near Guildford, begun by Sir W. More in 1562, completed by his son 50 years later, and several times honored by the visits of royalty. The ceilings of an Elizabethan residence were apt to be elaborately patterned in plaster, and the walls paneled in oak or hung with tapestry. In the ceiling patterns as well as in the mullioned windows the Gothic feeling is often strong, whether the designs are executed in ribbed or strap work. Floors were simply treated, usually strewn with rushes, with perhaps one rug in the main hall and another in the main parlor or "withdrawing room," for the use of the master. Windows and doors and the huge four-poster beds were elaborately draped sometimes with tapestries, but more often with embroideries in silk or linen, in elaborate floral and grotesque patterns. Heavy imported velvets and damasks and brocades were also used; and for upholstery, leather embossed in the Spanish fashion.

Jacobean. If the English during the seventeenth century had not been so busy dethroning the Stuarts and bringing them back again, or, in other words, if the full development of a Charles I style had not been obstructed by Parliament, London instead of Paris might have become the decorative capital of the civilized world, and Charles instead of Louis might be the supreme name in the history of decorative art. As it is, Jacobean is a convenient term under which to group the styles of James I (1603–25) and Charles I (1625–49), the corresponding French period being that of Louis XIII. How ambitious James and Charles, inspired by Buckingham, were to surpass the example of the French King Henri IV in encouraging the art industries, is shown by the establishment of the Mortlake tapestry works in 1619, and especially by the tapestries woven there for Charles I with a Latin inscription in the bottom border that says, "Kings foster the arts." (See TAPESTRY.) Cromwell and the Commonwealth not only ended the prosperity of the tapestry works, but also dealt another severe blow to the decorative arts when they dispersed the "household goods, jewels, plate, etc., belonging to the late King." These were sold "by order of the Councill of State, from ye severall Places and Palaces." The tapestries, both antique and modern, were especially noteworthy, and helped greatly to enrich the French, Swedish, and other continental collections. While late Elizabethan and early Jacobean are hard to distinguish, so that Jacobean furniture and interiors have often been described and sold as Elizabethan, between the periods as a whole the line of demarcation is definite. During the Jacobean period the last vestiges of Gothic disappear, and the victory of the foreign style is complete. Under the leadership of Inigo Jones and others who visited Italy in order to study the ancient buildings and familiarize themselves with the most approved examples of modern Italian work, all the freedom of Elizabethan invention disappeared. The instructions given in the famous book of the Italian Palladio were followed in England much more strictly than he followed them himself. Columns and pilasters and other classic ornaments began to be used less fancifully and with scrupulous adherence to what was regarded as

Greek and Roman precedent. The best examples of Jacobean interior decoration are those at Knole, near Sevenoaks, 21 miles southeast of London. Outside and inside this baronial mansion has changed little since the time when James I was entertained there, sleeping in the bedroom specially prepared for him by Richard, then Earl of Dorset, at a cost of $40,000. Illustrations of the principal rooms of Knole are given by Nash in his *Mansions of England in the Olden Time*, and some of the ancient tapestries are now on exhibition at the Metropolitan Museum in New York, lent by Mr. J. P. Morgan, whose father acquired them from the present owner of the estate in 1912. Particularly interesting at Knole is the "Spangled Bedroom," because the furnishings of it were the gift of James I, presumably in recognition of the hospitality shown him. The plaster and woodwork ornamentations of it are strikingly simple and classic as compared with Elizabethan, but what was saved in modeling and carving was more than made up for by the richness of upholstery and draperies. The posts of the bed are slender and simple, and in the age of Elizabeth they would have been massive and richly carved; but they are concealed by elaborate draperies. On chairs and stools upholstery replaces carving. There is a large rug on the floor, the walls are crowded with tapestries, and both windows and doors are heavily draped.

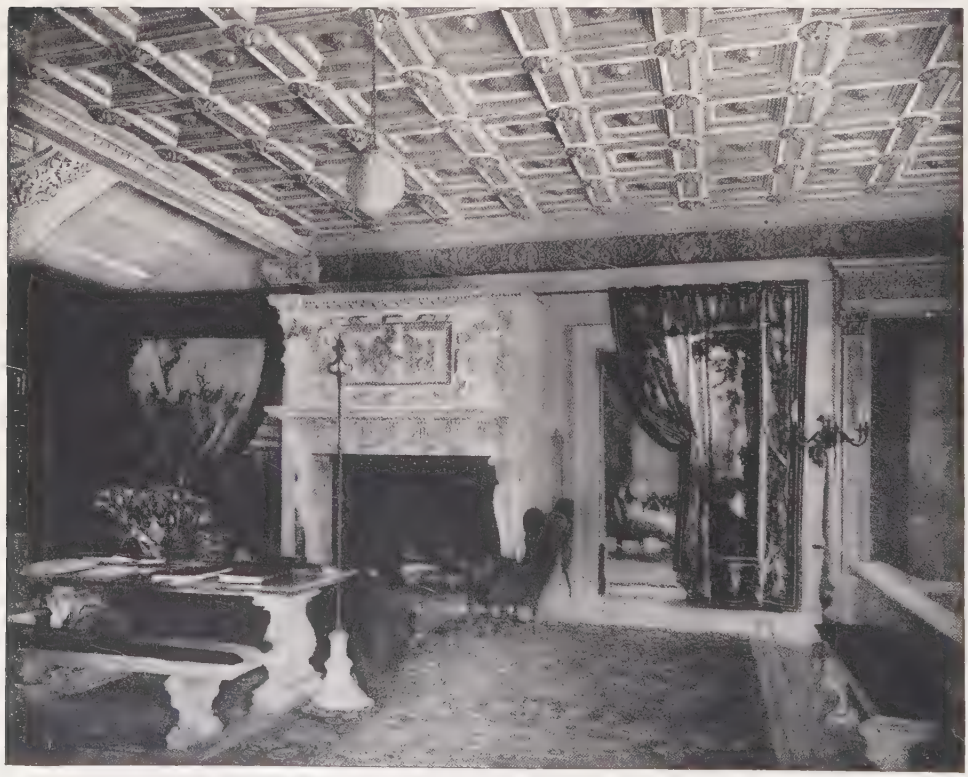
Louis XIV. During the reign of Louis XIV Paris became the decorative capital of the civilized world and the style of Louis XIV was imitated not only in Flanders and England, but also in Germany, Italy, and Spain. Earnestly, but not always faithfully, were copied the furniture and fabrics originated at the Gobelins and displayed at Versailles. The style of Louis XIV is a finished style. It has the completeness one would expect from a style developed under the influence of a powerful monarch who sought to dominate every field of artistic activity and whose reign lasted for 72 years, from 1643 to 1715. To be sure, at the beginning, during the minority of Louis XIV and the premiership of Mazarin, there was a period of transition from the style of Louis XIII; and at the end, during the old age of Louis XIV, there was a period of transition towards the Rococo of the Régime and of Louis XV; but the reign of Louis XIV was long enough to provide for these transitional periods, and at the same time to develop in the middle during the years when the Gobelins flourished under the direction of Charles Lebrun, one of the most interesting and adequate styles of decorative art the world has ever known. The style of Louis XIV is not a simple style and not a primitive style. It is not suited to country houses or modern cottages and city apartments; but it is suited to palatial city residences and to public buildings, when applied with due regard for changes of environment and condition. The style of Louis XIV is a classic style, but it is the Baroque classicism of the seventeenth century, not the Renaissance classicism of the sixteenth century. It is a magnificent style, solid and symmetrical, luxurious with gold, and, above all, dignified, but overloaded with ornament, especially ornament in relief, and often confusing with its variety of broken lines and curves. During this period the Gobelins was the centre of decorative activity. Here were designed and made furniture, tapestries, bronzes, mosaics, gold and silver ware for the King and the King's friends. Here in the month of "September, 1667, in the buildings of the Gobelins," according to the inscription at the entrance, "was established the Furniture Factory of the Crown under the direction of Charles Lebrun." The home of the Louis XIV style is the palace of Versailles, now a national museum, but not a museum in the ordinary sense of the word. It is not a haphazard collection of objects unsympathetically arranged in an unsuitable building. Versailles is Louis XIV himself incarnate in the decorative forms that expressed his personality and that of his artists and artisans. The Louis XV rooms there merely accentuate the grandeur of "the Sun King." Intimate and exquisite as they are, they seem like the refuges of diminished descendants seeking shelter from the glory of an ancestor whose too brilliant destinies it was their duty to attempt to sustain. It was in 1663 that Louis XIV began to visit Versailles frequently, deserting for it Saint-Germain-en-Laye, where he was born, which had been a favorite resort of the French kings since the twelfth century. Finding too small the palace built at Versailles by Louis XIII, i.e., the central part of the present palace, he decided in 1668 to enlarge it. The principal architect was Mansart, and the decorations were by Lebrun, who in gold and bronze and marble and stone enshrined the allegories of Victory and Empire, Europe conquered and the nations enchained, and crowded the heavy and tumultuous ceilings with Apollos and Alexanders, whose features are those of Louis XIV, advancing in triumph among terrified mortals and respectful divinities. One of the most interesting rooms at Versailles is the bedchamber of Louis XIV, which for many years was the centre of society and government in France. Here he held his great audiences and received the remonstrance of the Parliament. Here, on Sept. 1, 1715, he died, and in this bed his body was exposed to view after death.

Louis XV. Of the three great Louis styles, that of Louis XV is as much distinguished for *originality* as that of Louis XIV for *grandeur*, and that of Louis XVI for *simplicity*. The style of Louis XV was to some extent an *art nouveau*, or *new art* style. It represents a definite attempt to break away from tradition and, while retaining French Renaissance architecture, to adorn it with original decorative forms adapted and developed from rocks and shells and trees and plants. From this introduction of rock and shell motifs, *rocaille* and *coquille* in French, came the nickname of Rococo applied to the style of Louis XV. While the style of Louis XIV had eliminated Italian Renaissance feeling in French furniture and decorations, much that was ancient Roman still remained. In Louis XIV ornament the figures were Roman figures nude or clad in Roman draperies, and the characters were derived from Roman mythology. When Louis XIV or members of his family or court were introduced, it was in the guise of Roman gods and heroes. From the Watteau grotesques of the Régence, the term often applied to the style of the minority of Louis XV (1715–23) when Philippe of Orléans was Regent of France, the Roman tradition has entirely departed. The figures are avowedly French, clad in contemporary French costumes, and the buildings resemble those of the French court. The

BULL'S EYE SALON IN THE PALACE OF VERSAILLES.
A PERFECT ANCIENT EXAMPLE OF THE STYLE OF LOUIS XIV.

RECEPTION ROOM OF THE PETIT TRIANON AT VERSAILLES
A PERFECT ANCIENT EXAMPLE OF THE STYLE OF LOUIS XVI.

COLONIAL LIVING ROOM IN A SUBURBAN HOUSE NEAR NEW YORK.
THE FURNISHINGS ARE ALL MODERN.



ITALIAN RENAISSANCE HALL IN THE WHITNEY RESIDENCE, NEW YORK CITY.
DESIGNED AND EXECUTED BY THE LATE STANFORD WHITE. MOST OF THE FURNISHINGS ARE ANCIENT.

most obvious characteristic and the one that enables the novice most quickly to distinguish the style of Louis XV from that of Louis XIV is *lack of symmetry.* In the patterns of Louis XIV the right side is a replica of the left side, and a vertical median divides them symmetrically into equal halves. But in the patterns of Louis XV the sides are often totally unlike and do not correspond or repeat. Cartouches and shields often have the main axis in an oblique position. Another noteworthy characteristic of the style of Louis XV is *dread of the straight line.* Profiles bend into S's, and everything twists and undulates. Flat surfaces are replaced by surfaces bombé, or bulbous. The foremost designer in the Rococo style was Jules Aurèle Meissonier, who is described on the titlepage of his book of furniture and decorative designs as "painter, sculptor, architect, and designer of the King's Chamber and Cabinet." Meissonier also published a book on plants and vegetables as furnishing material for the designer, thus indicating clearly enough the back-to-nature tendencies of himself and his school. In the reign of Louis XV the romantic spirit dominated life and art alike. Woman was supreme. Her smiles and frowns decided matters of state, and the lords of the council chamber trembled before the ladies of the boudoir. For their comfort or to please their fancy, rooms were made smaller and more homelike, beamed ceilings disappearing and mirrors taking the place of huge paintings and enormous bas-reliefs. Chairs and tables and stands became graceful and coquettish, even capricious. Colors as well as forms became lighter in the period of Louis XV. The gold and crimson and green of Louis XIV were succeeded by gold in combination with white and ivory and delicate tones of lilac and lemon, sky blue, rose, blue gray, etc. Draperies also became lighter, and the use of lace curtains more general.

Louis XVI. While Louis XVI did not ascend the French throne until 1774, the classic revival that bears his name was already beginning to assert itself in 1760. Indeed, one of the leaders in the movement that substituted the back-to-classic style of Louis XVI for the back-to-nature style of Louis XV, was the latter's fair friend, the Marquise de Pompadour, who sent decorative artists to Italy to study the ancient interiors and decorative treasures unearthed at Pompeii 1700 years after Vesuvius buried them. The popular phrase in decorative circles was "in the antique style," and many books were published illustrating and describing Pompeian forms and ornament, where models and designs were copied with almost slavish fidelity. The style of Louis XVI was not only a classic style; it was also a pastoral style. In 1768 Louis XVI, then Dauphin, was pictured at the plow. Political economists preached the land as the source of all wealth; writers turned out idyllic stories like *Paul and Virginia* and the *Nouvelle Héloise;* decorators substituted fruit, flowers, and vegetables for the rocks and shells of Rococo. The style of Louis XVI is, above all, a gentle style. From it is banished all violence of line, shape, and color. The subjects of the tapestries, medallions, panels, bronzes, etc., are restful. There is none of the cold dignity of Louis XIV, none of the saucy affectation of Louis XV. Especially soothing are the colors, with their subdued grays and lack of brilliancy. The style is also essentially flat. There are none of the bold reliefs so common in the form of cornices, moldings, pediments, and furniture carvings in the days of Louis XIV. In both structure and ornament the straight line and the right angle rule. Parallelism of motifs is frequent, and rectangular panels are apt to be comparatively narrow. In small objects and for frames the oval is common. Besides pastoral forms, Louis XVI decorators loved also sentimental and allegorical forms—bows and arrows, cooing doves, and torches. Especially characteristic is the bow of ribbon applied to the top of panels and medallions, with ends floating down on each side. The style of Louis XVI is distinctly more refined than that of Louis XV. There is less coarseness and less suggestiveness in the paintings and the tapestries. It also differs from the style of Louis XV and resembles that of Louis XIV in being a symmetrical style, the motifs on the left of a panel repeating themselves on the right. But while the style of Louis XIV is a grand style, that of Louis XVI is dainty and intimate—a style for the home rather than for the court, and one that can be modified in the direction of simplicity and inexpensiveness without losing character; so that, of all the French styles, it is the one best fitted for general use, and the one most used to-day in English and American residences. Famous interiors in the style of Louis XVI are the apartments of Marie Antoinette in the palace at Fontainebleau and in the Petit Trianon at Versailles. The numerous vases and cameos used in the ornament of the former make clear why the Germans call this the *Zopfstil* (vase style) and indicate the close relationship between it and the contemporary English style of Adam, with its Wedgwood vases and plaques.

Charles II, William and Mary, Queen Anne. When Charles II (1660–85) returned to England after his long exile in France, he brought back with him French manners and tastes, and during the next half century the style of Louis XIV was dominant at the court and in the royal palaces of England and was followed or imitated by most of the English nobility. The surroundings of Charles II were luxurious to a degree previously unknown in England, and the establishments of his fair friends (Castlemaine and Portsmouth and Mazarin), made duchesses by him, were among the sights of London, very quickly swallowing up the £60,000 a year that he received from Louis XIV. The diarist Evelyn was particularly moved by the solid silver furniture in the apartments of the Duchess of Portsmouth—a Frenchwoman, Louise de Kérouaille in the pay of Louis XIV—and by the new French tapestries (Gobelins) which he naïvely describes as "incomparable imitations of the best paintings—Versailles, Saint-Germains, and other palaces of the French King, with hunting figures, landscapes, and exotic fowls, all to the life ready done." Nell Gwyn had a silver bedstead with embossed representations of the King's head, slaves, eagles, crowns, cupids, and Jacob Hall the tight-rope dancer. The King's head weighed 197 ounces, and the other ornaments 2168 ounces, costing altogether £906. Latham, in his *English Homes,* illustrates several pieces of silver furniture still preserved at Knole.

The quieter courts of James II (1685–88) and of William and Mary (1689–1702) encouraged

simpler and more practical furnishings, and of course during the reign of the latter the Dutch influence was strong, and importations from Holland were many. Much of the luxury that Charles II had loved was destroyed by the burning of Whitehall Palace in 1698, with its 1000 elegantly furnished apartments. The most prominent architect of the period was Sir Christopher Wren (1632–1723), who rebuilt a large part of London after the great fire of 1666. He never visited Italy, but was in Paris in 1665, returning thence, as he himself said, with "All France on paper." While in Paris he met the great Italian Baroque architect Bernini, who gave him a glimpse only of designs he was then making for the façade of the Louvre, and which Wren said he would have "given his skin" for a chance to copy. Upon the accession of William and Mary, Wren was commissioned with the enlargement of Hampton Court Palace and constructed the existing suite of state apartments in avowed imitation of the splendor of Versailles. One of the most important rooms at Hampton Court is the bedchamber of Queen Anne (1702–14), with elaborate four-poster bed in crimson Genoa velvet, and walnut chairs, benches and stools to match, all very good Louis XIV in style. The mural paintings by the Italian Verrio in Queen Anne's drawing room are each 20 by 35 feet, and, being overhung with green damask in 1735, were only brought to light again in 1899. They picture Queen Anne and Prince George in allegorical scenes, with Europe, Asia, Africa, and America come to offer homage. The most famous residence built in the reign of Queen Anne is Blenheim, tribute of the English nation to the Duke of Marlborough for his great victory over the French at Blenheim. It cost over half a million pounds, and the three state rooms with their tapestries picturing the Duke's victories, all in the style of Louis XIV, with furniture to match, are particularly imposing.

Georgian. During the reigns of George I (1714–27) and George II (1727–60) French decorative styles continued to be copied in England, and in both countries we find the same tendency to make decorations romantic, while keeping architecture classic. Especially in England the romantic movement was violently opposed by leading architects who had studied in Rome and drew their inspiration, not from Sir Christopher Wren and France, but from Inigo Jones and Italy. Indeed, it was from Inigo Jones that they derived the massive mantelpieces in wood and plaster that are so characteristic of the early part of the Georgian period. Massive and elaborate also was the woodwork framing doors and windows and paneling walls. But it was commonly painted in cream and in light tints of blue and green instead of being left in the natural, as in the seventeenth century. The great name of the period is that of William Kent (1684–1748), whose taste was regarded as second to none, and who, as Walpole remarks, "was not only consulted for furniture, frames of pictures, glass, tables, chairs, etc., but for plate, for a barge, and for a cradle," and even for gowns. One lady he accordingly dressed in a petticoat decorated with columns of the five orders. But while Kent was designing houses, furniture, decorations, and costumes in the classic style, the romantic spirit was abroad in the land. Langley in 1742 published a book on Gothic decoration and ornament, and a little later persuaded Walpole to let him build him a Gothic residence on Strawberry Hill. Edwards and Darley published their book of Chinese designs in 1754, while Langley, Johnson, Ince and Mayhew, Halfpenny, Manwaring, and others saw to it that Rococo was not neglected. So that Isaac Ware, in his book on *Classic Architecture* published in 1756, wrote: "His own misfortune to see at this time an unmeaning scrawl of C's inverted, turned and hooked together, take the place of Greek and Roman elegance, even in our most expensive decorations. This is not because the possessor thinks there is, or can be, elegance in such fond, weak, ill-jointed, and unmeaning figures; it is usually because it is French; and fashion commands that whatever is French is to be admired as fine." Elsewhere in the same book Ware laments that "paper has taken the place of sculpture"—by paper meaning wall paper; and by sculpture, columns and pilasters and pediments and moldings in wood and plaster. Wall paper began to be commonly used in England about this time and must have aroused Ware's wrath, not only because it displaced wood and plaster, reducing the frames of doors and windows to simple casings, and minimizing or eliminating chimneypieces, but also because it is of Chinese origin and because a large proportion of the early French and English papers have designs that were Chinese (more or less) in character, or Chinese and Rococo mixed. (See WALL PAPER.) Just as in France under Louis XV, so in England rooms became smaller, and pieces of furniture more numerous and more comfortable. Now there began to be chairs for all, and interiors not only looked less like Roman temples but felt less like them—which explains why the Georgian period was so distinctly an age of chairs and affords so appropriate a background for Thomas Chippendale (q.v.).

Adam. Not without reason has the name Adam become attached to the English classic revival contemporary with Louis XVI, for in interior decoration as well as in architecture the influence of Robert Adam was preëminent. Though Hepplewhite and Sheraton (q.v.) justly acquired fame as furniture designers, as far as style is concerned, they were followers rather than leaders, and were only too glad to model their chairs and other furniture to conform with the prevailing classic style. The common fault of the English classic interiors that preceded the Adam period was *ponderousness*. As Robert Adam himself says in the preface to the *Works on Architecture of Robert and James Adam*, published from 1773 to 1779, with a posthumous supplement in 1823, Robert Adam having died in 1792 and James Adam in 1794: "In place of the massive entablature, the ponderous compartment ceiling, the tabernacle frame, almost the only species of ornament formerly known in this country, we have adopted a beautiful variety of light moldings, gracefully formed, delicately enriched, and arranged with propriety and skill. We have introduced a great diversity of ceilings, friezes, and decorated pilasters and have added grace and beauty to the whole by a mixture of grotesque stucco and painted ornaments, together with flowery *rainceau* (rinceau) with its fanciful figures and winding foliage." The previous ponderousness, Adam goes on to explain, was due to the first

masters of the Italian Renaissance, who applied to residences massive ornament copied from Roman temples and other public buildings. In consequence of their mistake "all Europe has been misled and has been servilely groaning under the load for three centuries past." The Romans themselves, wrote Adam, were extremely careful as to proportion, and the decorations of their private apartments were "all delicacy, gayety, grace, and beauty." A lesser example of what Adam means are the famous Boncereale frescoes in the New York Metropolitan Museum. An important factor in the development of the Adam style was the secret of making compo ornament, which, together with workmen who understood the process, Robert Adam brought back from Italy. This compo, cast in various patterns in wooden molds and then applied to ceiling or wall, was much cheaper than wood carving or plaster work executed in position, and, for delicate ornament in the Adam style, much better. An individual note in the Adam style was the introduction of ornament copied from the vases and urns of the ancient Etruscans. Robert Adam also got fresh material from Diocletian's vast palace at Spalatro in Dalmatia, of which he was the first to make drawings, published as a folio volume in 1764. The book above all others from which to get an accurate knowledge of the Adam style is the *Works on Architecture,* mentioned above, that presents superb copperplate engravings not only of the exteriors but also of the interiors and the decorations of famous residences planned and executed by Robert Adam.

Contemporary American Decoration. Towards the close of the nineteenth century the French styles of Louis XIV, Louis XV, and Louis XVI were the fashion in the United States. The highest ambition of the decorative salesman was to be able to point out to customers the distinguishing marks of the three periods. As the years rolled on, and French and English decorators, as well as American decorators with French training, began to execute French interiors worthy of the name, there began to be a revival of interest in Old American furniture and furnishings, under the name Colonial. Naturally the first attempts at reproduction were crude, and many of the Colonial rooms composed of antiques or bad reproductions were confused in style and unsatisfactory in taste. By degrees, however, as Colonial furniture began to be assembled in intelligent collections by individuals and societies, furniture makers displayed more interest and more skill in the copying of fine models, and decorators made groupings that were harmonious. Of course, the study of Colonial soon led across the water to England, where most of it originated, and before long English and American decorators were creating Jacobean, Queen Anne, Georgian, and Adam interiors for American patrons. Gradually the French styles were eliminated entirely from merchandise shops, surviving only in the city homes of the very wealthy, mostly those who are willing to pay the price for antique French furniture and tapestries. In large American country homes we now find mainly Colonial and English interiors, with some of the more magnificent apartments in the style of the Italian Renaissance, and an occasional hall or living room Gothic or Gothic-Renaissance transition. A large percentage of the furniture is reproduced with considerable fidelity from excellent antique pieces, and a small percentage is genuinely antique. Around important old tapestries or pieces of furniture rooms are often built, all the other furnishings being planned to harmonize in style and scale.

Some of the best interiors are executed by the architects who have given attention to the art of interior decoration, but there are also men and women of different degrees of training and taste who are engaged in this work, and, as is perhaps natural, the jealousies among interior decorators of various classes or groups are bitter. The interests of the *merchandise house,* whether department store or furniture and carpet store, are constantly opposed to the interests of the decorative shop that devotes itself exclusively to *fine work,* while both are annoyed by the *upholsterer decorator* doing business on a small scale, and by the so-called *consulting decorator* without a shop. The most hopeful sign for peace among the warring elements, as they are found in New York, is the continued existence of the Art in Trades Club, organized in April, 1906, by graduates of Frank Alvah Parsons's classes in interior decoration, consisting of men in the decorative trades. The objects of the club are: "To bring into association men engaged in, or interested in the Arts and Art Trades, for mutual advancement and study; to study the principles of Art as applied to Trades connected with the decoration and furnishing of buildings; to harmonize commercial activities with the growing Art tendencies of the present time; to foster feeling and taste for Art expression in general; and to strengthen the natural bond between those thus allied by fellowship and a community of interests."

The increasing number of amateur decorators, with a brief training at some art or decorative school, causes considerable perturbation in the trade, especially among those who have been insufficiently educated, having "grown up in the business," without any special knowledge of art and of æsthetic theory. But the effect of this irruption into trade circles is decidedly uplifting and has raised the standards of culture and taste appreciably among decorative salesmen. Not the least important result of the work done by schools and universities along decorative lines is the development of a public whose knowledge compels increased knowledge on the part of the trade and promotes good taste even in the cheapest shops. Helpful in the same direction is the installation of well but very inexpensively furnished apartments of two or three rooms in some of the public schools, as well as of "period rooms" and "model houses" in many of the large merchandise shops.

Bibliography. Robert Adam, *Works in Architecture of Robert and James Adam* (London, 1773–1822); J. Nash, *Mansions of England in the Olden Time* (4th series, ib., 1839–49); James Ward, *Historic Ornament* (2 vols., ib., 1897); August Man, *Pompeii: Its Life and Art* (New York, 1904); Richard Glazier, *Historic Ornament* (ib., 1906); Alexander Speltz, *Styles of Ornament* (Berlin, 1908); Charles Latham, *In English Homes* (3 vols., London, 1909); Tipping, *English Homes, Elizabethan and Jacobean* (ib., 1912); Haencke, *Entwicklungsgeschichte der Stilarten* (Leipzig, 1913); and the numerous editions of Vitruvius, Palladio, Vignola, and

Serlio. Books on present-day furniture and furnishing are being brought out in bewildering variety; but many of the American books on decorative subjects are unworthy of serious consideration. Among exceptions to the rule are Wharton and Codman, *The Decoration of Houses* (New York, 1897); Elsie Dewolfe, *The House in Good Taste* (ib., 1913); G. L. Hunter, *Home Furnishing* (ib., 1913). Authoritative American books on special decorative subjects are G. L. Hunter, *Tapestries* (ib., 1912); L. V. Lockwood, *Colonial Furniture in America* (ib., 1913). Valuable for what is quoted rather than for the opinions expressed are Esther Singleton, *French and English Furniture* (ib., 1903); id., *Dutch and Flemish Furniture* (ib., 1907); id., *Furniture of our Forefathers* (2 vols., ib., 1913). Among American magazines that contain articles helpful to the interior decorator are *American Architect* (New York), *Architectural Record* (ib.), and *The Craftsman* (ib.). See DECORATIVE ART; FURNITURE; ARCHITECTURE.

IN'TERJEC'TION (Fr. *interjection*, Lat. *interjectio*, a throwing between, from *interjicere*, to throw between, from *inter*, between + *jacere*, to throw). One of the parts of speech. (See GRAMMAR.) Interjections proper are merely emotive reflex movements of the vocal organs accompanied by voice, as *ouch*, *O*, *grrh*, *poo*, and many of a like nature. Sounds of this type are the most primitive of all forms of speech and are the only sort of vocal language shared by man with other animals. The present tendency of logicians is to treat the interjection as the most primitive form of judgment. The term "interjection" is often applied to vocatives and imperatives when they are employed as isolated exclamations, as *heavens*, *the deuce*, *alas*, *Charles*, *stop*, *go on*, and the like. The vocative interjection may be a representative of the single-membered sentence consisting of a subject only, with no predicate. This is not undisputed, however, for there certainly is in many cases, and may perhaps be in all, an ellipsis of a predicate. The imperative interjection seems to be a predicate with an ellipsis of the subject. It is to be noted that though interjections proper stand isolated and complete in themselves, both vocative and imperative interjections are frequently elliptical and, strictly speaking, equivalents for sentences, and are not real sentences, as are the true interjections. Consult: Delbrück, *Grundfragen der Sprachforschung* (Strassburg, 1901); Wundt, *Sprachgeschichte und Sprachpsychologie* (Leipzig, 1901); Mauthner, *Beiträge zu einer Kritik der Sprache* (2d ed., Stuttgart, 1906–13); Paul, *Prinzipien der Sprachgeschichte* (4th ed., Halle, 1909).

INTERLAKEN, ĭn'tĕr-lä'ken (between the lakes). A summer resort of Switzerland, in the Canton of Bern, delightfully situated, 1863 feet above sea level, on the left bank of the Aar, in the Bödeli, a plain between lakes Thun and Brienz (Map: Switzerland, B 2). The name is applied to the whole plain, which is from 5000 to 6000 feet above sea level, and includes the villages of Interlaken, Matten, and Unterseen. Its mild climate (averaging 48° F.), dry air, and magnificent mountain scenery, which includes views of the famous Jungfrau Mönch, Schwalmern, and the Bernese Alps, make Interlaken one of the most popular resorts in the Alps. It is visited annually by between 30,000 and 50,000 tourists. There are numerous good hotels, restaurants, and a Kursaal on the Höheweg—the principal avenue. The chief building is that of the old monastery, founded in 1130 and suppressed in 1528. It is now occupied by the government offices and the hospital. During the season Roman Catholic, Scottish, Anglican, and Presbyterian services are held in its ancient church. Pop. (commune), 1900, 2962; 1910, 3747.

IN'TERLIN'EA'TIONS (from ML. *interlineare*, to write between lines, from Lat. *inter*, between + *linea*, line). In a deed, will, or other legal instrument, additions or corrections, written either on the margin or between the lines. They do not invalidate or cast suspicion upon the instrument in which they appear, but there is a presumption that they were inserted after its execution and that they are not to be taken as a part thereof. This presumption may, however, be rebutted by evidence that they formed a part of the original writing at the time of its execution. See EVIDENCE.

IN'TERLOCK'ING DIREC'TORATES. A method of insuring harmony of action between corporations in competitive relations, or in such other relations as may profitably be stabilized. By this plan, which was first employed extensively in the first decade of the twentieth century, the stockholders of one corporation elect to their directorate one or more men who serve as directors on the board of a second corporation; the stockholders of the latter reciprocate in kind. Thus, each corporation is represented in the board of control of the other by men primarily identified with its own interest. Originally this end was attained through the purchase, by those most heavily interested in one corporation, of enough stock in the other to secure the election of one or more directors. In the more highly developed form of the device such stock purchase was dispensed with. Often the representative directors held no more stock than was required to qualify them under the law for the directorate—an amount varying with the several jurisdictions from one share to five.

The device of interlocking directorates was employed extensively in the field of transportation, as a means of securing that unity of policy that could not be secured through combination or consolidation, in view of the prohibitions of the antitrust law. A more frequent object sought through this means was the securing of favorable treatment from important customers or from powerful financial agencies. Thus, the directors of the United States Steel Corporation established themselves as directors in railroad companies representing about one-half the mileage of the United States, in steamship companies, in street-railway companies, and in a large number of industrial companies consuming steel. The aggregate assets of all the companies thus interlocked amounted to over $16,000,000,000. The great financial houses made it a practice of securing representation in the directorates of other banking houses, and also in the directorates of railway and industrial companies that required their services in stock and bond flotations, etc. According to the report of the Pujo congressional committee, 18 banking houses were represented by directors or officers in at least 134 other corporations.

Popular opposition to the interlocking directorate became active about 1910. It was di-

rected especially against the principle as employed by the banking houses. In this field the interlocking directorate was believed to constitute a gigantic money trust, controlling the flow of money and credits and thus reducing industry to a state of subjection to financial interests. The principle as employed by industrial companies was also very unfavorably regarded. It was widely believed that the only possible object to be attained by an industrial company like the Steel Corporation, through representation on boards of steel-using corporations, was a market free from competition. While persons serving as directors in two companies made it a rule not to take an active part in fixing the terms of contracts between such companies, yet it was assumed that their wishes were tacitly considered and were reflected in the terms of such contracts.

A minor evil imputed to the system was that the multiplicity of directorships sometimes held by one man rendered it plainly impossible for him to give due attention to the interests of any corporation. Instances have been cited of 40 or more directorships held by a single individual. Inevitably his knowledge was restricted to the affairs of a few of these corporations; in the meetings of the others his vote was cast according to the wishes of some other person. Directors thus voting were popularly known as "dummy directors."

The Clayton Trust Bill of 1914 sought to check the evil of interlocking directorates by prohibiting any one from serving as director in more than one corporation of a capitalization of $1,000,000 or more, except in the case of common carriers. Directors of corporations dealing in railway securities, or in railway materials or supplies to the extent of $50,000 or more per annum, were prohibited from serving as directors of railways. See TRUSTS; RAILWAYS; CORPORATION.

INTERLOCKING SIGNAL. See BLOCK-SIGNAL SYSTEM.

IN'TERLOC'UTORY JUDGMENT. See JUDGMENT.

IN'TERLUDE (ML. *interludium*, from Lat. *interlude*, to play between, from *inter*, between + *ludere*, to play). 1. In the drama, primarily a short performance interposed between the parts of a longer entertainment, as the play of *Pyramus and Thisbe* in the *Midsummer Night's Dream*. The term was early used of dramatic moralities (q.v.), played in the intervals of banquets and other court festivities. During the sixteenth century, however, interlude came to be the specific name for a rude form of dramatic representation which sprang from the moralities, and was, as it chanced, historically intermediate between those and true comedy. It differed from the former in that its *dramatis personæ* consisted not of abstractions of moral qualities, but of real persons; it was shorter in dialogue and of a merrier and more farcical nature. The most noted author of such plays was John Heywood (q.v.), who flourished at the time of the great controversy between the Roman Catholic church and the Reformed church in England. His *Four P's* is an excellent specimen of this phase of the drama. A Peddler, a Pardoner, a Palmer, and a Poticary each tries to tell the greatest lie. At last the Palmer happens to say that he never saw a woman out of temper, whereupon the others declare that his is the greatest lie that can be told, and gains for him the victory. 2. In music an interlude is a short melodious phrase played by an organist (generally extempore) between the stanzas of a hymn; also, any short instrumental selection played between portions of the church service. Consult: Collier, *History of English Dramatic Poetry*, vol. ii (London, 1831); Dodsley, *Collection of Old English Plays*, vol. i (4th ed., ib., 1874); Ward, *English Dramatic Literature*, vol. i (ib., 1875); Symonds, *Shakespeare's Predecessors in the English Drama* (ib., 1884).

IN'TERMAR'RIAGE. The intermarriage or intercourse of near relatives has been universally believed to entail degeneration upon the offspring, and the act has been condemned and prohibited. The physical deformity and mental debasement of the Cagots of the Pyrenees, of the Marrons of Auvergne, of the Sarrasins of Dauphiné, of the Cretins of the Alps, and the gradual deterioration of the slave population of America have been attributed to consanguineous alliances. More recently the same opinion has been supported by the history of deaf-mutism and of idiocy. Of 235 deaf and dumb children whose parentage could be traced, 70, or nearly 30 per cent, were the offspring of the intermarriage of blood relations. But in opposition to, and apparently destructive of, such an hypothesis may be adduced the unimpaired condition and symmetry of the Jews, of the small Mohammedan communities in India, of the isolated tribes in North America, among whom the repeated intermarriage of near relatives is compulsory. Moreover, this opinion does not hold in the analogous cases among the inferior animals. (See BREEDING.) Darwin states that the first and fundamental law of heredity is that every attribute of the parents tends to be inherited by the offspring. Opposing influences counteract the tendency. If two brothers inherit strongly the characters of one of their parents, and if each transmits these characters strongly to his children, the cousins thus produced will have not only a close relationship of blood, but a close similarity of physiological characters, and if they marry, their offspring will be likely to be imperfect (Mercier). Insanity follows consanguineous marriages where the contracting parties inherit the same tendencies of a neurotic nature. If one of two brothers shows a reversion to a maternal ancestor, and the other inherits the father's character strongly, the first cousins springing from such brothers will have considerable physiological dissimilarity, and if these cousins marry, their offspring are likely to be well developed. See CONSANGUINITY.

IN'TERME'DIATE STATE. The condition of the disembodied spirit from the hour of death till the general resurrection. 1. Probably the most popular view is that the souls of the righteous pass to heaven and those of the wicked to condemnation immediately upon death. 2. A second theory is that the intermediate state is one of sleep or unconsciousness. This was taught in the middle of the third century by certain Arabians called Thnetopsychites, and combated by Origen. It was disapproved by the University of Paris in 1240 and by Benedict XII in 1366. It was revived by certain Swiss Anabaptists and opposed by Calvin. It has been held by a few in later times, most notably by Archbishop Whately in his *Future State*. 3. It is held that an intermediate place is provided

wherein the souls of the dead exist until the day of resurrection. The most definite form of this view is the Roman Catholic doctrine of purgatory. The church only lays down as *de fide* that there is a place of purification for departed souls and that the souls detained therein are aided by the prayers and masses offered by the faithful on earth (Council of Trent, sess. vi, xxii, xxv). The doctrine of purification after death for those who die in God's favor, but not yet sufficiently free from imperfections to enter His presence, is based upon such passages as Matt. xii. 32, 1 Cor. iii. 11–15, Matt. v. 25, 1 Pet. iii. 19, 20, iv. 6, as well as on the custom, of which Tertullian speaks at the end of the second century, of praying for the dead. The doctrine is also held to satisfy the demands of common reason, since many are not prepared at death to pass immediately into a state of perfect beatitude. As to whether purgatory is a definite place, and as to the method of purification employed, nothing has been defined; it is clearly understood, however, that no matter what are the pains incident to the purifying process, the souls undergoing it do so willingly and gladly, since they know that each moment brings them nearer to the goal of their desire, union with God.

The ancient Hebrew thought had no room for an intermediate state. With the rise of the ideas of a Messianic kingdom and a final judgment came the problem of the state of the dead before this judgment. This problem is first presented in the apocalyptic books, where the intermediate state is often one of rewards and punishments (Enoch x. 22, 100; Jubilees xxii, etc.). The teaching of Jesus does not discuss it, and the figures and parables which touch it are designed for ethical, not for dogmatic teaching. The writers of the New Testament reflect the thought of the current Judaism, which evidently had no well-defined theory. 1. In some passages the figure of "sleep" is used, and emphasis is sometimes laid, not on the blessedness of life after death, but on the "glorious appearing" of Christ at the resurrection (Thess. iv. 13–18). 2. Other passages show that the writers thought of the souls of the righteous as passing immediately into reward. Paul presents this view as well as the other (Phil. i. 23). It is natural that with this biblical variation there should be a variety of theories in the history of the Church.

Consult: Coleridge, *Prisoners of the King* (London, 1878); Jungmann, *De Novissimis* (Regensburg, 1871); Charles, *Eschatology, Hebrew, Jewish, and Christian* (London, 1899); and see HADES; HEAVEN; HELL; IMMORTALITY; JUDGMENT, FINAL; RESURRECTION; INDULGENCE; PROBATION AFTER DEATH; PURGATORY.

INTERMEZZO, ĭn'tĕr-mĕd'zō (It., interlude). In larger instrumental works, a short movement in slow tempo inserted between two main movements. It generally takes the place of the slow movement if the composer does not wish to write a full andante or adagio, as in Beethoven's Sonata, op. 53. In Schumann's Concerto in A minor the intermezzo is sufficiently extended to be considered the legitimate slow movement of the work. Sometimes an entirely separate and independent composition bears the title intermezzo. Brahms seems to have had a special fondness for this title, using it for a number of pieces in op. 76, 117, 118, 119. In the old suite any extra movements added to the four obligatory ones (allemande, courante, sarabande, gigue) and always inserted between the third and fourth are called intermezzi. The intermezzos originally were short musical interludes or entr'actes which it was customary in Italy to perform between the acts of a tragedy. When the *opera seria* began to flourish in the seventeenth century, intermezzos treating some mythological subject were performed between the acts. Originally the different intermezzos had no connection one with the other. But gradually the intermezzo became a secondary plot. For the sake of variety it always treated a comic subject, so that a performance of an *opera seria* consisted alternately of a serious act of the opera itself and a comic act of the intermezzo. The next step was the emancipation of the intermezzo into a separate art form, the *opera buffa*. Its place in the *opera seria* was then taken by the ballet (q.v.). The intermezzos in the spoken drama of to-day are purely instrumental. See INCIDENTAL MUSIC.

IN'TERMIT'TENT FEVER. A form of fever in which the rise of temperature above the normal (98.6° F.) is not constant, but in which there is a defervescence, or fall of temperature to the normal point, at intervals, to be followed by a successive rise to an abnormal point. The interval or intermission may be a few hours long (as in the double quotidian type of malarial fever) or it may be two days long (as in the quartan type of malarial fever). The intermittent form of fever occurs in abscess of the liver, in chronic obstruction of bile passages by gall stones, in Hodgkin's disease, in pyæmia, in pyelitis, in septicæmia, sometimes in secondary syphilis, in tuberculosis, and in some forms of malarial fever. The term, however, has been principally and popularly used to denote the ordinary tertian type of malarial fever, as a synonym of "chills and fever," and replacing the old term "ague." See MALARIA; REMITTENT FEVER.

INTER'NAL-COMBUS'TION EN'GINE. A form of prime mover utilizing the energy released in the form of heat when the combustion of a fuel or combustible takes place within the working cylinder of the engine. The pressure to move the working piston is the result of heating, to a high temperature within a confined space, the air required for combustion and the products of such combustion. The expansive tendency of such heated air and gases is the motive force. It is all released within the confines of the working cylinder and is not conveyed thereto by piping from a reservoir or receptacle exterior to it. This principle differentiates the internal-combustion engine from the hot-air engine (q.v.), in which the heat is imparted to the working medium (air) by transmission through the cylinder walls from without; and from the steam engine (q.v.), in which the heat from the combustion in a furnace is imparted to water and the resulting steam is allowed to pass in the form of pressure energy to the working piston. These last two may be called external-combustion engines.

The problems to be met and solved in an internal-combustion engine are threefold. The first is that of receiving the pressure energy of the heated air and gases and transmitting and transforming such energy so that it will do mechanical work. The second is that of the combustion of the fuel and the controlling of the

inconvenient temperatures in respect to the materials of which the mechanical parts consist. The third is the problem of control of the energy (quantity of fuel) as the resistances may vary, and the controls of the time of admission and release of potential energy as respects the cycle of the cylinder action. The first and third problems are mechanical in kind, the second is chemicophysical, and each laps over or is interwoven with the other two. Moreover, in the internal-combustion engine the problems incident to size of the cylinder and consequent power capacity of the motor are not only different in degree in small engines and in large, but so different that they become really different in kind. The problems of the small engines, or those of less than 500-horse-power capacity, will be considered first.

The basic requirement of an internal-combustion engine is a confined space within which the combustion of the fuel and the increase of pressure consequent thereon may take place. This combustion chamber must have one or more movable, gas-tight walls capable of moving outward, that in such motion the work concept of

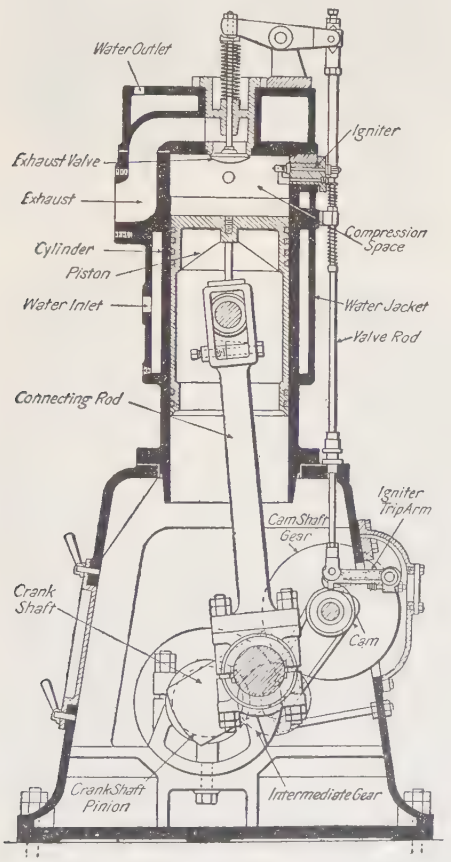


DIAGRAM OF SIMPLE VERTICAL INTERNAL-COMBUSTION ENGINE.

a force acting through a space may be realized. (See WORK.) This is most easily secured by having a cylinder within which fits a piston. Behind or above the piston is a space (usually about one-third of the space swept through by the piston in its stroke) into which the combustible mixture of fuel and air can be introduced and ignited. Under the pressure of such increase of temperature as the combustible mixture undergoes when fully heated, the piston will be forced outward and the space increased. Such piston motion must be controlled in extent and made available for a continuous motion which can be utilized. This is done by connecting the piston, by a connecting rod, to a crank on a revolving shaft, whereby the length of the piston travel is controlled, its energy used to rotate the crank shaft, and the piston itself brought back to the starting point for another stroke. On account of heat difficulties belonging to the second problem the cylinder is usually not closed at the end nearest the crank and shaft, and the cylinder is therefore single-acting or works only on the outgoing stroke and has atmospheric pressure on the crank end. Larger engines are sometimes or often double-acting, like the usual steam-engine cylinder.

The walls of this pressure or working cylinder and of the combustion chamber which is its extension must be strong enough to resist any internal pressure produced on the ignition of the charge. They must be gas-tight, so that no loss of pressure may occur through leakage, but they must have openings, also capable of being closed gas-tight, through which the combustible mixture may be admitted and through which the products of combustion may be expelled after the expanding gases have done their work. These openings must be closed completely by valves when the pressure is driving the piston, and at the proper times of the piston stroke these valves must open. The high temperatures to which the valves are exposed are sources of trouble. Small valves were at first of the flat, sliding type, but the difficulty of making and keeping these tight and the troubles of lubricating them resulted in a replacement of the sliding type by the lifting or poppet type, which needs no lubrication and is easily ground tight in place. A sliding-sleeve type has reappeared for small motors, but it cannot be easily applied to larger sizes and has certain objections even in smaller sizes under the higher temperatures of heavy service. Large engines have lifting poppet valves with a water circulation in hollow channels within their figure to keep them from warping and distorting under heat.

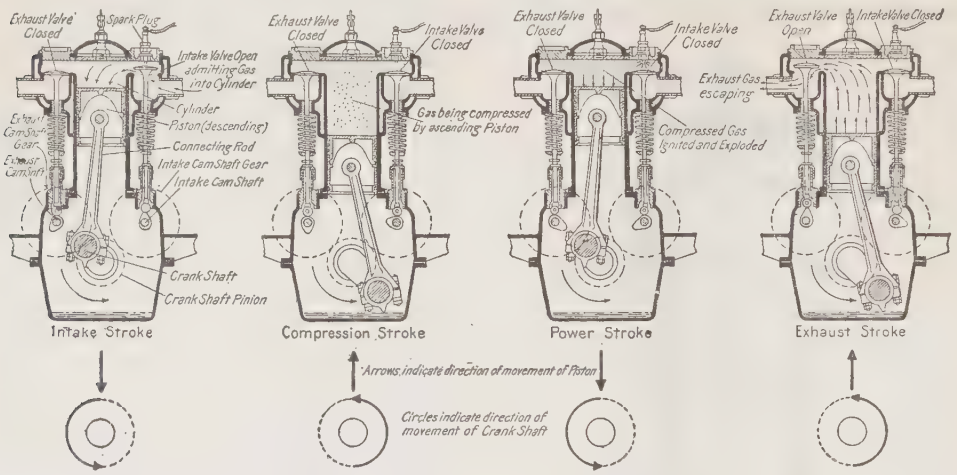
The valves controlling the admission of the combustible mixture are called inlet or admission valves; those controlling the escape of the burnt gases are called exhaust valves. Both are usually operated by cams on a secondary or "lay" shaft driven by gears from the crank or motor shaft and having the cams so timed as to function at the proper moments and during the proper period. Sleeve valves may be driven by eccentrics and some noise and clatter of valve motion thus eliminated at high rotative speeds. The cams bear upon hardened steel rollers and at low speeds make no detectable noise. Rotary valves have been designed in which cylinders or parts of cylindrical surfaces slide over cylindrical seats either lengthwise or at right angles to the cylinder axis. These are cheap to manufacture and reduce losses by clearance, but they are not likely to remain gas-tight, nor can they be made so after they have become worn.

The admission valves and a separate "throttle" valve in the pipe or channel through which the fuel or the combustible mixture passes on its way to the engine is the means of controlling the speed or power of the engine by controlling each charge admitted to the cylinder. Govern

ing of the speed and power of the internal-combustion engine can be effected by having a speed governor control the throttle valve and varying the weight of charge by varying its pressure and density, or by varying the duration of the period of admission by varying the cam action on the valve spindles. Larger engines usually govern by this latter method. The internal-combustion motor requires a flywheel on the revolving crank shaft to minimize irregularities of the turning effort caused by the intermittent pressure upon the piston. The mass of such flywheel will be less as the number of cylinders actuating the crank shaft is increased.

The second series of problems are those related to the combustion of fuel in the working cylinder. The first of these is that of securing perfect combustion, or complete union of the fuel elements with the oxygen of the air. Every particle of the fuel must be so intimately mixed with the air that its combustion shall be practically instantaneous. The fuel particle must therefore be so small or in so fine a state of division as not to be detectable by the senses of sight or touch. This means that the fuel must be in the gaseous state or in that of a mist or vapor and intimately mechanically mixed or disseminated through the air. The combustion is to be so rapid as to be comparable to that which takes place in an explosion. This requirement that the fuel in the cylinder at the moment of firing shall be a gas in effect makes the term "gas engine" (q.v.) synonymous with internal-combustion engine; but many internal-combustion engines make a liquid fuel supplied to them into the necessary gas by a process of carbureting the air supplied to them and are therefore not true gas engines. The term "internal combustion" is the broader and more comprehensive term and will apply to a wide range of fuel supplied—gas or liquid, volatile or non-volatile hydrocarbons, oils, tars, and petroleum distillates.

The next consideration involved in the combustion is the introduction of the mixture of combustible fuel and air into the combustion chamber and the removal of the burnt gases after the working stroke has been completed. Experiments indicate that the best all-round results are secured when the proportion of air to gas in the mixture is from 10 to 13 to 1. This mixture in due proportion must enter the cylinder, and this can be brought about only by having the pressure within less than that without, or the pressure outside greater than that within. An early solution was to have two pumps, their volume being in the desired relation of gas to air, and to have these fill on an aspirating stroke and force their capacity into the working cylinder on a compressing stroke; or to have one pumping cylinder receiving both gas and air in desired ratio on its suction stroke and delivering the mixture on the displacing stroke. Furthermore, it was early proved mathematically that an internal-combustion engine was efficient in proportion as the combustible charge was compressed mechanically before being fired. Hence the debt of obligation to Dr. Nicholas A. Otto for working out the Beau de Rochas "cycle" in 1878, whereby the necessary functions for efficient operation could be realized in the single working cylinder by taking two revolutions of the crank shaft or four reciprocations of the piston in the cylinder to complete them.



SUCCESSION OF CYCLES IN A FOUR-CYCLE GAS ENGINE.

This four-cycle, or more properly four-stroke cycle, requires:

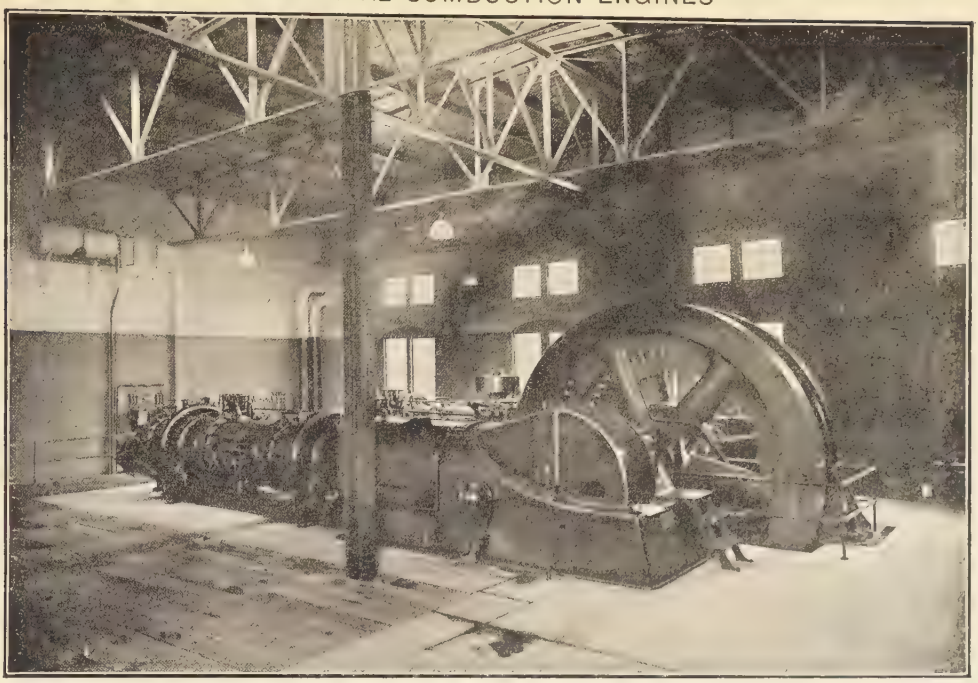
1. *Aspirating or Suction Stroke.*—Piston moves outward, lowering pressure in combustion chamber. Inlet valve open, combustible mixture flows in. Exhaust valve shut.

2. *Compression Stroke.*—Piston returns; inlet valve shut; mixture ordinarily compressed to about 40 pounds' pressure per square inch.

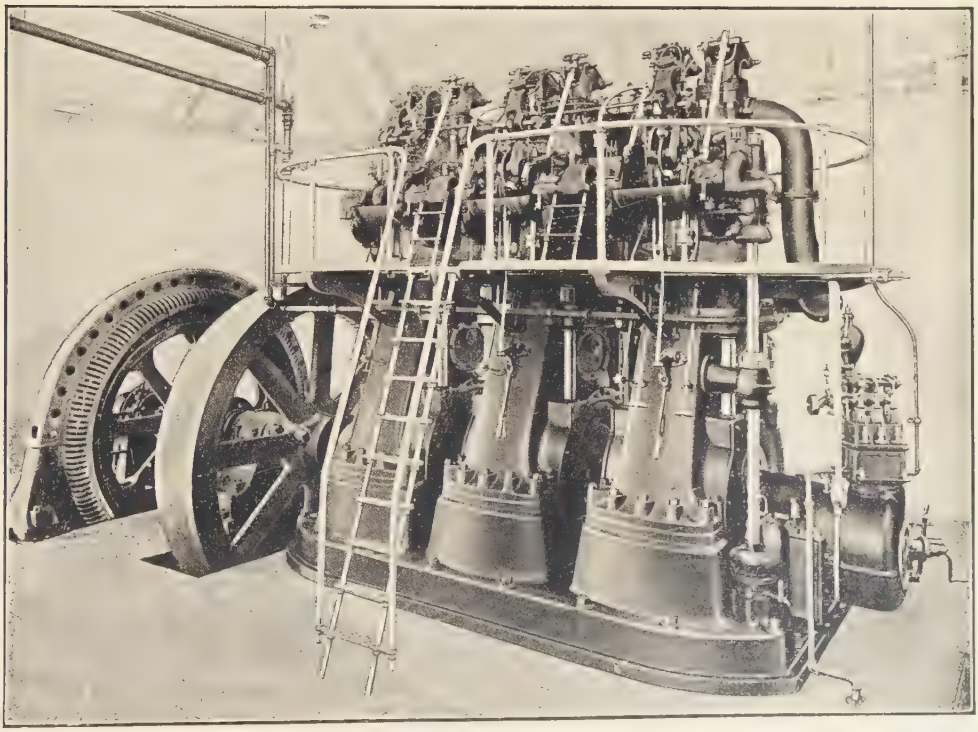
3. *Working or Power Stroke.*—Mixture is fired at or just before piston reaches its innermost position. Pressure rises to about 200 pounds per square inch and drives the piston outward. Pressure falls by the increase of the volume behind the piston. Both valves are shut during working or power stroke.

4. *Exhaust Stroke.*—Piston returns to position of No. 1 with exhaust valve open, inlet valve shut. Products of combustion escape. Exhaust valve shuts at end of piston traverse, so that only the clearance above or behind piston is left full of exhaust or burnt gases. Then the four-stroke cycle repeats itself.

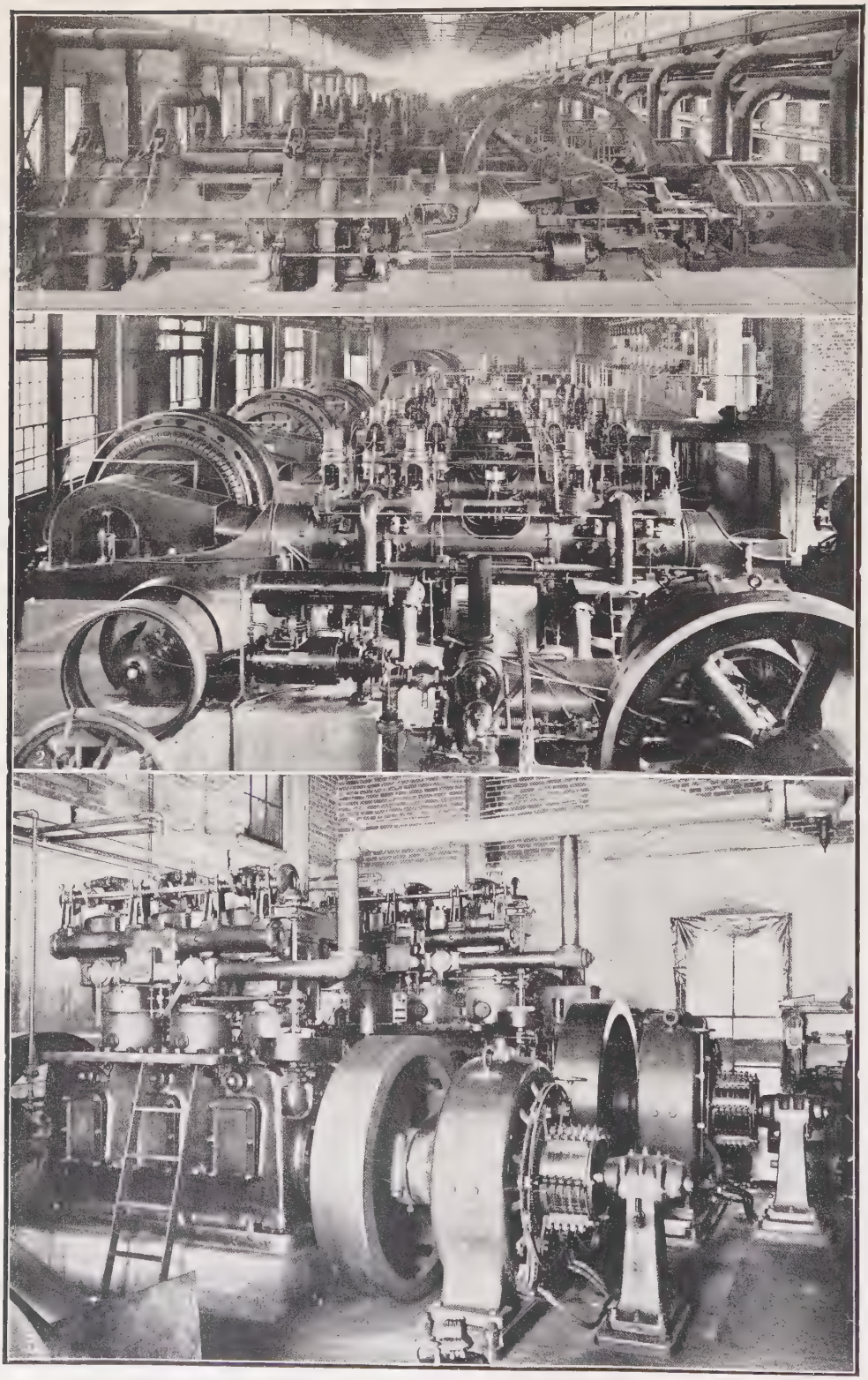
The objection to the four-stroke cycle is that only one traverse of the piston in four is a working or power stroke. This is corrected by



GAS ENGINE DEVELOPING 1200 HORSE POWER DIRECT CONNECTED TO A 60 CYCLE GENERATOR AT SHREVEPORT, LA OPERATES ON NATURAL GAS



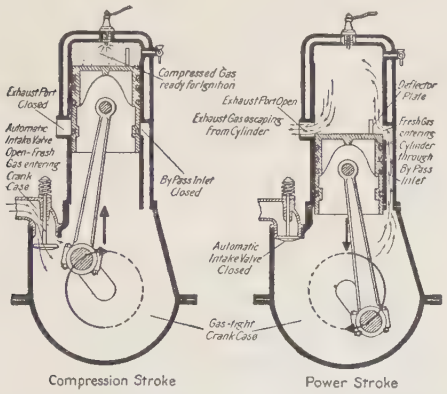
DIESEL ENGINE. TRIPLE CYLINDER 450-500 B.H.P. ENGINE, DIRECT CONNECTED, TO 375 KILOWATT ALTERNATOR. IN PLANT OF BRYAN WATER WORKS AND ELECTRIC LIGHT COMPANY, BRYAN, OHIO



1. EIGHT 2900 B.H.P. HORIZONTAL TWIN TANDEM BLAST ENGINES AT INDIANA STEEL CO PLANT, GARY, IND.
2. SIX 700 B.H.P. HORIZONTAL TANDEM DOUBLE ACTING NATURAL GAS ENGINES DRIVING 60 CYCLE ALTERNATORS
3. TWO 140 B.H.P. VERTICAL SINGLE ACTING PRODUCER GAS ENGINES

making four cylinders (or more) work upon one crank shaft, so that there are four (or more) working impulses in the two revolutions, as there would be in a double-acting single-cylinder steam engine.

The "two-stroke cycle," or, more briefly, the

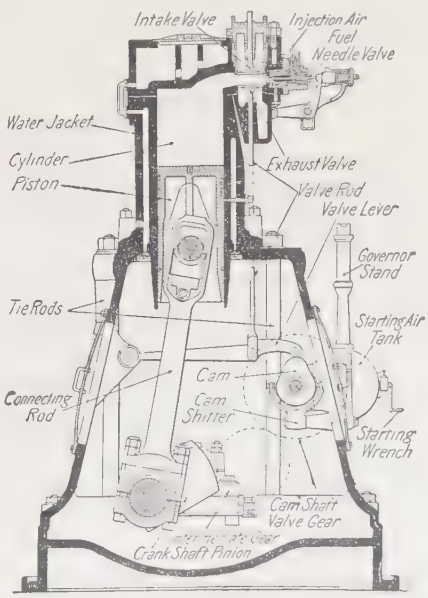

Exhaust Port Closed
Automatic Intake Valve Open - Fresh Gas entering Crank Case
Compressed Gas ready for Ignition
By Pass Inlet Closed
Exhaust Port Open
Exhaust Gas escaping from Cylinder
Deflector Plate
Fresh Gas entering Cylinder through By Pass Inlet
Automatic Intake Valve Closed
Gas-tight Crank Case
Compression Stroke
Power Stroke

SUCCESSION OF CYCLES IN A TWO-CYCLE GAS ENGINE.

"two-cycle" engine seeks to secure the same cycle of operations in two traverses of the piston and thus to have one working stroke in one revolution of the crank shaft. It does this by inclosing the crank and connecting rod air-and-gas-tight, and causing the mixtures of gas and air to be drawn into such crank case by the inward or upward stroke of the piston, while the compression stroke is in progress above such piston. The sliding piston operates as its own valves, opening a port in the cylinder wall at the end of the working stroke to allow escape of burnt gases, and immediately thereafter opening an inlet port connecting the crank case and its contents with the space above the piston. The charge in the crank case has been compressed slightly by the outward traverse of the working stroke, enough to cause it to flow into the space above the piston when the intake port is opened, and it further acts to displace the burnt gases which dispute its occupancy there. A deflection plate neutralizes a tendency for the fresh mixture to rush directly out at the open exhaust port. The two-stroke cycle has the advantage that the crank shaft can turn in either direction, for the steps of the cycle change at the dead centres. There are no valves, since the sliding of the piston performs the valve functions; and the power strokes are twice as frequent as in the four-stroke cycle. There are dangers of annoying explosions in the crank case full of combustible mixture; the engine is not at its best with variable resistances, so that it is current practice to call its power 1.65 that of the four-stroke cycle engine of the same number of cylinders, instead of twice.

The Otto cycle in two-stroke or four-stroke engines assumes the combustion or heating process to take place without measurable change in the volume which the gases occupy. In scientific phrase, the heating is at constant volume. Two other types are practical: in one the heating may be done at constant pressure, but therefore necessarily with an increasing volume as the heat is supplied in each stroke. This was the cycle used by Brayton in his "ready-motor" of 1873. The other has the heating done at constant temperature and hence with both pressure and volume varying in the process. This is the cycle of the Diesel engine, first proposed in Germany, and used for stationary engines and even for marine purposes and railway locomotives. In the Diesel, and to an increasing degree in other cycles, the air only is highly compressed, and the fuel in liquid form injected into the air, to burn rapidly or more slowly therein. This diminishes the dangers of crank-case firing in the two-stroke cycle type, and in the Diesel type not only attains the high efficiency desired but simplifies construction and operation, since the high pressure is secured without dangers of preignition, and the high temperature of the compressed air makes the fuel ignite easily and surely, so that very non-volatile or reluctantly flaming hydrocarbons may be used, such as crude oil or distillate or tarry residues. The excessive high pressures specified give trouble with the pump and other valves.

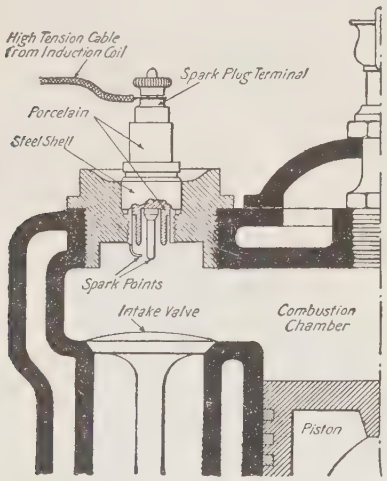
The third combustion problem is that of firing or igniting the combustible mixture at the proper time. This is universally done electrically in recent designs, either from a magneto or dynamo, or from a storage or other battery, except where the high temperature of the compression and the combustion chamber are sufficient. The magneto can be low-tension with a secondary coil to raise the voltage, or high-tension current can be generated directly. The electric spark is caused to jump a gap between terminals which stand in the mixture to be ignited, and a local ignition at the gap is propagated through the mixture. In low-tension systems a "make-and-break" ignition may be used, the spark passing when an opening or gap is made in a closed circuit, across which the current must jump at the proper time. The terminals are usually mounted in the *jump-spark*



VERTICAL SECTION OF DIESEL ENGINE.

system in a *spark plug* which has one or both terminals carefully insulated and so constructed that it can be conveniently removed and replaced if necessary. As there is also some lag or delay in the propagation of the flame on the electrical transmission to the terminals, the

timing of the spark passage should be variable with the speed of the motor for best effect, and a retarding of the spark can be used as a means of speed and power control. If the spark passes after the inner dead centre is passed, the pressure on the piston is much less than when the



HIGH TENSION SPARK PLUG.

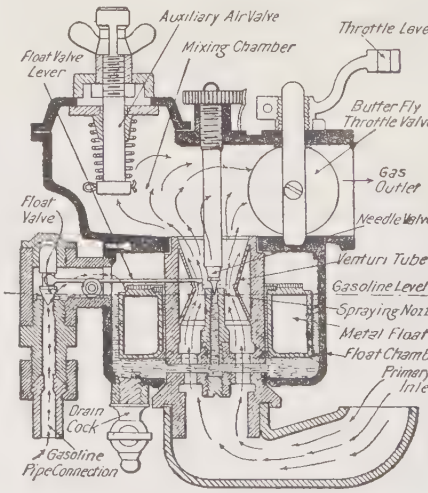
ignition or firing takes place in the more greatly compressed charge. Late firing makes an unnecessarily hot cylinder, and perhaps a flaming exhaust gas whose combustion was not completed within the cylinder. Ignition by an open flame, by incandescent metal, and by hot tubes have now only historic interest.

The fourth problem incident to internal combustion is the preventing of excessive temperature or overheating of the cylinder and valves. Overheating causes warping and distortion of valves and their seats so that they are not tight, excessive stresses in the metal of bed plates, undesired preignition of charges, the seizing of surfaces which should move easily over each other, and prevents proper and effective lubrication of rubbing surfaces. In large engines the difficulty of cooling makes it a question whether a diameter of cylinder greater than 18 inches should be attempted. Cooling is most effectively done by circulating water through passages in the cylinder walls and heads—*water jackets*—through hollows left in the valves and valve seats, and through the passages in hollow pistons and piston rods. Water-cooling may also be effected by injecting water into the working mixture, and a small power gain be realized from the resulting steam. Small engines may cool the cylinder walls only. Air-cooling by currents of rapidly moving air is applicable to engines of small cylinder diameter —say, below 8 inches—but not for large cylinders. Back-firing by preignition of compressed charges is too great a danger.

For motor-vehicle engines the cooling is done by water circulated by an attached pump, and such water air-cooled in its turn by being passed in thin films through a cooler or radiator over which air is moved by a rapidly revolving fan. Boat engines are cooled by circulating the water from outside the hull through the jackets. Cooling water in motor vehicles is not supposed to get hotter than 180° F. under heavy hauling, but in mountain work it is sometimes difficult to keep it from boiling, particularly at high altitudes. A certain amount of heat energy is carried off to waste with the water or air used in cooling, but to attempt to save this loss is to introduce greater practical difficulties than are represented by the value of the saving of heat.

A fifth difficulty in internal-combustion engines is that due to the deposit of carbon or lampblack as a hard coating on metallic surfaces exposed to flame. These deposits cause leaky valves and pistons and also cause preignitions if they become hot enough. They are removed by scraping, by burning off with oxygen in oxyacetylene or other blowpipes, or by solution in tetrachloride of carbon or other solvent. The carbon is the result of reluctantly combustible elements in the fuel and from deposits left by the cylinder lubricants.

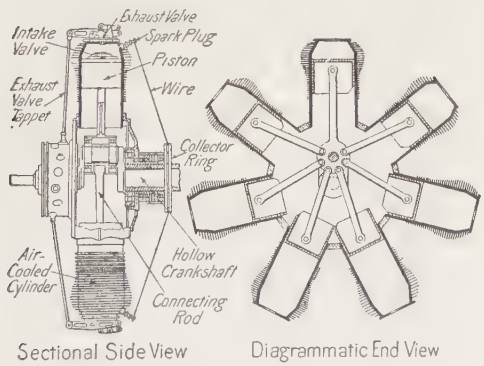
Carburetors and Carburation. Stationary internal-combustion engines may be supplied from a source of natural or of manufactured gas (q.v.). Usually the natural gas is a fuel gas low in illuminants, and producer gas may be cheaply manufactured for engines. But for portable engines, such as those used in motor vehicles and boats, storage tanks of compressed gas are not economic or desirable, and the liquid fuels are more easily obtained, more convenient, and usually cheaper. Hence, in such cases, the internal-combustion motor must be supplied with an accessory device to make the liquid fuel into a gas as it is needed by the engine. The convenient type of gas to be so made and supplied is an air gas, made by carbureting air or saturating it with as much vaporized or atomized hydrocarbon as it will carry without dropping. Most carburetors depend on the principle of injecting by pressure through a small nozzle a jet of the liquid into a moving current of air. The latter absorbs the liquid, divided as it is into atomized particles, and thus intimately mixes the fuel and air, so as to make either a true combustible gas or a fog or mist,



VERTICAL SECTION OF TYPICAL FLOAT FEED CARBURETOR.

which will burn like a gas when it meets additional air to support such combustion. This process is called carburation. The liquid fuel must be kept at constant head and at a level such that no flow of fuel shall take place except when needed. This is accomplished by means of

a float in a chamber forming part of the carburetor. This float controls a fuel flow or feeding valve from the fuel supply pipe and is borne upon the liquid fuel in the float chamber. As the desired level of fuel in the float chamber is reached, this float will rise and by its attached valve stop the flow from the fuel reservoir. The fuel jet pipe or passage leads from the float chamber and terminates in the pipe or passage carrying air to the cylinder inlets. The orifice or nozzle is adjusted to be about 1/16 of an inch above the level of the liquid in the float chamber when pressures at the jet and in the float chamber are the same. Under these conditions no flow takes place until the pressure at the orifice of the jet and in the air pipe is reduced by the movement of the piston during the aspirating stroke of the cycle in the engine cylinder. This reduced pressure does not affect the air on top of the fuel in the float chamber, and at once a jet of the liquid fuel is forced through the nozzle mixing with the flowing air, and carburation occurs. It is the necessity for making this suction pressure at the jet to carburet the air that makes it necessary to "turn the engine over" or "crank" the engine for the first stroke of the pistons in starting. The fuel jet is usually made capable of adjustment for a quantity of fuel per second, to meet variable speeds of motor; and in addition a second adjustment, either automatic or hand-controlled, is added to prevent a proportionate excess flow of liquid at the higher speeds or when the aspiration fall of pressure is the greatest. This is either an automatic air valve opening only



GNOME ROTARY AËROPLANE MOTOR.

The diagram above shows a typical rotary aëroplane motor, with a number of cylinders whose pistons act on a single shaft, and indicates how the problem of obtaining maximum power with minimum weight has been satisfactorily solved in one type engine of which there are numerous examples. The Gnome motor illustrated above has had considerable vogue, both in Europe and the United States for aëroplanes, and has been built up to 160-horse power and with as many as 9 cylinders, making 1200 revolutions per minute. The action of this motor will be apparent from the diagrams shown after reading the explanation of the vertical engines on the preceding pages. Aëroplane motors are also made with vertical cylinders as in an automobile engine with a V-arrangement of the cylinders, and may be water-cooled as in the case of the Curtiss and Wright motors, instead of being air-cooled as in the Gnome motor.

under such lowered pressure of the greater suction; or the flow of fuel is cut off proportionately as the suction pressure is lowered. Excess fuel is not only wasteful, but a mixture too rich in fuel ignites less easily and deposits soot and carbon. Where liquid fuel is injected into highly heated compressed air, the carburetor can be dispensed with, as in the Diesel system. The principle of carbureting air by means of a carbureting device was a great step in the progress of the internal-combustion motor and was first taken by Maybach and Daimler.

Starting the Engine. The cycle of the internal-combustion motor is a complete process. It leaves no energy stored except in the revolving flywheel, and hence when the engine is to be restarted after a stop some energy must be drawn upon external to the engine itself to cause the first stroke. This may be muscular effort of man in small engines, when the resistance of the compression is not too great for his strength. In larger engines a supply of compressed air in a reservoir may be drawn upon, the pressure being exerted on the motor piston of one or more cylinders to turn the crank shaft and allow the others to draw in the combustible charges and fire them. Or the starting may be done by turning the crank shaft by an electric motor. The compressed-air system is preferred for larger engines, the engine compressing the air into tanks by means of a compressor which it drives while running. The necessity for starting by external power makes it desirable that the useful resistance or work of the engine be disconnectible from it, so that the external power shall have only the internal resistance of the engine to overcome during the starting process. A clutch or engaging device is therefore a feature in nearly all internal-combustion motors, so that its crank shaft can be turned without turning all the machinery which it is to drive.

Advantages of the Internal-Combustion Engine. The Internal-Combustion principle offers the following advantages:

1. There is no stored energy in form of heat and pressure, as in the steam boiler, which may deal destruction if the shell is ruptured.
2. It has not the weight and bulk of boiler, chimney, and furnace, and the economic losses in indirect heating of the power medium.
3. The inconveniences due to poor water or to the absence of water in arid territory do not occur.
4. Licensed engineers are not required where there is no boiler with its dangers.
5. The engine is ready to start without delay for getting up pressure.
6. The expense of operation stops when the engine stops.
7. The machine is self-feeding as respects fuel, so that a second man is not required, and there is no trouble from ashes nor from sparks.
8. A high rotative speed and light weight per horse power are possible; this adapts the internal-combustion type for aëroplane work.
9. The higher thermodynamic efficiency of the operation.

Disadvantages of the Internal-Combustion Engine. 1. The motor has to be started by an auxiliary power, usually accumulated or stored from a previous running of the engine.

2. The four-cycle type does not reverse its direction of rotation, but where occasional reversals are to be required these must be secured by gearing in the transmission machinery between the motor and its work.

3. It is efficient at only one speed, and to meet lower speeds of the resistances it must be geared down in order to secure power.

4. Its superior limit of speed and power cannot be exceeded in emergencies.

5. It has only one power stroke in four piston traverses; hence to secure uniform turning ef-

fort for every traverse of the piston, or half-revolution of the crank shaft, the number of cylinders has to be increased.

6. If anything interrupts the functioning of the fuel supply or the ignition, the engine stops short and without a period of warning.

Capacity and Efficiency. The largest single unit internal-combustion engine of the present day has a capacity of 2000-horse power in its four cylinders. Where larger capacities than these are desired, they are secured by duplicating or multiplying the units, or by a return to the steam-engine or steam-turbine principle. The efficiency of the internal-combustion engine as a heat engine has been raised to 0.27 in special examples, and is about 0.20 for small types. Small gas engines are nearly as efficient as large ones, while small steam engines are much less efficient than large ones.

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INTERNAL-REV'ENUE SYSTEM. The revenue derived by the United States government from taxation other than that of imports is commonly designated as internal revenue. In its widest sense the term includes the direct taxes levied in accordance with the constitutional rule of apportionment according to population, in 1798, during the War of 1812, and in 1861. But as the constitutional rule noted differentiates such direct taxes widely from all other forms of internal taxation, we may properly exclude them from the discussion of the internal revenue.

Internal taxation did not acquire a permanent place in the fiscal system until 1862, though the nation had, in 1794, 1800, and 1813–17, gained some experience in this form of taxation. This earlier experience was not without value to the financiers of the Civil War and may be briefly examined here.

Soon after the inception of the national government the revenues proved to be inadequate. The fiscal policy of Hamilton had not sought to evade the responsibilities which the creation of a national government imposed, and the burden of State debts created in the common struggle for independence was assumed by the nation. The debt charges assumed in this manner were considerable, and the customs revenues insufficient to discharge them. As early as March, 1790, the Secretary of the Treasury proposed that excise taxes be laid upon snuff and tobacco, carriages, sales at auction, stamps, and on wines and distilled spirits. Alcoholic beverages were subjected to a moderate tax by an Act of March 3, 1791. Liquors produced from foreign materials were taxed at rates ranging from 11 to 30 cents a gallon, and those produced from domestic materials at rates ranging from 9 to 25 cents. The act was very unpopular and gave rise to much opposition, which interfered greatly with its operation, increasing the costs of collection and diminishing the returns. Nowhere was this opposition stronger than in western Pennsylvania, where in 1794 a display of military force was necessary to put down the uprising known as the Whisky Insurrection (q.v.). Despite the falling off in receipts due to this opposition, the revenues could not be dispensed with, and further taxation became imperative. In June, 1794, carriages, sales at auction, snuff, sugar, and tobacco were made taxable, and licenses were required for the sale of wines and liquors. Taxes on legal instruments were imposed in 1797. These measures were enacted in the face of vigorous opposition. As to the carriage tax in particular, the constitutional objection was raised that it was a direct tax and not levied in the manner prescribed, and when this failed to impress Congress, the matter was carried to the courts. The Supreme Court of the United States, in Hylton *v.* The United States, upheld the act, and in effect declared that land and capitation taxes were the only direct taxes in the constitutional sense. The opposition to this form of taxation was due to the fear that thereby the Federal government would gain increased power, and we may well surmise that Hamilton's advocacy of these measures was in part influenced by the desire to assert as soon as possible all the power which he believed to reside constitutionally in the Federal government.

With the rise of the Democratic party to power in 1801 all forms of internal taxation were abandoned. Party principles were opposed to them, and the treasury did not need them. Revenues from customs amply supplied all needs and permitted a considerable reduction in the public debt.

When the War of 1812 broke out, there was at first no thought that any additional revenues would be needed for current expenses, and it was believed that the costs of the war could be met by loans. Both public revenue and public credit were impaired by such a policy. In 1813 it became necessary to seek new sources of revenue, and, by acts of July 24 and Aug. 2, 1813, those taxes which had proved most advantageous before the opening of the century were reimposed. Duties on carriages, on sugar refined in the United States, license taxes on the distillers of spirituous liquors, and on retailers of wines and spirits, with stamp duties on legal instruments, etc., and taxes upon sales at auction, reappeared. These taxes were, however, designated as temporary, and the pledge was made that they should be repealed within a year from the close of hostilities. As it took some time to create the machinery for the collection of these taxes, the actual returns were slow in coming in. Before any appreciable revenue had been derived from this source ($1,662,984 being collected in 1814), rates were increased in December, 1814, and new taxes were imposed in January, 1815. They embraced pig iron, iron castings, bar and rolled iron, nails, candles, paper, leather, playing cards, vellum, hats, umbrellas, saddles, bridles, boots, shoes, beer, ale, tobacco, cigars, and snuff.

For the actual conduct of the war these taxes came too late to be available, but in the settling up of accounts they proved of great assistance. The Secretary of the Treasury was unwilling to part with them wholly and advocated the reten-

tion of a part of the excise system in order to meet any emergency which might arise. Congress, however, by Act of Dec. 23, 1817, abolished these taxes, and no further resort was had to internal taxation until the Civil War.

When the great struggle opened, it was generally believed that the war would soon be terminated, and that the expenses of the contest could be entirely provided by loans. As in 1812, there was a delay in the creation of new sources of revenue. A direct tax of $20,000,000 was levied on the States by Act of Aug. 5, 1861, but it was not until July 1, 1862, that an Act was passed to raise any considerable revenue from internal taxation. The law embraced almost every conceivable object of taxation. There were taxes on liquors of all kinds, license taxes upon merchants, taxes on all manufactured articles, on auction sales, carriages, yachts, billiard tables, plate, the gross receipts of railroads and other transportation companies, on the dividends of banks, trust, savings, and insurance companies, on advertising, on incomes over $600, on legacies, and stamp taxes upon bills of exchange and other mercantile papers. It took some time to establish the machinery necessary to the proper administration of this system of taxation; it produced in the fiscal year 1863 only $37,640,787, though its advocates had anticipated a revenue of $100,000,000. In the following fiscal year these taxes produced $109,741,134, without any change in rates. The demand for increased revenue led, June 30, 1864, to increased rates. New objects of taxation were discovered, and rates were considerably increased upon articles already taxed. On manufactured products generally the rate ranged from 3 to 5 per cent, while on specific articles it was doubled. On liquors rates rose from 60 cents per gallon, under the Law of March 7, 1864, to $1.50 and $2, while the maximum rate on tobacco rose from $3.50 per thousand to $40 per thousand, the latter rate applying to cigars valued at $45 per thousand. The revenue rose in the fiscal year 1865 to $209,464,215, but it was not in those articles which were so extravagantly taxed that the increased revenue was most conspicuous. Indeed, the product of the tax on distilled liquors fell from $30,329,149 to $18,731,422, while that of the tobacco taxes rose only from $8,592,098 to $11,401,373. A further increase of rates was made by an Act of March 3, 1865, and the fiscal year 1866 with revenues of $309,226,813 showed the high-water mark of internal-revenue receipts.

The increase of revenue resulting from these several acts was rapid, and the annual deficit grew relatively smaller, as compared with revenues, although it increased absolutely as the war progressed. Even more important, perhaps, than the actual revenue received was the improvement in public credit, which resulted from these serious efforts to place the revenues on a sound basis. The last act, while raising rates, contemplated their speedy reduction and provided for the appointment of a revenue commissioner charged with the duty of studying the whole revenue system and proposing suitable modifications. Extraordinary military expenditures were no longer required, but the general scale of national expenditure was vastly greater than before the war. The abolition of internal-revenue taxation was not thought of, but a reduction of the burden and the removal of some of the more vexatious taxes were generally demanded. By a series of acts in the years 1866, 1867, and 1868 many taxes were abolished, and rates on many others diminished. It was estimated that $196,000,000 would be taken from the revenue, but the actual diminution was less than $1,250,000. The greater productivity of moderate rates was amply demonstrated. In the case of distilled spirits a rate of 50 cents a gallon, enacted July 20, 1868, produced in the fiscal year 1870 a revenue of $55,606,094, while the maximum revenue under the $2 rate in 1867 had been $33,542,951.

In 1870 taxes still remained on spirits, tobacco, fermented liquors, gross receipts, licenses, incomes, legacies, successions, gas, stamps, and some few other articles. The income tax, which in 1870 had produced $37,775,873, was abandoned in 1872. The tax on spirits was raised to 90 cents in 1875, but elsewhere, especially on tobacco, there was a reduction of rates, and all stamp taxes ceased in 1883. While ultra-protectionists like William D. Kelly urged the abolition of all internal taxes, this plan did not secure any large following, the sentiment in favor of taxing liquor and tobacco, the main supports of the internal revenue, being well-nigh universal. The experience of recent years has, moreover, firmly demonstrated in the minds of the people that such taxation of the internal resources of the nation is an indispensable element in any revenue system, since it is capable of adjusting itself to the needs of a sudden emergency.

No essential changes were made in the system of internal taxes till 1894, when the Tariff Act of August 28 sought to compensate for the prospective falling off in customs duties by raising the tax on distilled spirits from 90 cents per gallon to $1.10 per gallon and by imposing a tax upon incomes. The Supreme Court of the United States decided the income tax established by the law to be unconstitutional (see INCOME TAX), while the increased rate on spirits did not prevent a diminution of revenue from that source.

When, in 1898, war was declared against Spain, internal taxation was chiefly relied upon to meet the increased expenditures. In framing the War Revenue Act of 1898 there was ample experience to draw upon, and that measure shows a judicious use of the taxing power. The act, which went into effect on July 1, 1898, provided an increase of rates upon some articles and reëstablished some of the taxes which the experience of 1862 and 1870 had demonstrated to be most productive. It imposed a special tax on bankers, brokers, proprietors of theatres, circuses, and other entertainment enterprises, tobacco dealers and manufacturers. It left untouched the rates on distilled spirits. On fermented liquors and also on tobacco and snuff the rates were doubled, while on cigars and cigarettes, previously heavily taxed, they were slightly increased. An important feature of the law was the imposition of stamp taxes upon mercantile papers of all kinds and upon proprietary articles (patent medicines) and wines. The revenue receipts under the law as amended are shown in the following table, which gives for comparison the years 1897 and 1898:

Fiscal year ending	Internal revenue receipts
June 30, 1897	$146,688,574
June 30, 1898	170,900,681
June 30, 1899	273,437,162
June 30, 1900	295,327,927
June 30, 1901	307,180,664

A comparison of receipts in 1897 and 1899 will show the effect of the new law and will also reflect the increasing prosperity of the country, as shown in the larger returns of 1899 in the foregoing table, without change of rates:

FISCAL YEAR ENDING JUNE 30

RECEIPTS FROM	1897	1899
Spirits	$82,008,542.92	$99,283,534.16
Tobacco	30,710,297.42	52,493,207.64
Fermented liquors	32,472,162.07	68,644,558.45
Special taxes	.....	4,921,593.21
Legacies	.....	1,235,435.25
Stamps	.....	43,837,816.66
Miscellaneous	1,628,691.06	3,068,426.07
	$146,819,693.47	$273,484,571.44

With the return of peace the demand for a reduction of revenue became general. By a Law of March 2, 1901, taking effect July 1, 1901, considerable reductions were made, the tax on fermented liquors being reduced from $2 per barrel to $1.60, the maximum cigar tax going back to what it was before the war, while all stamp taxes on proprietary articles and the most troublesome taxes on business papers, such as bills of lading, express receipts, certificates of various kinds, insurance contracts, mortgages, bank checks, and telegrams, were repealed. A further Act of March 2, 1902, which went into effect July 1, 1902, removed the last vestiges of the war taxes, old rates being restored and the remaining new taxes being abolished. By Act of Aug. 5, 1909, a new element was added to the internal-revenue system by the so-called excise tax on the net earnings of corporations. This tax was fixed at one per cent on all earnings above $5000. This tax was transformed into an income tax on corporations by the Law of 1913. (See INCOME TAX; TAXATION.) By the same law taxes on individual incomes were incorporated in the system. The relative importance of the two new elements is indicated by the following figures for 1914:

Ordinary internal revenue	$308,613,483
Revenue from corporation tax	43,079,819
Revenue from individual income tax	28,306,336

See FINANCE; TAX AND TAXATION; INCOME TAX.

IN'TERNA'TIONAL. See INTERNATIONAL WORKINGMEN'S ASSOCIATION.

INTERNATIONAL AF'RICAN ASSO'CIA'TION. See AFRICAN INTERNATIONAL ASSOCIATION.

INTERNATIONAL BOUND'ARY TRIBU'NAL. See ALASKA, *History*.

INTERNATIONAL COP'YRIGHT'. See COPYRIGHT.

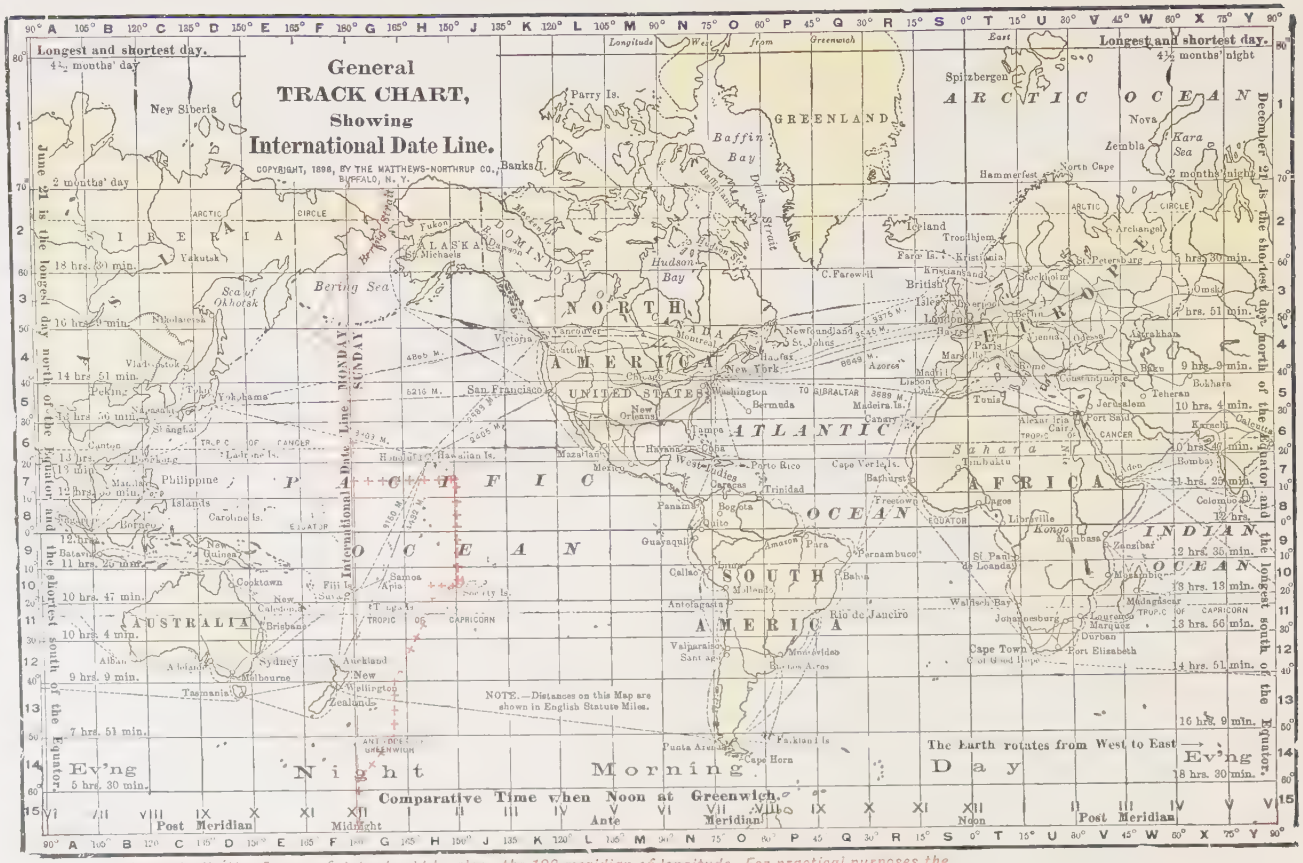
INTERNATIONAL DATE LINE. An irregular line drawn somewhat arbitrarily on the map of the Pacific Ocean, near the 180° meridian of longitude. It marks the place where navigators "change their date" on the trans-Pacific voyage. The following is a brief explanation of the cause of this change of date. When a person travels westward, he lengthens his day by one hour for every 15°, since he moves along with the motion of the sun; by going westward entirely round the earth, lengthening each day by a certain amount, four minutes for every terrestrial degree he travels, he will have lost one day at the arrival at the starting point. The second of a month, e.g., is to him the first; Monday is Sunday, according to his reckoning. This is obvious, since by going round the earth from east to west he has, in respect to himself, diminished by one the number of revolutions made by the earth during this time. Going round the earth eastward the reverse takes place, and a person gains one day, since he makes one more revolution than the earth does. Thus, two persons, having started from the same place and traveled round the earth in opposite directions, when they meet at their place of starting, will differ from each other two days in their reckoning. Thus, it becomes necessary to have a date line somewhere on the earth's surface, since it is impossible that the reckoning of days should go unbroken round the earth. Any meridian might do theoretically for this purpose, but for two important practical reasons the 180° meridian of longitude has been chosen for the international date line. These two reasons are: (1) that it lies nearly in the middle of the Pacific Ocean and thus far away from civilization; (2) it is exactly 12 hours from Greenwich. Thus, the theoretical date line coincides with the 180° meridian; but for reasons of convenience an arbitrary irregular line has been adopted in its place. This line is shown on the accompanying map; it has the advantage that no change occurs between important neighboring islands.

Since the line is an arbitrary one, we might expect cartographic authorities to differ considerably in its delineation; and this is, in fact, the case. Indeed, to have such a line drawn with perfectly definite authority, it would be necessary for the principal nations to have the line determined by a joint commission and then to adopt the commission's recommendations by international agreement or treaty. But this has never been done, and so in one sense it may be said there is no *international* date line. The term has, however, come into general use and may well be employed pending such governmental action. It is possible, however, to mark out the line as it is actually used in the Pacific islands. For this purpose it is merely necessary to find out, by correspondence with all the various settlements, whether the date in public use is the American or Asiatic one. Correspondence of this kind was carried on by Prof. George Davidson, of the University of California and formerly of the United States Coast and Geodetic Survey. His results were published by the United States government and form the basis of the accompanying map, which presents unquestionably the most authoritative date line so far placed at our disposal. The principal change from other recent authorities transfers Morell Island to the east of the line. The change of the Samoan Islands from west to east was made by order of King Malietoa in 1892. See ANTIPODES; TIME, STANDARD.

INTERNATIONALE. See INTERNATIONAL WORKINGMEN'S ASSOCIATION.

INTERNATIONAL FUR SEAL CONVEN'TION. See SEALING.

INTERNATIONAL IN'STITUTE OF AG'RICULTURE. A world institution, located at Rome, Italy, for the collection and dissemination of statistical and other information relating to agriculture. Its chief object is to furnish to the various countries prompt and reliable estimates and statistics of agricultural production and distribution, general information re-



Theoretically the change of date should be along the 180 meridian of longitude. For practical purposes the
[illegible] thus:

garding the progress of the industry and means for its improvement, and matters pertaining to the economic and sociological aspects of agriculture. It is under the patronage of the King of Italy and is supported quite largely by the joint contributions of the adhering countries, numbering about 50.

The establishment of the institute was due to the initiative of David Lubin, a prosperous business man of Sacramento, Cal., who after various attempts to win support for his plans in a number of countries succeeded in interesting King Victor Emmanuel of Italy, who called a conference of the nations in 1905. This conference was held in Rome and was attended by delegates from 40 countries. The enterprise received approval, and a treaty was formed providing for the organization and maintenance of the institute as a permanent institution and defining its field of operations. The King of Italy endowed the institute with revenues amounting to about $60,000 annually, and the Italian government has erected a handsome building for its use in the environs of Rome.

The institute is governed by a general assembly of delegates from the constituent countries, held every two years, and a permanent executive committee, composed of one member from each country. This permanent committee directly manages the institute. Its chairman is president of the institute. The general assembly reviews the work and the plans of the institute, approves the budget, and considers various matters relating to its methods and development. For example, the fourth session of the assembly, held in May, 1913, discussed methods of crop reporting, an international service of statistics, live-stock statistics, agricultural coöperation, crop insurance against hail, an international service of agricultural meteorology, proposal for an international agreement for the control of plant diseases and insect pests, protection of useful birds, and investigations on dry farming.

The work of the institute is divided among four bureaus: (1) the bureau of the secretary general, (2) the bureau of general statistics, (3) the bureau of agricultural intelligence and plant diseases, and (4) the bureau of economic and social institutions. The bureau of the secretary general deals with the *personnel*, financial, and other routine business, printing and distribution of publications, the library and bibliographical work, and the preparation and publication of an annual compilation of agricultural legislation in the different countries of the world. This *Yearbook of Agricultural Legislation* records the progress in the domain of law of the world-wide movement for the improvement of the economic and legal conditions of agriculture and rural communities.

The bureau of general statistics collects, collates, and publishes statistics of production and commerce in agricultural products, both animal and vegetable, throughout the world. These statistics are supplied by the adhering governments, the object being to secure a prompt dissemination of knowledge regarding the prospective and the actual world's supply of important products, farm live stock, etc. Monthly bulletins and an annual report on agricultural statistics are issued. The bureau of agricultural intelligence and plant diseases collects and publishes matter of interest regarding the progress of scientific and experimental investigations and practical experience in agriculture throughout the world, and as a branch of this work gives special attention to the diseases of plants and to entomology. The bureau of economic and social institutions gathers and publishes statistics and general information in regard to agricultural coöperation, insurance, and credit, together with other matters relating to the economic and social organization of rural communities. Each of these bureaus issues a monthly bulletin upon its work.

The institute has accumulated a large library of the world's agricultural literature, and issues a weekly bibliographical bulletin containing a list of the works received, notices of articles of general interest in the periodicals, and titles of legislative acts relating to agriculture. A universal bibliography of agriculture is planned. French is the official language of the institute, but the monthly bulletins are now issued in the French, German, English, Spanish, Italian, and Hungarian languages, the expense of translation and separate publication being borne by the respective countries. This attests the appreciation in which the publications of the institute are held.

The institute also endeavors to promote various enterprises which are of interest to one or more countries and which can be helped through this international agency. Thus, it aided the commissions on rural credit sent from the United States to study the subject in Europe in 1913, and it served as a meeting place of the International Phytopathological Conference in 1914, collecting in advance a vast amount of information regarding the inspection services in different countries.

The budget of the institute for 1914 was about $220,000—a considerable increase, growing out of the development of its activities, which necessitated raising the contributions of the adhering governments. The officers of the institute in that year were president, Marquis Cappelli, of Italy; vice president, M. Louis-Dop, of France; secretary general, Prof. G. Lorenzoni, of Italy. Mr. David Lubin has represented the United States on the permanent committee since the institute was established.

Consult *L'Institut International d'Agriculture, son organisation, son activité, ses résultats* (Rome, 1912), and "International Institute of Agriculture at Rome," in *Document No. 196, United States Senate, 63d Congress, First Session* (Washington, 1913).

INTERNATIONAL INSTITUTE OF SOCIOL'OGY (Fr. *Institut International de Sociologie*). A French scientific society founded in July, 1893. The membership is small and almost entirely confined to Europe. Congresses are held from time to time for the discussion of sociological topics.

INTERNATIONAL LANGUAGE. A phrase applied in the specific sense to languages artificially formed for the purpose of ready communication by persons whose natural language is different. The idea is to do away with the difficulties and irregularities with which historical accidents have encumbered the existing languages and to construct, from old or new materials, a language so simple and regular that any person, regardless of his nationality or degree of intelligence, can acquire it with ease and use it with all the necessary precision. Most of the schemes proposed are intended to serve the purposes of business, travel, and correspondence,

and not in any way to displace the existing languages nor, in spite of the efforts of some enthusiasts, to serve as vehicles of literary expression.

When, by the beginning of the seventeenth century, Latin had been given up as the scientific language, scholars were naturally the first to feel a need for an international tongue as a means of intercommunication. So, as early as 1641, a definite attempt was made by Bishop Wilkins to form a scientific language to take the place of Latin. This was a classification of ideas and of words by ideas and a scheme of characters, much like shorthand, to represent them. Leibnitz tried to improve it by making it even more philosophical, and his idea of pasigraphil, or language by signs, is still quoted as a curiosum. All of the fundamental ideas of the modern systems, however, are found in his scheme. Thus, he desired but one declension and one conjugation, both absolutely regular and without exception, complete suppression of the distinction of genders, simplification or suppression of flectional endings in verbs or nouns, etc. With the discovery of the relations of Sanskrit to English in the eighteenth century, thereby instituting the science of comparative philology, efforts at the formation of international languages multiplied rapidly. The first time an attempt was made to form a language a posteriori, i.e., from existing languages and not an independent philosophical scheme, was in 1765 in the famous encyclopædia of Diderot and D'Alembert. The author of this article, Faiguet, Treasurer of France, laid lown the general principles which have been followed to the present day. Of course the disciples of the French Revolution, desirous of reforming everything, did not neglect language. In 1795 Delormel presented his project, which possesses some interesting features. It would be impossible to mention here all the systems created in the nineteenth century, for their number is legion. We should not forget, however, Sudre's *Soldrésol*, or universal musical language. Originally established in 1817, an effort was made by Gajewski in 1902 to revive it. Among other projects that may be considered of importance are those of Grosselin (1836); Schipfer's *Communicationssprache* (1839), the first complete scheme of an a posteriori language; Vidal (1844); De Rudelle's *Pantos-Dimou-Glossa* (1858), an international commercial language; Letellier (1850), whose creation enjoyed considerable popularity for many years; Sotos Ochando (1845); Renouvier (1855); Pirro's *Universal-Sprache* (1868), of which Latin is the basis for the vocabulary; Dyer (1875), originator of the *Lingualumina*, or language of light; Volk and Fuchs's *Weltsprache* (1882); Courtonne's *Langue internationale néolatine* (1885), which furnished Zamenhof with the fundamental idea in his elaboration of Esperanto; Maldant (1887); and Eichhorn (1887). During the past 30 years, on account of the great increase in commercial relations and the development of pacifist ideals, considerable interest has been taken in the subject of international intercourse.

The point of departure of this sudden awakening of interest dates from the publication in 1879 of *Volapük* (q.v.) by Monseigneur Schleyer, which enjoyed the greatest popularity of any international language formed up to that time. As the basis of this project was principally English, nationalist tendencies were at once aroused, and within a few years more than a dozen schemes for international languages were put forth. Some proposed Latin or Greek, which they have sought to adopt to modern requirements, such as the *Novilatiin of Beermann* (1895); others preferred to adopt one of the modern European languages, as, e.g., Novicow, who argues brilliantly in favor of French.

Of all the efforts of this kind in recent years, we are forced by the limits of this article to mention only three or four, which have had the greatest vogue and have therefore been worked out in detail. The first of these is *Volapük*, which is discussed under a separate heading and which has elicited a number of imitations. Among these may be mentionel *Spelin*, invented by Bauer (1888), *Dil* by Fieweger (1893), and *Balta* by Dormoy (1893), all of which represent attempts to perfect Volapük; *Veltparl* and *Dilpok*, creations of Von Arnim (1896) and Marchand (1898) respectively, being simplifications of Volapük; and Mill's *Antivolapük* (1893), which, as its title indicates, is opposed to the artificial universal language. The second is *Bolak*, or the *Blue Language*, widely advertised by its inventor, M. Bollack, a merchant of Paris (1899). The author himself has devoted no less than nine volumes to this ingenious creation. The main defect of Bolak is that, notwithstanding its pretensions for practical purposes, its artificiality and extreme difficulty render it of little practical value. The author makes but little appeal to the intelligence of the learner, whereas the numerous and complicated rules of the grammar and the richness of the vocabulary make such demands on the memory that a complete mastery of the language is almost impossible. One might be inclined to say that M. Bollack has not invented a new language, but a new system of language. According to this system there are two categories of words, those expressing *vague* ideas, i.e., subjective ideas or ideas of relation, and those expressing *precise* ideas, i.e., objective ideas, complete in themselves. In conformity with the general usage of European languages, the first are represented by *motules*, or short words, and the second by granmots, or long words. As in ordinary grammar there are eight parts of speech, so in Bolak there are eight classes of words, to wit: *interjections; mots-cadres*, expressing affirmation, negation, interrogation, and the general ideas of relation; *connectives*, i.e., prepositions and conjunctions; *designatives*, being pronouns and pronominal adjectives; *nouns; verbs; attributives*, or adjectives and participles; and *modificatives*, or qualifying adjectives and gerundives. Each one of these classes of words is distinguished by its *aspect*, i.e., by its length and its form. The motules have from one to three letters, and if they have three letters, they end in a vowel; the granmots contain three or more letters, and if they have three letters, they end in a consonant. Interjections are composed of a single vowel, which, however, may be repeated. Nouns have generally one syllable and begin and end with a consonant. Verbs are formed by adding a vowel to a noun, and therefore consist usually of two syllables. The pronouns are declined in four cases, and the verbs have three moods, with eight tenses in the indicative alone. To show the artificiality of the language, we may quote the rule for comparison of attributives and modificatives, which is entitled the rule of the Marguerite. Thus, the degrees of com-

parison are indicated by prefixed vowels, used also as interjections, *a* signifying indifference, *o* doubt, *e* exuberance, *i* joy. Hence, *aloved* means the least loved, *oloved*, less loved, *eloved*, more loved, and *iloved*, the most loved.

As for the third language, *Esperanto* (q.v.), its great advantage lies in the fact that it makes use as far as possible of our living languages. Taking what is common to all tongues and dropping what is special to any of them, it is quite easily acquired.

Finally the *Idiom Neutral*, which may be said to represent what is best in both Volapük and Esperanto, originated with the Russian engineer Rosenberger (1902), but really is the product of the efforts of a number of enthusiasts. Though it developed out of Volapük, the subordination of grammar to vocabulary is in direct contradiction with the spirit of that language. At the same time it borrows many good principles from Esperanto, as, e.g., the abandonment of the use of purely arbitrary formatives, preferring formatives taken from Latin or English. Thus, *dom*, house, *domi*, houses, the affixed *i* being the sole sign for the plural. The accent always falls on the vowel that precedes the last consonant. There are no articles and no case endings, the genitive and dative relations being expressed by the prepositions *de* and *a* (*de dom*, *a dom*, etc.). The verbs have only a single conjugation and are invariable in number and person. Thus, *mi am*, I love, *il am*, he loves, *mi amav*, I loved, *mi av amed*, I have loved, *mi amero*, I shall love, *vo amerio*, you would love, etc. The passive is formed by means of the corresponding moods and tenses of the verb *esar* (to be), followed by the past participle. The prepositions, conjunctions, etc., are chiefly adopted or adapted from Latin or French. The object of easy intelligibility is thus fairly attained. It is claimed that an educated reader can read the Idiom Neutral almost at sight without the aid of either grammar or dictionary. So much of the text is intelligible on mere inspection that the rest may be inferred.

Americans have always taken an active interest in this movement, and many new languages have been proposed on this side of the water, such as *Ro* by Foster (1910) and *Altutonish* or *Pangerman* by Molee (1911).

In order to promote the use of the Idiom Neutral in international correspondence and commerce, a society entitled the Delegation for the Adoption of an International Auxiliary Language was formed in Paris on Jan. 17, 1901, and many publications have been issued by it. It remains to be seen what effect the present war will have upon this movement, for one of its main principles is the promotion of peace.

All of the literature on the subject up to the time of publication can be found in Couturat and Leau's excellent *Histoire de la langue universelle* (Paris, 1903), which has been translated into English. Among more recent works, consult: Couturat, *Weltsprache und Wissenschaft* (Jena, 1909), translated by F. G. Donnan into English under the title *International Language and Science: Considerations on the Introduction of an International Language into Science*, by L. Couturat, O. Jespersen, R. Lorenz, W. Ostwald, L. Pfandler (London, 1911); Ostwald, *Sprache und Verkehr* (Leipzig, 1911); Novikov, *Le Français, langue internationale de l'Europe* (Paris, 1911); Couturat, *Lingvo internaciona di la delegituro* (*sistemo Ido*); *angla guidlibreto vidita ed aprobita de la sekretaryi*, by Couturat and Leau (London, 1908); *Les nouvelles langues internationales*, by the same authors (Paris, 1907); Schuchardt, *Rapport sur le mouvement tendant à la création d'une langue auxiliaire internationale artificielle* (ib., 1904). For a good bibliography, consult the *List of Works in the New York Public Library Relating to International and Universal Languages* (New York, 1908). Among periodicals are *Lingvo Internacia* (Paris) and *Progreso* (Paris). For a discussion of the possibility of an artificial language, see Schinz, in the *Revue Philosophique* (ib., July–August, 1905). For the work of the Delegation mentioned above, see *Educational Review* (New York, May, 1907).

INTERNATIONAL LAW. The rules and usages by which sovereign states coincide in regulating, on most issues, their conduct and that of their citizens or subjects in their intercourse or dealings with the governments, citizens, or subjects of other similar states. It is neither solely nor chiefly *international*, for it primarily involves the government of a state and only concerns the nation or individual where statute, governmental decree, or accepted usage makes it the law of the land. And it is not, strictly speaking, *law*—being made up of rules and customs which have no binding force except that of abstract right or justice, policy, tacit acquiescence, or definite treaties or conventions, while some of its widely accepted precepts have never been recognized by certain governments. However, the humanitarian trend of modern thought, the closer relations of alien peoples with each other, the improved methods of communication, the increased regard for the rights of others, the prevailing practice of submitting matters of dispute to arbitration, the voluntary declarations of intention to comply strictly with its rules, and many other causes, have done much to give to international law a binding force which it has not hitherto had, aside from the fear of retaliation, or the pressure exerted by other governments who may deem violations of the rules as hurtful or dangerous to their interests. Nevertheless, in times of war (and under extreme circumstances in times of peace) history has shown that treaties, agreements, and rules of international law are broken without hesitation by states who deem observance of such conventions to be dangerous to their existence or subversive of their serious interests.

The beginnings of international law are doubtless as old as civilization, and even savage tribes have held themselves bound to observe certain formalities in intertribal intercourse. The civilization of antiquity was not calculated to do much in the way of regulating international relations except by special treaties between two adjacent monarchies. As a rule, the states were too large and intercourse too difficult to extend these agreements to many of them. Before the days of railways, telegraphs, and practicable roads it required a number of small, adjacent, independent, civilized states really to develop a system of international rules. Though the Greek states fulfilled these requirements, the character of their civilization and the condition of human thought had not yet developed to a point at which anything approaching a system of rules could be initiated. It therefore fell to the small mediæval states of Italy to begin the work. Their commerce, internal trade, close proximity, jealous rival-

ries, religious quarrels, and other sources of antagonism combined to invite war, and the practice of employing hired soldiery made war easy—indeed, almost inevitable—on the slightest provocation. The wiser rulers and their advisers often desired to avoid hostilities and, when they had begun, to mitigate their severities as leading to discontent among the people and to revolution. The result was the development, in this collection of miniature states, of the modern system of diplomatic representation and the beginning of international law and comity—the institution of passports, the distinction between armed forces and civilians, the laws of war on land and sea, and even the general idea that states have a mutual interest in the observance of law and order among themselves.

This condition of affairs did not obtain in northern Europe, because there the smaller states were overshadowed by the larger ones, and the rule that "might makes right" was carried out to the detriment of the weaker communities. The brutality of the Netherlands war for independence directed one of the greatest minds of the age towards ameliorating such conditions. This was Huig van Groot, who is best known as Hugo Grotius, the Latinized form of his name. He was a jurist, a dramatist, an historian, and a statesman. In 1604, at the age of 20, he composed a work called *De Jure Prædæ*. The manuscript remained unknown until 1868, when it was discovered and published. It is interesting because it shows the main principles and plan of the first part of his great work *De Jure Belli ac Pacis*, which was not written until 1623–25, while Grotius was an exile in Paris (published in 1625). The success of the latter work was immediate, and his fame as the father of international law—or "law of nations" (*jus gentium*), as he termed it—was secure. Grotius practically exhausted the subject so far as theoretical arguments are concerned, and almost nothing has been added to them by all of his successors. This work came at an opportune time, in the midst of the Thirty Years' War, and had a profound effect upon subsequent events.

Grotius was followed by Pufendorf, who published *De Jure Naturæ et Gentium* in 1672: Leibnitz, *Codex Juris Gentium Diplomaticus* (1693–1700); Van Bynkershoek (who was first to give special treatment to public maritime law), *De Dominio Maris* (1721); Wolff, *Jus Naturæ et Jus Gentium* (1740–49); and Vattel, *Droit des Gens* (1758). The writers upon international law since Vattel are too numerous to mention even the most distinguished of them. For a description and criticism of their work, consult Rivier's sketch in Holtzendorff, *Handbuch der Volkerrechts*, vol. i (Hamburg, 1885; Fr. trans., 1888, vol. i, pp. 351–394). In America the most important work has been done by Kent (1763–1847), Wheaton (1785–1848), Halleck (1817–72), Woolsey (1801–89), Dana (1815–82), Wharton (1820–99), Stockton (1845–), and Moore (1861–). The decisions and opinions of eminent judges as rendered in important cases have added much to the subject—in England, Sir Leoline Jenkins (1623–85), Lord Mansfield (1705–93), and Lord Stowell (1745–1836); in the United States, Chief Justice Marshall (1755–1835) and Justice Story (1779–1845).

The modern method of developing and adjusting the rules of international law is by means of conferences of the Powers. The first of these was at Paris in 1856, and its conclusions, commonly called the Declaration of Paris, formed the first step towards a definition and codification of the rules which has been followed in other conferences at Geneva (q.v.), London, The Hague (q.v.), and elsewhere.

INTERNATIONAL LAW IN GENERAL

Political Aspects. International law deals primarily only with sovereign states which are responsible for the acts of their subdivisions, colonies, and citizens. A sovereign state is also responsible to a certain extent for the actions of dependent states and those over which they have established a protectorate or suzerainty; the degree of responsibility depending upon the character of the dependency, protection, or suzerainty.

A sovereign state is a community of persons or of lesser states which has (*a*) an organized government and is permanently established for a political end, (*b*) is possessed of a definite territory, and (*c*) is independent of any external protection, suzerainty, or control. If these requirements are satisfied, the state exists, whether recognized or not by other sovereign states. Failure to recognize the existence of such a state would be an unfriendly act; but as the recognizing state is sovereign, recognition on its part cannot be exacted except by force.

The form of government is immaterial provided it be effective. But in case of any marked change of form, whether made peacefully or pursuant to a successful war or revolution, it is customary for the other Powers to recognize it officially before beginning or renewing diplomatic relations.

A sovereign state has certain inherent rights, such as (*a*) independence, (*b*) equality as respects other similar states, (*c*) absolute and exclusive jurisdiction over its own territory and over its own citizens when resident therein, (*d*) self-preservation, (*e*) determination of its own form of government, (*f*) freedom of navigation of the high seas (q.v.), etc. From the possession of certain rights by a sovereign state it naturally follows that it must discharge certain duties. Among these are (*a*) respect for the rights of others; (*b*) the maintenance of an orderly and efficient government which will guarantee to other states and their citizens the same privileges and protection which are extended; (*c*) good faith, courtesy, and the recognition of and compliance with the generally accepted rules of international law and comity. The mutual recognition of these rights and duties is the basis of international law.

At one time the rights of sovereign states herein mentioned and some others were regarded as absolute and exclusive of the rights of others, and this view is largely held at present by publicists and statesmen. But the improved means of communication and transportation have so extended commerce and business that the condition of the internal affairs of countries is a matter affecting the interests of the world at large. It is no longer a matter of indifference to nations whether one of them fails to maintain orderly government within its territory or exhibits a succession of short-lived administrations established, maintained, and over-

thrown by force of arms. Such a condition of affairs is a practical denial to orderly states of the same treatment of the citizens and commerce of those states as they themselves extend. To improve the objectionable conditions and to establish legal and stable government, other states have used force, diplomatic or of arms. Most neutrals suffer during war, nearly all do to some extent, though the gain in some instances is greater than the loss. Those neutrals which conceive an impending war to be hurtful to their interests or dangerous to their well-being have, when possessed of the power, sometimes brought such pressure to bear upon the states desiring to appeal to arms that war has been averted.

These interferences with the internal affairs or generally respected rights of sovereign or semisovereign states constitutes intervention (q.v.), of which Sir William Harcourt says: "It is a high and summary procedure which may sometimes snatch a remedy beyond the reach of law. Nevertheless it must be admitted that in the case of intervention, as in the case of revolution, its essence is illegality, and its justification is its success; of all things, at once the most unjustifiable and the most impolitic is an unsuccessful intervention." While in a measure true, this is an extreme statement from the modern point of view. In both cases the proper basis of justification is the degree of tolerability of the condition which is to be improved, the possibility of success, and a comparison of the results of success with the cost of life, property, etc., entailed by intervention.

Certain states, sovereign in most respects, have never been recognized as belonging to the great international group, chiefly from a lack of effectiveness of their governments, especially as regards protection of foreigners because of wide differences in laws and customs. From this condition Japan has emerged and China is endeavoring to emerge. Existing states of this type are Siam, Abyssinia, etc. Several small states of Europe are called neutralized states because their neutrality has been guaranteed by the Great Powers. Such are Switzerland, Belgium, and Luxemburg. Switzerland and Belgium possess armies, but only for the purpose of internal police and protection against invasion. (For the breach of neutrality in Belgium and Luxemburg in 1914, see WAR IN EUROPE.) Semisovereign states exercise full sovereignty except in certain matters defined by treaty with a Great Power or Powers. Such are Cuba, Panama, Morocco, and Persia. States existing under the protection of Great Powers have a very limited sovereignty. Egypt, Tunis, Zanzibar, and the little republics of Andorra and San Marino are examples.

Sovereign states which have been generally recognized as such are called *de jure* states. While a state is in the process of making by means of war, the revolutionists are called *insurgents* until they have established some form of government and control an area of territory in which they are able to give and do give the same protection to life and property as is afforded under like conditions by the authorities of sovereign states. They may then properly be recognized as *belligerents* and usually are so recognized if they obey the rules of international law. (See BELLIGERENT.) Whether recognized or not, they are *de facto* states. One of the most distinguished examples of a *de facto* state which did not become *de jure* was the Confederate States of America.

Jurisdiction. Since each sovereign state is in theory independent of foreign control, its full jurisdiction extends throughout its own territory and no farther. This territory includes the land and water wholly within its borders, the marginal seas to a distance of 3 miles, also the air above and the earth beneath the areas so defined. Treaty, comity, particular conditions, usage, the power of modern guns, and the development of airships have modified this jurisdiction. Rivers and narrow channels forming natural boundaries are open to the navigation of both states, the actual boundary passing through the centre of the deepest or most practicable channel. In the case of rivers or channels originating in one state and flowing through others, the parts within each state are subject to its full jurisdiction; but comity, usage, and treaty have generally extended the use of the full length of such waterways to peaceful commerce, so that a refusal to permit such use would be regarded as a most unfriendly act. If, however, artificial channels or canals are constructed by a state, it may impose any conditions upon their use that it pleases, provided the improved channel or canal has not closed to use a preëxisting natural one. Bays and indentations of the coast, where the headlands are less than 6 miles apart, are regarded as belonging to a nation's territory; even where the headlands are farther apart, treaty, long-continued exercise of jurisdiction, and special conditions have given a quasi acquiescence in such jurisdiction.

The control of the marginal seas to a distance of 3 miles from the coast is based upon natural right (of self-protection), the possibility of enforcing jurisdiction, and the distance at which guns on ships or on shore could inflict damage. The range of guns has greatly increased since this rule was first generally accepted, and it is now modified. Full jurisdiction within the 3-mile limit remains; beyond that limit the jurisdiction does not extend, but other powers must not carry on operations of war at a distance within the range of their weapons, as such operations might injure neutrals.

There are certain restrictions upon the jurisdiction of states called *servitudes*. These relate chiefly but not necessarily to territorial rights and are almost without exception defined by treaty. Among these are the right of passage through channels or territory; the right to fish in foreign waters, to build a canal in foreign territory; the requirement that a port shall be free of import or export taxes, that certain territory shall remain neutral, that certain places shall not be fortified, etc.

Over the *high seas* (q.v.) no nation has any right of sovereignty. They are free to the commerce and warships of the world. Since all nations have an equal right to their unrestricted use, no nation engaged in war can interfere with, interrupt, or render dangerous the operations of neutral commerce on the high seas when carried on in accordance with international law; nor may neutrals restrict the lawful operations of belligerents.

Merchant ships upon the high seas are subject to the exclusive jurisdiction of the state that issues the evidence of nationality which carries with it the right to fly the national flag. Except in time of war, a merchant vessel of a

nation cannot be interfered with by the vessels or forces of another when upon the high seas. While within the territorial waters of a foreign state, such a vessel is subject to all the laws of that state; but the French rules, which exempt a foreign vessel from French jurisdiction unless a crime be committed on board which disturbs the public peace, are becoming widely accepted. Public vessels of a nation are not subject to the jurisdiction of any other state, whether on the high seas or in the territorial waters of that other state. As regards armed vessels, the exemption from jurisdiction is absolute and unqualified, but they must obey the local laws and rules of the port. In certain cases of unarmed vessels satisfactory evidence of their public character may be required. For securing greater safety at sea, certain international rules (see RULES OF THE ROAD AT SEA) for the navigation of vessels have been adopted. These must be rigorously obeyed by all vessels, public and private.

The art of aviation has brought about a new condition of affairs as regards the jurisdiction of the air and has rendered a definition of that jurisdiction of greatly increased importance. As the questions involved chiefly concern operations of war, the subject is treated under that head.

The jurisdiction of a sovereign state over its citizens or subjects is absolute when they are within its borders. When they are abroad, its jurisdiction is modified and subject to consideration of the sovereignty of the country in which they are located or traveling. Resident aliens and aliens traveling in a country are subject in all respects to its laws unless these laws are modified by treaty or usage when applied to aliens. Subjection to local laws implies access to local courts. Protection to aliens in peaceful and legal vocations or business is guaranteed, and this protection is practically the same as that given to resident citizens. But aliens may be excluded from the whole or from any part of the territory of a state. Aliens cannot be forced to enter the military or naval establishment of a country unless born and resident within that country, in which case the question of their status is not well defined and the usage is not uniform.

Citizens of a state resident or traveling abroad are entitled to the protection of their own government against unjust treatment, from arbitrary acts of oppression, or deprivation of rights or property, but not against penalties incurred by infraction of the laws of the country in which they may be. They cannot, however, expect a more favorable treatment than citizens or subjects of the country. See ALIEN.

A diplomatic officer resident or traveling abroad is entitled to certain immunities from foreign jurisdiction. These include inviolability of his person and of his official residence and offices, exemption from civil and commercial jurisdiction (local police regulations, customs duties and taxes, religious regulations, etc.), and general exercise of authority over his official suite and his immediate family. Consuls are not diplomatic agents and do not possess these immunities. Their official papers are, however, exempt from seizure, and comity and convention have considerably extended their privileges. As officers of foreign states, international comity requires that certain consideration be shown them and that they should not be required to perform any duty or be subject to any treatment which will interfere with the proper discharge of their legitimate functions, so long as they conform with the local laws and treaty obligations. See DIPLOMATIC AGENTS; CONSUL, MERCANTILE.

Treaties. Treaties are contracts between states. They are not international law, though such of their provisions as receive general acceptance may become so. If any article of a treaty should contravene a well-established rule of international law, it would certainly be held as void by all but the contracting parties. See TREATY.

Measures Short of War. These include all measures for exerting pressure upon an offending state without declaring war. They are usually divided into two classes, retorsions and reprisals.

Retorsions are retaliations in kind. When any state has done certain acts which are regarded by another as prejudicial to its interests, it may retaliate by doing the same acts. Restrictions upon trade or commerce are frequently thus replied to.

Reprisals are any measures taken for the purpose of forcing an offending state to comply with its obligations or as a means of retaliation—these measures being taken without intending to declare or bring on war, though in many cases they do lead to a declaration of it by the other state. The following are some of the common forms of reprisal: (*a*) laying of special duties or taxes upon the commerce or domiciled citizens of the offending state (this is reprisal if it is not a retaliation in kind); (*b*) withdrawal or suspension of rights or privileges of such domiciled citizens; (*c*) sequestration or seizure of property of the offending state or of its citizens; (*d*) suspension of treaties or of certain parts of treaties; (*e*) suspension of commercial or other intercourse, partial or complete; (*f*) pacific blockade; (*g*) partial or temporary occupation of territory. See REPRISAL; RETORSION.

INTERNATIONAL LAW IN WAR

War is a contest between the armed forces of states. Revolutions or insurrections become war when the insurgents are recognized as belligerents. (See WAR.) These forces may operate on land, on the sea, under the surface of the sea, or in the air. The right to make war is one of the attributes of sovereignty and is theoretically defensible on the grounds of self-protection or self-interest.

When war has been declared, or has been recognized as existing, the relations of states to each are profoundly modified or changed. The contending parties become *belligerents* (see BELLIGERENT), and other states are known as neutrals. Formerly the citizens of opposing belligerent states were one and all held to be enemies, though this view is now greatly modified, as will be hereinafter explained. Treaties existing between belligerents are usually abrogated or suspended during war except as regards articles concerning the conduct of war. Treaties to which neutrals and belligerents are parties are modified to conform to existing conditions or suspended.

The possible area over which warlike operations are permissible are the territories of the belligerent states and the high seas. By agree-

ment, voluntary declaration, or through the coercion of other powers, the area of operations may be confined to a particular district or locality.

War may begin by hostile acts of states or a definite declaration or statement. The Second Hague Conference adopted the following rules as to the commencement of hostilities, and these were ratified by nearly all the Powers: "Art. I. The contracting powers recognize that hostilities between them must not commence without a previous and unequivocal warning, which shall take the form either of a declaration of war, giving reasons, or of an ultimatum with a conditional declaration of war.

"Art. II. The state of war should be notified to the neutral powers without delay, and shall not take effect in regard to them until after the receipt of a notification. Nevertheless, neutral powers cannot plead the absence of notification if it be established beyond doubt that they were in fact aware of the state of war."

Notwithstanding these rules the lack of inherent force in international law will probably lead to direct violation or evasion by subterfuge if a state considers its interests too deeply concerned to comply with its provisions. This is due in part to the rapidity with which modern troops and fleets may be mobilized and moved and the disastrous effects of delay or the great gains to be effected thereby. In the condition of affairs which commonly exists just previous to the outbreak of war the actions of both states or of their forces can be made an excuse for almost any proceedings short of general hostilities. The mobilization of the land or naval forces of a state for which no satisfactory explanation is given may be, and usually is, regarded as a hostile act by a possible adversary, and this act becomes still more hostile if the troops be directed towards or concentrate upon the frontier of this adversary. The invasion of the territory of another state is considered an act of war.

Land Warfare. The armed forces of a country consist of its army and navy. The Hague Convention of 1907 provides:

"Art. I. The laws, the rights, and the duties of war apply not only to the army but also to militia and volunteer organizations combining the following conditions: 1. Having at their head a person who is responsible for his subordinates. 2. Having a permanent distinctive sign, recognizable at a distance. 3. Openly bearing arms. 4. Conforming to the laws and customs of war in their operations. In countries where the militia or volunteer organizations constitute or form part of the army, they are comprised under the denomination of army.

"Art. II. The inhabitants of an unoccupied territory who, on the approach of an enemy, spontaneously take up arms in order to repel the invading troops, without having had time to organize in accordance with Article I, shall be considered as belligerents if they bear arms openly and respect the laws and customs of warfare."

Noncombatants are of two classes: (*a*) unarmed citizens or residents engaged in peaceful pursuits; (*b*) unarmed persons performing duties with the army or navy, but not part of the fighting force of an army or part of the crew of a vessel of war. The latter may be held as prisoners of war, the former may not, though any person possessing information, of which the dissemination might be detrimental to the interests of a belligerent, may be temporarily detained if captured within a belligerent's jurisdiction. Noncombatants of the first class are entitled to the protection of the enemy's troops, as regards life, liberty, property, and occupation, as far as is practicable. (*Hague Conv.*, 1907.)

Enemy's troops which surrender or are captured are prisoners of war. An offer to surrender must be accepted. Prisoners of war must be treated humanely and have the same food, bed, and clothing as the troops of the captor. Their personal belongings, except arms, horses, and military papers, remain their property. They are not to be confined except in case of necessity. They may be employed on work not connected with war operations; but if so, they must be paid. Expenses of maintenance of prisoners are to be repaid by their governments at the close of the war. A bureau of information regarding prisoners of war must be established, and it shall be furnished with all information concerning them and keep all papers, valuables, etc., found on the field of battle or left behind by prisoners who escape, are paroled, exchanged, etc. Prisoners may be given disciplinary punishment for attempting to escape or for insubordination or infraction of the rules established for their government. Parole, which is an engagement not to bear arms against the captor during the continuance of hostilities unless duly exchanged, may be accepted from prisoners, but they cannot be forced to give it. Breach of parole is punishable by a military court. Persons who follow an army but are not connected with it, such as newspaper correspondents, sutlers, furnishers of supplies, etc., if held by the captor shall be treated as prisoners of war. In regard to the wills, death certificates, burial, etc., the same rules are followed as for soldiers of the captor's army. Sick and wounded are to be cared for in accordance with rules of the Geneva Convention (q.v.). (*Hague Conv.*, 1907.)

Belligerents are forbidden: (*a*) to use poison or poisoned weapons; (*b*) to kill or wound through treachery or after an enemy has laid down his arms and surrendered; (*c*) to declare that no quarter will be given; (*d*) to employ weapons, projectiles, or substances of such a nature as to cause unnecessary pain; (*e*) to make improper use of the flag of truce, national flag, insignia and uniform of the enemy, or distinctive signs of the Geneva Convention; (*f*) to seize or destroy enemy's property except when actually necessary; (*g*) to declare extinguished, suspended, or barred the rights and choses in action of the nationals of the adversary; (*h*) to compel the nationals of the adversary to take part in military operations against their country, even if in the service of the captor before the commencement of the war; (*i*) to bombard undefended cities, villages, dwellings, or buildings; to give up a city or place to pillage, sack, or plunder even if taken by assault. (*Hague Conv.*, 1907.)

Stratagems and other means to obtain information concerning the enemy and the topography of the country are permissible. Before beginning a bombardment, the commander of the attacking force shall give warning if possible except in case of attack by main force. During sieges and bombardments buildings devoted to the care of the sick and wounded, re-

ligious worship, art, science, charity, and historical buildings and monuments will be spared as far as practicable if not used for a military purpose. These buildings shall be distinguished by the besieged by visible signs and the besieger informed of their character. (*Hague Conv.*, 1907.)

A spy is a person who attempts to get military information for the use of the enemy in a clandestine manner and by deception. Undisguised soldiers are not spies; nor are undisguised soldiers or civilians openly performing their duties, even if carrying dispatches. A spy caught in the act must not be punished without trial. A spy who escapes and rejoins his own army cannot, if recaptured, be punished for his offense.

Flags are carried to indicate the nationality of the troops to enemy and friend alike and for other purposes. The flag of truce (q.v.) is used to ask for a parley. A white flag is sometimes used as a sign of surrender.

Capitulations must take into account the rules of military honor and be agreed upon. An armistice (q.v.) suspends military operations by the parties to it over the territory and during the period agreed upon. Serious violations give the right to denounce it and resume hostilities; violation of clauses by individuals requires only their punishment.

A territory is considered as being occupied when actually under the authority of the hostile army and where that authority is capable of being exerted. The occupant shall take all measures necessary to restore and preserve order, life, property, and the rights to religious convictions and religious worship. Private property cannot be confiscated or taken except for public use, and then it must be paid for; looting is forbidden. Taxes, duties, and tolls may be collected for defraying the expenses of administration, but they should be laid and collected as nearly as practicable in accordance with previous custom. If other taxes are laid or contributions collected, they must be for the needs of the army or administration. All taxes must be established pursuant to a written order issued under authority of the commander in chief, and a receipt be given for all payments. Requisitions in kind and services can duly be levied for the needs of the army. Supplies must be paid for in cash as far as possible, a receipt given for the remainder, and the amounts due paid as soon as possible.

An army occupying a territory may seize only the specie, funds, collectible securities, arms, munitions of war, and other movable property of the state capable of being used in military operations. Private property, such as means of communication, transportation, munitions of war, etc., may be seized, but the owners must be indemnified for their use. Submarine cables connecting an "occupied" territory with a neutral territory shall not be seized or destroyed except in case of absolute necessity. If injured, they must be restored and the indemnities adjusted upon the conclusion of peace. Public buildings, real estate, and other fixed property of the state may be occupied by the captor as a usufructuary. The property of communes and of institutions devoted to religious worship, charity, instruction, or to arts and sciences, even when belonging to the government, shall be treated as private property. Seizure or destruction of such institutions, or historical monuments, or works of art or science is prohibited. (*Hague Conv.*, 1907.)

War on the Sea. The naval forces of a state comprise the regular navy, the naval reserve, naval militia, volunteers, and others taken into the public service. While privateers are still permissible under international law, it is not likely that they will again be used by a great naval power.

The rules for land warfare already cited also govern naval warfare so far as they are applicable. The area in which naval operations may take place comprises the high seas and the territorial waters of the belligerents. The objects sought in naval warfare are the capture and destruction of the naval and military forces of the enemy, of various naval and military establishments, and of his maritime commerce; also to aid military operations and defend the national territory, property, and sea-borne commerce.

Public vessels of the enemy may be captured outside of neutral waters; their officers and crews become prisoners of war, except those which are exempted by the Geneva Convention. The vessel itself is a prize of war, no prize-court proceedings being necessary. Vessels owned by private citizens of belligerent states are subject to capture as enemy property when outside of neutral water, though the United States has always striven to make it a rule of international law that private property not contraband of war be exempt from capture. After a merchant vessel is captured she must be turned over to the jurisdiction of a prize court (q.v.) to determine the validity of the act, or she may give a ransom bond. (See RANSOM.) Belligerent vessels of war have the right to search all private vessels, belligerent or neutral, in order to determine their nationality and whether they are subject to capture or not. Neutral vessels may be captured and condemned as prizes for the following offenses: (*a*) carrying contraband of war to a port of the enemy; (*b*) entering or attempting to enter a blockaded port; (*c*) unneutral service; (*d*) forcible resistance to stoppage or search.

Neutral trade with the enemy is permitted in ports not blockaded provided the neutral vessels do not carry goods which are contraband of war. All goods may be divided into three classes, viz., (*a*) *contraband*, which are useful solely for war purposes, such as arms, ammunition, etc.; (*b*) *conditional contraband*, which are used for both war and peaceful purposes, such as coal, oil, provisions, money, etc.; (*c*) free goods, which are used only for peaceful purposes, such as raw materials, machinery necessary for agriculture and mining, furniture, etc. While the provisions of the Declaration of London have not been universally agreed to, its terms are in accordance with the generally accepted rules of international law, so that its definite lists of contraband, conditional contraband, and free goods are likely to guide the decisions of future prize courts (q.v.). (*Decl. of London*, 1909.)

Though the United States has always striven to secure the exemption of private property from capture, the rule has not yet been adopted. Enemy's goods on an enemy's vessel are subject to capture and condemnation, but enemy's goods on a neutral vessel are not subject to condemnation, nor are neutral goods on an enemy's vessel. (*Decl. of Paris*, 1856.)

Blockades (see BLOCKADE) may be either on the sea or on land and may be military, naval, or commercial. Most sea blockades are both naval and commercial. The following remarks apply to commercial blockades:

A (commercial) blockade is the investment of the coast or a portion of the coast by a naval force in such a manner as to prevent vessels from entering or leaving any port in the blockaded area without imminent danger of capture. Blockades must be established by proclamation to all states and to the local authorities, and a reasonable time allowed for neutrals to receive the information. Breach of blockade by a neutral merchant vessel renders her liable to capture and condemnation as a lawful prize. But if the vessel escapes to her destination, she is not afterward liable for her act. The cargo of a vessel condemned for breach of blockade is also subject to condemnation. All private vessels, whether belonging to a neutral or the enemy, should be turned over to a prize court for adjudication, but in very exceptional cases they may be destroyed. (*Decl. of London*, 1909.)

Submarine mines may be laid in any belligerent waters by either belligerent for the purpose of destroying the war vessels of the enemy, but not for the purpose of intercepting commercial shipping, though certain channels to a harbor may be closed by mines, hulks, or any form of obstruction. (*Hague Conv.*, 1907.)

In regard to automatic submarine contact mines The Hague Convention of 1907 provides:

"Art. I. It is forbidden:

"1. To lay unanchored automatic contact mines, except when they are so constructed as to become harmless one hour after the person who laid them ceases to control them.

"2. To lay anchored automatic contact mines which do not become harmless as soon as they have broken loose from their moorings.

"3. To use torpedoes which do not become harmless when they have missed their mark.

"Art. II. It is forbidden to lay automatic contact mines off the coast and ports of the enemy, with the sole object of intercepting commercial shipping."

Another article provides that every precaution must be taken for the security of peaceful shipping and to notify neutrals of danger zones when the mines are no longer under surveillance. At the close of hostilities all existing mines must be removed by the state which placed them.

Unneutral Service. Unneutral service includes all acts by a neutral vessel, knowingly performed, which give aid to the enemy or assist him in carrying on the war. These include the carrying of troops or dispatches (not in the ordinary closed mails), or supplies for the enemy; or being in the exclusive employment of the enemy's government; or being under orders or control of an agent placed on board by that government; or taking an active part in the hostilities. Neutral vessels performing any of the services mentioned in the foregoing are therefore liable to capture and condemnation as lawful prizes.

Neutral States during War. It is the right of a state to remain neutral during war. It is its duty to observe that neutrality in its actions affecting belligerents. It is customary for the head of a neutral state to issue a proclamation of neutrality, informing its people of the existing war and cautioning them as to the obligations of neutrals and the penalties for breach of such obligations.

Neutral states must not (*a*) permit the use of their territory by belligerents or (*b*) aid belligerents in their operations. This aid includes the equipment and construction of vessels of war. But a neutral power is not called upon to prevent the export or transport, on the part of one or other of the belligerents, of arms, munitions of war, or, in general, of anything which can be of use to an army or a fleet. (*Decl. of London*, 1909.)

The fact of a neutral power resisting, even by force, attempts to violate its neutrality cannot be regarded as a hostile act. (*Hague Conv.*, 1907.)

A neutral power is not called upon to forbid or restrict the use on behalf of the belligerents of telephone or telegraph cables or of wireless telegraph apparatus belonging to it or to companies or private individuals, or even to a belligerent, if erected before the beginning of hostilities and if it is open to all public messages. But a neutral power may restrict the use of these methods of communication provided the restriction is applied impartially to both belligerents. (*Hague Conv.*, 1907.)

The transfer of a merchant vessel to a neutral flag must not be made for the sole purpose of evading capture as an enemy's ship. In order to be valid it must be unconditional, complete, and in conformity with the laws of the countries concerned, and in such manner that neither its control nor the profits of its employment shall remain in the same hands as before the transfer. If the transfer takes place 60 days before the outbreak of hostilities, the transfer is regarded as valid unless it can be proved that it was simply for the purpose of avoiding possible capture. If the vessel lost her belligerent nationality less than 60 days before hostilities began, and if the bill of sale is not on board, her capture gives no right to damages. Transfer to a neutral flag after the outbreak of hostilities is void unless it is proved that the transfer was not made in order to evade the consequences to which an enemy's vessel, as such, is exposed. There is absolute presumption that such transfer is void (1) if the transfer has been made during a voyage or in a blockaded port, or (2) if a right to repurchase or recover the vessel is reserved to the vendor, or (3) if the requirements of the municipal law governing the right to fly the flag under which the vessel is sailing have not been fulfilled. Consult Articles 55 and 56 of the *Declaration of London*.

Neutral states must not, in the absence of their own legislation to the contrary, permit belligerent war vessels to remain in one of their ports more than 24 hours, except on account of damage or stress of weather. If the war vessel refuses to go, it may be seized and with its officers and crew interned and held until the war is over. (*Decl. of London*, 1909.)

A belligerent vessel of war may only take, in a neutral port, sufficient supplies of fuel and provisions to enable it to reach a port of its own country. A prize may be brought into a neutral port, on account of unseaworthiness, stress of weather, or want of fuel or provisions, but must leave as soon as the circumstances justifying its entry are at an end. If it does not, and refuses to leave, the neutral power

must seize it, release its officers and crew, and intern the prize crew. (*Decl. of London*, 1909.)

Airships in War. As regards aviation, airships, and aërial war, no rules of importance have yet received international sanction; but many separate rules have been proposed, and many authorities have written on the subject. The consensus of opinion seems to be that: (*a*) the air above the territory of a country and of its territorial waters is under the exclusive jurisdiction of that country; (*b*) the air above neutral territory is neutral and not to be entered by belligerent airships without the consent of the neutral state beneath it, except through stress of weather, injury to machinery, lack of fuel to reach its own territory, etc.; (*c*) neutral states must not allow their territory or territorial waters to be used by belligerent airships in any manner which may assist their operation; (*d*) a belligerent state may make such rules as regards neutral aircraft entering its jurisdiction (see rule (*a*) above) as it may deem necessary for its own protection; (*e*) belligerent states may exclude neutral airships from the theatre of war to prevent disclosure of their movements to the enemy, whether this be their own territory, that of the enemy, or of a third power; (*f*) if a neutral airship is engaged in unneutral service, it may be captured if within territory (land or sea) in which such captures can be made and the facts submitted to a prize court for adjudication; (*g*) in case of capture of a neutral airship engaged in unneutral service its crew may be held as prisoners of war to prevent disclosure (to the enemy) of the information that may have been gained; (*h*) neutral airships communicating with besieged, invested, or blockaded places are liable to confiscation for breach of blockade, and the crew held as prisoners of war.

By declaration of the Second Hague Conference of 1907 it is prohibited to discharge projectiles and explosives from balloons or by other new methods of a similar nature. But public opinion has changed since that time, and in the great European War of 1914 both sides used aërial craft for bomb-dropping purposes.

It is manifest that airships should carry means of establishing their nationality, and that they should exhibit some distinguishing mark the absence of which would be evidence of unfriendliness; otherwise neutral or friendly airships might be destroyed by their friends.

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The Hague Peace Conference of 1907 and The London Naval Conference of 1909 cover in a general way nearly the whole field of international law as regards war. The Hague Conference adopted a series of conventions on the following-named subjects: (*a*) pacific settlement of international disputes; (*b*) respecting the limitations of the employment of force for the recovery of contract debts; (*c*) relative to the opening of hostilities; (*d*) respecting the laws and customs of war on land; (*e*) respecting the rights and duties of neutral powers and persons in case of war on land; (*f*) relative to the laying of automatic submarine contact mines; (*g*) respecting bombardment by naval forces in time of war; (*h*) adaptation to naval warfare of the principles of the Geneva Convention; (*i*) relative to certain restrictions with regard to the exercise of the right of capture in naval war; (*k*) concerning the rights and duties of neutral powers in naval war; (*l*) relative to the status of enemy merchant ships at the outbreak of hostilities; (*m*) relative to the conversion of merchant ships into warships; (*n*) relative to the creation of an international prize court. The Conference issued a declaration prohibiting the discharge of projectiles and explosives from balloons (and by inference from all aircraft), and it formulated an opinion and prepared a draft of a convention relative to the creation of a judicial arbitration court. Not all the conventions have been ratified by the Powers, nor were all signed by the delegates of every Power. Convention (*k*) was not ratified by the United States as regards one article; and conventions (*l*), (*m*), and (*n*) were not signed by the United States delegates and not ratified by the United States. The London Naval Conference of 1909 formulated the so-called "Declaration of London, 1909." This has not been ratified by the United States on account of some of its provisions. Nevertheless, it expresses, with a few exceptions, the generally accepted principles of international law as regards naval war with an authority far beyond that of occasional decisions by judges or of the opinions of the most distinguished international law writers. Full reports of these conferences may be found in the annual publications of the United States Naval War College for the years 1907 and 1908; The Hague Conferences of 1899 and 1907 are given by Higgins (see foregoing references) and by James Brown Scott (*The Hague Peace Conferences of 1899 and 1907*,

2 vols., Baltimore, 1909). See ALABAMA CLAIMS; CONQUEST; CONFLICT OF LAWS; EXTRADITION; HOSPITAL SHIP; PIRACY.

INTERNATIONAL PEACE CONFERENCE. See PEACE MOVEMENT.

INTERNATIONAL PEACE MOVEMENT. See PEACE MOVEMENT.

INTERNATIONAL PHOTOGRAPHIC CHART OF THE HEAVENS. See ASTROPHOTOGRAPHY.

INTERNATIONAL PRISON CONGRESS. The first prison conference was held in 1845 at Frankfort, followed by a second in 1857. These were largely attended by Europeans. After this, local associations were formed, but no international convention held. Count Sollenhub, of Russia, suggested to Dr. E. C. Wines, Secretary of the New York State Board of Charities, that the board call a congress. This was not deemed advisable, but shortly thereafter (1870) the first American prison congress was held, and President Grant was influenced to appoint Dr. Wines commissioner to arrange an international conference. The congress met in London in 1872. Meetings are now held at intervals of five years, the last having been at Washington in 1910. The programmes are arranged by a permanent committee, the International Prison Commission. The scope of the organization is wider than its name would indicate. All matters pertaining to crime and its repression fall within the field of the congress. At present the organization is divided into four sections: (1) criminal law; (2) prison administration; (3) prevention of crime; (4) crime among children and minors. Consult *Bulletins* and *Reports* of the congress.

INTERNATIONAL TRADE. Trade between nations or between distant regions has been a fruitful source of discussion among economic writers, and a subject which has often engrossed governmental attention to the exclusion of internal commerce, though it is a familiar fact that in modern times internal commerce is far more important to the welfare of the state. This apparently undue prominence in discussion and legislation was due not only to the fact that international trade caught the eye of the observer, while domestic trade withdrew itself from observation, but also to the fact that in early economic life foreign trade, as compared with home trade, was far more significant than it is in modern times.

This greater relative importance of international trade in its historical beginnings was due to the slight division of labor in the older economic order and to the relatively small areas of states. The soil of the neighborhood produced what was necessary for the simple wants of the inhabitants. Towns were rare and small, and artisans few in number. Most of the inhabitants were agriculturists, whose most pressing needs for manufacturing products were satisfied by the produce of the household. In short, the satisfaction of daily wants did not give rise to a "home trade" such as characterizes modern industrial society. To the uniformity of economic organization must be added the difficulty of internal communication as an obstacle to the development of any considerable interchange of commodities. Navigable rivers furnished the only means of internal transportation which were not attended with prohibitive costs. Only those nations with a favorable seacoast could develop any considerable commerce, and with it that diversification of industrial pursuits upon which domestic trade rests. We may therefore say that foreign trade preceded domestic trade.

If we except the period of the Roman Empire, when such trade as existed became internal trade, because the known world became, as it were, one nation, the division of sovereignty before modern times was so great that most trade was foreign rather than domestic. When petty principalities or provinces of the same realm enjoyed their own customs regulations, much trade was "foreign" which in modern times would be domestic.

Largely to these considerations, as well as to the more showy character of foreign trade, its spectacular and romantic character, does this trade owe its prominence in economic discussion and in the attention of governments. Moreover, as such trade came into early notice as a means of raising revenue for the state, it thus became a matter of public concern.

It cannot be claimed that the contradictory and vacillating practice of mediæval rulers developed any well-defined theory of foreign trade. It was not until after the discovery of America and the commercial awakening that followed the influx of the American silver that the beginnings of a theory of trade appear in the writings of pamphleteers who have since been designated as the mercantile school. Thomas Mun, in his work upon *England's Treasure by Foreign Trade* (1664), states in a few words the wisdom of his time. "The ordinary means to encrease our wealth and treasure is by *Forraign Trade*, wherein wee must ever observe this rule: to sell more to strangers yearly than wee consume of theirs in value. By such a course the balance must be paid in coin, and the country enriched, while a contrary course would deplete its stock of the precious metals." The confusion of wealth and money is obvious and characterizes the whole thought of the period. As we shall see, it led to some extraordinary governmental measures to promote the flow of gold and silver into the nation and to check its outflow. It distorted the economic policy of the nations for generations and threw the entire public interest in foreign trade upon its capacity to attract specie. It carried with it the corollary that importations should be limited as far as possible and caused vexatious restrictions, high import duties, and frequent prohibitions of the importation of foreign commodities. Thus, in 1674 the total prohibition of the importation of French brandy was advocated in England, not only to encourage the consumption of domestic ale and beer, but also because it was considered undesirable to increase the consumption of French goods. Writings upon trade subjects are full of fears lest any nation should sell more to England than it bought from her, and the government was repeatedly urged to take measures against any nation which so offended against public policy. All writers did not, however, share this shortsighted view, and Mun stands out from his contemporaries by his perception that what is apparently lost by trade with one nation may be the means of gain, since the goods imported from it may be disposed of at great profit to some other nation. He is none the less quite convinced that the aggregate of exports and imports should show a decided balance in favor of the former. Another characteristic of the time is the preference given to trade in distant parts, as when Mun says: "Also wee ought to esteem

and cherish those trades which wee have in remote or far countreys, for besides the encrease of shipping and mariners thereby, the wares also sent thither and received from thence are far more profitable unto the kingdom than by our trades near at hand." The great profits secured by those states which came to be depots of the Indian trade doubtless led Mun to take this view.

To these writers the entire advantage of foreign trade lay in exportation. Importation was at best a necessary evil. So far as individuals were concerned, it is true, the volume of business of both kinds was the measure of profitableness, and traders were prone to encourage all commerce; but from the standpoint of the kingdom as a whole that trade was regarded as profitable which resulted in an importation of specie.

The Physiocrats (q.v.) riddled the pretensions of these writers and held up their policy to derision. Adam Smith demonstrated still more conclusively the weakness of their doctrine. He did not feel it necessary to insist that money and wealth were not synonymous terms, that an increase in the former was not the sole goal of statecraft. In his day England's stock of the precious metals was adequate to its needs and was therefore not an object of peculiar solicitude for the statesman, as it had been in earlier times. Adam Smith states in the following terms the advantages to different countries of international trade: "It carries out that surplus part of the produce of their land and labor for which there is no demand among them, and brings back in return for it something else for which there is a demand. It gives a value to their superfluities, by exchanging them for something else which may satisfy a part of their wants and increase their enjoyments. By means of it the narrowness of the home-market does not hinder the division of labor in any particular branch of art or manufacture from being carried to the highest perfection. By opening a more extensive market for whatever part of the produce of their labor may exceed the home consumption, it encourages them to improve its productive powers and to augment its annual produce to the utmost, and thereby to increase the real revenue and wealth of the society." Trade enables a nation not only to obtain what it cannot produce itself, but also to carry its own production to the highest degree of perfection by reason of this outside demand. The advantage of trade lies in its effect upon home industry, and trade is represented as a mutual and not as a one-sided advantage. The home market is now recognized to be the most important, and foreign trade as subsidiary to it, as significant only in so far as it promotes a better division of labor and more productive employment of capital at home. The emphasis is shifted from the purely mercantile side, and the question shown to be a much larger one than a mere increase or decrease of specie.

If the mercantilists insisted that the entire advantage of foreign trade lay in exportation, while Adam Smith deemed the advantage mutual, later writers—as, e.g., John Stuart Mill —have gone so far as to declare that the importance to the nation of its international trade was measured by its imports. This is not, of course, a mere reversal of the mercantilist attitude, for the distinguished economist is far from contemplating the possibility of imports without corresponding exports. But to him the imports of a nation represent a saving of energy, time, labor, and capital in the acquisition of goods. While the same goods, or many of them, could doubtless be produced at home, it would be at far greater expenditure of effort than that involved in producing the goods exported to pay for them. In following the history of economic thought on the subject of trade, we have passed from the period of a crude but ultra protectionism to one of free trade.

In the meantime new questions have arisen which call for attention. It needs no expert to perceive the advantage of trade between temperate and tropical countries. But in the trade of temperate countries among each other the advantage is not so apparent. It may, and does, happen that a country will import from another a commodity which it can produce at home at less labor cost than is expended upon its production in the country whence it is imported. If such is the case, it is clear that production does not always take place at the point of maximum advantage. It is assumed that within a given country production is carried on at the point of greatest advantage, because of the mobility of capital and labor. But between different nations there is not such perfect mobility, and production continues under varying circumstances of advantage and disadvantage. In domestic trade the costs of production, as a rule, determine prices and values; but in international trade there must be another rule. If England can produce a commodity A with 10 units of productive power, while a foreign country requires 12 units for the same commodity, England may buy of the foreign country, but certainly will not pay 12 units for the goods. The first question which arises is, Why does not England in these circumstances produce the commodity A? Simply because in the production of other commodities, B, C, D, etc., it enjoys still greater advantages over foreign countries. Its maximum productivity is gained by concentration on these other lines of production. In the case mentioned the costs of production for England and the foreign country may be stated as follows for like quantities of each commodity:

A.	England	10	units,	the	foreign	country	12	units.
B.	"	9	"	"	"	"	13	"
C.	"	8	"	"	"	"	14	"
D.	"	7	"	"	"	"	15	"

It is clear that it will be profitable for England to produce B, C, D for its own wants, and so much in excess thereof as it can persuade the foreign country to take, while it will pay the latter to concentrate its production upon A and supply so far as possible its needs for B, C, and D by importations from England. This shows the motive for an international trade under these circumstances. There is a further question as to the rate at which these articles will be exchanged.

International Values. As in the illustration given it is obvious that England will not pay the foreign country 12 units for A when it can produce A at home for the expenditure of 10 units, the question is how much the foreign country will obtain. If the demand in England for A is equal to the demand of the foreign country for D, the exchange will take place between those commodities. England will get its supply of A at the cost of producing D; the foreign country will get its supply of D at a cost of 12 productive units instead of 15 productive

units. The advantages of the trade are obvious, and the total production of the two countries concerned is greatly increased. If there were no demand in the foreign country for D, but on the other hand a large demand for C, the trade might be between those commodities, and the advantage, though less, might still be considerable. These simple illustrations allow us to state the rule of international value. It is that in international trade the price paid for the foreign article does not follow the costs of production of that article in the country in which it is produced, but rather the costs of production of the article exported in exchange for it. This rule is stated only as a tendency. Economists have devoted considerable attention to the actual equation of exchange. A single modification of the foregoing illustration will indicate the infinite variety of circumstances which modify in practice the tendency stated. Let us suppose that England needs a larger quantity of the commodity A than the foreign country does of D. To stimulate the demand for D, it must be offered at a lower price. So that on the new basis by the exchange of the produce of 11 units of productive power the foreign country gains the same goods as before. Its advantage in the acquisition of D is therefore 15 units — 11 units, or 4 units. On the other hand, England has gained a quantity of A corresponding to the expenditure of 9 units of her own productive power; her gain by the exchange is no longer 3 units, but only 2. In this manner an infinite variety of circumstances, such as cost of carriage, customs, exchange, may be introduced to modify the conditions of the problem.

History of International Trade. It has already been pointed out that the earliest trade was between widely distant nations rather than contiguous ones; that in the entire period which preceded the nineteenth century trade between different countries rested upon a pronounced difference in their products, rather than on such slight advantages of comparative cost as in modern times. Fundamental, moreover, for an understanding of the course of earlier trade is a proper appreciation of the costs of carriage and of the legal obstacles to trade imposed by the governments. These considerations affected in a high degree trade by land, and in lesser measure that by sea and along the navigable rivers.

The great physical contrast upon which early trade was founded was that of temperate and tropical countries, which in historic times was the contrast of West and East. This physical contrast was enhanced by a distinct historical development of the two regions, by the earlier progress of civilization and the arts among the people of the Orient. Hence a large part of the history of commerce is the history of trade with the East. The first trade routes were overland from Central Asia to the Mediterranean, whence the goods were carried by Phœnician and later by Greek traders to all parts of the Mediterranean Sea. In view of the heavy costs of transport, the goods which were so traded were of the richer sort—spices, silk, embroideries, fine linens, and the finer manufactures of the metals—sword blades, gold and silver utensils, and precious stones. To the difficulty of transporting the goods was added the difficulty of protecting them, which again forbade the commerce with bulkier commodities, whose size would be an embarrassment. Protected by the power of Imperial Rome, this commerce extended as far as India and China, while Egypt was the granary of the Imperial city.

But with the break up of the Roman power commerce declined. Constantinople, indeed, maintained its relations with the East, and at a later period the Arabs, who controlled the southern Mediterranean from Egypt to Spain and had a firm footing in Sicily, carried on a considerable trade. But the Roman civilization on the Rhine, in Britain, and in Gaul, which had brought those countries into close connection with the Oriental world, had been destroyed, while Goths and Lombards subjected Italy to a ruder civilization than it had heretofore known. It was, however, in the Italian peninsula that commerce first arose in the Middle Ages. Venice, Genoa, Pisa, and Florence took up the trade between the East and the West, which in classic times had been in the hands of Greeks and Phœnicians. They claimed rights of trade in their settlements at Constantinople first with the Byzantine Empire and later, when Constantinople was taken by the Turks, with the Ottoman Empire. They opened trade with the Moslem monarchies of the Levant and through Egypt reached the trade of India and east Asia. These pretensions were supported by the naval power of the state, which protected the ships of its merchants. They carried the produce of the East and of Italy through the Strait of Gibraltar to Flanders and the Hanseatic towns. At the outset of this new development of maritime commerce it was harassed by pirates, but the strong hand of Venice put down this nefarious practice in the Mediterranean Sea, as the Hanseatic League crushed the Danish sea robbers.

With the advent of the Turks in Asia Minor and the final conquest of Constantinople, the old paths to the East were closed and the supremacy of the Italian states was doomed. New paths were sought to the East—Vasco da Gama discovered the passage to India around the Cape of Good Hope, and in a like quest Columbus revealed to Europe the Western Hemisphere. Portugal, Spain, Holland, England, in turn, succeeded to the commercial leadership. Commerce with these distant lands was not made free to all, but given over to the great commercial companies, of which the East India companies of Great Britain and Holland were the most conspicuous for their enduring results, the Mississippi Company in France and the South Sea Company in England most famous for their spectacular failure.

Of the various restrictions upon and encouragements to foreign trade, which little more than a century ago were so generally in vogue, prohibitive import duties, export duties, and export bounties, one only is of far-reaching significance to-day—duties upon imports. For the various questions to which they gave rise in their modern aspects, see COMMERCE; CUSTOMS DUTIES; FREE TRADE; PROTECTION; TARIFF; MERCANTILISM.

Consult: Adam Smith, *Wealth of Nations* (2 vols., Edinburgh, 1776; ed. by Edwin Cannan, 2 vols., London, 1904); J. S. Mill, *Principles of Political Economy* (2 vols., ib., 1848; ed. by Ashley, ib., 1909); J. E. Cairns, *Some Leading Principles in Political Economy Newly Expounded* (New York, 1900); C. F. Bastable, *Theory of International Trade* (4th ed., ib., 1903). The subject of international trade is discussed in all textbooks of economics, for a bibliography of which see POLITICAL ECONOMY.

INTERNATIONAL WORKINGMEN'S ASSOCIATION, often spoken of as THE INTERNATIONAL. An attempt to unite workingmen of all nations into an organization which should have for its purpose the protection, the coöperation, and the complete emancipation of the working classes. It was an international movement in harmony with the growing feeling of solidarity and common interests which was centralizing the national unions during the latter half of the nineteenth century. The founding of the International Workingmen's Association was occasioned by a visit of French workingmen to the International Exhibit in London in 1862. They came in contact with English trade unionists, recognized their common interests, and as a result a meeting of workingmen of all nations was held in London, Sept. 28, 1864. A provisional committee was appointed to draw up a constitution, which was drafted by Marx after Mazzini's ideas had failed to meet with approval. A general council with headquarters in London was appointed. Sixty delegates were present at the first congress in Geneva, in September, 1866, where an eight-hour day was approved and a system of education discussed. At Lausanne in 1867 Socialistic principles were first adopted, with the result that its English adherents, whose ideal was trade unionism, withdrew from the movement. At the third and most important congress at Brussels in 1868 the congress announced itself opposed to war, advocated a general strike in case of war, and declared itself in favor of state ownership of mines, land, and transportation facilities. Bakunin and other anarchists joined the fourth congress at Basel in 1869. In that year the Social Democratic party was founded in Germany, representing in politics the principles of the International. The Franco-Prussian War prevented the meeting of the fifth congress at Paris. In 1872 at The Hague congress the anarchists were expelled, and the general council removed to New York. A last congress, representing chiefly the anarchistic wing of the party, was held at Geneva in 1873. For some years this faction carried on a fiery agitation in the south of Europe, but with the death of Bakunin in 1876 it disintegrated, its members becoming the anarchistic Communists of to-day. The Marxist wing developed in other countries, as well as in Germany, into Social Democratic parties. Branches of both factions were formed in the United States, but were never firmly established. In the American movement the anarchistic faction showed the greater strength. This faction broke up into two rival associations, the International Working People's Association and the International Workmen's Association, the latter representing the more radical principles. While it existed, the International aided strikes of bronze workers in Paris (1867) and builders in Geneva (1868) and supported English trade unionists in their opposition to the importation of cheap labor. A number of journals were devoted to its cause.

Consult: John Rae, *Contemporary Socialism* (2d ed., New York, 1901); J. G. Brooks, *Social Unrest* (ib., 1903); R. T. Ely, *Labor Movement in America* (new ed., ib., 1905); Thomas Kirkup, *Inquiry into Socialism* (3d ed., ib., 1907); id., *History of Socialism* (4th ed., 1909); E. Kelly, *Twentieth Century Socialism* (ib., 1910).

INTERNMENT OF VESSELS. See INTERNATIONAL LAW, NEUTRAL STATES DURING WAR.

IN'TERNODE (Lat. *internodium,* space between knots, from *inter,* between + *nodus,* knot). In botany, the portion of stem between two successive nodes (joints). It is the internodes which give length to the stem and stretch the nodes apart. Among the Pteridophytes the differentiation of the stem into nodes and internodes appears in the Equisetales (q.v.), while it is a feature of all seed plants. This differentiation means the restriction to the nodes of the power of producing lateral members. This gives to nodes a power which is not generally appreciated. The lateral members usually produced are leaves and branches, but if a node is placed in proper relation to the soil it will produce roots also. This means that the power to produce new plants is lodged in the node, and therefore a node is a reproductive structure. The significance of internodes, therefore, is a contributory one, merely spacing the nodes apart, so as to give the lateral members freedom for work and development. See STEM.

IN'TERO'CEAN'IC SHIP CANAL. See CANAL; NICARAGUA CANAL; PANAMA CANAL.

INTEROCEANIC SHIP RAILWAY. See SHIP RAILWAY.

IN'TERPAR'LIAMEN'TARY UNION FOR IN'TERNA'TIONAL AR'BITRA'TION. An association of members of the supreme legislative bodies of the world, organized to promote the peaceful settlement of disputes between nations. It grew out of a parliamentary conference held in Paris in 1888. The first regular meeting took place at Paris in 1889. Since that year meetings have been held annually at various cities in Europe and America, excepting in years when, on account of international conflicts, as the Spanish-American and the Russo-Japanese wars, such meetings would have been unlikely to be productive of any results.

Any member of a national parliament or congress is eligible to membership; and a person once chosen a member of the union may retain his membership in that body after his membership in the parliament or congress has terminated. Until 1897 the United States sent no representative to the conference; in recent years, however, the American group in the union has taken a prominent part in its deliberations. It is one of the aims of the union to include in its membership a majority of the members of every national parliament or congress.

The business of the association at each regular meeting is under the general direction of a committee consisting of two delegates from each country. There is also a permanent executive committee which conducts the business of the association when the union is not in session.

At the meeting in 1894 the union declared in favor of a permanent court for international arbitration, and a committee was appointed to elaborate a project to this end. At the meeting in Brussels in 1895 the project of the committee was adopted, and it was then presented by the members of the union to their respective governments. Upon this project The Hague Tribunal, in its main outlines, is based. At the meeting of the union at St. Louis in 1904 resolutions were adopted urging the President of the United States to propose to the Powers the convening of a second peace conference at The Hague, to consider (1) the questions deferred by the first Hague Conference to a later date; (2) the negotiation of permanent arbitration treaties between the various powers; (3) the advisability

of establishing a permanent international congress of nations for the purpose of defining the rules of international law. In accordance with the suggestion of the union, the President directed the State Department to address a circular letter, proposing a second peace conference, to the governments signatory to The Hague Convention. At the meeting of the union in Brussels, 1905, the American group proposed the drafting of a model arbitration treaty, to be submitted to the Powers, and a commission was appointed to report on the project. At the meeting of the international council of the union in London in 1906 the form of such a treaty was adopted, amended, at the suggestion of W. J. Bryan, so as to provide that, in case there should arise between nations any disagreement not included in those which under the treaty must be submitted to arbitration, no resort to hostilities shall be had until the parties to the disputes shall have invited the formation of an international commission of inquiry or mediation.

IN'TERPELLA'TION. A method of European legislative procedure, whereby members of the legislature interrogate the ministers in regard to the policy and measures of the government. Its primary purpose is to force the chamber to pass judgment upon the policy of the cabinet. This form of interrogating the ministry occupies an important place in the parliamentary procedure of France and Italy and is also occasionally resorted to in other continental countries of Europe which have a purely parliamentary form of government. Any member of Parliament is free to bring forward an interpellation without regard to the wishes of the ministry. The legislative body fixes the day on which the ministry are to be interpellated on a given subject. The ministers then prepare their answers and make ready for a defense of their policy against the expected attack. Any member may reply to a minister, and a general debate may follow, as well as motions which may result in the resignation of the ministry. In France, of about 20 ministries which have resigned in consequence of an adverse vote in the Chamber of Deputies, 10 have done so on account of motions growing out of interpellations. Interpellations arouse more general interest than the debates on important measures, and one of the chief sources of a minister's strength is his skill in answering them. Ministers are not, however, obliged to answer interpellations when such an answer might prove prejudicial to the public interest, as in the case of diplomatic negotiations. It often happens that the ministry is glad to be interpellated, as a full disclosure of the government's policy may strengthen its position in the estimation of the chambers.

In Italy the method of interpellation exists in substantially the same form as in France. The rules of the Imperial German Reichstag also provide for interpellations; but since the Chancellor, to whom they are in theory addressed, has no seat in the Reichstag and never resigns on account of legislative disapproval, the interpellation is of little significance in German parliamentary procedure.

IN'TERPLEAD'ER. An equitable remedy, available to a person from whom two or more persons claim the same thing, debt, or duty, and who is reasonably in doubt as to which is the rightful claimant. The process was first employed by the courts of common law in England to enable a depositary or bailee of a deed in escrow of whom the grantor and grantee each demanded delivery of the deed (one affirming and the other denying that the conditions of the escrow had been complied with) when sued by either to apply to the court for an order compelling the other claimant to appear and be substituted as defendant in his stead.

It was in the Court of Chancery, however, that the process was developed to cover claims of every nature, where the demands were identical. It became the practice to permit one who was harassed by two claimants demanding the same thing, debt, or duty, to file a bill in equity setting forth the facts and praying that the parties be compelled to interplead, i.e., to contest their claims before the court between themselves, and that the court decree which of them was justly entitled to the matter in controversy. This was permitted irrespective of whether actions had been commenced against the debtor or holder of the property or not. In this form the remedy exists in modern practice. The pleading by which the complainant brings the matter before the court must set forth the following facts: (1) that two or more persons make a claim against him; (2) that they claim the same thing, debt, or duty; (3) that he has no beneficial interest in the thing or obligation claimed; and (4) that he cannot determine without hazard to himself which is the rightful claimant. He must also show by affidavit that he is not in collusion with either party and must allege his willingness to perform his obligation to the proper party. He must therefore be entirely indifferent as to which claimant succeeds—in other words, be in the position of a stakeholder. Very abstruse questions of law often arise as to whether the parties are demanding the performance of the same obligation. For example, if a landlord and a person claiming title from an entirely different and independent source, both demand rent from a tenant, he cannot compel them to interplead, as he is under a duty to his landlord not to dispute his title. However, if a person claims to have derived his title from or through the landlord by purchase or otherwise and both demand rent, the tenant has grounds for relief, as they demand the same obligation, and he does not thereby dispute his landlord's original title.

The relief will not be granted where it appears that the applicant knows or should know which of the claims is just; but if there is a reasonable doubt, and if, with the means of knowledge at his command, he would be running a personal risk to decide between them, it is the settled practice to allow the remedy. See EQUITY; PLEADING; and consult the authorities there cited.

INTER'POLA'TION (Lat. *interpolatio*, from *interpolare*, to alter, from *interpolis*, *interpolus*, altered, from *inter*, between + *polire*, to polish). In mathematics, the process of finding terms intermediate between given terms of a series. From the law of the series the values of the intermediate terms may be computed, but it is often sufficient for practical purposes to approximate the intermediate terms by assuming a simpler relation. For example, given log 80 = 1.9030, and log 90 = 1.9542, the logarithm of 85 is approximately obtained by adding to 1.9031 one-half of the difference between 1.9542 and 1.9031, although the logarithms are in arithmetic progression only when the numbers are in

geometric progression. The method of interpolation is not only of use in pure analysis, but it is particularly valuable in problems of astronomy and other sciences, often saving laborious calculation. Thus, the position of the moon for any hour may be determined by interpolation from its computed positions for every 3, 6, or 12 hours, with sufficient accuracy for practical purposes. Methods of interpolation for astronomical problems are found in Lagrange's memoirs of 1783, 1792, 1793. Consult: H. L. Rice, *Theory and Practice of Interpolation* (Lynn, Mass., 1901); C. L. Doolittle, *Treatise on Political Astronomy as Applied to Geodesy and Navigation* (4th ed., New York, 1903); Otto Biermann, *Vorlesungen über Mathematische Näherungsmethoden* (Brunswick, 1905).

INTER'PRETA'TION (Lat. *interpretatio*, explanation, from *interpretari*, to explain, from *interpres*, agent, interpreter), or CONSTRUCTION. The process of ascertaining, subject to the rules of law, the meaning of a speaker or a writer, or of parties to a legal instrument, as expressed in its spoken or written terms. Some authorities distinguish construction from interpretation; using the latter term to describe the process of finding out the true sense of any form of words, and applying the former to the process of ascertaining the legal effect of those words. According to these authorities, "the office of interpretation is analytic, that of construction is synthetic; the office of the one is to get at facts, that of the other to group these facts and determine their legal meaning; interpretation is exploration, construction is induction." Or, to put the distinction in another way, interpretation gives us the grammatical and logical signification of the words and sentences under consideration; while construction gives us their legal effect by "the familiar judicial process of applying the law to the facts of the case." In practice, however, the two terms are usually employed in the same sense, as denoting the process of ascertaining the true import of a document having legal consequences. Interpretation, as a separate branch of law, has its origin in the imperfections of language and the limitations of human understanding. How imperfectly and even bunglingly the average man expresses himself, not only in hurried memoranda, but in formal documents as well, is evidenced by the vast number of lawsuits brought to settle the meaning of such documents.

The legal process of interpretation is required, not only because of confused thinking and the careless use of language on the part of speakers and writers, but because of the frequent misapprehensions of hearers or readers, due to mental limitations. If a writing has legal consequences; e.g., if it is a constitution, or treaty, or statute, a will, a deed, or a contract, or if it contains an attack upon reputation or a right of property, provision is needed and has been made for determining which of various interpretations shall prevail. Speaking generally, that determination rests with a court of justice, in a legal action in which the written or spoken words are properly brought before it. If the form of words whose meaning is in doubt is a public writing, such as a provision of a statute, a treaty, or a constitution, the question of construction belongs exclusively to the judge. If it is a private writing, such as a contract, will, or deed, having peculiar expressions in it which have, in particular places or trades, a known meaning attached to them, it is for the jury to say what the meaning of those expressions is; but it is still the function of the court to construe the instrument after the jury has determined the true meaning of such peculiar expressions. This legal rule is due in part to the fact that in olden times jurors were frequently unable to read or write, but in part also, and perhaps more largely, to considerations of policy. A learned English judge once declared that unless this rule was followed "there would be no certainty in the law; for a misconstruction by the court is the proper subject, by means of a bill of exceptions, of redress in a court of errors; but a misconstruction by the jury cannot be set right at all effectually." While the construction of a writing is ordinarily for the judge and not for the jury, libel cases form an exception to the rule. Whether a particular writing is such an attack upon reputation as to amount to a libel is for the jury to decide. In other words, the jury, and not the court, construe a writing which is alleged to be defamatory. Such at least is the doctrine at present followed in England in all cases of defamation, and in the United States in all criminal prosecutions for libel.

It is to be borne in mind that the object of interpretation is not to discover the intention of parties to a transaction by the use of any and every legitimate means. Its purpose is much more restricted. The problem for the interpreter is this: given certain language in which persons have professed to state their intention in a particular matter, what is the intention thus stated? It may be that the parties have used language so carelessly that it fails to express any definite intention. In such a case interpretation is fruitless. It must stop short of accomplishing its object for want of materials. "All latitude of construction," said Chief Baron Eyre in an oft-quoted decision, "must submit to this restriction; namely, *that the words may bear the sense* which by construction is put upon them. If we step beyond this law, we no longer construe men's deeds, but make deeds for them." It is not the office of interpretation, then, to add anything to the text of a writing. Its function is only to discover and set forth what is in it. But a question arises at this point, upon which the authorities are not entirely in accord: What is to be deemed within and what without the text? It is sometimes said that judges and writers in answering this question range themselves in two schools of interpreters—a liberal and a literal school. The former declare that everything is in the text which a mind fully informed as to the circumstances in which the writing was made, "and doing no violence to the rules of language and the rules of construction, may reasonably find there." The latter insist upon limiting interpretation to the meaning of the text itself. Perhaps no better statement of the prevailing view on this point has been made than the following: "Interpretation is a process of reasoning from probabilities, a process of remedying by a sort of equitable jurisdiction the imperfections of human language and powers of using language, a process whose limits are necessarily indefinite, and yet continually requiring to be practically determined. It is not a mere operation requiring the use of grammar and dictionaries, a mere inquiry into the meaning of words."

So far as legal interpretation does make use of the rules of grammar and the laws of language, it does not differ from the process employed by every educated and intelligent listener or reader when engaged in discovering the meaning of a speaker or writer. But when this simple process does not suffice, the courts proceed under rules which have been laid down in the long course of judicial interpretation. Some of these rules owe their existence to peculiarities of legal procedure; but most of them have been evolved by the courts with a view to producing greater uniformity in the terms of legal writings, or to lessening and shortening litigation, or to securing consistency in the judicial process of construction.

The more important of these rules are as follows: 1. When the language of a writing is plain and unequivocal, there is no occasion for interpretation. Even though the court may believe that the language employed does not express the intent of the writer, it will not force upon words a meaning which they cannot fairly bear. When words admit of but one meaning, to put another upon them is not to construe a writing, but to alter it. In case of a statute it is not to interpret a law, but to make one. 2. The grammatical and ordinary sense of words is to be adhered to, unless that would lead to some absurdity, or some repugnance or inconsistency with the rest of the instrument, in which case the grammatical and ordinary sense of the words must be modified so far as may be necessary to avoid that absurdity or inconsistency but no further. Eminent English judges have called this the golden rule of construction. It is a corollary from this rule that when it appears, either from the instrument itself or from the circumstances attending its origin, that certain words are used in an abnormal or peculiar or technical sense, they shall be interpreted in such sense. 3. In construing any part of a writing regard should be had to the entire instrument. Other portions may throw much light upon the one under special investigation and greatly modify the meaning which it would bear as an independent clause. Every part of a writing should be brought into action in order to collect from the whole one uniform and consistent purpose, if that is possible. Accordingly, if one construction will give reasonable effect to every part of an instrument, while another would require the rejection of a part, the former will be preferred. 4. In the case of private writings, such as contracts and deeds, the language is to be construed most strongly against the party who is responsible for its use. Of course, this applies only to cases of ambiguity either in the words themselves or in their legal effect. Even then it will be applied only when other rules of construction fail, for it is deemed somewhat harsh and rigorous. 5. As between constructions otherwise equally balanced, preference is to be given to that which renders the instrument most fair and just and reasonable. 6. In construing doubtful language, the court is entitled to consider all the circumstances connected with the origin of the instrument. Proof of these circumstances is not excluded by any rule of evidence (q.v.). It is not offered to contradict or vary an instrument, but to put the court as nearly as possible in the place of the parties at the time they agreed upon this language as the formal expression of their intentions. 7. The construction put upon an ambiguous instrument by the acts of the parties is entitled to great weight.

The literature of the subject is extensive.

Bibliography. The best theoretical treatment of the subject is found in F. V. Hawkins, *Principles of Legal Interpretation* (London, 1860); Lieber, *Legal and Political Hermeneutics* (ed. by Hammond, St. Louis, 1880); J. B. Thayer, *Preliminary Treatise on Evidence* (Boston, 1898). Among the latest and most valuable practical treatises are the following: Wigram and O'Hara, *Interpretation of Wills* (New York, 1872); Theodore Sedgwick, *Statutory and Constitutional Law* (ib., 1874); F. V. Hawkins, *Interpretation of Wills* (Philadelphia, 1885); L. A. Jones, *Construction of Commercial and Trade Contracts* (New York, 1886); Elphinstone, Norton and Clark, *Rules for the Interpretation of Deeds* (Philadelphia, 1889); J. G. Sutherland, *Statutes and Statutory Construction* (Chicago, 1891); Henry Hardcastle, *Rules which Govern the Construction and Effect of Statutory Law* (London, 1900); Sir P. B. Maxwell, *Interpretation of Statutes* (4th ed., Toronto, 1905); Edward Beal, *Cardinal Rules of Legal Interpretation* (Boston, 1908); H. C. Black, *Handbook on the Construction and Interpretation of Laws* (2d ed., St. Paul, 1911).

INTER'PRETER, Mr. A character in Bunyan's *Pilgrim's Progress*, typifying the Holy Spirit.

IN'TERRA'CIAL MARRIAGE. See Cross Breeding in Man.

IN'TERREG'NUM (Lat., period between reigns), The Great. The name given to the period of German history between the death of Conrad IV, in 1254, and the election of Rudolph of Hapsburg, in 1273. It is often called the age of "fist law" (*Faustrecht*). During this time Germany had no ruler who was generally recognized. William of Holland had been elected as an antiking, in 1247, by the opponents of Frederick II (q.v.). After Conrad's death William, with the aid of the confederation of Rhenish cities, succeeded in restoring order in a portion of Germany. His death, in 1256, led to greater confusion. Some of the electors, in 1257, chose Richard of Cornwall, the brother of Henry III of England; the other electors chose Alfonso X of Castile. Richard spent but little time in Germany; Alfonso never visited it. Neither one acquired any real power, and neither was crowned Emperor at Rome. When Richard died, in 1272, Alfonso's claims were set aside by common consent, and the Pope ordered the electors to proceed to a new election. This resulted (1273) in the choice of Rudolph. One of his first acts was to annul all laws passed by the rival kings since the death of Frederick II, in 1250. For this reason the Great Interregnum is sometimes made to include the years between 1250 and 1273. Consult Kempf, *Geschichte des deutschen Reiches während des grossen Interregnums* (Würzburg, 1893).

IN'TERROG'ATORIES (from Lat. *interrogatorius*, consisting of questions, from *interrogare*, to question, from *inter*, between + *rogare*, to ask). Questions in writing prepared for the examination of one or more witnesses in a judicial proceeding, to be taken out of court.

In the English and American law interrogatories are commonly employed in the following classes of cases: where the testimony of an aged or infirm witness is to be taken before trial, in order that it may be available in case of his

death; where a witness is out of the jurisdiction, and it is desirable to obtain his testimony or deposition, as it is called; and in connection with a bill of discovery (q.v.) in equity. In the first two classes of cases the practice is for the counsel desiring the testimony to obtain an order, or commission, from the court, directing that the examination be taken before some officer competent to administer an oath, and then to prepare his interrogatories and submit them to the opposite party or his counsel, who may prepare cross-interrogatories. In some jurisdictions the legal competency of the questions is settled by the court before the examination, and in others the objections of counsel are noted at the time of the examination and ruled upon at the trial. The commission and the interrogatories are then forwarded to the designated officer, who summons the witnesses on the day fixed, administers the oath, propounds the questions, reduces the answers to writing and transmits them, together with the order and interrogatories, to the court out of which the commission issued. Such examinations are subject to all the rules of evidence. The answers so reported to the court constitute, when read on the trial, legitimate evidence admissible under a recognized exception to the "hearsay rule."

Interrogatories are sometimes annexed to a libel (q.v.) in an action in admiralty, but this is not common practice. See DEPOSITION; EVIDENCE; HEARSAY.

IN'TERSTATE' COM'MERCE. A phrase designating commercial transactions between persons in different States of the United States. The absence of power to secure uniformity in commercial regulations was a source of weakness in the Articles of Confederation and was one of the causes of the adoption of the Constitution. Power is conferred upon Congress by the Constitution (Art. I, Sec. 8, cl. 3) "to regulate commerce with foreign nations and among the several states and with the Indian tribes." It was early held by the Supreme Court in the case of Gibbons *v.* Ogden (9 Wheaton, 1) in which Chief Justice Marshall elaborately discusses the clause, that the subject of congressional action is not limited to regulating traffic, the mere buying and selling or interchange of commodities, but that it comprehends also the means of transportation, and that therefore acts of the New York Legislature granting to Robert R. Livingston and Robert Fulton the exclusive right of navigating the waters of that State with steamboats were void. Congress may exercise control over highways, railroads, and navigable waters whenever they form avenues for commerce not wholly within a single State. This authority extends to rivers wholly within a single State, if such river together with other bodies of water forms a continuous route for commerce to other States or to foreign countries. That the United States has such an interest in these highways that it may secure an injunction to prevent the obstruction thereof was held *In re* Debs (158 U. S. Reports, 564), decided by the Supreme Court in 1894. Congress has power to authorize or regulate the erection of wharves, piers, and bridges, and while, in the absence of congressional action, the States may also make similar local regulations, the authority of Congress is paramount. Congress may make provision as to the means of transportation in regulating the building, equipment, and registration of vessels, their transfer by sale or mortgage, and in prescribing rules for navigation and the qualifications of pilots and engineers. Similarly, in the case of transportation by land between States, Congress may legislate as to the management of railway trains and the duties of employees thereon. By virtue of this power the Safety Act of 1893 was enacted, requiring the use of automatic couplers and continuous brakes upon railroads engaged in interstate commerce.

The carriage of passengers as well as of goods is held to be within the meaning of the clause, so that Congress may provide regulations for the security of passengers. Even the transmission of interstate messages by telegraph or telephone comes under the national authority.

Congress has no right to interfere with commerce carried on wholly within a State or with the manufacture of goods to be sold and consumed wholly within the State of manufacture. The statutory provisions enacted in 1906 for the federal inspection of animals before slaughtering, and of meat and meat products and the establishments in which meat and meat products are prepared, and for the destruction of such meat as is unsound or unfit for human food, are confined to establishments where the products are to be used in interstate or foreign commerce.

Congress cannot regulate contracts which merely relate to commerce. For this reason it has been held by the Supreme Court that fire, marine, and life insurance do not fall within the scope of interstate commerce, and this is a chief obstacle to the proposed federal control of insurance. It has been questioned whether the power to regulate commerce includes the power to prohibit it. The constitutionality of the Embargo Act of 1807, prohibiting all commerce with Great Britain and France, was sustained by the lower courts but never authoritatively passed upon by the Supreme Court. This court, however, decided in 1903 in the Lottery Case (188 U. S. Reports, 321) that lottery tickets are objects of commerce and that their transportation could be prohibited. Four out of nine justices of the court dissented from this decision.

The Sherman Anti-Trust Act, passed in 1890, is an important enactment under the commerce clause. It provides: "Every contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce among the several States, or with foreign nations, is hereby declared to be illegal." While a combination relating merely to manufacture has been held not to be within the scope of this act, the statute is applicable where there are provisions in the agreement to destroy competition or enhance the price of articles upon sale between the States. An important decision under this statute is that of the Northern Securities Company *v.* The United States (193 U. S. Reports, 197), in which it was held in 1903 by a nearly evenly divided court that a combination of stockholders of the Great Northern and Northern Pacific Railway Companies, to form the Northern Securities Company as a holding corporation to own the majority of the stock of the two railroad companies, was an illegal combination in restraint of interstate commerce. For later judicial interpretations of this statute and for recent amendments, see TRUSTS.

For the provisions of the Interstate Commerce Act of 1887, as amended in 1906 by what is popularly known as the Railway Rate Bill, providing for the fixing by the Interstate Com-

merce Commission of rates for the transportation of persons or property, see RAILWAYS.

Congress is restricted in its power by being forbidden to lay any tax or duty on articles exported from any State (Constitution, Art. I, Sec. 10, cl. 5) and also by the provision that "no preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another; nor shall vessels bound to or from one State be obliged to enter, clear, or pay duties in another" (Art. I, Sec. 9, cl. 5).

The power of Congress is exclusive of that of the several States wherever the matter regulated is of a national character or admits of or requires a uniform system of regulation, and in the absence of legislation it is to be presumed that Congress intended the common law to remain unchanged so that any State statutes on such subjects will be held void. A State cannot prohibit the exportation or importation of any article of commerce or the delivery within the State of such an article purchased without the State, nor can it impose a tax on the subject of sale of interstate commerce. A State cannot impose a tax upon immigrants, nor can a tax be imposed on a railroad upon freight brought within a State, nor can it levy a tax upon the gross receipts from the business of transportation with other States, for this is in effect a tax upon interstate commerce. It was held by the Supreme Court that the State of Iowa could not prohibit the sale of intoxicating liquors by an importer so long as such liquors remained in the original package and had not been mingled with the mass of property within the State. To counteract the effect of this decision the Wilson Act of 1890 was passed by Congress, providing that intoxicating liquors transported into any State shall upon arrival be subject to the laws of such State, enacted in the exercise of its police powers in the same manner as domestic liquors. Similar statutes have been enacted by Congress to render effective State laws as to game and oleomargarine. Consult: Cooley, *Principles of Constitutional Law* (Boston, 1898); Prentice, *The Federal Power over Carriers and Corporations* (New York, 1907); Interstate Commerce Commission, *The Act to Regulate Commerce (as Amended) and Supplementary Acts thereto* (Washington, 1911); Judson, *The Law of Interstate Commerce* (2d ed., Chicago, 1912).

INTERSTATE COMMERCE ACT. See RAILWAYS.

INTERSTATE COMMERCE COMMISSION. See RAILWAYS.

IN'TERVAL (Lat. *intervallum*, interval, from *inter*, between + *vallum*, wall). In music, the difference of pitch between any two sounds, or the distance on the stave from one note to another, in opposition to unison, which is two sounds exactly of the same pitch. From the nature of our system of musical notation, which is on five lines and the four intervening spaces, and from the notes of the scale being named by the first seven letters of the alphabet, with repetitions in every octave, it follows that there can be only six different intervals in the natural diatonic scale until the octave of the unison be attained. To reckon from C upward, we find the following intervals: C to D is a second; C to E is a third; C to F is a fourth; C to G, a fifth; C to A, a sixth; C to B, a seventh; and from C to C is the octave, or the beginning of a similar series. Intervals above the octave are therefore merely a repetition of those an octave lower. A flat or a sharp placed before either of the notes of an interval does not alter the name of the interval, although it affects its quality; e.g., from C to G♯ is still a fifth, notwithstanding that the G is raised a semitone by the sharp. Intervals are classified as perfect, major, and minor. Perfect intervals are those which admit of no change whatever without destroying their consonance; these are the unison, fourth, fifth, and the octave. Intervals which admit of being raised or lowered a semitone are distinguished by the term *major* or *minor*, according as the distance between the notes of the interval is large or small. Such intervals are the third and sixth; e.g., from C to E is a major third, the consonance being in the proportion of 5 to 4; when the E is lowered a semitone by a flat, the interval is still consonant, but in the proportion of 6 to 5, and is called a minor third. The same description applies to the interval of the sixth from C to A and from C to A♭. The second and seventh are also distinguished as major and minor. If the upper tone of a major, or perfect, interval be raised, or the lower tone lowered a semitone, the interval becomes augmented; thus, c–e♯ or c♭–e. By lowering the upper or raising the lower tone of a minor, or perfect, interval by a semitone, a diminished interval results; thus, c–b♭♭ or c♯–b♭. Intervals are further distinguished as consonant and dissonant. Consonant intervals are those which can enter into the formation of a major or minor triad. They are the perfect unison, fourth, fifth, and octave and major and minor thirds and sixths. Thus, c, e, g, c′ (1, 3, 5, 8) and c, f, a, c′ (1, 4, 6, 8) are the tonic triads of C and F major respectively; whereas, with the third and sixth (e, a) flattened, they are the tonic triads of C and F minor respectively. Dissonant intervals are the major and minor seventh and all augmented and diminished intervals. Whenever they enter into a chord, that chord is a dissonance and requires resolution into consonance. The distinction between consonant and dissonant intervals is made according to the ratio of the number of vibrations between any interval and the fundamental tone.

(*a*) CONSONANT INTERVALS		(*b*) DISSONANT INTERVALS	
Unison	1:1	Major second	8:9
Fourth	3:4	Minor second	15:16
Fifth	2:3	Augm. second	64:75
Octave	1:2	Major seventh	8:15
Major third	4:5	Minor seventh	5:9
Minor third	5:6	Dimin. seventh	75:128
Major sixth	3:5	Augm. third	512:675
Minor sixth	5:8	Dimin. fourth	25:32
		Augm. fourth	18:25
		Dimin. fifth	25:36
		Augm. fifth	16:25

Consonant intervals satisfy the ear because of their simple ratios; dissonances give a feeling of unrest and desire for resolution because of their complex ratios. The mathematical relations of intervals are determined as follows: given the normal a′, which is produced by a string vibrating 870 times per second (see DIAPASON), the octave above is produced by shortening the string by half its length. The number of vibrations will then be doubled, or 1740. This establishes the ratio between the prime and octave of 1 : 2. A string producing e″ vibrates 1305 times. Thus, the ratio between

prime and fifth is as 780: 1305, or as 2: 3. The preceding table shows the ratios of the different intervals.

As the length of the vibrating string is in inverse ratio to the number of vibrations, the ratios of the above table need only be inverted to determine the length of the string for any given interval. See HARMONY; MUSIC.

IN'TERVEN'TION (Lat. *interventio*, interposition, a coming between, from *intervenire*, to come between, from *inter*, between + *venire*, to come). 1. In municipal law, an act or proceeding by which a person not originally a party to an action is admitted as such for the protection of a right or interest in the subject matter of the litigation, which will be materially affected by its determination. It has always been a well-established right under the civil law and was early introduced into the English procedure. In a few of the United States the right is confined to actions involving real or personal property, but in most jurisdictions no such limitation exists. A person may be thus admitted as a party plaintiff or defendant, by application to the court before the cause has proceeded to trial. See PLEADING; PARTIES.

2. In international law, the interference of one state in the affairs of another for the purpose of preventing injury to itself, or in behalf of some principle, person, or collection of persons. Intervention may assume several forms. Thus, it may be by verbal note delivered to the ambassador of the country against which the grievance exists; it may be by official notes publicly declared; it may take the form of an international congress or conference; or, finally, it may result in armed interference. It is the last form which is generally understood when reference is made to acts of intervention. Notable instances of intervention have been the invasion of Holland by the Prussians in 1787 to restore to his old position the Stadholder, who was a brother-in-law of the Prussian King; the interference of the Holy Alliance to thwart liberal movements and restore absolutism in Spain, Naples, Sicily, and Piedmont in the early part of the nineteenth century; the interference of Austria and Prussia in behalf of Louis XVI of France in 1791; and the intervention of France in Rome in 1849 to restore the temporal power of the Pope.

No general rule can be laid down to determine when intervention is justifiable. It is well settled that it is excusable as a measure of self-preservation. Thus, in Europe the policy of interference in behalf of the balance of power has been quite common. Any European state may be restrained from pursuing plans of acquisition of territory. Europe is regarded as a confederacy of states, and the balance of power is the guarantee of national existence against the designs of the more powerful states. This principle is not violated by territorial aggrandizements so long as the safety and liberty of neighboring states are not endangered. Notable instances of intervention under this head were that against Louis XIV to prevent him from seating his grandson on the throne of Spain; the coalitions against Napoleon; the interposition of the four Powers in 1840 in favor of the Sultan against Mehemet Ali of Egypt; and that of France and England in 1854 to preserve the integrity of the Turkish dominions against the designs of Russia. Concerted action or intervention by the Great Powers of Europe is sometimes resorted to in order to prevent a smaller state from following a particular line of conduct or to compel it to do a certain act. An instance of this form of intervention was the formal recognition of the independence of Belgium by the five Great Powers in 1830, when that country emancipated itself from Holland. With the development of modern civilization, humanitarian motives are often appealed to as a justification for interference where cruelty is inflicted by despotism or religious intolerance. Such cases must be carefully scrutinized, for the danger always exists that they may cover ambitious projects for territorial aggrandizement. But interventions on the ground of humanity have under exceptional circumstances certainly a moral if not a legal justification. Such was the intervention of Great Britain, France, and Russia in 1827, by which Greece was liberated from Turkey, and again in the interposition of the Great Powers in 1860 to stop the persecution and massacre of Christians of the Lebanon. The most important recent instance of intervention is that of the United States in Cuba in 1898, which may be referred in part to humanitarian feelings aroused by the cruelties attending the insurrectionary struggle against Spanish authority, in part to the destruction of American property, and the menace to American interests resulting from the possible acquisition of the island by another foreign power. See INTERNATIONAL LAW, and the authorities there referred to.

INTES'TACY (from Lat. *intestatus*, having made no will, from *in-*, not + *testari*, to make a will, from *testis*, witness). The condition resulting from one's dying with property undisposed of by last will and testament. By the present law of England and the United States there is no restriction upon the right of testamentary disposition. This has not always been the case, however, the right of disposing of one's property by will without restriction being a comparatively late acquisition in the evolution of society. Indeed, in Scotland, Louisiana, Quebec, and other States whose legal systems are based on that of the civil law, the power of testation is still limited by the right of children of the testator or other natural objects of his bounty to take by inheritance a certain definite share of his estate. See INOFFICIOUS TESTAMENT.

Intestacy may be complete, as where a person leaving property dies without leaving a valid will; or it may be partial, where a will does not dispose of the entire estate of the testator, either intentionally or through the lapse of a legacy, or the illegality of a specific devise. In either event the property undisposed of passes by the operation of the laws of descent (q.v.) and distribution (q.v.) to the heirs or next of kin of the decedent. See HEIR; INHERITANCE; TESTAMENT; WILL.

INTES'TINAL STA'SIS. See STASIS, INTESTINAL.

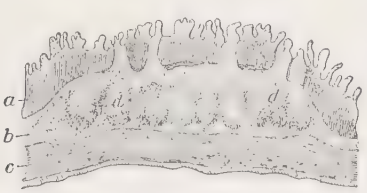
INTES'TINE (Lat. *intestinum*, neut. sing. of *intestinus*, internal, from *intus*, within, from *in*, in). The part of the digestive tract between the stomach and the anus. The small intestine includes the duodenum, the jejunum, and the ileum, and averages 22 feet, 6 inches in the male, 23 feet, 4 inches in the female. With the exception of the duodenum, the small intestine lies in general in the central part of the abdominal cavity, bounded by the large intestine on either side and above. The jejunum and

ileum are connected to the posterior abdominal wall by a reflection of the peritoneum, called the mesentery. The duodenum is about 10 inches long, 1½ to 2 inches in diameter, and curved like a horseshoe. The head of the pancreas is received into the curve. It is the part of the intestine which is continuous with the stomach at its pyloric extremity. The jejunum is described under its title. The jejunum and ileum vary much in the arrangement of their coils and there is little regularity in their position beyond that already stated. The term "ileum" is applied to the last three-fifths of the small gut. It ends at the ileocæcal valve, through which the contents of the small intestine escape into the head of the colon. The small intestine has four coats: serous or peritoneal, muscular, areolar or submucous, and mucous. The last is covered with minute prolongations called villi, and lined with columnar epithelium. There are few valvulæ conniventes, or folds of mucous membrane, in the ileum. Solitary glands alone or in aggregations (called Peyer's patches) are found in the lower part of the ileum. These are largely obliterated in typhoid fever.

The large intestine is divided into the cæcum; the ascending, transverse, and descending colon; the sigmoid flexure; and the rectum. It is so placed as to encircle the small intestine. The cæcum lies in the hollow of the right iliac region. From this point the colon rises to the liver, then crosses the abdominal cavity to the opposite side, passing below the stomach to the spleen; then, making a sharp turn, it descends to the left iliac fossa, where it forms a loop termed the sigmoid flexure (from its resembling the old Greek letter sigma); and finally, now termed the rectum, curves back to the head of the sacrum, thence curves backward to the anus. Attached to the cæcum, generally back of it, is a small, short, blind tube, about 3 to 4 inches long, opening into the gut, and termed the vermiform appendix (q.v.). The subdivisions of the large intestine are treated under their own titles. The constant motion of the intestine (peristalsis), by which its contents are conveyed along, is due to the contractions of the muscular fibres of the gut. See DIGESTION.

HISTOLOGY

The wall of the intestine is composed of four distinct coats, which from without inward are known as (1) the serous coat, (2) the muscular coat, (3) the submucous coat, and (4) the mucous coat or mucous membrane. These coats

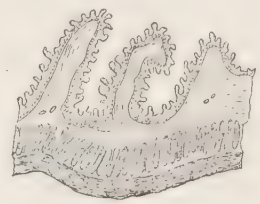


SECTION OF SMALL INTESTINE OF A CAT.

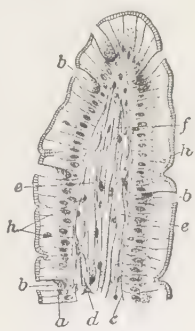
a, mucous coat; *b*, submucous coat; *c*, muscular coat; *d*, *d*, Peyer's patch, cut crosswise.

present certain differences in structure in the two main divisions of the intestine, the small intestine and the large intestine.

The Small Intestine. The serous coat of the small intestine consists of a single layer of epithelium or endothelium (forming the peritoneal surface) resting upon a thin layer of delicate connective tissue. Beneath this lies the muscular coat composed of (*a*) an outer portion in which the smooth muscles are disposed longitudinally to the long axis of the intestines and consequently known as the longitudinal muscular coat, and (*b*) an inner or circular coat in which the muscle cells are disposed transversely to the axis of the intestines. The two layers of muscle are separated by more or less connective tissue. The submucous coat consists of loosely arranged bundles of fibrous and elastic connective tissue, with a rich plexus of blood vessels, lymphatics, and nerves. Through the submucous coat are distributed, at varying intervals, circumscribed masses of lymphoid tissue or lymph nodules. These may occur singly (solitary glands, or follicles), lying in both submucosa and mucosa, and may even project slightly from the free surface of the mucous membrane. Or else, instead of a single nodule, there may be a collection of nodules forming what is known as Peyer's patches, which are found mainly in the ileum. Usually from 20 to 30 nodules constitute a patch. Like the solitary nodules, they lie in both submucosa and mucosa and often project upward to the free surface of the intestine. Finally, the mucous membrane of the small intestine is thrown up into transverse or oblique folds, which involve also the submucous coat, and which are known as the valvulæ conniventes. In addition to this the mucous membrane over the valvulæ is studded with minute projections known as villi, which are characteristic of the small intestine. The mucous membrane consists of three coats, the epithelial coat, the stroma, and the muscularis mucosæ. The epithelial coat is composed of a single layer of columnar epithelium, which covers the surface of the mucous membrane. Distributed at intervals among the columnar epithelial cells are clear, transparent cells which, on account of their shape, are called goblet cells, or, because of their secretion, mucous cells. The epithelium rests upon a basement membrane, beneath which lies the stroma. The latter is composed of delicate connective tissue and more or less diffuse lymphoid tissue. It extends up into the villi and supports the vessels, nerves, and glandular structures. From the bottom of the depressions between the villi, glands extend down into the stroma. These are tubular glands, called the crypts of Lieberkühn, and extend down almost



Longitudinal section of human small intestines, showing general relation of the folds constituting the valvulæ conniventes to the mucosa and submucous coat. The latter constitutes the fibrous core over which the mucosa with its villi and glands extends.



Longitudinal section of villus from intestine of dog, highly magnified. *a*, columnar epithelium containing goblet cells (*b*) and migratory leucocytes (*h*); *c*, basement membrane; *d*, platelike connective tissue elements of core; *e*, blood vessels; *f*, absorbent lymphatic radicle or lacteal.

to the muscularis mucosæ. The glandular epithelium is columnar in type, lower than that on the surface of the mucous membrane, with which it is directly continuous. Numerous goblet cells are distributed among the columnar cells. In one portion of the small intestine much more elaborate glands are found. They are situated in the duodenum and are known as the glands of Brunner. They are compound tubular glands, whose acini are situated in the submucosa and whose ducts pass up between the crypts of Lieberkühn and empty between the villi. The muscularis mucosæ is the innermost layer of the mucous membrane. It is composed of smooth muscle cells, whose long axes correspond mainly to the long axis of the intestine. At certain points a more or less complete internal circular layer is present. See BRUNNER'S GLANDS.

Simple tubular glands of large intestines of dog; the epithelial elements lining the follicles have become very largely converted into goblet cells.

Blood Vessels, Lymphatics, and Nerves. The larger arterial trunks pierce the serous and muscular coats, in which they give off branches, and form a rich network in the submucosa. From this network smaller branches are given off, which form a capillary anastomosis throughout the mucous membrane, extending up into the villi. From the capillaries arise veins which empty into the venous plexus of the submucosa, from which larger venous trunks pass outward, accompanying the arteries. The lymphatic system of the intestine is very extensive. Beginning as blind canals in the villi, the lymphatics pass downward to form a plexus in the deeper layers of the mucosa and in the submucosa. From this plexus larger lymphatic vessels pass outward to the mesenteric lymph glands. The nerves of the intestine are mainly nonmedullated fibres from the abdominal plexus of the sympathetic. Between the two muscular layers the nerve fibres form a rich plexus, known as the plexus of Auerbach. From this plexus fibres extend to the submucosa, where a second plexus, called the plexus of Meissner, is formed. In both plexuses microscopic groups of ganglion cells are found.

The Large Intestine. This differs from the small intestine in several important particulars. The mucous membrane is entirely devoid of villi, and its glands, which are of the simple tubular variety, open upon the surface of the mucosa. In the cæcum and colon the internal muscular coat is thinner than in the small intestine, and the external longitudinal muscle, instead of completely surrounding the gut, as in the small intestine, is collected into three flat bands. As these bands are shorter than the other layers which make up the intestinal wall, they are responsible for the sacculation which is so characteristic of the large intestine. In the rectum the serous coat is replaced by a fibrous coat, and towards the anus the circular muscular coat becomes thickened and is composed of voluntary muscle, forming the internal and sphincter muscle. Solitary lymph nodes occur throughout the large intestine. The collections of nodes known as Peyer's patches are, however, usually confined to the small intestine. The distribution of blood vessels, lymphatics, and nerves is similar to that in the small intestine. See ALIMENTARY SYSTEM.

INTI, ēn'tē. The deified sun, worshiped by the Incas of Peru.

INTIM'IDA'TION (from ML. *intimidare*, to intimidate, from Lat. *in*, in + *timidus*, afraid, from *timere*, to fear). Literally, the act of putting one in fear. In law, specifically, the use of this means for the purpose of inducing a person to enter into an obligation or to pay money or to do or refrain from doing some other act. In general the act induced by intimidation may be repudiated, and any money paid or other property parted with under its influence may be recovered in a quasi-contract action. But such a contract or other transaction is not wholly void, but only voidable at the election of the intimidated party.

In England it is a statutory offense punishable as a crime to intimidate a person with a view to compel him to abstain from an act which he has a legal right to do, or to do an act which he has a legal right to abstain from doing. Intimidation is not, save in exceptional cases, an excuse for committing a crime.

To constitute intimidation the duress employed must consist in actual violence or unlawful imprisonment, or in threats of violence calculated to cause fear of life or bodily injury to the intimidated person or his or her husband or wife or child, or in threats of criminal proceedings.

With respect to the more subtle forms of coercion sometimes employed in trade and labor disputes—such as the boycott, strikes, and the like—there is often grave question whether they amount to unlawful intimidation or not. When the acts complained of as constituting intimidation are unlawful in themselves, regardless of the question of their coercive effect, there is no difference of opinion in the cases in holding that such acts, when they reasonably result in coercing a person from the exercise of his legal freedom of conduct, constitute unlawful intimidation; as where actual physical violence is threatened and overt acts are done in pursuance of the threat.

Where, however, the acts complained of result in intimidation because of the number of persons by whom they are done in concert or in accordance with a common plan of so affecting the business or affairs of plaintiff, but would be harmless or ineffectual without such combination, the decisions are at variance. For example, the courts are not agreed as to what is and what is not legal picketing, as it is called; as to the legality of notice posted in the meeting rooms of trade-unions affecting the standing of particular employers; as to the legality of stigmatizing a shop as a scab shop; of the manner that may be used in requesting other workmen to quit work; of notifying employers that they have nonunion men who must be discharged to prevent a strike; of the fining of members to compel them to strike, etc. Formerly the law was unjust in its discrimination against the performance of these acts by combinations of workmen or others, but these rules have been much modified both by statute and judicial decisions. Generally speaking, the courts of the United States and of some States, as Massachusetts and New Jersey, adhere more closely to the spirit of the old common-law rule than is done in some of the other States, as

New York and Illinois, where the effort of organized labor has been more effective in modifying it. The most general question that remains unsettled is as to whether it is lawful for a body of men to do in unison or in pursuit of a common purpose any act which it would be lawful for each member of the body to perform as an individual, or whether such acts so performed may under the given conditions amount to a conspiracy. Consult, for a statement of the latest development of the subject in Great Britain, the case of Allen *v.* Flood, *House of Lords Cases* (London), and, in the United States, The National Protective Association *v.* Cummings, *New York Court of Appeals Reports* (New York, 1902); Beattie *v.* Colleman, *New York Supreme Court Reports* (ib., 1903); Groat, *Attitude of American Courts in Labor Cases* (ib., 1911); Laidler, *Boycotts and the Labor Struggle* (ib., 1914). See CONSPIRACY; DURESS; TORT; STRIKES AND LOCKOUTS; BOYCOTTING; PICKETING.

INTINE, ĭn'tĭn *or* ĭn'tēn (from Lat. *intus,* within). The inner and more delicate layer of wall of an aërial spore. The outer and heavier one is called the exine. The intine is also sometimes called the endospore, in which case the exine is called the exospore. In some cases, especially among water plants, a third spore coat is developed, and is called the perinium. This is a very conspicuous coat in the spores of *Equisetum* (q.v.). When the spore of an *Equisetum* matures, this perinium unwinds, as though it were composed of two spiral bands, thus exposing the exine or ordinary outer spore coat. See SPORE; EXINE.

IN'TONA'TION (from ML. *intonare,* to sing according to tones, from Lat. *in,* in + *tonus,* Gk. *τόνος, tonos,* tone; connected with Lat. *tendere,* Gk. *τείνειν, teinein,* Skt. *tan,* to stretch). In music, the production of tone either by an instrument or by the voice. It is of no importance in keyed instruments like the piano or organ, as the performer can strike only the proper key and is powerless if the instrument is not in tune. But the matter of intonation is of utmost importance in the voice and all string and wind instruments. Only a person having a finely trained ear is able to produce proper intonation. Hence we speak of pure and false intonation. In plain chant music the term denotes the opening phrase sung alone by the precentor (the celebrant of the mass), as *Gloria in excelsis Deo, Credo in unum Deum.*

INTOX'ICAT'ING LIQUORS. All liquors which may reasonably be used as beverages and which contain enough alcohol to produce entire or partial intoxication if drunk in ordinary quantities. An exact definition of this term is important under all excise and prohibition statutes, but as many palatable mixtures containing alcohol are sold in evasion of such laws, no definite enumeration of such liquors is possible. The statutes of many States are broad enough to cover all preparations or compounds containing alcohol when they come within the above definition.

The courts in most jurisdictions will take judicial notice of the intoxicating character and effect of the well-known liquors, such as gin, whisky, brandy, etc., but will require proof of the intoxicating qualities of mixtures containing alcohol, such as cordials or the various commercial, or proprietary, tonics. An interesting discussion of the subject will be found in the "Intoxicating Liquor Cases," reported in 25 Kansas Rep. p. 751. The law deals with intoxicating liquors in three ways: (1) by regulating and restricting the manufacture and sale thereof as a measure of public policy; (2) by imposing excise taxes and license fees for its manufacture and sale; and (3) by statutory protection of its purity. See EXCISE; LIQUOR TRAFFIC; LICENSE; PROHIBITION.

INTOX'ICA'TION (ML. *intoxicatio,* from *intoxicare,* to poison, from Lat. *in,* in + *toxicum,* from Gk. *τοξικόν, toxikon,* poison, originally that poison in which arrows were dipped, from *τοξικός, toxikos,* relating to a bow, from *τόξον, toxon,* bow). In medicine, poisoning by any agent; colloquially, a condition of impaired will and undermined control resulting from drinking alcoholic beverages. Intoxication is as correctly used of serious disturbance of mental and physical equilibrium by the use of opium, chloral, belladonna, cannabis indica, or by the ingestion of lead, as of the poisoning resulting from the use of liquor. Alcoholic intoxication may be acute, subacute, or chronic. Acute intoxication follows drinking a considerable quantity of liquor at once. Profound insensibility follows speedily, with stertorous breathing, purplish face, frothing at the mouth, weak pulse, and increasing coma. An active purge, such as croton oil, put on the root of the tongue or introduced into the rectum, together with hypodermic injections of strychnine, both used after the employment of the stomach pump, may be efficacious and save life. This form of intoxication is rarely seen. The subacute form is the usual drunkenness, of mild or serious type. It is the form observed in those who drink alcoholic beverages for the exhilaration they feel, or in those who drink till they are stupefied. Slight intoxication causes increased activity of the circulation and of nervous and mental processes, as well as in most cases derangement of the digestive apparatus. Heavy drinking results in delirium, staggering (due to cerebellar disturbance), loss of muscular power, and finally stupor. Vomiting, depression, and tremor appear when the person awakes or becomes conscious. An emetic, a cathartic, and a Turkish bath often rouse an intoxicated person when becoming drowsy, and prevent the occurrence of the coma which threatens. But after repeated indulgences these measures fail. Ammonia and strychnine are both very serviceable in treating the conditions existing after the patient is aroused from his unconsciousness. Habitual intoxication results in delirium tremens in some cases. (See DELIRIUM.) In others it leads to alcoholic insanity. (See INSANITY.) Serious organic diseases result from the use of alcohol, such as general neuritis; cirrhosis of the liver, cirrhosis of the kidneys with secondary heart disease, and arteriosclerosis, all of which are discussed under their proper titles. The will becomes undermined, judgment becomes impaired, and the idea of moral responsibility becomes diminished or lost. Intoxication from wood alcohol, often used as an adulterant of alcoholic drinks and patent medicines, is apt to produce blindness and frequently death.

Inebriety. This is the diseased mental condition resulting from the use of alcohol. There may have been an underlying neurasthenia, which has led the patient to seek some agent which will remove his weakness and lack of endurance. Repeated recourse to alcoholic stim-

ulation frequently results in inebriety in such a case. Heredity plays a prominent rôle in the causation of inebriety. Inebriety or insanity is found in the ancestry of about half the cases. Race has a certain influence. Denmark and Belgium suffer from the greatest amount of inebriety in the continental countries; Russia and Germany come next, and France, Sweden, Austria, and Switzerland follow. The Anglo-Saxon seems very susceptible to the disease. The Italian is singularly free from it, and the Spaniard has nearly as good a record. The Jewish people present an example of general freedom from inebriety wherever they are found. A hot, moist climate favors inebriety by reducing general nervous resistance. Exposure and occupation have also an evident influence. The mortality from alcoholism is stated by Norman Kerr to be 40,000 annually in Great Britain. He quotes Lankester as saying that one-tenth of the entire mortality in Great Britain is due to alcoholism.

Medicolegal Aspect. The tendency to commit crime is much greater in inebriates than in others, because of the weakening of the will and the lessened moral sense. It is held that intoxication is no excuse for commission of crime, and the criminal who remembers nothing of his acts committed while under alcoholic influence must pay the penalty due to his offenses. Consult: Kerr, *Inebriety* (Philadelphia, 1894); J. S. Billings, *Physiological Aspects of the Liquor Problem* (2 vols., Boston, 1903); B. G. Cutten, *Psychology of Alcoholism* (New York, 1907); H. S. Williams, *Alcohol, and how it Affects the Individual* (ib., 1909); J. W. A. Cooper, *Pathological Inebriety* (ib., 1913); F. Hare, *Alcoholism: Its Clinical Aspects and Treatment* (Philadelphia, 1913). See ALCOHOL, PHARMACOLOGY, TOXICOLOGY, AND THERAPEUTIC USE; ALCOHOLISM, and the authorities referred to thereunder; DIPSOMANIA.

INTRA, ên'trȧ. A manufacturing town in the Province of Novara, Italy, on Lago Maggiore (q.v.), between the mouths of the San Bernardino and San Giovanni rivers (Map: Italy, B 2). It has a school of trade and industry; manufactures, with its water power, cotton goods, hats, lumber, leather, and machinery. On its outskirts are many beautiful villas overlooking Lago Maggiore. Pop., 1901, 6902; 1911, 8036.

IN'TRAMERCU'RIAL PLANET. See VULCAN.

INTRANSIGEANTS, ăN'trän'sē'zhäN' (Sp. *intransigente*, uncompromising, from Lat. *in-*, not + *transigere*, to make a settlement, from *trans*, across + *agere*, to act). A term applied in European politics during the last half century to any ultraradical element. In Spain the name was given to a party of Red Republicans and Socialists who, after the declaration of the Republic in 1873, attempted to divide up the country into cantons and to introduce a communistic régime. They held Carthagena for six months against the government, but were put down by the dictator Castelar and General Dominguez. The term had been used in France before this at the time of the Commune. *L'Intransigeant* is a newspaper established in Paris by Henri Rochefort (q.v.), the famous Radical politician.

INTRENCHED CAMPS. See FORTIFICATION.

INTRENCH'MENT (from *intrench*, from *in-* + *trench*, from OF. *trencher*, *trancher*, Fr. *trancher*, to cut, from Lat. *truncare*, to lop, from *truncus*, trunk, from *truncus*, OLat. *troncus*, maimed). Any form of constructive defense work by which soldiers strengthen a position or fortify it against an enemy. See FORTIFICATION; TRENCH, MILITARY.

INTRODUCED SPECIES. Animals and plants brought into a country from a foreign land by the agency of man. In the settlement of North America from the Old World scores of species of plants, mostly noxious weeds, and hundreds of species of animals, largely parasitic or destructive to agriculture, have been introduced. Among plants, chicory, wild garlic, and the water hyacinth of Florida are examples of the great spread of introduced species. Domesticated animals may escape from captivity and become noxious. The wild pigs of our Southern States and the Galapagos Islands are examples. Goats have become wild in many places and have wrought great destruction. Thus the island of St. Helena, which is now a barren rocky desert, was formerly clad with forests. The change has been brought about in four centuries by goats. Cats that have become wild on islands have in many cases exterminated species of birds there. Rats and mice, in some cases previously imported from Asia, have been introduced into America from Europe and have spread everywhere, exterminating native species and conquering one another.

The European rabbit was introduced into Australia in 1864 for sporting purposes. By 1879 legislatures were enacting laws for its destruction, and recently an important industry has arisen in rabbit skins and canned rabbit meat. The setting free of Belgian hares in America is attended with dangers. (See RABBIT.) The mongoose of India was introduced into Jamaica in 1872 to rid the island of rats, whose depredations caused an annual loss of $500,000. In 1882 the mongoose had caused such a diminution in the rats that the annual loss from rats was reckoned at about one-half the former amount; but the mongoose multiplied, and domestic animals and barnyard fowls were destroyed by it in vast numbers; next native vertebrates fell a prey, also bananas and other fruits. About 1890 the mongoose became recognized as the worst pest of the island and as doing vastly more harm than good. Of late years, however, the depredations of the animal have begun to diminish. (See MONGOOSE.) Other examples of imported animals which have wrought untold damage might be cited at great length. The English sparrow, the cabbage butterfly, the Hessian fly, the gypsy moth (in Massachusetts) are familiar examples elsewhere described in detail. The reason why introduced animals thrive to so extraordinarily a degree is because they are removed from their natural enemies, and those that might keep them down have not learned to do so. Usually, in time, enemies are acquired, as they have been by the English sparrow, and thus the balance in nature is restored. Consult Palmer, "The Danger of Introducing Noxious Animals and Birds," in *Year Book of Department of Agriculture* (Washington, 1898). See ACCLIMATIZATION; ISOLATION.

IN'TRODUC'TION (Lat. *introductio*, a leading in, from *introducere*, to lead in, from *intro*, within + *ducere*, to lead). In instrumental music, a shorter movement preceding the composition proper. According to the character and

length of the composition the introduction may be shorter or longer. In a polonaise, waltz, etc., the introduction generally consists of only a few bars. In works written in sonata form the introduction can assume great dimensions, as in Beethoven's *Second* and *Seventh Symphonies*. The thematic material upon which the introduction is built may be entirely original and independent of any themes in the following principal movement, as in the case of the two Beethoven symphonies. Then again the introduction may be constructed upon themes of the movement proper, as in the case of Schumann's *First Symphony*. As the introduction is invariably in a slow tempo, the themes of the allegro appear almost invariably in augmentation when used in the introduction. But it is by no means obligatory to begin every longer composition with an introduction. Of Beethoven's symphonies the third, fifth, sixth, eighth, and ninth begin without any introduction.

In dramatic music the term "introduction" has several meanings. In the older operas, which were divided into *numbers*, the introduction was the second number. It followed the overture and generally was a short instrumental passage leading into the opening chorus. But even Gluck sometimes united the overture with the introduction. Some operas have no overture, but only an introduction of greater or less extent. Such works as Verdi's *Otello* or *Falstaff* have, properly speaking, not even an introduction. Beginning with *Lohengrin*, Wagner abandoned the form of the overture and substituted an introduction which he usually calls "Vorspiel" (q.v.), although in *Tristan und Isolde* he employs the term "Einleitung." Besides the principal introduction at the beginning of his dramatic works, Wagner generally opens every act with an introduction of some length.

INTRO'IT (Lat. *introitus*, entrance). An antiphon sung or said at the beginning of the mass, varying with the season or festival. After the antiphon proper comes a verse from the Psalms, followed (except in requiem masses and in Passiontide) by the Gloria Patri and the repetition of the antiphon. By the Vatican Gradual of 1908 it is to be sung during the procession from the sacristy to the altar, and then read from the missal by the celebrant. The opening words of the introit are commonly used in ecclesiastical terminology to designate the proper mass of the day, and certain Sundays are even popularly known in the same way, as *Gaudete*, *Lætare*, *Quasimodo* Sunday, etc. This practice is very usual in mediæval documents and authors.

IN'TROMIS'SION (ML. *intromissio*, from Lat. *intromittere*, to send within, from *intro*, within + *mittere*, to send). In Scots law, the assumption of legal authority to deal with another's property. It is divided into legal and vicious intromission. Legal intromission is where the party is expressly or impliedly authorized, either by judgment or deed, to assume the management and control of another person's estate. Vicious intromission is where a person without legal authority interferes with a deceased person's estate, as by assuming to act as heir or as executor of a will. Such acts constitute a usurpation, but have a certain qualified validity and cannot be impeached collaterally. They correspond to the acts of an executor *de son tort* of English and American law. See EXECUTOR.

IN'TROSPEC'TION (from Lat. *introspicere*, to look within, from *intro*, within + *spicere*, *specere*, to look; connected with Gk. σκέπτεσθαι, *skeptesthai*, Skt. *spaś*, *paś*, to look, OHG. *spehōn*, Ger. *spähen*, to spy). The specific method of psychology, as observation or inspection is the specific method of physical science; also termed SELF-OBSERVATION or "INNER PERCEPTION." The three names are characteristic of three different attitudes towards the study of mental phenomena, which we may term the rationalistic, the empirical, and the experimental. (1) Kant declared that a science of mind is impossible, for the reason, among others, that the method of psychology is impracticable: self-observation implies a change of the very facts which we desire to observe. If self-observation were, literally, the method of psychology, Kant's objection would be valid: there could be no ascertainment of mental uniformities, no science of mind; the more attentive the observer and the more systematic his use of the method, the scantier would be his harvest of facts; speculation would have free play. Hence the empirical school (2) substituted for self-observation the method—or, rather, the unmethodical employment—of inner perception (*innere Wahrnehmung*). Observation is planned and prepared for; perception, the noting of events and conditions as they appear, is a matter of happy accident. Now inner states and processes can be perceived or noted as well as outer; there is no self-contradiction involved in the phrase "inner perception"; but, at the same time, the loss of the plan and system implied by the term "observation" is a serious handicap to a science and must lead to inadequacy both of description and of theory. We find, accordingly, that the introspection or inner perception of the empirical psychologists has no claim to rank as a true scientific method. It makes the cardinal mistake of considering merely the most obvious aspect of mind—its cognitive function; it views mental processes always through the glass of meaning, of logical import; it tells us what mental events stand for, but not what they are. We should gain little knowledge of the anatomy of our bodies by a superficial cataloguing of the bodily functions as they are apparent in the occurrences of everyday life; indeed, we might go sadly astray in our attempt to translate function into the unknown language of structure. The same thing holds of mind as interpreted by the method of inner perception. (*a*) In the first place the method leads to an overemphasis of what James has called the "substantive" factors in the stream of thought and to an underemphasis of the "transitive" parts. We read of images and ideas and representations, but the "fringes" of these psychical entities, the elusive and yet essential processes which Spencer (still in logical terms) has denominated "feelings of relation," are left entirely out of account. The result of this error is that mind is pictured as if composed of discrete and sharply separable terms (the "sensations" or "ideas" which correspond to the simplest "bits of knowledge"), instead of being presented as what it really is, a shifting continuum, a tangle of ever-moving and ever-changing processes. (*b*) A second mistake to which inner perception is liable is that which has been called par excellence the "psychologist's fallacy." The psychologist is tempted to read himself, his own knowledge and attitude, into the mental process or group of mental processes

which he is considering. Instead of taking the mental stuff as it is, in the incompleteness and abstractness which are conditioned upon its detachment from context, he rounds it off and supplements it by his outside knowledge of this context. He is thus tempted into a twofold error. On the one hand—misled by the poverty of language, which ordinarily names a perception or idea by naming the object to which it refers, no matter what the mode or character of this reference may be—he is easily brought "to suppose that the thought, which is of the object, knows it in the same way in which he knows it, although this is often very far from being the case." On the other hand, since he is himself familiar with all the relations in which the given mental process stands, he is apt to read an awareness of these relations into the process; he makes the process conscious of itself as he is conscious of it. The result is that we are furnished not with a description, but with a logical construction of mind; while, as there is no appeal from the logical construction to the facts, empirical psychology is full of quasi-logical controversies, that are not only long drawn out, but are in the nature of things incapable of psychological termination.

(3) We arrive at introspection proper only when we reach the point at which the experimental method is introduced into psychology. (See PSYCHOLOGY, EXPERIMENTAL.) This does not mean that there was no valid introspection before there was experiment; men are often better than their methods. Nor does it mean that all the results of experimental research are the fruits of an unimpeachable introspection; methods may be better than the men who use them. It means that, with the advent of experimental control, psychology was able to combine the attitude of inner perception with the plan and system of self-observation, and that this science thus acquired a method which is as accurate and reliable in principle as are the methods of the physical sciences. Experiment enables us so to regulate external conditions that a determinate mental occurrence may be induced at a determinate moment of time; it enables us, further, to prevent any modification of consciousness save by the occurrence under investigation. Given a state of concentrated attention (q.v.) on the part of the observer, the requisite degree of practice, and an adequate command of language wherewith to report the experience (see DISCRIMINATION, SENSIBLE), and there is no reason why a psychological introspection may not be as exact as an observation in chemistry or physics. The sole difference between inspection and introspection lies, in fact, in the determination (see DETERMINING TENDENCY) of the observer. And since, with practice, the psychological determination becomes habitual and unconscious, introspection need not itself be a mental process; so that there is no ground for the Kantian objection that it alters the process to be observed, as there is none either for the objection that introspection must always be retrospection, and is therefore exposed to the illusions of memory. Feeling (q.v.), it is true, appears to offer special difficulties to introspection, since it cannot be made the direct object of attention. But recent work has shown that, under the determination to report upon feeling, we may give attention to the sensory aspect of the situation, and that the feelings aroused will then touch off relevant reports.

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INTRU'SION (ML. *intrusio*, from Lat. *intrudere*, to thrust in, from *in*, in + *trudere*, to thrust; connected with OChurch Slav. *truzdati*, to torment, and probably with Goth. *þriartan*, AS. *þrēotan*, OHG. *-driozan*, Ger. *-driessen*, to vex). In English law, an unlawful entry upon a freehold estate, not at the time in the actual seisin of the rightful owner, and with the view of ousting him of his estate. It could be effected in the interval between the death of a tenant in fee and the actual entry of the heir, or between the death of a tenant for life and the entry of the remainderman. Though not technically classed as a disseisin (q.v.), it had similar effects, vesting the seisin and title in the intruder. The usual remedy for an intrusion was by a writ of entry. The distinction between the several kinds of ouster (q.v.), dependent upon the time or manner in which it was effected, has generally been abolished in England and the United States, and the whole subject comprehended under the description of adverse possession and disseisin. In Scots law the term is employed in a looser sense to describe a trespass upon lands. See ADVERSE POSSESSION; DISSEISIN.

IN'TUBA'TION. The passage of a tube into the larynx between the vocal cords to keep the air passages open in cases of diphtheria, stricture, or other obstruction. The tubes used are those invented by Dr. Joseph O'Dwyer in 1883 and are made in graduated sizes for children of different ages. They are from 1½ to 3 inches long, with a flattened upper extremity to prevent slipping down beyond the larynx, an accident which is further guarded against by the fusiform shape of the tube. A special instrument is employed to introduce the tubes, and another similar device, an extractor, is used to withdraw them. The child is held during the procedure either in the upright or recumbent position. See TRACHEOTOMY.

IN'TUI'TION. See INSTINCT.

IN'TUI'TIONISM, or **IN'TUI'TIONALISM** (from *intuition*, from ML. *intuitio*, immediate cognition, from Lat. *intueri*, to look at, from *in*, in + *tueri*, to look). The name of the theory that our knowledge of at least some fundamental principles, whether of metaphysics or of ethics, is due to the fact that they present themselves to us as true in their own right and therefore need no proof of any sort. The view supposes that we have certain faculties for the immediate apprehension of these principles: we merely have to look at the statement of these principles to see that they are true; thus, our intellect is supposed immediately to apprehend the truth that two and two are four, and our conscience the truth that theft is wrong, or that action prompted by benevolence is better than action prompted by sensual appetites. In

ethics intuitionism is also used to designate the view that not only general principles are immediately apprehended, but the rightness or wrongness of each particular act. These views fail to recognize the fact that an unreasoned assurance of a truth may be the psychological outcome of forgotten processes of reasoning. See INDUCTION; KNOWLEDGE, THEORY OF.

IN'TUSSUSCEP'TION (from Lat. *intus*, within + *susceptio*, a taking up, from *suscipere*, to take up, from *sub*, under + *capere*, to take), or INVAGINATION OF THE INTESTINES. A displacement of a portion of the intestine into the part immediately below, just as the finger of a glove may be partly drawn within itself when the hand is withdrawn. This is a common form of intestinal obstruction occurring most frequently in infants and young children. The exciting *cause* is usually some irritant bringing about irregular and exaggerated intestinal peristalsis. Injudicious diet, the careless use of cathartics, and the presence of intestinal polyps are the common causative factors. The *pathological conditions* present are the invagination mentioned above, and more or less inflammation in the affected part of the intestine. The commonest site of the lesion is at the junction of the small and the large intestines. The involved portion of the intestine may measure anywhere from a few inches to as many feet. Unless promptly treated, death usually results in a short time from gangrene of the intestine, perforation, and general peritonitis. In adults the invaginated portion of the intestine may become gangrenous, separated, and passed per rectum. Such a termination is frequently followed by the formation of a contracting scar, resulting in a chronic form of obstruction. The symptoms are: violent abdominal pain, rather sudden in its onset; vomiting of stomach contents and of biliary and fæcal matter; abdominal distention; the passage of bloody mucous per rectum; collapse; normal or subnormal temperature. Palpation reveals the presence of a tumor, described as "sausage-shaped"; by rectal examination the invaginated gut may in some cases be felt with the finger, or it may even protrude through the anal orifice. The *treatment* is purely surgical and should be prompt. A laparotomy is performed and the intestinal displacement corrected. The prognosis is not at all bad in cases operated on early. In neglected cases the disease is almost invariably fatal.

INTUSSUSCEPTION. A term applied by plant physiologists to that type of growth in which the new particles are laid down between the old particles that compose the cells or cell organs. It is used as the counterpart to growth by "apposition," in which the new particles are laid down on the outside of the growing structure. The first type was once supposed to distinguish growth in the organism from increment of nonliving bodies, but the distinction lacks validity. Growth of the starch grain or the cell wall in thickness is largely by apposition, while intussusception seems to play an important part in the growth of the protoplasm and of cell walls in area.

INULASE. See DIGESTION IN PLANTS.

IN'ULIN. A group of polysaccharides, displacing starch as important storage materials in the underground organs of many Compositæ, Campanulaceæ, and representatives of several other families of plants. It is especially abundant in *Inula helenium*, *Helianthus tuberosus*, *Anacyclus officinarum*, *Arctium lappa*, and other species. Inulin forms a white powder similar in appearance to starch, but differing from it in certain important respects. It exists in cells as colloidal solutions, readily transformed to spherocrystals by the addition of absolute alcohol or glycerin. Upon hydrolysis by inulase or acid it produces *d*-levulose. It stains brown with iodine.

IN'UNDA'TION (Lat. *inundatio*, from *inundare*, to overflow, from *in*, in + *undare*, to rise in waves, from *unda*, wave; connected with OHG. *undea*, *unda*, AS. *ȳþ*, wave). Many large areas of low ground near rivers or the ocean are in danger of inundation from various causes. Of these inundations the most common, and probably also the most destructive, are the river floods that result from unusual rains or melting snows. Most rivers are subjected to rising and falling by these causes, and those that flow through flood plains or deltas may rise and overflow the bordering plains. The best-known instance of such river flooding is supplied by the Nile, which makes possible the existence of millions of people on the Nile oasis in the broad African desert. The rising of the waters begins in June in the lower Nile, the accumulation having taken weeks to flow down the river channel from the upper waters. It continues till September, and at Cairo the water reaches a height of 25 feet above the normal river level. A vast tract of flood plain and delta is inundated, and this water makes agriculture possible in the desert and is the basis upon which the ancient Egyptian agriculture was founded. The sediment deposited by the floods fertilizes the land and is raising the level of the flood plain at a rate of over four inches a century.

The Mississippi also supplies an illustration of great river floods. An area of 30,000 square miles, inhabited by 1,000,000 people, is liable to floods. Low natural embankments, built by the floods and called natural levees, keep the river in its channel, excepting during very high water; and levees added by man are built from the Gulf to Cairo in the effort to hold the extraordinary floods. But even these artificial levees are sometimes ineffective. Crevasses 50 to 500 feet wide break through the levees, and a vast area is inundated. These great floods come usually between February and May and are caused by the coincidence of heavy rains or rapidly melting snows, or both, in the Missouri, Mississippi, and Ohio valleys. During the great floods the discharge of the Mississippi reaches 2,000,000 cubic feet per second and is far in excess of the capacity of the channel. The water level then rises 40 or 50 feet, and great destruction of life and property results. Great inundations by the Mississippi are recorded in 1828, 1844, 1849, 1850, 1853, 1859, 1863, 1867, 1870, 1874, 1882, 1884, 1890, 1892, 1893, 1897, 1903, and 1912. In the flood of March and April, 1912, the water spread over an area of 15,000 square miles and inflicted damage to the extent of $45,000,000. See MISSISSIPPI RIVER and accompanying bibliography.

The most disastrous flood that has befallen the United States occurred in the Ohio valley during the last of March and the first part of April, 1913. It was brought about by the excessive rainfall in northern Indiana and Ohio, which amounted to from 6 to 10 inches in a period of five days. The damage to property was reckoned at about $180,000,000 and the loss of

life at 415. Dayton, Ohio, was nearly destroyed by the rush of waters.

The Hoang-ho of China flows out of its mountainous course over a low alluvial fan delta which is rapidly growing out into the sea. The town of Putai, which was on the seacoast about 2000 years ago, is now over 40 miles inland. Not only is the alluvial fan delta growing outward, but upward, and when the river bed is built up above the level of the surrounding plain the course of the stream becomes exceedingly unstable and liable to shifting in time of flood. The river then sometimes bursts through levees fully 70 feet high, erected more than half a mile from the banks. It has shifted its course nine times in 2500 years, laying waste a region as large as Great Britain. Its mouth has changed position fully 200 miles by these shiftings. In the flood of 1887, which covered an area of 50,000 square miles, densely populated, 1,000,000 people were drowned, and still more lives were lost by the famine and disease that followed the disaster. The river has been used as a weapon of war as far back as the year 1209. Hundreds of thousands of people have thus been drowned by the turning of the river floods against them. Smaller river floods are of common occurrence and are frequently caused by ice jams, which form a temporary dam and hold the water back. The bursting of the dams of artificial ponds and lakes also causes destructive floods.

Inundations of the sea are far less widespread than those of rivers, because some coasts are too high, and others are not frequently visited by high sea or "tidal waves." The great number of river lowlands and the frequency of the causes of a rise in the river water make these river floods more general than those of the sea. But where low coasts are exposed to inundations of the sea, the results are terribly destructive, especially since the lowland coasts are usually densely populated. There are various causes of inundations by the sea; the simplest are illustrated by those countries which are actually below the level of the highest tides and are protected from inundation by sand-dune hills and dikes. The Netherlands offer the best illustration. This plain is the delta of the Rhine and Meuse and is open to floods from river and ocean, and parts of it lie well below the level of the sea. At various times the dikes, which were formerly less solidly constructed than at present, have given way, and large tracts have been submerged, causing a vast destruction of life and property. For example, in 1421 a flood destroyed 72 villages, and 100,000 people perished. During the Spanish wars the people voluntarily admitted the sea to protect their cities from the attacks of the Spaniards.

Even dry land several feet above sea level is subject to inundations by the sea when there is some unusual rise in the water, commonly called a "tidal wave," doubtless because it reaches its greatest height at high tide. The lowlands of the Netherlands, Denmark, and England have suffered from such floods when high winds have driven water upon the shore and piled it up at periods of unusually high tide. At such times the surface of the sea may rise 10 or 15 feet higher than the normal reach of the high tide. The West Indies, the Gulf coast, and the coast of the Middle Atlantic States are subject to such inundations during the passage of the fierce tropical hurricanes. The flooding is experienced even as far north as New York and Boston; and the destruction at Galveston, Sept. 8, 1900, when thousands of lives were lost, was due to the passage of one of these hurricanes. The Sea Islands on the Georgia coast are occasionally flooded during these storms, and any low point along the coast south of New York is liable to such "tidal waves" at any time, but especially in August and the autumn months, when tropical hurricanes develop most commonly. High water followed the hurricane of Sept. 3–12, 1889, all the way from the West Indies to New Jersey. The rise in the level of the ocean during the passage of these storms is due to the combination of ordinary tides with the effect of the steady violent winds which drift the water before them and pile it up on the shelving shore. As illustrated in Galveston, this wave rises over ordinarily habitable land, undermining houses, and thus aiding in the destruction done by the winds themselves and the waves which these winds raise on the surface of the sea.

Far greater destruction of life is accomplished in the Pacific than in the Atlantic by these tropical storms, there called typhoons. The sea wave washes over low coral atolls. In the case of the Samoan hurricane of March 15, 1889, a typhoon washed ashore 21 vessels that were anchored in the harbor of Apia. Some 150 of the sailors on these vessels were drowned, and only two of the ships that were in the harbor were afloat after the hurricane. Typhoon waves advance on the low delta coasts of India and southern China. There has been case after case of destruction of life to the number of many thousands in the delta lowlands of Asia; and in at least one case, in 1876, it is estimated that 150,000 people were killed by such an inundation in the delta of the Ganges and Brahmaputra.

Finally, sea waves generated by earthquake shocks may inundate coastal lands. These, again, are best illustrated on the low, densely populated coasts of Asia, where earthquake shocks are numerous. The earthquake wave, caused by a jar along the seashore or on the sea bottom, disturbs the entire sea from surface to bottom. The wave is dome-shaped, though not very high, perhaps not over an inch or two. But it is so deep and broad that, advancing over the shallowing bottom towards the shore, it grows higher and higher, perhaps reaching a height of 100 feet. The wave rushes over the land with terrible force and destructiveness. The earthquake which destroyed Lisbon in 1755 was accompanied by a prodigious tidal wave. By the earthquake wave caused in 1883 during the eruption of Krakatoa in the Strait of Sunda, a water wave was generated which rose from 50 to 80 feet, upon the neighboring lowlands, drowning thousands of people, and carrying a large vessel inland a distance of a mile and a half, leaving it stranded 30 feet above sea level. By an earthquake wave, June 15, 1896, a part of the coast of Japan was devastated for a distance of 175 miles, 27,000 lives were lost, and 60,000 people made homeless. The Messina earthquake of 1908 was accompanied by waves which reached a height of 30 feet and submerged the low-lying portions of the coasts of Sicily and Italy. See EARTHQUAKE.

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IN'UUS. See MACAQUE.

INVAGINATION OF THE INTESTINES. See INTUSSUSCEPTION.

INVALIDES, ăn'vå'lêd', LES (Fr., invalids). Wounded veterans of the French army, maintained at the expense of the state. The Hôtel des Invalides is an establishment in Paris where a number of these old soldiers are quartered. The institution was founded by Louis XIV in 1670. In 1811 it was reorganized; in 1832 its property was alienated and the institution made a charge upon the annual budget. The hôtel can accommodate 6000 men, but the actual number of inmates is now much smaller. The buildings of the Invalides comprise the hôtel proper, the chapel, and the dome. The hôtel is an immense edifice of many courts and wings, grandiose in plan but commonplace in detail, the work of Levau and Bruand. A considerable part of the ground story is devoted to the unsurpassed National Museum of Artillery and an Historic Museum, chiefly military, and certain other portions to various services of the Ministry of War. Through the vast central court, entered from the Place des Invalides through a lofty portal of ineffective design, one passes to the chapel of St. Louis, by Levau and J. H. Mansart. This is a dignified but cheerless edifice, in three aisles with galleries, vaulted in stone and hung with battle flags. Mass was formerly celebrated here daily with military pomp by such of the Invalides as were able to attend. Beyond and built against it, and fronting south, is the Dome des Invalides, built by J. H. Mansart in 1693 as a royal sepulchral chapel, the finest domed edifice in France. Over the intersection of the arms of a Greek-cross plan inscribed in a square, rises the central dome, about 70 feet in diameter. This is built in three shells—an inner shell of stone with a large oculus, an intermediate shell of stone, and an outer shell of wood covered with lead, surmounted by a spirelike lantern. In 1861 the remains of Napoleon Bonaparte were transferred to the crypt of the dome (remodeled for this purpose by Isabelle and Visconti), and laid in a sarcophagus of porphyry. A circular opening in the floor of the crossing exposes the tomb to view.

IN'VALIDING (from *invalid*, Fr. *invalide*, invalid, from Lat. *invalidus*, not strong, from *in-*, not + *validus*, strong, from *valere*, to be strong). In military phraseology a soldier is said to be invalided when he is sent home from abroad, as a result of climate, wounds, or other causes rendering him unfit for duty. In the United States he would be sent to a general hospital (see HOSPITAL), where it would be decided whether he remained in the army or be returned to civil life. English soldiers are sent to Netley Hospital for similar treatment and final disposition.

INVAR, ĭn-vâr'. An alloy of nickel, 36 per cent, and steel, with 0.2 per cent of carbon, discovered by C. E. Guillaume, of the International Bureau of Weights and Measures, near Paris, useful in instruments for exact measurement and other scientific work, on account of its low coefficient of linear expansion practically negligible for most purposes. This alloy has found application for wires and tapes used in geodesy for the measurement of base lines with a high degree of accuracy, and also in the form of bars for standards of length and for comparators and similar instruments of precision. In the United States Coast Survey invar tapes have been used since 1905 with considerable success, as they permit of the rapid and economical measurement of base lines with greater accuracy than with the steel tapes or bars previously employed. These tapes resemble nickel rather than steel in their appearance, being soft, bending easily, and being much less elastic than steel. They do not oxidize as readily, and, while their tensile strength is less than steel, it is greater than is necessary for the measurement of base lines. The coefficient of expansion per unit length per degree Centigrade, in the specimen tested by the United States Geological Survey, varied from 0.000,000,37 to 0.000,000,44 as compared with 0.000,011,4 for a steel tape of similar use. See GEODESY.

Bibliography. Consult: C. E. Guillaume, *Recherches sur le nickel et ses alliages* (Paris, 1898); id., *Les applications des aciers au nickel* (ib., 1904); O. B. French, "Six Primary Bases Measured with Steel and Invar Tapes," in United States Coast and Geodetic Survey, *Report for 1907*, Appendix No. 4 (Washington, 1908).

INVA'RIABLE PLANE. In the solar system, a plane about which the planets' orbits perpetually oscillate, deviating from it only to a very small extent on either side. This plane passes through the centre of gravity of the solar system and is so situated that if all the planets be projected on it, and if the mass of each planet be multiplied into the area which is described by the planet's projected radius vector in any assumed unit of time, the sum of such products will be a maximum. The most recent determination of the position of the invariable plane is that of See, who finds that the inclination to the ecliptic, and the longitude of the ascending node, are 1.5855° and 106.1463° (epoch 1850), respectively. Such a plane is not peculiar to the solar system, but must exist in all systems where the bodies are acted on by their mutual attraction only. Consult Grant, *History of Physical Astronomy* (London, 1852).

INVA'RIANT. See FORMS.

INVAR TAPES AND WIRES. See GEODESY; INVAR.

INVA'SION (Lat. *invasio*, attack, from *invadere*, to invade, from *in*, in + *vadere*, to go, connected with OHG. *watan*, Ger. *waten*, AS. *wadan*, Eng. *wade*). The act of entry into an enemy's territory as an act of war. In ancient and mediæval times, when an army invaded a country, pillage, devastation, and slaughter were the rule. It was not until the War of the Spanish Succession that Marlborough and Villars, by a system of contribution, introduced comparative humanity into the conduct of armies. The Prussians and Austrians during the wars of Frederick the Great were generally dependent upon regularly levied supplies. During

the Revolutionary War the British government declared it to be a right of war: (1) to demand provisions and raise contributions, enforceable, if necessary, by the sword; (2) to ravage territory where there was no other way to bring an enemy to engagement or terms; (3) to treat all rebels as enemies. The right to ravage has not been asserted or acted upon since by either country, except in the case of the burning of the capitol and other buildings at Washington by the British in 1814, which was an unjustifiable violation of the laws of war. Napoleon enforced the principle that war must pay for war, and after the battle of Jena the exaction required of Prussia was more than 100,000,000 francs. The levy of 5,000,000,000 francs on France by Prussia at the end of the Franco-Prussian War in 1870 was the price paid to the invaders. The violation of the neutrality of Belgium by Germany in 1914 (see WAR IN EUROPE) aroused the strongest indignation all over the world and led to the entrance of Great Britain into the conflict.

The rights of an invader in the country occupied by him are important, but these rights of belligerent occupation, which are confined to the districts actually dominated by the invading force, must be carefully distinguished from those of conquest. The invaders' military rule in general supersedes the civil authority. In relation to property a sharp distinction must be drawn between public and private property. As to the former also the invader's rights are held to differ with its character. Thus the contents of the Palatine libraries were carried off to Rome during the Thirty Years' War, and Napoleon filled the Louvre galleries from every capital of Europe; but the rule is now well established that public money, military stores, and public buildings are lawful sources of plunder; public estates may be occupied, and the rents and profits therefrom appropriated; telegraph and railway property pressed into service, and public edifices interfering with military operations destroyed; but property not contributing to the uses of war must remain intact. The removal by the Germans of the astronomical instruments from the Observatory of Peking during the recent expedition of the allies against the Chinese capital was a violation of this rule.

The attitude of an invader towards private persons and property has been clearly defined by international law. Pillage is strictly forbidden. Private persons taking no part in the conflict are to remain unmolested, but inhabitants of an invaded district aiding their country forfeit protection and are subject to military execution, though the interests of humanity are conserved by this distinction between soldier and noncombatant. Property movable and immovable is to remain uninjured. If needed by the hostile army, the invading general may require its sale at prices fixed by himself, or even on occasions require their contribution without payment; but marauding must be checked by discipline and penalties. Such forced contributions of food, forage, labor, wagons, railroad rolling stock, or other means of transportation are called requisitions. See CONTRIBUTION; CONQUEST; and also INTERNATIONAL LAW and the authorities there referred to.

INVEC'TA ET ILLA'TA (Lat. nom. pl., carried in and borne in). An expression of the civil law, found also in the law of Scotland, to denote all things which a tenant has brought upon the premises, as his household furniture, tools, utensils, etc., and which are subject to the lien, or tacit mortgage, of the landlord for the rent of the premises. The English and American legal system in general recognizes no such lien, the landlord's remedies being confined to distress (q.v.) and to an action at law for the rent due.

INVECT'ED (from Lat. *invectus*, p.p. of *invehere*, to carry in, from *in*, in + *vehere*, to carry). In heraldry (q.v.), a partition line the reverse of engrailed.

INVEN'TION (Lat. *inventio*, finding out, from *invenire*, to find, from *in*, in + *venire*, to come). Literally, the act of making something not before made; also, the new thing produced. In patent law the term "invention" is specifically applied to any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, which when invented may under certain conditions be made the subject of the rights of a letter patent. In Great Britain the patent law expressly restricts such inventions to a "new manufacture," but the courts have construed this term so that it includes the four classes of inventions above named. Although it has been held that in the patent law "discovery" and "invention" are synonymous, in popular language and generally in legal literature the term "invention" has come to be used to designate a "patentable" invention or one that is "new" and useful.

To constitute an invention in this sense there must be a creating or origination of some useful thing that did not exist before, by means of an operation of the intellect. The extent of research and the simplicity or complexity of the result are of no importance, if the invention be new and useful and be something more than a construction following the beaten track of mechanical experience. Neither is any distinction made as to degree of usefulness or the amount of mechanical skill involved in the construction or making of the invention, so long as the usefulness or skill be not so slight as to make it negligible. It is no objection that the inventor was aided or assisted by ideas derived from others, so long as the final concrete product be something more and distinct from any one or all of these ideas or suggestions. The difficulty in drawing the line as to what is and what is not an invention is great. Mere simplicity is no objection and, indeed, may constitute the real excellence and newness of the invention. Neither is the use or application of old devices or machines an objection, for most patents are issued upon inventions based partly upon preexisting inventions. A mere advance or extended application of an original invention, changed only in degree and doing substantially the same thing in the same way by the same means, but with better results, is not an invention. There must be a new idea grafted upon the old invention. By reason of the difficulty here referred to the law is liberally applied to protect everything that might be properly called new and useful. See PATENT, and consult the authorities there referred to.

INVENTION. A musical term applied by J. S. Bach to a collection of 15 short piano pieces for two voices. In the very verbose title of the original edition Bach explains that he uses the term in the sense of "musical idea" or "theme," and that the object of the pieces is to show a proper development after the theme has once

been "invented." The term has never been used by any other composer, nor again by Bach himself, who gave to a collection of 15 other pieces, identical in character and development, but for three voices, the title *Sinfonien*.

INVENTION OF THE CROSS. See CROSS, INVENTION OF THE.

IN'VENTORY (from Lat. *inventarium*, list, from Lat. *invenire*, to find, from *in*, in + *venire*, to come; connected with Gk. *βαίνειν*, *bainein*, Skt. *gam*, to go, and ultimately with Eng. *come*). A written instrument setting forth in the form of a systematic schedule all the goods, chattels, and other personal property of a person or estate, whether for use in a legal proceeding or for ordinary commercial purposes. The term and the legal practice connected with its use originated in the reform of the Roman law instituted by Justinian to relieve the heir of a deceased person from his personal liability. In order to relieve the heir, and at the same time to protect creditors and legatees, a law was enacted under which the heir was relieved of all liability for the debts and legacies of his ancestor, excepting in so far as the property inherited by him would enable him to discharge the same, provided that within a certain time he should duly prepare and file a written instrument containing a correct enumeration of all property, real and personal, left by the deceased. See HEIR.

Until about two centuries after the Norman Conquest the identification of heir and ancestor was as complete under the English law as it had been under the Roman. About that time, partly through the influence of the Roman law, the heir's liability was limited to the amount of property descending to him; executors or administrators superseded him for the purpose of administration of his ancestor's personal estate, and the Roman practice of making an inventory of the assets of the estate was introduced. This plan was probably adopted more for the practical advantage of compelling the personal representatives of the deceased to commit themselves at the outset as to the amount and character of property coming into their hands, than as a means of relieving the heir from liability, as that reform had apparently already been accomplished. The ecclesiastical courts assumed jurisdiction of estates, and inventories of the personal property were required to be filed in these courts, where they were open to the inspection of all persons interested therein. This practice is substantially followed to-day. The inventory usually contains a list of all the personal property of the decedent, with the appraised value set opposite each item, as well as a schedule of his debts and liabilities, the executor or administrator certifying by oath or affirmation that the whole is true to the best of his knowledge and belief. It is filed in the court having jurisdiction of decedents' estates and may be examined by the heirs, next of kin, legatees, and creditors of the deceased, who may object to it if anything is omitted or improperly entered. After the inventory is filed, the executor or administrator becomes accountable for the disposition or distribution of every item set forth therein, and it is therefore a most efficient means of insuring the honest administration of estates.

The term "inventory" is also properly employed to designate the lists of assets prepared by the trustees of bankrupts' or insolvents' estates, and by guardians of infants or other legally incompetent persons, for the information of the court having jurisdiction over them and for the more convenient discharge of their fiduciary duties. See ESTATE; EXECUTOR.

IN'VERA'RAY. A royal and municipal borough, the county town of Argyllshire, Scotland, at the mouth of the Aray in Loch Fyne, 45 miles northwest of Glasgow (Map: Scotland, C 3). An obelisk commemorates the death of 17 Campbells, who were hanged here without trial, in 1685, for their adherence to Presbyterianism. Inveraray Castle, the seat of the dukes of Argyll, is close to the town. Fishing for herring is the chief occupation. Pop., 1901, 678; 1911, 533.

IN'VERCAR'GILL. The capital of the County of Southland, South Island, New Zealand, on an estuary called the New River Harbour, 17 miles from its port at the Bluff (Map: New Zealand, South I., B 7). New River Harbour at the town takes vessels drawing 10 feet. The Bluff has a good harbor, with wharfage for vessels of any tonnage, and is a port of call for the Melbourne and New Zealand mail steamers. The Bluff is 150 miles southwest of Dunedin, with which it is connected by rail. Its industries include numerous woolen mills, saw mills, flour mills, breweries, and meat-refrigerating establishments. It is the centre of a large agricultural and cattle-raising country, and a large export trade has grown up in wool, timber, and grain. The town is well built on a rectangular plan, has government buildings and a hospital. It is lighted by gas and has street tramways. The first settlement of Invercargill was begun in 1857. Pop., 1901, 9950; 1911, 12,782, (with suburbs) 15,858.

INVERLOCHY, ĭn'vĕr-lŏK'ê. A castle in Inverness-shire, near which, on Feb. 2, 1645, an army of about 2000 under Sir Duncan Campbell was routed and for the most part cut to pieces by an army numbering scarcely 1500 under the Marquis of Montrose (q.v.). The castle is now in ruins. Consult Gardiner, *History of the Great Civil War*, vol. ii (London, 1886–91). See GRAHAM, JAMES.

IN'VERNESS'. A town in Inverness Co., Cape Breton Island, Nova Scotia, Canada, situated on Big River and on the line of the Inverness Railway and Coal Company, about 150 miles by rail from Sydney and 61 miles by rail from Point Tupper. The colliery of the Inverness Railway and Coal Company is situated here. Copper, gypsum, and fire clay are found in the vicinity. Pop., 1911, 2719.

INVERNESS. A royal, parliamentary, and municipal burgh and seaport, the county town of Inverness-shire, Scotland, on both banks of the Ness, near its embouchure in the Moray Firth, 118 miles north of Perth. The Caledonian Canal empties into the Ness at Inverness (Map: Scotland, D 2). The town, picturesquely surrounded by wooded hills, has handsome wide streets and many beautiful residences. Its principal buildings are St. Andrews Episcopal Cathedral, the county hall, public library, observatory, infirmary, lunatic asylum, and Royal Academy. Other features are the fountain, containing the famous blach-na-cudain, long regarded as the town palladium; the suspension bridge, and the Islands promenade. It has a high school, a school of science and art, and an institute for the blind. There are iron foundries, shipbuilding yards, woolen manufactures, dis-

tilleries, tanneries, soap and candle factories, nurseries, saw mills, granite works, railway shops, breweries, and thread-making and bleaching works. The harbor, docks, and roads afford good accommodations, and a considerable trade is carried on. The town owns its own gas works. Inverness is of great antiquity, having been one of the Pictish capitals. William the Lion gave it four charters and made it a royal burgh. In 1411 it was burned by Donald of the Isles. The old castle where Macbeth murdered Duncan was razed by Malcolm Canmore, who replaced it by another which was destroyed by Prince Charles Stuart in 1746. The remains exist at the north of the town of the citadel which was built by Cromwell in 1652, and which was demolished at the Restoration. Pop., 1901, 23,075; 1911, 22,216. Consult: Mackintosh, *Invernessiana* (Inverness, 1875); Anderson, *Inverness before Railways* (ib., 1885); Grant, *The Commissariat Record of Inverness* (Edinburgh, 1897).

INVERNESS-SHIRE. The largest county of Scotland, in the northwest division (Map: Scotland, D 2). It includes several of the western islands, viz., Skye, Harris, North and South Uist, Barra, etc., and is bounded east by the counties of Aberdeen, Banff, Elgin, and Nairn; south by Perth and Argyllshire; west by the Atlantic Ocean; and north by Ross-shire and Cromarty. Area, 4211 square miles, most of which, except the valley of the Ness, is barren heath. The county consists chiefly of deer forests, which are rented as hunting ranges. It has valuable coast fisheries. Inverness, the county seat, is the only town. Pop., 1901, 90,104; 1911, 87,270. Consult J. C. Lees, *History of the County of Inverness* (Edinburgh, 1897), and *Records*, edited by Mackay and Boyd, vol. i (Aberdeen, 1911).

INVER'SION (Lat. *inversio*, from *invertere*, to turn about, from *in*, in + *vertere*, to turn). In music this term is applied to intervals, chords, and phrases or passages. An interval is said to be inverted where the position of its two notes is reversed by transposing one of them an octave higher or lower. The inversion changes the name and to some extent the character of the interval. The name or number of an inverted interval will be found by subtracting its original number from nine. Thus, a unison inverted becomes an octave, a second becomes a seventh, a third becomes a sixth, and so on, as shown in the following table of inversions:

By inversion major intervals become minor, and minor become major; diminished intervals become augmented, and augmented become diminished. But the two perfect intervals of the fourth and the fifth remain perfect when inverted. In these examples the transposed note is placed an octave higher, but naturally the same result is arrived at by transposing it downward, as will be seen by reading the table backward. For inversion of chords, see Harmony, *Chords*. For inversion of phrases or passages, see Counterpoint.

INVERSION, in Mathematics. See Circle.

INVERT'ASE (from *invert*). One of the enzymes (see Enzyme) which acts upon certain sugars, especially upon cane sugar (saccharose), which it hydrolyzes, forming grape sugar (glucose) and fruit sugar (fructose). Invertase acts most rapidly at 50° to 60° C. in a slightly acid medium. It can break up practically unlimited quantities of the sugar without being itself materially diminished. Invertase occurs in many fungi and in some bacteria; more recently it has been found widely distributed in the seed plants, in whose nutritive work it plays an important part, because cane sugar is probably one of the most widely distributed foods in the higher plants. Invertase is secreted abundantly by yeast, and without it yeast is unable to ferment cane sugar. After inversion of cane sugar the products are broken up by the enzyme zymase (q.v.). See Enzyme; Fermentation.

INVER'TEBRA'TA (Neo-Lat. nom. pl., from Lat. *in-*, not + *vertebratus*, vertebrate, from *vertebra*, joint, from *vertere*, Skt. *vart*, OChurch Slav. *vrŭtĕti*, to turn, Goth. *wairþan*, AS. *weorþan*, OHG. *werdan*, Ger. *werden*, to become). Animals which do not have a vertebral column or spine. The term is used in contrast with Vertebrata (q.v.), or animals with a backbone. One group, then, is formed on positive and the other on negative characters. Before the anatomical structure and the embryological development of animals was very generally worked out, the barrier between invertebrates and vertebrates was supposed to be absolute; but with the refinement of anatomical and embryological methods of study, brought about in a great measure by the use of the microscope, the hiatus between them is nearly bridged over. Ascidians are now considered to be degenerate ancestors of vertebrates; some of the nemertean and chætopod worms approach vertebrates in certain characters, and *Balanoglossus* and *Cephalodiscus* (q.v.) are frequently called hemichordata (see Adelochorda), because they are so near the boundary line between vertebrates and invertebrates that they can be said to be only half vertebrates. And not only has this barrier been broken down, but, with our increased knowledge, the absolute independence and isolation of many different groups of invertebrate animals which the earlier systematists believed to exist must be abandoned. The foundation of the zoölogy of these animals, as there defined, was laid by Lamarck (q.v.) in a monumental work, *Système des animaux sans vertèbres*, published in Paris in 1801; followed in 1815–22 by his *Histoire naturelle des animaux sans vertèbres*.

Bibliography. Von Siebold, *Anatomy of the Invertebrata* (Boston, 1874); Shipley, *Zoölogy of the Invertebrates* (London, 1893); Bumpus, *Laboratory Course in Invertebrate Zoölogy* (2d ed., New York, 1893); McMurrich, *Textbook of Invertebrate Morphology* (ib., 1894); Brooks, *Handbook of Invertebrate Zoölogy* (Boston, 1897); Böhmig, *Die wirbellosen Tiere*, vols. i–ii (Leipzig, 1909–11); Lang, *Handbuch der Morphologie der wirbellosen Tiere*, vols. i–iv (Jena, 1912–13); Rosalie Lulham, *Introduction to Zoölogy with Directions for Practical Work (Invertebrates)* (New York, 1913); G. A. Drew, *Laboratory Manual of Invertebrate Zoölogy* (2d ed., Philadelphia, 1913).

INVEST'ITURE (Lat. *investitura*, from *in-*

vestire, to invest, from *in*, in + *vestire*, to clothe, from *vestis*, garment; connected with Gk. *ἐννύναι*, *hennynai*, Skt. *vas*, Goth. *wasjan*, OHG., AS. *werian*, Eng. *wear*). In feudal and ecclesiastical history, the act of giving corporal possession of a manor, office, or benefice, accompanied by a certain ceremonial, such as the delivery of a branch, a banner, or an instrument of office, more or less designed to signify the power or authority which it was supposed to convey. The chief interest is in ecclesiastical investitures, and the contest which arose concerning them is so interwoven with the whole course of mediæval history that a brief account of its nature and origin is indispensable to a right understanding of many of the most important events of that period. The system of feudal tenure had become so universal that it affected even the land held by ecclesiastics, and attached to most of the higher ecclesiastical dignities, monastic as well as secular. Accordingly ecclesiastics who, in virtue of the ecclesiastical office which they held, came into possession of the lands attached to such offices, were regarded as becoming by the very fact feudatory to the suzerain of these lands; and, as a not unnatural result, the suzerains thought themselves entitled to claim, in reference to these personages, the same rights which they enjoyed over the other feudatories of their domains. Among these rights was that of granting solemn investiture. In the case of bishops, abbots, and other Church dignitaries, the form of investiture consisted in the delivery of a pastoral staff or crosier, and the placing of a ring upon the finger; and as these badges of office were emblematic—the one of spiritual care of souls, the other of the espousals, as it were, between the pastor and his church or monastery—the possession of this right by the lay princes, which they had held since the time of Charles the Great, became in the latter part of the eleventh century a source of disquietude to the Church. On the part of the suzerains it was maintained that they did not claim to grant by this rite the spiritual powers of the office, their functions being solely to grant possession of its temporalities, and of the rank thereto annexed. But the Church party urged that the ceremonial involved the granting of spiritual powers; insomuch that, in order to prevent the clergy from electing to a see when vacant, it was the practice of the emperors to take possession of the crosier and ring until it should be their own pleasure to grant investiture to their favorites. The investiture strife was complicated by the rebellions of the nobles in Germany; by the strife between rival parties in the Lombard cities; by the conflict of parties in Rome; and specifically by the question of the property of Countess Matilda of Tuscany. (See MATILDA; GERMANY; HENRY IV.) The disfavor in which the practice of investiture was held by the clergy found its most energetic expression in the person of Pope Gregory VII, who, having in the year 1074 enacted most stringent measures for the repression of simony, proceeded in 1075 to condemn, under excommunication, the practice of lay investitures, as almost necessarily connected with simony or leading to it. This prohibition, however, only regarded investiture in the objectionable form in which it was then practiced, or investiture of whatever form, when the office had been obtained simoniacally. But other members of the clergy went much further, and a pope of the same century, Urban II (1095), absolutely and entirely forbade, not alone lay investiture, but the taking of an oath of fealty to a lay suzerain by an ecclesiastic, even though holding lands of him by the ordinary feudal tenure. The contest lasted from 1075 to 1122. In the beginning of the twelfth century it assumed a new form, when Pope Paschal II actually agreed, in 1111, to surrender all the possessions with which the Church had been endowed, and which alone formed the pretext of the claim to investiture on the part of the Emperor, on condition that the Emperor Henry V give up that claim to investiture. This, however, never had any practical effect; but, the other subjects of contention being removed, the contest was finally adjusted by the celebrated Concordat of Worms in 1122, by the terms of which the Emperor agreed to give up the form of investiture with the ring and pastoral staff, to grant to the clergy the right of free elections, and to restore all the possessions of the Church of Rome which had been seized either by himself or by his father; while the Pope, on his part, consented that the election should be held in the presence of the Emperor or his representative; that investiture might be given by the Emperor, but only *by the touch of the sceptre;* and that the bishops and other Church dignitaries should faithfully discharge all the feudal duties which belonged to their fief.

For the investiture troubles in Germany, consult Mirbt, *Die Publizistik im Zeitalter Gregors VII.* (Leipzig, 1894); in England, Böhmer, *Kirche und Staat in England und in der Normandie im XI. und XII. Jahrhundert* (ib., 1899); for those in France, Ibach, *Der Kampf zwischen Papsttum und Königtum von Gregor VII. bis Calixtus II.* (Frankfort, 1884), and Imbart de la Tour, *Les élections épiscopales dans l'église de France du IXème au XIIème siècle* (Paris, 1891).

INVIN'CIBLE ARMA'DA. See ARMADA.

INVINCIBLE DOCTOR, THE (Lat. *Invincibilis Doctor*). A name given to the English theologian William of Occam, on account of his logical methods of argument.

INVINCIBLES (Lat. *invincibilis*, unconquerable, from *in-*, not + *vincibilis*, conquerable, from *vincere*, to conquer). Members of a secret Irish society composed of some of the most desperate spirits of the Fenian association. Each member was acquainted by name with but two others—the one who nominated him to membership and the one whom he in turn nominated. The chief was a mysterious person known simply as No. 1. The object of the society was the assassination of officials, and to its members was charged the murder of Lord Frederick Cavendish, the newly appointed Irish Secretary, and T. H. Burke, the Undersecretary, in Phœnix Park, Dublin, on May 6, 1882. Consult *Annual Register* (London, 1883, 1890). See FENIAN SOCIETY.

INVI'OLABIL'ITY (Lat. *inviolabilitas*, from *inviolabilis*, inviolable, from *in-*, not + *violabilis*, violable, from *violare*, to violate, from *vis*, Gk. *ἴς*, *is*, strength, violence). In international law, the freedom or immunity which attaches to a greater or less degree to the public vessels and their crews and to the diplomatic agents of one country when within the territory of another state, and also in a very limited degree to merchant vessels in foreign waters. This immunity is extended upon the fiction of exterritoriality (q.v.). With respect to public vessels it does not allow the granting of asylum (q.v.) to

criminals or fugitive slaves, but custom seems to have established the right of such vessels to grant hospitality to political refugees who without invitation come to them and ask for protection. This grant of asylum does not give the right to the foreign state to demand the surrender of the political refugee nor to expel the ship from its waters. When the commander of the vessel harbors a criminal, resort must be had to a diplomatic appeal; invasion of the ship is not allowed. Should the vessel, however, be made the headquarters of treason, or aid or assist in insurrection or disorders against the state, such measures as are necessary for self-protection may, of course, be taken. Merchant ships have but a slight degree of inviolability, such as that which permits them to regulate their internal discipline by their home laws, certain restrictions on the right of search, etc.

From the earliest times envoys or others sent on diplomatic errands from one state to another have been held sacred or inviolate in their persons during their stay. While this has been the general rule, the modern uniform observance of such immunity, as it now exists among civilized nations, is a late development. Formerly it was neither so extensive, nor was it free from frequent violation.

Inviolability attaches at once upon the entrance of the envoy or minister and extends during his entire residence. While it exists it protects him, his residence and movables, and his suite from the local jurisdiction, civil and criminal. His civil immunity may be waived only by his waiver at the time of his reception, or by his voluntary submission to the jurisdiction of the foreign courts with his sovereign's consent. The residence of the envoy or minister is entitled to absolute immunity from the execution of compulsory process and from all forcible intrusion. He cannot harbor criminals not of his suite, as was the common practice in the Middle Ages; but in barbarous countries and in the South American countries it is customary for asylum to be given to political refugees, although this custom depends rather upon the superior force of the nation represented by the minister than on any general policy of international law. The criminal immunity of a foreign diplomatic agent is suspended only in extreme cases, as when he is party to or aids in plotting or conspiracy against the government to which he is accredited, in which case he compels its authorities to arrest him in self-defense. In ordinary cases of violation of the criminal law his recall is demanded. Consult Hershey, *The Essentials of International Public Law* (New York, 1912), and the authorities noted under INTERNATIONAL LAW.

INVIS'IBLE EMPIRE. See KU-KLUX KLAN, THE.

IN'VOCA'TION OF SAINTS. See SAINTS.

IN'VOICE (probably from Fr. *envois*, pl. of *envoi*, OF. *envoy*, conveyance, a sending, from *envoyer*, OF. *envoyer, envoier*, to send, from Lat. *in*, in + *via*, way). A bill of parcels; a statement in detail of the nature, quantity, and price of certain articles. Although the term is used most frequently in connection with sales of goods, an invoice often accompanies a bailment, as when it is sent to a consignee by a shipper of goods, who has retained title in them by the bill of lading (q.v.). In such cases its function is to inform the consignee that the goods invoiced have been shipped to him and may become his upon payment of the prices named in accordance with the conditions named in or accompanying the bill of lading. An invoice is not a document of title, and its possession does not indicate that the holder is the owner of the goods therein described. Nor is it a written contract of sale. It is a mere memorandum, always susceptible of explanation by parol evidence. It may, however, be a sufficient memorandum under the statute of frauds (see FRAUDS, STATUTE OF) if it contains all the material terms of the oral sale contract and is signed by the party to be charged. Invoices of imported goods are required by the tariff regulations of some countries to be verified before one of their consuls or to be vouched for by him. Consult the authorities referred to under SALE; BAILMENT.

IN'VOLU'CRE (Lat. *involucrum*, wrapper, from *involvere*, to wrap, from *in*, in + *volvere*, to roll; connected with Goth. *walwjan*, AS. *wealwian*, Eng. *wallow*). As a rule, each flower in a cluster (inflorescence) is subtended by a bract. In case the flowers or their pedicels are close together, the bracts are thrown into a rosette, which is called an involucre. Such inflorescences as the umbel of Umbelliferæ and the head of Compositæ have very characteristic involucres. See INFLORESCENCE.

IN'VOLU'TION AND EV'OLU'TION. In mathematics, the raising to powers and the extraction of roots respectively. The result of taking a number twice as a factor is called the square of the number; the result of taking it three times as a factor, its cube; four times, its fourth power, and so on; e.g., $3 \cdot 3 = 3^2$, or 9 is the square of 3; $3 \cdot 3 \cdot 3 = 3^3$, or 27 is the cube of 3; $a \cdot a \cdot a \cdot a = a^4$ is the fourth power of a. This process is called involution. Evolution is the inverse of involution, or it is the process which undoes involution. The square root of a number is one of the two equal factors of the number, the cube root one of the three equal factors, and so on; e.g., the square root of 16 is either 4 or -4, since $4 \cdot 4 = 16$ and $-4 \cdot -4 = 16$; the cube root of 27 is either 3 or $-3(-\frac{1}{2} \pm \frac{1}{2}\sqrt{-3})$, since each of these cubed equals 27. The nth root of a perfect nth power is one of the n equal factors of that power. A number which is not a perfect nth power has not n equal factors. It is, however, said to have an nth root to any required degree of approximation. Thus the nth root of m to 0.1 is that number of tenths whose nth power differs from m by less than the nth power of any other number of tenths. The nth root of a is indicated by either $\sqrt[n]{a}$ or $a^{\frac{1}{n}}$. In the case of square root the index of the root is not written in connection with the radical sign; thus, we write $\sqrt{5}$ and not $\sqrt[2]{5}$.

When the number whose root is sought is a perfect power, the process of factoring is one of the most practical methods except the use of tables. In the case of numbers which are not perfect powers, and of certain algebraic expressions, the binomial formula is usually employed where tables are not available. Thus $a^2 + 2ab + b^2$, the square of $a + b$, may be applied to extracting the square root of a number or of an algebraic expression, since the root can always be expressed as a binomial whose square the power contains. The older methods of square

and cube root, depending upon the sections of a square and of a cube, were inferior, since they could not be extended to higher roots. The binomial formula is, however, of general application and may be extended so as to extract the *n*th root. The detail of these processes can best be obtained from textbooks. Practically to obtain the square or cube root of a number, reference is usually made to tables of roots or of logarithms, and therefore the subject is taught in the schools less frequently than it was at one time. See LOGARITHM.

In geometry two collinear ranges, three points each, are said to form an involution when the anharmonic ratios (q.v.) of any four, not two pairs of *conjugate* points, is equal to the anharmonic ratio of their four conjugates. Thus, in the figure

A, *B*, *C*, *C′*, *B′*, *A′* form an involution, *A*, *B*, *C* being conjugate to *A′*, *B′*, *C′* if $(A\ B\ C\ B') = (A'\ B'\ C'\ B)$. This form of involution is due to Desargues (1639). Involutions of higher degrees have been developed by Poncelet (1843) and Möbius (1855).

IO, Ī′ō (Lat., from Gk. Ἰώ). In Greek legend, the daughter of Inachus, King of Argos, and first priestess of Hera at Argos. She was loved by Zeus, who, on account of Hera's suspicions, changed her into a white cow. Hera, having obtained of him the cow as a present, set the hundred-eyed Argus to watch her (according to Æschylus, *Supplices*, 299, it was Hera who transformed Io into a cow). Hermes, by command of Zeus, killed Argus and released her. Hera then sent a gadfly, which pursued Io far and wide, e.g., over the Bosporus, "Oxford," and the Ionian Sea, both of which were said to have been named after her, until in her wanderings she reached Egypt, where she was restored to her original form and became the mother of Epaphus. A somewhat different account of this myth is found in the *Prometheus* of Æschylus. In the early Greek art Io is represented as a cow; about 500 B.C. it became customary to represent her as a maiden with horns on her forehead; later still there is a return to the earlier method. Various attempts have been made to explain the myth by natural phenomena, but none has obtained any general acceptance. Most authorities have regarded her as the moon and have found Argos in the stars. Consult: Engelman, *De Ione* (Halle, 1868); Plew, *Neue Jahrbücher für Philologie*, vol. cii (Leipzig, 1870); P. W. Forchhammer, *Die Wanderungen der Inachostochter Io* (Kiel, 1881); Engelman, in Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. ii (Leipzig, 1890–97); Gustav Mellén, *De Ius Fabula* (Upsala, 1901); C. M. Gayley, *The Classic Myths in English Literature and Art* (2d ed., Boston, 1911).

I′ODATES. See IODIC ACID.

IOD′IC ACID, HIO_3. A crystalline monobasic acid composed of hydrogen, oxygen, and iodine and prepared by boiling iodine with strong nitric acid. It is very soluble in water and acts chemically as a powerful oxidizing agent. The salts of iodic acid are called iodates. Neither iodic acid itself nor the iodates are used practically.

I′ODIDES (from *iodine*, from Gk. *ἰώδης, ἰōdēs*, like a violet, from *ἴον, ion*, Lat. *viola*, violet). The salts of hydriodic acid (q.v.). The iodides of potassium, sodium, ammonium, strontium, and zinc are used in medicine. They are extensively employed in the tertiary stages of syphilis, causing the rapid absorption of syphilitic deposits. The iodide of potassium is further beneficial in gonorrhœal rheumatism, in certain joint diseases, in pleurisy, Bright's disease, asthma, and as an expectorant in bronchitis; it is also used in cases of chronic lead and mercury poisoning. The other iodides have much the same effect as that of potassium, and the iodides of sodium and strontium are even believed to be preferable. Overdoses of iodides, and even moderate doses in the case of some people, may give rise to certain symptoms that are collectively known as iodism: there is an eruption on the skin, running at the nose and mouth, sore throat, and even laryngitis and bronchitis. In such cases the dose should be diminished, and, if necessary, the administration of the salt entirely discontinued. Potassium iodide sometimes causes great general depression; if so, it may be replaced by the iodide of sodium or of strontium, or preferably by free hydriodic acid. The iodide of sodium forms an interesting series of crystalline compounds (crystallo-alcoholates) with the alcohols, including wood alcohol, ordinary ethyl alcohol, and propyl alcohol. Iodide of starch is a blue powder prepared by gradually adding starch powder to iodine triturated with some water, until the mass assumes a uniform blue color. It is used in medicine for administering iodine internally. See IODINE.

I′ODINE (from Gk. *ἰώδης, ἰōdēs*, like a violet, so called from the color of its vapor). One of the halogen elements, similar to chlorine and bromine. It was discovered by Courtois in 1812 in the ashes of seaweeds. Its character and properties were investigated by Gay-Lussac in 1814. It occurs chiefly in combination in the iodides and iodates of sodium and potassium, and is thus widely distributed both in the organic and inorganic kingdoms. It exists in sea water, in sea plants and animals, and in mineral springs. Along with lead, mercury, silver, and zinc it occurs in ores from Chile, Mexico, and Spain. It is obtained from seaweeds, especially those thrown up on the north coast of France, the coasts of Spain and Ireland, and the west coast of Scotland, but its principal source at present is the mother liquors of the nitre works in Chile. When the weeds just mentioned are burned (formerly in the open air, now in closed retorts to prevent loss by volatilization), they yield an ash called kelp, which contains from 0.1 to 0.3 per cent of iodine. The kelp is dissolved in hot water, and the solution is evaporated until the bulk of the sodium carbonate contained in it has crystallized out. An excess of sulphuric acid is then added to the mother liquor, and thus hydriodic acid is set free. Manganese dioxide (an oxidizing agent) is now added to the liquor in the distilling apparatus, and thus the iodine is liberated. The product can be readily purified by sublimation, the first and last portions only being very impure. The crude sodium nitrate (caliche) from Peru and Chile contains about 0.2 per cent of sodium iodate. The iodine is extracted from the mother liquors from which the sodium nitrate has been separated by crystallization. These are run into wooden vats lined with lead,

and the iodine is precipitated by a mixture of neutral and acid sodium sulphites. The resulting iodine is then washed with water and pressed into thick cakes, which are further purified by sublimation.

Iodine (symbol, I; atomic weight, 126.92) is a grayish-black soft solid, with a metal-like lustre. It has a specific gravity of 4.9 at 60° C., melts at 114.15° C. (237.47° F.), and boils at 184.35° C. (363.83° F.), giving rise to a very heavy violet vapor with a peculiar and penetrating odor. The presence of iodine is best detected by the addition of a little starch, with which it gives a blue coloration. Iodine finds extensive use in the arts, especially in the manufacture of coal-tar colors. Some iodine is used in photography. But the greater portion of the iodine of commerce is employed in medicine, partly in the free state, partly in combination as iodoform, and as the iodides of potassium, sodium, ammonium, strontium, and zinc, all of which are official in the Pharmacopœia. Iodine itself is but little used internally, although repeated small doses of it, in form of the tincture well diluted with water, are often successfully used to stop vomiting. (See IODIDES.) Externally, however, iodine is in constant use as a disinfectant, irritant, counterirritant, and parasiticide. The pharmacopœial preparations are: 1. *Compound solution of iodine*, or Lugol's solution; an aqueous solution, 100 parts of which contain 5 parts of iodine and 10 parts of potassium iodide. 2. *Tincture of iodine*, which is a 7 per cent solution of iodine in alcohol. 3. *Iodine ointment*, which contains 4 per cent of iodine, 1 per cent of potassium iodide, 93 per cent of benzoinated lard, and 2 per cent of water. When applied to the skin, the preparations produce a stain, which disappears in time, largely owing to the volatility of iodine; the stain may, however, be readily washed off with potassium cyanide or sodium hyposulphite. As counterirritants the preparations mentioned are used for pleurisy, chilblains, chronic inflammation of the joints, etc. As an antiparasitic, iodine is often used for ringworm, in the form of *Coster's paste*, which is made from 1 part of iodine and 4 parts of wood tar. For the medicinal uses of iodides, see IODIDES.

Iodine is but sparingly soluble in water, 7000 parts of water dissolving only 1 part of the element. It is quite soluble in alcohol, and even more freely in ether. But it dissolves with great ease in hydrocarbons, in carbon disulphide, and in chloroform. It is also freely soluble in iodine derivatives of the hydrocarbons and in aqueous solutions of metallic iodides, but its solubility in all such substances is probably due to its supposed capacity for forming with them true chemical compounds. Among the compounds of iodine may be mentioned hydriodic acid and its salts (see IODIDES), iodic acid (HIO_3) and its salts, termed iodates, and periodic acid (HIO_4) and its salts, termed periodates. The anhydride or iodic acid is iodine pentoxide. The well-known compound of iodine with nitrogen is mentioned under the latter name. Very interesting are two compounds of iodine with chlorine—viz., the monochloride of iodine, ICl, and the trichloride of iodine, ICl_3, both of which may be prepared by the direct action of chlorine on iodine. The trichloride has been recommended as an antiseptic.

It was mentioned above that iodine volatilizes very readily. The density of its vapor has been studied by Dumas, Victor Meyer, Crafts, and Troost, of Paris. It will be remembered that, according to Avogadro's rule, the molecular weight of a substance equals twice its vapor density referred to hydrogen. Up to about 800° C. iodine vapor is found to be invariably about 127 times as heavy as hydrogen under the same conditions of pressure and temperature. Hence the molecular weight of iodine up to 800° C. is about 254, and as the atomic weight of the element is about 127, the molecule of iodine vapor is considered as made up of two atoms and is represented by the symbol I_2. Above 800° C., however, iodine vapor grows lighter and lighter. At 1000° C. it is only 100 times as heavy as hydrogen; at 1400° C. only 75 times as heavy; and at 1500° C., and under reduced pressure, Crafts found it to be only 66 times as heavy as hydrogen under the same pressure and temperature. This indicates that the molecular weight of iodine vapor gradually diminishes above 800° C., seemingly approaching the limit 127 (i.e., 2×63.5), which is the relative weight of single atoms. In other words, the molecules of iodine seem to become gradually dissociated into single atoms, and at some limiting temperature and pressure which have not yet been found, the particles of the vapor would all be single atoms. The phenomenon, which has also been observed in the case of certain other elements, presents considerable interest from many points of view. Van't Hoff thinks that if the chemical elements can at all be decomposed, the method might be like that employed in bringing about the phenomenon just described.

Consult "Untersuchungen über das Jod von Gay-Lussac," in Ostwald, *Klassiker der exakten Wissenschaften* (Leipzig, 1889). See HYDRIODIC ACID; IODIDES; IODIC ACID.

I'ODISM. See IODIDES.

IOD'OFORM, or TRI-IODO-METHANE, CHI_3. A chemical compound of carbon, hydrogen, and iodine, analogous to chloroform (q.v.). It is a yellow crystalline substance, having a penetrating sweetish odor and an unpleasant sweetish taste. It is very soluble in ether, moderately so in alcohol, and but very sparingly in water. It melts at 119° C. (246.2° F.) and can be readily distilled in a current of steam, although it undergoes decomposition if distilled alone. It also undergoes gradual decomposition under the action of light. It is produced when iodine comes in contact, in the presence of alkalies, with various organic compounds of the fatty series, such as ordinary alcohol, aldehyde, acetone, etc. Its preparation may be conveniently carried out as follows: Dissolve some caustic soda or caustic potash in alcohol diluted with water; warm this solution gradually, add iodine to it, and separate the precipitated iodoform by filtration. The filtrate contains considerable quantities of sodium or potassium iodide, and sodium or potassium iodate. These may either be recovered entirely, in the form of iodides, or else more alcohol and more caustic soda or potash may be added to the filtrate and a slow current of chlorine passed through it, the iodine of the salts being thus set free to form further quantities of iodoform. Another convenient method of preparing iodoform consists in gradually adding an aqueous solution of sodium hydrochlorite to an alkaline solution of potassium iodide in dilute aqueous acetone. Finally, iodo-

form may be manufactured by subjecting to electrolysis a solution of potassium iodide and acetone (or alcohol) in water with a current of carbonic-acid gas passing into the solution. The principal use of iodoform is for purposes of antisepsis, disinfection, and local stimulation. It has been demonstrated that iodoform itself really exerts no antiseptic action whatever and is incapable of preventing the development of microorganisms. When, however, it is brought in contact with a wound, the secretions of the latter speedily decompose it, and it is the decomposition products that possess the well-known antiseptic and disinfecting power. Iodoform, in the form of powder, of an ointment, or of its solution in collodion, has been extensively used as an application for syphilitic and tuberculous ulcerations, as well as for sores and wounds of any other kind, but it has been largely superseded by less disagreeable and less poisonous substitutes, such as aristol (q.v.) and xeroform. One of the disadvantages of iodoform is its disagreeable odor. But this may be masked by the addition of some musk, or by dissolving iodoform in volatile camphor oil or in balsam of Peru. Iodoform is rapidly absorbed from raw surfaces, and this sometimes gives rise to symptoms of poisoning, and has even caused death. The symptoms vary in different cases and may include any two or three of the following: quick pulse, fever, collapse, dilated pupils, erythema, hallucinations, and gastrointestinal irritation. The treatment consists in administering stimulants and diaphoretics and sponging the skin with warm water. A substance termed diiodoform has been introduced as a substitute for iodoform. See ACETYLENE.

IOD'YRITE. A silver iodide crystallizing in yellow to greenish hexagonal crystals. It is sometimes found with other silver ores, especially with cerargyrite (q.v.).

IOLA, ī-ō'lȧ. A city and the county seat of Allen Co., Kans., on the Neosho River, 40 miles west of Fort Scott, on the Missouri, Kansas, and Texas, the Missouri Pacific, and the Atchison, Topeka, and Santa Fe railroads (Map: Kansas, G 7). Owing to vast wells of natural gas, the city has grown rapidly and is showing a substantial industrial development. It has immense zinc smelters, cement works, brick plants, foundry and machine shops, and a wholesale trade in groceries, flour, and confections. Noteworthy features are a Carnegie library, a hospital, and a United States Weather Bureau station. Settled in 1857, Iola received a charter as a city of the second class in 1898 and has adopted the commission form of government. It owns and operates its water works, gas, and electric-light plants. Pop., 1900, 5791; 1910, 9032; 1914 (U. S. est.), 10,412.

I'OLAN'THE. An operetta by Sir Arthur Sullivan with libretto by W. S. Gilbert (1882).

I'OLA'US (Lat., from Gk. *Ἰόλαος*). In Greek mythology, the half brother and charioteer of Hercules (q.v.), whom he assisted in the destruction of the Lernæan hydra (q.v.) and in other contests. For his good offices Megara, the first wife of Hercules, was given to him. He also aided the children of Hercules against Eurystheus, and was worshiped with Hercules at Thebes.

I'OLITE (from Gk. *ἴον, ion*, violet + *λίθος, lithos*, stone), CORDIERITE, or DICHROITE. A magnesium-iron-aluminium silicate, containing a small amount of water, that crystallizes in the orthorhombic system. It is found in various shades of blue, which is deeper in one direction and more grayish or yellowish in a direction at right angles to the first. (See DICHROISM.) It is transparent to translucent. It occurs in gneiss or granite, but rarely in volcanic rocks. Iolite is found in Bavaria, Hungary, Tuscany, Brazil, and in Ceylon, where crystals of an intense blue color, called saphir d'eau, are found. In the United States dark-blue specimens occur at Haddam and Norwich, Conn. Modern usage employs the name saphir d'eau to the light-blue varieties of this mineral in contradistinction to those showing the darker colors that are commonly known as lynx sapphire. The terms are not strictly exact because of the great variety of shades from pale to deep blue that are classed under one of the two names, iolite and cordierite.

ION, ī'ŏn (Lat., from Gk. *Ἴων*). A tragedy of Euripides, the chief interest of which consists in Creusa's attempt to poison Ion, who had been brought up in Apollo's temple at Delphi and is given to Creusa and her husband as a son. When detected, Creusa is threatened with death at the hands of Ion, who is finally revealed to her as her son by Apollo. The date of the play is uncertain.

ION. See HELLEN; IONIA.

ION. See DISSOCIATION; IONIZATION; ELECTROCHEMISTRY, GENERAL; SOLUTION; ELECTRICITY; CATALYSIS; ESTERS; ACIDS; ETC.

IONA, ī-ō'nȧ (OI. *Hi, Hü, I*, island, whence the oldest Latin form, *Ioua*, corrupted in transcription to *Iona*). A celebrated island of the Hebrides; in Irish, Icolmkill. It is situated on the west coast of Scotland, a short distance from Mull and Staffa, and forms part of Argyllshire. It is over 3 miles long, varying in breadth from a mile to a mile and a half. Its area is estimated at somewhat over 2000 acres, of which rather more than a fourth part is under tillage. The soil in some parts is fertile and yields oats, barley, and potatoes in abundance. Dunii, the highest point of the island, is about 330 feet above the sea level. Pop., about 250.

The history of the island begins in the year 563, when St. Columba (q.v.) landed upon Iona with 12 disciples. Having obtained a grant of the island from his kinsman, Conall, King of the Scots, and later from Bruide, King of the Picts, he built upon it a monastery, which was long regarded as the mother church of the Picts and was venerated not only among the Scots of Britain and Ireland but among the Angles of the north of England, who owed their conversion to the missionaries of Iona. From the end of the sixth to the end of the eighth century the monastery of Iona was scarcely second to any monastery in the British Isles. In 838 it became the seat of the Bishop of the Western Isles. The island was several times invaded between the eighth and tenth centuries by the heathen Norsemen, and the buildings were burned and the monks slaughtered. Towards the close of the eleventh century the monastery was repaired by St. Margaret, the wife of King Malcolm Canmore, and was visited in 1097 by King Magnus the Barefooted, of Norway. It was now part of that kingdom and so fell under the ecclesiastical jurisdiction of the Bishop of Man and the Archbishop of Trondhjem. In 1203 the bishops of the north of Ireland disputed the authority of the Manx bishop, pulled down a

monastery which he had begun to build in the island, and placed the abbey under the rule of an Irish abbot of Derry. The Scottish church had long claimed jurisdiction in Iona, and before the end of the thirteenth century the island fell under the rule of the Scottish King. Its abbey was now peopled by monks of Cluny, and a nunnery of Austin canonesses was planted on its shores. At the beginning of the sixteenth century the island again became the seat of the bishopric of the isles. No remains of St. Columba's monastery now exist. The most ancient ruins are those of the Benedictine monastery of 1203. St. Oran's Chapel, now the oldest church in the island, may probably be of the latter part of the eleventh century. St. Mary's nunnery is, perhaps, a century later. The cathedral church of St. Mary seems to have been built chiefly in the early part of the thirteenth century. It has a choir with a sacristy on the north side and chapels on the south side; north and south transepts; a central tower, about 75 feet high; and a nave. An inscription on one of the columns appears to show that it was the work of an Irish ecclesiastic who died in 1202. On the north of the cathedral are the chapter house and other remains of the conventual or monastic buildings. The Reilig Oran, or ancient burial ground, is supposed to contain bodies of a number of Irish, Scottish, and Danish kings, but no monuments of these princes now remain. Consult: Reeves, *The Historians of Scotland*, vol. vi (Edinburgh, 1874); James Drummond, *Archæologia Scotica, Sculptured Monuments in Iona and the West Highlands* (ib., 1881); Fowler, *Adamnani Vita S. Columbæ* (Oxford, 1898); Robert Jaffray, *Iona, the Sacred Isle* (New York, 1907); G. C. Trenholme, *Story of Iona* (Edinburgh, 1909).

IONE, ī'ōn. A village in Amador Co., Cal., 40 miles east-southeast of Sacramento, on the Southern Pacific Railroad (Map: California, E 4). It is in an agricultural and coal-mining district and has deposits of clay. The Preston School of Industry is situated here. There are flour mills and a creamery. Pop., 1910, 1551.

IO'NIA, ī-ō'nī-â (Lat., from Gk. 'Ιωνία). The ancient name of the small but very fertile district comprising the centre of the western coast of Asia Minor from (approximately) the river Hermus in the north to Mount Latmus in the south, and the adjacent islands of the Ægean Sea (Map: Greece, Ancient, E 2, 3). It received its name from the Ionians, who, according to the mythological account, derived theirs from Ion (see Hellen), the son of Apollo by Creusa, a daughter of a king of Athens. According to the usual tradition they were driven out of the Peloponnesus by the Dorians (q.v.), and removed to Attica, whence bands of them went forth to settle on the coast of Asia, led by Neleus and Androclus, sons of Codrus (q.v.). (See below in the account of the Ionians.) Here in historical times we find a sacred league of 12 cities, whose centre was the *Panionium*, a sanctuary of Poseidon Heliconius on the promontory of Mycale. The 12 cities, beginning at the north, were Phocæa, Clazomenæ, Erythræ, Chios (island), Teos, Lebedos, Colophon, Ephesus, Samos (island), Priene, Myus, Miletus. (See the articles on these cities and islands.) Each city was completely autonomous, though from time to time all united for some common purpose. The cities flourished and sent out many colonies both to the north along the Propontis and the Black Sea, and to the west; thus, Smyrna was occupied by settlers from Colophon and became Ionian. During the seventh century B.C. they suffered from the Cimmerian invasion of Asia Minor and later were involved in wars with the Lydian kings, to whom in the sixth century they seem to have yielded a nominal submission and in turn to have exercised a powerful influence upon Lydian art and life. (See Cimmerians; Crœsus; Gyges; Lydia.) The Persian conquest of Lydia, about 546 B.C., led to the reduction of the Ionian and other Greek cities. (See Cyrus the Great; Persia.) They were left to the government of their own tyrants and merely paid a regular tribute, though nominally under the Satrap of Lydia and Ionia, whose residence was at Sardis. About 500 B.C. the Ionian cities revolted from Persia, at the instigation, said Herodotus, of Histiæus (q.v.). At first successful with the aid of the Athenians, the Ionians burned Sardis (q.v.); but the insurrection collapsed with the naval victory of the Persians at Lade in 494 B.C. and the fall of Miletus in the same year. The aid lent to the Ionians by Eretria (q.v.) and by the Athenians gave Darius Hystaspis (q.v.) a pretext for his onslaught upon Greece. (See Persia; Athens, *History*.) On the defeat of the Persians at Mycale by the Athenians and the Spartans (479 B.C.), the cities of Asia Minor again revolted and joined the Delian League. They remained dependent on Athens until the close of the Peloponnesian War (404 B.C.), when they quickly fell under Persian rule again, especially by the Peace of Antalcidas (q.v.), where they remained till the conquests of Alexander the Great. From this period Ionia shared the fate of the neighboring countries and in 64 B.C. was added to the Roman Empire by Pompey, after the Third Mithridatic War. In later times it was so ravaged by the Turks that hardly any traces of its former greatness are left at present.

The name Ionian was not confined to the Greeks of Ionia. In Greek tradition the mythical ancestor of the Ionians was Ion, son of Xuthus and brother of Achæus. (See Hellen.) In historic times it denoted one of the great divisions of the Greek race, occupying Attica and parts of Eubœa, and most of the islands of the Ægean, as well as the stretch of coast in Asia Minor described at the beginning of this article, and, of course, the colonies sent from these regions. It seems probable that these were the first Greeks known to the East, as their name was adopted by Eastern nations to denote the Greeks. They were distinguished by a dialect distinct from the Dorian and North Greek (see Greek Language), though containing several varieties, and seem also to have possessed greater artistic and literary ability, though also a greater tendency to luxury and ease, and a less vigorous and hardy character. (For the part played by the Ionians in art, see Greek Art, *History*.) It is generally believed that they came from the mainland of Greece and gradually spread over their later territory. The movement may well have begun as early as the twelfth century B.C., but probably received its main impulse from the Dorian invasion and its attendant migrations. (See Dorians.) This view was opposed by E. Curtius, who declared that the Ionians had originally come into Asia

Minor from the north of Asia and had crossed thence to the islands and Attica and Eubœa. More recently Bury, while admitting that the Ionians of history came from Greece, has maintained that the name is derived from the Asiatic tribe which they found in occupation of the coast. Curtius' view, though held by Holm in his *History of Greece*, is now generally discredited, nor is Bury's theory as yet more than an ingenious hypothesis. That the race was composed of many elements cannot be doubted, and indeed was recognized by the Greeks themselves. Herodotus, while defining Ionians as those who traced their origin to Attica and celebrated the festival of the Apaturia (see GREEK FESTIVALS), admits that neither Ephesus nor Colophon kept this feast, a fact which seems to indicate a considerable foreign element in these cities. In art, literature, and philosophy, Ionia enjoyed deserved distinction. Her great names are, among others, Mimnermus, Anacreon of Teos, Thales, Apelles, Parrhasius, Zeuxis, and others mentioned under IONIAN SCHOOL. Consult the histories of Greece, especially Ernst Curtius, *Die Ionier vor der ionischen Wanderung* (Berlin, 1855); Eduard Meyer, *Forschungen zur alten Geschichte*, vol. i (Halle, 1892); Georg Busolt, *Griechische Geschichte bis Schlacht bei Chæroneia*, vols. i, iii (2d ed., Gotha, 1893); Ed. Meyer, *Geschichte des Altertums*, vol. ii (Halle, 1894); Bury, in *English Historical Review*, xv (London, 1890); Hogarth, *Ionia and the East* (Oxford, 1909); Lenschau, in *Klio*, xiii (Leipzig, 1913); Pöhlmann, *Grundriss der griechischen Geschichte nebst Quellenkunde* (5th ed., Munich, 1914). See also DIANA, TEMPLE OF.

IONIA. A city and the county seat of Ionia Co., Mich., on the Grand River, 34 miles east of Grand Rapids, on the Grand Trunk and the Pere Marquette railroads (Map: Michigan, E 5). It is surrounded by a farming region and has car shops of the Pere Marquette System, a pottery plant, gristmill, and reed-furniture, school-furniture, automobile-body, and petticoat factories. The Michigan Reformatory and the State Hospital for Criminal Insane are located here. Ionia was laid out in 1833 and incorporated in 1873. The city owns and operates its water works. Pop., 1900, 5209; 1910, 5030.

IONIAN (ī-ō'nĭ-an) **ISLANDS.** A collective name given to the islands in the Ionian Sea (together with the island of Cerigo, farther south) belonging to Greece. They consist of six principal and a large number of smaller islands and fall mainly into three groups. The first and northernmost group lies off the west coast of Epirus and consists of Corfu and the little island of Paxos; the second group lies around the entrance to the Gulf of Corinth and consists of Santa Maura, Ithaca, Cephalonia, and Zante; the third group, consisting of Cerigo and its dependent islets, lies southeast of the Morea. The distance from the mainland to Santa Maura, the nearest of the larger islands, is scarcely more than a mile, while the distance to Cephalonia is 22 miles. There is little geographical unity between the islands; for geographical descriptions, see articles on the separate islands. Politically the western groups form the three nomarchies of Corfu, Cephalonia, and Zante, while Cerigo belongs to the nomarchy of Argolis. Their combined area is 1117 square miles, and their population in 1896 was 266,223, and, in 1907, 226,590.

The collective term Ionian is of modern date. After the division of the Roman Empire these islands were included in the eastern half, the Byzantine Empire, and so continued till 1081, when they fell into the power of Robert Guiscard (q.v.). In the thirteenth and fourteenth centuries the possession of the islands was disputed by the Venetians, the rulers of Naples, and the Greek and Italian corsairs of the Mediterranean. In 1386 Venice obtained possession of Corfu, the most important of the islands. By conquest and purchase the other islands of the Ionian group were acquired by the Republic. Cerigo, the last, was taken from the Turks in 1717. The islands were taken by France when Bonaparte extinguished the Venetian Republic in 1797. They were seized by Russia and Turkey in 1798–99, but were returned to France under the arrangement made in the Peace of Tilsit in 1807. Zante, Cephalonia, and Cerigo were seized by Great Britain in 1809, though Corfu did not yield till 1815. The islands were reconstituted a republic under a British protectorate. Austria was allowed equal commercial privileges. The government was composed of the British High Commissioner and an assembly composed of two chambers—the Senate of six, the Legislative Assembly of 40 members. Up to 1848 the press was restricted, and the government was really a despotism, but in that and the following year widespread dislike of the British government became apparent. To remove what were supposed to be grievances, Lord Seaton, then High Commissioner, introduced sweeping changes in the constitution, including vote by ballot, lowering of the franchise, and freedom of the press. A demand was then made for annexation to the Kingdom of Greece, and an insurrection broke out in August, 1849, in Cephalonia. It was suppressed by Sir Henry Ward, who had succeeded Lord Seaton. Fresh concessions were granted, but without appeasing the malcontents. In 1859 Mr. Gladstone was sent as a special commissioner to the islands, and he reported against their cession to Greece. There was no great desire, however, on the part of the British government to continue its connection with the Ionian Islands. They had cost the United Kingdom £100,000 per annum and had been a continual source of annoyance. In 1863 the election of Prince George of Denmark as constitutional King of Greece gave England an opportunity of getting rid of this troublesome dependency. In that year the Parliament of the islands proclaimed their annexation to Greece. On March 29, 1864, a treaty was concluded at London between the five Great Powers, by which this annexation was consummated, and on May 30 formal possession was taken by the Greek authorities. The neutrality of all the islands was at first guaranteed, but later it was made to apply only to the islands of Corfu and Paxo. In February, 1867, the islands were visited by a series of earthquakes, most violent in Cephalonia, where they caused great destruction of life and property and almost destroyed the two chief towns. Since their annexation the islands have suffered a gradual decline.

Bibliography. R. M. Martin, *History of the British Possessions in the Mediterranean Sea* (London, 1837); John Davy, *Notes and Observations on the Ionian Islands and Malta* (ib., 1842);

Edmund Spencer, *Travels in European Turkey, with a Visit to Greece and the Ionian Islands* (ib., 1853); J. D. Gardner, *Ionian Islands in Relation to Greece* (ib., 1859); D. T. Ansted, *Ionian Islands in the Year 1863* (ib., 1863); Emmanuel Rodocanachi, *Bonaparte et les iles ioniennes* (Paris, 1899); Gaston Lévy, *De la condition international des iles ioniennes depuis le congrès de Vienne jusqu'à nos jours* (ib., 1901); Georg Weber, "Zur Topographie der ionischen Küste," in *K. Deutsches Archeologisches Institut, Mitteilungen, Athenische Abteilung*, vol. xxix (Athens, 1904). See GREECE.

IONIANS. See IONIA.

IONIAN SCHOOL. The earliest school of Greek philosophy, represented by Thales, Anaximander, and Anaximenes of Miletus, and Heraclitus of Ephesus. Its chief problem was the search for the first principle in nature, which different exponents of the school found in water, fire, air, or atoms. See GREEK PHILOSOPHY.

IONIAN SEA. The name of that part of the Mediterranean which separates south Italy and Sicily from Albania and Greece (Map: Greece, A 4). It is connected with the Adriatic by the Strait of Otranto. Its main arm is the Gulf of Taranto, between the Calabrian peninsula and that of Otranto, and it forms a number of deep inlets on the coast of Greece, the chief of which is the Gulf of Corinth. The Ionian Islands are located along the eastern margin.

ION'IC DIALECT. See GREEK LANGUAGE, *Dialects;* IONIA.

IONIC MEDICATION. See CATAPHORESIS.

IONIC ORDER. One of the three orders of Greek architecture, so called because it was first used in the Greek (Ionian) cities of Asia Minor. It appears to have been developed during the sixth century B.C. from wooden prototypes no longer extant. Its use in Greece proper was almost wholly confined to Attica, where it appeared first as a distinct style, but was used in conjunction with the Doric as well as independently. (See GREEK ART.) It differs essentially from the Doric by its more slender proportions, carved ornamentation, banded architrave, plain frieze, molded base, and voluted capital. The column is from 7 to 10 diameters high in Greek examples, usually 9 in the Roman, and the shaft has 24 deep narrow flutes, separated by very narrow fillets. There are two types of cornice, one with and one without dentils (q.v.); the first was the universal Asiatic type. For illustration and details of the order, see ORDERS OF ARCHITECTURE. A very beautiful but unique example of the Attic-Ionic order is that of the Erechtheum (q.v.) at Athens. In this the upper part, or necking, of the shaft is enriched by an exquisite band of anthemion ornaments, and the channel of the spiral scrolls of the capital is double, while between the band connecting these and the ovolo there is a torus of braided pattern.

The Ionic order was generally used in the Greek cities of Asia Minor for peripteral temples (as at Ephesus, Priene, etc.), but in Greece proper its use was confined to small prostyle and amphiprostyle buildings (Temple of Wingless Victory, Athens), circular buildings (Philippeum at Olympia), and the interiors of some Doric buildings, as in the Propylæa at Athens and the temples at Bassæ and Tegea. There was, however, a general increasing tendency to use it in Greek architecture. The principal change made by the Romans in its form was in the band which connects the volutes. In the best Greek examples this was curved, but it is straight in the Roman Ionic and in many modern examples.

IONIC SCHOOL. See IONIAN SCHOOL.

I'ONIZA'TION (from *ion*, from Gk. *ἰών*, pres. p. of *ἰέναι, ienai*, to go). The modern theory of electric conduction is that an electric current consists of the motion of minute particles of matter which are charged positively and negatively, the motion of the oppositely charged particles being in opposite directions. These charged particles are called ions, and they are in no case identical with molecules; in fact, it rarely happens that a molecule as such is charged. The formation of these ions is called ionization. In metals and all solid conductors there are ions probably always present, the negative ones being electrons. (See ELECTRON.) In a liquid which is not a fused metal, e.g., water, etc., ions are produced by dissolving in it some salt or acid, which dissociates in the act of solution (q.v.). (There are undoubtedly a small number of ions present in the pure liquid, these being fragments of its molecules.) In ordinary gases ions are probably always present to a limited extent, although in a pure dry gas there may be none; but in any case their number may be enormously increased in many ways. If the Röntgen, i.e., X rays (q.v.) are passed through a gas, it is ionized, as is shown by its becoming a good conductor; similarly, if rays from any radioactive substance (see RADIOACTIVITY), or ultra-violet light, or the cathode rays, pass through a gas, it is ionized. The gases from a flame are strongly ionized, so that they will rapidly discharge any electrified conductor near which they are allowed to flow. If a spark is passed between the two terminals of an electrical machine or induction coil, the gas on all sides is found to be ionized; if there is a brush discharge from points, the same is true. By subjecting gas, in which there are only a few ions present, to a very strong electrostatic field, these ions may be given velocities high enough to enable them to break up into ions neutral molecules which they strike in their path; these new ions in turn are set in motion and make more ions, until the number of ions may be enormously increased. This process is called ionization by impact, and has taken place whenever an electric spark occurs. In cases of ionization where no spark passes, the number of ionized atoms is negligibly small compared with the number of neutral atoms, for as soon as the number of ions becomes large, the number of positive and negative ions coming close enough to each other to recombine because of their mutual attraction becomes large, the rate of recombination increasing as the square of the number of positive and negative ions present.

When ions are formed in gases at low pressures they have definite masses, but in gases at atmospheric pressure they seem to collect neutral molecules about them, forming aggregations of varying mass. Negative ions formed in gases at low pressure are identical whatever the gas from which they are formed. The charge of such an ion is the same as the charge of a hydrogen ion in electrolysis, and its mass is about 1/1800 of the mass of a hydrogen atom. This negative ion is the natural unit of elec-

tricity, the electron. (See ELECTRON.) It is conceived that the process of ionization consists in tearing an electron away from a previously neutral atom, leaving the remainder of the atom positively charged and forming the positive ion. Positive ions thus vary in mass according to the mass of the atom of the gas in which they originate. A beautiful experimental method of demonstrating the presence of ions in a gas and their motions has been devised by C. T. R. Wilson (*Proceedings of the Royal Society of London*, vol. lxxxvii, p. 277, 1912). It depends upon the fact that drops of water may be condensed upon minute charged particles. Thus, if there are ions in a gas saturated with moisture, a sudden expansion of the gas will chill it and cause drops to form around the ions, and then these drops may be photographed. For a definite fall in temperature, drops will form only on the negative ions; a greater fall is required for the positive ones.

Consult: J. J. Thomson, *Conduction of Electricity through Gases* (2d ed., New York, 1906); C. Barus, *Condensation of Vapor as Induced by Nuclei and Ions* (Washington, 1907–10); J. S. Townsend, *Theory of Ion of Gases by Collision* (New York, 1910); H. Scudder, *Electrical Conductivity and Ionization Constants of Organic Compounds* (ib., 1914). For notable modern work in this field, see papers in the *London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science* by Gill, Pring and Parker, Barkla and Simons, Owen and Roberts, Campbell, Townsend, J. J. Thomson, Bragg, Gill, Pidduck, Eve, Taylor, Florance, Jacot, Sheard, Barkla and Philpot, Wellisch and Woodrow, Burton and Kilby, and Wheatley, especially vols. xxiii–xxvi, 1912 and 1913. See also Pring's "Origin of Thermal Ionization from Carbon," in the *Proceedings of the Royal Society of London*, 1913, and in the *Transactions of the Royal Society of Canada*, Ottawa, 1912; and Turner, Jones, and Jacobson, in the *American Chemical Journal*, vol. xl, 1908. For further particulars, see also *Electrolysis* under the article ELECTRICITY.

ION (ī'ŏn) **OF CHIOS**, kī'ŏs (c.500–c.422 B.C.). A Greek author, who came to Athens when he was still young (478 B.C.). He was a member of the circle which included Cimon and Pericles, and was probably personally acquainted with Æschylus and Sophocles. His only work in prose, so far as we know, was the Ἐπιδημίαι, 'Sojournings,' reminiscences of celebrated visitors at Chios, which was of great importance to the Greek historians who succeeded him, and has some value for literary history. The fragments of this work may be found in Müller, *Fragmenta Historicorum Græcorum* (1853). There is also a tradition that he wrote on the colonization of Chios. But his poetry was even more important; he wrote tragedies, lyrics, and elegiac and dithyrambic verse. Consult: Nauck, *Tragicorum Græcorum Fragmenta* (Leipzig, 1889); Allègre, *De Ione Chio* (Lyons, 1890); Theodor Bergk, *Poetæ Lyrici Græci* (Leipzig, 1900); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (5th ed., Munich, 1908).

I'OPHON (c.450–c.390 B.C.). A Greek tragedian, son of Sophocles. We know little of his life or of his plays. There is a statement in Valerius Maximus attributing the *Antigone* to him. The story told by Plutarch, and by Cicero, *De Senectute*, 22, that he accused his aged father of insanity so that he might have control of his property, and that Sophocles proved his sanity by reading to the judges the famous chorus from the *Œdipus Coloneus*, 668 ff., is questioned in modern times, e.g., by Jebb, editor of the *Œdipus Coloneus*, pp. xl–xlii (3d ed., Cambridge, 1900). The few verses of Iophon which survive may be found in Nauck, *Tragicorum Græcorum Fragmenta* (1889). Consult Oswald Wolf, *De Iophonte Poeta* (Leipzig, 1884), and the editors on Aristophanes, *Frogs*, 73, 78.

IORGA, yôr'gȧ, NICOLÆ (1871–). A Rumanian historian and politician, born at Botoshani and educated at Iashi, Paris, Berlin, and Leipzig. In 1894 he was appointed professor of universal history at the University of Bucharest, and in 1910 was made a member of the Rumanian Academy. He became leader of the National-Democratic party. His works include, besides political writings, numerous and important publications of documents relating to Rumanian history, and historic monographs such as: *Philippe de Mezières et la croisade au XIVe siècle* (1896); *Notes et extraits pour servir à l'histoire des croisades* (1899–1902); *Geschichte der Rumänen* (1905); *History of the Byzantine Empire* (in English, 1907); *Geschichte des Osmanischen Reiches* (5 vols., 1907–13); *History of Rumanian Literature in the Eighteenth* (1901) *and Nineteenth Centuries* (1902–09), in Rumanian.

I'OS, or **NI'O.** One of the Cyclades, Greek Archipelago, situated about 13 miles south of Naxos (Map: Greece, G 7). Its area is over 45 square miles, and its surface very mountainous. The inhabitants cultivate cotton, olives, and the vine, and raise cattle. The only town, Ios, had a population, in 1907, of 2090. According to local tradition, Homer was buried on the island.

IO'TA (Lat., from Gk. *ἰῶτα*, from Phœnician *yōdh*, Heb. *yōd*, Ar. *yad*, hand). The ninth letter (ι) of the Greek alphabet, corresponding to the English *i*.

I. O. U. (I owe you). A memorandum of debt or due bill, named from its abbreviated form, viz.,

NEW YORK, January, 1915.

JOHN DOE, I. O. U. $20.

RICHARD ROE.

In England and in most of the United States an I. O. U. is not treated as a *promissory note* (q.v.) for the reason that it does not contain an express promise to pay. However, by statute or by judicial decisions, it has been in some States declared to be a promissory note, and as such capable of transfer by indorsement. It can everywhere be sued upon as an account stated, without proof of the origin of the debt. See DUE BILL.

IOVILÆ, or **JOVILÆ**, yō'vī-lē *or* yō'vĭ-lī. Oscan monuments in Campania, dating from the fifth to the third century B.C., found at Capua and Cumæ. Some of them are dedicated to Jupiter; others were attached to graves. All show heraldic emblems peculiar to a family or a group of families; the inscriptions on them have to do with the performance annually, on fixed days, of certain ceremonies. Consult: R. S. Conway, *The Italic Dialects* (Cambridge, 1897); Von Planta, *Grammatik der oskisch-umbrischen Dialekte* (Strassburg, 1892–97); C. D. Buck, *A Grammar of Oscan and Umbrian* (Boston, 1904); id., *Ele-*

mentarbuch der oskisch-umbrischen Dialekte (Heidelberg, 1906). See the account of the Oscan dialect under ITALIC LANGUAGES.

IOWA, ī'ō-wȧ (popularly known as the Hawkeye State). One of the North Central States of the United States. It lies between latitudes 40° 36′ and 43° 30′ N. and between longitudes 89° 5′ and 96° 31′ W. and is bounded on the north by Minnesota, on the east by Wisconsin and Illinois, from which it is separated by the Mississippi River, on the south by Missouri, and on the west by Nebraska, from which it is separated by the Missouri River, and by South Dakota. Its shape is nearly that of a rectangle, measuring 310 miles from east to west and 205 miles from north to south; its area is 56,147 square miles, and it ranks twenty-fourth in size among the States of the Union.

Topography. Iowa is a typical prairie plain with slight relief. The range in altitude is somewhat more than 1000 feet. The lowest point, 494 feet above sea level, is at Keokuk, in the southeast corner of the State; the highest point, the elevation of which is not definitely known, is on a great divide in Osceola County in northwest Iowa. The greater portion, though not perfectly level, is so free from natural obstructions that most of the country roads are laid out in squares, crossing at right angles with the absolute regularity of a checkerboard. The most rugged part is the Driftless Area in the northeast corner of the State. Iowa is divided into two hydrographic systems, the eastern two-thirds being drained by the direct affluents of the Mississippi, and the western third by those of the Missouri. The divide between the two systems runs obliquely across the State from northwest to southeast. From this the Mississippi affluents flow all in a southeast direction, and the Missouri affluents all to the southwest. The principal of the former are the upper Iowa, Turkey, Wapsipinicon, Cedar, Iowa, Skunk, and Des Moines rivers, the last being the largest river within the State. The principal Missouri affluents are the Big Sioux, forming most of the South Dakota boundary, the Little Sioux, the Nishnabotna, and the Nodaway. Many of these streams are navigable for very small craft, but, owing to the railroads, they are unnecessary as waterways and little used. Like all typical glaciated areas, Iowa is dotted, especially in the northern part, with numerous small but often beautiful lakes, several of which are favorite resorts, such as Spirit Lake in Dickinson County near the north boundary, a beautiful sheet of water, 2½ by 5 miles, with picturesque, wooded shores. Other beautiful lakes are East and West Okoboji, Clear Lake, and Storm Lake.

Geology. Owing to the heavy covering of drift, a thorough geological survey of Iowa is attended with difficulties. Nevertheless, our knowledge of the rock formations is fairly complete. In more than three-fourths of the State the surface consists of Paleozoic rocks appearing in parallel belts running northwest to southeast. Beginning at the northeast corner, there is a narrow belt of Cambrian rocks consisting of Potsdam sandstone; then follow the Ordovician, Silurian, Devonian, and Carboniferous systems, the last occupying the southwest corner. The northwestern part is covered by extensive Cretaceous beds deposited across and over the belts of the older strata. In Webster County is a small area of rocks probably of Permian age. Finally, in the extreme northwest corner there are outcroppings of metamorphosed rock of the Algonkian system, known as Sioux quartzite, the oldest formation in the State. Over the entire surface, with the exception of a small driftless area in the northeast corner, is a deposit of glacial drift from a few inches to several hundred feet in thickness. It consists mainly of fine rock fragments with but few bowlders and pebbles.

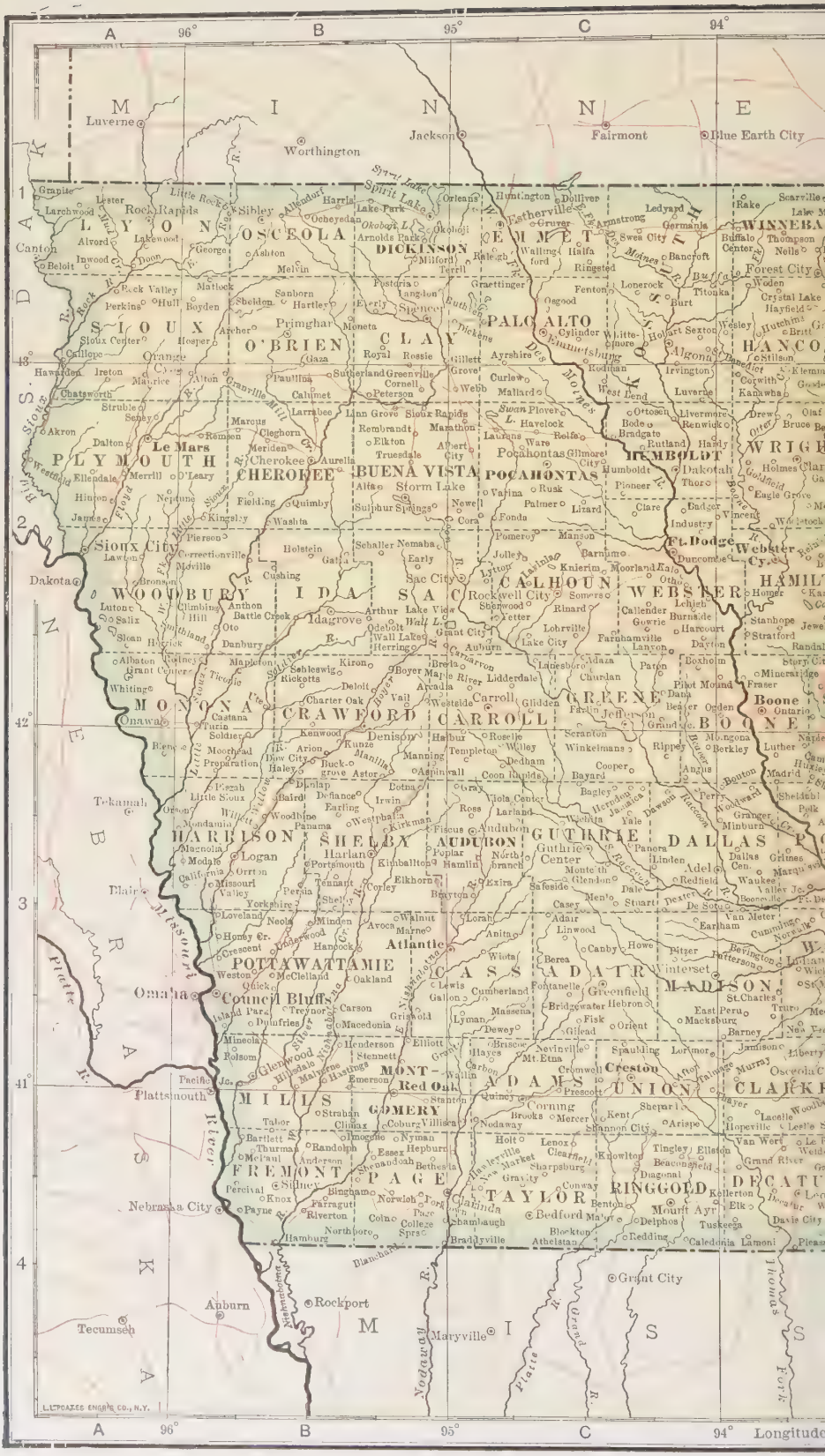
Mineral Resources. The most valuable of Iowa's mineral resources are the extensive bituminous coal beds found in the south-central quarter of the State. Lead and zinc ores have been mined in considerable quantities in the Galena limestone of the Ordovician system of the northeast. Extensive deposits of gypsum and cement materials are also found, and various other minerals occur in smaller quantities. The limestones of the Ordovician, Silurian, and Devonian systems furnish an inexhaustible supply of building stone.

Mining. The principal mining industries are coal mining and clay working, these two contributing about 77 per cent of the total mineral value. Over 60 per cent of the value is represented by the output of coal mines. The coal fields constitute the northern limits of the western interior region and occupy the central and southern portions. They have a total area of approximately 20,000 square miles, of which about 13,000 square miles are considered as workable under present conditions. The coal is of noncoking bituminous grade, somewhat high in sulphur, but is a fair steaming fuel. The market for Iowa coal is largely confined within the borders of the State. The production in 1913 was 7,525,936 short tons, valued at $13,496,710. In that year Iowa ranked eleventh in the production of coal. The industry dates from 1840, but has not shown the same progress as in many Western States.

The value of clay products in 1913 was $5,573,681. The chief products are draintile, in which Iowa holds first place among the States, and common brick. Cement ranks third in importance among mineral products; the output in 1913 was 3,623,674 barrels. In 1913 there were three modern cement plants of large capacity. Iowa ranked second in production of gypsum, the value of which in 1913 amounted to $1,157,939. Large quantities of stone, sand, and gravel are produced. The other commercial products are lead, lime, mineral paints, mineral waters, sand-lime brick, and a small amount of natural gas. The total of the mineral production in 1913 was $25,602,015.

Forest areas are small and are chiefly confined to the faces of the bluffs along the river courses. The most common trees are the oak, elm, cottonwood, hickory, and maple, while scanty forests of pine and cedar are found on some of the bluffs. Grasses are the predominating feature of the landscape as well of the flora of the State.

Climate. The climate in different parts of Iowa shows only slight variations, which are mostly due to differences in latitude and altitude. It is of the continental type, with great variations in temperature between summer and winter. The mean annual temperature is 47.5° F. The highest temperature recorded is 113° F. and the lowest is −43° F., giving the remarkable range of 156° F. The average winter temperature is 20.7° F., spring 47.5° F., summer 71.3° F., and autumn 50.5° F. The average an-


A
B
C
96°
95°
94°
Longitude
M I N N E
Luverne
Worthington
Jackson
Fairmont
Blue Earth City
LYON
OSCEOLA
DICKINSON
EMMET
WINNEBA
SIOUX
O'BRIEN
CLAY
PALO ALTO
HANCO
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGH
WOODBURY
IDA
SAC
CALHOUN
WEBSTER
HAMIL
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POTTAWATTAMIE
ADAIR
ADAMS
UNION
CLARKE
MILLS
MONTGOMERY
FREMONT
PAGE
TAYLOR
RINGGOLD
DECATUR
Sioux City
Le Mars
Storm Lake
Fort Dodge
Webster City
Council Bluffs
Omaha
Atlantic
Creston
Red Oak
Shenandoah
Clarinda
Corning
Grant City
Maryville
Plattsmouth
Nebraska City
Tecumseh
Auburn
Rockport
Missouri R.
Nodaway R.
Platte R.
Little Sioux R.
Boyer R.
Raccoon R.
Des Moines R.
Thompson Fork
Spirit Lake
Okoboji L.
Storm Lake
Lake Park
Estherville
Emmetsburg
Algona
Humboldt
Fort Dodge
Webster City
Sac City
Carroll
Denison
Harlan
Audubon
Guthrie Center
Dallas Center
Winterset
Indianola
Knoxville
Creston
Corning
Clarinda
Shenandoah
Red Oak
Atlantic
Council Bluffs
Omaha
Plattsmouth
Nebraska City
Tecumseh
Auburn
Rockport
Grant City
Maryville
Sioux City
Le Mars
Cherokee
Storm Lake

IOWA
SCALE OF STATUTE MILES
0 5 10 20 30 40
SCALE OF KILOMETERS
0 10 20 30 40 50 60
County Towns
Railroads
Electric Railroads
93° E 92° F 91° G
1
2
3
4
Mississippi R.
Iowa R.
Cedar R.
Wapsipinicon R.
Turkey R.
Maquoketa R.
Des Moines R.
Skunk R.
Fox R.
Chariton R.
Grand River
Missouri
Illinois
Wisconsin
Minnesota
Nebraska
Lancaster
Prairie du Chien
Dubuque
Galena
Guttenberg
Clayton
Fayette
Allamakee
Winneshiek
Howard
Mitchell
Chickasaw
Floyd
Charles City
Mason City
Cedar Falls
Waterloo
Butler
Bremer
Buchanan
Delaware
Jackson
Clinton
Scott
Muscatine
Louisa
Des Moines
Henry
Jefferson
Wapello
Davis
Appanoose
Van Buren
Lee
Fort Madison
Keokuk
Davenport
Rock Island
Burlington
Monmouth
Galesburg
Oquawka
Aledo
Carthage
Macomb
Montrose
Memphis
Kahoka
Unionville
Centerville
Ottumwa
Oskaloosa
Pella
Knoxville
Marshalltown
Grinnell
Iowa City
Cedar Rapids
Tama
Marshall
Benton
Linn
Jones
Jasper
Poweshiek
Johnson
Keokuk
Washington
Louisa
Marion
Monroe
Wayne
Lucas
Clarke
Union
Adams
Taylor
Ringgold
Decatur
Wayne
Appanoose
Davis
Van Buren
Lee
Clarke
Lucas
Monroe
Wapello
Jefferson
Henry
Louisa
Muscatine
Scott
Clinton
Jackson
Dubuque
Delaware
Buchanan
Black Hawk
Grundy
Hardin
Franklin
Wright
Hancock
Winnebago
Worth
Mitchell
Howard
Winneshiek
Allamakee
Clayton
Fayette
Chickasaw
Floyd
Cerro Gordo
Hancock
Kossuth
Palo Alto
Emmet
Dickinson
Osceola
Lyon
Sioux
Plymouth
Cherokee
Buena Vista
Pocahontas
Humboldt
Webster
Hamilton
Hardin
Grundy
Tama
Benton
Linn
Jones
Jackson
Clinton
Scott
Muscatine
Louisa
Des Moines
Henry
Jefferson
Wapello
Davis
Appanoose
Van Buren
Lee

nual rainfall is 31.5 inches, more than two-thirds of which usually falls during the six crop months, April to October. These copious but not excessive rains, coinciding with continued high temperature during the summer months, are, next to the rich soil, the chief cause of Iowa's agricultural prosperity.

Soil. Practically the whole of the State is arable land. The soil may be divided into three distinct kinds: alluvial soil, glacial drift, and loess. The alluvial soil consists of recent deposits on the bottom lands of the principal rivers; the principal tract is the Missouri bottoms, 150 miles long and from 5 to 20 miles wide. This is, of course, the richest soil of the State, but is, nevertheless, rivaled by the drift soil. The latter consists of a fine loamy mixture of clay and sand, with a little gravel. It is of almost inexhaustible richness and scarcely needs fertilizing. It covers by far the greater part of the State. The loess is a fine yellowish silt highly charged with carbonate of lime.

It is found in various parts of the State, but is related chiefly to the valleys of the large streams. It is generally considered to be of Æolian origin.

Agriculture. Iowa has been from its earliest settlement one of the most important agricultural States in the Union. It has, however, passed out of the class of States which are adding to their total farm area. In 1910, of an approximate land area of 35,575,040 acres, 95.4 per cent (33,930,688 acres) was in farm land, and the improved land in farms was 29,491,199 acres. In that year the total number of farms was 217,044, and the average acreage per farm was 156.3. The average value of all property per farm was $17,259 in 1910. The average value of land per acre was $82.58 in 1910. Of the total number of farms (217,044), those operated by owners and managers in 1910 numbered 134,929, and those operated by tenants 82,115, i.e., slightly more than three out of eight were operated by tenants. In 1910 the percentage of farm land improved was highest for farms operated by tenants and lowest for farms operated by managers.

Of the total farm acreage in 1910, 50.7 per cent was in farms of from 175 to 499 acres and 33.1 per cent in farms of 100 to 174 acres; these two size groups comprising about five-sixths of the aggregate acreage. The native white farmers numbered 167,856 and the foreign-born white 48,987. The negro and other non-white farmers numbered only 187.

The acreage, value, and production of the principal crops in 1914, as estimated by the United States Department of Agriculture, are shown in the following table.

LEADING CROPS	Acreage	Prod. bu.	Value
Corn	10,248,000	389,424,000	$144,712,000
Wheat	810,000	15,066,000	14,463,000
Oats	5,000,000	165,000,000	67,650,000
Barley	360,000	9,360,000	5,148,000
Potatoes	147,000	12,642,000	7,459,000
Hay	2,950,000	*4,071,000	41,117,000

* Tons.

The total value of the crops in 1909 was $314,666,000, and the combined acreage of crops in that year was 20,374,925, representing 69.1 per cent of the total improved land in farms.

The general character of agriculture in Iowa is indicated by the fact that about three-fourths of the total value of crops in 1909 was contributed by the cereals and about one-fifth by hay and forage. The remainder, representing 7.9 per cent of the total, consisted mostly of vegetables, fruits and nuts, and forest products. Of the 15,041,039 acres reported for cereals in 1909, over three-fifths were in corn, which, together with the acreage of oats, formed over nine-tenths of the whole.

The total acreage of potatoes and other vegetables in 1909 was 252,243, and the value of the crops was $12,021,408. Excluding potatoes, sweet potatoes, and yams, the acreage of vegetables was 80,402, and the value of the crops was $5,266,000. In 1909, 3791 acres were devoted to the raising of plants and flowers and of nursery products, and the value was $1,503,305. The total quantity of orchard fruits produced in 1909 was 7,234,000 bushels, valued at $4,284,000. Of this quantity apples contributed more than nine-tenths and cherries, plums, and prunes most of the remainder. The production of grapes in 1909 amounted to 11,708,000 pounds, valued at $330,000. The production of orchard fruits in 1909 was twice as great as in 1899. The small fruits produced are of considerable value, and these amounted in 1909 to 10,344,052 quarts, valued at $966,894. Strawberries are by far the most important. A small amount of sugar beets is grown. The product in 1909 was 7,117 tons, valued at $35,024. There was grown also 28,957 tons of sorghum cane, from which were made 250,205 gallons of sirup, valued at $139,293.

Live Stock and Dairy Products. In 1910 the value of all live stock on the farms was $393,003,000. The number and value of live stock on Jan. 1, 1915, is estimated by the United States Department of Agriculture as follows: cattle, 2,683,000, valued at $100,612,000; horses, 1,600,000, valued at $168,000,000; mules, 58,000, valued at $6,438,000; swine, 8,720,000, valued at $95,920,000; sheep, 1,249,000, valued at $6,994,000. The fowls of all kinds in 1910 numbered 23,482,880, with a value of $12,269,881. The milk produced in 1909 was 318,954,506 gallons, from which were made 38,679,568 pounds of butter and 78,538 pounds of cheese. The value of the milk sold was $6,032,685, and the total value of milk, cream, butter, and cheese in 1909 was $40,268,583.

Forest Products. The State contains very little timber land. For a number of years saw mills have been largely dependent upon the forests of Minnesota and Wisconsin for logs, and the depletion of these, with the establishment of many mills in these States, has caused a decline in the lumber industry of Iowa. In 1909 the value of products was $12,659,000. There were produced on the farms in 1909 forest products valued at $3,649,032. These included firewood, fencing material, logs, railroad ties, telegraph and telephone poles, materials for barrels, tanbark, etc.

Manufactures. Though preëminently an agricultural State, Iowa's manufactures are of increasing importance. In 1909, exclusive of the value of the products of the neighborhood and hand industries, the value of manufactures was $259,238,000. The table on page 318 gives the most important figures relative to leading industries in 1909 compared with 1904. On account of the limitations of space only those in-

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE—ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Cost of materials	Value of products	Value added by manufacture
			Total	Wage earners (average number)	Expressed in thousands				
All industries	1909	5,528	78,360	61,635	$171,219	$32,542	$170,707	$259,238	$88,531
	1904	4,785	61,361	49,481	111,427	22,997	102,844	160,572	57,728
Agricultural implements	1909	42	1,620	1,318	5,066	683	2,171	4,757	2,586
	1904	30	1,277	1,027	3,319	470	1,357	2,692	1,335
Artificial stone	1909	308	1,219	730	1,557	397	632	1,569	937
	1904	27	128	70	176	34	45	120	75
Boots and shoes, including cut stock and findings.	1909	10	770	716	790	318	1,059	1,633	574
	1904	5	499	478	419	186	522	854	332
Bread and other bakery products	1909	495	2,550	1,647	3,359	846	4,147	6,818	2,671
	1904	365	1,677	1,061	1,582	500	2,063	3,611	1,548
Brick and tile	1909	235	3,654	3,158	7,327	1,673	1,204	4,483	3,279
	1904	302	3,154	2,633	4,801	1,242	838	3,362	2,524
Butter, cheese, and condensed milk	1909	512	2,199	1,231	4,472	855	22,842	25,850	3,008
	1904	655	2,323	1,160	2,919	687	12,896	15,028	2,132
Buttons	1909	70	3,376	3,172	2,567	1,412	1,414	4,035	2,621
	1904	51	2,121	1,936	1,174	654	534	1,501	967
Canning and preserving	1909	71	1,420	1,247	3,503	299	1,568	2,549	981
	1904	59	1,769	1,607	2,920	418	2,118	3,675	1,557
Carriages and wagons and materials	1909	119	1,828	1,441	4,468	828	2,748	4,786	2,038
	1904	113	1,632	1,298	3,392	602	1,684	3,371	1,687
Cars and general shop construction and repairs by steam-railroad companies.	1909	33	7,460	6,969	5,488	4,535	5,149	10,269	5,120
	1904	40	6,781	6,372	3,628	3,860	3,303	7,619	4,316
Clothing, men's, including shirts	1909	28	1,672	1,480	1,554	425	1,412	2,496	1,084
	1904	18	1,375	1,176	1,325	335	1,142	1,920	778
Clothing, women's	1909	19	985	876	1,098	304	885	1,535	650
	1904	9	471	427	513	131	432	762	330
Confectionery	1909	40	1,302	1,032	1,272	360	1,703	2,914	1,211
	1904	24	819	688	752	187	794	1,435	641
Copper, tin, and sheet-iron products	1909	71	777	585	3,046	334	1,505	2,414	909
	1904	33	721	635	5,701	285	1,529	2,287	758
Flour-mill and gristmill products	1909	277	1,186	647	6,123	382	10,934	12,871	1,937
	1904	276	1,320	770	5,216	399	10,317	12,099	1,782
Foundry and machine-shop products	1909	274	6,289	5,108	12,865	3,085	6,372	14,064	7,692
	1904	211	3,913	3,221	6,456	1,669	2,653	6,331	3,678
Furniture and refrigerators	1909	44	1,257	1,074	2,232	606	1,336	2,650	1,314
	1904	35	1,034	858	1,343	370	803	1,677	874
Gas, illuminating and heating	1909	117	1,151	806	15,784	380	1,111	2,893	1,782
	1904	60	636	468	8,315	254	624	1,832	1,208
Leather goods	1909	67	845	600	2,038	353	1,812	2,855	1,043
	1904	35	533	413	953	196	768	1,310	542
Liquors, malt	1909	19	636	495	5,603	332	901	3,325	2,424
	1904	19	530	427	3,085	270	691	2,386	1,695
Lumber and timber products	1909	229	5,403	4,658	12,809	2,356	7,141	12,659	5,518
	1904	139	5,348	4,810	13,523	2,297	6,739	12,153	5,414
Marble and stone work	1909	87	504	315	926	243	616	1,338	722
	1904	36	340	241	487	152	263	636	373
Patent medicines and compounds and druggists' preparations.	1909	100	887	358	2,361	133	1,065	3,401	2,336
	1904	59	528	260	1,571	99	806	2,045	1,239
Printing and publishing	1909	1,110	8,065	4,853	10,623	2,591	3,287	12,129	8,842
	1904	1,113	6,665	4,317	7,329	2,038	2,048	8,549	6,501
Slaughtering and meat packing	1909	33	4,849	4,144	12,362	2,190	53,127	59,045	5,918
	1904	25	3,409	3,104	7,326	1,332	27,244	30,152	2,908
Tobacco manufactures	1909	372	2,523	1,943	1,821	856	1,386	3,423	2,037
	1904	444	2,734	2,072	1,599	847	1,280	3,359	2,079

dustries whose product had a value of 1,000,000 or over in 1909 are included in this table. Of the 61,635 wage earners, 51,770 were males and 9865 were females. The value, $88,531,000, added to products by manufacture represents the net wealth created by manufacturing operations during the year. There were, in 1909, 59 industries which had a value of products in excess of $500,000.

It will be noted from the table that the slaughtering and meat-packing industry is by far the most important when measured by value of products, although four other industries employed in 1909 a greater average number of wage earners. This industry is to a large extent confined to four cities: Cedar Rapids, Des Moines, Ottumwa, and Sioux City. The value of these products increased from $25,763,000 in 1899 to $59,045,000 in 1909. Industries connected with the making of butter, cheese, and condensed milk occupy second place when measured by value of products. Iowa has occupied a prominent place in the creamery industry ever since its establishment on a factory basis. From 1904 to 1908 the industry showed marked development, the value of products having increased 72 per cent. It ranked third in respect to its manufactured dairy products in 1909. Products of foundry and machine shops ranked third in value. This industry includes not only foundry and machine shops, but establishments engaged in the manufacture of gas machines and meters, hardware, plumbers' supplies, steam fittings and heating apparatus, and structural ironwork. Other important industries are those related to flour and grist mill products, lumber and timber products, printing and publishing, cars and general shop construction, and the manufacture of buttons. The lumber and timber industry includes logging operations as well as the mills. In 1909 the value of products was $12,659,000. The output of buttons in Iowa consists of the fresh-water pearl variety, made from the shells of the Mississippi River mussel. Muscatine is the centre of the industry, and it had within its corporated limits 43 of the 70 establishments in the entire State in 1909.

In 1909 the prevailing hours of labor for about three-fourths of the wage earners ranged from 54 to 60 a week. Sioux City had in 1909 the largest value of products of manufactures, $37,424,450, with 3750 wage earners. Cedar Rapids ranked second in value of products, $24,624,276, with 3565 wage earners; Des Moines had the largest number of wage earners, 5383, and ranked third in the value of products, $23,584,667. Other cities having a value of product of more than $10,000,000 in 1909 were Davenport, Dubuque, and Ottumwa. For additional details in regard to the manufactures of these and other cities of the State, see the articles under separate titles.

Transportation. The railway facilities, which consist of trunk lines and various branch lines serving as feeders, are excellent. In total length of track in 1909, Iowa ranked fourth among the States. Water transportation is afforded by the Mississippi River on the east boundary and the Missouri River on the west. Des Moines is the centre of a large number of railroad lines, and in general every section is amply provided with facilities. In the western part most of the railroads follow the course of some river, so that all of the larger tributaries to the Missouri River are paralleled by a railroad, thus giving them a northeast and southwest direction. The total railway mileage on July 30, 1914, was 9998. Railways having the largest mileage are the Chicago, Burlington, and Quincy (1365), Chicago Great Western (772), Chicago, Milwaukee, and St. Paul (1863), Chicago and Northwestern (1597), Chicago, Rock Island, and Pacific (2203), and the Iowa Central (798). The interurban lines in 1913 had a mileage of 413. The railroad rates are in the hands of the State Railway Commission. The interurban electric railways have been constructed mostly since 1906.

Banks. There were in Iowa on June 4, 1913, 340 national banks, with a total capital of $23,085,000 and total deposits of $234,583,000; 378 State banks with deposits subject to check amounting to $37,065,756 and savings deposits amounting to $24,180,259; 759 stock savings banks, with 354,742 depositors, deposits subject to check amounting to $45,177,018, and savings deposits amounting to $118,984,907; 16 loan and trust companies, with deposits subject to check amounting to $100,404 and savings deposits amounting to $1,134,622; and 84 private savings banks, with deposits subject to check amounting to $1,787,012 and savings deposits amounting to $189,276.

Government. Iowa has been governed under two constitutions. The first was adopted by the people in 1846, and the second, now in force, but amended in several important details, was sanctioned by the people at an election held in 1857. Amendments to the constitution may be proposed in either House of the General Assembly; if agreed to by a majority of the members of each House of two consecutive legislatures, such amendments are submitted to the people. In each tenth year dating from 1870, and also at such times as the General Assembly may provide, the question "Shall there be a convention to revise the constitution and amend the same?" shall be decided by the electors qualified to vote for members of the General Assembly; and in case a majority of the electors shall decide in favor of a convention, the General Assembly at its next session shall provide by law for the election of delegates to such convention.

Legislative.—The legislative authority is vested in a General Assembly, which consists of a Senate and a House of Representatives. The sessions of the General Assembly are biennial, beginning on the second Monday in January next following the election of its members, unless the Governor shall, in the meantime, convene it by a proclamation. Senators are chosen for a term of four years and Representatives for two years. The number of Senators shall be not less than one-third nor more than one-half the representative body. The Senate is composed of 50 members, and the House of Representatives consists of not more than 108 members. Members of the House of Representatives must be at least 21 years of age, and Senators must be at least 25 years of age.

Executive.—The supreme executive power is vested in the Governor, whose term of office is two years. He receives an annual salary of $5000, an allowance of $600 for house rent, and $1200 for services as member of the Executive Council. The Governor must be at least 30 years of age. There is also a Lieutenant Governor, who holds office for two years and is elected at the same time as the Governor. The other executive officers are Secretary of State,

Auditor of State, and Treasurer of State. These continue in office for two years, or until their successors are elected and qualified.

Judiciary.—The supreme court consists of seven judges, four of whom constitute a quorum for the transaction of business. The State is divided into 21 judicial districts, and each district is entitled to from one to five judges. In 1914 there were 59 judges of the district court, elected for a term of four years. A superior court may be established in cities containing 4000 inhabitants. In 1914 there were seven such courts, in the cities of Council Bluffs, Cedar Rapids, Grinnell, Keokuk, Oelwein, Perry, and Shenandoah, elected for terms of four years. An attorney-general is elected for two years, and each county has a county attorney, elected also for two years.

Suffrage and Elections.—Every male citizen of the United States of the age of 21 years, who shall have been a resident of Iowa for six months next preceding the election, and of the county in which he claims his vote 60 days, is entitled to vote at all elections. The general election for State, district, county, and township officers is held on the Tuesday following the first Monday in November. There are statutory provisions for direct primaries and for the direct election of United States Senators. The Legislature of 1913 passed a measure providing for the nonpartisan nomination and election of all judges of courts of record. This includes judges of the supreme court, district court, and superior courts. This Legislature also adopted the amendment to the Federal Constitution providing for the direct election of United States Senators by the people. The Legislature of 1913 also passed a joint resolution providing for the initiative and referendum. This calls for an amendment to the State constitution.

Local and Municipal Government.—The unit of local government is the county. Counties must contain not less than 432 square miles. No county or other political or municipal corporation is allowed to become indebted in any manner or for any purpose to an amount in the aggregate exceeding 5 per cent on the value of taxable property within such county or corporation. The electors of each county elect every two years such officers as are necessary for its government. The cities may establish on the approval of 60 per cent of the voters a department of publicity, development, and general welfare. The Legislature of Iowa was one of the first to authorize the commission form of government for cities, and the system of city government adopted by Des Moines in June, 1907, came to be known as the Des Moines System. It aroused great interest among students of municipal government. (See MUNICIPAL GOVERNMENT.) Other cities which have adopted the commission form of government include Burlington, Cedar Rapids, Fort Dodge, Keokuk, Marshalltown, Mason City, Ottumwa, and Sioux City.

Other Constitutional and Statutory Provisions.—The property rights of husbands and wives are equal, each upon the death of the other inheriting one-third in value of his or her real estate, while neither is liable for the separate debts of the other. Women are eligible to all offices connected with public schools. There is a pure-food law, conforming in its essential provisions to the national law. The use of narcotics by minors is prohibited, as is the sale of cocaine and certain other drugs. County attorneys in certain cases, with the approval of the court or a judge, are allowed to prosecute criminal cases to final judgment on information without the intervention of the grand jury. The Legislature of 1911 created the office of commerce counsel. It is the duty of this officer to investigate the reasonableness of rates charged for service rendered by railroads, express companies, parties, or corporations subject to the jurisdiction of the board of railroad commissioners. In general, he represents the people in matters pertaining to commerce. There is a workmen's compensation law and laws providing for safety in coal mines. The office of dairy and food commissioner was created in 1911. Thus Iowa is nominally under prohibition as the result of prohibitory laws passed in 1884 and in later years. However, the so-called Mulct Law rendered the prohibitory provisions inoperative by permitting the sale of liquor in counties where petitions, requesting licenses, show the valid signatures of 65 per cent of the voters who voted at the last general election, and in cities of 5000 population or more where a special petition shows the valid signatures of a majority of such voters. In cities of 2500 population and under 5000, the law requires a petition with the signatures of 88 per cent of the voters in order to make liquor selling legal. There are laws preventing the sale of liquor on trains, and also a law prohibiting others than qualified electors engaging in the sale of intoxicating liquors. In 1913, 10 cities with a population of 5000 or more were under no-license. The largest of these were Waterloo, Ottumwa, Muscatine, and Mason City. On Jan. 1, 1914, there were 519 saloons in Iowa.

Finance. The report of the State Treasurer for the biennial period 1912–14 shows a balance on hand June 30, 1914, of $737,860. The total debt on July 1, 1914, was $142,313. This was entirely a floating debt. The State has no bonded debt. The chief sources of revenue are the general property tax, tax of insurance companies, the collateral inheritance tax and fees from corporations, tax on motor vehicles, etc. The chief expenditures are for education and for the support of State institutions and State officers.

Militia. The number of males available for military duty in 1910 was 306,669. The organized militia consists of one brigade of infantry and a sanitary troop, which includes a field hospital. The infantry brigade consists of four regiments of 12 companies each. The total number of enlisted men in 1913 was 2768, and the officers numbered 213.

Population. The population of Iowa by decades is as follows: 1840, 43,112; 1850, 19,214; 1860, 674,913; 1870, 1,194,020; 1880, 1,624,615; 1890, 1,912,297; 1900, 2,231,853; 1910, 2,224,771. The estimated population on July 1, 1914, was 2,221,755; 1920, 2,404,021. In 1910 it ranked fifteenth in population among the States, and is the only State in the Union which showed a decrease in the population in the decade 1900–1910. This decrease of 0.3 per cent, while it affected most counties, was confined entirely to the rural population. The urban population (places of 2500 or more) increased from 567,267 in 1900 to 680,054 in 1910. The rural population decreased from 1,664,586 in 1900 to 1,544,717 in 1910; the decrease is attributed partly to the natural tendency which is evident in nearly all the States

for the population to centre in cities, and partly to the fact that, as the improved agricultural land has practically all been taken, many farmers moved to other States and to Canada, where new land could be obtained. The population per square mile in 1910 was 40. The native white population in 1910 numbered 1,935,707, the foreign-born white 273,484, and the negro 14,973. The population was divided by sex in 1910 into 1,148,171 males and 1,076,600 females. Males of voting age numbered 663,672.

There is no large centre of population, and the percentage of urban population is small compared with most of the North Central States. There were in 1910 eight cities with a population of 25,000 or over. These, with their populations in 1910, are as follows: Des Moines, 86,368; Sioux City, 47,828; Davenport, 43,028; Dubuque, 38,494; Cedar Rapids, 32,811; Council Bluffs, 29,292; Waterloo, 26,693; Clinton, 25,577.

Education. Educational standards in Iowa are exceptionally high. This is shown by the fact that the percentage (1.7) of illiteracy in 1910 was lower than any other State. Of a population of 1,760,286 of 10 years of age or over, the illiterates numbered 29,889. The total school population (ages 6 to 21 years), according to the thirteenth census, was 675,222. The total enrollment in the public schools in 1913 was 507,845. There were employed in that year 27,432 teachers, of whom 2544 were men and 24,888 women. The average monthly compensation of men teachers was $83.22 and of women teachers $49.91. The total expenditures for schools in 1913 was $16,442,528. The total number of schoolhouses was 13,858.

Iowa has had administrative problems of unusual difficulty in the conduct of its schools. These include a too great multiplication of school districts, together with a decreasing rural population and the lack of gradation common in the country schools. These problems, however, have been studied carefully, and the difficulties have to a large extent been eliminated. Recent legislatures have passed a number of excellent measures which have contributed largely to the efficiency of the system. Each school district exists as a school corporation, and the consolidation of two or more districts as consolidated independent school districts is provided for. There were, in 1914, 802 high schools with an attendance of 48,770. In addition to these there were many private, normal, secondary, and parochial schools. The Legislature of 1913 enacted a large number of important measures affecting education. Among these was an act to establish a minimum wage for teachers in the public schools. The Department of Public Instruction was reëstablished. The Superintendent of Public Instruction, appointed by the Governor for a term of four years, has supervision over all schools under the control of the State. The Legislature provided for normal training in high schools with State aid, and provision was made also for State aid to consolidated schools. Another measure provided for the teaching of elementary agriculture, domestic science, and manual training in the public schools after July 1, 1915. The compulsory attendance law was amended so that any person having control of any child at the age of 7 to 16 years inclusive is compelled, with exceptions, to cause such child to attend some public, private, or parochial school for at least 24 consecutive school weeks in each school year. Provision was made by this Legislature for the use of school buildings for public recreation grounds. Provision was also made for the education of deaf and dumb persons.

There are two private normal schools: the Normal and Scientific Institute at Bloomfield and the Western Normal College at Shenandoah. The institutions for higher education include Iowa State University at Iowa City, the Iowa State College of Agriculture and Mechanic Arts at Ames, Iowa State Teachers College at Cedar Falls, Coe College at Cedar Rapids, Charles City College at Charles City, Des Moines College at Des Moines, Drake University at Des Moines, St. Joseph's College at Dubuque, St. Ambrose College at Davenport, Parsons College at Fairfield, Upper Iowa University at Fayette, Grinnell College at Grinnell, Lenox College at Hopkinton, Simpson College at Indianola, Ellsworth College at Iowa Falls, Iowa Wesleyan College at Mount Pleasant, Cornell College at Mount Vernon, Penn College at Oskaloosa, Central University of Iowa at Pella, Morningside College at Sioux City, Buena Vista College at Storm Lake, Tabor College at Tabor, Leander Clark College at Toledo, Highland Park College at Des Moines, and Luther College at Decorah. All these, with the exception of St. Ambrose and St. Joseph's College, are coeducational.

Charities and Corrections. The charitable and correctional institutions include the Reformatory at Anamosa, the Cherokee State Hospital at Cherokee, the Clarinda State Hospital at Clarinda, the School for the Deaf at Council Bluffs, the Soldiers' Orphans Home at Davenport, the Industrial School for Boys at Eldora, the State Penitentiary at Fort Madison, the Institution for Feeble-Minded Children at Glenwood, Independence State Hospital at Independence, State Hospital for Inebriates at Knoxville, Soldiers' Home at Marshalltown, Industrial School for Girls at Mitchellville, Mount Pleasant State Hospital at Mount Pleasant, and State Sanatorium at Oakdale. These institutions are all under the supervision of the Board of Control of State Institutions. In addition there are a number of county and private institutions which are also subject to inspection and regulation by this board. The Legislature of 1911 passed a measure suspending the execution of sentence for the first offender except for murder, treason, robbery, or arson. In the same year surgeons in State institutions were authorized to sterilize criminals, idiots, feeble-minded, drug fiends, and epileptics. A commission appointed to investigate conditions in penal and correctional institutions reported in May, 1912, recommending many changes in penal administration, notably the abolition of the contract system and the purchase, for the use of first offenders and good-conduct and short-term convicts, of a farm of 2000 acres near Des Moines.

Religion. While the Roman Catholics have the largest number of members of all churches, the membership of the Methodist church, together with its adherents, is much stronger and is almost twice as great as that of any other Protestant denomination. Among a large number of other churches represented, the largest in their order are: Lutherans, Presbyterians, Baptists, Disciples of Christ, and Congregationalists.

History. The aboriginal inhabitants of the State were the Indian tribes of Iowa (q.v.) and Illinois (q.v.), who in the course of time

were driven from their homes by the Sacs and Foxes. Marquette and Joliet in 1673 and Hennepin in 1680 touched what are now the borders of the State. In 1788 Julien Dubuque, a Frenchman from Canada, obtained from the Indians the grant of a large tract of land, including the site of the city now bearing his name, and the rich mineral country surrounding it. He built a fort there, carried on the mining of lead, and traded with the Indians, but on his death in 1810 the settlement was abandoned. In 1803 the region passed to the United States as a part of the Louisiana cession, and Indian titles to the land were extinguished by treaties in the years 1804, 1832, and subsequently. It formed, in turn, a part of the Territories of Louisiana (organized in 1804), Missouri, Michigan, and Wisconsin. On June 12, 1838, it was organized as the Iowa Territory. In 1832 a number of emigrants settled on the site of Fort Madison, which had been erected by the United States government in 1808 and abandoned five years later. About the same time a settlement was made in the neighborhood of Burlington, and in 1833 Dubuque was founded. Six years later the government was removed to Iowa City, and in 1844 a State constitution was framed and admission to the Union sought for. After some delay, caused by the action of Congress in restricting greatly the boundaries of the new State, and after the rejection of two constitutions, the State was admitted on Dec. 28, 1846. Immigration was rapid and continued in spite of a bloody massacre of whites by Sioux Indians at Spirit Lake in March, 1857. In the same year the original constitution of 1846 was revised and Des Moines was made the capital. In the Civil War, Iowa, whose fundamental law prohibited slavery, took a zealous part. The two most important questions of public moment since 1870 have been railway legislation and prohibition. The development of the State was greatly accelerated by the building of railroads, of which there were, in 1900, nearly 10,000 miles; but with the rise of powerful railway corporations there ensued a continuous conflict between the Legislature and the companies in regard to the taxation of railway property and the regulation of rates. In 1872 an Act taxing railway property was passed, and in 1873 a powerful agitation stirred up by the Patrons of Husbandry (see GRANGE) against the extortionate rates imposed by the companies led to the creation of a board of railroad commissioners for the purpose of determining a maximum rate and preventing discrimination. Radical action on the part of the commissioners caused repeated appeals to the courts, and though many concessions were wrung from the companies, the advantage in general remained with them. A Prohibition amendment adopted in 1882 was promptly declared unconstitutional by the courts. A new law went into effect in 1884 and for some years proved fairly adequate. A very large part of the population, however, was opposed to sumptuary legislation, and in 1890, under the protection of the interstate commerce laws, a successful attempt was made to evade the antiliquor regulations by the importation of alcoholic products from other States. In 1894 the courts declared the prohibitory laws unconstitutional. From 1846 to 1854 the State was Democratic both in national and State politics. From 1854 to 1912 its vote in national elections was cast for the Republican candidate.

The State government, as a whole, has always been in the hands of the Republicans, and only in 1889 and 1891, years of stormy railway and liquor legislation, was a Democratic Governor elected. In the first decade of the twentieth century Iowa, under the leadership of Albert B. Cummins and others, became one of the more radical of the States in the adoption of new political policies. The "Iowa Idea" became the synonym for advanced steps in government. In 1908 Senator Allison, who early in the year had received the nomination to succeed himself to the United States Senate, died on August 4. At a special session held by the Legislature, Governor Cummins failed to be elected to the vacancy. However, at the senatorial primary held during the general election, he was nominated by a large majority and subsequently elected. In the election on November 3 the vote for President and Governor was as follows:

PRESIDENT		GOVERNOR	
Taft, Rep.	275,210	Carroll, Rep.	256,980
Bryan, Dem.	200,771	White, Dem.	194,129

The campaign and elections of 1910 were of especial interest, since the Progressives were stronger in Iowa than in any other State except Kansas. Governor Carroll received the Republican nomination for reëlection by a small margin, and after a spirited campaign was elected. Two Democratic congressmen were elected. Senator Dolliver died on October 15 of that year, and after a 12-week deadlock the Legislature, in 1911, elected William S. Kenyon to complete the term expiring on March 4, 1913. On June 3, 1912, Senator Kenyon received the nomination for reëlection over Lafayette Young, his principal opponent. He was reëlected by the Legislature on Jan. 21, 1913. A Republican Legislature was elected, insuring the election of a Republican Senator. In November, 1914, Senator Cummins was reëlected. The Progressive vote showed a great decline. The State has 11 members in the national House of Representatives. The vote for President and Governor in 1912 was as follows:

PRESIDENT		GOVERNOR	
Wilson, Dem.	185,276	Clarke, Rep.	184,148
Roosevelt, Prog.	161,783	Dunn, Dem.	182,449
Taft, Rep.	119,811	Stevens, Prog.	71,877

The Governors of Iowa since its organization as a Territory have been as follows:

TERRITORIAL

Robert Lucas		1838–41
John Chambers		1841–46
James Clark		1846

STATE

Ansel Briggs	Democrat	1846–50
Stephen Hempstead	"	1850–54
James Wilson Grimes	Whig and Free-Soil Democrat	1854–58
Ralph P. Lowe	Republican	1858–60
Samuel J. Kirkwood	"	1860–64
William M. Stone	"	1864–68
Samuel Merrill	"	1868–72
Cyrus C. Carpenter	"	1872–76
Samuel J. Kirkwood	"	1876–77
Joshua G. Newbold	"	1877–78
John H. Gear	"	1878–82
Buren R. Sherman	"	1882–86
William Larrabee	"	1886–90
Horace Boies	Democrat	1890–94
Frank Darr Jackson	Republican	1894–96
Francis Marion Drake	"	1896–98
Leslie Mortimer Shaw	"	1898–1902
Albert B. Cummins	"	1902–08
B. F. Carroll	"	1908–12
George W. Clarke	"	1912–16
W. L. Harding	"	1916–20
W. E. Kendall	"	1920–

Bibliography. Monette, *History and Discovery of the Mississippi Valley* (New York, 1846); Hyatt, *Manufacturing, Agricultural, and Industrial Resources of Iowa* (Des Moines, 1873); *Iowa Geological Survey Publications* (ib., 1893 et seq.); *State Historical Society Annals* (Iowa City); B. F. Shambaugh, *Documentary Material relating to History of Iowa* (3 vols., 1895–1901); H. M. Bowman, *Administration of Iowa* (New York, 1903); B. F. Gue, *History of Iowa* (4 vols., ib., 1904); Macy and Geiser, *Government of Iowa* (Boston, 1905); John Todd, *Early Settlement and Growth of Western Iowa* (Des Moines, 1906); D. G. McCarty, *Territorial Governors of Old Northwest* (Iowa City, 1910); McFee, *Story of Iowa* (Des Moines, 1912); Meyerholz, *History and Government of Iowa* (Chicago, 1912); Chandler, *Iowa and the Nation* (ib., 1913). Consult also reports of the State departments and statutes.

IOWA. The name of a tribe of American Indians, belonging to one of the main divisions of the great Siouan linguistic family. At the beginning of the eighteenth century they dwelt in Minnesota and afterward farther south in the area which now bears their name. They were called Pahotcha or Pahucha (dusty noses) in their own tongue, Ayanway by Lewis and Clark, and Ajowes by French traders. In 1836 they were moved to the west bank of the Missouri above Wolf River, and in 1861 they ceded part of their lands to the United States, settling upon reservations in Kansas and Oklahoma. In culture they were similar to the Omaha, being an agricultural buffalo-hunting people. At present they number but 224. There is no good published account of this tribe, but for a brief sketch consult W. H. Miner, *Iowa Indians: A Sketch of their History* (Cedar Rapids, Iowa, 1912).

IOWA, State University of. A State institution for higher education, founded at Iowa City, Iowa, by Act of the Legislature passed in 1847. The capitol, together with the land upon which it stood, was given to the university in view of the contemplated removal of the seat of government from Iowa City. The delay in removing the capital prevented the opening of the institution until March, 1855. The organization of departments began in the same year. From 1858 until 1860, owing to the lack of funds, the normal department was the only one in operation, and the university was reorganized in 1860. The law department was established in 1868, the medical department in 1876, the dental department in 1882, the department of pharmacy in 1885, the Graduate College in 1900, the College of Applied Science in 1905, the College of Fine Arts, or Mark Ranney Memorial Institute of Fine Arts, in 1911, and the College of Education in 1913. In 1909, pursuant to an act of the General Assembly, the control of the university, together with that of the Iowa State Teachers College and the Iowa State College of Agriculture and Mechanic Arts, passed into the hands of the State Board of Education. The university is an integral part of the public-school system of the State. Its work is based upon the preparation afforded by the duly accredited high schools, whose students are admitted to the undergraduate and professional courses upon the presentation of the proper certificates—except in the colleges of medicine and law, which require two years of collegiate work in preparation. The State, through the university, undertakes to furnish instruction in the various branches requisite for an education in the liberal arts, law, medicine, dentistry, pharmacy, fine arts, nursing, and engineering. It also aims to encourage research work in all departments. The income of the university is derived from the university funds and lands originally given by the United States and appropriations made by the State Legislature. The campus includes some 50 acres in the centre of Iowa City. On this are about 30 buildings, which are grouped around the historic old capitol grounds. The Iowa River has been dammed just below the university grounds, providing a water front for the enlarged campus and good facilities for aquatic sports. The majority of the buildings are new. The university is coeducational. In the collegiate year 1913–14 the total enrollment in all departments was 2669, and of these 1679 were men and 990 women. In the College of Liberal Arts were 1392, in the College of Law 203, in the College of Medicine 109, in the College of Homœopathic Medicine 5, in the College of Dentistry 246, in the College of Pharmacy 62, in the Graduate College 328. The faculty numbers about 275. The university library contains about 100,000 volumes and the university law library about 15,000 volumes. The publications of the university include a natural history bulletin, a law bulletin, university studies in psychology, and studies in sociology, economics, politics, languages, and history. The control of the university is vested in the State Board of Education, and the finances are administered by a finance committee, consisting of three members appointed by the board. The acting president in 1914 was T. H. Macbride, Ph.D.

IOWA CITY. A city and the county seat of Johnson Co., Iowa, on the Iowa River, 54 miles west by north of Davenport, on the Chicago, Rock Island, and Pacific and the Cedar Rapids and Iowa City railroads (Map: Iowa, F 3). The State University occupies the grounds and buildings of the former capitol, and also seven fine buildings erected by the Commonwealth. In Iowa City are the State Historical Society Library, Ranney Memorial Library, Iowa City Academy, Mercy Hospital, and the medical department and homœopathic hospitals connected with the university; and among other prominent structures are the county courthouse, a Carnegie library, Masonic Temple, post office, State tuberculosis sanitarium, and opera house. The industrial establishments comprise meat-packing plants, agricultural-implement works, a large jewelry factory, flour mills, knitting mills, glove and mitten factories, broom factories, soap and perfume factories, brick and tile works, a foundry, machine shops, etc. The government is administered by a mayor, elected every two years, and a unicameral council. Pop., 1900, 7987; 1910, 10,091; 1914 (U. S. est.), 10,412; 1920, 11,267. Founded in 1839 and incorporated in 1853, Iowa City was from 1839 to 1857 the capital of Iowa Territory and State. It was connected with the East in 1855 by the completion of the Mississippi and Missouri Railroad. Consult "The Historic Capital of Iowa," in *Magazine of American History*, vol. xxi (New York, 1888), and B. F. Shambaugh, *Iowa City: A Contribution to the Early History of Iowa* (Iowa City, 1893).

IOWA COLLEGE, The Trustees of. The legal name of the institution commonly known

as GRINNELL COLLEGE (q.v.). The name gave much trouble because of the confusion with the State University and the State College, and in 1909 the trustees authorized the name Grinnell College for use in all ordinary cases. This is the name used on all publications of the college.

IOWA FALLS. A city in Hardin Co., Iowa, on the Iowa River, 50 miles east of Fort Dodge, on the Chicago and Northwestern, the Illinois Central, and the Chicago, Rock Island, and Pacific railroads (Map: Iowa, D 2). It is the seat of Ellsworth College and contains a Carnegie library. A large shipping trade in grain, produce, and stone is carried on; and there are gasoline-engine works, tile and ditcher factories, etc. Iowa Falls adopted the city-manager plan of government in 1914. Pop., 1900, 2840; 1910, 2797.

IOWA RIVER. A river in the State of Iowa, rising in Hancock County, near the Minnesota line, and flowing southeast into the Mississippi, about 30 miles north of Burlington (Map: Iowa, F 3). It is 300 miles long and navigable to Iowa City, about 66 miles from its mouth. The river's drainage area is about 12,400 square miles, not including the basin of its chief tributary, the Cedar River (7600 square miles).

IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS. A coeducational State institution at Ames, Iowa, established by Act of Legislature in 1858. In 1862 the college came into possession of a grant of public lands bestowed by general act of Congress for the purpose of fostering agricultural and mechanic education. It was formally opened in 1869. It is a college of advanced technology, organized in divisions of agriculture, engineering, home economics, industrial science, and veterinary medicine. The department of agriculture is designed to give a general training for the career of a farmer and, in its longer course, to develop specialists in particular lines of work. A well-stocked farm provides practical work in all the agricultural processes, and the Iowa Experiment Station, in intimate relation to the college work of instruction, gives opportunity for original investigations of agricultural problems. In addition to courses in mechanical, civil, electrical, and mining engineering, the college gives instruction in clay working and ceramics and has a department of technology intended to equip students for the manufacturing industries. The division of industrial science supplies foundations in science, language and literature, and economic science. In the instruction of women emphasis is laid on the course in home economics. All male students are required to become members of the college battalion. The college domain includes about 1175 acres, of which about 120 acres form the campus. The buildings number 17 besides dwelling houses and buildings for farm stock, machinery, and work, all valued at $2,000,000. The endowment in 1914 was $683,709, the income $349,407, and the value of all the college property $3,000,000. The library contained 45,000 volumes. Tuition is free to residents of Iowa, students from other States paying an annual fee of $50. Students are admitted on examination or on certificates from accredited schools. The college has of late developed rapidly and in 1914 had an attendance of 3458 students and a faculty of 217 members. The president in 1914 was Raymond A. Pearson.

IOWA WESLEYAN COLLEGE. A coeducational institution for higher learning founded at Mount Pleasant, Iowa, in 1842, under the control of the Methodist Episcopal church. In 1914 it had an attendance of 298, including 195 collegiate and 55 preparatory students. The faculty numbered 27. The endowment of the college is about $300,000, and the annual income about $40,000. The grounds and buildings are valued at about $225,000. The library contains about 11,000 volumes, exclusive of government documents. The president in 1914 was Edwin A. Schell, Ph.D.

IPECACUANHA, ĭp'ĕ-kăk'ū-ăn'ȧ (Portug., from Brazilian *ipecaaguen*, small wayside plant emetic, the native name). The name both of a very valuable medicine and of the plant producing it. According to the American and English pharmacopœias the source of this drug is *Cephaelis ipecacuanha* (referred by some botanists to *Psychotria ipecacuanha* and *Uragoga ipecacuanha*), which belongs to the family Rubiaceæ and grows in damp, shady woods in Brazil and some other parts of South America. It is somewhat shrubby, with a few oblong-lanceolate leaves near the ends of the branches, long-stalked heads of small white flowers, and soft, dark purple berries. The part of ipecacuanha used in medicine is the root, which is simple or divided into a few branches, flexuous, about as thick as a goose quill, and is composed of rings of various size, somewhat fleshy when fresh, and appearing as if closely strung on a central woody cord. The different kinds known in commerce (gray, red, brown) are all produced by the same plant, the differences arising from the age of the plant, the mode of drying, etc. Ipecacuanha root is prepared for the market by mere drying. It is collected at all seasons, although chiefly from January to March.

IPECACUANHA.
a, root.

The plant is seldom cultivated in South America, but is sought for in the forests chiefly by Indians. It has been successfully cultivated in India and elsewhere, but the slow growth and low price have kept it from being profitable. Various other plants are used as substitutes for it. The ipecacuanha of Venezuela is produced by *Sarcostemma glaucum*, of the family Asclepiadaceæ; and to this family belongs *Tylophora asthmatica*, the root of which is found a valuable substitute for ipecacuanha in India. Other un-

officinal plants which are said to resemble ipecac in their effect are *Richardsonia pilosa, Richardsonia rosea, Psychotria emetica,* and various species of *Ionidium. Gillenia stipulata* is called American ipecac.

It is in the bark of the root that the active principle, the emetine, almost wholly lies, the other ingredients, such as fatty matters, starch, pectine, saccharose, choline, lignine, etc., being almost entirely inert. Emetine is represented by the formula $C_{28}H_{40}N_2O_5$ according to Lefort and Wurtz, and by $C_{30}H_{44}N_2O_4$ according to Glenard. It is a white, inodorous, almost insipid powder, moderately soluble in alcohol, and having all the characters of the vegetable alkaloids. It acts as a violent emetic in doses of one-sixteenth of a grain or even less, and is a powerful poison. In small and repeated doses ipecacuanha increases the activity of the secreting organs, especially of the bronchial mucous membrane, and of the skin. In larger doses it excites nausea and depression, while in still larger doses it acts as an emetic, without producing such violent action, or so much nausea or depression, as tartar emetic. Ipecacuanha is useful as an emetic when it is necessary to unload the stomach in cases where there is great debility or in childhood. As a nauseant, expectorant, and diaphoretic, it is prescribed in bronchitis, etc., and in disorders in which it is desired to increase the action of the skin. Besides the powder, the most useful preparations are the wine of ipecacuanha and Dover's powder, in which ipecacuanha is a constituent. To produce the full effect as a sudorific, a dose of Dover's powder should be followed by copious drafts of some warm and harmless drink.

IPEK, ê-pāk′ (i.e., silk), Serb **PEČ,** pĕch. A pleasant town of Montenegro, on the Bistrica (Bitritsa), or White Drin, close to the Servian frontier (Map: Balkan Peninsula, C 3). The houses are large and handsome, and as a rule have gardens in which fruit and mulberry trees are cultivated. Silk is extensively spun, and arms are manufactured. Ipek has a celebrated monastery, the former residence of the Servian patriarchs. Pop., about 10,500, mostly Serbs and Albanians. Ipek belonged for centuries to the Ottoman Empire, constituting an important town in the Sanjak of Novibazar, but in accordance with the territorial settlements of 1913, which followed the Balkan War (q.v.), it came into the possession of Montenegro.

IPHIC′RATES (Lat., from Gk. *Ἰφικράτης, Iphikratēs*). An Athenian general of the first half of the fourth century B.C. He was of humble parentage. At an early age he began his military career in the so-called Corinthian War. He was in command of the Athenian troops at Lechæum, near Corinth, in 393 B.C., where the Spartans were victorious over the allies. Immediately afterward he proceeded to introduce important changes in the armor and discipline of his troops. Thus, he made their swords and javelins longer, and, by substituting linen corselets for coats of mail, and light leggings or greaves for heavier greaves of metal, he made them capable of much greater rapidity of movement. With a band of the light-armed troops, called *peltasts,* he unexpectedly fell upon and destroyed or put to rout a Lacedæmonian *mora* of hoplites, or heavy-armed infantry, 600 strong, near Corinth. In 389 B.C. he was sent to Thrace to combat the Spartans under Anaxibius, and by a well-planned attack he inflicted a crushing defeat upon the Lacedæmonians. After the Peace of Antalcidas (387 B.C.) Iphicrates remained in Thrace, employing his peltasts in the service first of King Seuthes and then of King Cotys. In 378 B.C. he was sent, at the request of Pharnabazus, to assist Artaxerxes II in reconquering Egypt, but the undertaking was a failure. In 373 B.C. he was appointed joint admiral with two others to go to the relief of Corcyra, then besieged by the Spartans; in this command he was successful. In 369 B.C. he was sent to the neighborhood of Corinth to assist the Spartans against the Thebans, and later in the same year he commanded a small squadron on the coast of Macedonia. He remained in this neighborhood three years and was instrumental in retaining the family of Amyntas on the throne of Macedonia. He later held a command in the Social War (see GREECE, *Ancient History*), but was arraigned, on a charge preferred by Chares, his colleague, for neglect of duty and traitorous conduct in the battle at the Hellespont. He was acquitted, though his colleague Timotheus, who was arraigned at the same time and on the same charge, was fined 100 talents. Iphicrates died in Thrace (or, as some say, in Athens) in 353 B.C. Consult the Latin Life of Iphicrates by Cornelius Nepos, and, for his changes in the equipment of his troops, etc., Bauer, *Die griechischen Privat- und Kriegsaltertümer* (2d ed., Munich, 1893).

IPH′IGENI′A (Lat., from Gk. *Ἰφιγένεια, Iphigeneia*), or **IPH′IANAS′SA** (Lat., from Gk. *Ἰφιάνασσα*: see Leaf on *Iliad,* ix, 145, and Merrill on Lucretius, i, 85). According to the usual Grecian legend, a daughter of Agamemnon and Clytemnestra. Her father having offended Artemis, the Greek fleet, when on its way to Troy, was detained at Aulis by calms and a plague. Calchas, the seer, declared that only the sacrifice of Iphigenia could appease the goddess. At the altar the goddess took pity on the victim, substituted a hind, and carried Iphigenia in a cloud to Tauris (see CHERSONESUS, 2), where she became priestess of the Tauric Artemis, to whom strangers were offered in sacrifice. Thither came her brother Orestes (q.v.), and he was on the point of being sacrificed when he was recognized by his sister. Together they fled with the sacred wooden image of Artemis to Sparta, Argos, or, according to the Attic version, to Brauron in Attica, where Iphigenia remained as priestess of Artemis Brauronia, or Artemis Tauropolos, and where her grave was shown. (See BRAURONIA.) Hesiod declared that Iphigenia did not die, but was by Artemis made the goddess Hecate. The Spartans declared that the image of the Tauric Artemis was brought to Laconia, and that there the goddess was worshiped as Artemis Orthia. The legend is unknown to the Homeric poems, but was told in the *Cypria* (q.v.) and later became very popular, especially through the influence of the Athenian dramatists. The story is also represented on late vases, sarcophagi, and Pompeian wall paintings. Iphigenia is originally a goddess akin to Artemis and worshiped in early times with bloody rites, or else her whole story was developed out of an epithet of Artemis. Consult: M. C. H. E. Jacobsen, *De Fabulis ad Iphigeniam Pertinentibus* (Königsberg, 1888); R. Förster, *Iphigenie* (1898); C. M. Gayley, *The Classic Myths in English Literature and Art* (2d ed., Boston, 1911);

F. A. Hall, *Iphigenia in Literature* (St. Louis, 1911). The story figures largely in plays, Greek and Latin, and in modern literatures. See IPHIGENIA AMONG THE TAURI; IPHIGENIA AT AULIS; IPHIGÉNIE; IPHIGENIE AUF TAURIS; IPHIGÉNIE EN AULIDE; IPHIGÉNIE EN TAURIDE; IPHIGENIE IN DELPHI.

IPHIGENIA AMONG THE TAU'RI (Gk. *Ἰφιγένεια ἡ ἐν Ταύροις, Iphigeneia hē en Taurois*). A play of Euripides, produced about 412 B.C., continuing the story of Iphigenia after her rescue from the sacrifice, and her transportation to Tauris, where she is made the priestess of Artemis. Orestes, pursued by Furies, comes with his friend Pylades to Tauris, and is to be sacrificed to the goddess, when he is made known to his sister in a touching scene, and carries her back to their land. The play is original and careful in plot, and is the best known of the works of Euripides.

IPHIGENIA AT AU'LIS (Gk. *Ἰφιγένεια ἡ ἐν Αὐλίδι, Iphigeneia hē en Aulidi*). A play by Euripides, produced after his death by his son in 405 B.C. Its subject is the intended sacrifice of Iphigenia, who is saved by Artemis by the substitution of another victim. The play, which is probably the last written by Euripides, seems to have been left unfinished. Of his tragedies, it alone has no prologue.

IPHIGÉNIE, ē'fē'zhā'nē'. A tragedy by Racine, dealing with the Greek story of Iphigenia, first produced at Versailles in 1674.

IPHIGENIE AUF TAURIS, if'ē-gā'nĭe ouf tou'rĭs (Ger., Iphigenia in Tauris). A metrical drama by Goethe produced in 1789.

IPHIGÉNIE EN AULIDE, ē'fē'zhā'nē' äN'-nō'lēd' (Fr., Iphigenia in Aulis). An opera by Gluck (q.v.), produced in Paris, April 19, 1774.

IPHIGÉNIE EN TAURIDE, äN tō'rēd' (Fr., Iphigenia in Tauris). An opera by Gluck (q.v.), first produced in Paris, May 18, 1779 and then in the United States, November 25, 1916 (New York).

IPHIGENIE IN DELPHI, if'ē-gā'nĭe ĭn dĕl'fē. A dramatic poem by Friedrich Halm (1856), a continuation of Goethe's *Iphigenie.*

I'PHIS (Lat., from Gk. *Ἶφις*). A Cretan girl, brought up as a boy, betrothed to Ianthe, and at her mother's entreaty changed into a man by Isis on the wedding day.

IPIALES, ē-pyä'lās. A town of Colombia, situated in the western part of the Department of Cauca, on the frontier of Ecuador (Map: Colombia, B 3). It lies at an altitude of over 10,000 feet and has a customhouse. The population is estimated at over 10,000.

IP'OMŒ'A (Neo-Lat., from Gk. *ἶψ, ips,* worm + *ὁμοῖος, homoios,* like). A genus of the family Convolvulaceæ, differing very little from the genus *Convolvulus,* embracing about 400 species of tropical and warm-temperate plants. The species are mostly twining or trailing herbs and shrubs, although in the tropics a few become arborescent. Many are cultivated for their beautiful flowers, as the morning-glory and moonflower; others for their thick fleshy roots, as the sweet potato (*Ipomœa batatas*) and jalap (q.v.) (*Ipomœa purga*). The large fleshy roots of *Ipomœa batatilla, Ipomœa fastigiata,* and *Ipomœa digitata* are sometimes employed in the same way as sweet potatoes, and *Ipomœa megapotamica, Ipomœa cathartica,* and *Ipomœa jalapa* have properties similar to jalap, though less active. The ornamental species are very numerous and are easily cultivated. *Ipomœa quamoclit,* the cypress vine, beautiful in both flower and foliage, is a native of tropical America, but now well established in the warmer portions of the United States. *Ipomœa versicolor* and *Ipomœa purpurea,* natives of Mexico and tropical America, are among our most common morning-glories, the latter having escaped from gardens and become naturalized throughout nearly the whole country. The famous Japanese morning-glories are referred to *Ipomœa hederacea* by some authorities. There are many strains that have been developed by selection, some of them of very great beauty. The moonflowers are derived from *Ipomœa bona-nox* and *Ipomœa grandiflora.* The flowers open in the evening and close before noon of the next day. They are pure white or striped with green and very fragrant. *Ipomœa fastigiata* and *Ipomœa leptophylla,* both indigenous to the United States, are noted for their large fleshy roots, specimens weighing 20 pounds of the former and 100 pounds of the latter being not uncommon. They grow in dry soils, their thickened roots protecting them from injury by drought. *Ipomœa fastigiata,* known as man-of-the-earth and wild potato vine, in some regions is a troublesome weed, difficult of extermination on account of its huge roots. *Ipomœa arborescens,* a Mexican species, is a tree 20 to 30 feet high and a foot in diameter. See Plate of DICOTYLEDONS.

IPPOLITOV-IVANOV, ēp-pŏl'ē-tŏf-ē-vä'nôf, MICHAIL MICHAILOVITCH (1859–). A Russian composer, born in Gatchina, Nov. 19, 1859. From 1875 to 1882 he was a pupil of the St. Petersburg Conservatory, where he studied composition under Rimsky-Korsakov. For the next 10 years he lived in Tiflis, in the Caucasus, as director of the conservatory and conductor of the symphony concerts and the opera, both affiliated with the Imperial Russian Music Society. During this stay he became deeply interested in the folk songs of the Caucasian district, especially those of Georgia. The results of these studies he published later in a book, *The Georgian Folk-Song* (in Russian), which has become the standard authority. Through the influence of Tschaikowsky he became in 1893 professor of composition at the conservatory in Moscow, and in 1906 succeeded Safonoff as director of that institution. After 1899 he was also conductor of the Moscow Private Opera, through which he greatly encouraged the efforts of the younger nationalist composers, although his personal sympathies inclined more towards the style of Tschaikowsky. His chief works are: the operas *Ruth* (1887), *Assya* (1900), *Yabava Putyatishna* (1901), *Treachery* (1911); a concert overture *Yar Khmel;* a symphonic scherzo; an orchestral suite, *Caucasian Sketches;* a sinfonietta; several cantatas and choral works, *a cappella* and with orchestra; chamber music of a very high order; songs; compositions for piano.

IPSAMBUL, ĭp'säm-bo͞ol'. See ABU-SIMBEL.

IPSARA, ĭp-sä'rä. See PSARA.

IP'SUS (Lat., from Gk. *Ἶψος*). A town of Phrygia, Asia Minor, near the modern village of *Eski-kara-hissar.* It is noted for the battle (301 B.C., or, as Grote attempts to show, 300 B.C.) in which Antigonus and his son, Demetrius Poliorcetes, were overthrown by Seleucus and Lysimachus. Ipsus was the seat of a Christian bishop in the seventh and eighth centuries.

IPSWICH, ĭps'wĭch *or* ĭps'ĭch. A town of Stanley Co., Queensland, Australia, on the

Bremer, at the head of navigation, 23 miles west of Brisbane (Map: Queensland, H 9). It has manufactures of woolens, lumber, and ironwork, and, as the centre of a rich agricultural and coal-mining district, is a place of increasing business importance. In North Ipswich are large railway shops. Pop., 1901 (with suburbs), 15,246; 1911, 14,028, (with suburbs) 25,000.

IPSWICH. A municipal, county, and parliamentary borough, the county town of Suffolk, England, on the Gipping River, 11 miles northwest of Harwich (Map: England, H 4). The older portion of the town consists of narrow and irregular streets and contains many quaint old houses. Its notable public buildings include a modern town hall, corn exchange, an art museum, and the Tudor mansion in Christchurch Park. Among its educational institutions are the grammar school founded in 1477, an endowed girls' school, and a workingmen's college. It manufactures iron goods, railway supplies, fertilizer, bricks, sacking, agricultural implements, tobacco, clothing, shoes, and soap, and has shipbuilding establishments. Its docks and lock are commodious and admit vessels of 19-foot draft. The town owns profitable real estate, wharves, and markets, and maintains baths, free library with museum and school of science, and an arboretum with two well-laid-out pleasure grounds. Ipswich has sent two representatives to Parliament since 1447. It has Roman remains, but is first mentioned in 991 and 1000, when sacked by Northmen. Numerous charters date from the first granted by King John in 1199. Pop., 1901, 66,630; 1911, 73,932. In 1909 important anthropological discoveries were made. Consult John Wodderspoon, *History of Ipswich* (Ipswich, 1850), and "Manuscripts of the Corporation of Ipswich," in Great Britain Historical Manuscripts Commission, *Reports*, vol. ix (London, 1883).

IPSWICH. A town in Essex Co., Mass., on the Ipswich River, 28 miles northeast of Boston, on the Boston and Maine Railroad (Map: Massachusetts, F 2). It possesses the Heard Library, the Coburn Home for Aged Women, a House of Correction, and the Manning High School. The Ipswich Historical Society, founded in 1890, possesses a collection of old furniture, documents, etc., and its contributions to historical literature also are of value. There are planing and grist mills, some clam interests, and manufactures of hosiery, isinglass, heels, boats, and canoes. The government is administered by town meetings. Ipswich owns its water works and electric-light plant. Pop., 1900, 4658; 1910, 5777. Ipswich was settled as Agawam in 1633 by John Winthrop and 12 associates, and in the following year the Massachusetts General Court passed a resolution that "Agawam shall be called Ipswitch" (from Ipswich, England). When in 1687 Governor Andros levied an arbitrary tax, the town formally protested, on the ground that this tax "infringed their liberty as free English subjects of his Majesty, and the statute law that no taxes should be levied upon his subjects without the consent of an assembly chosen by the freeholders for assessing the same." Several of its citizens were thereupon arrested and punished, one of the judges asserting that English laws did not extend to America, and that colonists had no more privileges left them "than not to be sold as slaves." This was one of the earliest instances of Colonial resistance to arbitrary taxation. Ipswich was the home for a time of Nathaniel Ward, Anne Bradstreet, Nicholas Easton, William Hubbard, and John Norton.

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IPSWICH MAN. See MAN, SCIENCE OF, *Ancient Types*.

IQUIQUE, ê-kē'kâ. A seaport and the capital of the Department of Tarapacá, in northern Chile, on the coast (Map: Chile, E 2). It is regularly built, but lies in such an arid district that its water supply is secured by an aqueduct from Pica, a distance of 88 miles. Inland are the famous saltpetre mines for which the town is the port, and with which it is connected by a railroad, and a few miles to the north are the famous silver mines of Huantajaya. The harbor is very well sheltered, but its rocky shore and the strong surf make it necessary for vessels to anchor a considerable distance from the shore. Besides saltpetre, the town exports borax, iodine, and copper ores. The imports are chiefly machinery and fuel for the mines. In 1911 the imports amounted to $27,975,005, and the exports to $64,849,196 (bulk saltpetre). It is the seat of a United States consul. Pop., 1914, estimated at 45,000. Iquique suffered from earthquakes in 1868 and 1877. It formerly belonged to Peru and in 1879 was the scene of a naval battle between Peru and Chile, being occupied by the latter in 1880. In 1891 it was bombarded and captured by insurgents against the Chilean government.

IQUITO, ê-kē'tô. An important tribe, living about the junction of the Napo River with the Marañon (Amazon), eastern Ecuador. They are expert spearmen and are noted for their making of *chicha* liquor, which they flavor with the twigs of a plant having the effect of an opiate. In religion they are still devoted to fetichism.

IQUITOS, ê-kē'tôs. A city of Peru, the capital of the Department of Loreto (Map: Colombia, C 4). It is situated on the Amazon River, 2500 miles from Pará, Brazil, at the head of navigation for ocean steamers, and has extensive docks for handling its trade. It is connected with Europe by three steamship lines with regular sailings. Above Iquitos the Amazon is navigable to river steamers for 425 miles. It is 1268 miles from Lima, the journey thence, by rail, mule back, and river steamer, occupying 17 days, which time will be reduced when the railway connecting the Amazon with the port of Paita, on the Pacific, is completed. It is the centre of a very extensive rubber trade, this product from the districts along the Huallaga, upper Amazon, and Madre de Dios rivers forming the chief export. It is the second port of Peru, having in 1910 imports to the amount of $4,373,946 and exports, $5,428,064. It is the seat of a United States consul. Iquitos was founded in 1863 for the purpose of having a

port in direct connection with the Atlantic Ocean. It has a mean annual temperature of 75° F. Pop., 14,000.

IRADE, ē-rä′dā (Turk. *irādah*, will, desire). An Imperial decree promulgated by the Sultan of Turkey and corresponding to the European order in council.

IRAK, ē-räk′. The name of an indefinitely bounded region extending on both sides of the confluence of the Euphrates and the Tigris, from the Syrian desert northeastward to the Elburz Mountains, on the south shore of the Caspian Sea (Map: Turkey in Asia, E 4). The region consists chiefly of sandy desert lowlands in the west, called Irak-Arabi, and in the east a region of parallel ridges and furrows, mostly barren, with fertile river valleys, called Irak-Ajemi. Irak-Arabi is nearly coterminous with ancient Babylonia and includes parts of the modern Turkish vilayets of Bagdad and Basra. It includes the ruins of the ancient cities of Babylon, Seleucia, and Ctesiphon, and the modern cities of Bagdad, Basra, and Kerbela (Meshed Hussein). Irak-Ajemi coincides nearly with the ancient Media and includes a large part of western and central Persia, containing its largest and most flourishing cities, Ispahan, Teheran, and Hamadan. The population of the whole of Irak is estimated at about 3,000,000. The inhabitants of the western part are largely nomadic.

IRAK-AJEMI, -äj′*e*-mē′. See IRAK.

IRAK-ARABI, -ä′rà-bē′. See IRAK.

IRAN, ē-rän′. The native name of Persia, in its broadest sense. (See PERSIA.) The word *Irān* itself, in its modern form, is earlier found as *Erān* (whence often Eranian as an adjective), and it is ultimately connected with *Aryan* (q.v.) as a racial designation. In the *Avesta* (q.v.) the people speak of themselves as *Airyâ dainhavō* (Aryan nations), and *Ariya* in the Old Persian cuneiform inscriptions is employed in the sense of what we should to-day call Persian in the larger application of the term. As a more or less defined unit in ancient and modern times, the land of Iran is important geographically, ethnologically, historically, and linguistically.

Geography and Ethnology of Iran. As far as modern times are concerned, the more important geographical and ethnological points connected with Iran will be found treated under PERSIA. In remote times, as later, the Iranian boundaries comprehended the entire region from the Caucasus, the Caspian Sea, and Russian Turkestan on the north, to the Tigris, the Persian Gulf, and the Arabian Sea on the west and south, and extended to the Indus on the east, likewise comprising the modern Afghanistan and the territory to the north of it as far as the Jaxartes River (Sir Darya). The wide extent of this area showed as great a variety of climate, extremes of heat and cold, in antiquity as at present, and presented considerable diversity of features and characteristics. While the larger part of the country has ever been marked as highland or mountainous, there are extensive low or depressed tracts, with salt deserts and arid wastes alternating with swampy districts and plains. What we know of the country in antiquity shows that it was generally fertile and well wooded in parts; but irrigation is not infrequently referred to. With regard to territorial distribution in ancient times, it may be added that in the *Avesta* the lands on the west which came more prominently into notice were the country known in history as Media (q.v.), including Azerbaijan or Atropatene (q.v.), and the districts about the Caspian Sea, and on the east, Bactria (q.v.), including the modern territories of Khorassan and Seistan, together with parts of the present Afghanistan. Persis (ancient *Pārsa*), or Persia proper, is first mentioned at the time of the founding of the Achæmenian kingdom. (See ACHÆMENES.) From that time the real history of the Iranian Empire as a whole begins. Ethnologically the Iranian people are members of the Aryan or Indo-Germanic family. The general Iranian type may be deduced by a comparison of the racial features of the Persians, Kurds, Ossetes, Baluchis, Afghans, and inhabitants of the Pamir districts. The Iranian type, however, has been somewhat affected, even from the earliest times, by admixture with the adjoining Semitic, Turanian, and Indian tribes that border on the land itself. On the other hand, the spread of Iranian blood beyond its own country may be recognized, e.g., among the people of northwestern India. Similarly, Iranian lineaments, like linguistic traits, may be found penetrating into Armenia and Asia Minor, even from a remote period in the past. When the gradual dispersion of the Aryan or Indo-Germanic tribes took place in prehistoric times, it is presumed that the Iranians may have entered the great plateau from the north, on the west of the Oxus and Jaxartes, and have thus begun their advance into the country that later became their habitat. Linguistic, mythological, and religious evidences prove that they must long have remained in union with their Indian cousins.

History of Iran. The beginnings of Iranian history are shrouded in darkness, although the existence of an ancient kingdom in Bactria is inferred from early Oriental and classical references. (See BACTRIA.) With the Median kingdom, however, we are on historic ground, even though the early tradition of a Median conquest of Babylonia (2400 B.C.) as recorded by Berosus (q.v.) may not be authentic. Nevertheless, with the presumed advance of the Iranian peoples westward in their land, the Medes came earliest into real prominence, and though subject to Assyria for centuries, they were able to throw off the Assyrian yoke about the ninth century B.C., and real unity was given to the Median kingdom in the eighth century by Deioces, an able Iranian monarch. (For the subsequent history of the kingdom, see MEDIA.) The account of the overthrow of the Median dynasty by Cyrus (about 550 B.C.), and the events which led to the founding of the great Persian Empire of the Achæmenian kings, and to its fall through Alexander the Great, will be found in the several articles devoted to those topics. The Seleucid dynasty (see SELEUCIDÆ) swayed the fortunes of Iran for about 70 years and gave place to the Parthian dynasty of the Arsacidæ (q.v.), which reigned for nearly five centuries (250 B.C.–226 A.D.). This rule yielded in turn to the Iranian monarchy of the Sassanidæ (q.v.). The overthrow of this house by the Arab Mohammedan invasion in the seventh century changed the history of Iran, nationally, religiously, and linguistically. For details of these events, consult the article PERSIA.

Bibliography. The standard work relating to all Iranian subjects is Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strass-

burg, 1895–1904), where the fullest bibliographical references will be found. Besides this work, for the history and antiquities of Iran, consult: Rawlinson, *Seven Great Monarchies of the Ancient Eastern World* (London, 1865); Spiegel, *Eranische Altertumskunde* (3 vols., Leipzig, 1871–78); Geiger, *Civilization of the Eastern Iranians* (trans., London, 1885); Gutschmid, *Geschichte Irans von Alexander der Grosse bis zum Untergang der Arsaciden* (Tübingen, 1888); Curzon, *Persia and the Persian Question* (London, 1892); Justi, *Iranisches Namenbuch* (Marburg, 1895); J. J. Modi, ed., *The K. R. Cama Memorial Volume: Essays on Iranian Subjects Written by Various Scholars in Honor of Kharshedji Rustamji Cama* (Bombay, 1900); Marquart, *Eranšahr nach der Geographie des Pseudo-Moses Xorena'i* (Berlin, 1901); Eduard Meyer, "Zur ältesten Geschichte der Iranier," in *Zeitschrift für vergleichende Sprachforschung* (ib., 1907); J. J. Modi, ed., *Spiegel Memorial Volume: Papers on Iranian Subjects Written by Various Scholars in Honor of the Late Dr. Federic Spiegel* (Bombay, 1908); Prašek, *Geschichte der Meder und Perser bis zur makedonischen Eroberung* (Gotha, 1906–10); Eduard Meyer, *Geschichte des Altertums*, vols. iii–v (3d ed., Stuttgart, 1910–); Y. B. Mirza, *Iran and the Iranians: Being an Account of the History, Religion, Constitution, and Arts of the Persian People* (Baltimore, 1913).

IRA'NIAN, or ERANIAN. The term applied to peoples, some of which are now almost or altogether extinct, speaking languages belonging to the Aryan stock and inhabiting the plateau lying between Asia Minor and the Caspian on the west and the Hindu Kush Mountains on the east (of which modern Persia forms the chief part). The chief Iranian peoples, which number some 15,000,000 members, are the Persians (Tajiks of the East; Hajemis of the Caspian littoral, and the Teheran-Ispahan country; Parsis, now principally resident in western India, but also in the region between Ispahan and the Persian Gulf), ancient and modern, and the old Bactrians, whose descendants are said to speak still a purer Persian than that in vogue in Persia itself, together with the partly civilized Kurds; while the Tats and Azerbaijanis, the Sarts of Russian Turkestan, and certain portions of the population of Afghanistan, Baluchistan, etc., are physically Persians who speak, more or less, Turkic dialects. Earlier authorities classed the Armenians with the Iranians, but it is better to regard them as independent members of the Aryan stock. The Ossetes are generally regarded as Iranians. The mass of the Aryan tribes of Afghanistan and Baluchistan, by some considered Iranian, show, on the whole, greater affinities with the Aryans of Hindustan. The Golchas of Pamir are rather an independent Aryan branch than a subdivision of the Iranians. Müllenhoff and V. Miller have shown that many place names in southern Russia are of Iranian, and especially Ossetian, origin, and this agrees with the theory which considers the bulk of the Scythian peoples to have been Iranian. From the dawn of history the land from the borders of Asia Minor to the mountains of Pamir has been inhabited, generally speaking, by tribes and nations of Aryan stock, and chiefly of the variety called Iranian. Even beyond the Oxus, the traditional frontier between Iran and Turan, Iranian culture, old and new, can be traced beyond the borders of China, and no doubt some of the nomad hordes who hovered about western Europe were not all Turanian in their make-up. Within the Iranian area many blends exist. Besides the descendants of the Aryan Medes and Persians of a fairly pure strain, and the purer Eastern Iranians, almost every people of Asia Minor and of Central Asia has added its quota to the hybrid populations. Mongolian, Arabian, Turkish conquests, and the commercial and colonizing instincts of Jews, Armenians, natives of the Caucasus, etc., have also contributed their share to the mixture. War, slavery, and peaceful nomadism have likewise helped, both in ancient and in modern times. The range of culture of the Iranians is very extensive, reaching from the civilizations of ancient Bactrians, Medes, and Persians (and their modern representatives) to the half-savage seclusion and isolation of some of the small hill communities. Most authorities do not assign to the Iranians as high a rank intellectually as is possessed by the Aryans of India or by the Semites, to say nothing of the Aryans of Europe. The situation of the plateau of Iran between India and China on the one hand and Asia Minor and Arabia on the other has made it inevitably an absorber and a transmitter of culture, a highway of commerce, and a theatre of religious disputes. The great mass of the Iranians are now professors of Islam, but of the Shiite or "unorthodox" sort—a protest, as it were, of the Aryan against the Semitic mind. The ancient Aryan religion, Zoroastrianism, indigenous to the Eastern Iran, with its dualism and reverence of fire as the sacred symbol, exercised considerable influence upon the Hebrews.

Some of the Iranians (Persians and Parsis in particular) have from time immemorial been devoted to commerce, and have spread Persian influence to the Red Sea on the west, and to the western shores of India in the other direction, while northward they have carried it into Siberia and China. The best side of the Iranians of the present time is seen in the educational and charitable activities of the great Parsi merchants of India, who in many respects are setting examples for the whole world. The worst is seen in some of the aspects of Persian tyranny. All grades between still exist here and there over the wide Iranian land. The Iranians in general are judged by Ripley to belong physically to the "Mediterranean" race, their ideal type represented to a certain extent by the Farsis about the ancient Persepolis and the Luris of the mountains of western Persia, having been modified in the southwest by the Semitic intruders, in the east and northeast (the mass of the people) by Mongolian admixture, and on the littoral of the Arabian Sea towards the southeast by Indian, or perhaps Negritic, additions. See IRANIAN LANGUAGES; INDIAN PEOPLES.

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IRANIAN LANGUAGES AND LITERATURES. Historically, the linguistic and literary monuments of Iran cover a period of more than 2500 years, dating from the early Zoroastrian scriptures and the Old Persian cuneiform inscriptions, through the Pahlavi, down to Modern Persian literature. From the standpoint of speech the Iranian tongues are most closely allied to the Indic languages, and together they make up the Indo-Iranian group. (See INDO-IRANIAN LANGUAGES.) Three great periods in the development of these tongues may be recognized—Old Iranian, Middle Iranian, and New or Modern Iranian. 1. The first of these, the Old Iranian period, includes the *Avesta* (q.v.) and the cuneiform inscriptions and antedates the Christian era by fully six centuries, although it probably extended into the fourth century A.D. There is practically a barren period of five centuries during the Parthian sway, from the third century B.C. to the early part of the third century A.D., during which time there are no real literary monuments, although possibly some later Avestan texts may have been composed, and certain inscriptions and devices in coins may be cited as helping to eke out our knowledge of the Old Iranian period till the rise of the Sassanian monarchy (226 A.D.). 2. The Middle Iranian period dates from the latter event and extends to about the ninth or tenth century of our era. It is represented by the language and literature known as Pahlavi (q.v.), including Huzvaresh, Pazand, and Parsi. 3. The New or Modern Iranian period begins practically in the tenth century A.D., with the rise of the Modern Persian language and literature (q.v.) under Firdausi (q.v.) and his immediate predecessors. Within this period, besides the New Persian, there come the various modern Iranian languages and tongues, Afghan, Baluchi, Kurdish, Ossetish, the dialects of the Pamir and Caspian districts, and the dialects of Central Iran. All the Iranian languages have certain phonetic characteristics which mark them and distinguish them from the kindred group of Indic tongues. Most conspicuous among these are: (1) the change of Indo-Germanic *s* into Iranian *h;* e.g., Skt. *samá,* 'same,' 'like,' 'all' = Av. *hama,* OPers. *hama,* Phl. *hamak,* Paz. *hamā,* NPers. *hamah,* Bal. *hama(k),* Kurd. *hamū;* (2) the presence of the voiced sibilants *z, ž,* e.g., Skt. *jānu,* 'knee' = Av. *zānu,* Phl. *zānūk,* NPers. *zānū,* Afgh. *zangūn,* Bal. *zān,* Kurd. *zān;* Skt. *bāhú,* 'arm' = Av. *bāzu,* Phl. *bāzīh, bāzuk,* NPers. *bāzu;* Skt. *mṛḍīká* (Vedic *mṛḷīká*), 'mercy' = Av. *marəzdika;* (3) the use of spirants instead of aspirates, as well as a general tendency to spirantization (*th, θ, gh, γ,* etc.); (4) there are numerous minor phonetic, morphological, and syntactical features which can be discussed only in a technical treatment of the individual languages concerned. The details regarding the various Iranian literatures, Avesta, Old Persian, Pahlavi, etc., will be found in the separate articles devoted to those subjects. The modern Iranian languages are written in the Arabic script, the ancient Persian inscriptions in wedge-shaped letters borrowed from the Babylonian characters, while the Pahlavi and Avesta are in a script based on the Semitic writing and read from right to left.

Consult linguistic monographs in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1895–1904), full bibliographies; Gray, *Indo-Iranian Phonology* (New York, 1902); Bartholomæ, *Altiranisches Wörterbuch* (Strassburg, 1904); *Avesta, Pahlavi and Ancient Persian Studies in Honor of P. Sanjana* (ib., 1904); *The Spiegel Memorial Volume,* edited by J. Modi (Bombay, 1908).

IRAPUATO, ē'rä-pwä'tō. A district town in the Mexican State of Guanajuato, situated on the National Railways of Mexico, 33 miles from Guanajuato, the capital of the state (Map: Mexico, H 7). Its climate is so equable that strawberries are marketed the year round. It has a number of old convents and churches. Pop., 1900, 19,640; 1910, 21,469.

IRAWADI, ĭr'ä-wä'dĭ. A river of Farther India. See IRRAWADDY.

IRBIT, ĕr-bēt'. The capital of a district in the Russian Government of Perm, situated at the confluence of the Irbit with the Nitza, 110 miles northeast of Ekaterinburg (Map: Russia, K 3). It is famous chiefly for its annual fair, instituted in 1643 and second only to that of Nizhni Novgorod. It lasts the whole month of February and is visited by about 20,000 people. The chief articles of commerce are manufactures from Russia, silk, woolen, and cotton goods, trinkets, drugs, groceries, fruits, wine, and tea; hides and pelts from Siberia. The annual value of goods brought to the fair exceeds $20,000,000. Irbit was founded by the Tatars in 1633. Pop., 1897, 20,064.

IREDELL, īr'dĕl, JAMES (1750–99). An American jurist, born in Lewes, England. He was the son of a wealthy and influential English merchant largely engaged in the American trade, who secured for him a position in the customs service of North Carolina. He entered as a deputy collector in 1767, finally becoming in 1774 collector of royal customs for the entire Colony. Meanwhile he had studied law and had been admitted to the bar. In the pre-Revolutionary controversies between England and the colonists he openly showed his sympathy with the cause of his adopted country, resigned the collectorship, and entered enthusiastically into the work of organizing the Revolutionary government. The necessity for a reorganization of the law courts appealed to him particularly, and to this work he devoted his best efforts. In December, 1777, he was chosen a judge of the North Carolina Supreme Court, and in 1787 was commissioned by the Legislature to revise and codify the statutes of the State, which resulted in the important publication known as *Iredell's Revision of the Statutes of North Carolina* (1791). He was an ardent Federalist, but with his political associates could not overcome the opposition which prevented North Carolina from accepting the Constitution until several months after Washington's inauguration. In February, 1790, he was named by President Washington

as associate justice of the United States Supreme Court, in which capacity he served until his death. Consult McRee, *Life and Correspondence of James Iredell* (New York, 1857).

IREDELL, James (1788–1853). An American jurist and legislator, son of James Iredell, associate justice of the United States Supreme Court. He was born at Edenton, Chowan Co., N. C.; graduated at Princeton in 1806; studied law; and was admitted to the bar in North Carolina. In the War of 1812 he raised and commanded a company of North Carolina volunteers. His political career began in 1816, with his election to the State Legislature. To this body he was repeatedly reëlected, was Speaker of the Lower House in 1817–18, and, with the exception of a short term on the bench of the Superior Court in 1819, served until his election as Governor of the State in 1827. In the following year he succeeded Nathaniel Macon in the United States Senate, serving until 1831, when he retired permanently from public life and resumed the practice of law. He was a commissioner to revise the statutes of North Carolina, the result of his labors being the publication of the *Revised Statutes* (1836–37), and as the reporter for the Supreme Court of the State for many years he compiled 21 volumes of *Reports*. He also published a *Treatise on the Law of Executors and Administrators* (1837) and *Digest of Reported Cases in the Courts of North Carolina, 1776 to 1845* (1839–46).

IRELAND, īr'land. The smaller of the two great islands forming the United Kingdom of Great Britain and Ireland. It rises from the continental shelf amid shallow waters, the line marking a depth of 600 feet running from 25 to 100 miles west of the Irish coast. Beyond this line the bed of the Atlantic slopes rapidly to oceanic depths. Ireland is thus essentially a part of Europe and lies on the western rim of the mighty land mass of Eurasia. Its area is 32,586 square miles, including about 500,000 acres in water areas. Ireland extends through nearly four degrees of latitude, from the parallel of 51° 26′ N. to that of 55° 21′.

Topography. On the east, along the waters of the Irish Sea and St. George's Channel, which separate Ireland from England and Wales, the coast, of softer rock than that of the west, is comparatively straight for long stretches and has few deep indentations. On the west, however, where the coast, of hard rock with drowned valleys, is exposed to the gales of the Atlantic, the sea penetrates far into the land through long, deep valleys. These valleys are true fiords like those of the west coasts of Scotland and Norway, and, as in those countries, at the entrance to the inlets and all along the coast there are steep cliffs and hundreds of little islands that were torn from the mainland mass by ocean storms and other destructive influences. The northwest edge of Europe, therefore, has the same general characteristics from Bantry Bay, at the southwest corner of Ireland, to the North Cape, far north of the Arctic circle in Scandinavia. The chief ports of Ireland are Belfast and Dublin on the east coast, Waterford and Cork on the south, and Londonderry on the north. The west-coast ports are of little importance except in the coasting trade.

In its general surface Ireland may be described as basin-shaped. A traveler sailing along the coast waters might get the idea that Ireland is very mountainous. As he nears the coast from Holyhead—the common route from England to Dublin—he sees the blue line of the Wicklow Mountains rising 2000 feet above sea level. The details come into view as he approaches Dublin. He sees the rounded bosses of Killiney and the grim promontories of Howth and Bray, which are only the outliers of the high granite moorlands that stretch away for 70 miles to the south. Farther north, between Dundalk and Dundrum bays, he sees a still more rugged and picturesque coast, with the huge domes of the Mourne Mountains rising above it; and then at Belfast come into view the long, black scarps, terraced and uninviting, which form the edges of the high plateau behind them. Rounding the north coast, he sees along the Atlantic shores of Donegal and Mayo great walls of rock, 2000 feet high in places, the finest cliffs in the British Isles; and down the west coast are the rugged heights of Connaught, the high limestone terraces of northern Clare, and farther south range after range extends along the shores till they culminate in the gray masses that look down on Bantry Bay. The highest peak is Carrantuo Hill (Carran Tual), near the picturesque Lakes of Killarney, which has an elevation of 3414 feet above sea level. The interior of the northern portion of the country, from the latitude of Belfast, is partly broken and mountainous. The same is true of the southern part of the island a little south of the latitude of Dublin. The uplands are not comparable, however, to the Scottish and Welsh highlands, but resemble rather the hills of the Scottish lowland.

Broadly speaking, therefore, the highlands of Ireland are massed upon its margin. The central area, the largest single feature of the topography, is a plain with a breadth of 50 miles and an extent from east to west of 100 miles or more, in which numerous bogs and lakes have formed. When the traveler crosses Ireland, from Dublin to Galway (115 miles), e.g., he meets scarcely a hill on the way. He may travel over large parts of the central regions and feel himself on a great plain above which hills or ranges of elevated surface rise here and there, though they are quite insignificant in comparison with the wide expanse of brown bog or level meadowland.

Hydrography. So much of the high ground is for the most part insular masses with ill-determined divides that the river courses in most portions present no uniformity of system. The rivers, sometimes exhibiting sharp changes in trend, yet flow towards all the surrounding seas, even penetrating the coast highlands from the central plain, most of which is not over 500 feet above sea level. It is possible to go from the central plain to the sea by 12 lines through the hills without exceeding an elevation of 300 feet. The water parting between the eastern and western rivers may be traced from Lough Foyle to Mizen Head, but it is a winding line, marked by no definite and determining surface features.

The rainfall is abundant in the central plain, with the result that the slow-moving rivers widen into long lakes, or loughs. The Shannon and Erne rivers are chains of such lakes joined by stretches of river, the river sections being not very much longer than the lakes. The northern part of the central plain is drained by the Erne. The centre of the plain is drained

by the Shannon, which empties into the Atlantic through a wide estuary 70 miles in length. The Shannon, 250 miles long, is the longest river in the United Kingdom. Nearly half of it above the estuary is made up of the three lakes Allen, Ree, and Derg. All the most important rivers flow from the plain, the mountain streams on the coast sides being too limited in length and drainage area to have large volumes. Some of the plain streams, like the Boyne, have no lakes in their courses. A few of these sluggish rivers serve as means of communication with the interior, and their usefulness is augmented by the considerably developed canal system of the country. The Shannon River, navigable by large steamers for 129 miles, is connected with Dublin by the Grand and Royal canals, thus affording water communication across the island. Bogs covering a large part of the plain are the source of peat, so extensively used in Ireland for fuel. The Bog of Allen, to the east of the centre of the plain, is the most extensive of these wet, barren regions.

Climate. The most potent factor in determining the climate of Ireland is the Atlantic Ocean. The prevailing west winds blowing over the broad expanse of water are tempered by the influence of its comparatively warm surface, so that the mean winter temperature of Ireland, ranging from 40° F. to 45° F., is 20° F. to 30° F. higher than that of places on the same parallels of latitude in America and in west Russia. The influence of the equable sea climate is also very pronounced in summer, the mean summer temperature of Ireland, 59° F. to 62° F. being from 5° F. to 10° F. lower than that of east Prussia. Ireland has the greatest advantages, both as to temperature and rainfall, that an insular climate affords. It also has the disadvantages, as, e.g., the unpleasant damp winds that sweep in from the ocean and the fog and mist that hang around the flanks of the hills. In the south the average sunshine is 1400–1600 hours per year, while in the north this diminishes to 1200. The large average rainfall clothes Ireland with the vivid garb of green that has made it known as the Emerald Isle. The rainfall, averaging 40 inches per year, is quite uniformly distributed; the western hills, averaging a trifle higher than the central plains, do not stop the rain-bearing winds.

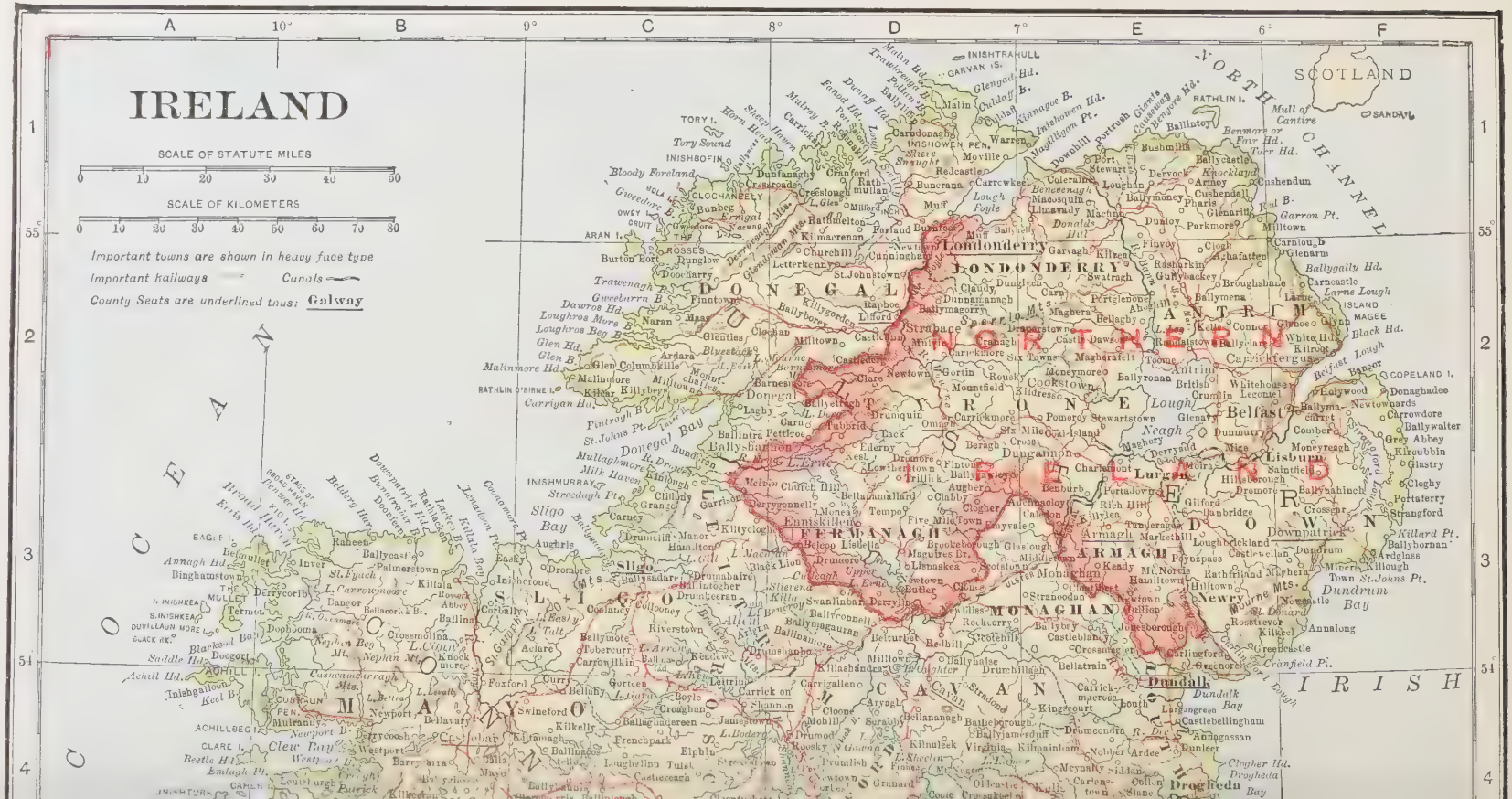
Soils. The fertility of Irish soils has long been recognized. About half of the island is formed of limestone, whose soils are proverbially rich. The red marls, calcareous grits, slate, and igneous rocks have also contributed fertilizing elements. The fact that the former glacial conditions transported the rocks of many localities and mixed them with those of others has, as in England, been very beneficial to the agricultural interests. Thus limestone detritus from the central plain was spread over hundreds of thousands of acres outside of it, contributing elements of fertility which the local rocks did not possess. In some regions the soil is naturally poor, and in many others bad tillage or overcropping has reduced fertility. Bog and barren mountain lands cover about one-fifth of the total area.

Flora. The Irish flora consists largely of English migrants, and England in turn derived most of her flora from the neighboring continent. The sedges, rushes, and ferns are most abundant in the wetter west. Grass is by far the largest product of the soil in every county of Ireland. The pastoral lands (permanent grass) include about four-fifths, and the arable lands (cereal, root, and fibre crops, and hay under rotation) one-fifth, of all lands utilized for agricultural and stock-raising purposes. The forests (chiefly oak and beech in the lower grounds and birch and pines in the higher regions) cover only a very small part of the area.

Fauna. The fauna differs in no marked degree from that of England or France and is largely a thing of the past. The great Irish deer and the garefowl (q.v.) were exterminated in prehistoric times, and since civilization began Ireland has lost its bear, wolf, wild cat, beaver, native cattle, and other species of mammals and birds. Nothing remains except the small rodents of the woods and fields and such small birds as belong to the fields, gardens, and seashore. The popular saying that there are no snakes in Ireland is true, but there are none in Scotland and only two species in England. The only reptile is the lizard. British standard works on natural history cover Ireland, but it has had also a special treatise of high repute in Thompson, *Natural History of Ireland* (London, 1849–51). The fact that there are fewer species both of plants and animals common to the Continent and Ireland than to the Continent and Great Britain points to an earlier separation of Ireland from Great Britain than of Great Britain from continental Europe.

Geology. The central plain of Ireland is underlaid by limestone strata belonging to the basal portion of the Carboniferous system. Upper Carboniferous rocks, including the coal measures, were originally developed on an extensive scale, but they have been removed by erosion and are now found in only a few localities. The highlands bordering and partially inclosing the central plain have a more varied character. In the northwest—in Donegal, Derry, Mayo, and the District of Connemara—the mountain axis consists of crystalline rocks, which give way on the flanks to upturned Paleozoic sediments. This structural type is repeated in the southeast, in the highlands of Leinster. The northern counties are floored largely by Silurian rocks, although there are small areas where the Permian, Cretaceous, and Triassic formations outcrop. The Giant's Causeway (q.v.) and the bold cliffs of the north coast owe their character to basalt intrusions. In the southwest highlands the Old Red Sandstone appears along the central ridges, which are the axes of anticlinal folds, while the synclinal folds consist of Carboniferous limestone.

Mining. Irish coal resources are insignificant compared with those of Great Britain—a fact which has placed Ireland at a serious industrial disadvantage. During the last years of the nineteenth century about 24 mines were in operation, employing 1000 persons and yielding about 125,000 tons annually; in 1913 the output was 82,521 tons, of which County Kilkenny furnished 48,082 tons. The coal mines employed 576 persons underground and 194 above ground. The greater part of the output of coal is of the anthracite variety. The iron-ore resources are more considerable, but in the absence of coal have not been extensively exploited. The annual output during the last years of the nineteenth century was about 100,000 tons. In 1913 the output was 60,014 tons, almost the whole of which was mined in County Antrim. The mining of copper, which was of some im-


IRELAND
SCALE OF STATUTE MILES
0 10 20 30 40 50
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80
Important towns are shown in heavy face type
Important railways
Canals
County Seats are underlined thus: Galway
A
B
C
D
E
F
10°
9°
8°
7°
6°
1
2
3
4
55°
54°
SCOTLAND
NORTH CHANNEL
IRISH SEA
OCEAN
Londonderry
LONDONDERRY
DONEGAL
ANTRIM
TYRONE
FERMANAGH
ARMAGH
DOWN
LOUTH
MONAGHAN
CAVAN
SLIGO
MAYO
Belfast
Lough Neagh
Lough Foyle
Donegal Bay
Sligo Bay
Clew Bay
Dundalk
Drogheda
Newry
Lisburn
Portadown
Downpatrick
Strangford Lough
Carrickfergus
Larne
Ballymena
Coleraine
Portrush
Ballycastle
Cushendall
Glenarm
Carnlough
Whitehead
Bangor
Holywood
Donaghadee
Newtownards
Comber
Ballywalter
Grey Abbey
Kircubbin
Portaferry
Strangford
Cloghy
Ardglass
Killard Pt.
Ballyhornan
Dundrum
Dundrum Bay
Newcastle
Annalong
Kilkeel
Greencastle
Cranfield Pt.
Carlingford
Omeath
Dundalk Bay
Larne Lough
Belfast Lough
Lough Swilly
Inishowen Pen.
Malin Hd.
Inishowen Hd.
Fanad Hd.
Horn Hd.
Tory Sound
Tory I.
Inishtrahull
Garvan Is.
Rathlin I.
Mull of Cantire
Sanda
Benmore or Fair Hd.
Tiar Hd.
Garron Pt.
Black Hd.
Copeland I.
Rathlin O'Birne I.
Aran I.
Achill I.
Clare I.
Inishmurray
Eagle I.
Inishkea
Duvillaun More I.
Black Hd.
Saddle Hd.
Achill Hd.
Achillbeg I.
Inishturk
Carlo I.
Inishbofin
Inishshark
Slieve League
Errigal
Muckish
Aghla
Croaghpatrick
Nephin
Nephin Beg
Mweelrea
Maumtrasna
Mt. Leinster
Slieve Gullion
Cuilcagh
Slieve Beagh
Sperrin Mts.
Mourne Mts.
Slieve Donard
Divis
Cave Hill
Knockagh
Slemish
Binevenagh
Benevenagh
Muckamore
Antrim
Ballymena
Ballymoney
Ballycastle
Cushendun
Cushendall
Glenariff
Glenarm
Carnlough
Larne
Whitehead
Carrickfergus
Belfast
Lisburn
Dromore
Hillsborough
Moira
Lurgan
Portadown
Banbridge
Gilford
Rich Hill
Tandragee
Armagh
Markethill
Loughbrickland
Dundrum
Castlewellan
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Coleraine
Portrush
Portstewart
Limavady
Dungiven
Maghera
Draperstown
Magherafelt
Cookstown
Dungannon
Coalisland
Stewartstown
Pomeroy
Omagh
Strabane
Castlederg
Newtownstewart
Plumbridge
Gortin
Rosslea
Irvinestown
Lisnaskea
Enniskillen
Belcoo
Garrison
Manorhamilton
Kinlough
Bundoran
Ballyshannon
Donegal
Killybegs
Glencolumbkille
Ardara
Dunkineely
Inver
Mountcharles
Dunkineely
Carrick
Glenties
Letterkenny
Milford
Rathmelton
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Castlewellan
Rathfriland
Hilltown
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Dromore
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Saintfield
Crossgar
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Letterkenny
Milford
Rathmelton
Buncrana
Carndonagh
Moville
Derry
Londonderry

IRELAND
ATLANTIC OCEAN
IRISH SEA
ST GEORGES CHANNEL
CONNAUGHT
LEINSTER
MUNSTER
GALWAY
MAYO
SLIGO
LEITRIM
ROSCOMMON
CLARE
LIMERICK
TIPPERARY
QUEENS CO.
KILDARE
WICKLOW
KILKENNY
CARLOW
WEXFORD
WATERFORD
KERRY
CORK
DUBLIN
MEATH
Galway
Limerick
Kilkenny
Wexford
Waterford
Dublin
Kingstown
Queenstown
Dingle
Tralee
Killarney
Clonmel
Ennis
Athlone
Drogheda
Navan
Trim
Kells
Mullingar
Longford
Carrick on Suir
Carrick on Shannon
Roscommon
Castlebar
Westport
Ballinrobe
Tuam
Loughrea
Gort
Ballinasloe
Portumna
Nenagh
Roscrea
Parsonstown or Birr
Tullamore
Philipstown
Edenderry
Kilcock
Maynooth
Celbridge
Naas
Athy
Carlow
Tullow
Baltinglass
Wicklow
Arklow
Gorey
Enniscorthy
New Ross
Wexford
Youghal
Middleton
Fermoy
Mallow
Kanturk
Buttevant
Mitchelstown
Cahir
Clonmel
Carrick on Suir
Callan
Kilkenny
Thomastown
Inistioge
Graiguenamanagh
Bagenalstown
Borris
Castlecomer
Kilkenny
Abbeyleix
Ballyragget
Durrow
Templetouhy
Johnstown
Urlingford
Littleton
Holycross
Thurles
Templemore
Borrisokane
Borrisoleigh
Toomyvara
Portroe
Killaloe
Ballina
Killimer
Tarbert
Ballylongford
Listowel
Abbeyfeale
Newcastle
Castleisland
Tralee
Dingle
Killorglin
Milltown
Farranfore
Killarney
Beaufort
Kenmare
Cahirciveen
Waterville
Valentia I.
Skellig Rocks
Portmagee
Sneem
Derrynane
Caherdaniel
Parknasilla
Kenmare R.
Bantry
Glengarriff
Castletownbere
Dunmanway
Drimoleague
Skibbereen
Baltimore
Clonakilty
Bandon
Kinsale
Cork
Passage West
Carrigaline
Crosshaven
Youghal
Ardmore
Dungarvan
Tramore
Waterford
Dunmore East
Helvick Hd
Ballycottin
Knockadoon Hd
Ballycotton
Ballynoe
Aghada
Whitegate
Cloyne
Midleton
Inchigeelagh
Macroom
Ballingeary
Coachford
Donoughmore
Watergrasshill
Glanworth
Castletownroche
Ballyhooly
Fermoy
Rathcormack
Glenville
Kilworth
Ballyduff
Lismore
Cappoquin
Tallow
Aglish
Drumana
Ballyduff
Dungarvan Har.
Helvick Hd
Ballyvoyle
Clashmore
Youghal Har.
Ardmore
Knockadoon Hd.

portance for many years, has almost ceased, only 778 tons of ore being mined in 1912. In 1913 the aggregate value of all minerals was £228,210.

Fisheries. The fishing industry, stimulated by a system of bounties and the necessity of drawing upon the resources of the country in consequence of the growth of population, was very active from about 1800 to 1829, when it employed 64,771 men, but the cessation of the bounties in that year caused a decline. Still more disastrous was the result of the famine period (1846), due to the blight and failure of the potato crop, and only in recent years has there been a revival in the industry. Deep-sea and coast fishing employed 4827 vessels and 19,523 men in 1912, as against 6458 vessels and 24,528 men in 1881. The total annual value of the catch, including shellfish, fluctuates about £400,000. It was £280,945, excluding shellfish, in 1913. Salmon fishing is pursued along the rivers and coasts, employing from 12,000 to 14,000 men and yielding an annual product of about £300,000. The haddock fisheries are carried on in the region to the east of the Leinster coast, hake fisheries on the south coast, and mackerel on the west coast. The revival of the fishing industry has been greatly encouraged by the government as one of the means of bettering the conditions of the poverty-stricken population. Piers and harbors have been built for the benefit of fishermen, money loaned them, and their interest protected by close inspection.

Agriculture. As a result of natural and historical conditions, the industrial activity of Ireland is largely confined to agriculture. Few countries have so large a percentage of area adaptable for cultivation. Most of the waste lands are in the mountains of west and south Ireland, though there is still much unreclaimed boggy area in the lowlands. The lowland region is naturally of a high degree of fertility. The climate is warm and humid, and consequently favorable to the growth of most plants, though the humidity is too great in some regions to allow wheat to ripen properly. While the country is favored by nature, the Irish system of agriculture does not result in the general welfare of the people, as may be understood in a study of Irish history. One of the features of the English subjugation of Ireland was the confiscation of the greater portion of the land and the granting of it in large dimensions to English citizens. These in many instances were nonresidents, and even when residents they did not always succeed in establishing cordial relations with the tenantry, who were not forgetful of the manner in which the landlord (as a class) came to his possession. During the eighteenth century Ireland was placed under the ban of the English commercial and colonial policy, and Irish agricultural products were excluded from the English markets. Later these restrictions were removed, and the high prices of the Napoleonic war period gave a decided impetus to agriculture. During the first part of the nineteenth century there was a general movement towards the division of the farms into small holdings—the result largely of the landlords' desire to secure greater political strength through the increase in the number of ballots, and of the extensive practice of subletting indulged in by the middlemen.

The potato blight of 1845 precipitated a crisis, and important changes date from this event. In great measure it marked the beginning of the end of the small holding and the change from tillage to pasturage. The repeal of the Corn Laws aided in the relief of the Irish, but later so diminished the value of Irish cereals in the English markets that the landholders in the lowland regions evicted their tenants and turned the lands into pasture fields. The evicted tenants had to seek a location in the less desirable regions. In Ulster the tenant fared somewhat better; for there custom had long recognized a sort of tenant right, which operated to restrict the privileges of the landlord. The great diminution of the population through emigration had the effect of providing more labor for those who remained, though too often the location of the laborer was remote from the labor. On the whole the condition of the peasantry improved. But the fact that tenant and landlord were of different race and religion still prevented the development of sympathetic and harmonious relations between the two, and the prevalence of tenantry at will resulted in an aggravating uncertainty of tenure and prevented the discouraged tenant from making such effort to improve his holding as his interests demanded. Accordingly the land question persisted and became more serious. Relief was sought through the legislative Act of 1870, granting compensation for improvements and for the disturbance occasioned by removal, and through the Act of 1881, which provided for a fair rent, fixity of tenure, and free sale.

HOLDINGS. (IN ACRES)

PROVINCES	Not exceeding 1 acre	From 1 to 5 acres	From 5 to 15 acres	From 15 to 30 acres	From 30 to 50 acres	From 50 to 100 acres	From 100 to 200 acres	From 200 to 500 acres	Above 500 acres	Total
Leinster	30,644	17,338	24,946	22,253	15,496	14,434	6,928	2,731	436	135,206
Munster	27,587	12,862	19,764	24,524	22,803	23,380	9,484	2,622	391	143,417
Ulster	22,035	20,126	62,823	53,604	25,436	14,845	3,662	975	315	203,821
Connaught	7,185	11,940	46,225	36,945	12,960	6,599	2,654	1,393	451	126,352
Totals for Ireland	87,451	62,266	153,758	137,326	76,695	59,258	22,728	7,721	1,593	608,796

The period for which rent might be fixed according to the Law of 1881 was 15 years, at the conclusion of which time it might be fixed again for another 15 years. From 1881 to 1900 the number of holdings for which the rent was fixed for the first 15 years was 328,720, embracing 9,859,970 acres, the per cent of the reduction in rent being 20.8. Those upon which rent was fixed for the second 15-year period during that time was 52,396, embracing 1,432,615 acres, upon which there was an additional rent reduction of 22 per cent.

Still more radical was the policy of enabling the peasant to purchase land. The government advances money for the purchase, and the peas-

ant pays the government in annual installments for a term of years. In accordance with the Acts passed from 1870 to 1896, there had been advanced for land purchase, up to March 31, 1913, the sum of £24,779,176, and 2,508,937 acres of land purchased. Under the Laws of 1903 and 1909 the moneys advanced totaled £59,163,128, and the area purchased, 5,725,984 acres. For further particulars, see IRISH LAND ACTS.

The table on page 333 gives the number of holdings by provinces, grouped into nine different classes (1912).

Compared with 1904, there has been a decided increase in the holdings of less than one acre (11,750), and an increase in the groups of 50 to 100 acres, and above 500 acres. Farms in the group 30 to 50 acres increased in number 2366; 50 to 100 acres, 1575; 100 to 200 acres decreased 205 in number; and the number in the group above 500 increased 66. The 1 to 5 acre group increased 81 in number; the group 5 to 15 acres decreased 532, and the group 30 to 50 increased 2366.

With regard to the change from tillage to pasturage since the famine, the decrease was greatest for cereals. This acreage was 2,832,564 in 1855 and only 1,265,687 in 1912. The decrease in the green crops was also large, the total acreage being 1,444,390 in 1855 against 1,022,089 in 1912. The meadow crops increased during the same period from 1,314,807 to 2,487,349 acres. The following table shows in more detail the changes which took place in the period 1855 to 1912:

YEAR	Oats (acres)	Meadow (acres)	Wheat (acres)	Barley (acres)	Flax (acres)	Potatoes (acres)	Turnips (acres)	Mangold and beet-root (acres)	Total (acres)
1855	2,118,858	1,314,807	445,775	226,629	97,075	982,301	366,953	22,567	5,574,965
1890	1,221,013	2,093,634	92,341	182,058	96,896	780,801	295,386	46,457	4,808,586
1901	1,099,335	2,178,592	42,934	161,684	55,442	635,321	289,759	77,457	4,540,524
1905	1,066,806	2,294,506	37,860	154,645	46,158	616,755	282,105	72,570	4,571,405
1912	1,046,000	2,487,349	44,855	165,367	55,062	595,184	271,771	81,700	4,747,288
Per cent increase or decrease, 1855–1912	−50.6	+89.2	−89.9	−27.0	−43.3	−39.4	−25.9	+262.8	−14.8

It will be seen that the largest actual decrease was shown by oats, but the largest per cent decrease was in wheat, the growing of the latter crop having become altogether unimportant. The continued decrease in the cereal crops in the last third of the nineteenth century is attributed to the fall in price of those commodities resulting from foreign competition, together with the superior adaptability of Irish soil for pasturage. Cereal production is carried on in all the provinces, but oats are most important in Ulster, and the raising of barley is largely centred in Leinster. Potatoes still constitute the most important food staple grown in Ireland; the average acreage, however, has fallen off nearly one-third since 1850. The area under crops not mentioned in the table, in 1912, was as follows: rye, 7765 acres; beans, 1421; peas, 279; carrots, 1332; parsnips, 651; cabbage, 37,950; vetches, 2008; rape, 3110; other green crops, 28,383. In 1913 the area under wheat decreased to 34,004 acres; that under potatoes to 582,303 acres; the differences shown by other crops are negligible.

In 1912 the area under crops, including clover, sainfoin, and grasses for hay amounted to 3,570,676 acres; under permanent pasture, 9,685,358 acres; under small fruit, 15,218 acres; under woods and plantations, 298,735 acres; under bog waste, barren mountain, water, and marsh, 5,761,611 acres.

Stock Raising. The increased importance of stock raising since the middle of the nineteenth century is shown from the fact that the number of cattle per 1000 acres of the total area increased from 143 in 1851 to 230 in 1901, while the number of sheep per 1000 acres increased from 102 to 215, and the number of hogs increased from 52 to 60 during the same period; while in 1913 the proportion per 1000 acres was cattle, 242; sheep, 178; hogs, 52. The large number of cattle is particularly noteworthy, there being in Ireland more head, area for area, than in any other European country. The shorthorned variety predominate. The second table on this page shows the number of the different varieties of domestic animals for 1881 and 1913.

A peculiarity of stock raising in Ireland, especially cattle raising, is that a large proportion of the animals marketed each year are not prepared in Ireland, but are shipped to Great Britain for that purpose. Ireland is Great Britain's greatest single source of foodstuffs. Of meat alone, including animals for slaughter, the exports from Ireland to England are valued at $112,000,000 and form from one-third to one-half of England's total imports in this line. In August, 1914, the fancy prices paid for cattle induced many Irish farmers to sell live stock which should have been kept to replenish the supply next season. Ireland is not excelled in the production of the hunter type of horses, this type being raised mainly in the country south of the Boyne River. Heavy cart horses are raised principally along the eastern seaboard from Wexford to Londonderry. On the western seaboard, especially in Galway and Mayo, ponies are the predominating breed. The raising of horses for general purposes is more widely distributed, with Ulster in the lead. It will be seen from the second table that the rapidly growing poultry industry has attained large proportions. A significant development latterly has been the growth in agricultural

YEAR	Horses	Mules	Asses	Cattle	Sheep	Pigs	Goats	Poultry
1881	534,873	26,392	187,143	3,956,595	3,256,185	1,095,830	266,078	13,972,426
1913	614,482	30,338	243,339	4,932,625	3,620,724	1,060,360	246,348	25,701,342

coöperation. There was one coöperative society in 1890; in 1908 there were 292 dairy and agricultural societies, with 57 auxiliaries; 168 agricultural societies; 267 coöperative banks; 24 poultry societies; 59 miscellaneous societies; and 4 federations—making a total of 871 societies, having an aggregate membership of 81,710 and an annual trade turnover of £2,476,000. Ulster leads in the movement; Leinster falls furthest behind.

Manufactures. The manufacturing industries are of comparatively little importance. The adverse conditions imposed upon them in former centuries by the British government hampered their development, and the absence of local coal resources and the general nonprosperous condition of the social life of the country have limited its development in recent years. The history of the manufacturing industries, however, is a record of long and desperately continued struggle and is not without its periods of success. In scope the industries have been largely confined to the textiles—wool, linen, and silk. Prior to the time of Charles II manufactures of Irish woolens were well known in many colonial and foreign markets. But the navigation acts in the reigns of Charles I and II cut Ireland off from the British market, while those of William III severed Ireland from all foreign markets. The country could only export woolens to the English markets under heavy duty, thus limiting it practically to the local home market. When the American Colonies revolted, these restrictions were removed. But by this time the industry had secured so great a lead in England that, with the additional advantage given to the latter country through the abundance of coal which now began to supply power for the industry, Ireland was not able to regain its former prominence. The best known of the Irish woolens are the tweeds. They are noted for their durability. In 1907 there were 4461 persons employed in the manufacture of woolen, worsted, and shoddy goods. In 1907 the total production of this industry was valued at £769,000.

The manufacture of linen by the Irish was not at first so detrimental to English interests as was the manufacture of woolens, and it fared much better at the hands of the government. Indeed, for a period, the linen industry became prominent as the woolen industry decreased. The Lord Deputy Strafford and his successor, Ormond, did all within their power to encourage the industry, as did both the Irish and the English parliaments—the latter allowing the products to enter England free of duty. The superior methods of manufacture in vogue in France and the Netherlands were studied, and attempts were made to induce skilled workmen from these countries to migrate to Ireland. With these and other advantages the industry increased, but only at last to excite the ill will of England, which closed its markets to many varieties of the Irish products, and thus seriously hampered the industry, in spite of the generous aid it continued to receive from the Irish government. The wet-spinning process of linen manufacture was introduced between 1825 and 1830, and the factory system grew rapidly. The extreme moisture in the atmosphere gives to Irish linen that delicate whiteness which is unobtainable in any other country. The number of spindles used in its manufacture increased from 396,338 in 1850 to 826,743 in 1879, since which time they have not greatly increased, having been 835,100 in 1900. The power looms, however, increased from 21,177 in 1880 to 32,245 in 1900. In 1907 the linen and hemp industry employed 1505 salaried persons and 70,944 wageworkers, of whom 68 per cent were women. Its products were valued at £13,354,000, distributed as follows: spinning, £5,779,000; weaving, £6,214,000; making-up, £1,361,000.

The manufacturing establishments are almost wholly centred in Ulster. The shirt-manufacturing industry has become very important in Londonderry County. Huguenots immigrating to Ireland after the revocation of the Edict of Nantes introduced the manufacture of silk, and for a time it enjoyed considerable prosperity, but it almost died out before the middle of the nineteenth century. In the early part of the nineteenth century a large number of factories changed from linen to cotton manufacture, and over 100,000 spindles were at one time used in the latter industry. But with the introduction of flax-spinning machinery the manufacture of cotton practically ceased. Owing to the small number of cotton factories, the British census of production does not give separate data on the cotton industry in Ireland.

Shipbuilding is a long-established industry and became especially prominent during the last three or four decades of the nineteenth century. Belfast is the centre of the industry; the principal yard at this place employed more than 10,000 men in 1913 and produced a larger annual tonnage than any other yard in the world. The whole fleet of the White Star Line, including the *Oceanic*, the *Celtic*, and the *Cedric*, were built at this yard. Shipbuilding on a small scale is carried on at Haulbowline and has been recently revived at Londonderry and Dublin. The milling industry is steadily declining. The number of mills decreased from 1482 in 1891 to 1351 in 1901, and their average output also diminished. Importations of flour increased in amount during this time, and importations of wheat decreased. Prior to 1870 there was a thriving leather industry, but machine methods were not adopted, and it has become insignificant.

According to the British census of production for 1907, the principal Irish industries, employing 291,304 persons (except outworkers), produced goods valued at £66,000,000 sterling. The production of the chief groups was as follows: food and drink trades, £27,335,000; textiles (except cotton), £15,836,000; brewing and malting trades, £5,906,000; iron and steel, engineering, and shipbuilding trades, £5,814,000; clothing trades, £5,190,000; public utility services, £2,904,000; spirit distilling, £1,416,000 (brewing and distilling are included in the food and drink trades).

The home industries are still widely spread through Ireland and, in the aggregate, contribute largely to the well-being of the people. Important among these home industries are hand knitting, hand embroidery, and lace making.

The brewing and distilling branches have become the most important of the Irish industries, whether estimated with respect to the number of persons employed or the value of the product. The output of the distilleries increased from 4,801,000 gallons in 1861 to 14,221,520 in 1901, but decreased to 9,723,815 gallons in 1911. It is somewhat less than the output of English distilleries and equals nearly one-half that of

Scotland. The production of beer increased from 1,437,703 barrels in 1861 to 3,762,629 in 1911, the latter figure being somewhat more than one-tenth the total output of the United Kingdom for the same year. Irish beer is remarkable for its purity, being made almost exclusively from malt. The largest part of it consists of porter, which first became the popular drink between 1850 and 1860.

Transportation. The railway system has been constructed, owned, and controlled by private capital. The system is peculiar on account of its large number of small lines, controlled by separate companies, though a tendency towards consolidation has been noticed in recent years. Since 1849 the main lines have had a uniform gauge. The total mileage increased from 1988 in 1871 to 3403 in 1912. The principal lines are the Great Southern and Western, the Midland Great Western, the Great Northern, and the Northern Counties. The number of passengers carried increased from 15,547,934 in 1871 to 22,202,258 in 1891 and 29,162,000 in 1912. The tourist traffic is comparatively large and receives special attention. Ireland has 173 miles of tramways and light railways and 848 miles of canals and canalized rivers, of which 95 miles belong to railways.

Commerce. Irish commerce is mainly with Great Britain and consists of the exportation of raw products and the importation of manufactured articles. The exportation of live stock leads and constantly increases as the pastoral industry grows in importance. Exports of fish are also important. The leading manufactured article exported is linen. Whiskies and beers are also shipped in considerable quantities. The exports to foreign countries and British possessions are quite small. The imports from foreign countries and British possessions, however, are considerable and are rapidly growing in importance. These consist largely of grains—corn and wheat—from the United States and flax and tow from Belgium and Russia. The value of the total imports in 1912 amounted to $355,931,522, and of the exports, $329,104,450. Of the total value of the imports, 36 per cent represented articles of food and drink, 49 per cent manufactured goods, and 15 per cent raw materials. About $107,000,000 worth of farm products were imported. Of the exports, 52 per cent represented articles of food and drink, 41 per cent manufactured goods, and 7 per cent raw materials. The leading imports were: maize, $20,655,455; wheat, $16,060,044; wheat flour, $12,588,637; coal, $14,551,166; cotton goods, $25,685,596; drapery, $23,942,382; raw cotton, $4,857,516; boots and shoes, $8,342,651. The leading exports were: linen goods, $68,158,428; linen yarn, $7,910,793; live stock, $59,987,478; butter, $20,244,504; eggs, $14,242,211; bacon and hams, $20,538,421; ales and liquors, $17,348,151; ships, $16,358,739; cotton goods, $12,969,145. The trade policy of Great Britain applies uniformly to Ireland. Only a few articles like tea, tobacco, sugar, and liquors are subject to import duties. For a discussion of the tariff duties, see *Finance*, under UNITED KINGDOM.

Shipping. The largest part of the trade of Ireland is through the ports of Belfast and Dublin. Belfast leads, both in the amount of foreign and of the total trade. The export trade of Ireland to foreign countries is mainly carried on through Liverpool and Glasgow. In 1912 Ireland owned 897 ocean-going vessels of 401,597 tons net. In the same year there arrived at the ports of Ireland 1716 foreign vessels, with a tonnage of 5,538,740 and 29,936 coasting vessels, with a tonnage of 7,410,829. In the trade between Great Britain and Ireland 26,993 vessels, of 6,964,235 tons, arrived at the ports of Ireland.

Banks. Ireland has nine banks, all of which are joint-stock and six of which are note-issuing. They have all adopted limited liability, except the Bank of Ireland. The authorized issue of notes may be exceeded if specie is held equal to the amount of the excess. The Bank of Ireland manages the public debt of Ireland free of charge. In 1865 the interest on advances to the government was reduced to 3 per cent. In January, 1913, there were also 683 branch banks. The total capital, reserve, and undivided profits of these institutions were £11,643,000, deposits and current accounts, £66,901,000, loans and discounts, £47,161,000. The cash money in hand and at call and short notice was £14,030,000, and the circulation, £7,228,000.

Savings Banks. Trustee savings banks were established early in the nineteenth century, and post-office savings banks in 1861. The greater security afforded by the latter has made them more popular, and deposits in them have become over three times as great as in the former. According to the Savings Bank Act of 1893, the maximum amount which each depositor might deposit in one year was raised from £30 to £50, and the annual maximum amount of stock which might be purchased, £100 to £200; the stock-holding limit was increased from £300 to £500. As a result, the total deposits increased. In 1893 the trustee savings banks contained £1,380,718 deposits; in 1900, £2,035,000; in 1913, £2,652,018. The deposits in the post-office savings banks increased from £663,000 in 1870 to £3,585,000 in 1890 and £13,161,895 in 1913. In 1913 the number of open accounts in the trustee savings banks was 56,867; in the post-office savings banks, 479,873 accounts were active and 199,350 "dormant," the latter being accounts with balances less than £1 and inactive for five years or more.

Coöperative Credit Associations. The want of capital sufficient to secure an improvement of conditions in the poorer rural sections of the west and south of Ireland led to the establishment (1895) of coöperative credit associations upon the Raiffeisen system, through which money is loaned. In 1912 the number of such "banks" was 308, but only 176 were really active; 110 of these held £32,350 of members' deposits. In a report issued on May 20, 1914, a select committee of the Department of Agriculture and Technical Instruction for Ireland recommended the promotion of limited liability societies to take the place of these credit unions.

Government. The chief executive officer for the government of Ireland is the Lord Lieutenant, who is assisted by a Privy Council. He is the personal representative of the crown, and as such occupies a viceregal position, the maintenance of which is his chief function. For this purpose he receives a yearly allowance of £20,000. The actual conduct of the government devolves upon the Chief Secretary for Ireland, who is President of the Irish Local Government Board, a member of the House of Commons, and, when Irish affairs are prominent in the debates, is a member of the cabinet, and as such

is chiefly responsible to Parliament for the manner in which the government of the island is administered.

Since the Act of Union (1800) Ireland has been without a parliament of its own, but is represented in the British House of Lords by 28 temporal peers chosen by the whole body of Irish peers, and in the House of Commons by 103 commoners chosen by an electorate substantially the same as that by which English commoners are elected, viz., a household and lodger franchise. (See UNITED KINGDOM.) The agitation for Irish Home Rule was finally brought to a successful issue in 1914. Owing to the European War, however, the carrying out of the measure was postponed until September, 1915.

The judicial system of Ireland is modeled upon that of England, and the Irish courts administer English municipal law. The chief judicial tribunal of the island is the Supreme Court of Judicature, which has two divisions—the High Court of Justice and the Court of Appeal. There are also a High Court of Admiralty, a Court of Bankruptcy, and a Land Commissioner's Court. The House of Lords is the final court of appeal from the decisions of the Irish courts. Minor offenses are tried by two justices of the peace.

Local government in Ireland has been revolutionized by the Irish Local Government Act of 1898, which undertook to collect, simplify, and adapt the mass of English and Irish legislation on the subject. Until then the chief county authority was the grand jury. By the Act of 1898 this was replaced by a popularly elected council, chosen for a term of three years. The lower administrative units, boroughs and urban and rural districts, were likewise given elective councils. Affairs formerly attended to by grand juries and presentment sessions, such as relate to poor relief, highways, public health, and local institutions, are now administered by the councils. The larger cities were erected into county boroughs, which are exempt from certain of the provisions of the Local Government Act.

Incorporated boroughs have a mayor, aldermen, and council, while those which are unincorporated are governed by commissioners. The borough councils have charge of such local matters as lighting, watching, sanitation, etc. The local councils are all subject to the supervisory authority of the Local Government Board, consisting of the Chief Secretary, the Undersecretary, and four commissioners. It advises, directs, and controls the action of the councils in many particulars. It approves or rejects the appointment of officials nominated by the councils, fixes salaries, and regulates their term of service. The four commissioners of the board are appointed by the Lord Lieutenant and receive large salaries for their services.

Finance. The Imperial British system of finance is applied to Ireland in practically the same way as it is to the other parts of the kingdom. In the union with Great Britain, Ireland became burdened with a share of the responsibility for a large national debt, which it had had no hand in making. The Irish generally maintain, and many financiers admit, that the burden which the Imperial revenue inflicts upon the country is out of proportion to its wealth, and this claim constitutes one of the most serious grievances of the Irish Nationalists. According to the royal commissioners' report (1896) on the financial relations of Ireland to Great Britain, the taxable capacity of Ireland was only $\frac{1}{20}$ that of Great Britain or less, whereas the revenue collected was about $\frac{1}{11}$ of the amount raised in Great Britain. A comparison of Ireland with England and Wales shows that the per capita receipts from the income tax in the latter is almost four times that in Ireland. Assuming that the income tax returns are a fair test of the relative financial capacities of the two countries, the injustice wrought by the indirect taxes is striking, since the per capita amount of these is only a little less in Ireland than in England and Wales. The proportion of the direct to the indirect taxes in England and Wales is as 56 to 44, whereas in Ireland it is as 31 to 69. The figures given below indicate the great importance of the excise duties. It is this item particularly that seems to be overburdensome.

The following figures give the amount of the Imperial revenue collected in Ireland in the fiscal year ending March 31, 1913: customs, £3,166,000; excise, £3,259,000; estate, etc., duties, £987,000; stamps, £372,000; income tax, £1,484,000; land value duties, £5000; post office, £963,000; telegraphs, £190,000; crownlands, £21,000; miscellaneous, £120,500. The Imperial expenditures in Ireland for the same year were: civil government, £8,816,000; collection of taxes, £299,000; post office, £1,559,000; paid to local taxation accounts, £1,463,000. The taxes on real property are the principal source of local revenue. In the fiscal year 1910–11 the local receipts were as follows: rates, water, gas, and electric light, £4,217,555; tramways and light railways, £218,301; tolls, dues, etc., £422,386; rents, interest, etc., £289,302; government contributions, £1,364,328; loans, £1,788,354; miscellaneous, £476,028. The principal branches of local expenditures for the same year were: town and municipal authorities, for police, sanitary works, etc., £2,957,574; unions and parishes for poor relief, £1,365,383; county, rural, sanitary, and road authorities, £3,640,088; harbor authorities, £529,853; other authorities, £154,494.

Population. Owing to its insularity and its position on the extreme outskirts of Europe, Ireland received only the ebb flow of the great European migrations, and its population is therefore relatively simple in composition. Three major types are usually recognized. The most primitive is a short black-haired, brown-skinned, dolichocephalic race, sometimes called Firbolg in accordance with Irish tradition, which has been variously defined by anthropologists as Neolithic and non-Aryan, or again as Iberian or a branch of the Mediterranean race. The conquerors of this people were a tall and blond race known in Irish traditions as the Tuatha De Danann. It is not known whether the Tuatha De Danann (q.v.) were a Scandinavian or Celtic-speaking people. They were followed by the Gaelic invasion, probably within historic times—a Celtic-speaking race identified with the predominant Irish type of the present day. Stature and cephalic index in Ireland to-day vary little from the characteristic type of England and Scotland, and the Irish people is discriminated from the English and Scotch mainly on grounds of pigmentation (as among the so-called "black Irish"), language, and temperament. Not taking into consideration the different early immigrants, such as the Scandinavians and the Anglo-Normans, which were largely assimilated with the original stock, there are to-day three fairly distinct racial elements represented in

Ireland, a fact which is responsible in a measure for the social and political troubles which have long disturbed the country. By expulsion and by extermination the population had been considerably reduced by the end of Cromwell's reign, when the number was estimated at but a little over half a million. The depopulated districts of east and north Ireland were repeopled by settlers from England and Scotland respectively, and the English became the landowners throughout the other portions of the island. Until after the middle of the eighteenth century the population grew but slowly, being not infrequently checked by the ravages of famine. But towards the end of that century different causes conspired to bring about a rapid increase in the population. Chief of these was probably the universal adoption of the potato as the main staple of food, the plant giving more returns for the amount of area and labor devoted to it than other plants and being well suited to the needs of the people. Connected with this was the increased impetus given to industry in general during the wars with France, and also the decided tendency which developed at this time towards the division of the land into leaseholds, making the acquisition of a holding easy. Under these influences marriages were entered into early and families were large. Whereas, in 1785, estimates place the population at less than 3,000,000, in 1821 the first official census records the population at 6,800,000, and the census of 1841 showed a population of 8,196,000. Considering that the population was almost wholly rural in composition, it was much in excess of that which a healthy economic and social status would permit.

The sequel was precipitated by the potato blight in 1845. This resulted in a large number of deaths from starvation and disease, but its greatest significance was the starting of the tide of emigration which has continued to depopulate the island to the present time. Prior to the Revolution in the American Colonies the Scotch-Irish element of northern Ireland had found its way to the Colonies in large numbers, but not until the time of the famine did the movement affect the Celtic element. It is estimated that in round numbers there were 2,000,000 Irish emigrants between 1840 and 1860, and 1,000,000 in each of the following 20-year periods, most of whom went to the United States. In the aggregate the male emigrants exceed in number the female, though the contrary is true for the Province of Connaught. During the year 1911 the emigrants leaving Ireland numbered 49,280. The births usually exceed the deaths by 27,000 to 29,000 annually. The following table gives the population by provinces for each decade since 1851 and the per cent of increase or decrease of each for the last decade:

POPULATION FROM 1851 TO 1911

PROVINCES	1851	1861	1871	1881	1891	1901	1911	Per cent
Leinster	1,682,000	1,457,000	1,339,000	1,279,000	1,192,000	1,153,000	1,162,000	+0.80
Munster	1,860,000	1,513,000	1,393,000	1,331,000	1,174,000	1,076,000	1,035,000	−3.78
Ulster	2,014,000	1,914,000	1,833,000	1,743,000	1,620,000	1,583,000	1,582,000	−0.07
Connaught	1,012,000	913,000	846,000	822,000	719,000	647,000	611,000	−5.56

In 1911 there were 2,192,048 males and 2,198,171 females, a total of 4,390,219. It will be seen that Munster and Connaught have each declined much more than one-third during the period, and the rate of decrease still continues high in those provinces, while Leinster for the first time shows a slight increase.

The average population per square mile is 135, or less than one-fourth that of England and slightly more than that of the State of Maryland. The loss of population has been in the rural districts, the urban population having held its own. The following table shows the population of cities above 25,000 for 1891, 1901, and 1911:

CITIES	1891	1901	1911
Belfast	255,950	349,180	386,947
Dublin	245,001	290,638	304,802
Cork	75,345	76,122	76,673
Londonderry	33,200	39,892	40,780
Limerick	37,155	38,151	38,578
Rathmines and Rathgar*	27,796	32,602	37,840
Pembroke*	23,992	25,799	29,294
Waterford	20,852	26,769	27,464

* Dublin suburbs.

The estimated population for 1921 is 4,496,000.

While the density of population is no longer excessive, even for a country largely agricultural, a large number are scarcely able to secure a livelihood. Certain regions are known as congested districts, and a special board has been created to aid the people and improve conditions. The explanation lies in the fact that the tenants have been evicted from the more fertile regions (see *Agriculture*) and have segregated in the less fertile broken regions, especially in the western Province of Connaught, where the small holding of the peasant does not afford sufficient livelihood for the family, and large numbers are annually obliged to leave their homes during the harvest months and supplement their income by labor in the harvest fields of Scotland and England. The landowning class, or the old aristocracy throughout Ireland, as also the greater part of the well-to-do trading and professional classes, belong to the English element. In Ulster a part of this class belongs to the Scotch element, but a majority of the Scotch are artisans or cotters, whose economic standard of life is somewhat higher than that of the Celtic element, the latter belonging almost entirely to the peasant and the laboring classes. According to the census of 1911, there were 141,134 persons belonging to the professional class, 170,749 to the domestic class, 111,143 to the commercial class, 780,867 to the agricultural class, 613,397 to the industrial class, and 2,572,929, mainly children, to the indefinite and nonproductive class.

The Irish language was almost universally used in the rural districts by the Celtic element until about 1835. Considering the resentment which the Celtic element has always held towards the British, the general change from the Irish to the English language was remarkable for the little opposition that was made to it and the rapidity with which it was accomplished. In

1881, 18.2 per cent of the population could speak Irish; in 1911 only 13.3 per cent (582,446). The percentage is naturally greatest in Connaught and Munster, where the percentages in 1911 were 34.0 and 21.8 respectively (over half of the population of Galway and Mayo were able to speak Irish), while in Ulster the percentage was only 5.8, and in Leinster 3.5. In 1911 only 16,873 persons were reported who spoke Irish only. In very recent years a movement has been started to popularize the Irish language again. In the first decade of the twentieth century the number who were able to speak the Irish language decreased for the country as a whole, though the number increased more than 52 per cent in Leinster and about 4 per cent in Ulster.

Religion. That the religious denominations in Ireland correspond very closely to the different racial elements explains in part the social friction which exists in the country. The Celtic Catholic church resisted from the first the attempts of the English to break its connection with Rome and impose upon it the changes which had accompanied the religious revolt in England. The property of the church, of course, continued in the hands of the church that represented the government. Catholics were placed under serious disabilities, not being allowed to teach school or to act as guardians. Priests were obliged to remain in their own parishes and were excluded from public affairs. Tithes were exacted from Catholics for the support of the Established church. The disabilities were not removed until 1829. The tithes were commuted in 1838. When the political union with England was effected in 1800–01, there was also a union between the established churches of the two countries. The union was dissolved and the Irish church disestablished by an Act of Parliament which went into operation in 1871. The Act provided for the surrender of the property and revenue of the church, with the exception of private endowments. Since then the government of the church of Ireland is in the hands of a General Synod which meets annually. There are also 23 diocesan synods. There are 2 archbishops and 11 bishops.

It will be seen from the accompanying table that more than three-fifths of the Episcopalians are concentrated in the Province of Ulster, and the greater part of the remainder are in Leinster. The Scotch who settled in Ulster were mostly Presbyterians. More recently Methodism has secured a hold among them. Presbyterianism was proscribed during the reign of Queen Anne, but with this exception was generally tolerated by the government, and until the disestablishment of the Episcopal church received a small annual bounty. The largest Presbyterian body has 36 presbyteries and 562 congregations.

The table on this page shows the respective strength of the four leading denominations in the different provinces and the tendency of each for the 50 years from 1861 to 1911. It will be seen that even in Ulster the Catholic church outnumbers any of the others, and in the provinces of Munster and Connaught the non-Catholic elements constitute but a very small fraction of the population. The extreme northeast counties of Londonderry, Down, Armagh, and Antrim have a larger non-Catholic than Catholic population.

The Methodists are the only sect that did not show a decrease during the period, while the percentage of loss was greatest for the Catholics. In the first decade of the century the Catholics lost 2.0 per cent of their membership, the Episcopalians 0.4 per cent, the Presbyterians

PROVINCES	Year	Catholic	Episcopalian	Presbyterian	Methodist
Leinster....	1861	1,252,500	180,500	12,300	6,290
	1911	990,045	140,182	12,866	8,068
Munster....	1861	1,420,000	80,800	4,000	4,430
	1911	973,805	50,646	4,180	4,175
Ulster.....	1861	966,600	391,300	503,800	32,000
	1911	690,816	366,773	421,410	48,816
Connaught..	1861	666,000	40,600	3,088	2,640
	1911	588,004	19,010	2,069	1,323
Total.....	1861	4,305,100	693,200	523,188	45,360
	1911	3,242,670	576,611	440,525	62,382

0.7 per cent, and the Methodists increased 2.0 per cent. The greater decrease of the Catholic population is due to the fact that the Catholics emigrate in larger numbers than the Protestants. See table under *Population*.

Education. In the establishment of an educational system in Ireland, as in many other countries, religion has been a seriously disturbing factor. Such educational advantages as were offered the Irish children by the government were thoroughly dominated by the idea of making them Protestants and essentially British, and consequently these advantages were shunned by all Catholics. At the same time laws passed in the reigns of William III and Queen Anne made it a penal offense for Catholics to teach or to send their children abroad to be educated. Catholic teaching, however, was carried on in violation of the law, such schools being known as hedge schools. A great deal of money from both private and government sources was expended on education during the eighteenth century and the early part of the nineteenth, most of it being expended through the proselyting societies. The Charter schools, founded in 1733, and the Association for the Prevention of Vice, founded in 1800, received government grants, while the London Hibernian Society, founded in 1805, and the Baptist Society, established in 1814, were supported mainly from subscriptions. The Erasmus Smith schools, dating from 1657, were endowed. A Catholic congregation—the Christian Brothers—was founded in 1802 for the purpose of teaching, and later attained considerable importance. In 1811 the Kildare Place Society was founded and after 1814 received government subsidies. This society introduced the policy of limiting religious instruction to Bible reading.

In 1819 the government began to make grants to schools established by voluntary subscriptions without regard to religion. In 1831–34 the so-called national system of education was established. Under this system secular instruction was given to children assembled together without distinction of creed, but it was provided that they should be separated for purposes of religious instruction, which should be given by the pastors of the respective local churches. At first the Catholics took kindly to the system, the Episcopalians and Presbyterians being opposed to it. However, concessions were made to the Protestants, and a proselyting spirit was allowed to creep into the secular teaching. The Catholics were unable to prevent this, owing to their small representation on the board of com-

missioners in charge; while the church condemned it, demanding (1850) separate education and forbidding Catholic children from attending Protestant instruction. In 1861 the Catholic membership upon the board was made equal to the Protestant. At present the system is divided for the most part along denominational lines. The children of the different religious faiths generally go to schools taught by teachers of their own faith. No child is allowed to attend a religious exercise of a denomination other than his own except upon the written request of the parent.

The Irish educational system differs radically from the English, in that the former is so completely under the control of the central administration. The regulating of teachers' salaries, determining the course of instructions, furnishing schools with supplies, including books, and even the erecting of a certain class of buildings, are all matters in the hands of the central board. The provision of textbooks by the state follows from its policy of not allowing religious questions to be raised in secular teaching and from the desire to prevent the fostering of sentiments out of harmony with Imperial unity. The omission of Irish patriotic songs and of Irish history naturally subjects the administration to much criticism. The supervision of the system is secured by dividing the country into districts and assigning an inspector and corps of subinspectors to each division.

Since 1892 there has been a compulsory school law, the compulsory period being from 6 to 14. The law is, however, not well enforced. Illiteracy is decreasing throughout the country, the percentage of persons five years and over who could neither read nor write having decreased from 25.2 in 1881 to 18.4 in 1891, to 13.7 in 1901, and to 9.2 in 1911. Illiteracy is much the most prevalent in Connaught, where in the last year it amounted to 15.2 per cent. The percentage among the Catholics was over twice as great as for any of the Protestant sects. In December, 1912, there was a total of 8255 elementary schools, of which 4397 were Roman Catholic, with 373,154 pupils; 1549 Protestant, with 117,985 pupils; and 2303 mixed, with 177,519 pupils. In that year 74.6 per cent of the enrollment was in average attendance. No special provision is made by the government for secondary schools other than certain grants in aid which are distributed without regard to the auspices under which they are conducted, according to the "payment in result" system. There are seven training schools for teachers, all of which are aided by the government; their attendance in 1912–13 was 1160.

About 94 per cent of the annual expenditure for schools is borne by the state. The system of apportioning the state grant to elementary instruction according to the results of an examination given the pupils was abandoned, and now the grant is based upon average attendance, with the teacher's salary additional, the salary being fixed according to the one of the three grades in which he teaches, though it may be raised within any given grade for "continued good service."

The principal higher institution of instruction is the University of Trinity College, Dublin, which had an enrollment in 1913–14 of 1285 students. The Catholic population have refused to patronize this institution and have sought in vain to secure state maintenance for a Catholic university. The University College in St. Stephen's Green, Dublin, is under the direction of the Jesuits. There is a National University which only exercises, in the main, examining functions, and a large number of Catholics receive degrees from this institution. Of the three Queen's colleges, at Belfast, Cork, and Galway respectively, only the first is of true university rank. The Presbyterians maintain the McGee College at Londonderry. There are also a number of technical and theological institutions. Alexandra College is for the education of women, and members of that sex are admitted also to the Queen's colleges.

Charities. The poor-law system is similar to that described under UNITED KINGDOM for England and Wales. The adult able-bodied indoor paupers in 1913 numbered 4312, and all other indoor paupers numbered 32,705. The outdoor paupers for the same year numbered 40,129, and the number of inmates of asylums was 1653. Much was done during the last decade of the nineteenth century to improve the conditions of the districts which had long suffered from poverty. A Law of 1821 declared that, when the population of an electoral division exceeded a certain ratio to the ratable value of its property, it should be known as a congested districts county. These districts are wholly in west Ireland—principally in Connaught and in the counties of Donegal and Kerry. A Congested Districts Board was established, and means were made accessible for this board's use in the betterment of conditions in these districts. The system of cultivation practiced in them was found to be most deplorable, and it was generally necessary for the occupants of the holdings to have a secondary source of income, as, e.g., harvest migrations to Scotland and England, as already mentioned. Agricultural inspectors were employed by the board, and much has been done towards improving the soil and the methods of cultivation. Sometimes families are removed to more favorable localities, and not infrequently a number of small holdings are amalgamated into one sufficiently large to maintain a family. The board has done much also to aid in the development of the coast fisheries. The board has powers almost indefinitely wide to aid distressed regions in any manner, and the funds annually at its disposal are about £245,500.

History. According to native legends Ireland was inhabited first by various tribes, of which the most important were Nemedians, Fomorians, Firbolgs, and Tuatha De Danann, who were eventually subdued by Milesians or Scots. Although Ireland is mentioned under the name of Ierne in a Greek poem five centuries before Christ, and by the names of Hibernia and Juverna in various Roman writers, little is known with certainty of its inhabitants before the fourth century after Christ, when, under the appellation of Scoti, they became formidable by their descents upon the Roman Province of Britain. These expeditions were continued, and extended to the coasts of Gaul, till the time of Lavgaire, or Loigaire, MacNeill (c.430), in whose reign St. Patrick (q.v.) attempted the conversion of the natives. Although Christianity had been previously introduced in some parts of Ireland, Patrick encountered great obstacles, and the new faith was not fully established in the island till about a century after his death.

From the earliest period each province of Ireland appears to have had its own king; accord-

ing to legend these kings were subject to the *ard-ri*, or monarch, to whom the central district, called Meath, was allotted, and who usually resided at Tara. Each clan was governed by a chief selected from its most important family. The laws were dispensed by professional jurists styled *brehons*, who received great consideration and were endowed with lands and important privileges.

In the sixth century extensive monasteries were founded in Ireland, in which religion and learning were zealously cultivated. From these establishments numerous missionaries went forth during the succeeding centuries, while many students of distinction from England and the Continent visited Ireland and received instruction at this period. The progress of Irish civilization was checked by the incursions of the Scandinavians, begun towards the close of the eighth century, and continued for upward of 200 years. Establishing themselves in towns on the east coast of Ireland, with the assistance of friendly native tribes, they continued to make expeditions into the interior until their signal overthrow at the battle of Clontarf, near Dublin, in 1014, by Brian, surnamed Boroimhe.

The first step towards an Anglo-Norman conquest of Ireland was made by Henry II, who is said to have obtained in 1155 a bull from Pope Hadrian IV authorizing him to take possession of the island, on condition of paying to the papal treasury a stipulated annual revenue. This bull is probably a forgery. At all events, nothing was done until Dermod Macmurrough (q.v.), the deposed King of Leinster, sought refuge at his court and obtained permission to enlist the services of English subjects for the recovery of his kingdom. Dermod, returning to Ireland in 1169, with the aid of his foreign mercenaries and still more numerous Irish allies, succeeded in recovering part of his former territories and in capturing Dublin and other towns on the east coast. After his death the succession to the Kingdom of Leinster was claimed by his son-in-law, Richard, Earl of Pembroke, surnamed Strongbow. In 1172 King Henry, with a formidable armament, visited Ireland, received homage from several minor native chiefs and from the principal Norman leaders, and granted to the latter charters authorizing them, as his subjects, to take possession of portions of the island, in virtue of the grant made to him by the Pope. The chief Anglo-Norman adventurers, "Strongbow," De Cogan, De Lacy, Fitzgerald, Fitzstephen, Fitzmaurice, and De Courcy, encountered formidable opposition before they succeeded in establishing themselves on the lands which they thus claimed. The government was intrusted to a viceroy, and the Norman legal system was introduced into such parts of the island as were reduced to obedience to England. The youthful Prince John was sent by King Henry into Ireland in 1185, but the injudicious conduct of his council excited disturbances, and he was soon recalled to England. John made a second expedition into Ireland in 1210, to curb the refractory spirit of his barons, who had become formidable through their alliance with the natives. During the thirteenth century the principal Anglo-Norman adventurers succeeded in establishing themselves, with the feudal institutions of their nation, in some parts of Ireland, by the assistance or suppression of native clans. The Fitzgeralds, or Geraldines, acquired almost unbounded power in Kildare and East Munster, or Desmond; the Le Botillers, or Butlers, in Ormond, or West Munster; and the De Burghs, or Burkes, in Connaught. After the battle of Bannockburn, in 1315, Edward Bruce invaded Ireland and attempted to overthrow the English power there. The Pope, at the instigation of England, excommunicated Bruce with his Irish allies; but although his enterprise failed of success, the general result was a decline of the English dominion in Ireland. The descendants of the most powerful settlers gradually became identified with the natives, whose language, habits, and laws they adopted to so great an extent that the Anglo-Irish Parliament passed, in 1366, the Statute of Kilkenny, decreeing excommunication and heavy penalties against all those who followed the customs of, or allied themselves with, the native Irish. This statute, however, remained inoperative; and although Richard II, later in the fourteenth century, made expeditions into Ireland with large forces, he failed to effect any practical result, and the power and influence of the natives increased so much at the time of the War of the Roses that the authority of the English crown became limited to a few towns on the coast and the district termed the Pale (see ENGLISH PALE), comprising a small circuit about Dublin and Drogheda. In the struggle between the houses of York and Lancaster, Ireland supported the house of York.

The participation of the Anglo-Norman nobility of the Pale in the War of the Roses greatly crippled the English interest. When he came to the throne, Henry VII left Gerald, Earl of Kildare, Viceroy of Ireland, although the Earl belonged to the Yorkist party. The assistance rendered by the Earl to the Yorkist pretenders finally compelled the King, in 1494, to remove him and to send over Edward Poynings to restore order to the Pale. Poynings represented the purely English interest, as distinct from the Anglo-Norman interest, which up to that time had prevailed in Ireland. He at once summoned the Parliament of Drogheda, which enacted most important legislation, providing for the defense of the Pale, reducing the power of the Anglo-Irish lords, and rendering the Parliament and judiciary of Ireland dependent on the English crown. The nobility was forbidden to oppress the inferior baronage, to make exactions upon the tenantry, or to assemble their armed retainers; their influence on the towns was diminished. The Statute of Kilkenny, which compelled the English and Irish to live apart and forbade Irish law and customs in the Pale, was confirmed. All state offices, including the judgeships, were filled by the King, instead of the viceroys, and the entire English law was to hold for the Pale. Most important of all was the so-called Poynings Law, which made the Irish Parliament dependent upon the King. It provided that all proposed legislation should first be announced to the King and meet with his approval, after which he should issue the license to hold Parliament.

Henry VII reëstablished the Earl of Kildare, who was the most powerful of the Irish nobility, as Viceroy, and under his rule the Pale grew and prospered. His family, the famous Geraldines, rebelled and were overthrown during the reign of Henry VIII. Henry VIII, in 1537, attempted to introduce the Reformation into Ireland, and the dissolution of the monasteries was begun. Somewhat later, relics and images were destroyed and the dissolution was

completed. The native chieftains were conciliated by a share of the spoils and received English titles, their lands being regranted under English tenure. It was Henry's policy thus to conciliate them and to leave the Irish under their own laws. An English commission held courts all over the island, but Irish right was respected, and the country remained peaceful. This result came about under the wise rule of St. Leger, who was Viceroy during the latter part of the reign. In the Parliament of 1541, attended for the first time by native chieftains as well as the lords of the Pale, Henry's title of Lord of Ireland, which had been conferred by the Pope, was changed into that of King.

The religious changes under Edward VI and Mary had little effect upon Ireland. Although Mary was herself a Catholic, she was the first to begin the colonization of Ireland by English settlers. The Irish people of King's and Queen's County were driven out and their lands given to English colonists. Elizabeth at first followed her father's policy of conciliating the Irish chieftains, but the rebellion of Shayne O'Neill, an Ulster chief, caused a radical change in her policy. An act was passed making all Ireland shireland, and the commissioners of justice were invested with military powers. So far from respecting Irish right, they ignored it altogether. The religious wars of Elizabeth were attended by rebellions of the Irish Catholics. The Earl of Desmond, a representative of the great house of Geraldine, which ruled over the greater part of Munster, was defeated after a long struggle. Hugh O'Neill, called by the English the Earl of Tyrone, annihilated an English army on the Blackwater and baffled the Earl of Essex, whom Elizabeth had sent against him. A Spanish force coming to his assistance made the mistake of landing in the south, instead of in the north, as had been promised, which led O'Neill to make a march of 200 miles through desolate country in order to join them. His forces were too weak to withstand the English in the field, and about the beginning of 1603 he submitted to Lord Mountjoy, but was allowed to retain his earldom. During all these wars the greatest cruelty and treachery were practiced on both sides. In order to destroy Irish resistance, the English devastated the villages, crops, and cattle, putting to death all the inhabitants they could secure. The greater part of Munster and Ulster was laid desolate, and many more perished from hunger than by the sword.

Under Elizabeth and James I the Anglican state church was extended over Ireland, not only obtaining all that belonged to the church of the Pale, but being invested with the establishment belonging to the Celtic church as well. There was an ancient feud between these two Irish churches, and they were intensely hostile to each other. The church of the Pale was effected by the Reformation, but the Celtic church became increasingly Roman. The entire Celtic population of Ireland, and the majority of the inhabitants of the Pale, remained Catholic. The Anglican church thus became a mere instrument in the hands of the English rulers in Dublin Castle.

During the reign of James I the English system was introduced into Ireland on a grand scale. English law was pronounced the sole law of the land. The fight of Tyrone and Tyrconnell gave a pretext for the confiscation of the land in six counties of Ulster. The independence of the Irish Parliament was destroyed by the creation of 40 boroughs out of small hamlets, which secured a permanent majority to the crown.

The despotism of the Earl of Strafford, the Viceroy of Charles I, produced order and prosperity in Ireland. By balancing the number of Catholics and Protestants in Parliament and holding out to the former the promise of toleration, he succeeded in obtaining liberal supplies for the King in his conflict with the English Parliament. The native Irish, who had been dispossessed by the plantations in Ulster and elsewhere, made use of the English situation to regain their possessions. Under the leadership of Rory O'More, a conspiracy was formed in 1641 to seize Dublin and expel the English. They succeeded in driving the English settlers out of Ulster and committed many outrages, not, however, so many as has been supposed. It has been estimated by English writers that at least 30,000 people were put to death, but this number is certainly exaggerated. The Scotch were, as a rule, spared. The insurgents were soon joined by the Catholic lords of the Pale, and together they chose a Supreme Council to govern Ireland. Charles I sent over the Earl of Glamorgan to treat with them, and the Earl went so far as to promise them the predominancy of the Catholic church in Ireland as the price of their assistance to the King. But the struggle in England was terminated in favor of the Parliament before the Irish Catholics could render effective assistance to the King. In 1647 the alliance between the lords of the Pale, who desired nothing beyond toleration for their religion, and the Celts, who hoped for the restoration of the ancient land system, came to an end. In 1648 the Earl of Ormond returned as the Viceroy of Charles I and made an alliance with the Catholic lords, thus securing Ireland to the Royalist party. In 1649 Cromwell landed at Dublin, which the Catholics had been unable to take. With his well-disciplined army, 10,000 men of the New Model, he stormed Drogheda and put its garrison of 2000 to the sword. At Wexford there was another slaughter. Cromwell's successors, Ireton and Ludlow, finished the war, and a great part of the best lands of Munster, Leinster, and Ulster was confiscated and divided among the soldiers of the Parliamentary army. The Catholics and Loyalist landowners were banished to Connaught. A portion of the land confiscated at this time was restored under Charles II, but at least two-thirds of the land in Ireland remained in the hands of the Protestants. The viceroyalty of Ormond did much to restore order and promote industry, but the Protestant ascendancy was maintained. James II, however, reversed this policy. Under his Viceroy, the Earl of Tyrconnell, Catholics were advanced to positions of state and placed in control of the militia, which Ormond had previously organized. Consequently the entire Catholic population took sides with James II in the English revolution of 1688, and when in 1689 James landed at Dublin with his French officers, Tyrconnell had an Irish army ready to assist him. The Protestant settlers were driven from their homes and found refuge in Enniskillen and Londonderry. James attempted to capture Londonderry, but he was hampered by the lack of artillery, and the city was relieved by way of the sea. His Parliament of 1689 restored all the lands

that had been confiscated since 1641 and passed an act of attainder against the partisans of William III. In the following year William landed in Ireland and in the battle of the Boyne (July, 1690) defeated the Irish forces. He failed, however, to capture Limerick, which was bravely defended. A brilliant sally of the Irish patriot Sarsfield destroyed William's heavy artillery, and he was forced to retire. The next year his generals defeated the Irish army at Aughrim, and Limerick was forced to capitulate. By the terms of the Treaty of Limerick, Catholics were permitted a certain amount of religious freedom, and the lands they had possessed under Charles II were to be restored.

The Parliament of England forced William to break the concession of the Treaty of Limerick regarding the restoration of the lands, and the Parliament of Ireland violated the terms granting religious toleration by enacting the penal laws, directed mainly against the Roman Catholics. The peasants were annoyed by cruel and vexatious restrictions alike on their religious worship and innocent amusements. Irish commerce and industries were deliberately crushed. In 1663, and again in 1696, all Irish trade with the English colonies was prohibited, and in 1665 and 1680 the Irish import trade to England in cattle, milk, butter, and cheese was forbidden. The trade in woolens, which had grown up among the Irish Protestants, was likewise crushed by an enactment of 1699, which prohibited the export of woolen goods from Ireland to any country whatever. Small amends for these injuries were made by leaving the linen trade undisturbed. The result of all these measures was the gradual decline of Ireland. A large percentage of the best elements of the population emigrated—the Catholics to serve in the armies of Spain and France, the Protestants to carry their industries to America.

The American Revolution awakened much sympathy in Ulster, especially among the Presbyterians, who, being disqualified from holding office, desired a general emancipation, including the Catholics. In 1778 the Irish Parliament passed the Relief Act, removing some of the most oppressive disabilities. Meanwhile the Irish Protestants, under pretext of defending the country from the French, who had formed an alliance with the Americans, had formed associations of volunteers, 80,000 strong. Backed by this military force they, under the lead of Grattan, demanded legislative independence for Ireland, and on motion of the younger Fox the British Parliament repealed both the Poynings Law and much of the anti-Catholic legislation. But the Irish Parliament was composed entirely of the Protestants of the Established church, who were unwilling to extend the suffrage, and it was even more corrupt and in need of reform than the British Parliament. The principles of the French Revolution found their most powerful expression in Ireland in the Society of United Irishmen, which organized the rebellion of 1798. The peasantry rose in Wexford and, although miserably armed, made a brave fight. At one time Dublin was in danger, but the insurgents were defeated by the regular forces at Vinegar Hill. A French force of 1100 landed in Killala Bay, but too late to render effective assistance. Pitt, the British Prime Minister, thought a legislative union of the two countries, together with Catholic emancipation, the only remedy for Catholic rebellion and Protestant tyranny. By a lavish use of money and distribution of patronage, he accordingly induced the Irish Parliament to pass the Act of Union. On Jan. 1, 1801, the Union was formally proclaimed.

The history of Ireland since the Union is the story of a continuous struggle for civic and religious freedom and for separation from Great Britain. Hardly had the Union been carried out when the universal dissatisfaction gave rise to the outbreak of July 23, 1803, under Robert Emmet (q.v.). It was easily suppressed, and for some time there were no further armed revolts. Instead a conflict was carried on along parliamentary lines under the leadership of Daniel O'Connell (q.v.). In 1823 he founded the Catholic Association, which demanded first of all Catholic emancipation. This was finally obtained, for in 1828 Catholics were permitted to hold office, and in 1829 they were allowed to sit in Parliament. The struggle now turned upon the tithes, which all, Catholics included, were compelled to pay for the maintenance of the Anglican church in Ireland. Great cruelties were perpetrated on both sides during the so-called Tithe War, which was coupled with a renewed emphatic demand for the repeal of the Act of Union. O'Connell formed various societies to carry on the agitation, and there was considerable lawlessness, which was fostered by the so-called Ribbon Society. See Ribbonism.

The reform of Parliament in 1832 aided the Irish leaders, for it increased the number of Irish members from 100 to 105 and, more important still, it gave the middle class more power, in place of the pro-English aristocracy. In 1838 a bill was passed converting the tithes into rent charge, to be paid by the landlords, and agitation in connection with the church ceased to be acute for a time. O'Connell had for a long period been supported by the more extreme of the Irish Nationalists, but in 1843 it became evident that he would never make an appeal to arms. The consequence was the formation of the Young Ireland party, whose leaders were all young men, the most notable being William Smith O'Brien, John Blake Dillon, Thomas Francis Meagher, and John Mitchel. The last named in turn seceded from the Young Ireland party and advocated an Irish republic. For a while Peel, the English Prime Minister, tried concessions, but in vain, the more so as from 1845 to 1847 rent-racked Ireland suffered from a terrible famine, due to the failure of the potato crop. Vast numbers emigrated, especially to America, whither they carried with them the hatred towards England and continued to give effective support to the Irish cause. Many also died, and it is said that in all one and a half million of people had disappeared by 1848. In the latter year the Young Ireland party sought to bring about a revolt, but the whole attempt proved a miserable failure; the leaders were captured and transported.

The work of the Young Ireland party was in time taken up by the Fenian Society (q.v.), which accomplished nothing, except arousing English feeling by various outrages, and thus giving rise to several coercive measures. Far-reaching reforms, however, came about through the efforts of Gladstone. On July 26, 1869, a measure was passed by Parliament which finally disestablished the Irish church, the Act taking effect on Jan. 1, 1871. (See Ireland, Church of.) Many reforms in the land laws were also carried out, which are described in detail under

IRISH LAND LAWS; while the agrarian agitation is treated under LAND LEAGUE. Ireland, however, was not content with ecclesiastical and agrarian reforms, and Home Rule (q.v.) became the all-absorbing question, the cause finding a champion of great ability in Charles Stewart Parnell (q.v.). In 1880 the agrarian movement in Ireland developed into a system of organized terrorism. As a result of this lawlessness a bill became law on March 2, 1881, known as the Coercion Act, which gave the Lord Lieutenant of Ireland power, by warrant, to arrest any person, on mere suspicion, for treason, intimidation, and the like. Under this law Parnell and other Irish leaders were arrested, but, as usual, the Irish retaliated with outrages, which culminated in the murder of the Chief Secretary for Ireland, Lord Frederick Cavendish, and the permanent Undersecretary, Thomas H. Burke, in Phœnix Park, Dublin, on May 6, 1882. Thereupon the government passed an exceptionally stringent and severe Crimes Act, which, among other things, permitted the examination of witnesses without bringing any specific charges against individuals. By this means a body, known as the Invincibles (q.v.), was discovered, under whose auspices most of the outrages had been perpetrated.

The parliamentary election of 1886 gave Mr. Gladstone a very small majority in the House of Commons and made him dependent on the Irish Nationalists for their support. On April 8 he brought in his first Home Rule Bill, followed a few days later by a Land Purchase Bill—the latter a sop to the Irish landlord. Deserted by a large section of his following who did not believe in the policy of Home Rule, the bill was lost by about 30 votes, and Parliament was dissolved. In the July elections the Conservatives and Liberal-Unionists outnumbered the Gladstonians and Parnellites by 100, and Lord Salisbury was again Prime Minister. In the same year Mr. Parnell introduced a bill by which leaseholders might partake of the benefits of the Land Act of 1881 (see IRISH LAND LAWS); it also provided for a revision of the judicial rents necessitated by the fall in agricultural prices. The rejection of this bill was answered by the Plan of Campaign drawn up by Messrs. Dillon, O'Brien, and Healy. Briefly the plan was this: the tenant was to offer a fair rent, and if the landlord refused the offer, the money was paid to trustees for the purpose of resisting evictions. Mr. Parnell did not approve of the plan. Mr. Gladstone, however, would not condemn it, holding it to be the consequence of the ministerial policy. As a result of the Plan of Campaign, Mr. Arthur Balfour on his appointment as Chief Secretary in March, 1887, succeeded in placing on the statute book the Perpetual Crimes Act, which substituted trial by magistrates for trial by jury in cases of certain acts of violence. But the plan also forced the government to pass Mr. Parnell's Land Measure, which it had rejected in 1886.

Prominent Liberals visiting Ireland at this time were greeted with much popular enthusiasm. On the other hand Irish members were eagerly welcomed on Liberal platforms in Great Britain. Not relishing the turn things were taking, the London *Times*, the chief opponent of Home Rule in the English press, published a series of articles on "Parnellism and Crime," based on a series of documents received from the Secretary of the Irish Loyal and Patriotic Union. These documents connected Parnell and many of his following with the agrarian crimes in Ireland and showed that Mr. Parnell himself condoned the Phœnix Park outrages. Parliament appointed a special commission of investigation, which continued in office for 13 months. This commission discovered that the chief documents were forgeries, executed by a disreputable and destitute Irishman named Richard Pigott, well known in Dublin. After confessing his crime, Pigott fled to Madrid and committed suicide. The special commission issued its report in 1890, and it seemed to be a turning point in the history of Ireland. Mr. Parnell became a hero with the English Liberals. The by-elections were beginning to go against the government, their majority was diminished, and hopes for Home Rule were very bright indeed when, on Nov. 17, 1890, Captain O'Shea filed a petition for divorce from his wife and named Mr. Parnell as corespondent. There was no defense and the decree was granted. The day after the judgment the members of the National League, with Mr. Redmond in the chair, passed a vote of confidence in Mr. Parnell. Mr. Gladstone expected that the Irish leader would retire for a time at least, but finding that he did not, sent a letter to Mr. Morley virtually demanding that he do so, and intimated that his continued leadership would mean the defeat of Home Rule. The Irish party was not prepared to make such a sacrifice for their leader, and Parnell was deposed by a vote of 45 to 26. The majority elected Mr. Justin McCarthy as their chairman. Mr. Parnell made a dogged resistance, attending meetings and making speeches week after week, but the strain upon his health was too great. He died at Brighton, Oct. 6, 1891. Party spirit among the Nationalists ran riot.

While the Irish members were disputing about the leadership, Mr. Balfour profited by the opportunity to silence his Liberal critics. In the autumn of 1890 he made a tour of Ireland. He found great destitution in many places, owing to the failure of the potato crop; this he remedied by a relief fund plus a small grant from the Exchequer. His Light Railways Act of 1890 opened up some of the poorest parts of the west and gave employment to some 14,000 men. The Ashbourne Acts were extended and modified by the Land Purchase Act of 1891, by which £30,000,000 were provided on security to convert the tenants of the Irish estates into proprietors. In the same year the Congested Districts Board was established. In February, 1893, the Liberals being in power, Mr. Gladstone introduced his second Home Rule Bill. It occupied the House of Commons 82 days; the third reading was carried on September 1 by a majority of 34. It was thrown out by the Lords by a vote of 419 to 41, and the public, rather tired of the Home Rule discussion, acquiesced in their decision. Early in the following year Mr. Gladstone retired. An Amending Land Act was added to the statute books in 1896. Two years later a Local Government Act, which the Unionists had made part of their programme, transferred the government of the counties and rural districts, except in some of the northern counties, from nonrepresentative grand juries to popularly elected county councils. This was not a substitute for Home Rule, nor was it intended to be. Most important was the passing in 1899 of an Act "for establishing a Department of Agriculture and other Indus-

tries and Technical Instruction in Ireland and for other purposes connected therewith."

In 1900 patriotism triumphed over party strife, the two factions in the Irish Nationalist party were reconciled, and Mr. Redmond, the leader of the Parnellites, was elected chairman of the United Irish party. In a speech at Liverpool in 1902 Lord Rosebery sounded what he thought was the death knell of Home Rule. A few days later Sir Henry Campbell-Bannerman, in a speech, took the supposedly buried issue under his protection, and Home Rule became one of the responsibilities of the Liberal party. Mr. Wyndham's Land Purchase Act of 1903 was founded on a report of a conference held between the representatives of the landlord and tenant, in Dublin, and £100,000,000 were provided for the buying out of the entire landlord class. Mr. Wyndham's policy of "devolution," i.e., the delegation to local bodies of larger powers, found little or no support among the Nationalists, and the Irish Unionists bitterly attacked it as a sop to Home Rule. In 1905 the Sinn Fein (Gaelic for "Ourselves Alone") was organized by the radicals in Ireland. Their aim was to regenerate the nation, not merely politically, but also linguistically, educationally, industrially, and socially. The General Elections of 1906 were disastrous to the Unionists. A Liberal government was in, with the largest majority ever attained since 1832. To the Nationalists, as the fruits of a generation of parliamentary agitation, Mr. Birrell in 1907 submitted the mild Irish Councils Bill. It was strongly opposed by the Sinn Fein and the Roman Catholic clergy. To the surprise of the Liberal party it was rejected with scorn at an Irish national convention at Dublin. Towards the end of the session an Evicted Tenants Bill was passed, by which the estates commissioners were empowered to force the sale of land by "compulsion." Owing to the inadequacy of the financial provisions of the Land Act of 1903, an Amended Land Purchase Act was passed in November, 1909, and £52,000,000 were granted for pending agreements and practically an unlimited amount for the future. (See IRISH LAND LAWS.) On Oct. 1, 1909, the two universities created by Mr. Birrell's Irish Universities Act of 1908 came into existence: the Queen's University with the Queen's College at Belfast, and the National University at Dublin with the Queen's colleges at Cork and Galway and a new college at Dublin. Each college in reality became an almost independent university. The governing bodies of these colleges are to a large extent Catholic and Irish. Religious services of any kind are prohibited within their precincts and there are no religious tests. Trinity College in Dublin remained untouched. This was the solution of the problem which Mr. Gladstone had vainly attempted to solve in 1873.

In 1911 the Nationalists, holding the balance of power in the House of Commons, insisted that Home Rule should have precedence over all other measures. In October Mr. Birrell, explaining the government's Home Rule Bill, declared that it involved a bicameral Irish Parliament, with an executive responsible to it, and with full representative powers and control over purely Irish concerns. The Ulster Unionists appointed a commission to draw up a plan of a provisional government for Ulster, which should come into operation if a Home Rule measure passed. On April 11, 1912, Mr. Asquith introduced the Government of Ireland Bill, as it was officially called. It provided for an Irish Parliament consisting of a Senate and a House of Commons, which was empowered to make laws for Ireland, but certain classes of legislation were removed from its jurisdiction, including powers regarding peace, war, treaties, army, navy, trade, navigation, coast defenses, coinage, stamps, weights, measures, copyright, religion, and Freemasonry. Besides the veto prerogative of the Lord Lieutenant and the Imperial Executive, the British Parliament retains authority over all Irish legislation. The financial provisions were regarded as the chief difficulty. The first reading was carried in the House of Commons on April 16 and the second reading on May 9. While in the committee stage it was so amended as to allow, after the first five years, proportional representation, by provinces, in the Senate. On Jan. 1, 1913, Sir Edward Carson, leader of the Ulster Unionists, proposed an amendment to exclude Ulster from Home Rule, notwithstanding the fact that in the Province of Ulster Roman Catholics constitute about 40 per cent of the population. The amendment was rejected by a vote of 294 to 197, and on Jan. 16 the bill passed its third reading in the Commons. It was rejected by the House of Lords on January 30. The bill was reintroduced in the summer session, but on July 15 the Lords refused it a second reading and declined to proceed with a consideration of the bill until it had been submitted to the will of the country. It passed the third reading, for the second time, in the House of Commons on July 17. The Ulster Volunteers' preparation for armed resistance to any measure of Home Rule went on apace, and the English Conservatives, the avowed guardians of law and order, condoned and openly supported the revolutionary propaganda of the Ulster Unionists.

During the year the Cunard and White Star lines, claiming that Queenstown harbor was unsafe for their vessels, refused to allow them to call at that port, thereby delaying the American mail at least 24 hours. The government supported the companies in their breach of contract, and the Irish charged that the government was antagonistic to Ireland's commercial prosperity. The year 1913 was remarkable also for the great strike of the Dublin transport workers, fomented by James Larkin. The first strike was on the tramway system during Horse Show week; then it quickly spread to every class of transportation, crippling trade and closing the port of Dublin for a time. Twenty thousand men were out of work, and the suffering in the strikers' families was so intense that the English Socialists offered to take the children to England and care for them. This plan, which aroused much hostile feeling, was frustrated by the Roman Catholic clergy of Dublin. Sir George Askwith, chairman of a commission of inquiry, appointed by the British Board of Trade, declared the strike disastrous to all concerned and asked for a mutual agreement. The employers refused to recognize the Transport Union till that body repudiated the syndicalist principles with which Larkin had imbued it. Larkin was tried and sentenced to seven months' imprisonment for inciting to destruction of property, physical assaults, and seditious libel. The Labor element accused the government of injustice in imprisoning Larkin while they left Sir Edward Carson free to organize and utter treason. After the arrest of the leader the

strike was broken, and the men gradually returned to work. Larkin was released about the middle of November, owing possibly to the government's loss of the Labor vote in certain of the English constituencies.

Parliament reassembled on Feb. 10, 1914, with every prospect for a stormy session. Sir Edward Carson threatened civil war unless Ulster was excluded from control of the Home Rule Parliament. Mr. Asquith proposed to allow the various counties in Ulster to decide for themselves whether they wished to be under the jurisdiction of the Dublin Parliament or not. Those who decided in the negative were to be excluded for six years and then be automatically included, unless the Imperial Parliament decided otherwise. This was vigorously opposed by the Irish leaders and the Nationalist papers on the ground that it would partition Ireland. At the second reading in April the majority fell from 98 to 80, as the followers of Mr. O'Brien deemed it ridiculous to vote on a measure which was not intended to pass. Seeing that Mr. Asquith was willing to make further concessions to Ulster, the leaders of the Irish party answered by extending their patronage to the National Volunteer movement, which they had discountenanced up to this time. The as yet unamended bill passed the House of Commons for the third and last time on May 25, 1914, and became law under the Parliament Act of 1911. (See ENGLAND.) It was then sent to the Lords, and a month was given for its consideration. The Lords refused to act upon the Home Rule Bill until the amending measure was before them. The Upper House passed the amending bill on its second reading on July 6, and then proceeded to modify it radically. Ignoring the large numbers of Home Rulers in Ulster, the entire province was to be excluded from the jurisdiction of the Dublin Parliament. There were further amendments, and the bill passed its third reading on July 15. Five days later the Commons took up the measure as amended for extended consideration. The King, in an effort towards an amicable adjustment, called a conference of the leaders of all the parties. After prolonged meetings no agreement was reached, as Sir Edward Carson demanded the entire exclusion of Ulster, and Mr. Redmond felt he could not sacrifice the Ulster Nationalists, who had suffered most for the cause of Home Rule. Civil war in Ireland seemed imminent when a truce was declared by both parties as a result of the entrance of Great Britain in the Great European War of 1914. Mr. Asquith's Amendment Act allowing the counties of Ulster to decide for themselves was passed, but its operation was postponed for one year. See WAR IN EUROPE.

While the agitation for Home Rule has seemingly overshadowed everything else, those who know Ireland from within are aware that Irish thought upon Irish problems, during the last 20 years, has been undergoing a silent revolution. Among the new forces in Irish life are two, which stand apart from all political and religious struggles and deserve more than passing notice. One is the Irish Agricultural Organization Society, inaugurated in 1894 mainly through the efforts of Sir Horace Plunkett; the other is the Gaelic League, founded by Dr. Douglas Hyde in 1903. The former aims to do in the industrial what the latter attempts in the intellectual sphere, the rehabilitation of Ireland from within. At a meeting in December, 1913, Father Finlay, S.J., the chairman of the I. A. O. S., announced that their societies had increased to nearly 1000. These include industrial societies, creameries, agricultural societies for the purchase of seed, implements, etc., on coöperative lines, and credit societies, which loan money at low rates of interest, thereby freeing the small farmer from the thralldom of the gombeen man, or usurer. The membership in these societies is over 100,000, while their combined trade amounts to over £2,000,000 a year. This coöperative movement is spreading so rapidly, and in so many different directions, that in the near future it will give a distinct character to Irish industry, constituting the whole community a truly coöperative commonwealth. Equally hopeful is the outlook of the Gaelic League, which has over 964 branches. It is not only fulfilling its declared object—the popularizing of the national language and literature—but it is also developing the intellectual, moral, and social life of the Irish people and has done excellent work in the cause of temperance.

Although, as mentioned above, the outbreak of the Great World War in 1914, caused a virtual truce with regard to the Irish question, it was not long before the entire matter was opened up again. The south of Ireland feared that with the establishment of a coalition ministry the Unionists would come into power and strike the Home Rule Bill from the statute books. The fears of the southerners were increased when Sir Edward Carson, the bitter foe of the Home Rule movement, was called to the cabinet. By the Suspensory Act of September, 1914, the Irish Home Rule Act had been suspended until the expiration of 12 months from the date of passing, i.e., until Sept. 18, 1915, or "until such later date (not being later than the end of the present war) as may be fixed by Order in Council." The anticipation of the Irish Nationalists that the Coalition cabinet, instead of permitting the act to come into effect in September, 1915, would take advantage of the loophole permitting a further suspension, was realized when on Sept. 14, 1915, the government published an Order in Council as follows: "If at the expiration of 12 months the present war is not ended, no steps shall be taken to put the Government of Ireland Act, 1914, into operation until the expiration of 18 months from the date of the passing of that Act unless the present war has previously ended, nor if at the expiration of those 18 months the present war has not ended until such later date, not being later than the end of the present war, as may hereafter be fixed by Order in Council."

The Irish situation was considerably complicated by the outbreak of the "Easter Revolution" in 1916. This revolution was brought about by the Sinn Fein organization. This society was formed in 1905. Its central idea was that the Irish people should recover and assert its nationality in every possible way, in language, in dress, in the development of Irish resources, and industries, and in progress along national lines. Its scope was political. It opposed Irish representation in the British Parliament and attacked the Nationalist party, whose members in Parliament it accused of being the tools of the Liberal party and indifferent to the Irish cause. Sinn Fein had no patience with the Home Rule cause. It held that Ireland should not wait for Home Rule as a gift from the British Parliament, but should start meas-

ures of independence on its own account. It was inspired at first by Arthur Griffith, a journalist of marked ability and force who expounded its doctrines in a weekly newspaper. Sinn Fein made little headway at first. It was ridiculed by the Nationalists. In 1913 it allied itself with the Irish Volunteers and seemed to grow fairly rapidly after that.

On Easter Monday, April 24, 1916, the revolution was begun by the seizure of some public buildings in Dublin. At the same time a proclamation was issued asserting the right of Ireland to national existence and announcing the foundation of a new republic. A provisional government was set up under Padraic Pearse, president, James Connolly, commandant in Dublin, and Messrs. Clarke, MacDonagh, Ceannt, Plunkett and MacDiarmad. The revolt was short-lived, being put down in a few days by British forces under General Sir John Maxwell. Almost 1000 people (including military) lost their lives. In connection with this revolution, Sir Roger Casement (q.v.) was captured when trying to land on the coast of Ireland from a German submarine, and the accompanying German munition ship was blown up. Casement was later tried and executed, as were Pearse, Clarke, MacDonagh, and eleven others. More than 3000 were arrested. The government's severe course was bitterly condemned on all sides and did much to stir up sympathy for Sinn Fein. The Nationalists, headed by Mr. John Redmond, remained loyal and condemned the revolt.

Criticism became so strong that the Asquith government was forced to take action. The government's programme provided that the Irish Home Rule Act of 1914 should go into effect at once after certain serious modifications, of which the most important was that Ulster should be temporarily excluded; a parliament was to be set up in Dublin for the other provinces with a Lower House consisting of the Irish members of the British House of Commons with the exception of the 25 from Ulster, and a senate to be chosen by proportional representation; Appeal Court at Dublin was to consist of judges appointed by the imperial executive. This settlement was regarded as temporary, and on the conclusion of peace a revision of it was to be considered at an imperial conference. The Nationalists unwillingly accepted the compromise. The Sinn Feiners and the irreconcilable Unionists opposed it. The plan called for the retention of 40,000 British troops in Ireland. The critics of the government characterized the Prime Minister's course as halting and inefficient.

Next to the war, itself, the Irish problem was the most serious one which faced Lloyd George when he became Prime Minister on Dec. 6, 1916. He was compelled to decide whether the conscription act should be enforced in Ireland or not. Ulster, in general, was in favor of it, but the south of Ireland was almost unanimously opposed to it. After a considerable amount of discussion it was finally decided that the Act should not apply to Ireland. Doubtless the fear of revolution had a great deal to do with the government's decision. After the failure of several schemes for the application of Home Rule, strikingly similar to the Asquith plan mentioned above, the government announced on May 21, 1917, that it would immediately summon a convention in Ireland to draw up a plan for a constitution of the government of Ireland and submit this plan to the British government. The southern Unionists and the Ulster Unionists accepted the scheme, but the Sinn Fein stated in their national council that they would accept it only on condition that it should be free to declare an Irish Republic and that the British government should pledge itself to ratify the decisions of the convention. The convention met July 25 at Trinity College, Dublin. In the meantime the Sinn Feiners were showing signs of increasing power. In several bye-elections they won decisive victories over Nationalists. One of the most important of these was the election of Eamon De Valera. He was one of the chief Sinn Fein leaders and ran on a platform of absolute independence for Ireland, representation at the peace conference after the war, and revolution if necessary, but only when England's difficulties gave rebellion a good chance of success; also the resolution to subdue Ulster if Ulster should resist the new government, provided that the Sinn Fein succeeded in winning independence for Ireland. In the general elections held in December, 1918, the Sinn Feiners captured 73 seats. They steadfastly refused to take them, however.

The report of the Irish Convention was laid before Parliament in April, 1918. The principal points of the scheme were as follows: Parliament was to consist first of a senate of 64 members, including besides the archbishops, lord mayors, and representative peers, representatives of commerce and industry, of labor and of local government; and second a house of commons of 160 elected members, twenty additional members chosen by Ulster constituencies and twenty nominated by the lord lieutenant to represent the southern Unionists. To the Unionists 40 per cent of the total membership was to be guaranteed. As to representation in the British House of Commons forty-two Irish members were to be chosen on the basis of proportional representation. The executive power remained with the King, who was to appoint a lord lieutenant who was to act in accordance with the advice of the Irish Executive Council. The subjects on which the new Irish Parliament was not to legislate were: The crown, peace and war, the army and navy, foreign relations and treaties, dignities and titles, harbors, coinage, copyright, and patent rights. Money bills were to be passed only on the message from the viceroy. No law was to be passed interfering with religious equality. The Irish parliament was not to control the customs and excise until after the war. All other branches of taxation came under its control. The report was adopted by the rather close vote of 44 to 29. Despite widespread demands that the government take immediate action on the report of the Irish convention, nothing was done about it.

In January, 1920, the Sinn Feiners took steps again to proclaim their independence. The seventy-three members who had been elected to the British Parliament held a conference in Dublin, and adopted a declaration of independence and proclaimed the so-called Provisional Government of the Irish Republic. Mr. De Valera, Mr. Arthur Griffith, and Count Plunkett were appointed to present an appeal on behalf of Ireland at the Peace Conference. De Valera stated that if the Peace Conference failed to take steps to allow self-determination for Ireland, violence would be the only recourse left to Irish patriots. De Valera and the Irish Re-

publicans received hearty support among the Irish Americans in the United States. De Valera and his associates were unable to get passports from the British government to attend the Peace Conference. Subsequently the Irish leader came to the United States, where he was most enthusiastically received by Irish sympathizers.

The movement towards an independent republic was checked by the threat of military suppression. The military force was increased to 100,000 and martial law virtually existed throughout all of southern Ireland. Lord French was the military viceroy. An attempt on his life led to a series of reprisals which, with the rioting and general disorder, left Ireland in a sorry state. Lloyd George declared that Great Britain would never accept separation and asserted that any one who thought of this as a practical solution was ignorant of the history of the past five years.

The Lloyd George government introduced its settlement of the Irish problem in the House of Commons on Feb. 25, 1920. Its main provisions were as follows: Two parliaments, each with a single chamber, one for northern and one for southern Ireland; a council of Ireland to serve as the instrument of adjustment between the two and to consist of 20 members of each parliament under the King as president; the two parliaments to have the right to substitute for this council a parliament for the whole of Ireland; provincial parliaments to have control over local government; parliaments to hold annual sessions; the southern to have 128 members, the northern 52; election by proportional representation; representation of the Irish in the British parliament to consist of 42 members; and repeal of the government of Ireland Act of 1914. The second reading was passed on March 31 and the third on November 12. Late in December it received the royal assent.

The Sinn Feiners denounced the new Home Rule Bill throughout its entire history. The year 1920 was marked by severe uprisings on the part of the Irish which were sternly repressed by the government. Hundreds of arrests were made and some of the prisoners, such as Terence MacSwiney, mayor of Cork, died as a result of hunger strikes. Reprisals for Irish attacks on police barracks, etc., were carried out by the "Black and Tans," as the English recruits to the Irish constabulary were called. Hundreds of lives were lost and a large amount of property was destroyed by the activities of both parties. In 1921 the Pope made two appeals for the cessation of violence on both sides.

Although rioting and disorders were prevalent during the early months of 1921, Lloyd George made a definite step towards a peaceful solution of the vexatious problem. On July 9 he summoned De Valera and Sir James Craig to a meeting in London. The British proposals were practically all rejected. A new conference was called and met Oct 11, 1921. As a result of this conference, which lasted until December 6, the Irish delegates signed a treaty in the name of the Irish Free State. The chief provisions of this treaty are: Ireland shall have the same constitutional status as the Dominion of Canada, Australia, etc.; the relations between the Irish Free State and the British government shall be the same as those between Canada and the British government; members of Parliament of the Irish Free State must take an oath to be faithful to the British King; Ulster is given one month to determine her status, i.e. whether she will become part of the Irish Free State or be governed by the Home Rule Bill of 1920; no act may be passed imposing religious restrictions either by northern or southern Ireland. The treaty was ratified by the House of Commons on December 14 and the House of Lords on December 16. In the Irish parliament the treaty was sharply attacked by De Valera and the extremists and defended by Arthur Griffith, one of the signers. After a long and bitter debate the Irish parliament finally ratified the treaty by the extremely close vote of 64 to 57 on January 7, 1922. Two days later De Valera resigned the presidency of the Irish Republic. He ran for reëlection against Mr. Griffith but was defeated by the close vote of 60 to 58. The Free State government was formally set up on January 14. Michael Collins was elected premier of the new state by the Irish Free State parliament. The evacuation of Ireland by the British army began almost immediately. Serious disorders, requiring the presence of British troops, marked the settlement of the boundary dispute between Ulster and the Irish Free State.

The De Valera faction hoped to bring about the defeat of the Irish Treaty in the elections held on June 6, 1922. When it was unsuccessful in this it openly declared war on the Irish Free State. The revolt was unsuccessful and by the middle of July, 1922, it was reported to have been completely put down.

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History. For the early history of Ireland the most valuable sources have been published by the Irish Record Commission (London, 1802–69).

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the many shorter histories perhaps the best is Morris, *Ireland*, in the "Cambridge Historical Series" (ib., 1896). Other short accounts are: Bryce (ed.), *Two Centuries of Irish History, 1691–1870* (ib., 1888); Hassencamp, *History of Ireland from the Reformation till the Union*, trans. (ib., 1888). The best account of Ireland from Elizabeth to the Union is in Lecky, *History of England in the Eighteenth Century* (ib., 1878). Froude, *The English in Ireland in the Eighteenth Century* (New York, 1875), is based on much documentary research, but is violently partisan. For the seventeenth century the chapters on Ireland in Gardiner, *History of the Great Civil War* (London, 1886–94), and id., *History of the Commonwealth and Protectorate* (ib., 1894–1901), are very valuable, as is also Carte's edition of the *Ormond Papers* (ib., 1739). For the more recent history, consult McCarthy, *Ireland since the Union* (ib., 1887). Other authorities are: Keating, *General History of Ireland* (ib., 1823); Gilbert, *Viceroys of Ireland* (Dublin, 1865); Lecky, *The Leaders of Public Opinion in Ireland, Swift, Hood, Grattan, and O'Connell* (London, 1871); Wills, *The Irish Nation: Its History and its Biography* (ib., 1875); Sir C. E. Trevelyan, *The Irish Crisis* (ib., 1880); Gilbert, *History of the Irish Confederation* (Dublin, 1882–91); Richey, *Short History of the Irish People* (ib., 1887); Zimmer, *The Irish Element in Mediæval Culture* (New York, 1891); La Faye, *L'Irlande au 19e siècle* (Paris, 1896); Duffy, *Young Ireland* (London, 1896); Justin McCarthy, *History of our own Times* (New York, 1897); Mitchel, *The History of Ireland* (Glasgow, 1898); Morris, *Ireland, 1798–1898* (London, 1898); R. B. O'Brien, *Life of Parnell* (ib., 1899); Ingram, *Critical Examination of Irish History* (ib., 1900); O'Dea, *Maynooth and the University Question* (Dublin, 1903); Justin McCarthy, *An Irishman's Story* (New York, 1904); Davitt, *Fall of Feudalism in Ireland* (London, 1904); Horace Plunkett, *Ireland in the New Century* (ib., 1904); P. W. Joyce, *Outlines of the History of Ireland* (8th ed., ib., 1906); Stokes, *Ireland and the Catholic Church* (London, 1907); L. P. Dubois, *Contemporary Ireland* (Dublin, 1908); A. S. Green, *Making of Ireland and its Undoing* (London, 1908); Walpole, *Short History of the Kingdom of Ireland* (5th ed., ib., 1908); John Morley, *Life of Gladstone* (2 vols., New York, 1911); Green, *The Old Irish World* (Dublin, 1912); Hackett, *Ireland, A Study in Nationalism* (New York, 1918); Barker, *Ireland in the Last Fifty Years* (Oxford, 1919); Turner, *Ireland and England* (New York, 1919); Hayden and Moonan, *A Short History of the Irish People* (New York, 1921); Hackett, *Story of the Irish Nation* (New York, 1922).

IRELAND, Church of. The name applied to the independent branch in Ireland of the Anglican communion. It was united with the Church of England by the Act of Union, which went into effect on Jan. 1, 1801. The Established church of Ireland, considering itself the rightful successor of the mediæval Roman Catholic church, took possession of the dioceses, parishes, and Church property, and for a long time retained the divisions then existing. The Roman Catholics, constituting a large majority (more than three-fourths) of the population, always regarded as unjust the existence, in their country, of an Established Protestant church in connection with that of England. Notwithstanding its small membership, the church had, in 1833, 4 archbishoprics, 18 bishoprics, the income from which was estimated at from £130,000 to £185,000. In that year the first inroad was made upon the prerogatives of the Established church in the reduction of the archbishoprics to two and the bishoprics to 10. In 1868, on motion of Gladstone, the English House of Commons voted to disestablish the Church of Ireland. The House of Lords rejected the proposition. But so strong was the expression of public opinion against the continuance of the privileges of the Irish church that the royal commissioners on the revenues and conditions of the Church of Ireland recommended in their report, July 27, 1868, important reductions as to its benefices. They suggested, among other changes, the abolition of four bishopries and one archbishopric, and that all benefices with less than 40 Protestants should be suppressed. Gladstone introduced, in March, 1869, a new bill for the disestablishment and disendowment of the Irish church, which, after a long and earnest debate, passed both Houses of Parliament and took effect Jan. 1, 1871. The disestablishment was to be total; ecclesiastical courts and laws were to cease; the bishops were to be no longer peers in Parliament; the ecclesiastical commission was to terminate, and a new commission of Church temporalities, composed of 10 men, was to be appointed, in which the whole property of the Irish church should be vested. Public endowments, including state grants or revenues (valued at £15,500,000), were to be retained by the state, and private endowments, such as money given from private sources since 1660 (estimated at £500,000), were to remain with the disestablished church. The vested interests connected with Maynooth College, with the Presbyterians who were receiving the *regium donum*, and the incumbents, were to be secured. The aggregate of the payments would amount to about £8,000,000, leaving £7,500,000 at the disposal of Parliament. A general convention held in Dublin, 1870, adopted a constitution for the disestablished church, according to which it was to be governed by a General Synod, composed of a House of Bishops and a House of Clerical and Lay Delegates, meeting annually in Dublin. The House of Bishops has the right to veto, but seven members must agree upon a veto to render it valid. The bishops are chosen by the diocesan convention, but if the convention fail to elect a candidate to a vacant see by a majority of two-thirds of each order, the election falls to the House of Bishops. The Primate, the Archbishop of Armagh, is elected by the House of Bishops from their own order. The property of the church is vested in a permanent Representative Body, composed of three classes—the ex-officio archbishops and bishops, one clerical, and two lay representatives for each diocese, and the coöpted members chosen by the ex-officio and representative members, and equal in number to the dioceses. One-third of the elected members retire by rotation. In 1912 the Church of Ireland had two archbishops (Armagh and Dublin), 11 bishops, a membership of about 524,000, and £9,403,956 in funds in custody of the Representative Body. The general feeling among the members of this church has been hostile to the introduction of High Church doctrines and practices, and the Prayer Book has, since the disestablishment, been modified in this sense. See England, Church of.

Consult *Reports of the Representative Church Body* (Dublin, 1872–to date); J. T. Ball, *The Reformed Church of Ireland* (London, 1892); Olden, *The Church of Ireland* (ib., 1892).

IRELAND, John (1838–1918). An American Roman Catholic prelate. He was born at Burnchurch, County Kilkenny, Ireland, Sept. 11, 1838, but was brought to the United States at the age of 11, his parents settling at St. Paul, Minn. In 1853 he was sent to France to be educated for the priesthood, to which he was ordained in 1861 on his return to St. Paul. Here he remained, except for a service of two years as chaplain of the Fifth Minnesota Regiment in the Civil War, becoming rector of the cathedral. In 1875 he was made Coadjutor Bishop of St. Paul, and on Bishop Grace's resignation, in 1884, succeeded him, the see being made metropolitan with the title of archbishop in 1888. The influence of his personality made Archbishop Ireland a commanding figure in many important movements, especially those for total abstinence, for colonization in the Northwest (he was a director of the National Colonization Association), and for the establishment of the Catholic University at Washington. He is the author of *The Church and Modern Society* (1897).

IRELAND, William Henry (1777–1835). A Shakespearean forger, son—probably, though his legitimacy is under suspicion—of Samuel Ireland, engraver and author, born in London in 1777. After attending various private schools he was sent to schools in France, where he remained four years. On returning to London he was apprenticed to a conveyancer. In 1794 he visited Stratford-on-Avon with his father, who was preparing a book descriptive of the town. Here he met John Jordan, a Stratford poet, who had published much gossipy information in regard to Shakespeare, even forging the will of the dramatist's father. After the return of the Irelands to London, William began on his own account a series of remarkable forgeries, which deceived first his credulous father and then many scholars. He produced legal documents, verses, and letters purporting to be Shakespeare's, a number of sixteenth-century volumes with Shakespeare's name on the title-pages, the manuscripts of *Lear* and of a fragment of *Hamlet*, and finally two plays, *Vortigern* and *Henry II*, which he tried to foist as Shakespeare's. On April 2, 1796, *Vortigern* was performed at Drury Lane amid peals of laughter. The same year young Ireland published a written confession, which he enlarged in 1805. Subsequently he wrote considerable verse in imitation of Chatterton, political squibs, and several Gothic romances. He died in London, April 17, 1835. His *Confessions* (1805) were reissued by R. G. White (New York, 1874). In December, 1795, the elder Ireland published facsimiles of the forged documents bearing the title *Miscellaneous Papers and Legal Instruments under the Hand and Seal of William Shakespeare.* These forgeries James Payn made the subject of an interesting novel, *The Talk of the Town* (1885). A collection of the Ireland forgeries in the Birmingham Library was destroyed by fire in 1879.

IRELAND ISLAND. One of the Bermudas. See Bermuda Islands.

IRENÆUS, ī'rē-nē'ŭs (Lat., from Gk. *Εἰρηναῖος, Eirēnaios*), Saint (c.130–c.202). Bishop of Lugdunum (Lyons) and one of the leading Church Fathers of the West. He was born in Asia Minor, perhaps about 130, and died after the year 200. In his youth he had heard Polycarp, Bishop of Smyrna, who had been a disciple of the Apostle John. Thus Irenæus preserves a direct line of apostolic tradition. A fragment in the Moscow manuscript of the *Martyrdom of Polycarp* says that he was then teaching in Rome (155). Some time after this he removed to Gaul, where he became a presbyter in the church of Lugdunum. Pothinus, the aged Bishop of Lyons, suffered death in the persecution under Marcus Aurelius (177), and Irenæus was chosen to succeed him. Shortly before this time he visited Rome again, carrying letters with reference to the Montanists. (See Montanus.) The remainder of his life seems to have been passed in the successful administration of his see. When towards the end of the century the Easter controversy broke out afresh, and Victor, Bishop of Rome, threatened the Asiatic churches with excommunication unless they conformed to the Roman usage, Irenæus intervened with a fraternal letter to Victor, admonishing him to peace. Nothing is known about Irenæus' life after this time. A fifth-century tradition, which cannot be traced further back than Jerome, says that he met a martyr's death in the persecution under Septimius Severus (202). Gregory of Tours gives a full account of the alleged martyrdom in his *History of the Franks.*

Irenæus wrote in Greek. His work *Against Heresies* has survived only in a Latin translation. It was written in Gaul to combat the Gnostic teaching (see Gnosticism) and dates from 181 to 189. It is valuable for the history of doctrine. Fragments of some of his other works are preserved by the later writers. Harnack has recently shown that the so-called 'Pfaffian Fragments' were forged by Pfaff himself. The first edition of Irenæus' works was edited by Erasmus (Basel, 1526). Modern editions are by Migne, *Patrologia Græca,* vi, and (a better edition) Harvey (Cambridge, 1857). An English translation of the *Adversus Hæreses* may be found in the *Ante-Nicene Fathers,* edited by Coxe, vol. i (Buffalo, 1885). In general, consult Cruttwell, *Literary History of Early Christianity* (London, 1893), and Adolf Harnack, *Geschichte der altchristische Literatur* (Leipzig, 1893).

IRENE, ī-rē'nē (Lat., from Gk. *Εἰρήνη, Eirēnē*) (c.752–c.803). Byzantine Empress from 780 to 802. She was a native of Athens and in 768 married Leo, who became Emperor as Leo IV in 775. Her husband died in 780, and Irene became Regent during the minority of her son, Constantine VI. A worshiper of images—in fact, this had during the lifetime of her husband almost caused her disgrace—she quickly began to plot for their restoration and with this purpose assembled a council of bishops at Constantinople (786 A.D.), which, however, was broken up by the opposition of the troops of the capital. A second council held at Nicæa in the following year was more successful, and image worship was reëstablished in the Eastern church. (See Image Worship; Iconoclasm.) In 790 the government was taken out of her hands by the partisans of her son; but in 792 she was again in power, and in 797 she caused Constantine to be blinded and excluded from all power. In 802 her treasurer Nicephorus rebelled, and

banished her to the Isle of Lesbos, where she remained until her death, the following year. It is stated by one authority that negotiations were begun for a marriage between Charles the Great and Irene, but these were frustrated by a favorite of the Empress.

Consult: Bury, *Later Roman Empire*, vol. ii (London, 1889); Diehl, *Figures byzantines*, vol. i (Paris, 1909); McCabe, *The Empresses of Constantinople* (Boston, 1913).

IRENE, Saint (c.1084–1124). A Byzantine Empress, daughter of Ladislas I, King of Hungary. In 1104 she married Emperor John II, but she had lived for some time in a cloister before 1124, when she died. She was canonized by the Greek church for her piety and charity. The name St. Irene is often incorrectly applied to Irene, the wife of Leo IV and enemy of the Iconoclasts.

IRETON, īr'ton, Henry (1611–51). An English general of the Commonwealth. He was the eldest son of German Ireton, of Attenborough, Nottinghamshire. He graduated B.A. at Trinity College, Oxford, in 1629, and studied law at the Middle Temple, London, but at the outbreak of the Civil War offered his services to the Parliament. He served under Manchester in 1644, with the rank of quartermaster-general. At Naseby, in 1645, as commissary general, he was in command of the left wing, and, his lines having been broken by the furious charge of Rupert, he was wounded and taken prisoner, but regained his liberty when Cromwell's Ironsides decided the fortunes of the day. Later in the same year he became a member of Parliament and took an active part in its disputes with the army. At first he favored a settlement between the King and Parliament and was the chief author of "the Heads of the Proposals," but upon being convinced of the impracticability of such an arrangement he became the King's implacable enemy and was one of those who signed his death warrant. His connection with Cromwell, whose daughter Bridget he married in 1646, greatly advanced his interests. When Cromwell went to Ireland to subdue that country, he was accompanied by his son-in-law, on whose vigor, judgment, and tact he placed much reliance. Cromwell's presence, however, was soon required in Scotland, and the complete subjugation of Ireland was intrusted to Ireton. His career was brief, severe, but successful. He compelled the surrender of Carlow, Waterford, Duncannon, and Limerick, and inaugurated a policy of civil government which was marked by fairness and religious sincerity. He died of an epidemic fever at Limerick. His remains were conveyed to England and interred in Westminster Abbey; but after the Restoration they were disinterred, hanged, and burned at Tyburn.

IRGENS, Johannes (1869–). A Norwegian statesman, born at Aas, where his father was professor of mineralogy in the Agricultural High School. He was educated at the University of Christiania, was in the consular service at Bordeaux and Antwerp in 1892–95, practiced law in Christiania for 10 years, was Secretary of the Norwegian Legation in London in 1906–08 and then Minister to the Court of St. James's in 1908–10. In 1910–13, in the Konow and Bratlie cabinets, he was Minister of Foreign Affairs.

IRI, ē'rē. A river of Greece. See Eurotas.

IRIARTE, ē'rē-är'tȧ, Ignacio (1620–85). A Spanish landscape painter, born at Azcoitia in Guipuzcoa. He studied under Herrera in Seville and was one of the original members and the first secretary of the Academy of Seville, founded by Murillo (1660). He painted the backgrounds in some of Murillo's pictures, and Murillo in turn furnished the figures for his friend's landscapes. There are four well-composed, conventional landscapes by him in the Prado Museum at Madrid which show his talent as colorist; others in the Louvre and the Hermitage. Murillo said of him that "he painted landscape so well, he must be inspired."

IRIARTE, or YRIARTE, Y OROPESA, ē'rē-är'tȧ ė ō'rō-pā'sȧ, Tomás de (1750–91). A Spanish poet, born at Orotava on the island of Teneriffe, Sept. 18, 1750; educated at Madrid under the care of his uncle, Juan de Iriarte, the head of the Royal Library. He began very early to translate French plays and to compose plays of his own. For his maintenance, however, he depended throughout his life upon the income derived from certain minor posts to which he was appointed in the Ministry of Foreign Affairs and of War and from other administrative appointments. The tranquillity of his career was somewhat disturbed by numerous literary quarrels with other writers of the time, notably with Juan Pablo Forner, and in 1786 he was summoned before the Inquisition to answer a charge of adherence to the doctrines which the French philosophers were then disseminating—a charge from which he seems, however, to have had little difficulty in clearing himself. He died at Madrid, Sept. 17, 1791. Much of his published verse consists of translations, most of which are not so good as his original poems. Among these are the *Epistles*, one of which forms the dedication of his translation of Horace's *Ars Poetica* to his friend Cadalso, and a didactic work, *La musica*, a discussion of the elements of music, which attracted attention abroad and won him praise from Metastasio. But his permanent fame is based upon his versified fables, the *Fábulas literarias*, still among the most popular in Spain. In their content these show considerable skill on Iriarte's part in adapting the peculiarities and habits of animals to doctrinal purposes; in their form they also display his ingenuity, being written in a great variety of metres with a due regard for harmony and symmetry. The fables were translated into many European languages. Belfour's *Literary Fables Imitated from the Spanish of Yriarte* appeared in London in 1806, and Rockliff's rendering of Iriarte reached a third edition in 1866. His name is given in the *Catálogo de autoridades de la lengua*, published by the Academia Española.

Bibliography. Iriarte, *Colección de obras* (Madrid, 1805); *Biblioteca de autores españoles*, vol. lxiii (ib., 1891), containing his poems; Iriarte, "Poesías inéditas," in *Revue hispanique*, vol. ii (Paris, 1895); Cotarelo y Mori, *Iriarte y su época* (Madrid, 1897); "Proceso inquisitorial contra Iriarte," in *Revista de Archivos, etc.*, vol. iv (1900).

IRIARTEA, ir'i-är'tē-ȧ (Neo-Lat., named in honor of Juan de Iriarte, a Spanish amateur botanist). A genus of South American palms which have lofty, smooth, faintly ringed stems, and pinnate leaves with somewhat triangular leaflets. The pashiuba or paxiuba palm (*Iriartea exorrhiza*, by some botanists called *Socratea exorrhiza*), common in low, wet grounds in the forests of the Amazon district, is remarkable for its aërial roots, which extend from the stem

obliquely downward and often divide into many rootlets just before they reach the soil. As the tree grows, it produces new roots from higher points. Since the older and more central ones die, a man may walk erect under a palm of 70 feet high, supported as on legs rising straight above his head. The outer wood, which is very hard, is used for harpoons. It splits easily into straight laths, is excellent for floors, ceilings, shelves, etc., and is exported for umbrella sticks. The leaves are extensively used in Brazil as thatch.

IRIDACEÆ, ĭr'ĭ-dā'sē-ē (Neo-Lat. nom. pl., from Lat. *iris*, Gk. *ἶρις*, *iris*, rainbow, sort of lily), or IRIS FAMILY. A family of monocotyledonous plants, consisting mostly of herbaceous perennials, with tubers or rhizomes. The leaves are usually in two rows and equitant (i.e., so placed that one seems to fit over the back of the other). The perianth is six-parted, colored, and in some kinds very beautiful. The stamens are three with anthers turned outward. The ovary is inferior, with one style and three stigmas, which are often petal-like and add much to the beauty of the flower. The fruit is a three-celled capsule containing many seeds with small embryos in a hard endosperm. There are about 60 genera and 800 species known in temperate and tropical countries. South Africa and tropical America contain the greatest number. Some species, however, range to rather high latitudes. Familiar examples of the family are the garden irises, crocuses, gladioli, etc. Some species have acrid properties, while the corms of others are edible, and others have medicinal properties of considerable value. The representatives of the family indigenous in the United States are species of *Iris* (flag), *Nemastylis*, and *Sisyrinchium* (blue-eyed grass). Two additional genera, *Calydorea* and *Blerbertia*, grow in Texas, and there may be others farther west. See accompanying Colored Plates of IRIS FAMILY and FLEURS-DE-LIS.

IR'IDEC'TOMY. See CATARACT.

IRIDESCENT GLASS (ĭr'ĭ-dĕs'ĕnt) (from Lat. *iris*, Gk. *ἶρις*, *iris*, rainbow). Glass containing a display of changing colors on the surface somewhat similar to the delicate hues of soap bubbles. It is produced by rendering the surface of the glass imperceptibly uneven, either by artificial means or by the natural process of incrustation and decay. One form of treatment consists in applying to the surface of the glass to be treated a strong solution of hydrochloric acid under pressure in a closed vessel. Another method in use in many factories is to apply the fumes from chloride of tin or other chlorides volatilized in a reheating furnace. Glass which has for many years been submitted to the slowly disintegrating influences of natural causes, such as damp, successive heat and cold, light and darkness, will in many instances display an iridescent play of colors. The cause is due to a process of decomposition in the texture of the glass, resulting in the formation of minute scales. The action of water on glass has a tendency to extract the potash and soda which enter into its composition, together with a portion of the silica, the decomposition taking place with greater ease in proportion as the glass is richer in these alkalies, and more minutely divided, and the temperature of the water higher. The moisture in the atmosphere produces a similar alteration in the lapse of time. It separates the potash and soda, leaving the greater part of the silica with the lime on the surface of the glass. It is this decomposition which causes the prismatic colors. If subjected to heat, numerous fine scales will peel off and leave the surface dull, opaque, and wrinkled. Many attempts have been made to imitate by artificial means the singular display of changing hues, and varied success has attended the efforts. In Venice the workers succeeded in giving the surface of their glassware a peculiar kind of metallic iridescence, and a similar result was reached by certain Hungarian glassworkers. The beautiful *Favrile Glass* made by Tiffany of New York in many styles and colors has a most striking iridescent play of color. See GLASS.

IRID'IUM (Neo-Lat., from Gk. *ἶρις*, *iris*, rainbow; so called on account of its iridescence). A metallic element discovered in 1802 by Smithson Tennant. It is found in platinum ores—as osmiridium, a native alloy of iridium and osmium in varying proportions—and in the form of native alloys with the other platinum metals. The principal sources of these ores are various districts in the Ural Mountains, and on the Pacific coast of the United States. The preparation of metallic iridium involves its separation from the accompanying metals by a long and complicated process.

Iridium (symbol Ir; atomic weight, 193.1) is a white steellike metal, brittle when cold, and somewhat malleable at a white heat. In its ordinary, compact form, iridium is insoluble not only in the several mineral acids, but also in aqua regia; the latter reagent, however, dissolves iridium powder, which may also be converted into the oxide Ir_2O_3 by heating in the air. Iridium has a specific gravity of 22.4, and it melts at about 2200° C. (about 4000° F.). It combines with oxygen to form an iridium sesquioxide, Ir_2O_3, and an iridium dioxide, IrO_2, which in turn give rise to iridious and iridic salts. As Wöhler and Witzmann showed, in 1908, an oxide of the formula IrO does not exist, although iridium sulphide, IrS, may be readily enough obtained by heating metallic iridium in sulphur vapor. Similarly, iridious chloride, $IrCl_2$ (corresponding to the oxide IrO) is obtained by passing chlorine over spongy iridium. The metal itself alloys with copper, gold, and lead, as well as with other platinum metals, and the alloy consisting of nine parts of platinum with one part of iridium is extremely hard, as elastic as steel, perfectly unalterable in the air, and capable of taking a high polish. It is of this alloy that the international prototype standard meter kept in Paris was made. Iridium is also used for the manufacture of standard weights, knife edges of balances, and for other articles which it is desired to preserve from the influence of the atmosphere. It is also used to tip the edges of gold and other pens so as to produce a very hard surface. William L. Dudley invented a process for the electrolytic deposition of this material, and his process has been successfully used for coating surgical instruments and other articles requiring an exceedingly hard surface. Gutbier and Hoffmeier, in 1905, obtained a colloidal solution of iridium (see COLLOIDS) by reducing iridium chloride, in the presence of some gum arabic, with hydrazine hydrate. See HYDRAZINE.

IR'IDOS'MINE (from *irid*-ium + *osmium*). A native alloy of iridium and osmium that cry-

IRIS FAMILY

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1 YELLOW CROCUS — CROCUS SUSIANUS
2 GARDEN GLADIOLUS — GLADIOLUS COMMUNIS
3 FREESIA — FREESIA REFRACTA
4 BLUE FLAG — IRIS VERSICOLOR
5 BLUE-EYED GRASS — SISYRINCHIUM GRAMINOIDES
6 BLACKBERRY LILY — BELAMCANDA PUNCTATA

tallizes in the hexagonal system. It is tin white to light steel gray in color and has a metallic lustre. The proportions of iridium and osmium in it vary, and other platinum metals, such as platinum, rhodium, and ruthenium, are frequently present. The mineral occurs with platinum minerals in the Ural Mountains, in the auriferous drifts and sands in New South Wales, and in northern California.

IRIGA, ē-rē'gȧ. A town of Luzon, Philippines, in the Province of Ambos Camarines. It lies on the right bank of the Buhi River, 23 miles southeast of Nueva Cáceres, and had a population (1903) of 19,297. Near by is an extinct volcano nearly 4000 feet high.

I'RIS. An opera by Mascagni (q.v.), first produced in Rome, Nov. 22, 1898; in the United States, Oct. 16, 1902 (New York).

IRIS (Lat., from Gk. Ἶρις). In Hesiod, the daughter of Thaumas and Electra, and sister of the Harpies. (See HARPY.) In the Homeric poems she is the virgin messenger of the gods; but Alcæus and later writers state that she was the wife of Zephyrus and the mother of Eros. She is frequently represented on vases and in bas-reliefs as a youthful winged virgin, with a herald's staff. The name in Greek means 'rainbow,' and, though Vergil (*Æneid*, iv, 700–702) is the first writer to represent the bow as the path of the goddess, there can be no doubt of their original connection. It may be noted that to the Greeks the rainbow was a divine portent, presaging war or heavy rain. Consult Mayer, "Iris," in Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. ii (Leipzig, 1890–94). —Iris is also the name of one of the planetoids (q.v.), discovered in 1847.

IRIS (Lat., from Gk. *ἶρις*, rainbow, sort of lily), or FLOWER-DE-LUCE, *Fleur de lis* in French. A genus of plants of the family Iridaceæ, having the three outer segments of the perianth reflexed, the three inner arched inward, and three petal-like stigmas covering the stamens. The species, about 875, are chiefly natives of temperate climates, especially of North America, Europe, and Asia. The yellow iris, or corn flag (*Iris pseudacorus*), is a well-known native of moist grounds in many parts of Europe, often spreading over a considerable extent of land, and conspicuous even at a distance by its tall leaves and large, deep-yellow flowers. It is also established in a few places in the eastern United States. The stinking iris (*Iris fœtidissima*), a species with livid purple flowers and ill-smelling leaves, is very abundant in the south of England, but does not extend far north. The flowers of most of the species are beautiful. Some of them have received much attention from florists, particularly *Iris xiphium*, sometimes called Spanish iris; *Iris xiphioides*, or English iris; and *Iris germanica*, or common iris, all European corm-rooted species; and the Japanese irises, which probably are all referable to *Iris lævigata*. Many fine varieties have been produced. The Persian iris (*Iris persica*) is delightfully fragrant; the snake's-head iris (*Iris tuberosa*) and the Chalcedonian iris (*Iris susiana*) are also much esteemed. The roots of all these species are annually exported in considerable quantities from Holland. Many other species are of frequent occurrence in flower gardens, such as *Iris reticulata* and *Iris atrofusca*. The fresh rootstocks of *Iris pseudacorus* are very acid. Those of *Iris florentina*, *Iris pallida*, and *Iris germanica* are orris root (q.v.). Some species have edible rootstocks. *Iris versicolor*, the large blue flag, is common in wet places through the United States as far west as Minnesota and Arkansas. *Iris cristata* is a dwarf species with fragrant flowers found in several localities, and *Iris verna* and *Iris lacustris* are other dwarf American species, all of which are cultivated as border plants to a considerable extent. See IRIDACEÆ and accompanying Colored Plates.

IRIS (Gk. *ἶρις*, *iris*). A term used in anatomy to denote the thin circular curtain, pierced by the pupil, which hangs in the anterior chamber of the eye in front of the crystalline lens. It is attached by its peripheral margin to the sclera, and its posterior surface is pigmented. See EYE; VISION; IRITIS.

IRIS FAMILY. A family of plants. See IRIDACEÆ.

IRISH. See CELTIC LANGUAGES; IRISH LITERATURE.

IRISH ACADEMY, ROYAL. A learned association in Dublin, Ireland, which developed from a society of gentlemen, chiefly of the university, which was established in Dublin in 1782. Its object was to promote the study of science, polite literature, and antiquities. It was incorporated in 1785. The first volume of its transactions appeared in 1788. It is governed by a council consisting of 21 members, divided into three committees, viz., the committee of science, the committee of polite literature, and the committee of antiquities. The meetings of the council are distinct from those of the academy at large and are held every month from November to June. The library contains a collection of Irish manuscripts, in themselves invaluable, besides papers of public interest, including those of the Ordnance Survey of Ireland. Since 1870 the academy has been publishing the more important of its Irish manuscripts. Its collection of Irish antiquities on exhibition in the National Museum, Dublin, under the science and art departments of the academy, is both interesting and important.

IRISH CATHOLIC BENEVOLENT UNION. A fraternal and benevolent organization, founded at Dayton, Ohio, in 1869. The membership in the union is confined to those who are members of the Roman Catholic church. There were in 1914 four national societies and 137 subordinate societies. The membership is about 15,000. Since its organization the union has disbursed about $2,650,000. During the fiscal year 1913 there were disbursed for benefits about $54,000.

IRISH DEER. See DEER; ELK.

IRISH GAELIC LITERATURE. See IRISH LITERATURE, I.

IRISH HARP. The oldest accounts describe this instrument, not as triangular, in which form it has served for centuries as the national emblem, but as quadrangular, thus resembling the crowd (q.v.). It seems that the triangular form came into Ireland from England towards the end of the tenth century, when it was a very rude instrument with strings made of untanned hide or twisted horsehair. Early in the eleventh century we have accounts of Irish bards possessing wonderful skill, playing on triangular harps having strings of gold and silver. At any rate, metal strings were used, and the front pillar was gracefully curved. The number of strings varied from 8 to 18, producing the diatonic scale of G. Only the right hand was used in playing, and the strings were

picked with the finger nails, which the harpers allowed to grow long. The ordinary harp was a little over 2 feet in height and was held on the lap, although illustrations from the fourteenth century represent also larger sizes resting on a stool. In this improved form the instrument passed again to England and to the Continent, where it underwent further development, culminating in the invention of the pedal harp and the double pedal Erard harp (see HARP); while in Ireland it maintained itself practically unchanged, except for a gradual increase in the number of strings to 30. An attempt made by John Egan about 1800 to introduce an improved Irish harp was unsuccessful. On the other hand, the new Irish harp, improved by the application of modern scientific principles by the American harp virtuoso Melville A. Clark, holds out every promise of success. Built after a model formerly owned by the poet Thomas Moore, it preserves all the characteristics of size, shape, and general construction, and has, besides, a vastly more powerful and beautiful tone. It is made in two sizes, 25 inches with 26 strings and 39 inches with 31 strings. The first of these instruments were placed on the market in 1913, and their quality demonstrated the same year on a concert tour of the United States by the Irish tenor John McCormack (q.v.) and the inventor. Consult R. B. Armstrong, *The Irish and the Highland Harps* (Edinburgh, 1904), and W. H. Grattan-Flood, *A History of Irish Music* (Dublin, 1906).

IRISH LAND LAWS. The land tenure of Ireland is the product of two distinct systems, the Irish tribal and the English feudal. In the former, as described in the Brehon laws, the land was ultimately the property of one of the four or five tribes into which the Irish population was divided. A portion of this land was set aside for the chief or king of the tribe, but by far the greater part of it belonged to the different clans of which the tribes were composed. The clan lands were subdivided among the septs, which were the lowest social units. Land was set aside both for the chiefs of the clans and the chiefs of the septs. The greater part of the sept land, however, was held by the free tribesmen, who owed both rents and military service to their immediate chiefs. These tribesmen held their lands by different kinds of free tenure. The Ceil had herds of cattle (the chief wealth of the country) of his own, while to the Saer and the Daer tenants cattle were lent by the chief. Besides these there were servile tenants (the Fuidhir), who were not original members of the tribal community. These were personally dependent on the chief, who had a right to quarter his retainers upon them or rackrent them at pleasure. It is impossible to determine the numerical proportion of the population represented by these servile tenants, but it is probable that at the time when the English system was superimposed upon Ireland the free element was predominant.

Under the Irish system land was conceived to be held on a communal basis. On the death of the chief his land was distributed among his descendants by the tribesmen, and on the death of a tribesman the chief redistributed the land of the sept. In contrast to this, under the English feudal system, the King was conceived to be the ultimate owner of the land, and the lords and other tenants derived their ownership from him. The English law in Ireland, however, prevailed only within the Pale, while the Irish law prevailed in by far the greater part of the country. The evils of the Irish land system are to be ascribed to the dispossession of the native population and to the forced imposition of the English land law upon Ireland. The dispossession began under Queen Mary, when the Irish were driven out of King's and Queen's counties and the English settlers established there. Under pretext of the treason of two Ulster chiefs, James I in 1607 established the famous Ulster plantation. Later in his reign confiscations, though not such extensive ones, were made. All Ireland was divided into shires and declared subject to English laws. This policy was continued during the succeeding reigns, but no second great confiscation was attempted until the time of the Commonwealth. After his Irish victory Cromwell divided the best lands of Leinster and Munster and a part of the lands in Ulster among 40,000 of the English soldiery. A small portion of this land was restored under Charles II and James II, but more was confiscated by Parliament under William III.

The effect of these measures was to dispossess almost the entire Irish nobility and gentry. The penal laws enacted by the Irish Parliament after the defeat of James II carried this principle still further by making it impossible for a Catholic to acquire land. The confiscation acted with equal severity upon the lower classes. The English law confounded all Irish tenantry with the Fuidhir class, reducing them thus to a servile status. The lands were increasingly held by absentee landlords, who endeavored to obtain the highest possible rents. The large number of middlemen who held land under the lords and acted as their agents made the condition of the peasantry still worse. The need of reformation was seen by all classes, but was not fully realized by English statesmen until the report of Lord Devon's commission, which was appointed in 1843 and sat for two years. This report, backed by the famine of 1846, showed conclusively that the cause of the poverty and suffering in Ireland was not due, as was generally supposed in England, to the shiftlessness of the Irish people, nor yet to their religion, but to the disastrous relations that existed between landlord and tenant. It recommended that the tenant receive from the landlord compensation for the improvement of his holding. Accordingly in 1847 Lord Russell proposed a measure providing for such compensation in cases of eviction, but it was rejected by Parliament. His second measure, the Encumbered Estates Act, however, was accepted. This act compelled the sale of estates upon which the rents were mortgaged, the idea being that a new set of solvent landlords would not need to rackrent the tenants. This act, however, was a failure. Estates to the value of £25,000,000 were sold for £10,000,000 and the incoming landlords, regarding their possessions as purely financial investments, had less consideration for the customs which formerly safeguarded the tenantry than their predecessors.

In 1850 the Tenant Right League, composed alike of Presbyterians and Catholics, was founded at Dublin. It contended for fair rents by actual valuation, excluding the improvements made by the tenantry, for continued possession of the holding by the tenant as long as valuation rents were paid, and for relief from arrears

of rent due from the time of the famine. The League entered actively into political affairs, and in 1852 sent 50 members to Parliament pledged to adhere to no party that did not support the principles of the League. Three of its leaders were won over by the Liberal cabinet, and its strength was broken by the opposition of the Roman Catholic hierarchy and the holy see. In consequence of renewed agrarian disturbances, the Palmerston ministry brought forward the Land Acts of 1860.

The first really efficient land legislation enacted for Ireland was a consequence of the attempted Fenian rebellion and was the work of the Gladstone ministry in 1870. It established the Ulster custom throughout Ireland. This custom provided that tenants could not be evicted while their rents were paid, and that whenever a tenant gave up possession, either voluntarily or otherwise, he might sell his own improvements. Evictions for nonpayment of rent could only be made in case of three years' arrears, and could not be made at all in cases where the rent was under £15 if the court deemed the rental exorbitant. When a holding was relinquished, a tenant could legally claim compensation for his own improvements from the landlord. The Bright clause provided for the purchase of the holding by the tenant by enacting that the Board of Works should advance two-thirds of the purchase money.

The Act of 1870 failed, however, to remedy the existing evils.

The Land Act of the second Gladstone ministry, passed in 1881, was a result of the disturbances fostered by the Land League (q.v.). It was drawn up by Forster, the Irish Secretary. This act recognized that the tenant had a possessory right in the holding, by the provision that he might sell it for whatever it would bring, subject only to the landlord's right of prëemption. Except for the nonpayment of rent, the tenant could not be evicted. In case of the increase of rent he could apply to the land commission, established by the act, and procure a rate which would hold for 15 years. This commission also provided for the easy payment of arrears. The clause providing for the purchase of the holdings by the tenants was strengthened in 1885 by the Ashbourne Act, which advanced £5,000,000 for this purpose. In 1887 an additional £5,000,000 was advanced. The Balfour Land Purchase Bill passed by the Conservatives in 1891 continued the same policy. It provided for purchase based on voluntary agreement between landlord and tenant, the government advancing the entire purchase money, such sum to be repaid by the tenants in 41 annual 4 per cent payments. The fund created for this purpose was £30,000,000, a sum deemed sufficient to establish peasant proprietorship in Ireland. John Morley's Land Law of 1896 improved the application of the law. Nevertheless, agitation did not cease, and in January, 1898, the United Irish League was founded, which aimed, among other things, to agitate for the abolition of the dual ownership of land, and the redistribution of the grazing ranches of Connaught among the small holders. In 1902 a conference between representatives of the landlords and tenants to settle the land question was urged, and a preliminary meeting was held at Dublin on Dec. 20, 1902. As a result of the agreements reached at that meeting, the Balfour government introduced, on March 25, 1903, a comprehensive measure, known as the Wyndham Act, which went into effect on November 1. It provided for the creation of a land purchase fund not to exceed £100,000,000, by the sale of treasury stock, the proceeds to be loaned to tenants to enable them to acquire title to the lands they were occupying. Of the fund, £12,000,000 was to be distributed in the form of bonuses to the vendors of estates. The amount which each tenant might borrow was limited to £5000 or, in exceptional cases, £7000, and the loans were made repayable in 68½ annual installments that were on the average calculated to be 15 per cent less than the judicial rent for 1903 would have been.

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IRISH LANGUAGE. See CELTIC LANGUAGES.

IRISH LANGUAGE, SOCIETY FOR THE PRESERVATION OF THE. A society with headquarters in Dublin founded in 1876 for the restoration of the ancient Gaelic tongue as a spoken language. The movement of which this organization is the result had its origin in Boston, Mass., in the Philo-Celtic Society, which was organized in 1873. From there it spread to other parts of the United States and finally attracted the attention of scholars in Ireland, where eventually the society became firmly established. Its publications are mainly textbooks of the Gaelic language designed for schools and colleges, and especially in demand after Gaelic became a subject taught in the government schools. See IRELAND.

IRISH LEAGUE OF AMERICA, THE UNITED. See UNITED IRISH LEAGUE OF AMERICA, THE.

IRISH LITERARY REVIVAL. See IRISH LITERATURE, II.

IRISH LITERARY SOCIETY. A society for the study of the Irish language, literature, history, music, and art, founded in London in 1892 by a small coterie of young Irishmen and Irishwomen, with the coöperation of leading Irish literary men in England and Ireland. The society has a large library of Irish books and during each season provides lectures on Irish subjects and social entertainments for its members and their friends. The membership is about 600 and includes the names of many prominent littérateurs, among whom may be mentioned Rev. Stopford Brooke, W. B. Yeats, Justin McCarthy, and Barry O'Brien. A sister institution is the National Literary Society of

Ireland, which has its headquarters in Dublin, holds weekly meetings, and has aims and functions similar to those of the former association. It is very active in publishing and in offering courses of lectures. It publishes books concerned with the interests it was founded to further.

IRISH LITERATURE. **I. Gaelic.** Irish literature shows an unbroken, if varying, continuity from the seventh or eighth century until the nineteenth. In its earlier periods it is of especial interest and in some kinds of production ranks with the richest literatures of mediæval Europe.

Three periods are regularly recognized by scholars in the history of the Irish language: Old Irish, from the time of the earliest monuments through the tenth century; Middle Irish, from the eleventh century to the seventeenth; and Modern Irish, from the seventeenth century to the present time. It is convenient to follow the same divisions in treating the history of Irish literature, though there is no such well-defined distinction between the literary productions of successive periods as between the corresponding stages of the language.

Old Irish.—There is an abundance of material for the study of the Old Irish language. The most archaic stage is represented by the Ogam inscriptions, some of which date from the fifth and sixth centuries and even earlier. They contain little besides proper names, but these are of great interest for the light they throw upon the beginnings of Celtic phonology and inflection. (See OGAM.) From the period between the seventh and the tenth century a score or more of manuscripts have been preserved containing thousands of Irish glosses, and on the basis of these a very complete grammar of the Old Irish language has been constructed. Unfortunately only a few continuous Irish texts exist in any of these early manuscripts. An ancient Latin-Irish sermon, a short sketch of St. Patrick's life, a few poems and incantations—this is about all that is preserved of the oldest Irish literature in contemporary copies. We have to wait for the Middle Irish manuscripts before we find much direct evidence of its character. However, many of the texts in these later manuscripts are composed, in a language only half contemporary with the writers; they abound in archaic forms, which make it safe to set them down as being substantially Old Irish, in spite of the circumstances of their preservation. The reason for the scarcity of early literary monuments is to be found in the political conditions of Ireland from the eighth to the tenth century. This was the Viking age, and Ireland with the rest of western Europe suffered from the ravages of the Norsemen. Monasteries were repeatedly sacked and burned by the Scandinavian invaders, and few libraries survived the struggle. Nearly all the manuscripts of the Old Irish period have been preserved on the Continent.

Middle Irish.—In 1014 the Scandinavians were defeated in the battle of Clontarf, and from that time forth their power in Ireland declined. From the period between about 1100 and about 1500 there has come down to us a great body of manuscripts containing a vast variety of writings in both prose and verse. Among the most important of these Middle Irish manuscripts are the *Liber Hymnorum* (ed. by Bernard and Atkinson, London, 1895), and the *Book of the Dun Cow* (facsimile reprint, ib., 1870), written about 1100; the *Book of Leinster* (facsimile reprint, ib., 1880), of the twelfth century; the *Yellow Book of Lecan*, the *Leabhar Breac* (Speckled Book), and the *Book of Ballymote*, all of the fourteenth century; and the *Book of Lecan*, from about the beginning of the fifteenth.

The religious element in Middle Irish literature, consisting of hymns and sermons, theological treatises, and lives of saints, bears a general resemblance to contemporary writings in other vernacular languages of Europe. The poetry is largely conventional and technical, but it often reveals a fine fancy and a strong love of nature.

In metrical form it is highly intricate and shows great artistic skill. Chief interest, however, attaches to the heroic sagas, which constitute the best contribution of the Irish to the world's literature. These hero tales fall into three main groups: (1) the so-called *mythological* cycle, which relates various traditions about the early settlement and conquest of Ireland and extends to near the beginning of the Christian era; (2) the *Ultonian*, or Red-Branch, cycle—the most complete, productive, and brilliant of the three traditional epochs—which tells of the wars between Ulster and Connaught in the time of King Conchobar and is identified with the period immediately before and after the commencement of the Christian era; and (3) the *Ossianic* cycle, which extends to the middle of the third century A.D. The tales of the first group are chiefly interesting for the light they seem to throw on the ancient Celtic pantheon. The characters are generally held to be derived by a process of euhemerism from the gods of the old mythology. The stories belonging to this period are fewer in number than those belonging to the later periods. Two of the *Three Sorrows of Story-Telling* are connected with this cycle, i.e., the *Aided or Tragedy of the Children of Tuireann* and *The Tragedy of the Children of Lir*, the latter dealing with the struggles between the Milesians and the Tuatha De Danann, races of demigods vying with each other for the supremacy of Ireland. The cycle of King Conchobar of Ulster represents ancient Irish literature at its best. Some 96 tales have been classified as belonging to this cycle, whose heroes are Conchobar, Cuchulinn, Fergus MacRoich, Conall, Celtchar, and Curigh. Among the most important of these sagas are the great prose epic *Táin Bó Chuailgné, or The Raid of the Cattle of Cooley, Deirdre and the Sons of Uisneach*, the *Conception and Training of Cuchulinn*, the *Wooing of Eimer*, the *Battle of Rosnaree*, *Cuchulinn's Adventure at the Boyne*, *Eimer's Jealousy*, *Briciu's Banquet*, *the Death of Conlaoch*, the *Death of Cuchulinn*, and the *Recovery of the Táin*. While not uninfluenced by foreign thought, these old sagas are in the main a representative national product, and they furnish the best existing record of what the ancient Celtic people must have been. They were composed in a mixed prose and verse, which long remained the typical Irish epic form. Many of the sagas of this group seem to have taken practically their final shape before the end of the Old Irish period. The third cycle—that of Finn and Ossian—is found in later manuscripts than the second, and the tales are composed in a more modern language. The events with which they deal are supposed to have taken place two

or three centuries after those of the earlier group. The wealth of this cycle is so great that, according to O'Curry, its sagas will fill 3000 large quarto pages. Its leading heroes are Fionn, Gol MacMorna, Ossian the son of Fionn, Oscar the son of Ossian, Diarmad O'Duibhne, Caoilte MacRonan, Fergus Finne-bheoil, and Conan Maol. The literature of this cycle is divided into four classes, of which the first consists of poems ascribed to Fionn MacCumhail, to his sons Ossian and Fergus, and his nephew Caoilte, about 16 poems in all; the second class consists of stories in prose and verse attributed to one of the aforementioned bards, but related by some one else, such as *Agallamh na Seanórach,* or *Dialogue of the Ancients;* the third class consists of miscellaneous poems attributed mainly to Ossian and a large number which are ascribed to no particular author, such as the beautiful *Ossian and Evir-Alin;* and the fourth class of prose tales, describing in romantic style the deeds of Fionn and of individuals of his band, such as the *Pursuit of Diarmad and Grainne.* The Ossianic cycle shows more traces of foreign influence, and in the opinion of some scholars owes its origin and character largely to the contact of the Irish with the Scandinavian people. But it is more likely that the stories of Finn were in the main a native product, and they have continued down to this day to be a favorite body of tradition with Irish and Scottish Gaels alike.

In addition to these three saga cycles there exist in Middle Irish manuscripts many separate tales, or groups of tales, of interest and importance. The *Immrama,* or stories of marvelous voyages, deserve special mention, both because they go back to very ancient Celtic tradition and because they appear to have had considerable influence on mediæval literature in other tongues. The *Voyage of Bran,* the oldest and in some respects the most interesting of this series, can safely be dated in the Old Irish period. An entirely different literary vein is represented by the *Vision of MacConglinne,* a satire of which the fun has seldom been surpassed. Far removed from either of these types is the story of the *Sons of Eochaid Muigmedoin,* who have an adventure similar to that related in Chaucer's tale of the Wife of Bath. Middle Irish translations (or adaptations) of foreign material are preserved in considerable number, and represent a wide variety of originals from the tale of Troy to the travels of Sir John Maundeville.

Modern Irish.—Throughout the older periods of Irish literature nearly all the greatest works are anonymous. In the Modern Irish period this is less the case. The later literature is on the whole less significant than the earlier, but the writers, as such, claim more attention. At the beginning of the period stand several prose writers of first importance: the Four Masters, who compiled the greatest collection of Irish annals (ed. by J. O'Donovan, 1857); Duald MacFirbis, the genealogist; and Geoffrey Keating (also a poet), whose religious writings and *History of Ireland* are the standards of classic Irish prose. Treatises in prose, chiefly religious, continued to be written throughout the seventeenth century; but as education declined among the Irish-speaking population, literature of this sort found itself without a public and died out. Poetry, on the other hand, continued to be extensively cultivated; and the work of the modern poets, though it seldom rises high in thought or imagination, possesses great melody and charm. Much of it is distinctly popular in character and has long been common property of the Gaels in both Ireland and Scotland. The seventeenth century witnessed a great change in the form of Irish poetry. The metrical system of the old bardic schools, in which syllable counting and consonantal rhyme were the controlling principles, gave way to a new verse form, in which the accent was the unit of measure and the rhyme was primarily vocalic. The use of vowel rhymes was extended till it applied to all the accented syllables in the line, and a strangely melodious verse form resulted, in which whole poems are constructed with the same accented vowels recurring throughout in orderly sequence. The two systems existed side by side throughout the seventeenth century; but in the eighteenth, after the disappearance of the old bardic schools, the use of the newer metres became practically universal. The chief representatives of the classic style in its final stage were Teig mac Daire and Lughaidh O'Clery (the leaders in the great "Contention of the Bards"), Teig Dall O'Higinn, and Eochaidh O'Hussey. The later school of poets was very numerous, especially in the eighteenth century. Among the most representative of the number were David O'Bruadar, John O'Neaghtan, Torlough O'Carolan, Teig O'Naghten, Brian MacGiolla Meidhre (whose "Midnight Court" is one of the most remarkable pieces in Modern Irish), Timothy O'Sullivan (Tadhg Gaolach), Donough MacConmara, Egan O'Rahilly, Owen Roe O'Sullivan, and in the beginning of the nineteenth century Anthony Raftery, the blind poet of Killeadan.

In the nineteenth century even poetry ceased to be much written in Ireland, and the native language fell into disuse for literary purposes. Only in very recent years has a movement been set on foot to restore the language to general use and to revive Irish literature. An organized effort is being made to bring this about, and Irish books and periodicals are being published in large numbers every year.

Two societies have been especially active in the revival: the Society for the Preservation of the Irish Language, which has long labored to get more recognition for Irish in the schools; and the Gaelic League, a very large organization, which has lately waged a lively popular campaign all over the country. Dr. Douglas Hyde (q.v.), the president of the league, has been one of the leaders in the movement. Among others who have borne an important share in the work should be mentioned the late Father Eugene O'Growney and Fathers P. J. Dinneen and Peter O'Leary, who have contributed largely as authors and editors to the publications of the league.

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A Text Book of Irish Literature (2d ed., 2 vols., ib., 1910) is an excellent manual. Other works of importance are D'Arbois de Jubainville, *Essai d'un catalogue de la littérature épique de l'Irlande* (Paris, 1883); *Cours de littérature celtique* (12 vols., ib., 1883–1902); Nutt and Meyer, *The Voyage of Bran* (2 vols., London, 1895–97); Hull, *The Cuchullin Saga* (ib., 1898); Joyce, *Social History of Ancient Ireland* (2 vols., ib., 1903); Sigerson, *The Bards of the Gael and Gall* (Dublin, 1906); *The Cattle Raid of Cualnge (Tain bo Cuailnge), an Old Irish Prose Epic* (Eng. trans. by Faraday, London, 1904; Ger. trans. with text by Windisch, Leipzig, 1905; Fr. trans. by D'Arbois de Jubainville, Paris, 1907); Strachan, *Stories from the Táin* (Dublin, 1908); *Old Irish Paradigms and Glosses* (ib., 1909); Rolleston, *The High Deeds of Finn* (New York, 1911); *Myths and Legends of the Celtic Race* (ib., 1911); Hull, *The Poem-Book of the Gael* (Chicago, 1913). For other translations from the Gaelic of this and later periods, see bibliography below under *Irish Literature in English.*

Old Irish. Stokes and Strachan, *Thesaurus Palæhibernicus,* part i (Cambridge, 1902; vol. ii, 1904). The completed work will contain all the Old Irish monuments. Meyer, *Selections from Ancient Irish Poetry* (London, 1911) deserves to be mentioned.

Middle Irish. Stokes and Windisch, *Irische Texte* (4 vols., Leipzig, 1881–1909); O'Grady, *Silva Gadelica* (2 vols., London, 1892). Numerous texts have appeared in the *Revue Celtique* (Paris), the *Zeitschrift für Celtische Philologie* (Halle), the *Anecdota Oxoniensia,* Leahy, ed. (Oxford); *Heroic Romances of Ireland, translated into English Prose and Verse* (2 vols., London, 1905), and also in the publications of the Royal Irish Academy, the Irish Archæological Society, the Celtic Society, and the Irish Texts Society; Meyer, *Colmán mac Lúacháin,* in the "Todd Lecture Series," vol. xvii (Dublin, 1911); and Dottin, *Manuel d'irlandais moyen,* vol. ii (Paris, 1913), containing texts, glossary, and bibliography, are among the most important of recent works.

Modern Irish. Atkinson's edition of Keating, *Three Shafts of Death* (Dublin, 1890), is the best introduction to the modern language. Keating, *History of Ireland,* is being edited by D. Comyn for the Irish Texts Society (3 vols., London, 1901–08). Brooke, *Reliques of Irish Poetry* (Dublin, 1789), Hardiman, *Irish Minstrelsy* (London, 1831), O'Daly, *Poets and Poetry of Munster* (Dublin, 1850), and *The Irish Language Miscellany* (ib., 1876), represent the poetry of the last two or three centuries. Several poets of this period have been published very lately in the "Irish Texts Series" of the Gaelic League. Douglas Hyde's *Songs of Connacht* form also an important collection. In folklore the collections of T. Crofton Croker, Jeremiah Curtin, Patrick Kennedy, William Larminie, D. O'Foharta, and Douglas Hyde all deserve mention. For a good general bibliography, the *Esquisse d'une histoire des études celtiques* of Tourneur (Liége, 1905) is recommended. Monahan's *Nova Hibernia, Irish Poets and Dramatists of Today and Yesterday* (New York, 1914) contains studies of recent Irish poets who write in English.

II. **Irish Literature in English.** Side by side with the expiring Gaelic a new Irish literature in English began to make its appearance at the close of the eighteenth and the beginning of the nineteenth century—a literature distinctively national, though not in the native language, and standing quite apart from the imposing stream of English literature by which it flowed. This new Irish-English literature opened with songs and popular ballads, some of which sang of the sorrows of Ireland and breathed a passionate patriotism, while others were idylls of peasant love, or verses convivial or humorous. "The Boyne Water," "The Wearin' o' the Green"—a fine street ballad which is now the national anthem—"The Shan Van Vocht," "The Cruiskeen Lawn," and "Irish Molly O," are good examples of the early attempts at making the English language the vehicle of Irish feeling. Along with the popular literature of ballad and song which belonged to peasants and ragged street minstrels there went a more sophisticated sort of verse which belonged to the drawing room and found its most characteristic expression in the poetry—high and fine at moments, though in general facile and artificial—of Thomas Moore's *Irish Melodies* (1807), *National Airs* (1815), and other poems. In this period Gerald Griffin (1803–40), gratefully remembered for his "Eileen Aroon" and a little sheaf of lovely poems, was writing; and also "Father Prout" (Francis Sylvester Mahony, 1804–66), whose "The Bells of Shandon" still chime through uncounted anthologies. Dashing and racy verse was coming, too, from the pen of William Maginn; and Lever and Lover occasionally threw off such prime comic songs as the former's "The Widow Malone" or the latter's "The Widow Machree."

Contemporary with a part of the productions just mentioned were the beginnings of the literary movement of the Young Irelanders who were banded together under the banner of the *Nation,* the paper which, founded in 1842 by Charles Gavan Duffy, Dillon, and Thomas Davis, quickened the intellect and stirred the heart of Ireland and made the written word a power in the land. Around it sprang up a band of poets, conspicuous among them Thomas Davis (1814–45), Thomas D'Arcy McGee (1825–68), Denis Florence McCarthy (1817–82), Lady Wilde ("Speranza," c.1820–96), and Joseph Sheridan LeFanu (1814–73), who must always have a conspicuous place in Irish literary history. Their work was sincere, fiery, and strong in the rhetorical qualities of poetry—rhythm, phrase, and picturesque diction. But their importance is rather practical and political than strictly literary. Their art was subservient to ideals of nationality and patriotism, and the insatiable artist was often a stranger among them. The artist was, however, potent in James Clarence Mangan (1803–49), a fragile and tremulous spirit in the world of affairs, but, by virtue of some 20 or 30 splendid lyrics, unsurpassed among Irish poets of his own or a later day. In his poems of Gaelic theme and inspiration, and in the like poems of two of his contemporaries, J. J. Callanan (1795–1829) and Edward Walsh (1805–50), we have what is in a manner the prelude to a chorus of Irish poets who in the latter end of the nineteenth century were to constitute a part of a second literary movement. Sir Samuel Ferguson (1810–86) carried on the work of the three men last named and powerfully influenced the course of Irish poetry. His

Lays of the Western Gael (1867) may be regarded as the definite point of departure of the Celtic movement, and the poems of his which made free of the material of the old Irish sagas opened up a new poetic realm, abounding in fresh subjects and new impulses, of which later poets both Irish and English—and Tennyson among them—were to make good use. The Fenian and agrarian movements had their singers, but they were perhaps not of an importance that demands attention for them here. During the two movements just named, however, two other poets, who, like Ferguson, stood rather apart from politics, produced poetry of a rare and finished beauty. The reference is to Aubrey de Vere (1814–1902) and William Allingham (1824–89).

In fiction Irish genius was uninterruptedly at work, from end to end of the nineteenth century, on stories native both in style and in substance. The first of these was Maria Edgeworth's tale of the devil-may-care pre-Union gentry, *Castle Rackrent* (1800), the best thing that ever came from her pen, and a little masterpiece in its kind, which was followed by three other Irish novels, *Ennui* (1809), *The Absentee* (1812), and *Ormond* (1817). Miss Edgeworth wrote from the point of view of the Anglo-Irish Protestant gentry, and so did her fellow novelists W. H. Maxwell (1792–1850); the prolix Lady Morgan (?1777–1859); Samuel Lover (1797–1868); Charles Lever (1806–72); William Maginn (1793–1842), whose stories and sketches present the traits of the convivial Anglo-Irishman; T. C. Croker (1798–1854), the historian of the fairies; and the worthy Anna Maria Hall (1800–81), whose pictures of Irish life are thrown out of focus by her zeal for moral and social edification. Of this group Lever and Lover are the best—and the former is best represented by *Harry Lorrequer* (1839), *Charles O'Malley* (1840), and *Jack Hinton* (1843); the latter by *Rory O'Moore* (1837) and *Handy Andy* (1842), novels in which the Irish peasant is to the fore. Lever, in his comic extravaganzas of sparkling fun and irrepressible high spirits, is well-nigh incomparable among novelists, and Lover is a droll of no mean quality; but a taste for burlesque, caricature, and exaggeration has left their pictures of Irish life and character both misleading and distorted. Contemporary with these novelists who wrote in the spirit of the Anglo-Irish gentry worked a little company of novelists who wrote in the spirit of the peasantry and were themselves of Celtic stock and Catholic faith. This group includes John Banim (1798–1842) and Michael Banim (1796–1874), who collaborated in *Tales of the O'Hara Family* (1825–32); Gerald Griffin (1803–40), whose tale of middle-class, Catholic life, *The Collegians* (1829), is among the best of Irish novels; and William Carleton (1798–1869)—who turned Protestant, be it said by the way—the most gifted of them all, and now unduly neglected by a generation unaware how moving, graphic, and richly humorous are his *Traits and Stories of the Irish Peasantry* (1830), *Fardarougha, the Miser* (1839), etc. In his stories, beyond those of any other novelist, one comes to know the Irish peasant as he was in truth and reality. The years between the Irish story-tellers of the first half of the nineteenth century of whom we have just spoken and those of whom we are to speak presently as a part of a new literary movement, were not inactive ones and witnessed the appearance, notably, of Joseph Sheridan Le Fanu's *Uncle Silas* (1864) and other sensational but fine novels; of Charles James Kickham's *Sally Cavanagh* (1869) and *Knocknagow* (1879); of Emily Lawless's *Hurrish* (1886); and of William O'Brien's *When we Were Boys* (1890).

During—and beyond—the period embraced in the foregoing brief survey of Irish poetry and fiction in the English language Ireland was by no means lacking in writers who distinguished themselves in other fields—in science, in history, in the essay, in the drama, in philosophy, and in scholarship—witness such names as Tyndall, Lecky, Dowden, Oscar Wilde, Bernard Shaw, and Professor Mahaffy; but their work, as well as that of other Irishmen in these fields, is so much a part of English literature, and has been so carefully treated in the article ENGLISH LITERATURE and under the names of the individual authors, that it is unnecessary to treat them here; nor, for a like reason, is it necessary to consider under this head such Irishmen as Congreve, Swift, Goldsmith, and Sheridan, who, discover in them as we may certain inalienable Celtic traits, have still fully identified themselves with the literature of the sister island.

With the passing of the writers of '48 literary activity in Ireland steadily declined, and was at the lowest ebb just before the fall of Parnell. After his fall part of the national energy which had been absorbed in politics turned once more to literature. In quick succession young writers began to make their appearance with plays and poems, novels and stories, essays and translations from the Gaelic. In 1899 the Irish Literary Theatre was founded in Dublin, and in 1892 the National Literary Society. By the last decade of the nineteenth century the activities of these young writers, known as the Irish Literary Revival, constituted the most interesting literary movement of its day, and one conspicuous in a time of confused ideals for the clarity and solidarity of its aims. While national in spirit and drawing inspiration from the past and present of Ireland, this movement took various forms and directions.

One band of young writers went for their material to the cycles of Gaelic romance and delighted to reveal to their own day, in the form of lyric, narrative poem, or drama, the beauty and glamour of the ancient creations of the Celtic imagination. In the forefront of these was William Butler Yeats (1866–), on the whole the representative man of the revival, who was a part of almost every phase of it, and its chief apologist as well. His best work is found in *Poetical Works* (1912), *Plays* (1912), and *Ideas of Good and Evil* (1903). Among lyric poets who wrote in English he was probably unsurpassed in his generation. Other poets who, like Yeats, used the materials and personages of the Irish sagas as vehicles for their own thought and feeling were Dr. John Todhunter (1839–), Nora Hopper (Mrs. W. H. Chesson, 1871–1906), and William Larminie (1850–1900). Work good in itself and a boon to original poets and dramatists was done by a number of translators who put into English the Gaelic romance and folklore that were the driving force of the literary awakening in Ireland. First among these was Lady Augusta Gregory, whose *Cuchulain* (1902) and

Gods and Fighting Men (1904), translations in the Irish idiom from the cycles of Irish romance, are likely to float Gaelic romance down the centuries as Malory did the romances of King Arthur. Among the translators may also be mentioned Dr. Douglas Hyde (1860–) and T. W. Rolleston (1857–). Religious poetry, as might be expected in the Isle of Saints, had its place in the revival, and is represented, notably and variously, by Lionel Johnson (1867–92), in point of strength and finished art hardly surpassed by any of his fellow singers; in G. W. Russell ("A. E.," 1867–), mystic and pantheist, also a finished artist, and in Katharine Tynan-Hinkson (186 –), like Lionel Johnson in being a Catholic poet, though in other ways unlike enough. Still another band of poets—and a very engaging choir they make—sings of the joys and sorrows of peasant life in verses of tender pathos or rich and mellow humor, and among them must be mentioned Alfred Percival Graves (1846–), "Moira O'Neill" (Mrs. Walter Skrine, ?–), and Jane Barlow (1857–).

No feature of the revival was more conspicuous than its dramatic activity, to which, notably, Yeats, Edward Martyn (?–), George Moore (1853–), Douglas Hyde, Lady Gregory, and, by no means least, John Millington Synge (1871–1909) contributed. Synge's *Playboy of the Western World* (1907) represents the climax of dramatic success reached by the dramatists of the revival. Like George Moore drawn into the movement by Yeats, Synge was an outstanding figure among the Irish writers, and his death was an irreparable loss. His plays, poems, and miscellanies are collected in his *Works* (4 vols., Dublin, 1910). The plays of the young Irish dramatists, and their philosophy of the drama, of acting, and stage effects were in practical protest against the shabby ideals of the commercialized theatre—a protest that had its effect, thanks to the talent of its dramatists and actors, to the critical resource of its apologists, and to the successful visits to England and America of the Irish Players.

The revival was fertile in novels and produced some books of excellent quality in this kind. Standish O'Grady (1846–) offered tales of the mythic Irish past of an epic sweep and with a kind of bardic afflatus. Jane Barlow, mentioned also above, could fill appealing stories with genre pictures of peasant life in the west. Life in the north was the field of Seumas Mac Manus (1868–) and of Shan Bullock (1865–). In *Luke Delmege* (latest ed., 1901) and *My New Curate* (1899), Canon P. A. Sheehan (1852–1913) presented pictures of the Catholic priesthood of Ireland and of Irish life at its points of contact therewith in novels that are a little provincial and prolix, but on the whole interesting and informing. Two collaborating ladies, Miss Somerville (?–) and Miss Violet Martin ("Martin Ross," ?–), have added to the gayety of English-speaking peoples in stories highly spiced with "divilment and divarshion," somewhat in the manner of Lover and Lever. Perhaps the best of their books is *The Experiences of an Irish R. M.* (latest ed., 1910). George Moore, whom Yeats and Edward Martyn lured back to Ireland to help with the Irish Theatre, stands high among the novelists. Though bred a Catholic, Moore avows his strong anti-Catholic bias in the absorbing short stories of his *Untilled Field* (1903) and in his novel *The Lake* (1906), both of which were a result of his return to Ireland, as were also the three volumes *Ave, Salve,* and *Vale* which composed the trilogy entitled *Hail and Farewell* (1914). The last-named work is Moore's account, frank to the limits of indiscretion, of his decade's experience with the revival. It includes, in its wonderful portrait group, sketches from the life, not always flattering and sometimes far from good-natured, of most of the writers prominent in the literary activities of Dublin within the period covered. It should be read by all who would look behind the scenes of this literary movement, but somewhat discounted on the score of its whimsicality and unbridled satire. Finally we may mention the Rev. James Owen Hannay ("George A. Birmingham," 1865–), canon of St. Patrick's Cathedral, whose *The Seething Pot* (1905) and other novels concerned with the men and movements of his day invite the attention of every one who would know how faithfully and skillfully Irish life is reflected in Irish fiction, and we may name also James Stephens, whose *Crock of Gold* (1913), a prose fantasy, and *Demi-Gods* (1914) have found enthusiastic admirers.

Bibliography. Bibliographical and other information regarding most of the authors named above is given elsewhere in these pages under the name of each author. For criticisms and selections from Irish poetry in English, consult *A Book of Irish Verse* (London, 1895), edited, with an excellent introduction, by W. B. Yeats, and *The Treasury of Irish Poetry,* admirably edited by Stopford A. Brooke and T. W. Rolleston (ib., 1900). *Irish Literature* (10 vols., Philadelphia, n.d., but c.1904) is an anthology of prose and verse, editorially uneven and bibliographically unsatisfactory, but with some excellent critical articles, by Yeats, Hyde, Sigerson, and others. H. S. Krans, *Irish Life in Irish Fiction* (New York, 1903), is a careful study of Irish fiction from 1800 to 1850; id., *W. B. Yeats and the Irish Literary Revival* (New York, 1904), is a critical study of Yeats and a survey of the movement indicated in the title. Studies of the Irish Theatre and of the younger Irish dramatists are: Francis Bickman, *Synge and the Irish Dramatic Movement* (New York, 1912); C. Weygand, *Irish Plays and Playwrights* (ib., 1913); Maurice Bourgeois, *Synge and the Irish Theatre* (London, 1913); Lady Gregory, *Our Irish Theatre* (New York, 1913). Yeats's *Ideas of Good and Evil* (London, 1903), a volume of essays, and prefaces and introductions to various volumes of selections of Irish prose and verse of his editing, will be found informing. George Moore's *Hail and Farewell* (3 vols., New York, 1911–14), mentioned above, is of especial importance.

IRISH LORD. A yellowish, sculpin-like fish (*Hemilepidotus jordani*) of the waters about the Aleutian Islands, which is of great importance as food to the Aleut islanders. This is also known as yellow sculpin, and a more southerly species of the same genus is called red sculpin. Both are mottled or barred blackish and are from 1 to 2 feet in length.

IRISHMEN, Society of United. See United Irishmen, Society of.

IRISH MOSS. An edible seaweed. See Carrageen.

IRISH MOSS GUM. See GUMS.

IRISH MUSIC. See CELTIC MUSIC.

IRISH PALE. See ENGLISH PALE; IRELAND, *History*.

IRISH POM'PANO. A West Indian food fish (*Gerres olisthostomus*), one of the mojarras (see MOJARRA), and also called mutton fish.

IRISH SEA. The almost circular middle expansion of the channel separating Ireland from Great Britain (Map: Europe, C 3). It connects with the Atlantic Ocean to the north by North Channel between southwest Scotland and northeast Ireland, and to the south by St. George's Channel between Wales and south Ireland. Its greatest width is 140 miles, and its length from north to south is nearly the same. It contains the Isle of Man in the north central part, and Anglesey in the southeast. The east half is shallow, and the Isle of Man belongs therefore to Great Britain rather than to Ireland, but the western half is a northward extension of the relatively deep St. George's Channel.

IRISH TERRIER. See TERRIER.

IRISH TEXTS SOCIETY. A society formed in London in 1898 to promote and foster the study of ancient Irish texts and to undertake their publication. In 1914 some dozen volumes had appeared under this society's imprint.

I'RIS ROOT. The fragrant root of various species of *Iris*. See ORRIS ROOT; IRIS.

IRISSON, ē'rē'sôN', MAURICE HÉRISSON, COUNT OF. See HÉRISSON, MAURICE.

IRI'TIS (Neo-Lat., from *iris*, iris). Inflammation of the iris. The objective symptoms of iritis (those which can be observed by the physician) are: 1. Redness of the eye, arising from vascularity of the sclerotic around the cornea and general redness of the sclerotic from accompanying conjunctivitis. 2. Change in the color of the iris. When there is an exudation into the iris, a gray or blue eye is rendered greenish, while in a dark eye a muddy reddish tint is produced. The brilliancy of the color of the iris also disappears. When the inflammation is very violent, or has been unchecked by remedies, suppuration may take place, the pus settling at the lower part of the anterior chamber. 3. Irregularity, sluggishness, and sometimes immobility of the pupil, produced by the adhesion of the back of the iris to the crystalline lens. The subjective symptoms (those of which the patient is conscious) are intolerance of light, dimness of vision, pain in and around the eye, and lachrymation. The disease is often confused with acute catarrhal conjunctivitis. Many acute cases recover under treatment in a few weeks; others run a more mild but chronic course. Complicating inflammation of the deep portions of the eye increases the danger. Iritis may be followed by adhesions between the iris and lens, occlusion of the pupil, glaucoma, and sometimes blindness. Iritis may be primary, or secondary to inflammation of other portions of the eye. The primary cases are often caused by syphilis, rheumatism, injury, or, less frequently, by tuberculosis, gonorrhœa, acute infectious diseases, or diabetes. In the so-called idiopathic iritis no cause is found. The treatment consists in absolute rest of the eye, with protection from light, the application of moist, warm compresses, local bloodletting, and dilatation of the pupil by the instillation into the eye of a weak solution of sulphate of atropine, with the view of preventing adhesion of the iris, or of breaking, or, at all events, of stretching and elongating, any adhesive bands that may be formed; and thus of preventing any impairment of the movements of the iris, and any irregularity of the pupil after the inflammation shall have abated. When this is done, the result must be carefully watched by the physician. Constitutional treatment must be directed to the cause of the inflammation, especially in cases of syphilitic origin. See EYE, DISEASES OF THE.

IRKUTSK, ĕr-kōōtsk'. A governor-generalship and a government of east Siberia. The former comprises the governments of Irkutsk and Yeniseisk (q.v.), and the Territory of Yakutsk (q.v.), with a total area of nearly 2,792,289 square miles, and a population in 1912 of 2,011,300 (Map: Asia, N 3). The Government of Irkutsk is bounded by the Territory of Yakutsk on the north, the territories of Yakutsk and Trans-Baikalia on the east, China on the south, and the Siberian Government of Yeniseisk on the west. Area, about 280,429 square miles. Its surface is generally mountainous. The Sayan Mountains run along the southern boundary; the Baikal Mountains along the west shore of Lake Baikal. The chief rivers are the Lena, which rises in the Baikal Mountains, and the Angara, with its numerous mountain tributaries. Irkutsk takes in a large portion of Lake Baikal. The mountains of Irkutsk are rich in minerals, containing deposits of iron, coal, graphite, salt, gold, and many varieties of precious and semi-precious stones, including great deposits of lapis lazuli and malachite. The climate is raw and severe, the annual average temperature at the capital being about 32° F. Only an insignificant portion of the cultivable land has been cleared, by far the larger part of the country being covered with forests, filled with fur-bearing animals. The land is fertile and yields ample crops of rye, wheat, oats, barley, buckwheat, and potatoes. The raising of domestic animals is confined mostly to the natives. The manufacturing as well as the mining industries are developing rapidly, and each year brings a remarkable increase in the wealth and population of the province. The manufactures, mainly centred at the city of Irkutsk, include flour milling, pottery, glass blowing, and iron smelting and working. The Baikal fisheries are important. The population (714,900 in 1912) consists mostly of Russians, Buriats, Tunguses, and Jews. Capital, Irkutsk (q.v.).

IRKUTSK. The capital of the Governor-Generalship and of the Government of Irkutsk, and the finest city of Siberia, situated at the confluence of the Irkut with the Angara, 40 miles north of the south extremity of Lake Baikal and 3385 miles by rail from Moscow (Map: Asia, M 3). It was almost entirely rebuilt after the destructive fire of 1879, and is now a handsome, well-laid-out city, with well-paved, wide streets, and all the essential features of a modern city. The climate is healthful, owing to the high altitude of the city; the winters, however, are severe. There are in Irkutsk a theatre, a library, a museum, a school of medicine, and numerous other primary and secondary schools, a meteorological station, and a branch of the Imperial Geographical Society. The cathedral, the seat of an Orthodox archbishop, dates from 1718, and is a fine stone building with five domes and a clock tower in the Russian style. The Roman Catholics and Lutherans have also fine places of worship. The manufactures are unimportant and go mostly

to satisfy domestic demands. The commerce is of great importance, Irkutsk being one of the chief centres of the Russian tea trade as well as one of the principal stations on the Trans-Siberian Railway. Each year an important fair is held in December which attracts merchants from all over Siberia and from Russia. On the left bank of the Angara lies the rapidly growing suburb of Glaskovsk, which contains the railroad depot and is connected with the city proper by a bridge of boats. Pop., 1911, 108,060, including over 5000 exiles. Some 45 miles to the northwest lies the village of Alexandrovskoi, which contains the great Central Prison of Siberia. Irkutsk was founded by Cossacks in 1653, created a town in 1686, and soon became the centre of the Russo-Chinese tea trade.

IRMINUS, ēr'mĭ-nŭs (AS., exalted). The divine ancestor of the Germanic Hermiones, probably identical with Tiw or Tyr. The Saxons erected in his honor great tree trunks, the so-called Irminsûli, e.g., at Scheidungen, after the defeat of the Thuringians, and at Eresburg, Westphalia. The latter, which was looked upon as the national shrine, was destroyed by Charles the Great in 772. See HERMIONES.

IRNERIUS, ēr-nē'rĭ-ŭs, or **GUARNE'RIUS** (c.1050–c.1130). An eminent Italian jurist, founder of the so-called School of Glossators. (See GLOSS.) He was born at Bologna. When quite young, he taught, in his native city, dialectics and rhetoric, but soon devoted himself entirely to the study of the Justinian Code, probably in Rome, where he also seems to have lectured on law. In or about 1084 he returned to Bologna and there established a new law school. He held an Imperial office under Henry V in the early part of the twelfth century. His most important work is the *Summa Codicis* (first ed. by Fitting, 1894), formerly attributed to Placentin. Consult Fitting, *Die Anfänge der Rechtsschule in Bologna* (Berlin, 1888).

IRON (AS. *īren, īsern,* Goth. *eisarn,* OHG. *īsarn, īsan,* Ger. *Eisen,* from OIr. *iarn,* Welsh *haiarn,* Corn. *hoern,* Bret. *hoiarn,* iron; possibly connected ultimately with Lat. *æs,* Goth. *aiz,* OHG. *ēr,* Ger. *Erz,* bronze, AS. *ār,* Eng. *ore,* Skt. *ayas,* metal). The most abundant and useful of the metals. Unlike many of the common metals, iron is found only rarely in the native state. Nordenskjöld found it, embedded in basalt rocks, in masses of several tons each, in Greenland. Some native iron has also been found in Cañon Diablo in Arizona. Further, metallic iron has been found in meteorites, which proves the existence of the element in extraterrestrial regions. Spectroscopically iron has been found in many of the stars, and Angström has fully demonstrated its existence in the photosphere of the sun. Combined with oxygen and other elements, iron is widely distributed as a constituent of rocks and forms extensive deposits in many parts of the world.

Early History. Articles of stone, bronze, and iron have been found together on the site of the Swiss lake dwellings, but the most ancient specimens of iron at present known come from Egyptian and Assyrian ruins. There is in the British Museum a piece of iron taken from the Pyramid of Gizeh, which is believed to date from about 4000 B.C., and also an axe head of Egyptian manufacture dating from 1370 B.C. Though the earliest pieces of iron now known came from Egypt, it is thought that probably the Assyrians were the first to use the metal freely in the manufacture of tools, weapons, and ornaments. Numerous samples of iron implements dating from 800 B.C., and including the fragment of a saw 44 inches long, were obtained from the ruins of Nimrud. In India the famous iron pillar at Kutub, near Delhi, standing 22 feet aboveground and weighing about 6 tons, dates from 400 B.C. It was made by welding disks of metal together, indicating a remarkable degree of skill on the part of those early iron-workers.

The Greeks were familiar with the uses of iron at least 600 years before the Christian era, although the metal was very scarce. It was not until the Roman Empire was fairly established that the use of iron became general over civilized Europe. The Romans made both wrought iron and steel, using the latter metal for swords and other edged implements. The ancient Britons at the time of the invasion of Britain by Julius Cæsar (55 B.C.) were found to use swords, spears, hooks, and scythes of iron, indicating a familiarity with the metal for a considerable period previous. During the Roman occupation iron manufacture was vigorously developed, and in the succeeding Saxon age it seems also to have flourished. After the Norman Conquest little attention was paid to iron manufacture in England. In Germany, however, the art flourished vigorously, iron implements being exported to other countries in considerable quantities. Until about the middle of the fourteenth century all iron was produced by the direct process, the product being wrought iron or steel, as the case might be, according to the details of the process. About 1350, however, cast iron began to be made in Germany, and the beginning of the modern process of iron and steel manufacture was inaugurated.

Iron (symbol, Fe; atomic weight, 55.84), in the chemically pure state, is a silver-white metal that crystallizes in the isometric system. Its specific gravity is from 7.85 to 7.88, and, according to Carpenter's determination of 1908, it melts at 1505° C. (2741° F.). It is the most tenacious of all the ductile metals, and it may be rolled into sheets so thin that the weight of a sheet of given size will be less than the weight of a sheet of paper of the same size. The magnetic properties are well known; it must, however, be observed that if iron is heated above 760° C. (1400° F.) its magnetic properties almost suddenly disappear. Pure iron may be prepared by the prolonged action of a weak current of electricity on a solution containing pure ferrous sulphate and sal ammoniac or sulphate of magnesium (a high temperature and the presence of ammonium citrate are favorable factors), and heating the precipitated metal with a view to freeing it from "occluded" hydrogen and diminishing its brittleness. Another method of obtaining chemically pure iron consists in preparing pure ferric hydroxide by adding ammonia to the solution of some pure iron salt and then heating the hydroxide in a stream of hydrogen gas. Iron and platinum are the only metals that may be welded together immediately, i.e., without the use of any soldering material. With mercury iron refuses to combine directly, the iron amalgam that has been used for electrical machines being made by a somewhat complicated process with the aid of the amalgam of sodium. After being immersed in fuming nitric acid, iron refuses to

dissolve in acids; it is said to be in the *passive* state, a condition that is not yet completely understood. Dry air or oxygen gas has no effect on iron. The "rusting" of iron in ordinary atmospheric air is due to the presence of moisture and of carbon dioxide; the fact that rust is invariably found to contain ammonia would seem to indicate that iron reacts chemically with the moisture of the air, combining with its oxygen and setting free its hydrogen, which in the nascent state forms ammonia with the nitrogen of the air. Rusting may accordingly be prevented by covering iron with a waterproof coating or some paint or varnish, or with a coating of some metal like lead, tin, copper, nickel, or preferably zinc.

In agreement with Osmond, it is now generally believed that pure iron can exist in three distinct allotropic modifications, which are referred to respectively as *α-ferrite*, *β-ferrite*, and *γ-ferrite*. Pure iron at ordinary temperatures is α-ferrite. At 760° C. (1400° F.) it quickly passes into the β-form—a change comparable to the transformation of ice into liquid water at 0° C. (32° F.), although of course β-ferrite is itself a solid. At 900° C. (1652° F.) a second rapid transformation takes place, β-ferrite changing into γ-ferrite; and finally, at 1505° C. (2741° F.), as we have seen, the solid, now γ-ferrite, melts. The changes from α to β and from β to γ ferrite are accompanied by considerable absorption of heat, just as the further change from γ to liquid and just as the melting of ice and all other solids. The specific volumes of α and β ferrite are nearly the same; on the other hand, the change of the β into the γ form is accompanied by a very considerable contraction of volume. That most important property of iron—its capacity for dissolving carbon, not only in the liquid, but also in the solid state—is possessed by only one of the three solid forms, viz., by γ-ferrite. If such a "solid solution" is allowed to cool slowly, its dissolved carbon is enabled to crystallize out in the form of graphite crystals of more or less appreciable size; the result is a soft iron (or rather steel), whose appearance, under the microscope, is quite heterogeneous and rough. If, on the contrary, the solid solution—which is now usually referred to as *martensite*—is cooled rapidly, then any carbon that separates out is in a state of very fine division indeed, the appearance of the metal under the microscope is comparatively smooth and homogeneous, and the metal is hard: we say, the steel has been *tempered*. This is the present-day view of the tempering of steel; in its details, however, the practice of tempering is awaiting much fuller explanation.

The dissolution of carbon in molten iron lowers, as usual, the freezing point (q.v.), and when the molten mass contains as much as 4.3 per cent of carbon, its freezing point is no longer 1505° C., as when it was pure iron, but only 1130° C. (2066° F.). This is the lowest temperature ("entectic point") to which the freezing point of molten iron can be depressed by the addition of carbon. And if heat were abstracted from the liquid, which contains, as stated, 4.3 per cent of carbon, it would begin depositing a mechanical conglomerate of graphite and a solid solution of carbon in γ-ferrite containing 2 per cent of carbon. On cooling, this solid solution would become supersaturated and would deposit some of its dissolved carbon. At 1000° C. (1832° F.) the solid solution would contain only 1.8 per cent of carbon, but, if further cooled from now on, it would deposit, not graphite, as heretofore, but an important carbide of iron having the formula Fe_3C and known as *cementite* (a sort of white cast iron). The separation of cementite, on account of the considerable proportion of carbon in it, would still further impoverish the solid solution, and finally, if cooling were continued, a temperature would be reached (viz., 670° C. or 1238° F.) where metallic iron also would begin separating out, and the solid solution would be gradually decomposed into a conglomerate of cementite and metallic iron. This conglomerate (a sort of gray cast iron) is known as *perlite*. It is designated by this special name because it is always found to contain the same percentage of carbon, viz., 0.8 per cent; it is, however, certain that perlite is not a definite compound but a mechanical mixture.

The Oxides of Iron. With oxygen, iron forms three distinct compounds: ferrous oxide, FeO; ferric oxide, Fe_2O_3; and ferroso-ferric, or magnetic, oxide, Fe_3O_4. *Ferrous oxide*, or rather ferrous hydroxide, $Fe(OH)_2$, may be obtained by adding caustic soda to a solution of ferrous sulphate. It is a white compound readily absorbing oxygen from the air, even if kept under water, and thus changing into ferric oxide; the oxidation causes its color to change gradually from white to green, gray, and brown. It is but sparingly soluble in water, the solution having an alkaline reaction. If boiled with a solution of caustic potash, ferrous hydroxide attacks the water of the solution, setting free its hydrogen and combining with its oxygen to form ferric hydroxide. *Ferric oxide*, in its anhydrous form, is found extensively as hematite. It is prepared artificially, by heating green vitriol, for use as an oil paint for wood, being known as *colcothar*. Ordinary *rouge*, which is used for polishing glass and metals, is artificial ferric oxide reduced to a fine powder. Ferric oxide may be obtained in the form of crystals having a dark-violet color, by heating green vitriol with common salt. If strongly heated, ferric oxide loses its property of readily dissolving in acids and can then be dissolved only in strong acids and only at a high temperature. If heated to a white heat, it loses part of its oxygen and becomes converted into Fe_3O_4, which exhibits marked magnetic properties. The hydrate of ferric oxide, as ordinarily obtained by adding alkalies to solutions of ferric salts, has the composition $2Fe_2O_3.3H_2O$, and is readily soluble in acids. Another hydrate of ferric oxide has the composition $Fe_2O_3.H_2O$ and, like the anhydrous oxide, does not, if heated, readily dissolve in acids. By exactly neutralizing a solution of ferric chloride with alkali, and subjecting the resulting liquid to a process of hydrolysis, ferric oxide may be obtained in aqueous solutions. According to Tribot and Chrétien, a better way to obtain a solution of pure ferric oxide is to subject a solution of ferric chloride to electrolysis in a porous vessel. But, like other colloidal solutions (see COLLOIDS), that of ferric oxide is unstable, and the oxide readily passes from the soluble to the insoluble form. The hydrated forms of the oxide may be converted into the ordinary anhydrous form by the application of a moderate heat; at a certain point of this process the substance suddenly becomes incandescent—showing that a peculiar molecular change is taking

place in it—and after that it is found to have lost its property of readily dissolving in acids. The exact nature of the change is still unknown. *Ferric anhydride*, sometimes referred to, is unknown in the free state. It is the hypothetical anhydride of ferric acid, H_2FeO_4, which is likewise unknown in the free state, but certain of whose salts may be readily prepared. Thus, potassium ferrate, K_2FeO_4, may be obtained by heating small pieces of iron with the chlorate of potassium. From the existence of such salts it is evident that, much unlike ferrous oxide, which is distinctly alkaline in reaction, the peroxide of iron acts as a feeble acid. The tendency of peroxidized iron to pass into the stable ferric state is even greater than the tendency of ferrous iron to pass into that state, and hence the ferrates act as powerful oxidizers, readily burning such substances as oxalic acid, readily changing manganous oxide into manganese dioxide, etc.

The Salts of Iron. Corresponding to ferrous oxide and ferric oxide, respectively, are two series of iron salts, ferrous salts and ferric salts.

The action of acids on metallic iron, in the absence of oxidizing agents, causes the formation of ferrous salts, among which deserve mention the sulphate, the sulphide, the chloride, and the oxalate. *Ferrous sulphate*, known as green vitriol, or iron vitriol, is the substance from which the compounds of iron are generally prepared. The sulphate itself is obtained as a by-product in certain industrial processes and may be prepared by the action of sulphuric acid on metallic iron. In its ordinary, hydrated form its composition corresponds to the formula $FeSO_4.7H_2O$. It has a greenish color that is scarcely perceptible when the salt is dissolved in water; the solution readily takes up oxygen, which causes the formation of ferric sulphate, and hence must be kept in sealed vessels out of contact with air, if it is to be preserved unchanged. Two other hydrates of ferrous sulphate are known—a pentahydrate, $FeSO_4.5H_2O$, and a tetrahydrate, $FeSO_4.4H_2O$. Ferrous sulphate is used for a variety of purposes in the arts; it is employed in making fuming sulphuric acid, in dyeing, as a disinfectant, in making colcothar and rouge, etc. With the sulphate of ammonium it forms a stable double sulphate, whose crystals have the composition $Fe(NH_4)_2(SO_4)_2.6H_2O$. *Ferrous sulphide*, FeS, which has been found in many meteoric stones, may be made by heating iron filings with flowers of sulphur. It is largely used in chemical laboratories for the preparation of sulphureted hydrogen, which it yields on coming into contact with dilute sulphuric or hydrochloric acid. *Ferrous chloride*, or rather its hydrated form, $FeCl_2.4H_2O$, may be prepared by the action of hydrochloric acid on metallic iron. The crystalline anhydrous chloride, $FeCl_2$, may be prepared by the action of gaseous hydrochloric acid on red-hot iron. *Ferrous oxalate*, which is a powerful reducing agent, is used as a developer in photography, potassium-ferrous oxalate being used for the same purpose. Another important compound containing iron in the ferrous state is the well-known potassium ferrocyanide, or yellow prussiate of potash, which may be found described under HYDROFERROCYANIC ACID.

Among the ferric salts deserve mention the chloride, the sulphide, the nitrate, and the phosphate. *Ferric chloride*, Fe_2Cl_6, is a volatile and extremely hygroscopic salt prepared by passing a rapid stream of chlorine over red-hot metallic iron. Its solutions in water have a brown color which is due, not to the ferric chloride itself, but to the formation of basic chlorides of iron and of colloidal ferric hydroxide, which are eventually precipitated out of solutions of ferric salts. Commercial ferric chloride contains a considerable percentage of water and hence contains basic chlorides, probably some free ferric hydroxide, etc. It is prepared by dissolving ordinary ferric hydroxide in hydrochloric acid. Ferric chloride forms four distinct hydrates: a dodecahydrate, $Fe_2Cl_6.12H_2O$; a heptahydrate, $Fe_2Cl_6.7H_2O$; a pentahydrate, $Fe_2Cl_6.5H_2O$; and a tetrahydrate, $Fe_2Cl_6.4H_2O$. Each of these melts completely at a certain temperature: the dodecahydrate at 37° C. (98.6° F.); the heptahydrate at 32.5° C. (90.5° F.); the pentahydrate at 56° C. (132.8° F.); the tetrahydrate at 73.5° C. (164.3° F.). The solubility of these hydrates exhibits an interesting phenomenon: that the solubility of a salt depends upon the form and composition of the crystals used in saturating the solution is now generally understood, so that it is not surprising that at some given temperature two different solutions may be obtained—both saturated—if two different hydrates are used in making up the solution. But with the hydrates of ferric chloride, at certain temperatures, it is possible to obtain two very unequally concentrated solutions—both saturated—by using *one and the same hydrate*. However, this interesting phenomenon is not confined to ferric chlorides, and many other substances are now known to exhibit it. *Ferric sulphide*, FeS_2, occurs in nature abundantly as iron pyrite; it is used for the preparation of sulphurous anhydride in manufacturing sulphuric acid and in bleaching. *Ferric nitrate*, $Fe_2(NO_3)_6$, is obtained by dissolving metallic iron in an excess of cold nitric acid and allowing the solution to evaporate in a vacuum; the crystals thus obtained correspond to the formula $Fe_2(NO_3)_6.9H_2O$, and melt at 35° C. (95° F.). In aqueous solution the nitrate gradually decomposes unless an excess of free nitric acid is present. *Ferric phosphate*, $FePO_4$, is an insoluble white substance formed when acid sodium phosphate is added to solutions of ferric acetate. Another compound containing iron in the ferric state, viz., potassium ferricyanide, may be found described under HYDROFERRICYANIC ACID.

Medicinal Uses of Iron Compounds. Iron itself and a number of its compounds are used in medicine in the form of various preparations; in the stomach all such compounds are converted mostly into ferric chloride and to a small extent into ferrous chloride. One of the best medicinal compounds of iron is ferric chloride, the evil effects of whose strongly acid properties may be avoided by free dilution or by the addition of bicarbonate of sodium. Another way to avoid the undesirable effects of acid compounds of iron is to administer them in the form of coated pills which may pass through the stomach unchanged, the acidity being then neutralized in the alkaline juices of the intestine. The constipating effect of iron compounds is well known, but is generally somewhat exaggerated; this effect may be readily avoided by the use of suitable purgatives. To avoid indigestion, iron compounds should not be taken

shortly before or after meals. In the mouth iron salts may (if acid) attack the enamel of the teeth, and by combining with sulphur (from food or the tartar of the teeth) form a black deposit of ferrous sulphide on the teeth and the tongue. For these reasons iron preparations are usually administered through a glass tube, and the mouth is to be carefully rinsed immediately after taking the dose.

Besides constituting the best-known local astringents for external application, iron salts are extensively used as a remedy for many forms of anæmia and the conditions caused by them, the best results being obtained by the use of ferrous sulphate and ferric chloride (the latter together with some glycerin). Iron salts have also been given with success in diphtheria, tonsillitis, and other forms of sore throat, as well as in erysipelas. In anæmia they have the effect of restoring the number of corpuscles and the normal amount of hæmoglobin in the blood. The fact that this takes place was long considered remarkable, since it was believed that no iron is actually absorbed into the system. Late investigations show, however, that both the organic and inorganic forms of iron are so absorbed. The substance has been demonstrated in the thoracic lymph soon after the ingestion of ferric chloride. We have seen above that in the stomach iron salts are transformed into ferric chloride. On reaching the intestine the chloride is transformed into ferric hydroxide, and subsequently the latter is in turn transformed into the black sulphide and tannate of iron, which are voided with the fæces. Most of the iron taken is thus voided, and none passes into the urine. On the other hand, when injected into the blood, even in very moderate quantities, iron salts produce symptoms of poisoning. The question therefore arises: In what manner do iron salts act in relieving anæmia? Definitely this question has not yet been answered. According to a theory advanced by Bunge, the iron normally present in the blood enters it in the form of complex organic iron compounds that are contained in food. That iron in some form or other necessarily enters the blood is evident, if we remember that the amount of iron in the body of a child increases with age. Now, according to Bunge, the alkaline sulphides that may be present in the intestines are capable of depriving the iron compounds of food of their iron, the resulting sulphide being of course incapable of absorption. But if sufficient quantities of iron are taken internally, the alkaline sulphides are decomposed, and the organic iron of the food becomes available. The amounts of iron required depend of course upon the amount of alkaline sulphides in the intestines, and this is why it may be found necessary to administer as much as 18 grains a day to an anæmic woman whose body in a normal state contains altogether about 30 grains. A strong argument in favor of Bunge's theory of the indirect action of iron is found in the fact that manganese, copper, and certain other substances not at all present in the blood are almost as efficient as iron in curing anæmia. An excellent discussion of this long-debated question is to be found in H. C. Sherman's *Chemistry of Food and Nutrition* (New York, 1911).

Ferric chloride, the most important medicinal salt of iron, is usually administered in the form of its tincture, which contains about 3.25 per cent of iron, corresponding to about 9.5 per cent of anhydrous ferric chloride. The tincture is prepared by making up 250 parts of the official aqueous solution of ferric chloride to 1000 parts with alcohol. *Ferric hydroxide with magnesia* is known as "arsenic antidote," being an effective remedy for poisoning with arsenic. The antidote may be best prepared by gradually adding 10 parts of magnesia in water to 50 parts of ferric hydroxide in water and shaking the mixture vigorously. It should be prepared immediately before using and should be given repeatedly in large doses. Iron salts should never be given together with any preparation containing tannic or gallic acid. Besides the preparations mentioned above, several other iron salts and compounds are extensively employed. Among these may be mentioned reduced iron (iron by hydrogen) and the carbonate, iodide, lactate, nitrate, citrate, acetate, phosphate, valerianate, and oxide of iron. A useful preparation for strumous conditions in children is the sirup of the iodide of iron, which combines the tonic effect of iron with the specific action of iodine. Many preparations of organic iron are also used, most of them proprietary medicines, and many of weak or doubtful therapeutic value. See BLAUD'S PILLS.

IRON ORE

The ore minerals of iron, together with their composition and theoretic percentage of metallic iron, are: 1. *Magnetite*, or *magnetic oxide* (Fe_3O_4), with 72.4 per cent iron. 2. *Hematite* (Fe_2O_3), known also as *specular iron ore*, *red hematite*, *fossil ore*, and *Clinton ore*, according to its character, and containing 70 per cent iron. 3. *Brown ore*, consisting usually of limonite ($2Fe_2O_3.3H_2O$), but containing also other hydrous iron oxides, such as turgite, goethite. Other names are *brown hematite*, *bog iron ore*, and *ochre*. The limonite has 59.89 per cent iron. 4. *Siderite* ($FeCO_3$), with 48.27 per cent iron, also known as *clay iron stone*, *kidney ore*, *blackband ore*, *carbonate ore*, and *spathic ore*.

Pyrite (FeS_2) is occasionally used as iron ore after it has been roasted for the recovery of sulphur in sulphuric-acid manufacture. *Franklinite* [$(FeZnMn)O$, $(FeMn)_2O_3$] is employed in the production of spiegeleisen, after extracting the zinc by roasting.

Composition. The ores of iron rarely approach the theoretic percentage, owing to the presence of common rock minerals in the gangue. The impurities which they supply are alumina, lime, magnesia, silica, titanium, arsenic, copper, phosphorus, and sulphur.

Some of these, like phosphorus, sulphur, and titanium, are especially objectionable. Phosphorus cannot be eliminated in the blast furnace or acid converter used in making Bessemer steel, and for this purpose very low phosphorus ores must be employed, the high phosphorus ones requiring special treatment. Sulphur is undesirable, as it makes the iron brittle.

Titanium, found in many magnetites, renders them difficult to smelt and causes a loss of iron. The carbonate ores are first roasted to free them of carbon dioxide and thus raise the iron contents. Brown ores are similarly improved by washing, and magnetite, if of low grade, by crushing and magnetic separation.

The table on page 364 gives the composition of a number of iron ores.

Classification. The chief types of iron-ore deposits found in the United States are: 1. Magmatic segregation deposits. 2. Contact metamorphic deposits. 3. Sedimentary ores. 4. Ores concentrated by surface waters percolating through the rocks, the ore being deposited as replacements, or in residual materials. 5. Lenticular masses in metamorphic rocks, of variable origin. 6. Gossan ores. For description of these types, see ORE DEPOSITS.

COMPOSITION OF IRON ORES

	I	II	III	IV	V
Fe	60.91	57.44	58.83	31.3	48.54
SiO_2	4.49	.75	6.80	23.98	11.22
P	1.548	....	.062	.24	.38
S	.027	.....	.069	SO_3 .987	.09
TiO_2	.03	12.08	.....	.225	....
Cu	.007	....	.....	....	....
CO_2	.....	....	.....	9.60	....
Moist.	.25	....	.....	.26	13.00
Al_2O_3	.....	4.62	2.23	7.26	3.61
Cr_2O_3	.....	.32	.....	....	....
V_2O_3	.....	Trace	.....	....	....
MnO	.....	.28	.816	....	....
CaO	.....	.13	.32	9.15	.84
MgO	.....	2.04	.32	2.92	....

I, magnetite, Mineville, N. Y.; II, titaniferous magnetite, North Carolina; III, high-grade hematite, Mesabi Range, Minnesota; IV, Clinton hematite, New York; V, Alabama brown ore.

Resources of the United States. Iron ores are widely distributed in the United States, and in geologic age they range from Pre-Cambrian to Recent. The relative importance of the different iron ores mined in the United States is shown by the following percentages of the total output for 1913: hematite, about 93 per cent; brown ore, under 3 per cent; magnetite, about 4 per cent; siderite, 0.045 per cent.

A large part of the *hematite* production comes from the Lake Superior region, where vast deposits have been found in metamorphosed Pre-Cambrian rocks. Six important productive belts—or "ranges," as they are commonly called—as well as several smaller districts, are known. The first six are: 1. The *Marquette*, opened in 1856 and situated in Michigan, east of the Keweenaw Peninsula. 2. The *Menominee*, first developed in 1877 and lying on the border of Wisconsin and the upper peninsula of Michigan. 3. West of the Menominee is the *Gogebic*, opened in 1884. 4 and 5. *Vermilion* and *Mesabi* ranges, situated northwest of Lake Superior, in Minnesota. 6. *Cuyuna*, lying southwest of the Mesabi, in Minnesota, and of recent development. The deposits are mostly near the surface, and in the Mesabi, after removing the overburden, the soft granular ore is excavated by steam shovels, which deposit it directly on the cars. A single mine in Minnesota produced, in 1920, 6,994,728 long tons of ore. The total production of the Lake Superior mines up to and including 1920 was 1,007,446,713 long tons. Most of the ore is forwarded by rail to ports on Lakes Superior and Michigan and thence shipped by boat to Chicago and Lake Erie ports, a large proportion being destined for the manufacturing centres of western Pennsylvania. A great shipping industry is engaged in the transport of Lake Superior ores.

Hematite ore is also mined in many of the Appalachian States, the most important being that found in the Clinton formation of the Silurian, which outcrops along the western slopes of the Appalachians from New York to Alabama. The ore is a true bedded deposit, but owing to its comparatively low grade is not extensively developed anywhere, except in the Birmingham district of Alabama. There it is far removed from other sources of richer ore that might compete with it. In the Western States, notably in the Cordilleran region, there are scattered deposits of hematite and magnetite of the contact-metamorphic type, but they form a reserve source of supply.

Brown ores, chiefly of the residual type, are of importance in the southern Appalachians from Virginia to Alabama.

The *magnetite* ores found in the United States are of three types: 1: *Nontitaniferous magnetites*, found chiefly in a belt of gneissic rocks extending from the Adirondacks to North Carolina and most extensively worked in the former region. 2. *Titaniferous magnetites*, usually associated with igneous rocks of the gabbro type and found at a number of localities in the United States. They are of little or no commercial value at the present time. 3. *Magnetite sands*, of no commercial importance.

The quantity of iron ore shipped from the mines in the United States in 1921 amounted to 27,009,000 long tons, valued at $89,688,000. This, as compared with 1912 when the shipments were 69,558,000 long tons valued at $290,607,000, represented a decrease in quantity of 61 per cent and in value of nearly 69 per cent. The average price per ton in 1921 at the mines was $3.32. Of the quantity marketed in 1920, Minnesota supplied 58.9 per cent; Michigan, 25.4 per cent; Alabama, 9.6 per cent; New York, 1.44, and Wisconsin 1.39 per cent. The imports of iron ore in 1920 amounted to 1,268,536 long tons; the exports, 1,145,037 long tons.

The latest available figures of ore production of the important countries are as follows:

COUNTRY	Year	Metric tons
United States	1920	37,520,495
Germany	1917	22,464,800
France	1920	13,871,187 [1]
United Kingdom	1919	12,254,195 [2]
Sweden	1919	4,981,110
Spain	1919	4,640,061
Luxemburg	1920	3,704,390
Austria	1913	3,039,324
Hungary	1914	1,722,340
Cuba	1920	889,852
Algeria	1919	758,199
India	1919	563,750
Italy	1920	423,300
Newfoundland	1920	127,826 [2]
Greece	1917	63,364
Canada	1920	7,120

[1] Long tons. [2] Short tons.

Foreign Countries. *Oölitic limonites*, which form well-defined and extensive beds in sandstones, shales, and marls of Jurassic age, in Germany, France, and Luxemburg, are of great importance as present and future sources of supply, even though the iron content ranges only from 31 to 40 per cent. In England the *oölitic siderite* of Jurassic age is also very extensively mined, the largest supply coming from Cleveland Hills in the Yorkshire district. Of great importance are the *magnetite* deposits of northern Sweden, probably the largest in the world. At Kiruna the ore body forms an enor-

mous, steeply dipping mass, lying between porphyries. The product of these mines after the World War as before goes chiefly to Germany, and borings have shown a reserve of 480,000,000 tons. In recent years considerable development has demonstrated the existence, in eastern Cuba, of millions of tons of *residual ores*, whose iron content ranges between 40 and 50 per cent. Brazil contains large reserves of iron ore in the district of Minas Geraes, some 300 miles from the coast. In British North America *bedded hematites* have been extensively worked in Newfoundland, and *magnetites* and *hematites* in Ontario.

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IRON, GALVANIZED. See GALVANIZED IRON.

IRON, RALPH. The pseudonym of Olive Schreiner (q.v.).

IRON AGE. See GOLDEN AGE; NEOLITHIC PERIOD; BRONZE AGE; EUROPE, PEOPLES OF.

IRON AND STEEL, METALLURGY OF. Native iron in the free or metallic condition is almost unknown, and it is therefore necessary to resort to special processes to extract it from the mineral compounds (see IRON) in which it occurs. These minerals, mixed with varying amounts of foreign or earthy matter, principally sand or clay, and technically known as the *gangue*, constitute the huge ore deposits which are widely distributed over the globe. To be of commercial value the character of the ore, its location with respect to sources of fuel and flux, and its ultimate point of consumption or market must be taken into consideration as well as its content of iron calculated on a metallic basis, i.e., as the element Fe. The most important deposits of the United States are those of the Lake Superior region, which contain from about 49 to 61 per cent of iron, with an average of, say, 55 per cent; the Southern ores (Alabama) are not so rich, their content being about 40 to 50 per cent.

Ores with less than about 30 or 35 per cent can be employed only in special cases, and if below about 40 per cent must generally be concentrated by some operation which will remove as much as possible of the foreign material. The operation may consist in *calcination*, the simple application of heat to drive off (*a*) moisture, (*b*) water of combination if the ores or minerals are hydrated, and (*c*) carbon dioxide in the case of carbonates. *Roasting*, consisting in heating with free access of air (oxygen), is employed to burn off organic matter or sulphur if the ores contain too high a proportion. *Weathering* is for the same purpose and consists in exposing the ore to atmospheric conditions for a long period. *Washing* is an operation to separate substances of different specific gravities which are only mechanically mixed, by forming different layers or strata in a pulsating current of water, the layers being drawn off separately.

Ores in too fine a condition, or which readily crumble, give trouble on account of their tendency to choke up a furnace and so prevent the necessary freedom of passage for the gases through the charge. Much attention has recently been given to methods designed to correct this condition. *Nodulizing* consists in sintering or partially fusing the small particles into large coherent lumps; *briquetting* aims to attain the same end by mixing the ore with some binding substance, such as lime water or molasses, and molding it into bricks which are subsequently burnt hard. The fine material carried out of the furnaces by the blast, known as *flue dust*, has also been similarly treated.

GENERAL PRINCIPLES

Even where concentration is applied, only a partial removal of foreign matter and impurities can be effected. The problem presented to the metallurgist can be broadly divided into:

1. Removal of mechanically intermixed matter and preliminary purification.
2. Reduction to the metallic state.
3. Final purification.
4. Adjusting the composition to secure the desired physical properties.

The first and second processes are generally effected in the blast furnace, while the third and fourth are performed in some purification or steel-making process. In commercial practice all the various processes depend upon reactions taking place at high temperatures, which are nearly always obtained by the combustion of fuel, usually carbon in the form of coal, coke, or charcoal. For certain purposes gaseous fuel or its equivalent is necessary. During the last few years electricity has been adopted to a very limited extent. See *Electrothermic Processes*, below.

In the case of ores part of the carbon in the fuel unites with and removes the oxygen combined with the iron, the latter being thereby reduced to the metallic state, the attraction or affinity of oxygen for carbon at high temperatures being greater than for iron. The gangue is separated by melting, usually assisted by the special addition of material known as *flux*, with which it combines to form a more fusible compound termed *slag* or *cinder*. This is either allowed to run off, or else collects on top of the iron by reason of its lower specific gravity, and an almost perfect separation can be attained in this way. As will be explained more fully later, the slag performs two functions: (1) mechanical—the removal of material chemically inert towards the iron; (2) chemical—a purifying action, more or less perfect, of removing and retaining impurities which would otherwise contaminate the iron.

Five elements are always found in the iron and steel of commerce—carbon, manganese, phosphorus, sulphur, and silicon. The first is derived from the fuel or special additions; the others from the raw materials or special additions. Many others may be present in special cases.

The reduction of iron to the metallic condition can take place at relatively low tempera-

tures—considerably below its melting point—and under such conditions it is in a pasty or spongy condition. Probably the oldest method of procedure was to dig a hole at the top of a hillside, forming a crude fireplace or hearth, which was filled with selected ore and charcoal. It was then covered over, a hole left in the top for the escape of the hot gases, and another at the bottom so that the air could enter and burn the fuel, the prevailing winds being depended upon for the draft. A portion of the iron oxide of the ore combined with the siliceous gangue to form a slag sufficiently fusible to melt and run down to the bottom of the hearth, where it collected and enveloped the mass of pasty iron which had been reduced. A large portion of the slag was subsequently expelled from the interstices of the iron ball or *bloom* by hammering it while hot.

Early improvements consisted in forcing the air in under a slight pressure by means of a crude form of bellows, later replaced by some form of blowing engine, usually operated by water power. This removed the dependency on prevailing winds; hence the furnace could be located wherever most convenient to the supply of raw material. With air under pressure it became possible to increase the height of the charge, and the furnaces were accordingly constructed of stones or bricks, the output being correspondingly increased. The increase in height brought about still another advantage, not at first anticipated. This was an increase in temperature and reduced fuel consumption per unit of iron produced. It was therefore only natural that when these facts were realized the tendency was towards increased size and height of furnace. Finally a point was reached where a sufficiently high temperature was attained to melt the iron, which collected at the bottom, with the much lighter slag floating on top.

The molten iron so obtained differed, however, materially from that produced at lower temperatures in a solid pasty condition, as it could not be worked under a hammer, even when hot, and could be shaped only by pouring it while molten into the desired form. It was therefore called *cast iron* to distinguish it from the variety which could be so worked, hence called *wrought iron*. The reason for this difference was later found to be due, in the case of the cast iron, to the absorption of a considerable amount of carbon from the fuel with which it was in contact, this absorption being directly due to the high temperature and to the strongly reducing conditions. Under such conditions the amount of carbon absorbed cannot be controlled, and the excess responsible for its brittleness must be removed subsequently by some oxidation process if it is desired to restore its malleability. This double treatment for producing wrought iron or steel is called the *indirect* method, to differentiate it from the *direct* method by which only one operation is necessary. The direct method has practically been abandoned except in primitive regions where there is a very limited demand and no real competition. The indirect method, even with its double treatment, is very much less expensive on account of the economy in fuel and particularly in labor and also because cheaper raw materials can be used. Since cast iron is produced in a molten condition, it can be handled largely by gravity and in enormous units by the aid of mechanical equipment. For the latter reasons steel is generally less costly than wrought iron produced from cast iron. By the direct method the material must be worked by hand to be effective, hence in small units, which results in heavy labor charges. The quality of the raw materials must also be better (e.g., charcoal instead of coke), and the loss is much greater.

DIRECT PROCESS

By this method wrought iron or steel (when the percentage of carbon is higher) is produced from the ore in one operation. This process has not been used in the United States since 1901, in which year only slightly over 2000 gross tons were produced. Two classes of product may be obtained according to its intended use: (*a*) wrought iron or steel blooms, to be subsequently forged or rolled into the desired shape; (*b*) spongy iron very low in carbon and, as the name indicates, not welded up into a solid mass, to be used as part of the charge in some steel-making process.

Typical of the first class is the **Catalan Process,** a brief description of which will be given. The furnace proper (see Fig. 1)—or "forge," as it is called—is square or rectangular in cross section and somewhat resembles a large packing box in appearance. It is from 20 to 40 inches wide and from 20 to 32 inches deep, with a height of about 1 to 2 feet. It is usually formed of heavy cast-iron plates which are double and water-cooled to prevent their being overheated and burnt through. The interior of this box or chamber is called the hearth, and being open in front, to permit of charging the raw material and withdrawing metallic iron and slag, is termed an *open hearth*. At the back, about halfway up from the bottom, is the single *tuyère* or pipe, inclining slightly downward, through which the air necessary for the combustion of the fuel is introduced under a moderate pressure. Above this chamber is a stack or chimney for carrying off the waste gases. In the stack is set a pipe in which the air is preheated before entering the hearth,

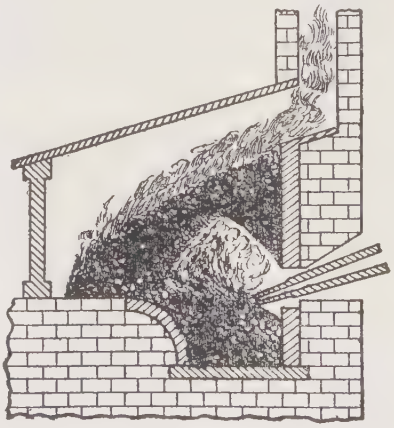
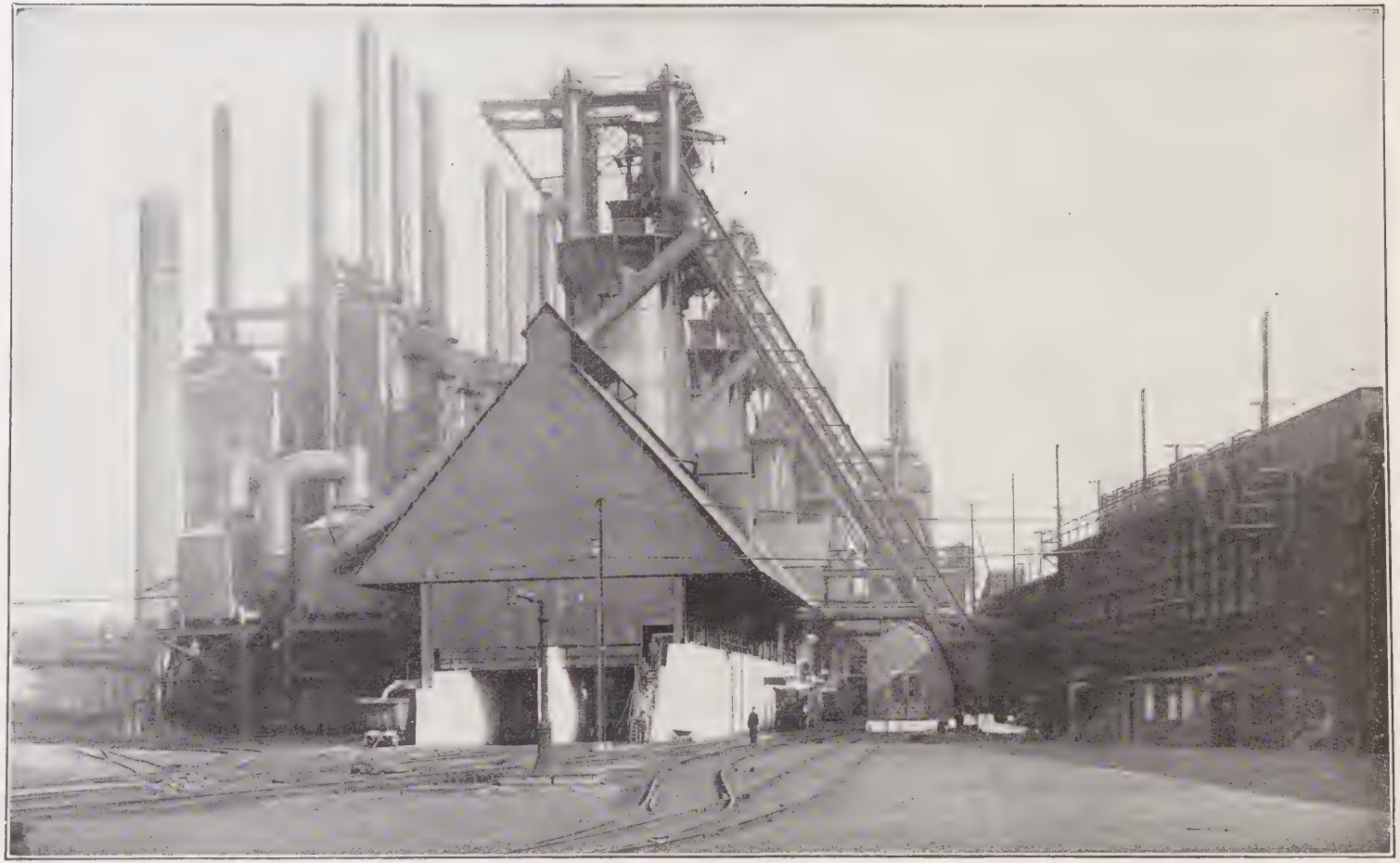


FIG. 1. CATALAN FORGE.

thereby increasing the temperature and correspondingly reducing the fuel consumption. The hearth, initially heated by burning fuel in it or hot from the previous charge, is filled to about the tuyère level with charcoal, upon which

ORE DOCK AND STOCK PILE OF A MODERN AMERICAN BLAST FURNACE PLANT

SHOWING UNLOADERS (RIGHT) AND GANTRY CRANES BY WHICH THE ORE IS TRANSFERRED FROM THE VESSELS TO THE STOCK PILES; (LEFT) BLAST FURNACES AND STOVES. LACKAWANNA STEEL COMPANY



A MODERN AMERICAN BLAST FURNACE PLANT

SHOWING ELECTRIC SKIP HOIST, STOVES, AND DUST CATCHER (LEFT); TRESTLE FOR UNLOADING COKE AND LIMESTONE, AND BINS (RIGHT). (FOREGROUND, LEFT) SLAG RUNNING INTO LADLE. BETHLEHEM STEEL COMPANY

are piled small lumps of ore in a separate column, with additional charcoal separating it from the tuyère so that the oxygen of the blast must first pass through the charcoal. The reduction is completed by contact with the solid carbon in conjunction with the high temperature in the neighborhood of the tuyère. As the charcoal burns away and the charge sinks, more ore and charcoal are shoveled on top, until it is judged that a sufficient amount of iron has been produced. A part of the ore is not reduced, but melts and, combining with the siliceous gangue, forms a liquid slag which collects in and around the spongy mass or ball of metallic iron at the bottom of the hearth. This slag, being highly oxidizing and basic, serves to restrain most of the phosphorus from entering or remaining in the iron and also prevents the iron from taking up any considerable amount of carbon from the fuel, the only moderately reducing conditions in the hearth being highly favorable to both of these conditions. Owing to the character of the fuel and ore employed, there is very little sulphur present. The blast is now stopped, and the ball or bloom removed from the hearth and hammered to remove most of the intermingled slag and compact the particles; the latter operation was formerly termed *shingling*. Reheating and hammering may be repeated one or more times, both to remove additional slag and to secure the desired form. With the average size of furnace about 300 to 400 pounds of iron were produced in from four to six hours. The loss of ore was considerable, and the fuel consumption was relatively high.

The **American Bloomary Process** resembles the Catalan in general details, both as regards the process itself and the type of furnace employed. The charge consisted of fine ore and charcoal mixed together (instead of piled separately), and a bloom weighing approximately 300 pounds was obtained in about three hours.

The *stückofen* or *old high bloomary* was a shaft furnace about 10 to 16 feet high, and even more nearly approaching the present blast furnace in its dimensions and operation was *Husgafvel's high bloomary* or *continuous stückofen*, which was about 26 feet high. In the latter furnace the raw materials were charged at regular intervals. While both forms were intended for the production of wrought iron, cast iron was occasionally made owing to the much more pronounced reducing action.

Sponge-Making Processes. The principle of nearly all these processes is to reduce the iron at a comparatively low temperature by means of solid carbonaceous matter mixed with the ore, or else by passing reducing gases through it, sometimes by a combination of both methods. The product was obtained as a spongy mass. The necessary heat was supplied either externally or by the combustion of a portion of the solid carbonaceous matter mixed with the ore, and in some cases in both ways. These processes have also been abandoned, as they were found unable to compete with other modern methods. The best-known processes of this type were Chenot's, Blair's, and the Eames or Carbon Iron Company's process.

BLAST FURNACE

Historical. In speaking of the high bloomary it was stated that, if the reducing action were too strong, cast iron, instead of wrought iron, was unintentionally produced. From this to the modern form of shaft furnace—or *blast furnace*, as it is always called—is a simple and natural transition. The old name *high furnace* is still used in France and Germany (*haut fourneau*, *Hochofen*). The first blast furnace was operated about the thirteenth century. Until the beginning of the last century they were about 20 to 30 feet high, rectangular or circular in cross section, shaped outside like the frustum of a pyramid or cone with the smaller end on top, and were constructed of blocks of stone. They were situated close to a steep hillside, so that a level trestle could be placed from the hillside to the top of the furnace to avoid the expense of a hoist for charging the raw materials. Frequently there was only one tuyère, of a peculiar construction, quite unlike the water-cooled tuyères now employed. Cold air, under only moderate pressure, was furnished by blowing engines of the simplest possible type, generally driven by water power, with wooden connecting rods and wooden blowing "tubs" or cylinders provided with leather valves. As the furnaces were open at the top, the combustible gases produced escaped into the air and frequently ignited. Charcoal was the principal fuel used. Dudley in 1619 demonstrated that coke could be successfully substituted, but no advantage was taken of this discovery until considerably later.

Unquestionably the greatest improvement was the introduction of hot blast by J. B. Neilson, of Glasgow, Scotland. He was granted a patent in 1828 for preheating the blast for smiths' fires, and the next year this was adopted for a blast furnace at the Clyde Iron Works. In a few years it was almost universally employed. Like most other great discoveries, the principle upon which it is based is comparatively simple, being briefly as follows: A pound of carbon, whether burned in a minute or in a year, generates the same *amount* of heat. In the former case, however, the *degree* of heat, or the temperature, will be very much greater. Also the temperature generated by a definite amount of fuel, burned in a given time, will depend upon its initial temperature and the nature of the surrounding materials (including the products of combustion) which absorb the heat, other conditions being the same. In a blast furnace a certain temperature is requisite to effect the proper reduction and fusion. Therefore, if part or all of the materials is introduced in a heated condition, a smaller amount of fuel will develop the necessary temperature. A fuel ratio of about eight to one in 1820, with cold air, has been reduced to one to one and even less at the present time; but it should be stated that a considerable part of this is due to other improvements, mentioned below.

Blast-Furnace Equipment. Before taking up the process, as at present conducted, a clear idea should be formed of the apparatus used. A modern plant, comprising one or more furnaces with an individual capacity of 300 to 600 tons of pig iron per day, is constituted as follows: In the first place there is the furnace proper or *stack*, in which the actual smelting of the ore takes place. The raw materials are hoisted to the top in a large box or bucket, called a *skip*, and there mechanically dumped. When the ore comes from the Great Lakes, a large supply or *stock pile* must be provided for use during the winter months, as navigation is open only from

about May to November. The ore is taken from the stock pile by means of gantry cranes equipped with buckets and is placed in separate bins, according to the grade, which is carefully determined by chemical analysis. From these it is transferred to the skips by scale cars in which the predetermined mixture of the various ores is carefully weighed.

The engines for compressing the blast are driven either by steam or, more recently, by gas. The engines must be powerful enough to deliver the air at a normal pressure of 12 to 16, and in an emergency up to 25, pounds per square inch. When steam is used, a battery of boilers must be provided, usually fired with the gas given off from the furnace. The advantage of gas engines is their greater efficiency, and the excess power is then available for generating electricity or for some other purpose. The air, after being compressed, is passed through regenerative fire-brick stoves, of which there are usually four to each furnace. These stoves, although of smaller diameter, are frequently taller than the furnace. The gas given off from the blast furnace is first led into a large chamber or *dust catcher*, where most of the suspended particles of dust are deposited. From this it may be led directly to the stoves and boilers, where it is burnt. If used for gas engines, however, the remaining dust must be further removed as completely as possible, and it is therefore *cleaned* and *scrubbed* with water in special apparatus. In front of the furnace is the *cast house*, which is a roofed structure with a sand floor if the iron is to be cast directly into pigs, or else of smaller size and provided with runners and spouts for delivering the molten metal into ladles in which it is transferred to the steel plant or to the pig-casting machine. In some cases the metal is run into iron or *chill* molds set in the cast-house floor so that the surface of the pigs will be free from sand. The molten slag is similarly removed in ladles and disposed of as waste material or in some cases used in the manufacture of cement.

We may now consider the more important parts of the equipment in somewhat greater detail.

Stack. The interior of the furnace was formerly of a cylindrical shape, i.e., the walls were perpendicular and the cross section circular. In modern furnaces, however, there are three well-defined divisions, as shown in Fig. 2: (*a*) at the bottom is the *hearth* (also called the *well* or *crucible*), which is cylindrical; (*b*) above this the walls slope outward, forming an inverted truncated cone known as the *bosh* (this term is also used to denote the point at which the internal diameter of the furnace is greatest); (*c*) above this again the walls converge to the top or *throat*, forming another longer truncated cone set upright, this portion being known as the *shaft* or *stack*. The reason for the gradual increase of the diameter from the top downward is to facilitate the descent of the charge, which would tend to stick and choke up the furnace if the walls were perpendicular. From the bosh line to the hearth the diameter is decreased, because it is principally here that the fuel is burned, and, unless due allowance were made for this reduction in bulk, the charge would descend too rapidly in this region, and the action on the ore or sponge would be uncompleted.

The furnace is built of fire bricks inclosed in a jacket of riveted steel plates, which generally extends to the top. In the walls of the hearth and bosh are inserted *cooling plates*, through which water constantly circulates, to prevent excessive corrosion of the brickwork and thereby preserve the lines of the furnace as much as possible. The blast is introduced at a point near the top of the hearth through tuyères, of which there are usually from 8 to 16, depending upon the design and the size of the furnace. These are joined by pipes to the *bustle* pipe, which encircles the furnace and is connected with the hot-blast main. Surrounding the portion of the *blowpipes* which penetrates into the furnace are hollow water-cooled bronze or copper *blocks* to prevent them from being burned away at the very high temperature to which they are continuously exposed. The entire cooling system is of the greatest importance, and the discharge pipes are arranged in full view so that they may be under constant observation. A little below the tuyères is located the hole called

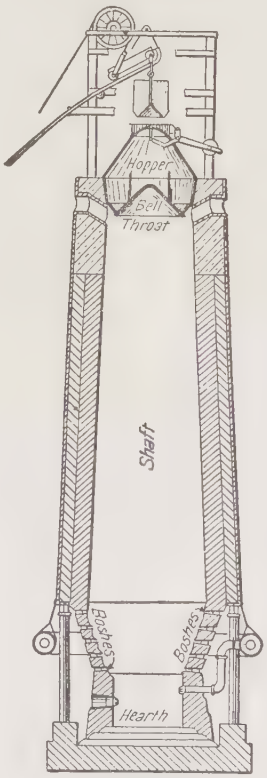


FIG. 2. SECTION OF ONE OF THE DUQUESNE BLAST FURNACES

the *cinder notch*, out of which most of the slag is tapped. Below this again, and at about 90° to one side, is the *iron* or *metal notch*, out of which the iron runs when the furnace *casts*.

Except during charging, the top of the furnace is closed, and the gases are led off through a large pipe, called the *downcomer*, into the *dust catcher*, and thence to the stoves and boilers or after cleaning to the gas engines. While the furnace is being charged, which happens at frequent intervals, the escape of the gases is prevented by an arrangement of two bells or cones, one somewhat smaller than the other and a short distance above it, one of the bells always

being closed, the space between forming a chamber. The charge is placed around the upper bell, which is then lowered, depositing it on the lower bell, when it is raised again and closes the top. The second bell is then in turn lowered and the charge dropped into the furnace.

Until nearly the beginning of the present century the charging was done entirely by hand. The stock was loaded on wheelbarrows, which were weighed and then hoisted to the top on an elevator. The contents were then dumped around the bell, of which there was usually only one. This method is inadequate to supply the necessary amount for the present large furnaces, and the material is therefore hoisted in skips running on an inclined track or *skip bridge*.

Stoves. The earliest type of stove consisted of a row of cast-iron pipes, generally U-shaped, inclosed in a brick combustion chamber and heated externally with fuel in much the same manner as in the case of a water-tube boiler. The blast from the blowing engines passed through these pipes uninterruptedly. Although this style of stove was employed for a long time, it was not satisfactory, as the temperature to which it could heat the blast was limited by reason of the danger of burning out or melting the cast iron. It has been superseded, commencing about 1860, by the regenerative fire-brick stove, the first of which was invented by Whitwell. The temperature which can be secured in this stove is limited practically only by the question of efficiency.

The general form is a very high cylindrical chamber with fire-brick walls inclosed in a steel casing. In this is a large flue or combustion chamber in which the gas from the blast furnace is burned. The hot gaseous products of combustion are then led through other smaller flues filled with bricks with small passages left around them, called *checkerwork*, the arrangement being such as to offer the maximum surface for heating purposes. Various designs and modifications are in use which differ slightly in the method of heating. The gases, after reaching the top of the combustion chamber, may be led through the checkerwork and thence to the stack, or they may then be deflected upward again, heating another part of the stove and escaping at the top. The former is called a *two-pass* and the latter a *three-pass* stove. When a stove has been sufficiently heated, the gas is shut off, and the blast is introduced, passing through in the reverse direction to that which was followed by the gas. Purification of the gas, in the same manner as when intended for gas engines, has shown a marked improvement. With four stoves to a furnace, each stove, in rotation, is "on gas" (i.e., is heated) for about three hours and "on wind" (is heating the blast) one hour.

Blowing in is the term applied to starting up a furnace when it is new or has just been relined. It is first necessary to dry it out thoroughly so that there will be no moisture present, and then to heat it up gradually to prevent cracking of the walls from the sudden expansion which would result if the full temperature were attained immediately. Principally fuel, with only small amounts of ore and flux, are charged at first, the proportions being gradually increased with succeeding charges of coke, the full *burden* (the proportion of ore to fuel) being reached only after a day or two.

Charging. The charge is made up of ore, fuel (coke), and flux (limestone). The relative proportion of each is calculated from their respective compositions as determined by very accurate chemical analysis. The amounts of ore and limestone are based on a definite unit of coke. The ore and limestone are carefully weighed each time; the coke, however, is simply measured, as the weight of a definite volume practically does not vary. One complete charge of ore, coke, and limestone is termed a *round*. The coke is charged first, followed by the ore and limestone.

The rate of charging depends upon how fast the stock descends in the furnace. It is very important to keep the furnace constantly filled to a certain level, called the *stock line*, as otherwise irregular working would result. If, owing to part of the charge sticking to the walls, the material at the top is prevented from descending, the furnace is said to be *hanging*, and its subsequent sudden descent, after the obstruction has been removed, is termed a *slip*. When this occurs, there is an immediate increase in the internal pressure, which may result in a violent explosion, causing serious damage to the equipment as well as loss of life. To relieve this condition *explosion doors* are provided at the top of the furnace, which open automatically under any marked increase of pressure. A valve operated by hand, called a *bleeder*, may also be opened when a slip is anticipated. Julian Kennedy has attacked the problem in a satisfactory manner from the opposite standpoint by devising a *closed top* of sufficient strength to resist the force of the explosion, which thereby loses its suddenness and hence much of its violence.

The make-up of the charge requires good judgment and considerable experience, not only of the principles involved, but also of the individual behavior of different furnaces, the materials used, and the product desired. It is the function of the limestone to flux the siliceous gangue and also to render the slag sufficiently basic to prevent an undue amount of sulphur and silicon from entering the iron. There is a set of interdependent conditions involved: the larger the proportion of lime, the more basic the slag and the higher its melting point, which in turn determine the fuel requirements and the temperature of the furnace, which again largely controls the degree or intensity of reduction. By proper manipulation one condition may be made a greater factor than another, with corresponding success or failure in the object sought.

With ordinary ore, containing about 50 per cent of iron, the proportions of materials entering and leaving the furnace, per ton of pig iron produced, are approximately as follows, expressed in tons:

ENTERING THE FURNACE		LEAVING THE FURNACE	
Ore	2	Pig iron	1
Coke	1	Slag	½
Limestone	½	Gases	6
Air	4		
Total	7½	Total	7½

From this it will be seen that the air constitutes over one-half of all the materials going into the furnace, while the escaping gases represent over three-quarters of the material which comes out. The reason for this difference is that the oxygen, carbon, and other substances which enter the furnace as solids are converted into the gaseous state by certain chemical reactions.

Furnace Reactions. When the heated blast enters the furnace at the tuyères, it comes in contact with incandescent coke, and carbon dioxide (carbonic acid) is formed. This in turn reacts immediately with additional coke (carbon) and is reduced to carbon monoxide (carbonic oxide), both of which are gaseous. This carbon monoxide passes up through the charge and comes in contact with the descending ore. In this way the iron oxide loses nearly all of its oxygen, part of the carbon monoxide being changed to dioxide, so that by the time the ore has proceeded some distance down it is in a spongy, semimetallic condition. In the lower part of the furnace, in the region near the tuyères, the reduction of the iron is completed in contact with the solid incandescent coke, and about 4 per cent of the carbon is absorbed as the metal melts and trickles down into the hearth. The carbon dioxide in the limestone is driven off near the top of the furnace, and the calcium oxide (burnt lime) remaining gradually combines with the gangue, and the resulting slag finally melts somewhat lower in the furnace than the iron, as it requires a higher temperature for its fusion. It also collects in the hearth, floating on top of the iron on account of its lower specific gravity. The coke remains solid throughout its descent, gradually decreasing in amount as it is burned away. What remains is forced down through the slag and iron to the bottom of the hearth, where further opportunity is afforded for carburizing the iron.

Casting. The iron is allowed to remain in the hearth until a sufficient amount has collected. The usual practice for large furnaces is to tap out the iron about every four hours. Most of the slag is tapped out through the cinder notch at more frequent intervals, depending upon the volume formed, so that it will not rise above the tuyères and prevent the free entrance of the blast; this is termed *flushing.* It is allowed to run into a ladle which conveys it away. When the iron notch is first opened, nothing but iron runs out, but as the level in the hearth sinks it is accompanied by a certain amount of slag. This is separated from the iron by a *skimmer,* a depression or well in the main runner or trough, directly in front of the furnace, across which is set perpendicularly a cast-iron plate coated with loam and extending a little way below the regular bottom of the runner. The iron fills up the depression and continues to flow underneath; but the slag, being lighter, is backed up by the plate and overflows into a side runner leading to the slag ladle. The iron, by means of a main runner and a number of branch runners, is led into other ladles, being subsequently cast into pigs in a special machine, or else taken to the mixer or to some steel-making furnace for refining.

When the hearth is nearly empty, the hole is closed up by ramming in balls of clay, the blast being almost entirely shut off (by slowing down the blowing engine) while this is being done. This is the only time when the blast is not on full during normal working. The clay was formerly rammed in by hand, but this method has been practically abandoned in America in favor of a mechanical device known as a *gun.*

A few furnaces still employ charcoal instead of coke for fuel. They are necessarily smaller (about 30 to 40 feet high), as the charcoal will not sustain such a heavy weight (high column) without crushing as coke, one of the functions of the fuel being to keep the charge sufficiently open for the passage of the gases. With charcoal the process is also run at a lower temperature, and occasionally the blast is not preheated. The product is accordingly known as *hot-blast* and *cold-blast charcoal iron* respectively. It is used almost exclusively for high-grade castings, as it possesses certain qualities which make it especially desirable for this purpose. Anthracite furnaces are usually operated with a mixture of coke and anthracite coal.

Product. As already stated, pig iron contains other elements besides iron, the range in composition in the United States being about as follows:

Iron	92.00 to 95.00	per cent	
Carbon	3.00 " 5.00	"	
Manganese	0.50 " 2.00	"	
Phosphorus	0.05 " 1.00	"	
Sulphur	0.02 " 0.10	"	
Silicon	0.50 " 3.00	"	

It frequently also contains other elements in varying amounts, such as copper, nickel, chromium, titanium, etc.

The carbon may exist either in combination with part of the iron as iron carbide, Fe_3C, or uncombined as graphite. In the former case the fracture of the pig is white, in the latter case black; and if part of the carbon is combined and part is free, the fracture will have an intermediate or mottled appearance. The condition of the carbon depends upon a number of factors. The tendency to be combined is increased by the presence of manganese or sulphur or by rapid cooling. It is decreased by the presence of silicon or by slow cooling.

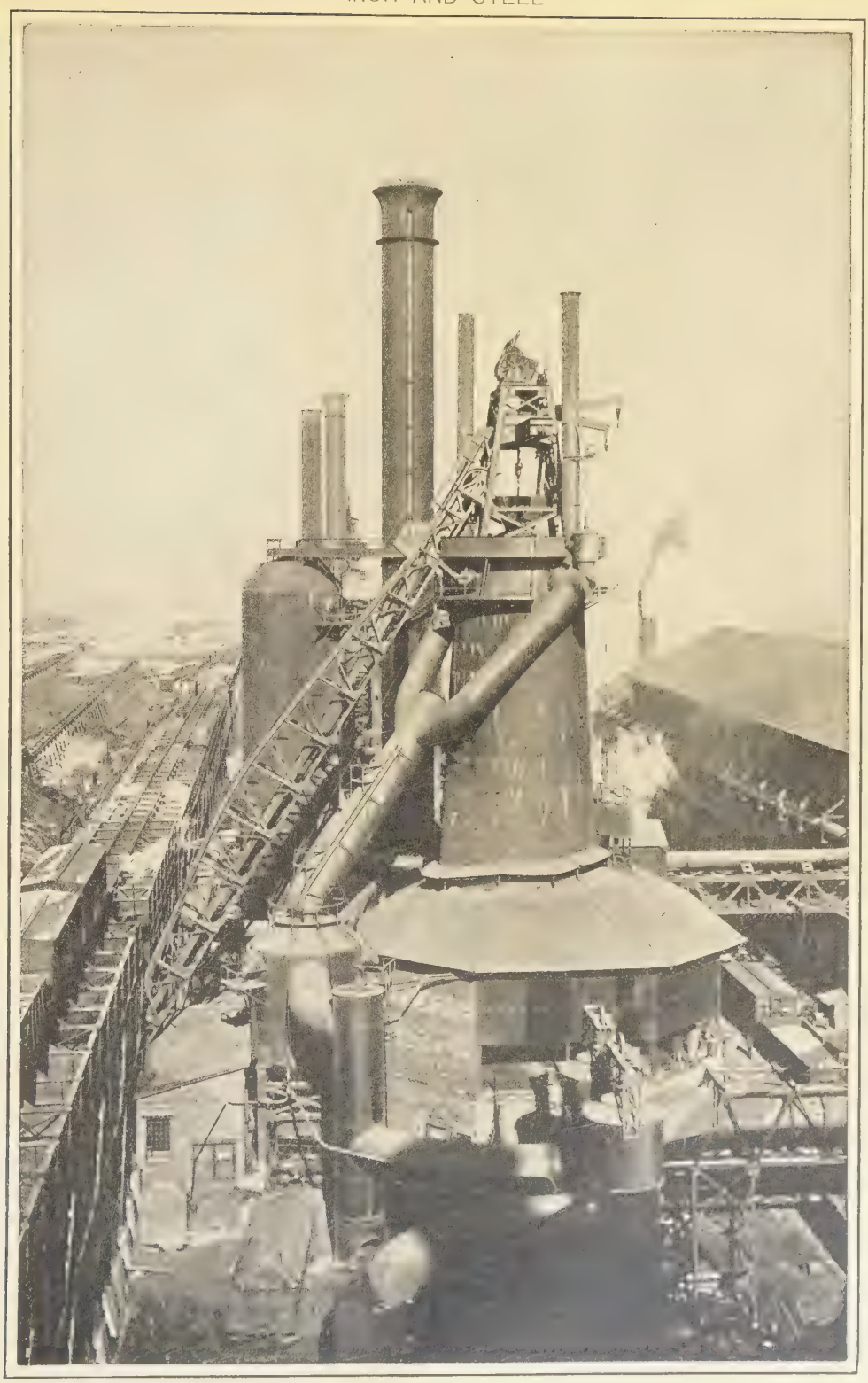
Foundry irons—those used for making castings—must usually contain a considerable amount of silicon. This causes nearly all the carbon to be in the graphitic form so that the casting will be soft and readily machined. A certain amount of phosphorus may be desirable, as it makes the iron more fluid, so that the casting will be sharp, i.e., any intricate parts of the mold will be completely filled. Sulphur in any considerable amount tends to make the iron thick and sluggish.

For steel-making processes there is a general division based on the phosphorus contents. When it is below 0.1 per cent, it is suitable for the acid Bessemer and generally for the acid open-hearth processes in which there is no elimination of this element. For the basic Bessemer process, being depended upon as the source of heat, it must run over at least 2 per cent; for the basic open-hearth process, however, it is preferable to have it reasonably low. The former grade is termed *Bessemer* pig, and the latter *Thomas, basic,* or *non-Bessemer* pig. The sulphur in either grade is generally required to be low—for the acid processes not over 0.05, and for the basic processes not over about 0.05 to 0.10 per cent.

There are other special products similar to ordinary pig iron, but having a high percentage of some special element because of which they are principally valuable as additions to secure a given composition. These are termed *ferroalloys* or *special pig irons,* and are made either in the blast furnace or, in some cases, in an electric furnace or by reduction by aluminium. A few of these are given below:

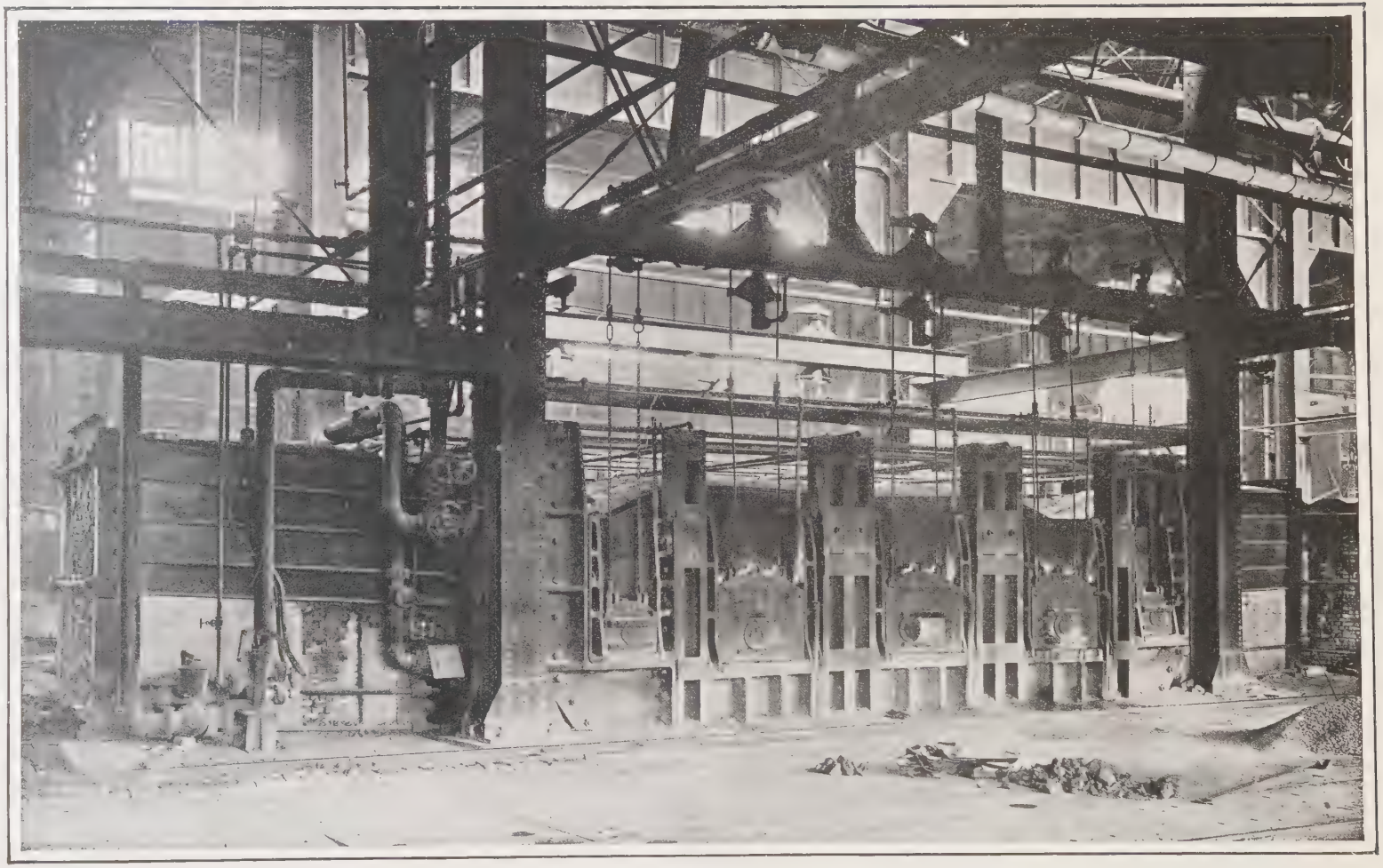
Ferrochrome: chromium about 60 to 68 per cent; produced in the blast furnace.

Ferromanganese: manganese about 80 per



A MODERN BLAST FURNACE

Blast Furnace of Colorado Fuel and Iron Company at Pueblo, Colorado. Capacity, 600 Tons.



OPEN-HEARTH FURNACE

Forty-Ton Open-Hearth Furnace at the Homestead Steel Works of the Carnegie Steel Company.

cent. This term is also applied to any pig iron containing over 30, usually over 60, per cent. With manganese between 10 and 30 per cent it is called *spiegel* or *spiegeleisen*. *Silicon spiegel* contains about 17 to 22 per cent of manganese and also 6 to 12 per cent of silicon. These are all produced in the blast furnace.

Ferrosilicon: silicon about 10 to 20, usually about 12, per cent; produced in the blast furnace. A higher grade than this is also produced in the electric furnace and ordinarily contains over 40 per cent of silicon. It is known as *special ferrosilicon* or *special high-silicon iron*, and is commonly guaranteed to contain either 50 or 75 per cent.

Ferronickel: nickel 25 to 75 per cent, as specified.

Ferrotungsten: tungsten 60 to 85 per cent.

Ferrotitanium: titanium 10 to 12, and also about 50, per cent.

Ferrovanadium: vanadium 20 to 35 per cent. The four last named, and in general those containing rare elements, are produced by special processes and are sold per pound of alloy or per pound of the element in question. The others are sold by the ton, except where some special process is employed to produce a given element as free as possible from impurities, in which case it is also sold on the pound basis.

Dry-Blast Process. This is a comparatively recent development in blast-furnace practice, although Mushet in 1879 took out a patent based on the use of calcium chloride, etc. The amount of water carried into a furnace due to the moisture in the blast is much greater than would at first glance seem possible. Thus, a furnace of the average size in the Pittsburgh district consumes about 40,000 cubic feet of air per minute and passes into the furnace approximately 40 gallons of water per hour for each grain of moisture contained in a cubic foot of air. This water, being introduced at the tuyères, is immediately decomposed by the incandescent coke by a reaction which absorbs a large amount of heat. This effect is not constant, for the percentage of moisture in the air varies according to the season of the year and even from hour to hour. The object of drying the blast is therefore twofold—to remove as much moisture as possible and to maintain the remainder constant.

This was first successfully carried out by James Gayley at Isabella Furnace No. 1 of the Carnegie Steel Company in August, 1904. His method was to pass the air around pipes in which circulated iced brine cooled to a temperature below the freezing point of water, the moisture being deposited upon the pipes in the form of snow. The effect, resulting in reduced fuel consumption and more regular working, was even greater than expected, for a number of reasons which cannot now be considered. Since then a number of other methods have been devised in which calcium chloride is employed as the desiccating agent.

Disposal of Pig Iron. The molten pig iron from the blast furnace may be either used direct in its molten condition or cast into pigs for transportation cold. The latter method has the disadvantage that the heat lost must again be supplied when it is remelted, thereby adding to the cost of manufacture. The pigs may be cast in sand or iron (*chill*) molds in the floor of the casting house or by means of a *pig machine*. The type of pig machine most commonly used in the United States consists of one or more endless strings or *strands* of metal molds mounted on vertically revolving drums. The metal is run from a ladle into the molds at one end and is rapidly cooled by being sprayed with water and later passing through a tank of water, as the molds advance, so that the pigs are cold enough to be dumped into a car or other receptacle when they reach the other end. If the metal is used direct in its molten state, it may be transported in ladles and poured into the furnace or converter in which it is to be further treated. A better practice is to pour it into a large vessel, termed a *mixer* (see Fig. 3),

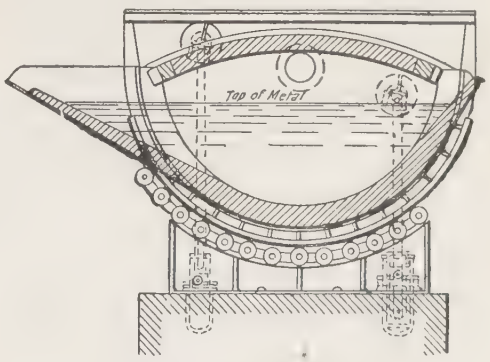


FIG. 3. MIXER FOR MOLTEN PIG IRON.

which serves primarily as a reservoir from which it can be taken as needed, thus avoiding delays waiting for the blast furnace to cast, and also preventing chilling if the furnace is not ready to receive it. Generally a small amount of gas is burned in it to maintain the temperature of the metal. As its name implies, the mixer serves another useful purpose, which is to provide a more uniform and constant composition by permitting the metal from a number of different casts from the same or different blast furnaces to be poured into it. There may also be some removal of sulphur by a reaction with manganese, if a sufficient proportion of the latter is present, the manganese sulphide resulting passing out of the metal and into the slag; this requires a considerable time, at least an hour or more. The mixer is the invention of Capt. W. R. Jones, of the Edgar Thomson Works of the Carnegie Steel Company. Attempts have been made from time to time, generally with considerable success, to employ the mixer to obtain a partial or preliminary refining of the pig iron in order to reduce the amount necessary later.

Malleable Cast Iron. This is originally white cast iron, in which the combined carbon has been converted by special heat treatment into an uncombined amorphous condition, also usually more or less removed by oxidation. This carbon exists in small spots or patches which do not break up the continuity of the metal nearly so much or so detrimentally as do the large thin plates of graphite, in the case of ordinary gray cast iron, which promote or assist fracture by serving as cleavage planes. The usual method consists in heating the white cast iron (in which practically all the carbon is in the combined form) to a temperature between about 750° and 1100°C (1380° and 2010°F), when the conversion of the carbon to the amor-

phous, uncombined condition takes place. The essential conditions appear to be the proper temperature, a sufficient length of time, and the presence of a certain amount of silicon. The castings are generally less than an inch in thickness so that when cast the cooling will be sufficiently rapid to avoid the formation of graphite. After cleaning, the castings are packed in some material, such as ore or clay, in an iron box, called a *sagger* or *annealing pot*, to protect them from the air, which otherwise would cause excessive scaling. Depending upon the nature of the surrounding material, more or less oxidation of the carbon occurs. In the United States usually only the outer portion is affected, and the fracture shows a white border surrounding a black interior, from which comes the designation *black-heart malleable*. Abroad the oxidation is frequently carried further so that the entire fracture is white. The product is capable of some deformation (hence the name *malleable*) and also offers considerable resistance to shock. The process was discovered by Réaumur in 1725.

PURIFICATION PROCESSES

Practically any reduction process by which metallic iron is produced from ore or oxide has the disadvantage of introducing into the iron considerable amounts of foreign elements or substances which, for the majority of uses, are objectionable if not positively detrimental. We have already seen that, owing to its pasty condition, wrought iron produced by the direct process contains intermingled slag, and that, if the temperature is raised sufficiently to obtain it in a fluid state, it greedily takes up carbon, while phosphorus and silicon are also reduced and combined with it. The subsequent removal of impurities in excess of what is desirable constitutes a general treatment known as purification, which must, as a rule, be conducted under oxidizing conditions.

Purification, in general, is divided into: (*a*) *refining processes*, those principally concerned with the removal from pig iron of silicon, phosphorus, and sulphur, the action being stopped when the carbon is attacked—the product is further treated by some other process; (*b*) *purification processes*, those embracing certain details or modifications applied to ordinary processes for making iron and steel.

From a practical viewpoint purification processes are not considered to include the regular processes for the manufacture of steel and wrought iron, although, from strictly theoretical considerations, these should properly be included.

Fining, refining, and hearth refining are some of the terms given to this treatment, which is still employed to a limited extent to produce material principally for the charcoal hearth process (see below). The type of furnace is called a *finery*, *refinery*, etc. (see Fig. 4). It consists of a hearth, which is generally rectangular in cross section, formed of water-cooled iron plates, and of a capacity to treat a charge of about one-half to two tons of pig, which may be charged molten or more commonly solid. The fuel is either coke or charcoal which is burned by the blast, usually supplied by two tuyères opposite to each other, which also furnish the oxygen necessary for oxidizing the silicon, etc. If ore is added, part of the phosphorus is removed. Each change takes about two hours, but less if the metal is initially molten. The product (*fine metal*, *refined metal*, or *refined cast iron*) is usually tapped out on the iron plates of the floor or into iron molds, which causes a white fracture due, however, even more to the almost complete absence of silicon.

Pig-Washing Processes are a modification of ordinary refining and are used to obtain a metal very low in phosphorus and silicon, for use principally in the manufacture of special steel. In *Bell's pig-washing process* the molten pig is agitated with molten oxides of iron only. At the low temperature employed and in the presence of the very basic slag most of the silicon and the phosphorus are removed up to 90 to 95 per cent of the original contents, the metal being tapped out, however, before the carbon has been materially attacked. Krupp's pig-washing process, patented a couple of months later, is essentially the same, except that a certain proportion of oxide of manganese was used. They are now commonly referred to as the Bell-Krupp process, and the special addition of oxide of manganese is dispensed with as unnecessary. Somewhat similar methods have been tried from time to time with more or less success. For example, *Talbot's slag process* consisted in removing some silicon and phosphorus by pouring molten pig iron through a layer of slag rich in lime and iron oxide contained in a vessel somewhat resembling a ladle.

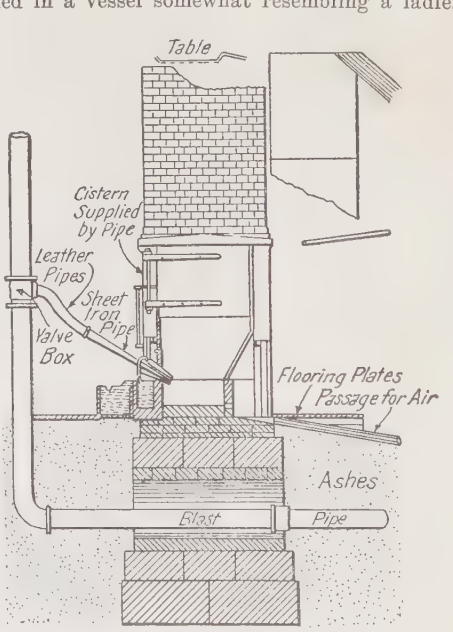


FIG. 4. MELTING FINERY FOR TREATING PIG IRON.

In the *Ellershausen* process the metal from the blast furnace was run through troughs lined with iron oxide.

The processes mentioned above have only a slight effect on the sulphur. Among those designed specially for its elimination may be mentioned the following: The *Massenez* or *Hoerde process* is based upon the fact that sulphur combines with manganese (if in sufficient amount) in preference to iron, the resulting manganese sulphide being insoluble in the molten iron, and therefore passes off into the slag if the requisite time is allowed. In

Heaton's process nitrate of soda was placed in the bottom of a ladle or other suitable vessel, being kept in place by an iron grating, and molten pig iron was poured on top. It was claimed that the action of the nitrate was to remove some of the phosphorus, all of the silicon, and nearly all of the sulphur. The *Saniter process* depends upon the use of calcium chloride in a slag containing a high percentage of lime, the principal action of the chloride being, apparently, to render the slag very fluid, fluorspar also being added for this purpose. It should be observed that puddling and steel-making processes are merely special and highly developed applications of the foregoing methods and principles.

CHARCOAL HEARTH PROCESSES

These processes are designed for the production of wrought iron by the purification of pig iron. The metal is obtained in a pasty condition, as the temperature is not sufficient to melt it after its decarburization and purification, and hence contains a certain proportion of intermingled slag. The name is derived from the fuel and the type of furnace employed. The hearths are low rectangular chambers, with one or more tuyères, resembling those used for the bloomary or Catalan processes for the direct reduction of iron from the ore. They are usually built of unlined cast-iron plates, water-cooled in part at least. Brickwork is avoided, as it would contribute silica to the slag and decrease its basicity, thereby destroying its effectiveness.

The general practice is to fill the hearth to a point above the tuyères with charcoal, upon which the pig iron is placed and gradually melted down. The blast from the tuyères encounters the molten metal as it trickles to the bottom, oxidizing the carbon and impurities, which latter are largely retained by the highly basic slag which is present. The slag from a previous charge is usually allowed to remain in the hearth and is augmented by the simultaneous oxidation of part of the iron. It is usually stirred into the pasty iron to assist further in its decarburization and purification. The metal so obtained may be further purified and freed from slag by a second or even a third melting operation under the same conditions. Most of the remaining slag is then removed by hammering the bloom. If the decarburization is not carried so far, the metal can be obtained with sufficient carbon to enable it to be hardened by quenching, and on account of this property it is then termed *steel*. Quite a number of methods were designed with this object in view.

There are various modifications, known by special names, which differ principally in minor details which need not be considered here. The *Swedish Walloon process* is still used in Sweden for making bars to be converted into blister steel. The American Lancashire process, brought to America by Welsh workmen, is no longer employed; there is, however, a modification still used, but to a very limited extent, for furnishing material for special sheets and tubes, in which wrought-iron or soft-steel scrap is melted with charcoal. The *South Wales process*, employing refined cast iron from the finery, was also used in America under the name of the *knobbling process*. Charcoal hearth iron is of better quality than puddled iron (see below), as it contains less intermingled slag, but principally because it is purer, being made from a better grade of material, preferably charcoal pig or refined cast iron, and charcoal which contains only traces of sulphur.

PUDDLING PROCESS

This process, like those just described, has for its object the production of wrought iron (rarely wrought steel) by oxidizing and removing most of the carbon, silicon, manganese, phosphorus, and usually some sulphur, contained in pig iron, the operation being conducted on the hearth of a reverberating furnace. The charge during the early stages is molten, but, owing to the temperature not being sufficiently high, the final product is in a pasty state and for this reason is mechanically mixed with a certain proportion of slag, most (but never all) of which is removed during subsequent steps in its manufacture.

Until 1784 all wrought iron had been made from ore by some direct process or from cast iron by a charcoal hearth process. In this year, however, Henry Court, in England, gave a new impetus to the iron industry by a patented process, termed *puddling*, which did not require an air blast and greatly reduced the cost of production.

The oxidation and removal of the carbon and impurities were effected by the oxygen in the air and in the gases passing over the charge, together with that furnished by the oxide of iron obtained by the oxidation of the iron itself. The loss of iron in this way was very heavy, as the hearth was originally lined with sand which, being acid in character, combined readily with the basic iron oxide formed. A sufficient amount of the latter had to be provided to render the slag sufficiently basic to complete the purification, particularly with regard to the phosphorus. An improvement introduced by Hall in 1830 consisted in lining the hearth with iron ore instead of sand and by adding a certain amount during the operation. By this means the heavy oxidation of the metallic iron was greatly reduced and there was greater control over the purification.

Puddling Furnace. The hearth (see Fig. 5)

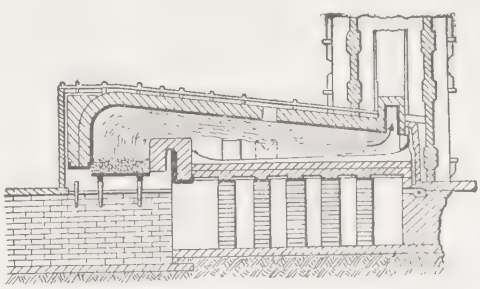


FIG. 5. PUDDLING FURNACE.
Longitudinal section.

is built of cast-iron plates, water-cooled, and carried on brick walls or on short iron pillars. It is usually about 5 or 6 feet long, and 4 feet wide opposite the charging door. The fuel is generally bituminous coal, although gas is occasionally used. Between the grate and the hearth

is a fire-brick *bridge wall*, and at the other end of the hearth, and separating it from the chimney, is a second bridge or *altar*, both of these serving to prevent the overflow of metal during the working of the charge. On the side of the furnace opposite the middle of the hearth is the working door, closed by a slide lined with fire brick which can be raised or lowered. A small opening at the bottom of the door permits the introduction of a *rabble* (an iron instrument resembling an ordinary hoe), with which the workman can stir the charge. The roof of the furnace is in the form of an arch, about 2 feet at the fireplace, and sloping gradually until at the chimney it is less than a foot above the bottom of the flue. Such a furnace has a capacity of about 400 to 600 pounds per charge.

Lining and Fettling. The bottom and sides of the hearth are covered with ore or slag rich in iron oxide, which is set in place by heating to a high temperature. After a charge has been drawn, the hearth is repaired (*fettled* or *fixed*) by throwing in ore or similar material, slightly moistened. Since Hall's modification the process has been carried on without any material change except in relatively unimportant details. Efforts have been made to substitute mechanical devices for hand labor, but without much success.

Operation. After the furnace has been fettled, about 200 to 600 pounds of pigs are thrown in, and the door is closed. In about 20 minutes melting commences, and after the fusion is complete the bath is worked with a rabble to expose the iron to the action of the slag and the flame. The silicon is oxidized first, and when this has nearly all been eliminated the iron *clears*, i.e., the bath loses the mottled appearance it had up to that time. The phosphorus is removed during this and the subsequent period. The temperature is now slightly raised, and the carbon is attacked, the resulting evolution of carbon monoxide, a gas, constituting the period known as the *boil*, and puffing up the slag so that the level of the bath is raised. As the carbon is burned away, the charge becomes more and more pasty, owing to its increasing melting point, and finally the bath drops to its former level. About this time grains of nearly pure iron appear on the surface, and the iron is said to have "come to nature." At this point in the process the charge must be well worked to insure proper welding together of the particles. When the action is completed, the pasty mass is broken up with a bar into lumps called

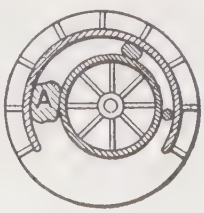


FIG. 6. ROTARY SQUEEZER.

balls (the operation being termed *balling*) of about 100 to 200 pounds each. These are drawn successively from the furnace by means of tongs. The total time for a charge is about one to one and three-quarters hours.

The puddle balls are taken from the furnace directly to the *squeezer*, a machine in which the greater part of the intermingled slag is expelled and the grains of iron thoroughly welded together. The present form (see Fig. 6), known as a rotary squeezer or Burden squeezer, consists of a cylinder with teeth, like a cogwheel, mounted on a vertical shaft and revolving inside a casing, set eccentrically, and also provided with teeth. The ball, *A*, is inserted where the distance between them is greatest, and is progressively crushed and reduced in size as it is carried around to the point where the distance is smallest. Hammers were formerly used for this operation, which was termed *shingling*.

Piling. After squeezing, the rough bloom is rolled out into a flat bar known as *muck bar* or *puddle bar*. This is then cut up into short pieces, and a number placed together to form a *pile*, which is heated and rolled again. The operation of piling and rerolling may be repeated with improvement in the quality of the product. Instead of piles, a rough box may be made, the sides, bottom, and top consisting of pieces of muck bar, the interior being filled with small pieces of scrap iron. This is termed a *fagot*. Small pieces of iron are also heated up in a furnace until they can be formed into a ball (*scrap ball*), which is handled in the same manner as already described. *Puddled steel* or *wrought steel*, now practically obsolete, is made in a similar way, and the same cinder may be used; but the process must be arrested before there is such a complete removal of carbon, and it is therefore carried on at a somewhat lower temperature. The product contains up to about 0.5 per cent carbon, while wrought iron has usually less than 0.1 per cent, but there is no sharp division between them. The term *steel* was applied only when the product could be hardened by quenching. Wrought iron is chiefly used for bars, principally where welding may be required, stay bolts for boilers and boiler fire boxes, tubes, and roofing sheets.

CEMENTATION PROCESS

This process, sometimes called in England the *converting process*, depends upon the fact that iron, when heated under the proper conditions in contact with carbonaceous matter for a long period of time at a temperature below its melting point, will absorb or become impregnated with a certain amount of carbon. It is used to a limited extent, chiefly in England, for the production of high-carbon bars to be employed in the manufacture of crucible steel and *shear* steel. The bars are usually of pure Swedish iron made by the Walloon process, already described. They are packed in layers, separated by and covered with powdered charcoal, in fire-brick chambers, called *converting pots*, contained in the *cementing* furnace (see Fig. 7). The top of each pot is closed with an arch of wheel swarf which frits when heated and forms an air-tight cover. The furnace attains its full temperature in about three to four days, at which it is maintained about seven to eight days for *mild heats*, about nine and one-half days for *medium heats*, and about 11 days for *high-carbon heats*. The cooling down requires about four to six days. If wrought iron has been employed, the finished bars will be covered with blisters formed by a reaction between the contained slag and the carbon, whereby carbon-dioxide gas is gen-

erated. From this characteristic appearance the name *blister bar* or *blister steel* is derived. These blisters are not produced when low-carbon steel bars are similarly treated, owing to the almost complete absence of slag. In the Sheffield district, where this material is principally made and consumed, practically nothing but wrought iron is used. If bars of very high carbon content are desired, a retreatment may

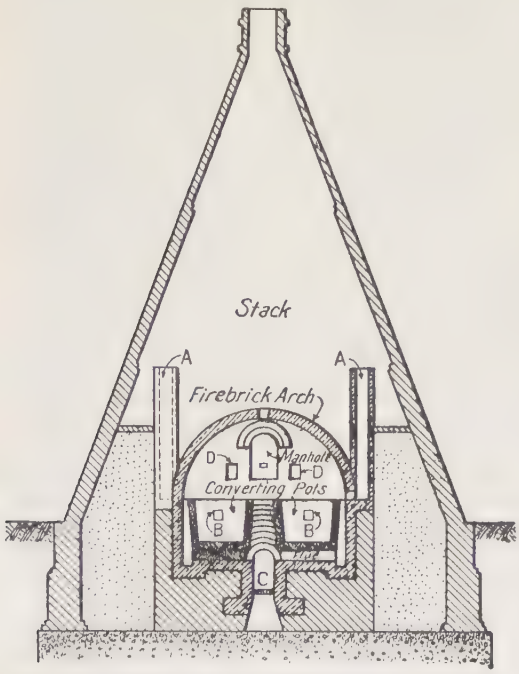


FIG. 7. TRANSVERSE SECTION OF CEMENTATION CONVERTING FURNACE.

A, short chimneys communicating with stack; *B*, holes for removal of trial bar; *C*, fire grate; *D*, holes for removal of trial bars.

be given, and the product is then termed *doubly converted bars*.

The penetration of carbon being from the outside, there is naturally a progressive decrease in percentage from the surface to the centre. As an example of this, a bar ½ inch thick contained at the outside 1.50, at the centre 1.15, and an average for the entire cross section of 1.33 per cent. In Sheffield six grades of cement steel are recognized under the following names, the percentages of carbon being approximately as given: (1) *spring* heat, 0.50; (2) *country* heat, 0.63; (3) *single-shear* heat, 0.75; (4) *double-shear* heat, 1.00; (5) *steel-through* heat, 1.25; (6) *melting* heat, 1.50.

Blister bars rolled or hammered down at a yellow heat are known as *plated* bars or *bar steel*. In the manufacture of shear steel a number of pieces, broken to a suitable length, are piled together, constituting a *fagot*, covered with fire clay and borax to avoid excessive oxidation, and drawn out under a hammer into a bar termed *single-shear* steel. If this bar is doubled back upon itself and welded together, it is then known as *double-shear* steel. Shear steel is used for various articles of cutlery, particularly to form the cutting edge, in which case it is welded to a softer grade to form a tough backing.

CRUCIBLE PROCESS

As shown by the analysis cited above, blister steel is not at all homogeneous, even with the most careful preparation, and consequently under the relatively crude conditions which formerly existed the irregularities in composition were much more pronounced. To overcome this objectionable feature, Huntsman carried out lengthy experiments with the idea of securing uniformity by fusion in small fire-clay pots or crucibles. He was finally successful in 1740, and his original process is still carried on at Sheffield and also serves as the basis of a number of modifications. The process is principally employed for the production of special steels for tools, machine parts, etc., where quality is of the first importance, its cost being prohibitive for ordinary grades, which are supplied by the Bessemer and open-hearth processes. It is also used to a limited extent for making small castings. The modifications have to do with the materials used rather than with the details of the process itself. Of these may be mentioned: (1) the *carburizing fusion method* of melting soft steel or wrought iron with charcoal; (2) the *pig and scrap method* of melting soft steel or wrought-iron scrap with a pure grade of cast iron; (3) the Uchatius or *pig and ore method*, in which ore is added to melted cast iron to reduce its carbon content as desired. The first of these is the one used in the United States.

The crucibles which hold the steel are made either of a high quality of fire clay mixed with a little powdered coke as a binder, known as *clay crucibles* or *white pots*, and used principally in England; or of a mixture of about half clay and half graphite, called graphite crucibles, which are practically the only kind used in the United States and on the Continent. After molding, the crucibles are fired or burnt at a high temperature. Their manufacture requires great care and skill in its details and is a considerable industry in itself.

The furnaces for heating the crucibles may be classed as vertical or horizontal, according to the method of charging. The horizontal type is a regenerative reverberatory furnace (Krupp furnace), resembling an open-hearth furnace, gaseous fuel being employed, and the crucibles standing on the hearth. With the vertical type the fuel may be either gas, coal, or coke. If gas is used, the furnace is regenerative, and consists of a number of rectangular chambers, or *melting holes*, in which the combustion of the gas takes place. There are about 6 to 15 of these chambers to a furnace, each capable of holding 6 crucibles. In coal or coke furnaces, also called *pot holes*, *coke holes*, etc., the crucibles are set directly in the fuel, which is supported by grate bars, a chamber being provided underneath for cleaning.

In the United States the charge is ordinarily 100 pounds, and the graphite crucible weighs about 50 pounds. The material employed is usually soft-steel or wrought-iron scrap, together with the necessary proportion of charcoal and a small amount of oxide of manganese and fluorspar or other flux; if blister steel is used, the charcoal is omitted. The larger pieces are put at the bottom, the charcoal and oxide of manganese poured on these, and the remaining space filled up with the smaller pieces. The cover is then put on, and the crucible set in the

furnace. Depending upon the nature of the charge (low-carbon heats, on account of the higher temperature necessary, require a longer time than those high in carbon), the melting, which is the first stage in the process, occupies about two to four hours. When this is complete, the charge is allowed to remain a certain length of time until the steel becomes quiet, i.e., does not evolve any more gas—a result probably due to silicon, reduced by the action of carbon on the wall of the crucible, combining with any oxygen present, either free or existing as oxide, and also conferring on the steel the property of absorbing and retaining a certain amount of gas. This operation is known as *killing* the steel, which, when perfectly quiet, is said to be *dead*, and requires about one-quarter to one and three-quarters hours, usually from one-half to one hour. The total time for a heat is about three to four hours, three heats being made during each *turn* of 12 hours. When ready for pouring, the crucibles are drawn from the melting holes and set on the floor. The covers are then taken off, and the slag floating on top of the steel is largely removed by means of a light iron rod with a ball of clay on one end, against which it chills and to which it adheres. The steel is now poured or "teemed" into the molds, the slag remaining on top of it being kept back by a bar (*flux stick* or *skimmer*) held against it. Each mold receives the contents of one crucible, or, if of larger size, several cruciblefuls are used. Several cruciblefuls may also be poured into a ladle, from which the molds are filled. Ingots, after cooling and before being worked down, may be *topped*, i.e., the tops broken off, to determine the grade from the appearance of the fracture, and also for the purpose of removing the piped portion. Chemical analysis has now almost entirely replaced this optical method for determining the composition. The average life of graphite crucibles is about six to nine heats. In English practice, where clay crucibles are used, the life of a crucible is about three heats, and the charges are reduced successively on account of the *slag* or *flux line* which is left after each melting. The first charge is generally 56 pounds, the second about 44 pounds, and the third 38 pounds. As the crucible is cold for the first heat, this takes about four and one-half to six hours, the succeeding heats taking considerably less time, as the crucible is then hot; three heats are made in 12 hours.

BESSEMER PROCESS

The present era of steel making commenced about 1855 with the advent of Sir Henry Bessemer's process, which he discovered while in search of a better material than cast iron, but not too costly, of which to manufacture ordnance. In the course of his investigation he experimented with a jet of air blown through molten cast iron. The use of air and steam had been tried before, but not exactly in the same manner. He introduced the air by means of a small clay tube passing through the lid of a crucible and reaching almost to the bottom. The crucible was placed in a furnace in order to melt the cast iron it contained and also to supply the heat necessary to keep it in this condition in view of the strongly cooling effect which it was supposed the air would have. When this experiment was actually performed, it was found that the air, instead of lowering the temperature, greatly increased it, and that after the metal was once molten no external source of heat was necessary. This phenomenon is due to the large amount of heat generated by the *rapid* combustion of the silicon, carbon, and manganese which the cast iron contains. It is stated that William Kelly, in the United States, discovered and applied the fundamental principles at an earlier date, and this is apparently borne out by the fact that the Patent Office, some years afterward, allowed his claims for the extension of his patent.

In 1856 Bessemer read before the Royal Institution his now famous paper entitled "On the Manufacture of Steel without Fuel." The method described appeared to be such a radical departure that it was not fully accepted until it had been actually demonstrated. When, however, the attempt was made at various works to put it into practice, it resulted in complete failure, the reasons for which now seem obvious. It required several years of laborious research to determine that with pig iron low in manganese the blown metal would be *red-short*, i.e., would crack and crumble when worked hot, owing to the presence of a large amount of oxide of iron; and that if the metal were high in phosphorous it would be *cold-short*, i.e., brittle when cold, owing to the presence of this element, none of which is removed by the original (acid) method. These facts had not been discovered in Bessemer's earlier experiments, as the cast iron used was low in phosphorus and contained a fairly high percentage of manganese. The final success of the process is due in great measure to Robert Mushet, who discovered that either a grade of pig iron rich in manganese or spiegel added to the blown metal would effect its deoxidation. Göransson, in Sweden, was also largely responsible for its ultimate adoption, being the first to operate it successfully on a commercial scale. It is also sometimes called the *converting*, *pneumatic*, or more rarely, *air-refining* process. It may be defined as a process for the production of steel, consisting in blowing cold air through molten pig iron contained in a suitable vessel, whereby certain impurities are oxidized and removed, and the product obtained in a fluid condition.

Depending upon the nature of the lining of the vessel, there are two modifications: (*a*) the *acid Bessemer process* (the original, and hence called simply the *Bessemer process*), by which nearly all of the silicon, carbon, and manganese are eliminated, the phosphorus and sulphur, however, remaining unaffected; and (*b*) the *basic Bessemer process* (due to S. G. Thomas, aided to some extent by P. C. Gilchrist, hence sometimes called the *Thomas-Gilchrist*, or, on the Continent, simply the *Thomas process*), in which there is elimination of nearly all of the silicon, carbon, and manganese, as in the acid process, and, in addition, most of the phosphorus and part of the sulphur.

The *vessel* or *converter* is shaped like an egg or a pear, the bottom or rarely (except for foundry work) one side of which is perforated with a number of small holes through which a powerful blast of air enters and passes through the bath of metal, thereby oxidizing the impurities, which go into the slag if solid, or out of the mouth of the converter if gaseous. After the oxidation of the impurities the bath contains a certain amount of oxide and free oxy-

BESSEMER CONVERTER BLOWING A HEAT OF STEEL

AN OPEN-HEARTH STEEL PLANT

THE EDGAR THOMSON OPEN-HEARTH STEEL PLANT OF THE CARNEGIE STEEL COMPANY.
It embraces 14 furnaces with a capacity of 80 to 100 tons each

1. CHARGING FLOOR SHOWING CHARGING MACHINES
2. TAPPING SIDE OF FURNACES, WITH LADLE IN FOREGROUND AND POURING PLATFORM ON RIGHT

gen, which are removed principally by manganese in some form, and the composition adjusted as desired.

The equipment of a modern plant, particularly as regards American practice, consists essentially of usually two to four converters, with the necessary appliances for handling the molten pig iron, the finished steel, etc.; large auxiliary vessels or *mixers*, in which molten metal from the blast furnaces is stored, or, if cold pig is used, cupolas for melting it as well as the spiegel, if rail steel or a similar grade is to be manufactured; and powerful blowing engines for supplying the blast. The operation of the vessels is controlled by a *blower* stationed on a platform or *pulpit* a short distance away, where he can see all that is going on. There are also pouring platforms, storage yards, etc.

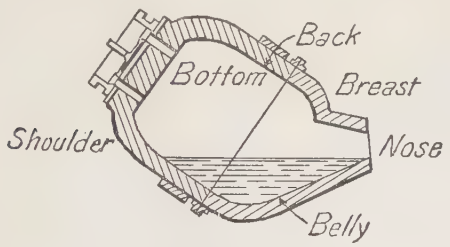


FIG. 8. BESSEMER CONVERTER.
Vertical section.

The converter (see Fig. 8) is lined with either acid or basic material, according to the method that is to be employed, and is suspended, at a little above the centre of gravity, by trunnions so that it can be tilted through various angles. In the original form, now little used, it was set on a permanent foundation and could not tip. The lining is contained in a steel shell consisting of the following sections: the "bottom"; the middle portion, known as the "body" or "belly"; and the upper part or "nose," which is open at the top or "mouth." The blast, at a pressure of about 20 to 25 pounds per square inch, is admitted through the bottom by means of tuyère bricks in each of which are a number of small holes or tuyères; these bricks are set in refractory material or *bottom stuff*, and the whole is held in a suitable casting fastened to the body of the converter by cotter pins.

As the lining of the bottom wears away much more rapidly than that of the body portion, the advantage of the present form, which can be readily removed and replaced by a fresh one, is evident. This was designed by A. L. Holley, who was also responsible for many other important mechanical improvements. The bottom is closed by an iron plate, between which and the tuyères is an open space or *wind box* into which the blast is admitted from a pipe connected with one of the trunnions, which is hollow and is in turn connected with the blast main. In basic practice the refractory bottom portion is called the *plug*, and the tuyère holes are usually formed by ramming burnt lime, mixed with tar or pitch as a binder, around pins which are subsequently withdrawn. For acid vessels the body and nose sections are lined with blocks and pieces of ganister or firestone set in a mixture of moistened ground ganister or quartz together with a little clay to render the mass plastic. In basic practice crushed burnt dolomite, mixed with tar or pitch as a binder, is rammed in between the shell and a temporary wooden form. The bottom and lining must be dried very carefully before use. When a vessel is tipped over on its side or *turned down*, there must be enough curve or belly to bring the level of the molten metal below the tuyères.

Acid Bessemer Process. The vessel, heated from a previous charge or from a fire built within it, is turned down, and the molten pig iron run in. The blast is then turned on, after which the vessel is *turned up*, i.e., rotated to the vertical position. The actual blowing takes about 8 to 12 minutes in the United States and usually over twice as long in England. The changes taking place in the charge are indicated by the character and appearance of the flame issuing out of the nose of the converter. At first practically only the silicon and part of the manganese are burned, and the flame is short and dull in color; after the silicon has been oxidized the carbon is attacked, and the flame becomes longer and of dazzling brilliance. This latter period is sometimes termed the *boil* on account of the copious evolution of carbonic-oxide (carbon monoxide) gas which violently stirs up the metal and, after escaping, burns in the air to carbonic acid (carbon dioxide). As the flame is very trying to the eyes, special dark-colored blowers' glasses are worn in order to observe it. While the carbon is burning, it is long, clear, and brilliant. When the carbon is nearly gone, the flame *drops* or shortens and also becomes full of dark lines, showing that the blowing is finished. The vessel is then turned down, the blast shut off, and the metal *recarburized* (see below) preparatory to pouring it into molds.

The heat necessary for the process is derived principally from the combustion of the silicon and carbon. If the pig iron contains too high a percentage of silicon, too much heat will be generated, and the charge is said to *blow hot*. In this case it is necessary to cool the bath, and this is effected by blowing in steam with the blast or, better, by throwing in cold steel scrap, which is low in these elements. If, on the other hand, the iron contains too little silicon, the opposite condition results, and the charge is said to *blow cold*. The vessel must then be turned down so that the blast will strike the surface of the bath. This produces the required heat by the oxidation of some of the metallic iron. The metal is said to have been *blown full* when only traces of carbon remain (about 0.04 or 0.05 per cent); if the blowing is stopped shortly before this point is reached, the metal is said to have been *blown young*. In the United States the capacity of a vessel varies from about 8 to 25 tons per heat, the output of a pair of vessels being about 40,000 to 65,000 tons per month. The use of the converter in the *duplex* process is mentioned below.

Basic Bessemer Process. A certain amount of lime is charged with the molten pig iron, but otherwise the process is conducted in practically the same manner as the acid process until the drop of the flame. At this point, instead of turning the vessel down, the blowing is continued (sometimes after the removal of the old slag and the addition of a little more lime) for about four or five minutes as determined by experience, during which most of the phosphorus and some of the sulphur are removed. The end

of the operation is determined by taking a small test ingot, which is forged down while still hot, quenched in water, and broken. The appearance of the fracture and also the malleability of the metal indicate the state of the process. The first period, up to the drop of the flame, is known as the *foreblow*, and the second, the *afterblow*. When ready, the vessel is turned down and the blast stopped, as before. As much as possible of the slag is poured off before recarburizing to prevent an undue amount of phosphorus from being reduced and reëntering the metal. As this action always occurs to a certain extent, the charge must be *blown down*, i.e., the phosphorus reduced to a considerably lower percentage than that permitted in the finished steel. A heat requires about 20 to 30 minutes, and one vessel can produce about 1000 to 5000 tons per month, depending upon the size, which varies from about 15 to 25 tons per heat. As already stated, the basic process is not used in the United States, as the pig iron does not contain a sufficient percentage of phosphorus.

In steel foundries small converters, called "baby" Bessemer converters, with a capacity of about two to five tons, are frequently employed. Various types and modifications, principally as regards the apparatus, have been tried from time to time; but the process itself is essentially the same as described for the acid process, which is practically the only one used in connection with the manufacture of castings, at least those made outside of large steel works.

OPEN-HEARTH PROCESS

This is a process for the production of steel by the oxidation and removal of the excess of impurities contained in a bath of metallic iron lying on the hearth of a regenerative furnace, the product being tapped in a fluid condition. The metallic charge may consist of (*a*) pig iron (either solid or molten); (*b*) pig iron and steel or wrought-iron scrap; or (*c*) steel or wrought-iron scrap and carbon (coal or coke). As in the Bessemer process, there are two modifications, depending upon the nature of the lining of the furnace: (1) the acid open-hearth process, in which nearly all the silicon and manganese, and the desired proportion of the carbon, are removed; (2) the basic open-hearth process, in which there is removal of silicon, manganese, and carbon, as in the acid process, and, in addition, most of the phosphorus and usually also some of the sulphur, but to an uncertain extent.

The process was invented by Sir C. W. Siemens in England and was first used commercially in 1865. The principle of keeping the charge molten throughout the entire operation of purification was not new as applied to reverberatory furnaces, but had previously failed owing to the insufficient temperature obtainable in this type of furnace as then known.

The original (acid) method of Siemens was to melt pig iron alone and oxidize the impurities by additions of ore (*Siemens* or *pig and ore process*), assisted by the oxygen in the furnace gases; it was therefore practically identical with puddling except for the higher temperature which maintained the charge in a molten condition. The brothers Martin, in Sireuil, France, added steel or wrought-iron scrap, without any ore, to molten pig iron until the desired composition was obtained, there being only slight oxidation (and purification) from the gases (*Siemens-Martin, Martin-Siemens, Martin* or *pig and scrap process*). The former was therefore strictly an oxidation process, while the latter was almost solely a dilution process. The various names mentioned have commonly lost their special significance and are used more or less interchangeably, the terms *pig and ore* or *pig and scrap* being employed when it is necessary to distinguish between them. Ordinarily a combination method, with varying proportions of pig, scrap, and ore, is practiced. The term *open hearth* as applied to the process is derived from the type of furnace; it is used universally in the United States and to a certain extent in England.

Open-Hearth Furnace. This is a regenerative reverberatory furnace, the name signifying that the hearth is open or exposed to the action of the flame. It should rather be called a *Siemens* or a *Siemens regenerative furnace*, as is done in England; the name *Martin furnace* (used on the Continent) is incorrect, as the Martins had nothing to do with the design of the furnace, only with the process.

The furnace (see Fig. 9) comprises the following essential features: (*a*) the hearth or *sole*, which contains the charge, covered (*b*) with an arched brick roof; (*c*) *ports* or passages at each end of the hearth, the air and gas for combustion entering through those at one end and the products of combustion leaving through those at the other end; (*d*) the *regenerators* or *regenerative chambers*, nearly filled with *checkerwork*, at each end of and below the hearth; the regenerators at one end are connected with

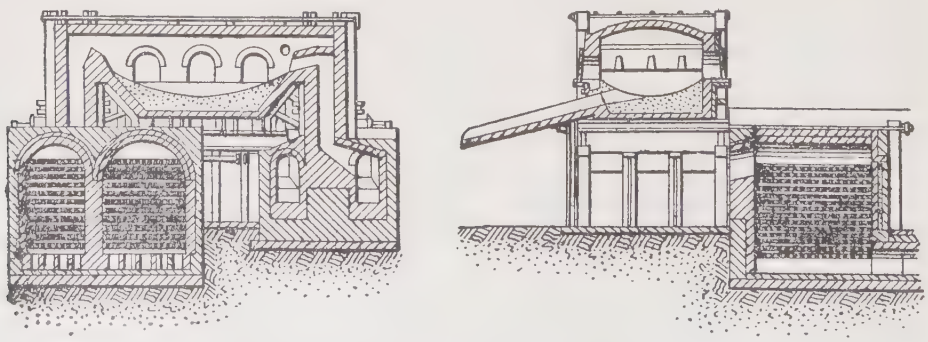


FIG. 9. LONGITUDINAL AND TRANSVERSE SECTIONS OF STATIONARY OPEN-HEARTH STEEL FURNACE.

the ports by vertical flues or *uptakes*, and at the other with the chimney or stack by horizontal flues; at the bottom of the uptakes are (*f*) small chambers or receptacles called *cinder* or *slag pockets*, which can be easily cleaned, to catch any large particles of dirt and slag carried over from the hearth and thus prevent their entering and clogging up the checkerwork. The hearth of a modern furnace is constructed of steel plates, covered first with silica bricks, on top of which is the lining proper, consisting of (*a*) for acid practice, silica bricks with fine sand, burnt or sintered into place; (*b*) for basic practice, magnesite bricks covered with crushed dolomite, sometimes mixed with a little pitch or tar to serve as a binder. The roof and walls, above the level reached by the slag of the bath, are built of silica (rarely magnesite) bricks, and below this of silica (acid) or magnesite (basic) bricks, according to the nature of the process. Sometimes chrome (neutral) bricks are inserted between the silica and the magnesite bricks in the walls and lining. The hearth is provided with a tap hole through the back wall, which in the case of stationary furnaces must be closed up carefully with refractory material of the same kind as the lining; with a tilting furnace this hole, except when tapping, is above the level of the bath and so need not be closed up tightly. The hearth is usually rectangular in shape, rarely round or oval. The regenerators are the distinctive feature of the furnace and consist of fire-brick flues filled with bricks set on edge and arranged in such a way as to have a great number of small passages between them, called, on account of the fancied resemblance, *checkers* or *checkerwork*, which abstract most of the heat from the outgoing waste gases and return it later to the incoming cold gases for combustion, on the same principle as the stoves of a blast furnace. On account of the system of heating, only gaseous fuel, or fuels having the same general character, can be employed. In the case of producer gas, both the air and gas are preheated in separate regenerators, uniting and burning only after they have entered the furnace; with natural gas, petroleum, or powdered coal, only the air is preheated; they are introduced near the ports, the two latter being injected with air or steam.

The furnace may be built either on a permanent foundation, when it is termed a *stationary* or *fixed furnace*, or else arranged so that the portion comprising the hearth may be tipped, when it is known as a *tipping* or *tilting furnace*.

In the United States, steel-works furnaces, i.e., those of large size intended for the manufacture of ingots, generally have a capacity per charge of about 50 to 100 gross tons, the usual size of furnaces constructed recently being about 70 to 100 tons; for some special processes they may have a capacity up to 250 tons or over, and in this case are of the tilting variety. Smaller furnaces of about 10 to 20 tons' capacity are generally confined to use in steel foundries. In ordinary practice a heat requires about 6 to 12 hours, usually 7 to 10 hours, and a furnace will make about 12 to 22 heats per week of six days, depending somewhat upon the size, a large furnace, as a rule, requiring more time for a heat. The furnaces were originally charged by hand, the material being laid on a spadelike instrument, called a *peel*, which was rested on the sill of one of the doors and then pushed into the furnace. With large modern furnaces, however, charging is done by means of a machine. The stock for the charge is loaded into steel boxes, which are picked up by the *peel* of the machine, pushed into the furnace, revolved to deposit their contents, and then withdrawn.

Acid Open-Hearth Process. Ordinarily the charge is composed of pig and scrap, the latter, as a rule, forming the greater part, up to about 60 or 70 per cent. As in the acid Bessemer process, the materials must contain less phosphorus and sulphur than is permissible in the finished steel, as there is no elimination of these elements, and in the case of sulphur an additional amount may be taken up from the gases. In some cases the scrap is charged first, and the pig placed on top; in others this order is reversed. The first stage consists in melting the materials down, during which much of the silicon, manganese, and carbon are oxidized and eliminated. When completely melted, the bath should contain about 0.60 per cent carbon for low-carbon steel, and slightly over about 1 per cent for high-carbon steel when the carbon is secured principally from that in the bath without any considerable final addition. To determine the condition of the bath a sample is taken out in a long-handled spoon and poured into a small iron mold. The test ingot so obtained is removed immediately, quenched in water, and broken, the appearance of the fracture giving the desired information. In foreign practice the test ingot is usually forged down before quenching and breaking. Frequently when making high-carbon steel, say, over about 0.50 per cent, a rapid chemical determination for carbon is made.

If the heat *melts high*, i.e., if the percentage of carbon is still too high, ore in small amounts is fed in to hasten its oxidation, an operation termed *oreing*. Under these conditions there is little danger of corroding the lining owing to the protection afforded it by the metallic bath and the slag already formed. If, on the contrary, the heat *melts low*, with the consequent danger that the bath will not be hot enough by the time the carbon has been oxidized to the necessary extent, a certain amount of pig (which is high in carbon) is thrown in to supply the deficiency in this element, and this is known as *pigging* or *pigging back*. If the carbon has been eliminated too soon, and there is only slight agitation of the bath, owing to the small amount of carbon dioxide being evolved, there is danger of chilling, as sufficient heat cannot be absorbed by the metal through the relatively nonconducting blanket of slag. A certain amount of heat is furnished by the oxidation of the carbon and impurities, but the greater part necessary (owing to the slowness of the process, as referred to in connection with the Bessemer process) must be secured from the combustion of fuel. Contact of the metal with the hot gases, by which its heating is effected, is brought about indirectly by the oxidation of the carbon in the metallic bath itself, which causes it to bubble and seethe. Consequently, as mentioned above, it is essential at all times to have a certain proportion of carbon in the bath, as otherwise it would become too cold to tap. The temperature of the bath is usually determined partly by the eye (protected by blue glasses) and partly from the melting effect on a low-carbon steel bar submerged in the bath for about 10 seconds. If the bar is melted off almost squarely across, the bath is hot enough,

while if there remains a long tapering point it is still too cold. The direction of the air and the gas is reversed, by changing the valves, at regular intervals of about 20 minutes at the beginning, and 15 minutes or less towards the end of the heat. Just before tapping, a small amount of ferromanganese, containing about 80 per cent of manganese, is usually thrown into the bath to *hold the heat*, i.e., to prevent any further removal of carbon and also to effect a partial deoxidation by its own oxidation.

There are two methods for obtaining the desired carbon content in the finished steel: (*a*) by removing nearly all the carbon and adding the proper amount at the end; (*b*) by eliminating it only to the desired percentage ("catching the carbon on the way down") and then tapping immediately. In either case manganese, and usually a slight amount of silicon, must be added (generally in the ladle) to remove the remaining oxide from the metal. When the bath is in the right condition, both as to composition and temperature, it is *tapped* by knocking out the material in the tapping hole, if the furnace is stationary, or by tilting the furnace, if it is of that type, so that the metal can flow out.

Basic Open-Hearth Process. The charge is much the same as for the acid process, except that it is not limited in its phosphorus content; the sulphur, however, should be reasonably low, as its elimination is rather uncertain; the silicon should also be low to avoid the use of an excessive amount of lime, and also since its oxidation is not depended upon for the necessary heat. The limestone and ore to form the basic slag and to assist in the oxidation are charged before the metallic portion, as in this case there is no danger of excessive corrosion of the lining, since it is also basic in character; the actual elimination of the phosphorus and any sulphur is due to the lime. The limestone is generally employed in its natural condition, but is occasionally burnt beforehand. With these and certain other minor differences, the basic process closely resembles the acid in its operation. The proportion of pig is commonly larger and, whenever practicable, is charged in the molten condition direct from the blast furnace or mixer, as a considerable saving results.

Special Open-Hearth and Combination Processes. Certain special modifications have been adopted with a view to decreasing the cost, increasing the output, or making use of material otherwise difficult to treat, e.g., high-phosphorus pig.

Bertrand-Thiel Process.—This process was worked out about 1894 at the works of the Prager Eisenindustrie Gesellschaft at Kladno, Bohemia, by Ernst Bertrand and Otto Thiel, and was designed for use with pig iron too high in phosphorus (about 1 to 2 per cent or over) for convenient treatment according to ordinary practice, but which was still too low in this element for the basic Bessemer process. It consists in charging pig, either alone or mixed with scrap, in one basic furnace run at a relatively low temperature, in which nearly all the phosphorus and silicon, and only a small part of the carbon, are removed; this part of the process closely resembles *pig washing*. The resulting partly purified metal, without the slag, is then immediately transferred to another basic furnace in which scrap or ore, or both, together with some lime (occasionally also a little additional pig), have previously been heated. A very rapid reaction at once takes place between the iron oxide and the carbon and remaining impurities in the metal, which are speedily reduced below the required limits. The further details are the same as in regular practice. The time for a charge is about two to four hours in each furnace, depending largely upon the size of a charge.

Monell Process.—This is a modification of the pig and ore process in which steel scrap may also be used, and was devised by Ambrose Monell at the Homestead Steel Works of the Carnegie Steel Company. It is usually carried out in a fixed basic furnace, but is equally applicable to a tilting furnace. It consists in heating lime and ore or some other form of iron oxide, the latter amounting to about 20 to 25 per cent of the pig, until they become pasty. When this has occurred, the pig in a molten condition is run in, and a violent reaction takes place. A large quantity of slag is formed, most of which runs out of a special notch in the back wall of the furnace, if stationary, into an auxiliary cinder pit, or by tilting the furnace, if of that variety, so that it can run out of the tapping hole. This first slag contains about 90 per cent of the phosphorus and most of the silicon originally in the pig, while at this point about 2 per cent of the carbon still remains in the bath owing to the initially relatively low temperature. The heat is then worked down and handled as in regular practice, requiring about the same time as an ordinary pig and scrap heat.

Talbot Process.—This is also a pig and ore process, although scrap is occasionally added, but principally as a means of disposing of it. It was originated by Benjamin Talbot about 1897 at the Pencoyd Iron Works, near Philadelphia. It depends upon the rapid oxidation of the impurities contained in molten pig iron by a liquid, highly ferruginous slag, and is carried out in a basic furnace, generally of the tilting type. The essential point is always to keep a certain amount of metal in the furnace for the purpose of (*a*) diluting the impurities contained in the subsequent additions of pig iron, and (*b*) furnishing a reservoir of heat to enable a very fluid slag to be maintained. A tilting furnace of about 250 tons' capacity or over is ordinarily employed, and about one-quarter to one-third of the finished steel is tapped out at one time. This having been done, additions of ore or other form of iron oxide and lime are made, and after they are thoroughly melted and incorporated with the former slag, the proper amount of molten pig iron is run in. This occasions a violent reaction, and most of the phosphorus and silicon is eliminated in a few minutes; while this reaction is in progress a large amount of the slag boils up and runs out of the furnace. The bath is then adjusted as in ordinary practice, a portion is tapped out, and the cycle of operations repeated. A furnace is emptied completely only at the end of the week or for a shutdown for repairs. A heat requires about two to four hours.

Duplex Process.—This consists in the combined treatment of pig iron, first in an acid Bessemer converter, and afterward in a basic open-hearth furnace, the object being to obtain the more rapid working of the former and the

greater purification characteristic of the latter. Osann in Germany patented the process, which is essentially the same as that used to-day. The blowing in the converter takes about 10 to 15 minutes, and the finishing in the open-hearth furnace about two to eight hours, depending upon the size of the heat and other conditions. As carried out at one works, part of the pig is blown until nearly all of the silicon and the carbon is oxidized, as in ordinary Bessemer practice. This serves as molten steel scrap, and, being highly oxidized, it produces a vigorous reaction with the remainder of the pig, which is blown only sufficiently to remove the silicon, the action being stopped before much of the carbon has been eliminated. The process is completed as usual. Blown metal is sometimes used in the Talbot process to replace part or all of the ordinary molten pig iron.

ELECTROTHERMIC PROCESSES

The term "electric processes," commonly used, is likely to prove misleading to the uninitiated as signifying that electricity per se exerts some peculiar action which confers a special quality on the product. As a matter of fact, in its present commercial application to the manufacture of steel or cast iron, it is chiefly a substitute for fuel as the source of heat. An alternating current is always used, as it can be transmitted at a high voltage, with lower cost of conversion to the required voltage than is possible with a direct current; in the case of induction furnaces a direct current is out of the question. Electrolytic methods, such as are employed for the refining of copper, by which the material is chemically decomposed or split up, require a direct current and have been applied to the production of iron only when it is desired to have the metal as pure as possible for experimental purposes and in very small quantities, the cost of these methods being prohibitive for general purposes. Electrothermic processes may be classified according to the type of furnace and the method of heating employed; another classification would depend upon the nature of the operation, such as smelting, refining, carburizing, etc.

1. **Arc Furnace.** The requisite temperature is obtained by radiation from an arc formed between two electrodes, or between one or more electrodes and the charge, either initially in solid lumps (between which small arcs may also be formed) or molten. When the charge is molten, the current may pass from one electrode into the bath, then out again to another electrode in series with the first, or else out through the bottom of the hearth which then contains one of the electrodes; a certain amount of heating by resistance also occurs, and to indicate this fact the term *arc-resistance heating* (or *furnace*) is sometimes employed.

2. **Induction Furnace.** This is based on the principle of an electrical transformer. It consists of an annular trough, or two or more such troughs connected together, which constitute the hearth, the contained metal acting as the secondary circuit of a transformer, the primary circuit of which is arranged as usual. The heat is obtained from the resistance offered by the metal itself to the transformed current of very high amperage and low voltage.

3. **Resistance Furnace.** The charge or bath of metal forms part of the circuit, and the resistance it offers to the passage of the current yields the required temperature.

4. **Surface-Resistance Furnace.** Here the electrodes do not at first suffice for the passage of the current. To heat up the furnace it is necessary to connect them by means of some kind of conducting material, such as a bed or lining composed of or containing pieces of carbon. These conductors by their resistance to the passage of the current are highly heated and form a melting hearth upon which are placed the materials to be treated. The charge itself subsequently becomes a conductor between the electrodes.

The steel-making furnaces are practically always lined with basic material, so that purification with lime can be effected; however, for smelting ore they are frequently lined with fire bricks similarly to blast furnaces.

The first metallurgical use of electricity for heating purposes, of which we have definite record, was an experimental demonstration in 1810 by Sir Humphry Davy. Other investigators were Pepys (1815), welding; and Pichon (1853), electrothermic furnace. In 1878–79 Sir William Siemens, the inventor of the open-hearth furnace, took out patents for electric furnaces of the arc type which possessed most of the important details of the present arc furnaces. He employed an ordinary crucible to hold the charge, one electrode being introduced through the bottom and the other through the cover or at the top, this latter electrode being adjustable. In a later form the electrodes were introduced through the sides at points directly opposite each other. Other patents were taken out from time to time. The adoption of the more widely known furnaces at present in use has occurred chiefly since the beginning of this century.

The *Stassano furnace* is of the arc type (see Fig. 10) and is nearly cylindrical in cross section. It usually rotates about a vertical axis slightly inclined from the perpendicular; it may, however, be stationary. It is provided with three or more large cylindrical electrodes

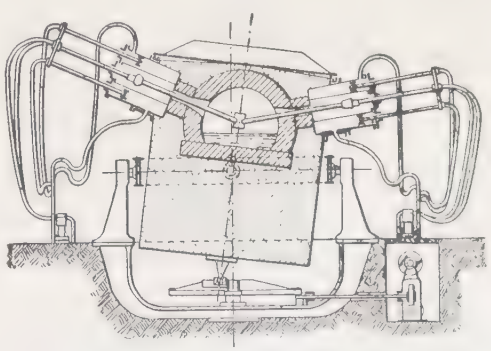


FIG. 10. STASSANO ELECTRIC FURNACE.
Vertical section.

inserted through the sides, nearly meeting at the centre, and connected with a three-phase alternating current. The furnace is generally lined with magnesite, and the molten products are tapped out at the bottom. This type of furnace has been principally used to produce steel directly from the ore, but pig and scrap may also be employed as in ordinary steel-making processes. By the former method finely

ground ore, with the correct proportion of carbon and flux, is first molded into briquettes. The rotation of the furnace is to effect a thorough mixing of the charge.

The *Héroult* and *Girod furnaces* are both tilting and closely resemble this variety of furnace as used in the open-hearth process except that they are much smaller. Since no gas is to be preheated or burned, there are no ports, regenerative chambers, or stack. Working doors, which also serve for charging, are provided in the front of the furnace. While the method of heating for these two furnaces is the same, the manner of introducing the current differs. In the Héroult furnace (see Fig. 11) there are at

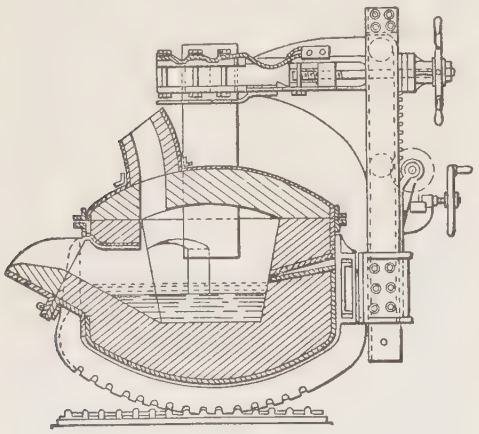


FIG. 11. HÉROULT ELECTRIC FURNACE.
Transverse section.

least two vertical carbon electrodes passing through the roof, their height being regulated by a suitable device. These are connected in series, the current flowing from one to the other after traversing the bath. The ends are lowered into the slag covering to form the circuit and are then usually raised a certain distance, whereby an arc is formed over the space separating each electrode from the bath, as this method of heating is much more effective than simply depending upon the resistance offered by the bath. In the Girod furnace (see Fig. 12) there are one or more vertical carbon electrodes, also passing through the roof, but in series with an electrode, consisting of soft steel pieces, embedded in the hearth, the upper ends being in contact with the molten metal. The current, entering by way of the upper electrode (or electrodes), passes by an arc into the bath and leaves through the bottom electrode.

The *Kjellin furnace* (see Fig. 13) is of the induction type. The hearth is of annular shape and is provided with covers. The metal in the hearth forms the secondary circuit of a transformer, the primary circuit of which consists of a coil of fine insulated copper wire wound around a laminated iron core. The winding is placed on one leg only. It is protected from the heat radiated by the furnace by air spaces and a water jacket. This furnace has generally been used for obtaining steel of any grade from low to high carbon by a suitable mixture of pure pig and steel scrap, with the proper additions of ferrosilicon, etc.; little purification of the charge has been attempted, hence pure materials are used. In starting the furnace the hearth is warmed up by a ring of iron or steel which serves to carry the secondary current. If cold material is charged, only a portion of the bath

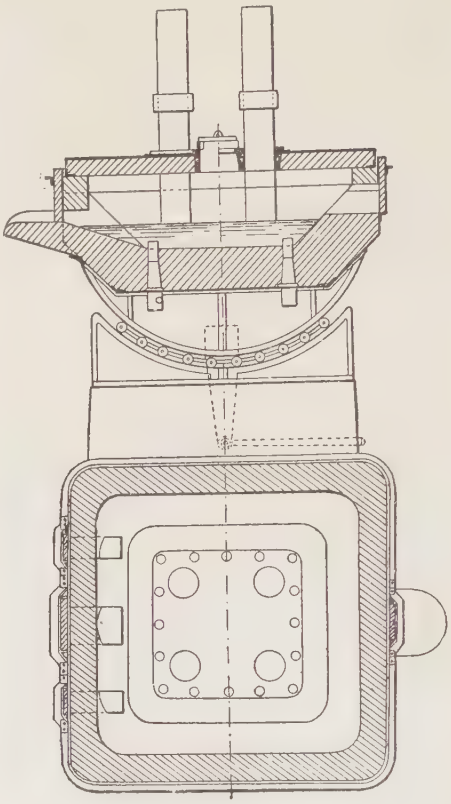


FIG. 12. GIROD ELECTRIC FURNACE.
Plan and sectional elevation.

is poured off at a time, but with the use of molten metal from an open-hearth furnace or a Bessemer converter the hearth can be entirely emptied, as it will be sufficiently hot to prevent chilling.

The *Röchling-Rodenhauser furnace*, also of the induction type, is a modification of the Kjellin furnace devised by Schoenawa and Rodenhauser. In addition to the induced method of heating

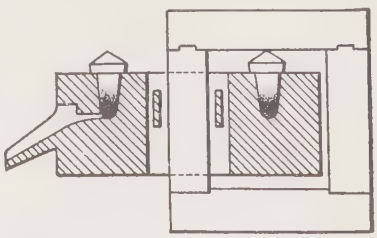


FIG. 13. KJELLIN ELECTRIC FURNACE.
Transverse section.

there are secondary coils of wire about the primary, connected by pole pieces buried in the hearth slightly below the surface. When the refractory lining has been sufficiently heated, it becomes a conductor of high resistance. After

the furnace is in regular operation, the heating is consequently a combination of induction and resistance. The hearth, which differs from those of other induction furnaces, varies in form, depending upon whether the furnace is operated with a single-phase or a three-phase current. In

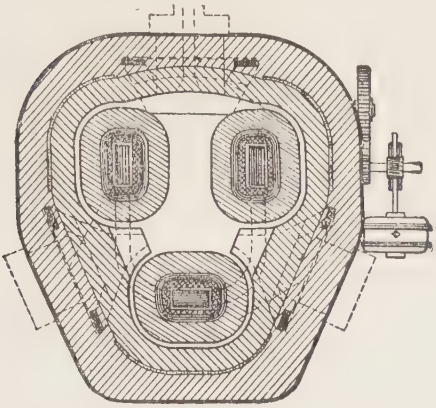


FIG. 14. RÖCHLING-RODENHAUSER ELECTRIC FURNACE.
Horizontal section.

the former case it is like two Kjellin rings or hearths joined together to form a figure 8; in the latter case, like three joined together (see Fig. 14). In either case the grooves open into a distinct open hearth, where they intersect, constituting the working chamber or "laboratory," where all the metallurgical operations are effected. The grooves which have a relatively small cross section form the secondary circuits and serve only as heating channels, no purification being performed in them.

The furnaces at present used for steel-making purposes have a capacity varying from about 2 to 30 tons per heat. The length of time required depends principally upon the amount of refining and purification to be done. Materials may be treated in the same manner as by the open-hearth process, but it has been found more advantageous, owing to the high cost, to start with metal initially treated in a Bessemer converter or an ordinary open-hearth furnace, the electric furnace being then employed only for finishing purposes. The war gave a great impulse to the use of the electric furnace in the production of special steels.

Of the furnaces for the production of pig iron it will be sufficient to mention the *Grönwall furnace*, which is in successful operation at Trollhattan, Norway (see Fig. 15). This is a shaft furnace and resembles most nearly an ordinary blast furnace in which the tuyères are replaced by carbon electrodes, three in number. The charge is introduced at the top by means of a bell and hopper, and the molten products are tapped out through a hole at the bottom of the hearth.

RECARBURIZATION

In all steel-making processes which depend upon oxidation for the necessary purification of the charge the action must usually be carried to such a point that not only is there an insufficient amount of carbon and manganese (and sometimes silicon) remaining, but also a certain proportion of the iron is oxidized and dissolved in the metal itself, which, if allowed to remain, would render it unfit for use. Recarburization (sometimes "recarbonization") means, in its special sense, adding carbon in some form to metal too much decarburized in some steel-making process, to secure the proper percentage in the finished steel; in its more general application the term signifies the addition of all the material needed to give the steel the desired composition as well as to effect its deoxidation. The additions are commonly made cold, generally in the ladle; but if they are in such large amounts that there is danger of chilling the metal, they may be (*a*) preheated to about a cherry red, (*b*) melted, or (*c*) added in the furnace or converter, either wholly or in part. For high-carbon heats a fairly recent method is to add molten pig iron, usually in the furnace, just before or during the tapping of the heat, so that it is thoroughly mixed in while the steel is running into the ladle. The ladle additions are made while the heat is being tapped, and an important point is to get them all in before much slag has appeared on the surface of the metal. In the United States, for soft and medium-carbon heats, the carbon is generally added in the ladle in the form of crushed anthracite coal contained in paper sacks. This is a modification of Darby's method, according to which crushed coal or coke is introduced by means of a hopper and funnel which regulated the rate of flow. Nickel, as nickel steel scrap or ingot nickel, is usually charged at the commencement of the heat, as it is not materially oxidized during the process, at least no more than the iron.

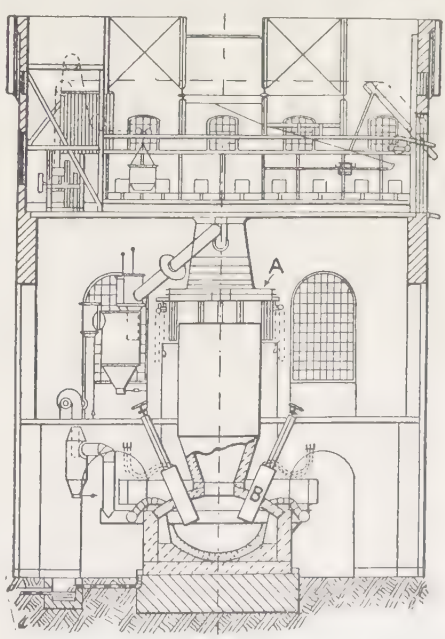


FIG. 15. GRÖNWALL ELECTRIC FURNACE.
Vertical section.

Other materials, as a rule, are added towards the end of the heat or else in the ladle, depending largely upon their amount (chilling effect) and any danger of their being excessively oxidized. For the latter reason ferrotitanium and ferrovanadium are put into the ladle after all the other additions.

INGOTS

The liquid steel, however made, is obtained in suitable shapes, called "ingots," for rolling or forging by casting it in special molds, usually made of cast iron, particularly for ordinary sizes, but sometimes of sand if of large size or for special purposes; recently steel molds have been tried, a longer life being claimed for them, but this has not yet been conclusively shown. The ingots are generally rectangular in cross section and slightly tapering to the top to permit of the removal of the molds. For crucible steel they usually do not exceed a few hundred pounds in weight, while for ordinary structural material they are generally of from 2 to 10 tons, and for special purposes, such as armor plate, they may weigh as much as 100 tons. In the case of crucible steel the pouring is commonly done directly from the crucible, but in the other steel processes the metal is tapped into a *ladle*, a large vessel or pot consisting of a steel shell lined with fire bricks or other refractory material. There is a hole in the bottom closed by a stopper which can be raised or lowered, thus controlling the flow of the steel. For the production of ingots, the steel is usually poured directly into the top of the mold; this method is sometimes objectionable on account of a certain amount of splashing against the sides. Where an ingot with better surface is desired, or in case a sand mold is used whose surface might be cut away by the falling stream, the metal is introduced at the bottom through a pipe or *runner* on the outside of the mold. The molds were formerly set on the floor of a pit, but this method has been largely abandoned, at least in the United States, in favor of car casting. This was devised by F. W. Wood, of the Maryland Steel Company, and consists in setting the molds on small cars or *buggies* on which they can be transported to their destination.

When the steel cools and solidifies, two conditions arise to a greater or less extent, depending upon the attendant circumstances, affecting (*a*) the chemical homogeneity and (*b*) the physical structure or soundness. As discussed under METALLOGRAPHY, steel when slowly cooled is made up of a number of distinct constituents, much as in the case of composite rocks. During cooling those constituents or elements whose combination with iron reduces its melting point segregate or separate out in the still liquid portion near the top of the ingot or casting, becoming more and more concentrated as the remainder freezes. Chemical analysis of such portions shows a higher percentage of carbon, phosphorus, and sulphur than is found in other portions. Somewhere near the bottom of the ingot a reverse condition exists, due to such elements or constituents leaving the steel to enrich the upper portions; this latter is termed *negative segregation*. Segregation may be reduced by different means, such as rapid cooling, the use of small sections, and the addition of certain deoxidizing substances, e.g., silicon or aluminium, but is never wholly prevented, although in many cases it is revealed only by the aid of the microscope. The evolution of gases during solidification may have a beneficial effect, by keeping the still molten metal stirred up.

Solidification naturally takes place first in the portions in contact with the wall of the mold and gradually proceeds inward. As contraction also occurs, since the metal occupies a smaller volume the lower the temperature, there should result eventually a hollow space or cavity, termed a *pipe*, situated in the upper central portion of the ingot. Most of the gases dissolved by the metal when molten are evolved during freezing, and any which cannot escape freely, owing to the metal having become pasty, are mechanically held in little pockets or cavities, called *blowholes*. The space occupied jointly by the pipe and the blowholes may, in general, be taken as equal to the difference in volume of the steel when respectively molten and cold (solid). Hence, with a large number of blowholes, there may be no pipe, and the maximum amount of pipe can be present only in the entire absence of blowholes. The absence of both these defects is necessary to secure sound steel. The simplest and, as a rule, the most satisfactory method for arriving at this result is to eliminate the blowholes by proper manipulation and treatment and then remove (*crop*) and discard the portion containing the pipe. In the case of regular castings an extension is provided to contain the pipe, called the *sinkhead*, which is subsequently machined or broken off.

Special methods may be divided into chemical, mechanical, thermal, and a combination of two or all of these. Blowholes are prevented by the removal of gases either chemically, by the use of *deoxidizers* or *degasifiers*, which may also have some effect in causing the steel to retain a certain amount of gases when cold; mechanically, by applying pressure during solidification which will also serve to eliminate the pipe, also by agitating the steel while molten, thereby assisting the gases to escape. So many different processes and methods have been suggested and tried that only a few can be mentioned here. *Brinell* regulated the number and position of the blowholes and the amount of pipe by means of the manganese and silicon contents. *Allen's agitator*, consisting of two arms fastened to a vertically revolving shaft, was intended to stir up the steel in the ladle to secure thorough incorporation of the additions, but it was also found to disengage a considerable amount of the dissolved gases. *Fluid compression*, also called *liquid* or *plastic compression*, as the name signifies, consists in applying pressure to the ingot during solidification which, to be effective, must be sufficient to expel the gases given off and to follow up the contraction of the metal in cooling so that no pipe or other cavities can form. *Whitworth* casts the steel in a cylindrical mold with vertical walls, a hydraulic plunger then being forced down on the top of the ingot. *Williams* and *Lilienberg* attack the ingot from the side in much the same manner. In *Harmet's process* a tapered ingot is driven upward in a tapered mold. *Centrifugal casting*, consisting in rotating or revolving the molds after pouring, has a somewhat similar effect, but to a less degree, as the pressure is not nearly so great. *Sebenius* pivoted the molds on swinging arms attached to and rotated by a vertical shaft. In *Stridberg's modification* the mold was rotated about its longitudinal axis. Pressure applied by steam or volatile substances within a closed mold have been suggested by *W. R. Jones* and *Bessemer* respectively. *Talbot's method* consists in rolling the ingot before

the centre has completely solidified. Retardation in the cooling of the upper portion of the ingot, as compared with the lower portion, is the principle upon which many processes have been based, with the idea that as soon as any pipe forms it will be filled up with liquid steel. Methods to retard cooling at the top consist in a refractory lining at the upper part of the mold; keeping the mold full by the overflow of steel from one mold to the next (*Sauveur method*); covering the top of the ingot with molten slag, covered in turn with fuel which is kept ignited by a blast of air (*Hadfield method*); having the ingot of greater cross section at the top; heating the top of the ingot by means of an electric arc or the effect of powerful induced currents on the principle of an electric induction furnace (see above); the use of *thermit* (a mixture of powdered aluminium and a metallic oxide whose reaction generates a very high temperature), formerly introduced near the top to keep the metal molten, but more recently near the bottom to secure reduction of any oxides in the steel and to assist the escape of gases by keeping the still molten metal stirred up; increasing the rate of cooling at the bottom by increasing the thickness of that portion of the mold wall, and reducing the thickness at the top, also increasing the cross section of the ingot at the top (*Gathman method*). There are, or may be, various combinations of the above.

COMPARISON OF STEEL

Difference in the quality of steel made by different processes may be due either to the process itself or to the raw materials used and the care with which the process in question is conducted: this latter cause is too frequently overlooked. Where the highest quality is necessary, e.g., for tool steel, the price is sufficient to permit of special selection of the raw materials and of attention to the smallest details. Where, however, as in the case of structural materials, moderate excellence is sufficient, a considerable variation in the choice of raw materials and the general practice is possible. But it should be noted that the proportionate degree of excellence of the respective materials for the purpose intended may be (and usually is) greater in the second case than in the first. As ordinarily conducted, the order of merit is usually considered to be: (1) crucible; (2) electric; (3) open hearth; (4) Bessemer. The two first are generally employed for the production of special material, and the two last chiefly for the great proportion of the tonnage consumed for general purposes.

PHYSICAL PROPERTIES AND THE EFFECT OF VARIOUS ELEMENTS

Iron, either pure or in combination with different elements, is capable of a wider range in physical properties than any other known substance, depending upon the composition and also to a large extent upon its physical condition. (See METALLOGRAPHY.) When chemically pure, in which form it is practically never used owing to the cost, it has a moderate tensile strength of about 40,000 pounds per square inch, with relatively high ductility and good conductivity for electricity and heat. With increasing proportions of other elements, at least to a certain extent, particularly of carbon, its strength and hardness are progressively increased, and its ductility and conductivity decreased. Changes in its properties may also be effected by suitable treatment, either physical or thermal. The usual grades of structural

WORLD'S PRODUCTION OF PIG IRON AND STEEL, 1920 (except where noted)

COUNTRY	METRIC TONS	
	Pig iron	Steel
Austria-Hungary	2,418,322 [5]	1,763,745 [3]
Belgium	1,113,000	333,660 [1]
Canada	989,137	1,126,753
France	3,468,000 [2]	2,961,508
Germany	11,754,542 [2]	13,756,813
Italy	.....	731,823
Japan	377,616 [4]	1,031,550 [4]
Czecho-Slovakia	.....	972,976
Russia	3,000,000 [2]	3,000,000
Spain	303,206 [1]	294,167
Sweden	452,300	426,600
United Kingdom	8,136,827	9,202,614
United States	37,520,495	42,811,274

[1] 1919. [2] 1917. [3] 1918. [4] Estimated. [5] 1916.

steel have a tensile strength of between 50,000 and 70,000, with a carbon content of about 0.12 to 0.30 per cent; machinery steel and forgings, between 60,000 and 90,000, with about 0.25 to 0.55 per cent of carbon. Alloy steels, containing one or more of the elements, nickel, chromium, vanadium, etc., usually also heat-treated, generally show from about 100,000 to 150,000 pounds' tensile strength or over.

Ordinary steels contain up to about 1 per cent of manganese, and in some cases even up to 1.5 per cent, without the resulting decrease in ductility destroying their commercial value. Above this, up to about 7 per cent, the material is rendered excessively brittle. When, however, the content is between about 7 and 15 per cent, a remarkable change occurs, for the metal, while

ANNUAL PRODUCTION OF IRON ORE IN THE UNITED STATES

YEAR	GROSS TONS	
	Lake Superior region	Total
1910	43,442,397	57,014,906
1911	32,793,130	43,976,552
1912	46,483,798	55,150,147
1913	52,518,155	61,980,437
1914	33,629,613	41,439,761
1915	46,994,254	55,526,490
1916	64,734,198	75,167,672
1917	62,498,901	75,288,851
1918	61,156,732	69,658,278
1919	47,177,395	60,466,000
1920	58,527,226	67,773,000

increasing in hardness, may, by rapid cooling, be rendered tough and ductile. Its great hardness, in the sense of resistance to abrasion, is such that grinding must ordinarily be employed when any finishing is required. This material is known as "manganese steel" and is used for pulverizers, rock crushers, etc. In cast iron its effect is to retain the carbon in the combined condition and to permit of a higher percentage in the iron. Phosphorus tends to cause *cold*

shortness (brittleness when cold), and sulphur *red shortness*. This, however, is when these elements are in appreciable amounts, say, over 0.1 to 0.2 per cent, except in certain cases when it may be necessary to keep them much lower. A certain amount of phosphorus is desirable in steel for thin sheets to prevent them from sticking together when rolled in a *pack;* sulphur in combination with manganese, as manganese sulphide, enables steel to be more readily machined, particularly when low in carbon, without injury to its other properties. Silicon increases the strength, and to a certain degree the ductility of steel. The effect of these last three elements upon cast iron has been mentioned in connection with the product of the blast furnace. Oxygen, as oxide of iron dissolved in steel, is injurious except in very small proportions. Nitrogen and hydrogen may be absorbed or occluded to a considerable extent, particularly when the metal is molten. Their effect when cold, if present to any marked degree, is to induce brittleness.

By *alloy* or *special steels* is meant those which owe their properties chiefly to the presence of some element other than, or in addition to, carbon or the usual amounts of manganese. The general effect is considerably increased strength and elasticity, combined with equal or greater ductility than is possible with ordinary or *carbon steels*. So far the greatest application has been for nickel steel containing from 3 to 4 per cent of nickel, particularly for important bridge work. *High-speed* or *self-hardening steel*, discovered by Mushet, owes its peculiarities principally to tungsten, molybdenum, and chromium, usually with a little vanadium, and very recently with cobalt (*cobalt steel*). Its importance is due to its use for machine tools which retain their cutting edge even when heated to a dull red by the friction of the chip which is removed. Other combinations with chromium—chrome-nickel, chrome-nickel-vanadium, etc.—are largely employed in machines, engines, and automobiles, parts subjected to severe stresses and shocks.

PRODUCTION OF PIG IRON IN THE UNITED STATES IN 1921 *

PRODUCTION OF PIG IRON BY GRADES, 1910–1921

YEARS	Basic	Bessemer	Foundry	Malleable	Forge	All other	Total Gross tons
1910	9,084,608	11,245,642	5,260,447	843,123	564,157	305,590	27,303,567
1911	8,520,020	9,409,303	4,468,940	612,533	408,841	229,910	23,649,547
1912	11,417,886	11,664,015	5,073,873	825,643	469,183	276,337	29,726,937
1913	12,536,693	11,590,113	5,220,343	993,736	324,407	300,860	30,966,152
1914	9,670,687	7,859,127	4,533,254	671,771	361,651	235,754	23,332,244
1915	13,093,214	10,523,306	4,843,899	829,921	316,214	309,659	29,916,213
1916	17,684,087	14,422,457	5,553,644	921,486	348,344	504,779	39,434,797
1917	17,671,662	13,714,732	5,328,258	1,015,579	345,707	545,278	38,621,216
1918	18,646,174	13,024,966	5,145,260	1,117,914	393,932	726,398	39,054,644
1919	14,494,131	9,975,934	4,916,758	1,009,049	271,286	348,206	31,015,364
1920	16,737,722	12,062,084	5,957,782	1,310,951	318,048	539,400	36,925,987
1921	7,753,071	5,595,215	2,568,136	457,340	112,748	201,616	16,688,126

* Special Statistical Bulletin No. 1–1922 of the American Iron and Steel Institute, March 2, 1922.

PRODUCTION OF STEEL INGOTS AND CASTINGS BY PROCESSES IN THE UNITED STATES *

YEARS	Open-hearth Basic	Acid	Total	Bessemer	Crucible	Electric	Miscellaneous	Total Gross tons
1910	15,292,329	1,212,180	16,504,509	9,412,772	122,303	52,141	3,194	26,094,919
1913	20,344,626	1,255,305	21,599,931	9,545,706	121,226	30,180	3,831	31,300,874
1914	16,271,129	903,555	17,174,684	6,220,846	89,869	24,009	3,622	23,513,030
1915	22,308,725	1,370,377	23,679,102	8,287,213	113,782	69,412	1,527	32,151,036
1921	15,042,564	507,238	15,549,802	4,015,938	7,613	169,499	945	19,743,797

PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL IN THE UNITED STATES, 1890–1921

YEARS	Iron and steel rails	Plates and sheets	Nail plate	Wire rods	Structural shapes	All other finished rolled products	Total Gross tons
1890	1,885,307	809,981	251,828	457,099	.....	2,618,660	6,022,875
1895	1,306,135	991,459	95,085	791,130	517,920	2,487,845	6,189,574
1900	2,385,682	1,794,528	70,245	846,291	815,161	3,575,536	9,487,443
1905	3,375,929	3,532,230	64,542	1,808,688	1,660,519	6,398,107	16,840,015
1910	3,636,031	4,955,484	45,294	2,241,830	2,266,890	8,475,750	21,621,279
1913	3,502,780	5,751,037	37,503	2,464,807	3,004,972	1,030,144	24,791,243
1914	1,945,095	4,719,246	38,573	2,431,714	2,031,124	7,204,444	18,370,196
1915	2,204,203	6,077,694	31,929	3,095,907	2,437,003	10,546,188	24,392,924
1916	2,854,518	7,453,980	30,088	3,518,746	3,029,964	15,493,093	32,380,389
1917	2,944,161	8,267,616	22,864	3,137,138	3,110,000	15,585,921	33,067,700
1918	2,540,892	8,799,135	18,310	2,562,390	2,849,969	14,385,058	31,155,754
1919	2,203,843	7,372,814	12,832	2,538,476	2,614,036	10,359,543	25,101,544
1920	2,604,116	9,337,680	20,577	3,136,907	3,306,748	13,941,835	32,347,863
1921	2,178,818	4,260,574	14,573	1,564,330	1,272,624	5,483,087	14,774,006

* Special Statistical Bulletin No. 3–1922 of the American Iron and Steel Institute, May 27, 1922.

Production of Iron and Steel. The accompanying tables must be considered in connection with the World War and the political and economic developments and changes resulting. The

destruction of iron and steel plants in France and Belgium and the cession under the treaty of Versailles of valuable iron mines were of course outstanding occurrences. (See VOLUME XXIV.) However, the industrial changes involved in the high prices and large production to be followed by a slump after the war years were no less significant.

ESTIMATED MONTHLY OUTPUT OF PIG IRON AND STEEL IN FIVE COUNTRIES IN 1920, 1919 AND 1913

	PIG IRON		
	1920	1919	1913
United States	3,000,000	2,584,600	2,581,000
Great Britain	645,000	617,000	855,000
Germany	519,000	519,000	1,508,000
France	246,000	289,000	428,000
Belgium	80,800	...	204,000
Total	4,490,800	4,009,600	5,576,000
	STEEL INGOTS AND CASTING		
United States	3,420,000	2,889,270	2,608,000
Great Britain	738,000	658,000	639,000
Germany	632,000	632,000	1,633,000
France	242,600	190,000	385,000
Belgium	97,260	.....	202,300
Total	5,129,860	4,369,270	5,467,300

Considering the above figures it will appear that in 1913 the United States contributed 46.3 per cent of the pig iron output of the five countries; but by 1919 its production had increased to 64.4 per cent and in 1920 had advanced to 66.8 per cent. In Europe the pig iron output had declined since 1913, even Great Britain showing a net loss of about 200,000 tons per month in 1920, not all accounted for by the coal strike. The falling off in the pig iron output of the four European countries by about 1,100,000 tons per month in 1920 and by 1,500,000 tons per month less in 1919 than in 1913 was an outstanding feature which the future years of readjustment would have to take into consideration in some way.

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IRON AND STEEL INSTITUTE, THE. An English association, organized by the iron trade of the north of England, the first meeting taking place in London, Feb. 25, 1869. Its object is the discussion of practical and scientific questions connected with the manufacture of iron and steel. There are two general meetings each year, one in May, in London, and the autumn one in other cities, not always in Great Britain, for the institute has met in Paris, Vienna, Brussels, and New York. Since 1874 it has annually presented the Bessemer gold medal, for some invention or notable paper, and it awards annually research scholarships founded by Andrew Carnegie, who gave $100,000 for this purpose. The Institute publishes the semiannual *Journal of Iron and Steel Industry*, containing original papers and abstracts and reviews

IRONBARK TREE. A name given in Australia to certain species of *Eucalyptus* (q.v.), particularly *Eucalyptus siderophloia*, on account of the extreme hardness of the bark. These trees attain a height of 80 or 100 feet and a circumference near the base of 10 to 12 feet. The timber, which is very valuable for shipbuilding and other purposes in which hardness and durability are required, is rated as one of the strongest of Australian woods; its tensile strength exceeds that of hickory.

IRON CHANCELLOR, THE. A name given to Bismarck.

IRON CHEST, THE. A play by George Colman the Younger (1796), based upon Godwin's novel *Caleb Williams.*

IRON CITY, THE. Pittsburgh, Pa., so called from its iron and steel industries.

IRONCLAD. See SHIP, ARMORED.

IRON CROSS (Ger. *Eisernes Kreuz*). A Prussian military order or decoration first instituted in 1813 by Frederick William III as a reward for distinguished services in war. It consists of a Maltese cross, made of iron, edged with silver, and worn suspended from the neck or at the buttonhole. The superior decoration of the grand cross, a cross of double the size, is reserved for officers of high rank, who have successfully carried out a campaign, won a decisive battle, or conducted a brave defense of a fortress or position. The order was revived during the war with France in 1870–71, and in the Great European War of 1914– , when the Kaiser decorated great numbers of his soldiers. See Plate of ORDERS.

IRON CROWN. The name of the old crown of the Lombards, still preserved in the church of St. John the Baptist at Monza. It is made of six pieces and is adorned with 22 jewels, 26 golden roses, and 24 enamels. On the inside there is a circlet of iron, said to be formed from a nail used at the Crucifixion, brought from Palestine by the Empress Helena, given by Pope Gregory I to the Lombard Princess Theodelinda. Before the twelfth century it was called the golden crown. It was used at the coronation of the Lombard kings, and of the German emperors as kings of Italy. In 1805 Napoleon crowned himself at Milan with it. In 1838 it was worn by the Emperor Ferdinand I. In 1859 it was carried off by the Austrians, but after 1866 restored to Monza. Consult Bombelli, *Storia della corona ferrea* (Florence, 1870), and Thomas Hodgkin, *Italy and her Invaders*, vol. vi (Oxford, 1880).

IRON DUKE. THE. A popular sobriquet for the Duke of Wellington.

IRON GATES (Turk. *Demīr-Kāpu*). A celebrated pass on the lower Danube, near Gladova,

just below the point where the river leaves Hungary, where a spur of the Transylvanian Alps nearly barricades the river. It is the last great defile of the Danube and is about 2 miles in length. In 1890 the demolition of the obstructions to navigation was begun by a Hungarian company, and in the course of 10 years was practically completed. The work necessitated the excavation by blasting of nearly 1,200,000 cubic yards of rock, about half of which was in the river bed. The regulation work has afforded an artificial waterway for vessels, chiefly on the Servian side, through which there is an extremely rapid current.

IRON MASK, The Man in the (Fr. *L'Homme au masque de fer*). The story of this mysterious prisoner confined at Pignerol, in the Bastille, and other French prisons in the reign of Louis XIV has long excited a romantic curiosity in the minds of students of history. The first notice of him in print was given in *Mémoires secrets pour servir à l'histoire de Perse* (Amsterdam, 1745–46), in which the prisoner was identified with the Duke of Vermandois, a natural son of Louis XIV and La Vallière, who had to expiate an offense against his half brother, the Dauphin Louis, with imprisonment for life. This absurd assertion was without foundation; for the Duke of Vermandois died in 1683, whereas the prisoner is known to have died in 1703; but the confidence with which it was made caused a deep sensation, and the romance of Mouhy, *L'Homme au masque de fer*, which immediately followed (Hague, 1746), was read with all the more avidity because it was prohibited by the court. Voltaire, in his *Siècle de Louis XIV* (1751), treated the anecdote historically, but without doing anything to unravel the mystery. The first authentic information with regard to the Man in the Iron Mask, therefore, was given by the Jesuit Griffet, who acted for nine years as confessor in the Bastille, in his *Traité des différentes sortes de preuves qui servent à établir la vérité dans l'histoire* (Liége, 1769). He quoted from the manuscript journal of Du Jonca, the royal lieutenant of the Bastille, according to which Saint-Mars, the Governor of the island of Sainte-Marguerite, in September, 1698, brought with him to the Bastille a prisoner whom he had already had in custody at Pignerol in Piedmont. The prisoner's face was always kept concealed by a mask of black velvet. The journal also mentions his death on Nov. 19, 1703, and that he was buried in the cemetery of Saint-Paul. This is confirmed by the register of burials for the parish of Saint-Paul, where the prisoner is mentioned under the name of Marchiel. These two entries are the bare facts of the case, and upon them have been erected theories and hypotheses without number. Besides the earliest story already mentioned, there have been at least four other explanations as to the identity of the prisoner. Among the minor conjectures are those which connect him with Fouquet, the financial minister of Louis XIV, and with the Duke of Monmouth, the illegitimate son of Charles II of England, to mention only a few of many. An addition to the article on the subject in the *Dictionnaire philosophique* freely states the opinion that the prisoner was a bastard brother of Louis XIV. The writer, who was probably the editor of the work, makes the prisoner an illegitimate son of Anne of Austria. Louis XIV first learned the existence of his brother when he came of age, and put him in confinement to guard against any possible unpleasant consequences. Linguet, in the *Bastille dévoilée*, ascribes his paternity to the Duke of Buckingham. Saint-Michel, in 1790, attempts to connect the prisoner with a supposedly secret marriage between Queen Anne and Cardinal Mazarin. What is remarkable is that the court continued to manifest an interest in the matter and took every means to keep the identity of the prisoner in the dark. When the Bastille fell, the prisoner's room was eagerly searched and also the prison register, but all inquiry was vain. The Abbé Soulave, who published *Mémoires du maréchal Richelieu* (London and Paris, 1790), tried to establish from a document alleged to have been written by the tutor of that unfortunate Prince that the Man in the Iron Mask was a twin brother of Louis XIV, and that, to avoid the calamities of a disputed succession to the throne, Louis XIII had caused the later born of the twins to be brought up in secret. Louis XIV learned of his brother's existence only after the death of Mazarin, and the twin brother, having discovered his relation to the King by means of a portrait, was subjected to perpetual imprisonment. This view of the matter was at one time almost universally prevalent. The first conjecture of what is still held by many to be the truth is contained in a letter dated 1770, written by a Baron d'Heiss to the *Journal Encyclopédique*. The same is repeated by Louis Dutens, who declares in his *Intercepted Correspondence* (1789) that there is no point of history better established than the fact that the prisoner in the iron mask was a minister of the Duke of Mantua. This minister, Count Matthioli, had pledged himself to Louis XIV to urge his master, the Duke, to deliver up to the French the fortress of Casale, which gave access to the whole of Lombardy. Though largely bribed to maintain the French interests, he began to betray them to several countries vitally interested; and Louis XIV, having obtained conclusive proofs of his treachery, contrived to have Matthioli lured to the French frontier, where he was kidnaped April 23, 1679, and conveyed to the fortress of Pignerol, which was his first prison. The conclusions of D'Heiss and Dutens were followed up by Roux-Fazillac, who published a small work on the subject in 1801. This attempt to show that Matthioli was the Man in the Iron Mask, though clever, was not altogether successful; but the documents later discovered and published by M. Delort and M. Marius Topin seemed to leave little doubt on the subject, and the public had apparently made up its mind that the secret was at last discovered, until a still more recent work by a French officer, M. Jung, seemed to show conclusively that Matthioli could not have been the mysterious prisoner, and endeavored to prove that the Man in the Iron Mask was a soldier of fortune of Lorraine, Marechiel by name, who was the head of a widespread and formidable conspiracy, working in secret for the assassination of Louis XIV and some of his ablest ministers. In the course of his researches M. Jung examined some 1700 volumes of dispatches and reports in the bureau of the Ministry of War. According to his story, Marechiel was arrested by order of Louvois in 1673, and after being brought to Paris was sent to Pignerol to be under the care of Saint-Mars, who took him with him to Exilles (1689), Sainte-Marguerite,

and finally to the Bastille (1695), where the prisoner died in 1703. The so-called iron mask, really a velvet one, was burned with his clothes and effects. Lang in his work on the subject followed out this same idea, only his name for the prisoner was Dauger. Up to 1891 Jung's theory was considered satisfactory, but in that year Captain Bazières, of the garrison at Nantes, published a translation of some of Louis XIV's cipher dispatches to Louvois and the Minister's replies. From these it appeared that the mysterious prisoner was General de Bulonde, who was punished, for his mistake or cowardice in raising the siege of Cuneo, by lifelong imprisonment at Pignerol and later in the Bastille. During the last decade, however, there has been a reaction in favor of the Matthioli theory, due chiefly to the efforts of M. Funck-Brentano. Opinions still differ, and there is a tendency in many quarters towards regarding the Man in the Iron Mask as some obscure plotter, probably a valet possessed of a great secret, and therefore held in the strictest confinement. The whole question, however, is one of those mysteries of history that will probably never be satisfactorily solved, though it may be that the secret archives of the Vatican could throw light on the subject.

Bibliography. The literature concerning the Man in the Iron Mask is very large. Up to 1870, 52 works had been written to elucidate the mystery, and since then over 20 more have appeared. The following list, therefore, is merely a selection of the best and most noteworthy contributions to the subject: Roux-Fazillac, *Recherches historiques sur l'homme au masque de fer* (Paris, 1801); Delort, *Histoire du masque de fer* (ib., 1825); Topin, *L'Homme au masque de fer* (ib., 1870); Jung, *La vérité sur le masque de fer, 1664–1703* (ib., 1873); Loiseleur, *Trois énigmes historiques devant la critique moderne* (ib., 1882); Burgaud and Bazières, *Le masque de fer* (ib., 1883); Funck-Brentano, "L'Homme au masque de velours noir dit le masque de fer," in *Revue Historique*, vol. lvi (ib., 1894). The best work to consult in English is Hopkins, *The Man in the Iron Mask* (London, 1901); for the Dauger theory, consult Lang, *The Valet's Tragedy* (ib., 1903).

IRONMASTER, The. A dramatization of Ohnet's *Maître des forges*, by Pinero (1884).

IRON MOUNTAIN. One of the isolated knobs of the St. François Mountains, in St. François Co., Mo. It is 81 miles south of St. Louis, on the Iron Mountain Railroad, and is 1078 feet in elevation above the sea and 200 feet above the adjoining valley. This mountain contains deposits of specular hematite iron ore.

IRON MOUNTAIN. A city and the county seat of Dickinson Co., Mich., 72 miles northwest of Menominee, on the Chicago, Milwaukee, and St. Paul, the Wisconsin and Michigan, and the Chicago and Northwestern railroads, and on the Menominee River (Map: Michigan, B 3). It is noted for large iron-mining interests and contains a Carnegie library. Settled in 1879, Iron Mountain was incorporated in 1888. The government is administered by a mayor, elected annually, and a unicameral council. Pop., 1900, 9242; 1910, 9216.

IRON ORES. See Iron, *Iron Ore*.

IRON PYRITES. See Pyrites.

IRONS. The fetters used for confining prisoners. They consist of handcuffs, or *hand irons*, and *leg irons*, a pair of the latter being connected with light chains of sufficient length to permit the prisoner to walk, taking short steps. Irons are used to confine men for punishment, or for safekeeping when violent (as they frequently are when intoxicated), or when awaiting trial and it is feared they may attempt to escape. The Spanish used to confine their prisoners in *bilboes*, which consisted of shackles around the ankles joined by a bar of iron. In the seventeenth and eighteenth centuries bilboes were used to some extent in the British navy, and the name survived for a long time after the character of the irons had changed. The use of irons for confinement as a punishment has been abolished in the United States navy.

IRONSIDE, Sir. A knight of Arthur's Round Table.

IRONSIDES, Old. A name popularly used of the United States frigate *Constitution*. See Constitution, The.

IRONSMITH. A barbet. See Coppersmith.

IRONTON, ī'ērn-tŭn. A city and the county seat of Lawrence Co., Ohio, on the Ohio River, 134 miles southeast of Cincinnati, on the Norfolk and Western, the Cincinnati, Hamilton and Dayton, and the Detroit, Toledo, and Ironton railroads (Map: Ohio, E 8). The Chesapeake and Ohio Railroad, on the opposite side of the river, maintains a free passenger ferry and a large freight transfer. Ironton is the centre of a region rich in timber, iron ore, bituminous coal, and fire and pottery clay; carries on an important river commerce; and has extensive manufactories of iron (including foundries, machine shops, blast furnaces, rolling mills, wiredrawing and nail works, etc.), cement, lumber, machinery, boilers, stoves, furniture, doors and mantels, and fire brick. The city has a memorial hall, Masonic Temple, Odd Fellows' Hall, Briggs Public Library, fine Federal and Courthouse buildings, and Kingsbury School. The parks are Beechwood, River View, and Lincoln. Settled in 1832, Ironton was incorporated in 1849. The government, under the municipal code of 1902, is vested in a mayor, elected biennially, a unicameral council, and boards of public service and public safety. The city owns and operates its waterworks. Pop., 1900, 11,868; 1910, 13,147; 1914 (U. S. est.), 13,690; 1920, 14,007.

IRONWOOD. A city in Gogebic Co., Mich., about 135 miles (direct) west of Marquette, on the Chicago and Northwestern and the Minneapolis, St. Paul, and Sault Ste. Marie railroads, and on the Montreal River (Map: Michigan, F 2). Iron mining is the principal industry, though lumbering is of considerable importance. Among the more prominent buildings are a fine city hall, the Luther L. Wright High School, and the Carnegie Library. Settled in 1884 and incorporated in 1887, Ironwood is governed under the revised charter of 1893, which provides for a unicameral council and for a mayor, elected annually and controlling, subject to the consent of the council, the appointments of all subordinate officials excepting the school trustees, city clerk, and city treasurer. Pop., 1900, 9705; 1910, 12,821; 1914, 14,147; 1920, 15,739.

IRONWOOD. A name given to various trees with hard, heavy wood. *Metrosideros vera*, a native of Java and other Eastern islands, is much valued by the Chinese and Japanese for making rudders, etc., and is exported in small quantities. The bark is used in Japan as a remedy for diarrhœa and mucous discharges. *Mesua ferrea*, a native of the East

Indies, is planted for its heavy hard wood and for its fragrance and roselike flowers. In Australia the name ironwood is given the timber of *Melaleuca genistifolia, Myrtus gonoclada, Notelæa ligustrina,* and *Olea paniculata.* In the United States it is applied to *Ostrya virginiana, Carpinus caroliniana* (see HORNBEAM), *Eugenia garberi,* and other trees which have tough wood. *Olea laurifolia* and *Sideroxylon inerme,* called ironwood in the south of Africa, are valuable timber trees. The name ironwood is given to *Casuarina equisetifolia* in Australia; to *Parrotia persica* in Persia; to *Mimusops djava* in tropical Africa; to *Ixora ferra* in the West Indies; and to various species of *Citharexylum* in tropical America. See CASUARINA.

IRONY, ī'rō-nĭ (Lat. *ironia,* from Gk. *εἰρωνεία, eirōneia,* dissimulation, irony, from *εἴρων, eirōn,* dissembler, from *εἴρειν, eirein,* to talk). The name given to that peculiar style of thought and expression by which words are gravely made to convey literally a meaning quite other than that actually intended. When skillfully used, there is no more fatal literary weapon of destruction. Such an instrument it was in the hands of Swift, when, e.g., he proposed to the poor people of Ireland, apparently in all seriousness, that they should rid themselves of poverty by selling their children to the rich, who should eat them. Irony united with a kindlier feeling is one of the charms of Thackeray's style. There is also the irony of fate, or of events, where the issue is otherwise than might with reason or justice be expected. See RHETORIC, FIGURES OF.

IROQUOIAN (ĭr'ō-kwoi'an) **STOCK.** One of the most important linguistic stocks of the American Indians, formerly inhabiting a large part of the present Ontario, New York, Ohio, and Pennsylvania, with portions of eastern Virginia and North Carolina and the whole of the southern Alleghany region. The stock name is derived from that of the Iroquois (q.v.), or confederated Five Nations of New York—the Mohawk, Oneida, Onondaga, Cayuga, and Seneca. Other important tribes were the Wyandot (or Huron), Neutral Nation, Erie, Conestoga, Nottoway, Meherrin, Tuscarora, and Cherokee. See IROQUOIS; CHEROKEE; WYANDOT.

IROQUOIS, ĭr'ō-kwoi'. A confederacy of five tribes of Iroquoian stock—Mohawk, Oneida, Onondaga, Cayuga, and Seneca—to which the Tuscarora were afterward added. They called themselves by names signifying respectively "we of the long house" and "real people." The term *Iroquois* is of French origin, being possibly compounded from two ceremonial words of frequent occurrence in their councils, with the addition of the French suffix *ois.* Another theory makes it an Algonquian derivative. Their Algonquian neighbors knew them as *Mengwe* or *Nadowa,* about equivalent to "alien" or "enemy," while by the English they were designated as the Five, or Six, Nations.

The people found by Cartier in 1535 occupying the shores of the St. Lawrence River from the present Quebec to Montreal were of Iroquoian stock, as proved by linguistic evidence, and appear to have been, in part at least, the ancestors of the later Iroquois. These tribes were dispossessed shortly afterward by the more powerful Algonquian tribes, some, like the Hurons, taking refuge farther to the west, while others, including the Iroquois, retired to the south. Shortly after this withdrawal—probably about the middle of the sixteenth century—the tribes known later as the Five Nations were persuaded by the counsel of their traditional legislator, Hiawatha, to form a league or confederacy upon such a well-ordered plan that it has endured for more than three centuries and exists to-day as their ruling government, in spite of all the changes brought about by the advent of the white man. The five tribes at this time occupied central and western New York, where they were found in 1609 by Champlain, who, by joining forces with their Algonquian enemies, brought down upon the French the lasting vengeance of the Iroquois League, which was one of the main factors in the ultimate loss of Canada.

By the formation of the league, in which each tribe represented a state government, with a central federal council of 50 chiefs sitting at Onondaga, the Iroquois were enabled to withstand the inroads of the hostile Algonquian tribes, and even to assume the offensive. On the establishment of the French missions among the Hurons (see WYANDOT), about the year 1630, the Iroquois, who in the meantime had been supplied with firearms by the Dutch on the Hudson, began war upon their kinsmen in Canada with such effect that in a few years those of the Hurons who had not been slaughtered or carried into captivity were forced to abandon their country and fly hundreds of miles to the west. The same fate soon after befell the cognate Neutral Nation and the Erie, as well as the Ottawa and others of Algonquian race, resulting in almost complete ruin to the French missions in Canada. The destroyers then turned upon the Conestoga and others in the south, the Mohican and others east of the Hudson, and the Miami and Illinois in the west, until by the year 1700 they claimed and were conceded a paramount influence and dictation from Hudson Bay to the Cherokee frontier of Carolina, and from the Connecticut almost or quite to the Mississippi, the only tribes able to make successful opposition being the Ojibwa in the northwest and the Cherokee in the south. From the beginning of the Colonial period they held the balance of power between France and England in the north, and were courted alike by both, but remained steadfast to the English interest. The few exceptions were chiefly in the case of the Mohawk and Cayuga, who yielded to the influence of the French Jesuit missionaries, by whom they were finally drawn off from the territory of the league and settled in the mission villages of Caughnawaga and St. Regis. About the year 1715 the cognate Tuscarora, who had been driven out from North Carolina in a war with the settlers, removed to New York, where they were assigned lands by the Iroquois and admitted as the sixth nation of the league.

At the outbreak of the Revolution in 1775 the league council declared for neutrality, while allowing each of the six component tribes to take sides as it thought fit. The great majority of the Iroquois sided against the Americans, only the Oneida and a part of the Tuscarora refusing. The Mohawk and Cayuga followed their great chief, Brant, in a body to Canada. At the close of the struggle these, with other Iroquois who had supported the English cause, were settled by the Canadian government on a reservation on Grand River, Ontario, where most of them still remain, others being at Quinte Bay, Thames River, and Gibson, in the same province.

The Catholic Iroquois are at Caughnawaga, St. Regis, and Lake of Two Mountains, in Quebec Province, but are no longer affiliated with the league. Those of Caughnawaga constitute the largest single Indian settlement north of Mexico. In addition to the Catholic St. Regis Iroquois in Canada, about as many more are on the New York side of the line, the reservation having been cut in two when the boundary was finally established by survey. The Iroquois in the United States are all on reservations in New York, excepting the Oneida, most of whom removed to Wisconsin about 1820, and a mixed band of so-called Seneca in Oklahoma.

The political importance of the Iroquois, although due in part to their geographic situation and early acquirement of firearms, was in great measure the result of their superior system of organization and of their individual force of character. The same traits have enabled them to hold their own in the midst of an alien surrounding. Prominent features of their system were the council of matrons, the elaborate clan structure, and the wholesale adoption of captives, who, if spared, were admitted to full tribal rights, instead of being reduced to semi-slavery, as among some other tribes. The best single source of information upon the confederacy is probably L. H. Morgan, *League of the Hodé-no-sau-nee or Iroquois* (Rochester, 1851; new ed., New York, 1904). Dialectically all the Iroquoian tribes closely resemble each other.

The Iroquois had a highly developed woodland culture (see INDIANS), being noted for their fields of corn, pumpkins, tobacco, to which they later added orchards of apple and peach. They built long bark-covered houses, the various families of a clan residing in compartments along the sides. This was the famous "long house," the symbol of the league, or government. They made fine black pottery, splint baskets, and fine mats of corn husk. The wampum belt was used by them for public records. They maintained many secret societies, known in literature as "false-face societies," because the members wore curious carved wooden masks representing various deities. Consult: C. Colden, *History of the Five Indian Nations of Canada which are Dependent on Province of New York* (2 vols., New York, 1904); W. M. Beauchamp, *Civil, Religious, and Mourning Councils and Ceremonies of Adoption of New York Indians* (Albany, 1907); H. C. Converse, *Myths and Legends of New York State Iroquois* (ib., 1908). The New York State Museum has large collections representing the aboriginal life of the Iroquois and has published many important monographs on them in which may be found detailed information.

The present number of the Iroquois, including those of the Catholic mission colonies which have cast off all allegiance to the ancient league, is considerably above 17,000, distributed as follows: Ontario, Canada, Iroquois and Algonquins of Gibson, 139 (perhaps one-half being Iroquois); Mohawks of the Bay of Quinte, 1271; Oneidas of the Thames, 770; Six Nations on the Grand River, 4195. Quebec, Canada, Iroquois of Caughnawaga, 2074; Iroquois of St. Regis, 1426; Iroquois and Algonquins of Lake of Two Mountains, 393 (perhaps one-half being Iroquois). In the United States—New York reservations, 4918; Wisconsin (Oneida), 2107; Oklahoma (Seneca), 215. See IROQUOIAN STOCK.

IROQUOIS, or MATILDA. A port of entry of Dundas Co., Ontario, Canada, 43 miles southeast of Ottawa, on the left bank of the St. Lawrence and on the Grand Trunk Railway (Map: Ontario, J 4). It commands the entrance to the Iroquois Canal. Pop., 1901, 1097; 1911, 849.

IRRA'DIA'TION. In optics, the apparent enlargement of a white or strongly illuminated object when seen against a dark ground. Helmholtz attributes the phenomenon to want of perfect accommodation in the eye, whereby diffusion images are formed about the true image of the bright object and, encroaching upon the surrounding dark region, extend the borders of the image. See VISION.

IRRA'TIONAL NUMBER. Any number that cannot be expressed as the quotient of two integers. A fraction or quotient of two integers may be expressed in the form of either a terminating or a nonterminating decimal, the latter always containing a repetend. (See DECIMAL SYSTEM.) Thus, $\frac{8}{5}$ equals 1.6, a terminating decimal; $\frac{2}{3}$ equals 0.6666 . . . . , a nonterminating decimal. In either case the decimal may be transformed again into the common fractional form by the formulas of series (q.v.). But when the process of evolution is applied to integers and the results are expressed decimally, there is often produced a decimal form that is nonterminating, contains no repetend, and cannot be expressed as the quotient of two integers. For example, the surd $\sqrt{2}$ equals a number (1.4142 . . . .) containing a nonterminating and nonrepeating decimal, and cannot be expressed as the quotient of two integers. While, however, evolution thus often results in an irrational number, it is not every irrational number that can be expressed in the form of a surd. This may be plainly seen in the case of π, the ratio of the circumference to the diameter of a circle. The value of this irrational number to five decimal places is 3.14159 . . . . See CIRCLE.

Certain operations with irrational numbers were performed by the ancients. The Pythagoreans proved the irrationality of the square roots of 3, 5, 7, ... 17. The arithmetic part of Euclid's *Elements* contains a geometric treatment of the subject. Archimedes approximated the value of a great number of surds, stating, e.g., that $1351/780 > \sqrt{3} > 265/153$; but the method by which he arrived at his results is unknown. In the Middle Ages Fibonacci, and still later Stifel and Rudolff, devoted much attention to irrationals. But not until very recent times has a purely arithmetic theory of surds been produced, through the researches of Weierstrass, Dedekind, G. Cantor, and Heine, whose efforts were inspired by a desire to fortify the bases of analytic mathematics. No adequate explanation of these methods can be given here. That of Weierstrass starts with a consideration of the formation of different kinds of number through arithmetical operations. Dedekind arranges positive and negative, integral and fractional numbers in order of magnitude, and observes that any rational number, as a, divides the system into two classes, C_1 and C_2, such that every number in C_1 is less than every number in C_2, and a is either the greatest number in C_1 or the least in C_2. These rational numbers are then represented by points on a straight line. But there are still an infinite number of points on the line for which there are no corresponding rational numbers. He then shows that to every one of these points corresponds a unique irra-

tional number. Cantor and Heine introduce irrational number through the concept of a fundamental series. Following is an example of the series method. The surd $\sqrt{2}$ lying between 1.4142 and 1.4143 may be expressed thus:

$$\frac{14}{10}+\frac{1}{100}+\frac{4}{1000}+\frac{2}{10000}<\sqrt{2}<\frac{14}{10}+\frac{1}{100}+\frac{4}{1000}+\frac{3}{10000},$$

or, more generally,

$$\frac{N_1}{10}+\frac{N_2}{10^2}+\frac{N_3}{10^3}+\cdots\frac{N_p}{10^p}<\sqrt{2}<\frac{N_1}{10}+\frac{N_2}{10^2}+\frac{N_3}{10^3}+\cdots\frac{N_{p+1}}{10^p}.$$

Now, as p becomes indefinitely great, $\sqrt{2}$ evidently becomes the common limit of the two series, and may therefore be defined by them. Expressing the sum of the series on the left by P/Q, and that on the right by $(P+1)/Q$, the square root of 2 may be expressed by the relation $P/Q<\sqrt{2}<(P+1)/Q$. Similarly, any irrational number I may be expressed by the relation $P/Q<I<(P+1)/Q$, where P and Q are derived from the corresponding series.

Bibliography. Consult: Dedekind, *Essays on Number*, translated by Beman (Chicago, 1901); Dirichlet, *Vorlesungen über Zahlentheorie* (Brunswick, 1879); Stolz, *Vorlesungen über allgemeine Arithmetik* (2 vols., Leipzig, 1885–86).

IRRAWADDY, ĭr'â-wä'dĭ, or **IRAWADI.** The principal river of Burma (Map: Burma, C 3). It rises on the extreme northeast border, near Mount Daphabum, a peak of the Namkiu Mountains, and flows southward with a tortuous course over 1500 miles, till it enters the Bay of Bengal through a large delta between the cities of Rangoon and Bassein. The scenery along its banks is extremely varied; the lower valley, especially the delta, is occupied by wide and level rice fields; farther up there are undulating, fertile, and thickly populated agricultural districts, broken here and there by large forests, and in three places the river breaks through mountain ranges in narrow and rocky defiles. The third or uppermost of these, which is 140 miles above Bhamo and 1168 miles from the sea, is the head of navigation for boats and small steamers. Below this the river is wide and deep, and the current not too swift, even for sailboats. Steamers ply regularly to Bhamo, and the river is an important artery of commerce for the interior of Burma, though it has now been supplemented by a railroad running parallel with its valley from Rangoon to Bhamo, crossing the river at Mandalay. For 100 miles from the sea extensive embankments have been built to protect the low delta plain from inundations. The river rises in March and reaches its maximum height in September. During November and December it is at its lowest stage and considerably blocked by sand deposits. For a description of the river and the country on its banks, consult Mowbray, "A Sail Down on the Irrawaddy," in the *Scottish Geographical Magazine*, vol. xvii (Edinburgh, 1901).

IR'REDEN'TISM (from *irredentist*, It. *irredentista*, from *Italia irredenta* (unredeemed Italy), *irredenta* being from Lat. *in-*, not + *redemptus*, p.p. of *redimere*, to redeem, from *red-*, back again + *emere*, to buy, take). A popular movement which originated in Italy after 1878, having for its object the recovery of what its adherents call "unredeemed Italy," *Italia irredenta*, meaning all that territory at present belonging to Austria, Switzerland, France, or England having an Italian-speaking population, but no longer forming part of Italy. Under this description would come southern Tirol, Triest, Görz, Istria, and Dalmatia, the Swiss Canton of Ticino, Corsica, Nice, and Malta. To all but the most exalted patriots the chimerical nature of the Irredentist programme is apparent, inasmuch as its execution would involve the surrender by Switzerland of territory it has held for more than 300 years, by Austria of its only seaport, Triest, and by England of its great base in the central Mediterranean, Malta. Besides, Italian is not the universal language in Tirol, Görz, or Istria. Malta has a dialect of its own, and Dalmatia is completely Slavic. Irredentism has ceased to be an influential factor save with the younger element in Italian politics. Whatever force Irredentism has is directed against Austria in order to recover Triest, but the movement received a severe setback in the formation of the Triple Alliance embracing Austria. Irredentism was revived by the Great European War which began in 1914. The failure of Italy to aid Germany and Austria was hailed with great jubilation, and the government was forced to call out the troops to quell anti-Austrian demonstrations. See POLITICAL PARTIES, *Italy*.

IR'REDU'CIBLE CASE. See CUBIC EQUATION.

IRREF'RAGABLE DOCTOR. See ALEXANDER OF HALES.

IRREG'ULARITY. In plants, a term used in connection with the descriptions of flowers. Flowers are regular in which all the members in each set are alike, and, conversely, irregularity means that all the members in a given set are not alike. In practice, regularity and irregularity have to do chiefly with the petals. There are many kinds of irregularity, but the three principal types are characteristic of the three great divisions of angiosperms. Among the Archichlamydeæ the Leguminosæ represent the most important region of irregularity, which is of the papilionaceous (butterfly) type, as in sweet pea. Among the Sympetalæ the characteristic irregularity is the bilabiate (two-lipped) type, as in the mints. Among the monocotyledons the chief region of irregularity is in the orchids, in which one of the petals usually develops a more or less elongated spur and a projecting lip.

IRREG'ULARS (ML. *irregularis*, not according to rule, from Lat. *in-*, not + *regularis*, relating to rule, from *regula*, rule, from *regere*, to rule). A military term generally applied to partisan and to guerrilla troops assisting the regular establishment. They are, as a rule, only partially trained and equipped, as, e.g., the Francs-tireurs (q.v.) in 1871; some of the Cossack (see COSSACKS) regiments of Russia; the Bashi-Bazouks (q.v.) of Turkey; and the armies of the feudatory chiefs and rulers of India. See ARMIES; GUERRILLAS.

IR'RIGA'TION (Lat. *irrigatio*, from *irrigare*, to irrigate, from *in*, in + *rigare*, to moisten; connected with Goth. *rign*, AS. *regn*, OHG. *regan*, Ger. *Regen*, Eng. *rain*, and probably with Gk. *βρέχειν*, *brechein*, to wet). In agriculture, the process of increasing the growth of crops by an artificial application of water.

The practice of irrigation is very ancient. There is evidence to show that works for the storage and distribution of irrigation water were constructed in Egypt as early as 2000 B.C. Extensive works, intended for irrigation on a large scale, existed in times of remote antiquity also in Assyria, Mesopotamia, Persia, India, Ceylon, China, and other parts of the East, as well as in Peru, Mexico, and the southwestern United States (New Mexico and Arizona) in the Western Hemisphere. In all these regions irrigation is necessary for successful agriculture, because the rainfall is insufficient for the needs of ordinary crops. Irrigation is also required even in humid regions for crops, such as rice and cranberries, which require a large amount of water, and is of advantage in growing truck and fruit crops, which are susceptible to injury by short droughts.

The area of the earth's surface over which the annual rainfall is deficient (less than 20 inches or 500 millimeters), and irrigation consequently generally practiced, is very extensive. In addition to this vast area in which irrigation is common, there are considerable areas in the so-called humid regions in which the irregularity of the rainfall makes irrigation profitable. The extent to which the arid lands can be reclaimed depends upon the water supply available for irrigation. It has been estimated that there is sufficient water to irrigate only about one-tenth of the arid region of the United States, or from 75,000,000 to 100,000,000 acres. Of this irrigable area probably not more than 15,000,000 acres have already been reclaimed. In Europe irrigation prevails chiefly in the south, where it was introduced by the Romans. It is most extensively and systematically practiced in Lombardy and Piedmont, in Italy, in Spain, and the south of France, but exists to some extent in other parts of Europe. Wilson estimates the irrigated area in Italy to be about 4,700,000 acres, in Spain 2,800,000 acres, in France 400,000 acres. Nowhere else is irrigation practiced on so large a scale as in India, and the irrigation systems of that country are being rapidly extended by the British government. According to a commission appointed by the British government, the irrigated area in India is about 40,000,000 acres. Considerable areas in Turkestan have been irrigated for many years, and the Russian government is now undertaking large extensions. The Turkish government is building works to irrigate the valleys of the Tigris and Euphrates and restore them to their ancient prosperity. China has large irrigated areas, and the Chinese government in 1914 appointed a commission of foreign engineers to study its irrigation conditions and recommend policies for the future. Egypt has an irrigated area of about 6,000,000 acres, although irrigation works now in process of construction will increase this area to some extent, and plans for further extension on the Blue Nile and the White Nile are being prepared. Only at a comparatively recent date has irrigation been introduced into Australia, but it is rapidly extending there. The same is true in a measure of South Africa and South America. The practice of irrigation has declined or entirely disappeared in many of those regions where it prevailed most extensively in remote antiquity, but the ancient works are being restored and new ones built in Mesopotamia. See INDIA.

Water Supply for Irrigation. Water for irrigation is derived from (1) natural streams, springs and lakes; (2) wells; (3) storage of storm waters. In some places, particularly in Europe, the sewage water of cities is used for irrigating purposes. The United States Census of 1910 showed that in that country 94 per cent of the land irrigated was supplied with water from streams. It is probable that fully as large a percentage of the land irrigated throughout the world is supplied from the same source.

In torrential streams with sandy bottoms, diversion dams are usually made of brush, rocks, and sand, and are expected to be washed out in almost every flood and to be replaced when the flood has passed. In streams where better foundations can be secured more permanent dams of wood, masonry, or concrete are built. (See DAMS and RESERVOIRS.) These are for the purpose of holding back the water and directing it into the canals which are to convey it to the place of use.

At the heads of most canals there are more or less elaborate works for shutting out the water which is not needed or belongs to others. In new countries these sometimes consist of mere piles of rock which are increased or diminished as it is desired to get more or less water into the canals, but usually there are structures with openings for the passage of water, which are controlled by gates which can be opened to admit water to the canals and closed to shut it out. In the early days of irrigation in the United States most of these structures were of wood with vertical wooden gates which slid in grooves. As these decay or are destroyed they are being replaced by concrete and steel structures, and most of the newer works are of this type. In other countries masonry and concrete are more generally used than in the United States.

Most canals are excavated in the natural earth and are unlined, but in rough and rolling country water is carried through hills in tunnels, along steep hillsides and across valleys in timber, metal, and concrete flumes, and through deep valleys in pipes which go down one side and up the other, commonly called inverted siphons. Much water is lost from canals by seepage into the sides and bottoms, and many canals are lined with a thin coating of cement plaster to prevent losses by seepage.

Water is turned from the main canals to branch canals which carry it to the land to be irrigated, to which it is delivered by still smaller branches. The structures and gates for controlling the flow of water into the branch canals are much like those at the heads of the main canals, except that they are on a smaller scale.

With few exceptions streams which are used for irrigation are subject to annual floods which are followed by long periods of low water. It is therefore necessary, if all the water is to be utilized, to store the surplus water during flood periods for use during the low-water periods. This requires the building of reservoirs (see DAMS AND RESERVOIRS) in which to store the surplus waters. These are sometimes formed in the channels of streams by building dams in the places where large basins will be filled by the water held back, and are sometimes in natural depressions outside the stream channels filled through feed canals from the streams. The Census of 1910 showed nearly 7000 reservoirs in the United States with an aggregate

capacity of 12,600,000 acre feet. Among the famous reservoirs in the world are the one formed in the valley of the Nile by the building of the Assuan Dam, the Roosevelt Reservoir in the Salt River in Arizona, and the Pathfinder Reservoir in the North Platte River in Wyoming. Much water is stored by raising the outlets of lakes on the headwaters of rivers. This water is retained when not needed for irrigation and turned into streams when they are low.

In many countries small reservoirs, away from stream channels, are built to store storm waters. This practice is very common in India, where a considerable part of the land irrigated is supplied from such reservoirs, commonly called tanks. About 100,000 acres were watered from such reservoirs in the United States in 1910.

In the United States wells rank next to streams as a source of water supply for irrigation, serving about 350,000 acres in 1910. About one-third of the acreage was supplied by flowing wells and two-thirds by pumped wells. The larger part of this acreage lies in California and New Mexico. Since flowing wells occur only under peculiar geological conditions, it is not probable that they will ever be a very important source of water for irrigation. Ground water which can be pumped is, however, of very general occurrence and will be increasingly important as the supply which can be cheaply diverted from streams is exhausted. Springs are an unimportant source of supply, as they are not of very general occurrence and the flow is usually small.

In addition to the water pumped from wells, much is pumped from streams. This is particularly true of the rice-growing districts of Louisiana and Texas in the United States. Practically all of the water used for rice irrigation in the States named and in Arkansas is pumped, and along the Gulf coast most of it is pumped from the rivers and bayous which drain that section. In the rice districts most of the pumping is done with large steam plants burning crude oil, which operate large centrifugal and rotary pumps. In other sections, where individual farmers have their own pumping plants, gasoline engines are in very general use. In California electrical power, generated by water power, is much used for irrigation. Both centrifugal and deep-well pumps are used with the gasoline engines and electric motors. In Egypt many of the canals which carry water from the Nile are below the land to be irrigated, and the water is lifted from the canals to the lands by crude devices which have been in use for centuries, and also by the most modern motors and pumps.

Except where natural drainage is measurably good, long-continued irrigation has a tendency to raise the ground-water level to such an extent as to injure the land, and drainage becomes necessary. This is now being provided in many cases when the irrigation system is constructed. See DRAINAGE.

Types of Conduits. Main canals and conduits are often the most expensive part of irrigation works, owing to their length and the difficulties encountered in their construction. The cheapest and simplest conduit is a ditch, heading in the source of supply and departing just sufficiently from the natural contour of the country to insure a flow of water. In the early days of irrigation such ditches were little more than single furrows, or channels no larger than might be formed by a plow, leading a short distance from the banks of a stream. To-day

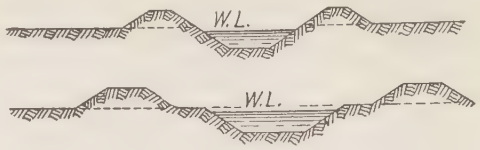

FIG. 1. EARTH CANAL UNLINED.

there are thousands of miles of irrigation ditches or canals large enough for small boats, while in India and Italy it is quite common to build combined irrigation and navigation canals, thus

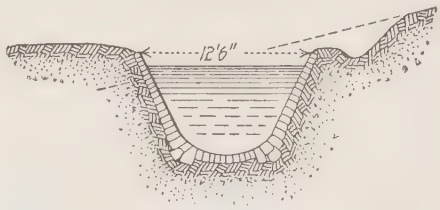

FIG. 2. CANAL IN EARTH LINED WITH MASONRY.

affording a ready outlet for the products of the irrigated area and inlets for supplies. In rolling or hilly country canals may have to follow circuitous routes to maintain their level, thus

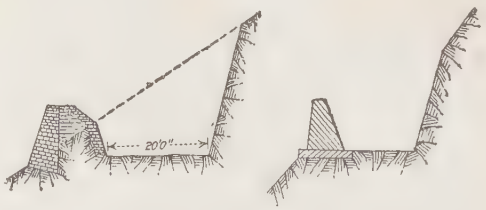

FIG. 3. CANALS ON ROCK SLOPE WITH RETAINING WALLS.

adding greatly to their length. It may be cheaper or, when a stream or valley is encountered, even necessary to continue the line of the canal, changing the construction to an ele-

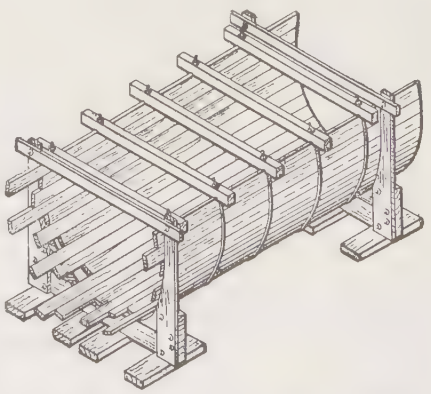

FIG. 4. SEMICYLINDRICAL WOOD-STAVE FLUME.

vated flume or else substituting a pipe or inverted siphon, laid on or in the ground.

Seepage should be guarded against. To this end lining with stone laid in mortar or with con-

crete or with cement mortar may be employed. A great advantage in linings, if reasonably smooth, is that they increase the carrying capacity of the canals by lessening the friction, and

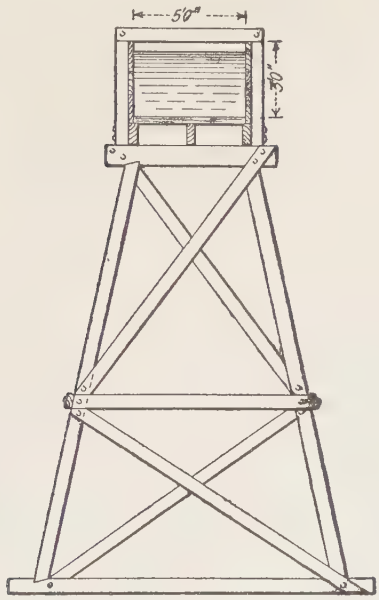

FIG. 5. WOOD IRRIGATION FLUME ON TRESTLE.

aid in maintaining it by lessening the sedimentary deposits and plant growths on their sides and bottoms. Sometimes leakage may be diminished by throwing powdered clay into the water at the head of the canal. The sedimentary matter naturally carried by the water will often reduce the leakage in a few months or years.

Flumes are most commonly built of wood,

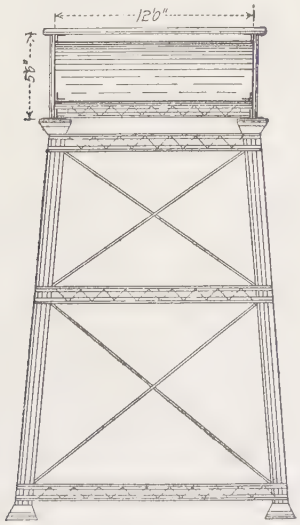

FIG. 6. STEEL IRRIGATION FLUME ON TRESTLE.

with a rectangular cross section, but in recent years steel has been employed, particularly in steep rocky locations or where the flume crosses streams or deep ravines. The ordinary flumes of boards or plank are subject to leakage. To avoid this, and also to give a channel better adapted to the flow of water, wooden staves are sometimes being employed, formed into a semicircular or other shape designed to give a curved bottom. The staves are held in place by steel rods or bands, so arranged that they can be tightened by turning nuts. The steel flumes are made of thin plates riveted together. Galvanized iron flumes are also quite common in the United States. Flumes may rest on mudsills or timbers placed on the ground, but, being generally designed to cross depressions, they are more frequently supported on trestles. The trestles, like the flumes, are generally of wood, but they are sometimes of steel, particularly where the flume proper is of that material or where the flume support must be in spans, as at a stream crossing. In the most recently built projects in the United States and in many older

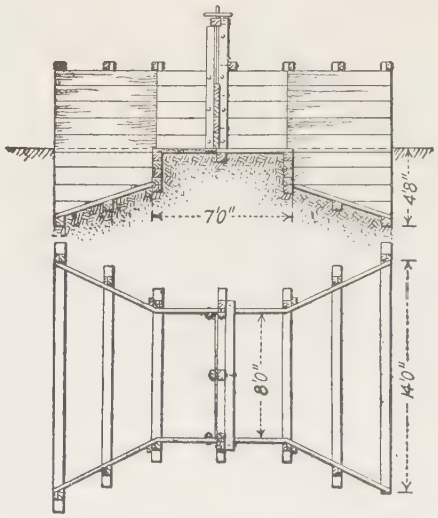

FIG. 7. HEAD GATE FOR SMALL IRRIGATION CANAL.

projects in other countries masonry and concrete flumes are quite common.

When, instead of valleys or streams, hills are encountered, necessitating long detours for canals, tunnels are often employed. They do not differ materially from other tunnels. If lining is necessary, as in earth, or to reduce the friction when in rock, it may be of brick, concrete, or stone, and resembles that for masonry aqueducts in tunnels. See TUNNEL; AQUEDUCT.

Headworks of some kind are required for nearly all canals, flumes, or pipe lines. In America they are generally of timber or concrete, but in much of the foreign work they are more commonly permanent structures of stone. The essential features are a bulkhead, gates, and wasteway. Where there is a dam at the head of the canal, the headworks may be at one end of it or form a part of it.

Pipes may be substituted for canals or flumes, either to convey water across depressions or under streams, as already mentioned, or to prevent losses from both evaporation and seepage. Either riveted steel or wood staves are the materials most commonly used for such pipes, being preferable to cast iron on account of their relative lightness and consequent ease of transportation in rough country remote from

railways. Where the water is under little or no pressure, either vitrified clay or cement pipes are sometimes used, particularly in southern California, and reënforced concrete pipes are used where the pressure is greater.

Works for Final Distribution consist chiefly of open or closed channels, generally the former, leading from the main or branch canal or other conduit to the land to be irrigated. For the most part small ditches are employed, with permanent or movable gates, or temporary earth dams, to divert the water to or from the minor channels.

Except as modified by the topography, the application of water to land is chiefly a detail of agriculture rather than engineering, depending on the crop and the soil and also the ideas of the cultivator. Subsurface irrigation is generally considered impracticable because of the difficulties experienced in securing a thorough spreading of the water, besides which the pipes may clog and the construction prove expensive. Surface application, therefore, is almost universally employed. Broadly speaking, the latter is effected either by flooding the whole surface or sending the water through furrows. Neither involves much engineering skill, but it is best to have the main channels located with the aid of a level, particularly where the areas are large or have an irregular surface. Where pipe systems are employed for final distribution, thin wrought iron or steel, vitrified pipe, or plain and reënforced concrete may be used, and hydrants must be provided for drawing out the water.

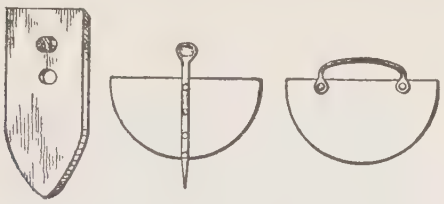

FIG. 8. TAPPOONS (WOOD AND METAL) FOR USE IN IRRIGATION.

The distribution of water by means of underground pipes, standpipes, and hose is, however, too expensive for irrigation on a large scale.

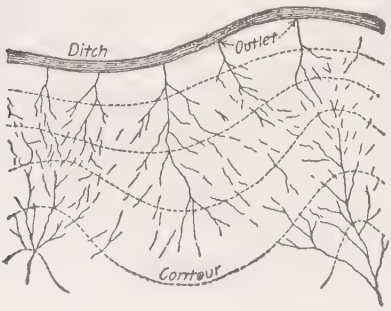

FIG. 9. IRRIGATION BY FLOODING.

The open ditch, which takes the water out of the larger canal or reservoir to the land to be irrigated, is made to follow the contour of the land, so that the flow is moderate and uniform and the water can be readily distributed to lateral ditches or flumes at any desired point. The simplest method of turning water from a ditch is to cut a hole in the side and to use earth to make a dam in the ditch. An improvement on this method is the use of portable cloth, wood, or metal dams or tappoons. The water is spread over the land by a variety of methods, which belong, as a rule, in three main classes:

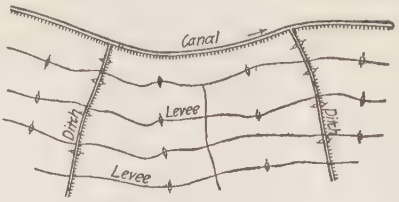

FIG. 10. CHECKWORK IRRIGATION.

(1) flooding, (2) furrow irrigation, and (3) subirrigation.

Wickson describes the following methods practiced in the western United States: 1. Free flooding or running water on the land without restraint, except that of the banks of the lateral conveying it. In this method the ditches or laterals are carried along the higher parts of the field and the water is released by spade cuts at intervals in the banks, or it is made to overflow the banks by means of dams, as described above. This is the oldest and simplest method of irrigation. It is best suited to small grains and forage plants which are sown broadcast, and is most effective with nearly level ditches and on land of uniform grade. On account of the labor involved and the difficulty of securing uniform irrigation, this method has been superseded in many places by one of the check systems. 2. Flooding in contour checks or irregular areas of land inclosed by low embankments, the size and shape of these areas being determined by the inequalities of the surface. This method is best adapted to land of very gentle slope. Its first cost is considerable, but it permits more effective irrigation with less labor than free flooding. In

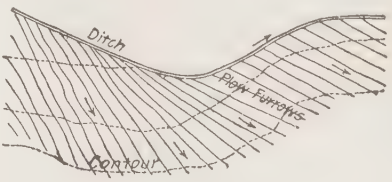

FIG. 11. FURROW IRRIGATION.

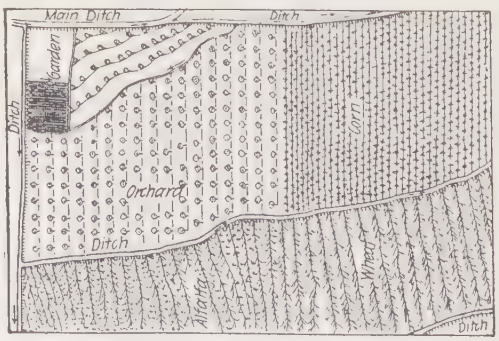

FIG. 12. PLAN OF IRRIGATED FARM.

this method the highest check is filled from the ditch or lateral, and the water is either allowed to overflow into the next lower check or is drawn off into it by means of gates provided for the purpose. 3. Flooding in rectangular checks or level areas of approximately the same size inclosed by low embankments. This method is little used except for orchard, vineyard, garden, and rice irrigation, being largely superseded for other purposes by the contour check method. Unless the land is quite level, its preparation for the method involves the shifting of a large amount of earth, and the levees of irregular heights which are required interfere with the use of power machinery in cultivating. 4. Flooding by the border method, in which fields are divided into long strips by low parallel embankments between which water is made to flow over the fields. 5. Depressed bed method, in which the ditches are carried on the tops of the levees and the water is allowed to soak out into the checks inclosed by the levees. This is a garden modification of the rectangular check system and is used in the growing of vegetables and small fruits. It is best suited to porous soils, which require frequent irrigation. A primitive form of this method is ridge irrigation, in which plants are grown on the sides or at the base of raised ditches. 6. Furrow irrigation, or running water in furrows between the rows of crops, is the simplest, cheapest, and most widely used method of irrigating crops which can be grown to advantage in rows and is adapted to a wide range of slope and soil conditions. If the slope is not too great to carry a small stream without excessive washing, the rows are run straight down the grade from the supply ditch or flume, which occupies the crest of the highest ground; otherwise the rows are run diagonally at the angle giving the proper grade. The length of furrow that can be used depends upon the character of the soil and the head of the water. The more porous the soil, the larger should be the stream or the shorter the furrow. For most field and garden crops a larger stream and a shorter run are used than for fruit trees. Laterals or supply ditches are usually taken across the slopes of the land at intervals of about 25 rods. The laterals should be as nearly level as possible, so that they can be kept full and will discharge uniform amounts of water through the openings into the furrows. 7. The corrugation method lies midway between the furrow and flooding methods. After the land is seeded small and shallow furrows or corrugations are made with a marker. These serve as guides to the water, making it wet the field uniformly and preventing the wetting of the surface, which tends to make some soils puddle and bake. 8. Raised-bed irrigation, in which a raised bed is surrounded by a small ditch from which the water passes into the soil by seepage and capillary action, is a modification of the furrow system, especially suited to rather heavy, retentive soils in which water moves readily. 9. Subirrigation, or distribution by means of underground pipes with suitable outlets, or from tile drains or blind ditches, from which the water can rise to the roots of plants by capillarity. The method is expensive and of doubtful practicability, except on a limited scale in greenhouse and other horticultural work. A similar method, known as underflow irrigation, consists in opening furrows at considerable distances apart and keeping them filled with water until the ground water rises so that it can reach the roots of plants by capillarity. The method is little used. 10. Distribution by means of underground pipes, standpipes, and connections for sprinkling is a method which is considered too expensive for use on a large scale.

The choice of a method must be determined by the amount of water available, the slope and nature of the land, the character of the crop, etc.

According to Wickson a method, to be of value, must secure the following results: "(1) distribution of moisture evenly throughout the soil mass to as great a depth as possible, providing it does not sink beyond the reach of the plant by root extension nor beyond recovery by capillary rise; (2) economy of labor both in aggregate time and in the feasibility of operating without employment of extra hands; (3) economy of water in the prevention of waste by overflow or evaporation or by rapid percolation and in placing the water where it will do the most good; (4) leaving the land in the best condition for attaining with least labor a state of tilth which conserves moisture and at the same time favors thrift in the plant." Crops sown broadcast can be irrigated only by flooding, corrugations, or sprinkling. The contour check, border, and furrow method require least labor. The furrow methods are best suited to subsequent cultivation by horse power, which is a matter of great importance, since thorough cultivation, to overcome the compacting tendency of irrigation and to secure a soil mulch, should in all cases follow as soon after irrigation as the condition of the soil will permit. Deep and thorough preparation of the soil increases its storage capacity for water, and frequent cultivation of the surface reduces loss from evaporation, thus reducing materially the amount of irrigation required and enabling the soil to utilize to the best advantage whatever rainfall may occur.

Duty of Water in Irrigation. The relation between the quantity of water used and the acreage irrigated, expressed either in acreage irrigated per unit of volume of water or in quantity of water per unit area of land, is commonly called the duty of water. When the rate of flow is given, the duty is usually expressed in acres irrigated per cubic foot per second, and when the quantity of water is given, the duty is usually expressed in acre feet used per acre irrigated, which represents the depth in feet to which the water used would cover the land if it were all held on the surface, since the acre foot is the quantity of water required to cover one acre to a depth of one foot.

The duty of water is sometimes confused with what is more properly called the water requirements of crops, i.e., the quantity of water actually consumed by plants in the processes of growth. It is not possible to grow crops under arid conditions without supplying water far in excess of the quantity actually consumed by the plants, and duty is an expression of the quantity which must be supplied and includes losses by evaporation from the soil, by percolation beyond the reach of plant roots, and by surface run-off, as well as moisture retained in the soil.

The water requirement of the crop grown is the minimum or ideal duty, towards which careful irrigators work by cutting down all losses so far as practicable. Many experiments have been made to determine the water requirements of various crops; but the more results become available, the more conclusively it is shown

that there is no fixed relation between quantity of water and quantity of crop, but that this relation varies with the fertility and moisture content of the soil, the character of the season, and many other conditions. It is evident that when to the variations in the actual moisture requirements of crops there are added the variations in the practically unavoidable losses by evaporation, seepage, and run-off, due to differing soils, subsoils, and climatic conditions, no definite quantitative statements can be made as to the duty of water.

Duty of water measurements have sometimes been divided into those showing gross duty, net duty, and duty for different crops. Gross duty has been applied to results showing the relation between the total amount of water entering a canal system and the acreage served by the system; net duty to the relation between the water delivered to a single farm and the acreage of that farm; while the duty for different crops represents the water applied to individual fields of those crops. The reports of the United States Census for 1910 give returns from something over 800 canal systems, supplying water to 2,500,000 acres of land, which show an average area of 62 acres served per cubic foot per second of average discharge for the season. This agrees almost exactly with general estimates for the arid region of the United States made by well-informed persons. The same report gives returns from nearly 1,000,000 acres for which the quantity of water diverted per acre irrigated was reported, which show an average of 4.8 acre feet per acre, or sufficient water to cover the land irrigated to a depth of 4.8 feet. The average length of the irrigating season for the United States is five months, and during a season of five months one cubic foot per second will supply almost exactly 4.8 acre feet per acre to an area of 62 acres. The United States Reclamation Service reports having delivered 3.5 acre feet per acre in 1910 and 3.7 acre feet per acre in 1911. The average for the two years, 3.6 acre feet, with an allowance of 25 per cent for losses by seepage, would indicate a diversion of 4.8 acre feet per acre. The exact agreement of these figures indicates that the figure given represents correctly the gross duty of water in the United States under present practice. This is a general average, the items varying from 1.5 acre feet per acre or less in places where the land is devoted principally to grain, to 8 or 10 acre feet per acre where the growing season is long and alfalfa is the principal crop. Expressed in acres irrigated per cubic foot per second, the items vary from 50 acres for general crops in northern latitudes to 500 or 600 acres for citrus fruits in southern California.

As already stated, the United States Reclamation Service reports having delivered an average of 3.6 acre feet per acre during the season of 1910 and 1911. The United States Department of Agriculture reported in 1908 measurements from 24 farms scattered throughout the United States, showing an average net duty of 3.34 acre feet per acre. The average of these two quantities, or 3.5 acre feet per acre, is probably representative of common practice in the United States. Very few measurements from other countries are available, but these measurements are probably typical.

In sections where water is scarce and crops are of high enough value to justify large expenditures to prevent losses, many of the losses of water have been eliminated and the duty of water is high. In sections where water is plentiful, or where only crops of low value can be grown, the cost of preventing losses is too high to be met and the duty remains low.

The water necessary to be supplied to different crops has been the subject of much study and experiment in the United States. Experiments have shown that the quantity of water supplied affects not only the quantity of crop produced, but the chemical composition as well as the relative weights of stalks and seed.

There is a very general agreement in the results of experiments showing that, within reasonable limits, the larger the quantity of water supplied, the larger the yield of crop per acre. There is, however, as a rule, a very rapid decrease in the yield of crop per unit of water used as the quantity of water is increased. If, therefore, land is scarce and water is plentiful and inexpensive, it may pay to use much larger quantities than can be used profitably when water is scarce or expensive. On the other hand, where land is plentiful and cheap and water is scarce, it is more profitable to use smaller quantities of water per acre and spread the available water over larger areas. Widtsoe gives the following figures to illustrate this point for Utah conditions:

CROP PRODUCED WITH 30 ACRE INCHES OF WATER USED ON DIFFERENT AREAS

CROP	30 ACRE INCHES SPREAD OVER								
	One acre 30 inches deep	Two acres 15 inches deep		Three acres 10 inches deep		Four acres 7.5 inches deep		Six acres 5 inches deep	
		Total yield	Yield per acre	Total yield	Yield per acre	Total yield	Yield per acre	Total yield	Yield per acre
Wheat, grain (bus.)	47.51	91.42	45.71	130.59	43.53	166.16	41.54	226.86	37.81
Corn, grain (bus.)	97.12	187.86	93.93	268.56	89.52	316.56	79.14	....	....
Timothy, hay (lbs.)	6,054.00	7,688.00	3,844.00	11,739.00	3,913.00	11,928.00	2,982.00	....	....
Alfalfa, hay (lbs.)	8,840.00	15,093.00	7,546.50	29,653.00	9,884.33	.....	.....	.....	.....
Sugar beets (tons)	20.82	38.90	19.45	55.89	18.63	64.84	16.21	82.68	13.78
Potatoes (bus.)	195.00	373.00	186.50	456.00	152.00	544.00	136.00	691.00	115.16

Whether a given quantity of water will produce the largest net return when used on a greater or less acreage will depend in each case on the relative availability of land and water, the cost of land, the cost of water, and the cost of the growing crops aside from the cost of water.

The system of water rights, or of charging for water used, has a large influence on the quantity of water used per acre. The theory of American

water law is that the water user is entitled to as much water as he can use beneficially on his land, but that he may not dispose of any water which he cannot use on his own land. Under such a system the whole tendency is for a farmer to use as much water as he can, without injury to his land, since the more water used, the larger return. If he were allowed a fixed quantity of water which he might use on much or little land as he chose, the tendency would be towards the spreading of the water supply over the greatest possible area. Where water is disposed of under contracts, the usual practice is for the company supplying water to agree to furnish sufficient water for land for which rights are purchased for a given sum per acre. Within the limits of the quantity which the farmer can use beneficially, his water costs just the same whether he uses much or little or even if he uses none. From his standpoint it will pay him to put on water until the cost of applying it equals the increased return due to the increased quantity of water used. Here also a system under which the farmer would pay according to the quantity of water used would reverse the tendency and lead to the spreading of the water over the largest possible area. Existing laws and customs are all against an economical use of water. Since, the world over, the acreage which can be irrigated is limited by the water supply, this becomes a serious matter.

Amount and Frequency of Irrigation. The conditions that must be taken into consideration in determining the amount of water to be applied are: (1) the storage capacity of the soil, (2) the depth to which the roots of the particular crop penetrate, (3) the rate at which water will rise from the soil below the root zone, (4) the dryness of the soil and the subsoil, and (5) the water requirements of the crop grown. The frequency of irrigation will be determined by: (1) the amount of available moisture which the soil can store, (2) the rate at which moisture is lost by transpiration through the plant and by evaporation from the soil, (3) the degree of dryness of the soil which the plant will tolerate without injury, and (4) the stage of plant growth. Where the soil is deep and mellow, the roots of plants extend to a great depth and over a wide area. Thus, having a wider field from which to draw supplies of moisture and plant food, the actual percentage of moisture in the soil may be smaller without detriment to the plant than if the root feeding were more restricted. Again, compact, clayey soils hold moisture so tenaciously that plants growing on them begin to suffer for moisture, even when the soil contains a percentage of water which in case of less tenacious, sandy soil would be abundant for the plants' needs. The aim in irrigating should be to apply simply enough water to meet the needs of the plant without loss in the drainage. It is well to bear in mind, in attempting to accomplish this desired result, that plants vary in their water requirements at different stages of growth. Three to five irrigations seem to be about the average for wheat. With maize the number of irrigations needed varies from 3 in Italy to 15 in Egypt, but 5 to 7 irrigations appear to be about the average. It is usual to give only one irrigation for each crop of clovers and alfalfa. Water meadows are irrigated as often as the water supply will permit. The practice with potatoes is to give 2 to 4 irrigations, according to the slope and texture of the soil, beginning when the plants have nearly or quite reached the blossoming stage. In actual practice the intervals between irrigations of fruit trees and vineyards vary from 7 to 40 days. According to Wickson, fruits in California receive 2 inches of water per month during May to August, on retentive soils, and 3 inches during the same period on coarse soils. In rice culture the land is kept flooded the greater portion of the time during the growth of the crop. According to Maxwell, it is a common practice in Hawaii to apply 200 to 250 acre inches of water to sugar during a growing period of 18 to 20 months, although experiments have shown that 100 acre inches is ample.

Division and Measurement of Water. Successful irrigation is very largely dependent upon the judgment of the irrigator, and this in case

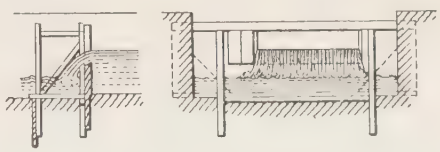

FIG. 13. MEASURING WEIR.

of an expert is probably as reliable as measurements, in our present knowledge of the duty of water. Measurements, however, are necessary when many irrigators draw their water supply from the same source. In this case various methods of division and measurements are used. When the supply is small and the whole of it

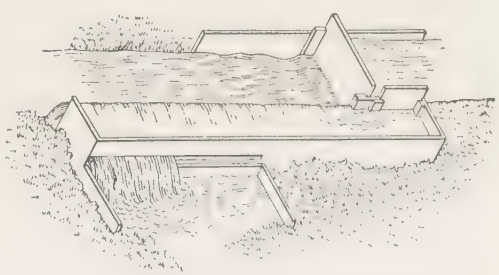

FIG. 14. FOOTE'S MEASURING WEIR AND SPILL BOX.

can be used by each irrigator to advantage, water is often distributed on the time basis, allowing each user to have the whole stream a length of time proportionate to the amount of water to which he is entitled. By this method there is a rotation in the use of water. When the supply is too large to be used by a single

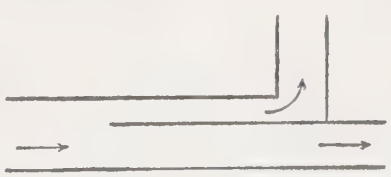

FIG. 15. DIVISION BOX.

individual, various devices, called divisors, are used to apportion to each user the proportion of water to which he is entitled, or modules, measuring weirs, and spill boxes are employed to measure to each irrigator a definite quantity

of water. This division and measurement of water for irrigation is controlled by law. The right or privilege of using water from a canal, ditch, or stream in definite quantity or upon a prescribed area of land is termed a water right, and such right or privilege is usually acquired either by priority of use or by purchase. In an arid region, where so much depends upon the supply of water, a water right is a very valuable property. See HYDROGRAPHY; WATER SUPPLY.

Quality of Irrigation Water. The character of the water available for irrigation purposes is a matter of great importance. All natural waters carry more or less organic and mineral matter in suspension or solution and thus furnish, in addition to the water so necessary for the growth of plants, a certain amount of fertilizing matter. Waters carrying a large amount of soluble matter should, however, be used with caution, since they may cause the accumulation of alkali in the soil in injurious amounts. Of the waters available for irrigation, sewage is most valuable on account of the fertilizing matter carried to the land. Sewage irrigation is practiced with success in Great Britain and on the continent of Europe, notably on the Craigenlinny meadows, near Edinburgh; at Gennevilliers, near Paris; in the vicinity of Berlin; at Milan, Italy; and also at a number of places in the United States.

Laws and Institutions. As the water supply for irrigation comes largely from streams which serve also for domestic supply, power development, and navigation, the use of water for irrigation has always been subject to more or less public control and consequently the subject of legislation. The matter has been dealt with on three distinct legal theories. Under the Roman, or civil, law the water of streams is held to belong to the state or the crown, and rights to its use are required by grant; under the English, or common, law the right to use the water of streams attaches to the ownership of lands abutting on the stream; and under American legislation and judicial decisions in the arid States the water of streams belongs to the public, and its use is controlled by the States under their police power. In India, where more land is irrigated than in any other country, the use of water is controlled by the state.

Each of the arid States of the United States, except Arizona, California, Colorado, Montana, and Washington, has enacted laws under which a person wishing to acquire a right to water for irrigation must apply to the State for such right, and must submit to the State proof of having complied with the conditions prescribed by the State. In these States and in Colorado diversion from streams is controlled by State officials, the water being distributed in accordance with rights acquired under the State laws. In Arizona, California, Montana, and Washington rights are acquired by posting and filing notices of what is claimed, building works to convey the water to the place of use, and actually putting the water to use. Rights so acquired are protected by the courts.

In the United States about two-fifths of the land irrigated is supplied by works built and controlled by individual farmers or a few neighbors without formal organization. The most common form of organization for controlling the larger enterprises is the stock company, the stock of which is owned by the water users. In 1910 such companies supplied water to about one-third of the acreage irrigated. A small part of the land is watered by works controlled by irrigation districts, which are public corporations having power to issue bonds to obtain funds for construction or purchase of works and to levy and collect taxes to pay off their bonds and cover interest and operation and maintenance charges. In 1894 the Federal Congress passed what is known as the Carey Act, under which the Federal government granted to each of the States containing arid land 1,000,000 acres of such land on condition that the State provide for its irrigation. A small area of land has been reclaimed under this law. In 1902 Congress passed the Reclamation Act, under which works are built directly by the Federal government with the proceeds from the sale of public lands. The law requires that the water users shall repay to the government the cost of construction, after which the works are to be turned over to the water users. The repayments are to be used for building other works, thus constituting a revolving fund. At the end of the first 10 years of operation about 3,000,000 acres were included in projects being built under this law, and about 500,000 acres were being irrigated. Works built under both the Carey Act and the Reclamation Act are to be turned over to the water users, and consequently it can be stated that in the United States nearly all of the irrigation enterprises are controlled by the water users or will be so when completed.

In India the larger irrigation works are built and controlled by the British government, which gets its returns principally by taxation of the crops grown. Approximately one-half of the land irrigated is supplied by works built and controlled by the native states or by individuals and communities. In Egypt the works are built and controlled by the government, which gets its returns there, as in India, by taxation of the crops grown. In Australia most of the works are built by the states, which levy charges for water used. In Italy some canals are controlled by the national government, some by the provinces, some by local associations, and still others by individuals. The national and provincial governments contribute to the cost of works built by local associations. Brazil has a similar scheme of aiding local agencies in the construction of irrigation works. Mexico has created a bank for aiding in the financing of irrigation enterprises, which are built by private corporations under government concessions.

The largest irrigation enterprises in Canada are owned by the Canadian Pacific Railway Company, and one of their most important projects is southeast of Calgary in the Province of Alberta. This irrigation area is on the North or Red Deer River slope of the divide, and the total irrigable area is, in round figures, some 440,000 acres. There is involved a canal system with various flumes, conduits, ditches, and laterals, with a total mileage of canals and ditches in excess of 3000. This is the largest irrigation project of the American continent and exceeded by few outside of India. The most important engineering feature of this work is the Bassano Dam, a composite structure, consisting of an earth embankment 7000 feet long with a maximum height of 35 feet, combined with an Ambursen hollow reënforced-concrete dam 750 feet between abutments and 39 feet high to the crest. There are 24 openings,

each 27 feet long, with Stoney gates 11 feet high and a reënforced-concrete headwork at right angles to the dam proper, and five 20-foot openings, each of which is closed by Stoney gates 14 feet high. This dam was designed to pass 100,000 second feet of water with 14 feet on the crest.

Irrigation in Humid Climates. Supplemental irrigation to carry crops through periods of drought has been found profitable in many cases in humid regions, especially on light, well-drained soils and with crops of high value. To what extent the practice may be extended with advantage has not been definitely determined. The rainfall of such regions is a disturbing factor. If a heavy rain occurs soon after a thorough irrigation, more serious damage may be done by excess of water than would have resulted from drought, especially if the soil be compact and poorly drained. Irrigation should therefore be attempted in such regions only on soils provided with thorough natural or artificial drainage.

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See AQUEDUCT; CANAL; CONSERVATION; DAMS AND RESERVOIRS; FLUME; HYDROGRAPHY; PUMPS AND PUMPING MACHINERY; SEWAGE DISPOSAL; TUNNEL; WATER METER; WATER SUPPLY.

IR'RITABIL'ITY (Lat. *irritabilitas*, from *irritabilis*, irritable, from *irritare*, to irritate). The state or condition of the protoplasm of plants when it responds to a change in external influences or the adjacent protoplasm. The change which initiates the response is called a stimulus. When the nature of the stimulus is unknown, automatism is predicated rather than irritability. Temporarily the protoplasm may lose the power of responding to a stimulus, but when this is permanently lost the protoplasm is dead. Temporary loss of irritability may be occasioned by prolonged or repeated stimulation, in which case the loss is said to be due to fatigue; or by unfavorable conditions, such as deficient moisture, low or high temperature, lack of oxygen, anæsthetics, etc. Under such conditions the protoplasm is said to be in a state of rigor.

The agents affecting plants are extremely numerous and varied. The light changes both in intensity and direction from hour to hour; the temperature fluctuates; the moisture in air and soil is seldom the same for two consecutive days. The nature of the stimulus does not directly determine the character of the response, but this is conditioned by the mechanism which the stimulus sets in action. As there is unlikeness between stimulus and reaction, so there is disproportion between them in the energy involved. Although the stimulus stands to the reaction apparently in the relation of cause to effect, it only initiates a series of changes, in the course of which the energy liberated by increased respiratory activity produces, through the appropriate mechanism, the result observed. The stimulus is only a releasing cause, and, were the energy not provided by respiration, no reaction would occur. The only apparent exception to this is seen when a stimulus inhibits the action of an organ whose normal function requires the expenditure of energy. Here the release of energy seems to be prevented. In the absence of exact knowledge as to how this is accomplished, it may be assumed that it is by counteraction rather than by suppression.

Not all portions of the plants are equally sensitive to a given stimulus. Indeed, in many cases the sensitive regions are sharply localized and very limited. It has been shown, e.g., that sensitiveness of a root to the stimulus of gravity resides mainly in the terminal 1.5 to 2.5 millimeters. In other parts the whole growing region may be sensitive. When the sensitive region is sharply localized, it may be coincident with the region in which the response is perceived, or it may be separated from it by a considerable distance. In the latter case a propagation of the stimulus must occur. There are in plants no definite structures correspond-

ing to the nerves of animals, but the conduction is mainly through living active parenchyma cells or along such living cells as the sieve tubes or companion cells. Setting in action the mechanism of perception, the propagation of the stimulus, and the execution of the final response consume time. In some plants the final response follows in a fraction of a second after the stimulus is received, as in the sensitive plant. In most cases, however, the end reaction is separated in time from the initiation of stimulation by seconds, minutes, or even hours. This interval is known as the reaction time. When it is sufficiently long, a stimulus may be applied during a portion of the reaction time and then discontinued. After the usual interval, however, the reaction will still occur, although no stimulus is then operating. Such effects, the results of previously acting stimuli, are known as "after effects." The time during which any stimulus must act in order to call forth a response is the presentation time.

The reaction to a stimulus may consist in a growth or turgor movement, in a change in rate, or in a general change in the course of development of the organ. Further, the reaction may be either direct or induced. Induced reactions are such as will not occur in response to the stimulus acting unless some other stimulus first brings about a change; after which reaction to the first stimulus becomes possible. Thus, a plant may not respond to stimulation by gravity unless it is first stimulated by light. It is difficult, therefore, to disentangle the effects of different stimuli without extreme care in experimentation. Every living cell of the plant is in reality an irritable structure. Since movement is the most easily observed reaction, the mistake has been made of considering motor organs as being specially irritable regions. Thus, tendrils, the leaves of the sensitive plant, the peculiar motile leaves of the Venus's flytrap, the tentacles of the leaves of *Drosera*, the contractile filaments of many anthers, etc., are looked upon as sensitive organs par excellence. In reality, however, many of these are far inferior in sensitiveness to structures whose reactions are less evident. See BIOLOGY.

IR'RITANCY (from *irritant*, from Lat. *irritare*, to render void, from *irritus*, *inritus*, invalid, from *in-*, not + *ratus*, decided, p.p. of *reri*, to think). In Scottish law, the forfeiture of an estate as the result of a breach of condition, express or implied, or the happening of an event upon which the termination of the estate is made to depend. The irritant or fatal condition, or proviso, may be an incident of the estate granted, as the duty annexed to a feudal freehold, or it may be the result of an express provision, known as an irritant clause, contained in the deed creating the estate affected by it. See CONDITION; FORFEITURE.

IR'RITANT (from Lat. *irritare*, to irritate, annoy). An agent that causes increased circulation, pain, increased function, or muscular contraction, when applied to an animal tissue. Among the irritants are many vegetable and the mineral acids, strong alkalies, bichloride of mercury, nitrate of silver, mustard, croton oil, turpentine, etc. The term has been sometimes vaguely applied to medicines which produce irritation of nerves in distant parts when taken internally, as instanced in the action of strychnine upon the spinal cord. Heat is a mechanical or kinetic irritant. Light is also an irritant to the retina and in diseases of the eye is often a powerful one. Electricity is an irritant when applied in certain forms. See COUNTERIRRITANTS.

IRTYSH, ĭr-tĭsh'. An affluent of the Obi, and fourth in importance among the rivers of Siberia (Map: Asia, J 3). It rises in the southwest range of the Altai Mountains in China, frequently called here the Urungu, whence it flows in a northwest direction through Lake Zaisan-Nor, past the city of Tobolsk, until it reaches the Obi, after a course of 2633 miles. Its chief affluents are the Bukhtarma, the Om, and the Tara from the right; and the Ishim, the Tobol, and the Konda from the left. The basin of the Irtysh, comprising the governments of Tomsk, Tobolsk, Perm, and Orenburg, the territories of Akmolinsk, Turgay, and Semipalatinsk, and some Chinese territory, covers the immense area of 638,000 square miles. The Irtysh is ice-free about 200 days in the year and is navigable for nearly 2000 miles. The principal ports are Semipalatinsk, Pavlodar, Omsk, Tara, and Tobolsk.

IRUN, ē-rōōn'. A frontier town of Spain, in the Province of Guipúzcoa, situated on the Bidassoa River, here forming the French boundary, 5 miles from its mouth in the Bay of Biscay. It is a military station and a first-class port of entry. It contains an interesting old church, restored in 1508, and has manufactures of leather, tiles, and bricks. It is also the centre of a flourishing mining and agricultural district and the terminus of a number of electric and steam railroads. Pop., 1910, 10,629.

IRVINE, ĕr'vĭn. A royal, municipal, and police borough and a seaport in Ayrshire, Scotland, on the Irvine, a mile above its mouth, in the Firth of Clyde, 29 miles southwest of Glasgow (Map: Scotland, D 4). It has a good town hall, an academy, and a fever hospital; also the ruins of two Norman castles. Shipbuilding, iron founding, and the manufacture of machinery, soap, chemicals, book muslins, jaconets, and checks are the chief branches of industry. Duntonknoll Quarry yields a stone largely used for the making of bakers' ovens. Neighboring coal mines yield the principal article of export. Since 1875, when its harbor was dredged, it has gradually regained its lost shipping. The principal features of the town are the municipal building, a fine bridge, and the academy, an educational institution of high repute. The town owns its water works. Mentioned in 1184, Irvine is described as a chartered burgh in the reign of Robert Bruce. Pop., 1901, 9618; 1911, 10,180.

IRVINE, WILLIAM (1741–1804). An American soldier. He was born in Ireland, graduated at Dublin University, and was surgeon on an English warship during the Seven Years' War, at the close of which (1763) he emigrated to America and settled at Carlisle, Pa. In 1774 he was a member of the Provincial Convention, and in January, 1776, was appointed colonel of the Sixth Pennsylvania Regiment. At the battle of Three Rivers, in June, 1776, he was made prisoner and, though soon paroled, was not exchanged until May, 1778. He became a brigadier general May 12, 1779, serving with Lord Stirling on his expedition against Staten Island, and with General Wayne at Bulls Ferry in July, 1780. In 1782–83 he had command at Fort Pitt of the troops for the defense of the western frontier, and in 1785 acted as agent of his State for the distribution of the public

lands among the soldiers. During his term of office he recommended the purchase of the "triangle" tract, which gave Pennsylvania her outlet on Lake Erie. He was elected to Congress in 1786 and was made one of a commission of three to adjust the accounts of the Confederation with the various States. He also was a member of the convention called to revise the State constitution, and of that by which the Federal Constitution was ratified for Pennsylvania. From 1793 to 1795 he was again a member of Congress, and in 1794, during the Whisky Insurrection (q.v.), commanded the Pennsylvania militia. He subsequently removed to Philadelphia and at the time of his death was president of the Pennsylvania branch of the Society of the Cincinnati.

IRVING, ēr'vĭng, Edward (1792–1834). An eloquent and distinguished Scottish clergyman. He was born at Annan, Dumfriesshire, Aug. 4, 1792. He studied at the University of Edinburgh and, after completing his curriculum for the ministry in 1809, became a school-teacher at Haddington and later at Kirkcaldy. At the former place one of his pupils was Jane Welsh, and at the latter began his friendship with her future husband, Thomas Carlyle. He was licensed as a preacher in 1815, but his early attempts at preaching were not successful. In 1819 he became assistant to Dr. Thomas Chalmers in Glasgow. Here he felt himself overshadowed by his more famous colleague, and in 1822 he accepted a call to the Caledonian Church, Hatton Garden, London. His success as a preacher in the metropolis was unparalleled. In brief time he transformed a poor and obscure congregation into a rich and fashionable one and exchanged the humble chapel for a handsome structure on Regent Square. In 1823 he published his first important work, *The Oracles of God: Four Orations, with an Argument on Judgment to Come.* At the close of 1825 he began to announce his convictions in regard to the second personal advent of Christ, which he declared to be near at hand. This was followed by his translation of a Spanish work, *The Coming of the Messiah in Glory and Majesty,* which professed to be written by a Christian Jew, Juan Josafat Ben Ezra, but was in reality the composition of a Spanish Jesuit, Manuel Lacunza. In 1828 appeared his *Homilies on the Sacraments.* He now began to elaborate his views of the incarnation of Christ, asserting the doctrine of His oneness with man in all the attributes of humanity. The language which he used on this subject drew upon him the accusation of heresy, to which he gave little heed. He was deep in the study of the prophecies; and when the news came to London in the early part of 1830 of certain extraordinary manifestations of prophetic power in the west of Scotland, Irving was prepared to believe them. In 1831 he published *An Exposition of the Book of Revelation.* Irving was arraigned before the presbytery of London in 1830 and convicted of heresy, ejected from his new church in Regent Square in 1832, and finally deposed in 1833 by the presbytery of Annan, which had licensed him. The majority of his congregation adhered to him, and gradually a new phase of Christian order and worship was developed, commonly known as Irvingism, though Irving had really very little to do with its development. (See Catholic Apostolic Church.) Shortly after, his health failed, and, in obedience, as he believed, to the Spirit of God, he went to Scotland, where he sank a victim to consumption. He died at Glasgow, Dec. 7, 1834. Irving's works were published in London (5 vols., 1864–65). Consult: M. O. W. Oliphant, *Life of Edward Irving* (2 vols., London, 1862); J. W. Carlyle, *Letters and Memorials* (2 vols., New York, 1903); Thomas Carlyle, *Critical and Miscellaneous Essays* (3 vols., ib., 1903).

IRVING, Sir Henry (1838–1905). A distinguished English actor and manager. He was born at Keinton Mandeville, Somersetshire, Feb. 6, 1838, his name being originally John Brodribb; his stage name of Irving was legalized by royal license in 1887. He was carefully educated at a private school and then placed in a commercial situation, but he early began preparing himself for a dramatic career, and made his first appearance on the professional stage at Sunderland in 1856, as Gaston, Duke of Orléans, in *Richelieu.* After playing in Edinburgh, Glasgow, Manchester, and elsewhere, not without meeting frequent discouragements, he appeared in 1866 at the St. James's Theatre in London. He soon became noted as an interpreter of light comedy parts, and more especially as the "heavy villain" in such rôles as Robert Macaire and Bill Sikes. But his first great success was as Digby Grant in the comedy of *Two Roses* (1870), which he performed at the Vaudeville Theatre for 300 consecutive nights. In November, 1871, he was engaged by the Lyceum Theatre and increased his reputation by his appearance in *The Bells,* as Mathias (1871), in *Eugene Aram* (1873), *Richelieu* (1873), and *Hamlet* (1874). The peculiarities of his style in *Hamlet* excited great difference of opinion among the critics, which continued over his rendering of *Macbeth* (1875) and *Othello* (1876, and again with Edwin Booth in 1881), but the importance of his position constantly increased. His *Richard III* (1877) and his *Louis XI* (1878) attracted great admiration. In 1876 he made a tour through Scotland, Ireland, and the provinces. The withdrawal of Mrs. Bateman from the management of the Lyceum gave Irving, in 1878, entire control over the theatre in which he had long been the leading attraction; he secured Miss Ellen Terry, and together they inaugurated a series of brilliant performances which continued, with brief interruptions, till 1903. Irving as a manager was famous for the carefully elaborate stage setting of his productions, while as an actor he was distinguished for the psychological force of his characterizations. His theatre became in all its appointments and in the class of the plays produced there the most admirable of London playhouses, though its financial success left something to be desired. In 1899 the Lyceum passed into the hands of a limited liability company, though still under Irving's direction. In the long list of rôles which he assumed after his management began were Shylock (1879); Benedick, in *Much Ado about Nothing* (1882); Mephistopheles, in *Faust* (1885), which proved one of the most popular of his presentations, though critically less admired; Becket (1893), in Lord Tennyson's drama, which he rearranged for the stage; and Robespierre (1899), in the play written for him by Sardou.

He first came to the United States, with Miss Terry and the other members of his company, in 1883, when he made his New York début as Mathias, in *The Bells.* The welcome which he

won on this first visit was frequently repeated, and he reproduced in the United States most of his London successes. Irving was knighted in 1895, the first actor who ever received this honor. Among his publications is *The Drama: Addresses* (London, 1892). The Irving Edition of Shakespeare (ed. by Henry Irving and F. A. Marshall) appeared in 1887–90 (London).

Irving's marriage in 1869 to Miss Florence O'Callaghan gave him two sons, Henry Brodribb Irving and Lawrence Irving (qq.v.).

Irving died suddenly in October, 1905, at Bradford, England, after a performance of *Becket* in which he had shown unusual power. His body was placed in Westminster Abbey beside the ashes of Garrick and under the shadow of the Shakespeare statue.

Bibliography. William Archer, *Henry Irving, Actor and Manager* (London, 1883); Arnold Daly, *Henry Irving in England and America, 1838–84* (ib., 1884); Hatton, *Henry Irving's Impressions of America* (ib., 1884); Scott, *The Drama of Yesterday and To-Day* (ib., 1899); P. H. Fitzgerald, *Sir Henry Irving: A Biography* (New York, 1906); H. Macfall, *Sir Henry Irving* (ib., 1906); B. Stoker, *Personal Reminiscences of Henry Irving* (ib., 1906); A. Brereton, *Life of Henry Irving* (2 vols., ib., 1908); W. H. Pollock, *Impressions of Henry Irving* (ib., 1908).

IRVING, Henry Brodribb (1870–1919). An English actor, manager, and author, son of Sir Henry Irving. He was born in London, was educated at Marlborough and at New College, Oxford, and in 1894 was called to the bar. But as early as 1891 he had appeared on the stage in John Hare's company, and he soon gave up law to follow in his father's footsteps; in 1894–95 he was with Comyns Carr at the Comedy Theatre, in 1895 with Ben Greet's company in the provinces, in 1896 with George Alexander at the St. James's. In the latter year he married Dorothea Baird, who created the rôle of Trilby. His success as an actor was followed by success as a manager. In 1902 he took the Duke of York's Theatre; in 1906–07 toured America, in 1911–12 Australia, and in 1912–13 South Africa; and then leased the Savoy. He played Crichton in Barrie's *Admirable Crichton* in 1903, and Hamlet at the Adelphi in 1905. *The Lyons Mail* had a remarkable run in 1908, and among his later productions were *Dr. Jekyll and Mr. Hyde* and *The Bells*. His early training for the bar and his sense of the dramatic are seen in his *Life of Judge Jeffreys* (1898), *French Criminals of the Nineteenth Century* (1901), *Occasional Papers* (1906), *The Trial of Franz Müller* (1911), *The Trial of Mrs. Maybrick* (1913).

IRVING, Isabel (1871–). An American actress, born at Bridgeport, Conn. She first appeared upon the stage in 1887, in *The Schoolmistress*, at New York, and the next year became a member of Daly's company, with which she continued till 1894. She became in 1897 John Drew's leading woman, appearing with him in *The Liars* (1898), *The Tyranny of Tears* (1899), and other pieces. At the beginning of 1902 she became leading woman in William Faversham's company. She was "starred" in 1907 in *Susan in Search of a Husband* and *The Girl who has Everything*. In 1910 she appeared in New York as Mrs. Dallas-Barker in *Smith* and in 1912 as Dulcie Anstice in *Preserving Mr. Panmure*. She was married in October, 1899, to W. H. Thompson. Consult L. C. Strang, *Famous Actresses of the Day in America* (New York, 1900).

IRVING, John Beaufain (1826–77). An American genre and historical painter, born in Charleston, S. C. He was a pupil of Leutze at Düsseldorf, and after the Civil War removed from his native city to New York. He was elected to the National Academy in 1872. Among his pictures are: "The Splinter"; "Wine Tasters" (1869); "The End of the Game"; "Cardinal Wolsey and his Friends" (1876); "A Banquet at Hampton Court in the Sixteenth Century." His bright color and elaboration of detail suggest the Düsseldorf school and have caused him to be called an admirer of Meissonier.

IRVING, John Duer (1874–1918). An American economic geologist, born at Madison, Wis. In 1896 he graduated from Columbia University (Ph.D., 1899). Joining the United States Geological Survey in 1899, he was assistant geologist in 1900–06 and geologist in 1906–07. He was acting professor of mining and geology at the University of Wyoming in 1902–03 and became assistant professor (1903) and professor (1906) of geology at Lehigh University and in 1907 professor of economic geology at the Sheffield Scientific School (Yale). In the summer of 1907 he made investigations in Alaska for the Guggenheim and Morgan interests. He became editor of the journal *Economic Geology* and is author of *Economic Resources of the Northern Black Hills*.

IRVING, Lawrence (Sydney Brodribb) (1872–1914). An English actor and manager, son of Sir Henry Irving. He was educated at Marlborough College and at the Collège Rollin in Paris and lived in Russia for three years while he was studying for the diplomatic service. In 1893 he appeared in Shakespearean parts in Dundee. He starred in provincial companies, acting *A Bunch of Violets*, *Trilby*, and *Under the Red Robe* in 1896–99; played in his father's company in 1900–04; toured in 1904–05 with his wife, Mabel Lucy Hackney; created the rôle of Crawshay in *Raffles;* presented his own vaudeville sketches in England and America in 1908–09; and as his own manager brought out *The Unwritten Law* at the Garrick in London in 1910. In 1912 he played Iago in Tree's production of *Othello*, at His Majesty's Theatre. On his way back to England in May, 1914, returning from a tour with his own company, he was drowned in the *Empress of Ireland* disaster when endeavoring to save his wife. He wrote several plays, *Peter the Great* (played 1898), *Bonnie Dundee*, *Richard Lovelace* (produced in New York, 1901), and *The Typhoon* (1913), after Lengyel; and translated from Gorky, *The Lower Depths* (1912).

IRVING, Roland Duer (1847–88). An American geologist, born in New York City and educated at the School of Mines of Columbia University. Upon graduation, he was made assistant on the geological survey of Ohio and in 1870 was appointed professor of geology and mineralogy in the University of Wisconsin, also serving as assistant State geologist (1873–79). In this connection he published *Geology of Central Wisconsin* (1877); *Geology of the Lake Superior Region* (1880); *Crystalline Rocks of the Wisconsin Valley* (1882); *Mineralogy and Lithology of Wisconsin* (1883). In 1882 he was placed at the head of the Lake Superior

division of the United States Geological Survey. His important reports, published by the government, include: *The Copper-Bearing Rocks of Lake Superior* (1883); *On Secondary Enlargements of Mineral Fragments in Certain Rocks* (1884); *The Classification of the Early Cambrian and Pre-Cambrian Formations* (1886).

IRVING, WASHINGTON (1783–1859). An American author. He was born in New York City, April 3, 1783. His mother was English, and his father had come from Scotland to New York City, where he engaged in trade. Irving studied in the schools of New York and at the age of 16 took up law. Before he was 20 he contributed, under the pseudonym of "Jonathan Oldstyle," to the New York *Morning Chronicle*, of which his brother was editor. Never in these early years in good health, he was obliged in 1804 to go to Europe, where he remained two years. Shortly after his return he published, in 1807, with his brother William and James K. Paulding (q.v.), *Salmagundi*, an undertaking in the style of Addison's *Spectator*. In 1809 appeared *A History of New York from the Beginning of the World to the End of the Dutch Dynasty, by Diedrich Knickerbocker*—a humorous, whimsical, and genially satirical sketch, which brought him reputation and money. This book had been begun with the intention of burlesquing a pretentious guidebook by Dr. Samuel Mitchell. The *Knickerbocker History*, to give it its most common name, grew as Irving's humor found more and more curiosities in the quaint and phlegmatic Dutch type, which is so strongly contrasted with the quick and more volatile descendant of British stock. He then gave up any idea of law and became a sleeping partner of his brothers, whose business house was in Liverpool, occupying himself meanwhile with literary work. Irving's reputation had preceded him to England, where his gracious manners made him a favorite in society. He met Campbell and Thomas Moore and was heartily liked by Walter Scott, who persuaded Murray to publish *The Sketch-Book*. Among other things he edited *The Poetical Works of Thomas Campbell*. During the War of 1812 he was on the staff of Governor Tompkins, of New York, and was connected with the *Analectic Magazine* of Philadelphia. In 1815 he went to Europe to look out for the business interests of the firm, the failure of which in 1818 turned him for good and all to literature.

In New York and in London (1819–20) Irving published the book by which he is most popularly known, *The Sketch-Book of Geoffrey Crayon, Gent.* It was heartily welcomed on both sides of the Atlantic, and two of the stories especially, *Rip Van Winkle* and the *Legend of Sleepy Hollow*, have become classics in American literature. The *Sketch-Book* soon went through many editions, was illustrated by Caldicott and commentated by Pfundheller for the Germans. The vein of the book is one of humor, tenderness, geniality, and good-fellowship; the manner is reminiscent of Goldsmith and other English authors of the eighteenth century, to whom Irving was temperamentally drawn. The spirit that animated Irving in all of his writing, save that which was distinctly historical, is admirably expressed by his own *apologia* in the *Sketch-Book:* "It is so much pleasanter to please than to instruct—to play the companion rather than the preceptor. What, after all, is the mite of wisdom that I could throw into the mass of knowledge; or how am I sure that my sagest deductions may be safe guides for the opinions of others? But in writing to amuse, if I fail, the only evil is in my own disappointment. If, however, I can by any lucky chance, in these days of evil, rub out one wrinkle from the brow of care, or beguile the heavy heart of one moment of sorrow; if I can now and then penetrate through the gathering film of misanthropy, prompt a benevolent view of human nature, and make my reader more in good humor with his fellow beings and himself, surely, surely, I shall not then have written entirely in vain." In 1822 appeared another volume in much the manner of the *Sketch-Book, Bracebridge Hall, or the Humorists*, a series of sketches, translated into German by Spiker (1826). In 1822 Irving visited the Rhine, lived for a while in Paris, and again in England in 1824. In 1824 appeared the *Tales of a Traveller*, a collection of short stories, with the same general good feeling, but with more action. In 1826 he went to Spain, remaining there until 1829, and, as a result of his stay, produced four books quite different from his former work: *History of the Life and Times of Christopher Columbus* (1828); *A Chronicle of the Conquest of Granada* (1829), an interesting narrative, but of no real historical value; *Voyages and Discoveries of the Companions of Columbus* (1831); and *The Alhambra* (1832), a series of sketches and stories associated with the author's life in the romantic ruins of Granada. Irving's book on Columbus was written with the help of Spanish archives, after Irving had given up his original purpose to translate Navarrete's recently published work on the discoverer. *The Chronicle of the Conquest of Granada* purports to be founded on the manuscripts of Fray Antonio Agapida, an imaginary chronicler. *The Alhambra* was written mainly in London, where Irving was Secretary of the United States Legation from 1829 to 1831. He returned to America in 1832, where he was welcomed with almost national honor; for the people of the United States knew that he had won recognition abroad for American literature.

In 1841 Irving was appointed United States Minister at Madrid, where he lived from 1843 to 1846, continuing his historical writing with the work on Mahomet. He passed the rest of his life, with the exception of some months of travel in the West, at Sunnyside, his country seat near Tarrytown, N. Y. From the appearance of *The Alhambra* up to 1849 his literary work was inferior to what he had previously done and is of no great charm or value. It consists of *The Crayon Miscellany* (1835); *Astoria* (1836); and *The Rocky Mountains: or, Scenes, Incidents, and Adventures in the Far West* (1837). The work which came towards the end of his life, however, added to his reputation. It was chiefly biographical and historical: *Oliver Goldsmith* (1849); *Mahomet and his Successors* (1849–50); *Wolfert's Roost* (1855); and his long-planned and affectionate *Life of Washington* (1855–59), which he completed only with the year of his death. He died at Sunnyside, November 28, 1859. Posthumously there appeared *The Life and Letters of Washington Irving* (1862–64) and *Spanish Papers and Other Miscellanies* (1866), edited by his nephew, P. M. Irving. His *Works*, in 27 volumes, appeared in New York in 1884–86.

Selections from them in English and in German, with illustrations by Ritter and Camphausen, were published in Leipzig in 1856. The standard *Irving* is now the 40-volume Knickerbocker Edition (New York, n. d.), which is based upon the edition revised by the author and published in the middle of the last century.

Irving is significant in the history of American letters as the first American, after the independence of the United States, to obtain real literary recognition in England. His own whimsical but keen explanation of his foreign reception is as follows: "It has been a matter of marvel, to my European readers, that a man from the wilds of America should express himself in tolerable English. I was looked upon as something new and strange in literature; a kind of demi-savage, with a feather in his hand instead of on his head; and there was a curiosity to hear what such a being had to say about civilized society." By another than the modest author, however, his success may well be attributed to the geniality of his nature, his social gifts, and his literary feeling. He was able to please an audience schooled in the manner of Addison, Johnson, and Goldsmith, and at the same time to cause no offense to the patriotic sensibilities of his countrymen. Much of his work deals directly with English life and customs and is written in the manner of a kindly, well-bred Englishman. The influence of Irving upon American letters was hence, in the main, good; it enabled writers to make use of the best English tradition and helped to rid them of the provincialism which had characterized their work up to his coming. He is perhaps best as an essayist, and he will be permanent for his charm and refinement; yet it must not be forgotten that he was practically the discoverer, for Americans at least, of the effectiveness of the short story as a form of art. Nor is Irving's place in English literature unimportant, for he was a link between Goldsmith and Dickens. Indeed, Irving seems rather like an English than like an American author; for, though there is a quaintness in his humor and freshness in his views, he is devoted to English traditions as to form. With Whitman, Bret Harte, and Mark Twain one encounters a more obviously American school.

Bibliography. A fair amount of commentary on Irving exists. In addition to the biography by his nephew, P. M. Irving, *Life and Letters* (3 vols., New York, 1909), there are: W. C. Bryant, *Discourse on the Life, Character, and Genius of Washington Irving* (New York, 1860); H. W. Longfellow, *Address before the Massachusetts Historical Society* (Boston, 1870); Laun, *Washington Irving: Ein Lebens- und Charakterbild* (Berlin, 1870); C. D. Warner, *Life*, in the "American Men of Letters Series" (Boston, 1884). Critical discussions of his work are to be found in the literary histories, such as Beers, *Initial Studies in American Letters* (New York, 1892); Barrett Wendell, *A Literary History of America* (ib., 1900); H. W. Mabie, *Backgrounds of Literature* (ib., 1904); id., *Writers of Knickerbocker* (ib., 1912).

IRVING, William (1766–1821). An American author, brother of Washington Irving, born in New York City. He was engaged in fur trading with the Indians in the region of the Mohawk River from 1787 to 1791 and in 1793 established his business in New York City and married a sister of James K. Paulding, one of his brother's collaborators in *Salmagundi*. He was a popular member of the literary coterie which flourished in New York early in the last century; and his many poems and contributions to *Salmagundi* mark him as among the best of early American humorists. From 1814 to 1819 he was a Democratic member of Congress.

IR'VINGITES. See Catholic Apostolic Church.

IR'VINGTON. A town in Essex Co., N. J., adjoining Newark, of which it is a residential suburb, on the Lehigh Valley Railroad (Map: New Jersey, D 2). It has smelters, foundries, automobile works, lumber yards, refineries, a tannery, and manufactories of linoleum, machinery, masons' materials, and novelties. The city contains the Gladden Lodge Hospital, Bethany Home, Elks Home, a large public park, and a fine town hall. The commission form of government was adopted in 1914. Settled as early as 1666, Irvington was called Camptown until 1852, when it received its present name. It was incorporated in 1898. Pop., 1900, 5255; 1910, 11,877; 1914 (U. S. est.), 14,697; 1920, 25,480.

IRVINGTON. A village in Westchester Co., N. Y., on the Hudson River, 23 miles north of New York City, on the New York Central and Hudson River Railroad. It is a beautiful place of residence. Prominent among its features of interest are the fine town hall with the Guiteau Library, and "Sunnyside," the home of Washington Irving. The waterworks are owned by the village. Pop., 1900, 2231; 1910, 2319.

IRWIN, ĕr'wĭn. A borough in Westmoreland Co., Pa., 22 miles southeast of Pittsburgh, on the Pennsylvania Railroad (Map: Pennsylvania, B 6). Some of the most extensive bituminous coal mines in the State are located here, and there are also iron foundries, flour mills, car shops, facing and planing mills, electrical goods and mirror factories, etc. Pop., 1900, 2452; 1910, 2886.

IRWIN, ĕr'wĭn, John (1832–1901). An American naval officer, born in Pennsylvania. He entered the Naval Academy in 1847 and became passed midshipman in 1853. He served on the frigate *Wabash* in the Civil War and took part in the battle of Port Royal, S. C. Irwin also participated in the engagements at the forts at Hatteras Inlet and Forts Walker and Beauregard. At the capture of Fort Pulaski he received special mention in the report of the battle sent to the Navy Department. During his career he was advanced through the various ranks of the service until, in 1891, he was made a rear admiral. He retired April 15, 1894.

IRWIN, May (1862–). An American actress, best known in farce comedy. She was born at Whitby, Ontario, Canada, and made her appearance on the stage at Buffalo early in 1876. Coming to New York, she played for several years at Tony Pastor's Theatre; then became a member of Daly's company, with which she remained until 1887. She appeared as a star in *The Widow Jones; Kate Kip, Buyer; Mrs. Peckham's Carouse; Getting a Polish; Widow by Proxy* (1912); *The Crimson Rambler* (1914); *No. 13 Washington Square* (1915); and other light pieces. Consult L. C. Strang, *Famous Actresses of the Day in America* (New York, 1900), and Norman Hapgood, *The Stage in America, 1897–1900* (ib., 1901).

IRWIN, Wallace (Admah) (1875–).

An American journalist and author, brother of Will Irwin, born at Oneida, N. Y. He graduated from the Denver High School in 1895 and studied at Stanford University (1896–99). He was special writer for the San Francisco *Examiner* in 1900, served as editor of the San Francisco *News Letter* in 1901 and of the *Overland Monthly* in 1902, wrote burlesque for the Republic Theatre in 1903 and topical verse for the New York *Globe* in 1904–05, and was staff member of *Collier's Weekly* in 1906–07. Besides his magazine articles, he is author of *The Love Sonnets of a Hoodlum* (1902); *The Rubaiyat of Omar Khayyam, Jr.* (1902); *Fairy Tales up to Now* (1904); *Nautical Lays of a Landsman* (1904); *At the Sign of the Dollar* (1904); *Chinatown Ballads* (1905); *Random Rhymes and Odd Numbers* (1906); *Letters of a Japanese Schoolboy* (1909); *Mr. Togo, Maid of All Work* (1913); *Hashimura Togo, Domestic Scientist* (1914).

IRWIN, Will(iam Henry) (1873–). An American journalist and author, brother of Wallace Irwin, born at Oneida, N. Y. He graduated from Stanford University in 1899. He served as assistant editor (1899) and editor (1900) of the San Francisco *Wave*, as reporter (1901), special writer (1902), and Sunday editor (1902–04) of the San Francisco *Chronicle*, as reporter of the New York *Sun* (1904–06), as managing editor of *McClure's Magazine* (1906–07), and as writer for *Collier's Magazine* (1907–08). Thereafter he devoted himself to general magazine writing. He is author of *Stanford Stories* (1900), with C. K. Field; *The Reign of Queen Isyl* (1903) and *The Picaroons* (1903), with Gelett Burgess; *The Hamadryads* (1904), verse; *The City that Was* (1907); *Old Chinatown* (1908, 1913); *The Confessions of a Con Man* (1909); *Warrior the Untamed* (1909); *The House of Mystery* (1910); *The Readjustment* (1910); *The Red Button* (1912); *Where the Heart is* (1912); *Beating Back* (1914), with Al J. Jennings.

IS. See Hit.

ISAAC, ī′zak (Heb. *Yiṣḥāk*, from *sāḥaḳ*, to laugh). One of the Hebrew patriarchs. The story of Isaac is given in Gen. xviii–xxxv. He was the son of Abraham and Sarah, born to them when Abraham was 100 and Sarah 90 years old. The connection of the name with the root "to laugh" is explained in three different versions. When the birth of Isaac is foretold by the angels, *Sarah* is reported to have laughed (Gen. xviii. 12); another account says it was *Abraham* who laughed (Gen. xvii. 17–19); the third says *every one who heard of it* would laugh (Gen. xxi. 6). When the child was eight days old, he was circumcised (Gen. xxi. 4), and as he grew older he was a good deal with Ishmael, his half brother. This displeased Sarah, and she had Hagar and her son driven forth (Gen. xxi. 9 et seq.). The next that we hear of Isaac is in the episode of the offering (Gen. xxii). In obedience to divine prompting, Abraham set out with his son for Mount Moriah (q.v.) and there attempted to sacrifice the lad as a burnt offering. An angel interposed, and a ram was substituted. After the death of his mother Isaac married Rebekah, his kinswoman, brought by Eliezer, the servant of Abraham, by his master's command from Mesopotamia (Gen. xxiv). Isaac was then 40 years of age. After 20 years two sons were born, Esau and Jacob. The sons were different in character, with the result that Isaac loved Esau better, while Rebekah loved Jacob (Gen. xxv. 21–34). When a famine came upon the land of Canaan, Isaac was warned of God not to go down to Egypt, but to go to Abimelech, King of Gerar. Here he practiced the same deceit as his father before him, saying that his wife was really his sister. He prospered greatly in the land and excited the envy of the inhabitants, who twice took away the wells that he had digged. A third well was left unmolested, and he called it Beersheba (Gen. xxvi). In his old age Isaac became blind and, fearing that he was soon going to die, was anxious to bless his favorite son, Esau. By dressing in hairy garments Jacob was able to deceive his father and received the blessing intended for his brother. In consequence of this Jacob had to leave home, but not before he had received a second blessing from his father (Gen. xxvii). Isaac lived 180 years, long enough to see his son deceived by his children when they sold their brother Joseph. He was buried by Jacob and Esau in the cave of Machpelah (Gen. xxxv. 29; xlix. 31).

It is the opinion of many scholars at the present time that Isaac is either a tribal name or the name of the numen, or local divinity, of Beersheba. The theory is plausible that the full name was once Yishak-El, i.e., 'El (or god) laughs.' There is no evidence as yet, however, of a tribe bearing this name, and though the scornfully laughing (cf. Ps. ii. 4) or benignantly smiling El would not be an impossible designation of a local deity, no evidence has yet been forthcoming of the worship of a god by that name. Isaac is more especially associated with Beersheba, as Abraham is with Hebron, and Jacob with Bethel (see Negeb); and whatever light may in the future be shed on the other two patriarchs by contemporaneous records is likely to affect also the judgment as to the character of Isaac.

Scholars who accept the composite character of the present Book of Genesis believe that the Isaac narrative contains: (*a*) specimens of Hebrew folklore, as the story of Isaac's birth, and the play upon his name, "the laughter"; (*b*) illustrations of a religious doctrine, as in the story of the sacrifice, showing the proper attitude of the Yahwe worshiper, which is also found in the Pentateuchal codes, to human sacrifice; (*c*) traditions of the wanderings of some of the Hebrew tribes during the nomadic period.

In the accounts of Isaac's birth there is a tendency on the part of scholars to see an attempt to modify tradition so as to make it appear that Isaac is the legitimate and "only" son of Abraham. The claims of Ishmael (q.v.), who is the older, cannot be altogether set aside; but the distinctively Jewish point of view is brought out, not only by making Isaac the offspring of Sarah—the true wife of Abraham—but by the elaborate account of the promise made to Abraham that he should have a son by Sarah, despite the latter's great age, and by the emphasis laid upon the joy that Isaac's coming occasioned on all sides. The setting aside of Ishmael to make room for Isaac reflects the separation of the Ishmaelite clan or clans from Israel and Judah. Ishmael not having formed an element in the Hebrew confederacy, the very closeness of the bond between the two as preserved by tradition even among the Hebrews becomes the motive for transforming these tradi-

tions in such a manner as to present Ishmael in as unfavorable light as possible. Hence in the most important incident of the Isaac narrative, the journey of Abraham and Isaac to the place of sacrifice, Isaac is not only called the beloved but the only son of Abraham, with the evident intent of ignoring Ishmael altogether. The story of Isaac's sacrifice may be a genuine Jewish midrash, not based at all upon popular tradition, but deliberately introduced as a *mashal* (or allegory) to illustrate Abraham's implicit obedience to Yahwe. Abraham in this story is the type of the true and pious Yahwe worshiper who is willing to sacrifice, at divine command, even that which is dearest to him. But the point of the story is that, precious as this unflinching devotion is to the God of Israel, he is ready to accept an animal sacrifice as a substitute for human sacrifice. Similarly the commandment, "The first-born of thy sons shalt thou give unto me; likewise shalt thou do with thine oxen and with thy sheep" (Ex. xxii. 29 et seq.), the original significance of which can be subject to no question, was subsequently modified by permitting a ransom in the case of the human sacrifices. In view of the persistence of such sacrifices among some of the other Semitic nations, this sign of social progress, reflected both in story and legislation, is significant.

When we come to the wanderings of Isaac from Rehoboth to Gerar and from Gerar to Beersheba, and the quarrels over the wells, we seem to be again in the presence of popular traditions regarding the nomadic period, to which, however, a religious turn has been given by the compilers of the tradition in making Isaac a type of the mild and peace-loving Israelite; and once more the artificial (though also artistic) character of the Isaac narrative appears to some scholars to be revealed in making Isaac die at Mamre-Hebron (Gen. xxxv. 27), in order to locate his burial place in the cave of Machpelah with Abraham, whereas Isaac's real home is Beersheba. As for the stories of Isaac's relationship to his two sons, Esau and Jacob, they reflect again the rivalry between Edom and Israel. (See JACOB.) Consult the commentaries on Genesis. See GENESIS, BOOK OF.

ISAAC I COMNE'NUS (?–1061). Byzantine Emperor from 1057 to 1059. He was the first of the line of the Comneni to ascend the throne, though his family had been for some time prominent in both military and civil capacities. In 1057 he was proclaimed Emperor by the landed aristocracy in opposition to Michael VI, whom he defeated and deposed. On his accession he found the affairs of the Empire in a very bad condition—rebellion within, aggression without, and the treasury exhausted. He succeeded in establishing a system of great economy in all branches of the administration and, in order still further to lighten the burden of taxes on the people, called upon the clergy to contribute their share. But the clergy refused to endure the imposition of any such burdens, and the Patriarch Michael is reported to have even threatened him with deposition. Death delivered Isaac from this formidable opponent, and the clergy were compelled to submit. In 1059 he repelled the Hungarians, who had encroached upon his possessions in the northwest, but soon afterward he was attacked by a violent fever and, believing his death approaching, appointed his famous general, Constantine Ducas, as his successor. He recovered from his illness, but nevertheless resigned the crown and retired to a convent, where he died after two years. Isaac was not deficient in literary attainments. We still possess his *Scholia* on Homer, his favorite author; further, a work, *Characteristics*, dealing with the Greek and Trojan chiefs mentioned in Homer; and, finally, a treatise entitled *On the Works of Homer*. Consult Finlay, *History of Greece*, vols. ii, iii (Oxford, 1877).

ISAAC II ANGELUS (?–1204). Byzantine Emperor from 1185 to 1195 and 1203–04. Delivered by a popular revolution from death, to which he had been condemned by his kinsman, Adronicus Comnenus, Emperor of Constantinople, he obtained the throne in 1185. His vices, incapacity, and military disasters rendered him unpopular, and he was dethroned, blinded, and shut up in a monastery by his brother, Alexius III, in 1195, but was restored by the Crusaders, who took Constantinople in 1203, only to be again dethroned by Alexius Ducas in 1204. He died soon after. Bulgaria was lost to the Byzantine Empire during his first period of power in 1186. Consult Finlay, *History of Greece*, vol. iii (Oxford, 1877), and Pears, *Fall of Constantinople* (New York, 1886).

ISAAC OF ANTIOCH. A poet and theologian in the Syrian church. He was probably born at Edessa in the first part of the fifth century and seems to have moved to Antioch c.450 A.D. The Chronicle of Edessa refers to him as flourishing in 451–452; the Chronicle of Michael the Syrian makes him a contemporary of Nonus, who began his bishopric in 449, and he was still living in the days of the Patriarch Peter the Fuller (470–488) and the Emperor Zeno (474–491). He was for many years abbot of a convent near Antioch. Isaac was a Monophysite, and his teacher Zenobius was a disciple of Ephraem. Many of his poems are lost; and of the 191 metrical homilies that go by his name, some may have been written by an Isaac who flourished in the beginning of the fifth century and was a disciple of Ephraem or by another Isaac living in the days of Bishop Paul (510–522). The lost poems on the classical games in 404 and the destruction of Rome by Alaric in 410 may have been by the former of these. Isaac of Antioch no doubt wrote the famous poem of 2136 lines dealing with the parrot which uttered the Trisagion in the streets of Antioch. In his denunciations of current abuses, of corrupt judges, of oppression, luxury, and licentiousness, he resembles one of the Hebrew prophets. He alludes to the invasion of the White Huns. His homilies were written in a heptasyllabic metre, and his style is forceful and rich in imagery. Bickell published in two volumes 37 of the 191 poems given in his list (Giessen, 1873–77); and 67 poems, among them 43 new ones, were published by Bedjan, *Homiliæ S. Isaaci* (Paris, 1903). Consult Brockelmann, in *Die Literaturen des Ostens*, vii, 2 (Giessen, 1907). See SYRIAC LITERATURE.

ISAACS, RUFUS (DANIEL). See READING OF EARLEY, first BARON.

ISAAK, ē'zäk, **IZAK,** or **YZAC,** HEINRICH (c.1450–c.1517). A German-Italian musician. We know nothing of his life except that he was in the service of Lorenzo de' Medici for a num-

ber of years, was organist in Rome, and later was "symphonista regis" to Maximilian I at Vienna. He was a prolific composer of the contrapuntal school and was one of the first to employ the melody in the soprano. His compositions were frequently reprinted in collections, and some of his part songs and melodies (notably the choral "Nun ruhen alle Wälder") are still in use.

ISABELA, ē'sȧ-bā'lȧ. A province in Luzon, Philippines. It takes in part of the Sierra Madre and the Carballos Mountains and borders on the Pacific Ocean. The chief rivers are the Grande de Cagayán and the Magat (Map: Philippine Islands, C 2). A large part of its area is covered with thick forests peopled by savage tribes. Live stock is raised extensively, and palay, coffee, chocolate, corn, and vegetables are cultivated. Area, 5394 square miles; pop., 1903, 76,431. Capital, Ilagan (q.v.).

ISABELA. A town of Negros, Philippines, in the Province of Negros Occidental, 36 miles south of Bacólod. Pop., 1903, 12,836.

ISABELA ISLAND. See Albemarle Island.

ISABELINOS, ē'sȧ-bȧ-lē'nôs. In the first Carlist War, the party that opposed Don Carlos and supported the young Queen Isabella II. They were also known as Christinos or Cristinos (q.v.), from their support of Cristina, the Queen mother, in her defense of the rights of her daughter.

ISABELLA, ĭz'ȧ-bĕl'lȧ. A buff or brown color. The term originated in a story told of Isabella of Austria, daughter of Philip II, at the siege of Ostend (or of Isabella of Castile at the siege of Granada), who vowed not to change her linen before the capture of the town. Owing to the length of the siege, the linen was discolored and so gave rise to the name.

ISABELLA; or, The Pot of Basil. A poem by Keats, based on a story by Boccaccio (1818).

ISABELLA I, Sp. **ISABEL,** ē'sȧ-bĕl' (1451–1504). Queen of Castile, known as the Catholic. She was born at Madrigal, Old Castile, the daughter of John II, King of Castile and León, by his second wife, the Infanta Isabella of Portugal. In 1454 Isabella's brother Henry ascended the throne of Castile, and in 1469 the Princess, after considerable opposition and in the face of great difficulties, married Ferdinand of Aragon. On the death of Henry IV, in 1474, Isabella and Ferdinand, jointly, succeeded to the throne of Castile and León, to the exclusion of her niece Joanna. She had won the support of a great part of the estates of the kingdom during her brother's life, and the victorious arms of her husband compelled the consent of the rest. A war with Portugal, which was waged by King Alfonso in behalf of the Princess Joanna, was terminated in Isabella's favor in 1479, and the same year Ferdinand succeeded to the throne of Aragon as Ferdinand V. This union of the two chief Spanish kingdoms laid the foundation of Spain's future greatness. The first task the allied sovereigns set themselves to perform was the pacification and consolidation of the kingdoms of Castile and Aragon. Then in 1482 they began the 10 years' war against the Moors of Granada, which culminated with the capture of the Moorish capital and the extinction of Moorish sovereignty in Spain at the beginning of 1492. It was towards the end of this struggle, the danger and hardships of which Isabella shared with her army, that the Queen of Castile earned her greatest title to fame in the eyes of posterity, by her acquiescence in the plans of Columbus, who was then a suppliant at the Spanish court. For their successes against the Moors and their stanch Catholicism the title of "Catholic sovereigns" was conferred by the Pope on Ferdinand and Isabella. Queen Isabella was possessed of no inconsiderable beauty and much winning grace, although proud, ambitious, and exceedingly punctilious. She was always present in meetings of the council, and insisted on the use of her name with that of Ferdinand in all public documents. The consolidation of the Spanish Kingdom through the organization of the Hermandad (q.v.) and the establishment of the royal supremacy over the great military orders were in a large measure her work. In the reign of Isabella the Inquisition was organized in Castile by Torquemada, under whom its work was carried on with a barbarity bred of the most fanatical zeal. In 1492 the Jews were expelled from Castile and the rest of Spain, to the great detriment of the country. She died at Medina del Campo on Nov. 26, 1504, and was buried in accordance with her own wishes in the Franciscan monastery at Granada, whence her remains and those of Ferdinand were removed to the royal chapel of the cathedral in 1521. Of her five children, the two eldest, Isabella, Queen of Portugal, and John, her only son, died in 1498 and 1497 respectively. Of her three remaining daughters, Joanna the Mad became the wife of Philip of Austria and the mother of Charles V of Germany; Maria married Emmanuel of Portugal; and Catharine of Aragon was the unfortunate first wife of Henry VIII of England and the mother of Mary Tudor.

Bibliography. H. del Pulgar, *Crónica del reinado de los Reyes Católicos* (Valencia, 1780); Prescott, *History of the Reign of Ferdinand and Isabella the Catholic, 1479–1516* (London, 1889), the best general work containing full biographical notes; Clemensin, "Elogio de Isabel," in vol. vi of the *Memorias de la Academia de la Historia,* with biography and letters of Queen Isabella (Madrid, 1820); Nervo, *Isabella la Catholique, reine d'Espagne, sa vie, son temps, son règne, 1451–1504* (Paris, 1884); J. H. Mariejol, *L'Espagne sous Ferdinand et Isabelle* (ib., 1892); O. O. Howard, *Isabella of Castile* (New York, 1894); G. Sela, *Politica internacional de los reyes católicos* (Madrid, 1905); M. A. S. Hume, *Queens of Old Spain* (New York, 1906); C. Hare, *Queen of Queens and the Making of Spain* (ib., 1906); also consult works cited under Spain and Castile.

ISABELLA II (1830–1904). Queen of Spain from 1833 to 1868. She was the daughter of Ferdinand VII by his fourth wife, Maria Christina of the Two Sicilies, and was born at Madrid, Oct. 10, 1830. By a decree which set aside the Salic Law in Spain and which was confirmed by the Cortes, March 29, 1830, the Infanta Isabella became the heiress apparent to the throne, which she ascended on the death of her father in September, 1833, her mother being appointed Queen Regent. An insurrection in favor of her uncle, Don Carlos (q.v.), who according to the Salic Law would have succeeded to the throne on the death of his brother, immediately broke out and raged with great violence until 1840, when the cause of the court triumphed. In the course of the period politicians had begun to divide into the two parties of the *Moderados,* or Conservatives, and the *Exaltados,* or Liberals;

and the Queen Regent found it necessary to enlarge the Liberal constitution in 1834 and ultimately (1836) to reëstablish the constitution of 1812. In 1840 Maria Christina, after making Espartero, the champion of the court in the war over the succession, Prime Minister, was reduced to the necessity of resigning the regency, which was conferred on Espartero. An insurrection broke out in 1843, which led to the overthrow of the Regent Espartero and the establishment of the military dictatorship of Narváez, who introduced an anti-Liberal policy. On Nov. 8, 1843, Queen Isabella was declared by the Cortes to have attained her majority. Although the young Queen enjoyed personal popularity, political intrigues continued, with frequent attempts at insurrection. In 1846 the Queen married her cousin, Don Francisco d'Assisi, elder son of Ferdinand VII's youngest brother. A change to almost purely absolute government in 1853 was followed by the banishment of many chiefs of the Constitutional party, as a result of which a formidable rising of the army took place in 1854 under O'Donnell (q.v.). Espartero was put at the head of an administration in which Liberal principles held sway. But the Queen disapproved of his policy, and he resigned in favor of O'Donnell, July 14, 1856, who was soon after supplanted by Narváez. For a number of years the chief power was held alternately by these two ministers. Though Liberal ministers were more than once forced upon her, the Queen, as time went on, fell more completely under the influence of the reactionary faction. She lost much of her former popularity, and the nation became impatient under her arbitrary rule. In September, 1868, a revolution broke out, headed by Serrano, Prim, and Topete, ending in the formation of a Republican provisional government and the flight of Isabella to France. In 1870 she abdicated in favor of her son, Alfonso XII, who succeeded to the throne in 1875 after the brief reign of Amadeo of Savoy and the failure of the Republic under Castelar. After 1871 the ex-Queen of Spain passed the greater part of her time in Paris. See SPAIN.

Bibliography. F. H. Gribble, "Isabella," in *Fortnightly Review*, vol. xcix (London, 1904); C. Cambronero, *Isabel II íntima* (Barcelona, 1908); R. Challice, *Secret History of the Court of Spain, 1802–1906* (New York, 1909); E. B. D'Auvergne, *Queen at Bay* (ib., 1910), an account of the Carlist War, 1833–40; F. H. Gribble, *The Tragedy of Isabella II* (Boston, 1913).

ISABELLA, ISABEAU, or **ELIZABETH, OF BAVARIA** (1370–1435). Queen of France. The daughter of Stephen II of Bavaria, and at 15 the wife of Charles VI of France, she was crowned Queen in 1389 and bore several children. She was noted for her remarkable beauty, and for a few years all went well; but in 1392 Charles began to have periods of insanity. He showed a great dislike for Isabella, whom he had loved madly, and a great partiality for a mistress. Isabella became very intimate with the Duke of Orléans, the King's brother, who was suspected of being the father of Isabella's seven children born between 1393 and 1407, the year of the Duke's assassination. Although frequently acting as Regent, Isabella led a scandalous life and joined first one political party, then another. She was imprisoned for a few months, but was freed by John the Fearless, after whose murder she joined in surrendering France to England, in 1420, by the Treaty of Troyes. Her daughter Catharine she married to Henry V of England, and she had her share in the English triumphs; but she was heartily despised by the French. After the death of Charles VI, in 1422, she lived a lonely life at Paris, having grown very stout and become an object of general contempt. Consult: Vallet de Viriville, *Isabeau de Bavière* (Paris, 1859); Lavisse, *Histoire de France*, vol. iv (ib., 1902); Thibault, *Isabeau de Bavière* (ib., 1903).

ISABELLA OF BRAZIL (Portug. ISABEL), COUNTESS D'EU (1846–). A princess of Brazil, born in Rio Janeiro, the daughter of Emperor Dom Pedro II. Because of her brother's early death, she was the heir apparent during the long reign of her father. In 1864 she married Gaston d'Orléans, Count d'Eu, and in 1886 was left as Regent, with full powers, during her father's absence on a visit to Europe. An ardent opponent of slavery, and intolerant of the process of gradual abolition which was being carried out, she determined to end the institution at once. Accordingly she had her Minister introduce into the Chamber of Deputies a law for immediate emancipation without compensation, and on May 15, 1888, she issued the decree putting the law into effect and freeing forever all the slaves in Brazil. This measure caused the large planters to join with the Republicans in their opposition to the monarchy. Further, Isabella and her husband were decidedly unpopular and were thought to be under the dominance of the clergy and desirous of maintaining an autocratic rule. These conditions precipitated the revolution which overthrew the Empire and drove Isabella, her father, and the Imperial family into exile (Nov. 15, 1889). By an arrangement between the head of the French royal house and the Count d'Eu, the descendants of the Count and Countess d'Eu form an independent ex-ruling house, bearing the title Orléans-Braganza.

ISABELLA OF ENGLAND. See EDWARD II; EDWARD III.

ISABELLA THE CATHOLIC, ORDER OF. A Spanish order of knighthood, founded by Ferdinand VII, in 1815, as a reward for loyalty in the defense of Spanish-American possessions. It is now conferred for all kinds of merit. The sovereign is the head of the order, which is divided into four classes of grand cross, commanders of the first and of the second rank, and knights. The badge of the order is an eight-pointed cross of gold inlaid with red enamel, bearing a central plaque with the motto "A la lealtad acrisolada" (to proven loyalty), and suspended from a laurel crown which is held by a ribbon of orange and white.

ISABELLE (ē'zȧ'bĕl') **GAZELLE.** A gazelle of Kordofan and Sennar (*Gazella isabella*), also known as Genai, distinguished from the dorcas mainly by the sharp inward bend of the horn tips, which form decided hooks. See Plate of GAZELLES.

ISABELLITA, ē'sȧ-bĕl-lē'tȧ (Sp., little Isabelle). A name in the Spanish West Indies for any of the gaudy fishes of the genus *Angelichthys*, called also angel fish and emperor fish (q.v.).

ISABEY, ē'zȧ'bȧ', JEAN BAPTISTE (1767–1855). A French painter of portraits in miniature. He was born at Nancy, where he painted miniatures of the neighbors and studied with Claudot. Arriving in Paris at the age of 18, he was coldly received by his compatriot of Lorraine,

Dumont, the Queen's miniature painter. To pay his expenses, he painted buttons at 12 sous each and medallion copies of Vanloo and Boucher. Fortunately, through his roommate's father, who worked at Versailles for the tutor of the royal children, he received the commission to paint for the Queen, Marie Antoinette, miniatures of her two nephews, sons of the Comte d'Artois, who afterward reigned as Charles X. This made Isabey's fortune. The Queen liked his work, and he painted a miniature of her, after a portrait by Sicardé. He then studied with David and after the Reign of Terror became professor of drawing in a school attended by Hortense Beauharnais, who introduced him to Josephine. He was the intimate friend of both Bonaparte and Josephine and in 1805 was named First Painter to the Empress, with the additional duty of organizing the court fêtes and superintending the decorations of the Opéra. After the fall of Napoleon, Isabey stood in high favor at the courts of Louis XVIII, Charles X, and Louis Philippe, and became Commander of the Legion of Honor and Director of Fêtes under Napoleon III. He exhibited regularly at the Salon from 1793 to 1841 and during his long career painted likenesses of almost all the eminent persons of France. In the Morgan collection of miniatures loaned to the Metropolitan Museum, New York, are 13 portraits by Isabey, among them "The Duke of Reichstadt," "Queen Hortense and her Son," and "Madame Récamier." His drawing is of distinguished excellence, and his work displays to a remarkable degree the possibilities of miniature painting. Consult: Edmond Taigny, *Isabey, sa vie et ses œuvres* (Paris, 1858), containing important extracts from his diary; Williamson, *Catalogue of the Miniatures of J. Pierpont Morgan* (London, 1908); Basili-Callemaki, *J. B. Isabey* (Paris, 1909), richly illustrated and exhaustive.

ISABEY, ē'zà'bâ', Louis Gabriel Eugène 1803–86). A French genre and marine painter. He was born in Paris, the son and pupil of Jean Baptiste Isabey (q.v.), through whose influence he was made painter of the Algerian expedition of 1830. He became Chevalier of the Legion of Honor in 1832, Officer in 1852. He continued to exhibit until 1878, and towards the end of his life worked much in water colors. His works include: "Harbor of Honfleur" (1827); "Battle of the Texel" (1839), Versailles Museum; "View of Boulogne Harbor" (1843), Toulouse Museum; "Ceremony in the Church of Delft" (1847); "Marriage of Henry IV" (1848); "Embarkation of De Ruyter and De Witt" (1850) and "Roadstead of Saint-Malo," in the Luxembourg Museum; and others in the provincial museums of France and Germany. The Metropolitan Museum of New York possesses his "Banquet Hall" (1873). He was much influenced in color by Delacroix, although his art is of a lighter character. His genre pictures represent scenes of a past age and are painted in delicate and harmonious colors, especially the costumes. His marines show in an admirable manner the glittering evanescent effects of light upon the waves.

ISABNORMAL (īs'ăb-nôr'mal) **LINES** (from Gk. *ἴσος, isos,* equal + Eng. *abnormal,* from Lat. *abnormis,* abnormal, from *ab,* from + *norma,* rule). Lines connecting places whose temperature, pressure, etc., for any epoch have equal departures from the normal values of the respective places.

ISÆ'US (Lat., from Gk. *Ἰσαῖος, Isaios*) (c.420–350 B.C.). A Greek orator included in the Alexandrian canon of the 10 Attic orators. Of his life little is known. He was the son of Diagoras and was probably born at Chalcis, although most of his life was spent at Athens, where he was a contemporary of Isocrates (q.v.), whose pupil he is said to have been. As he was not an Athenian citizen, he could not plead before the courts, but, like Lysias, he took up the profession of logographer, or writer of speeches for others. His specialty was the laws of inheritance. Ancient traditions say that Demosthenes was a pupil of Isæus. The ancients had 64 speeches which were attributed to him, of which 50 were held to be genuine. Of these only 10 have come down to us complete, although the single manuscript which contains them has preserved about half of another speech, and Dionysius of Halicarnassus (q.v.) has a long fragment, which is usually printed as a twelfth oration. Isæus' strength is said by Dionysius to have depended on his skill in forensic controversy. In the development of Athenian oratory he marks the transition from Lysias (q.v.) to Demosthenes (q.v.). The speeches are best edited by Bürmann (Berlin, 1883). There is an English translation by Jones, *The Speeches of Isæus* (London, 1779). Consult: Jebb, *The Attic Orators,* vol. ii (London, 1876); Blass, *Die attische Beredsamkeit,* part ii (Leipzig, 1892); Wyse, *The Speeches of Isæus* (Cambridge, 1904); Christ-Schmid, *Geschichte der griechischen Litteratur,* vol. i (5th ed., Munich, 1908). See Canon Alexandrinus; Logographers.

ISAG'ORAS (Lat., from Gk. *Ἰσαγόρας*) (c.545–c.500 B.C.). An Athenian politician. He was chosen first archon (508 B.C.) after the expulsion of Hippias (510), although Clisthenes (q.v.) had been much more influential at the time. In the quarrel which followed Isagoras was opposed by Clisthenes and the entire people, and the new constitution was victorious. But Isagoras appealed to Sparta, and Cleomenes I (q.v.), King of Sparta, insisted that Clisthenes be surrendered, since he was descended from the accursed Alcmæonidæ (q.v.). The leader of the people voluntarily retired; the Spartans occupied the city; Isagoras banished 700 families and attempted to replace the democratic Five Hundred by an aristocratic Three Hundred. At this the people rose, hemmed the Spartans within the Acropolis, and after three days permitted them and Isagoras with them to retire to Sparta, but executed all Athenian partisans of Isagoras, who himself died in exile.

ISAIAH, ī-zā'yà *or* ī-zā'yà (Heb. *Yesha'ayāhū,* help of Yahwe, or Yahwe helps). One of the most famous of the older Hebrew prophets. He was the son of Amoz and lived at Jerusalem during the reigns of Uzziah, Jotham, Ahaz, and Hezekiah. We may assume that he was born about 760 B.C., that he began to prophesy in the year in which Uzziah died (c.737 B.C.), and that he died about 700 B.C. He appears to have occupied a high social position, had easy access to Ahaz, and exerted much influence on Hezekiah. Beyond this we know little of his private life. It appears from his discourses that he was married and had at least two children, to whom (like Hosea, q.v.) he assigned symbolic names, Shear-jashub and Maher-shalal-hash-baz (vii. 3; viii. 3). It is the opinion of modern scholars that but few of the discourses in the Book of Isaiah (see Isaiah, Book of) emanate from Isaiah himself, and that it is doubtful

whether any one of these discourses has been preserved in its original form. They are found in the first part of the book, contain additions belonging to various later periods, and have been so radically rearranged that it is exceedingly difficult to fix the chronological order and to determine the political events to which they have reference. Still some of the discourses are quite clear.

The most important event in the reign of Ahaz was the combination of Pekah, King of Israel, and Rezin of Damascus against Judah (2 Kings xvi). To this event (which occurred in 734 B.C.) and its consequences several discourses of Isaiah refer, found in chaps. vii, viii, and xvii. The prophet advises Ahaz to be calm and to place his trust in Yahwe. As a matter of fact, the combination against Judah failed, but not until Ahaz had called for aid upon Tiglath-pileser IV, the King of Assyria (745–728 B.C.). This act arouses the prophet's ire. He changes his tone towards Ahaz, denounces his lack of confidence in Yahwe, and predicts havoc and misfortune to the country from these very Assyrians whom Ahaz has called in as allies. The result was that the northern kingdom of Israel was partly taken in 732 B.C. and finally conquered by the Assyrians in 723 B.C. (see SAMARIA), and incorporated in the Empire as a province, while Judah escaped only by becoming a vassal to the King of Assyria. In the days of Hezekiah the country chafed under the yoke, and a party arose in Jerusalem which formed an alliance with Egypt as a means of freeing the country from Assyrian suzerainty. Isaiah was equally opposed to this policy. Portions of his discourses during this period are preserved in chaps. xxviii–xxxi. He declares that the Egyptians and their allies will be defeated and goes so far as to intimate that Yahwe Himself will fight on the side of Assyria against His own people if they ally themselves with Egypt. Isaiah could not quell the warlike spirit which was rife in Judah, and the King watched for every chance to oppose Assyria. He not only joined with Egypt, but actually organized a revolt against Sennacherib (see HEZEKIAH), which terminated disastrously for the Judæan Kingdom, although by a fortunate turn of events it escaped being entirely wiped out. At this juncture the leading thought in what may be called Isaiah's theology reveals itself. The terrified ruler and his people in their distress hoped that by entreaties and sacrifices they might again secure the favor of Yahwe, for the calamity that befell the country was looked upon as a sign of Yahwe's displeasure. The first chapter of Isaiah (verses 5–26) gives the prophet's view of the situation. There is only one hope of salvation, and that is by a complete change of conduct on the part of the people, by upright practices, and by fair dealings, by honest government and just courts. As for sacrifices, prayers, and festivals, Yahwe hates them. This and other chapters afford an insight into the social conditions prevailing in the days of Isaiah, which is most important for understanding the attitude of the prophet towards political events. He felt deeply that there was no hope for Judah unless by a total change of conduct the people might secure once more the favor of Yahwe. Political alliances were of no avail, either with Assyria or with Egypt. He had warned Ahaz, but the warning was not heeded. His influence over Hezekiah was greater. Largely, no doubt, at his instigation, the King undertook some religious reforms. (See HEZEKIAH.) But Hezekiah, like Ahaz, yielded to pressure and put his trust in princes instead of in Yahwe. Isaiah, no doubt sorely disappointed, lost all hope and became a prophet who foresaw only gloom and woe for his people, declaring that none, whether great or small, would escape the punishment deserved by their shortcomings.

Hence, despite the obscurity in which the personality of the great prophet is enveloped through editorial interference with his productions, enough can be determined to enable us to grasp his essential message in its full force. His contention is that through right conduct alone can a people be saved. It is because of the profound impression that this message made —not, indeed, upon his own age, but upon later generations—that Isaiah became a type of the true prophet of Yahwe and that discourses of various periods which seemed worthy to be associated with Isaiah were grouped with his utterances, and a composite Book of Isaiah was gradually evolved.

ISAIAH, BOOK OF. The first of the so-called major prophets in the English version of the Old Testament and in all other translations. In the printed Hebrew Bibles and many manuscripts, including the *Codex Petropolitanus*, it also precedes Jeremiah and Ezekiel. But the order given in the Babylonian Talmud (*Baba bathra* 14 b) is Jeremiah, Ezekiel, Isaiah, and according to Elias Levita this was followed by the German and French Jews in their manuscripts. For this arrangement the Talmud assigns as a reason that "the Book of Kings ends in desolation, Jeremiah is all desolation, Ezekiel begins with desolation and ends with consolation, and Isaiah is all consolation." The significance of this order and the reason for it have been fully discussed by Schmidt (*The New World*, ix, 656 ff., Boston, 1900). Before larger books were made, while each prophet was copied on a separate scroll, as still was the case in the first century A.D. (Luke iv. 17), it is not probable that the question of precedence was seriously considered. When it was raised, the arrangement was, no doubt, determined by the same practical considerations of the effect upon readers and listeners in the synagogues that may be observed in the inner economy of each book, where words of comfort are apt to follow severe rebuke, and cheerful predictions denunciations of doom. The impression that the Book of Isaiah is "all consolation" was the result of the manner in which it was edited.

There is much evidence of editorial activity. Certain divisions are indicated by headings, either ascribing a section to Isaiah or describing its contents, or both. Thus, the prophecy beginning ii. 2 is introduced as "The word that Isaiah, the son of Amoz, saw concerning Judah and Jerusalem"; the narrative of the prophet's call, chap. vi, is dated "in the year when King Uzziah died"; the episode described in chap. vii is said to have occurred "in the days of Ahaz"; chaps. xiii–xiv are designated as "The Oracle concerning Babylon which Isaiah, the son of Amoz, saw"; chaps. xv–xvi are only called "The Oracle concerning Moab"; chap. xvii is called "The Oracle concerning Damascus"; chap. xix is designated as "The Oracle concerning Egypt"; chap. xx is dated in the year when "Tartan came against Ashdod, when Sargon, King of Assyria, sent him"; xxi. 1–10 is called "The

Oracle of the Wilderness," 11–12 "The Oracle concerning Duma," 13–17 "The Oracle concerning Arabia," xxii. 1–14 "The Oracle concerning the Valley of Vision" (perhaps Hinnom); chap. xxiii is said to be "The Oracle against Tyre" (probably Sidon); and i. 1 has the appearance of having been originally the heading of chap. i before it was expanded into a superscription to a larger collection of oracles. It is noticeable that headings ascribing particular sections to Isaiah and indicating the occasion are, with the exception of chap. xx, found only in chaps. i–xii; that the term *massa* (oracle) is limited to chaps. xiii–xxiii, where it is of frequent occurrence; that in these chapters the author's name is not added except in xiii. 1; and that there are no headings of any kind in chaps. xl–lxvi. The absence of any superscription in xl. 1 is all the more striking as the last 27 chapters are separated from the earlier collection of prophecies by four historic chapters (xxxvi–xxxix), which likewise have no special heading. It is also to be observed that in chaps. vii and xx, as well as in xxxvi ff., Isaiah is spoken of in the third person, while in chap. viii he speaks in the first person. A peculiarity that challenges attention is the appearance of more or less extensive sections, distinct in character, often strangely contrasting by their cheerful and comforting nature with what precedes them and yet without any special heading or ascription in any form to Isaiah. It is therefore natural to infer that the first collection of prophecies specifically assigned to Isaiah and to some definite occasion in his career has been preserved in chaps. i–xii; that the majority, if not all, of the oracles in chaps. xiii–xxiii were anonymous; that some prophecies, like those in chaps. vii and xx, were drawn from a biography of the prophet; that a second collection of Isaianic prophecies was used in chaps. xxviii–xxxi; that chaps. xxxvi–xxxix, which, with slight exceptions, are also found in 2 Kings xviii. 13–xx. 19, were taken over from the Book of Kings, or a common source; that large portions of the book were left by the final editor without any heading because they had none, among them such remarkable productions as chaps. xxiv–xxvii, xxxii–xxxv and xl–xlvi; and that the volume could not have been constituted by Isaiah himself in this manner.

Such facts did not fail to attract some degree of attention even in earlier times. Already Ibn Ezra (died 1167) hinted at later material in the book by his suggestion that it was Isaiah's in the same sense as the Book of Samuel was ascribed to this prophet. Grotius felt that many passages in Isaiah lx ff. showed that a situation in the Maccabæan period was in the prophet's mind, though he did not express any doubt as to the revelation of this situation to Isaiah; and the same attitude was apparently taken by Houbigant. Spinoza suggested that the Book of Isaiah was edited after the prophet's time. As long as it was supposed that all parts of the work must necessarily have come from Isaiah, the references to Cyrus in xliv. 28, xlv. 1, and the allusions to circumstances after the exile were explained as due to the prophetic gift which enabled Isaiah to place himself in any period in the future, even though it be separated by centuries from his own time, and to speak in view of the circumstances of that distant period. But the more clearly the historic situation was realized which is assumed to exist in many parts of the book, the more difficult it became to harmonize such a projection into the future, even if it was thought possible, with the practical religious aims of the prophets, and serious questions began to be raised whether this or that section may not have been added in later times. It was observed that the prophets, though their eyes were always turned to the future, seem to have proclaimed their oracles in view of present circumstances, and invariably appear to have had in mind the moral effect of their messages on the people they addressed, and it was asked what purpose Isaiah, who never threatened Judah with a Chaldæan invasion, could have had in comforting Zion with the return of Judæan exiles from Babylon and the rebuilding of the temple by Cyrus, whose name could have meant nothing to his hearers; how he could have hoped to be understood at all; and what the moral influence of such a change of tone, justified by nothing in the circumstances of his own time, would have been on the attitude of the people and the reception of his repeated denunciations of sin and prophecies of doom. Finally, the psychological difficulty of such a transfer to a definite point in the distant future, without any explanation of the circumstances leading up to it, began to be felt.

Especially Doederlein (1775), Koppe (1779), Eichhorn (1780), Justi (1793), Bauer (1794), Paulus (1793), Rosenmüller (1791–93), Bertholdt (1812), De Wette (1817), and Gesenius (1821) paved the way for a wider recognition of the composite character of the book. During the last century a very large number of scholars have endeavored to determine by internal evidence what prophecies are likely to have been uttered by Isaiah himself and when the assumed additions were made. It is now generally admitted that the following passages come from Isaiah, the son of Amoz: i; ii. 6–iv. 1; v. 1–23; vi; viii. 1–18; ix. 7–x. 4; x. 5–15; xvii. 1–11; xviii; xxii. 1–25; xxviii. 1–4; xxviii. 7–xxxi. In spite of the fact that Isaiah is spoken of in the third person, and that chap. vii especially offers great difficulties, the substance of chaps. vii and xx is also regarded by most scholars as coming from him. Concerning viii. 19–ix. 6 and x. 16–xi. 9 there is a marked difference of opinion: as they seem to presuppose the Babylonian exile and voice hopes centring around some descendant of the fallen Davidic dynasty, many scholars consider them as coming from a later period, while it is argued by others that Isaiah may have looked forward to the appearance of a stronger and nobler monarch of the reigning house after a time of great depression. The hymn of thanksgiving in chap. xii is generally held to be postexilic. In spite of the ascription to Isaiah, the magnificent poem in chaps. xiii–xiv reflects so clearly the situation at the end of the exile, when the overthrow of the last King of Babylon was expected, that those who do not regard the editorial heading as correct ascribe the section to this period. The same applies to the anonymous prophecies in chap. xxi. The date of chaps. xv–xvi can scarcely be determined. Psammetichus I (663–610 B.C.) is probably the "fierce king" of xix. 4; and in view of the Elephantine papyri (q.v.) it is not improbable that there was a Jewish colony at Heliopolis as well as at Elephantine. Chap. xxiii is plausibly supposed by Duhm to be an elegy on the destruction of Sidon in 348 B.C.

The judgment of the world in chaps. xxiv–xxvii, with its elaborate eschatological programme, appears to many scholars to be very late—some think of the time of Alexander, others of the second century B.C. To the same epoch the prophecies in chaps. xxxiv–xxxv are frequently assigned, and chaps. xxxii–xxxiii are also regarded by many as postexilic. If chaps. xxxvi–xxxix were taken from 2 Kings xviii. 13–xx. 19, they are later than the exile; but even if both recensions came from an earlier source, this appears to have been a biography of the prophet, and not a collection of his oracles. It is evident that, if the sayings here ascribed to Isaiah were uttered by him, his attitude must have undergone a very marked change, which to many students seems wholly improbable. In reference to chaps. xl–lxvi it was for a long time held that these chapters were written towards the end of the Babylonian exile by an unknown prophet whom it has become customary to call Deutero Isaiah. Questions arose, however, concerning four poetical descriptions of the Servant of Yahwe—some considering these as earlier, some as later, than the main work—and the genuineness, in this sense, of a number of Songs of Zion was also doubted. Later Duhm's view gained wide acceptance, according to which chaps. lvi–lxvi were written in the middle of the fifth century by an author who has been designated as Trito Isaiah. While Deutero Isaiah was supposed to have lived either in Babylon or in Egypt or in Phœnicia, Trito Isaiah was regarded as being a citizen of Jerusalem. This solution of the problem has not been adopted by all scholars who reject the Isaianic authorship, though it is the prevalent one at present. Some still adhere to the essential unity of the whole appendix (xl–lxvi) and its origin c.540 B.C. This appears to be the position of Wellhausen (*Israelitische und jüdische Geschichte*, 7th ed., Berlin, 1914). On the other hand, doubts have recently been expressed as to the accuracy of either view. Torrey has voiced his conviction that all of these chapters were written by the same man later in the Persian period. He has not yet published his reasons for this conclusion. But they are undoubtedly connected with certain difficulties that are not satisfactorily met by the scholars who advocate the current opinions and which seem to necessitate a reconsideration from a new point of view. In the very first lines it is Jerusalem that is addressed as Yahwe's people and comforted with the hope of better conditions and the return of exiles. These are to come from the north and the south, the east and the west (xliii. 5, 6), presupposing the scattering of the Jews in all of these directions. There is no sign that the author himself belongs to the dispersed Jews. He speaks to the heart of Zion, and the exiles are always in the distance. When he refers to those living in Babylonia, he asks them to come forth from Babylon (xlviii. 20); and in speaking of the effects of Jerusalem's redemption "in the eyes of all the nations" he advises his people to "go out from thence" (lii. 11). His standpoint seems to be Jerusalem everywhere. The desire for a return of exiles from all parts of the earth is as marked in lx, lxvi. 20, as in the earlier chapters. The comforting note is found in the later chapters as well as in the earlier, and the consciousness of Israel's unworthiness, unbelief, and sin is met with in both. The mention of Cyrus in xliv. 28 and xlv. 1 has naturally led to the idea that the end of the exile is the historic situation. But in xlv. 1 "To Cyrus" is metrically redundant and looks like a later addition, and the lines referring to Cyrus in xliv. 28 have the appearance of being a homeless fragment finally interpolated here, while it once seems to have been part of an oracle ascribed to Jeremiah, as 2 Chron. xxxvi. 22, 23, Ezra i. 1, 2, suggests. Passages supposed to refer to Cyrus may in reality apply to the Servant of Yahwe or to a Judæan high priest or king. It is evident that the figure of the Servant of Yahwe, so differently interpreted in modern times, already puzzled the ancient scribes, and some of their exegesis is likely to have left traces in the text itself. The assumption that the Samaritans at the time of Ezra and Nehemiah, their sins and their heretical purpose to build a rival temple on Mount Gerizim, are alluded to in lvi–lxvi does not seem to be well founded. Such descriptions as we have, even from prejudiced sources, of the Shechemite community do not intimate that they were guilty of the practices denounced in lvii, lxv, and lxvi. A distinction seems to be made between the servants of Yahwe who tremble at His word and the sinners who in reality are apostates from the faith and have become pagans, though they hypocritically continue to participate in the official cult, and the sins enumerated seem to suggest the conditions of the Hellenizing Jews in Jerusalem in the second century B.C. It is not necessary to interpret lxvi. 1 ff. either as a condemnation of all temple service or of the attempt to build a new temple; the passage voices essentially the same feeling as 1 Kings viii. 27, and the following verses seem to denounce those who offer legitimate sacrifices, but also such as are heathenish and proscribed by the Law. The awful picture of Yahwe's vengeance on Edom and other peoples in lxiii likewise has the appearance of reflecting the victories of the Hasmonæan period. Already Grotius and Houbigant thought that this period was in the prophet's mind. From the internal evidence it would not be impossible, therefore, to maintain that the bulk of the appendix comes from the fourth century B.C., with interpolations and additions made in the second century B.C. But it should be strongly borne in mind that all such theories can only be tentative, and that a vast amount of labor and thought will have to be expended on this remarkable work before anything more can be affirmed as a fixed result of science than the bare fact that this anonymous appendix reflects conditions later than the capture of Jerusalem by Nebuchadnezzar. Eminent Catholic scholars still maintain that all parts of the Book of Isaiah come from the prophet who lived in the eighth century. Their arguments are based chiefly on the conception of prophecy as implying accurate prognostication of future situations, regardless of the needs and understanding of those immediately addressed, and partly on the similarity of certain phrases to Isaiah's style, explained by the critics as due to imitation by later writers or copyists.

Concerning the date of those passages that are ascribed to Isaiah by almost all scholars, it is generally held that chap. i originated c.705–701 B.C.; ii. 6–iv. 1, v. 1–23, and vi, c.737 B.C.; viii. 1–18, c.734 B.C.; ix. 7–x. 4, c.737–734 B.C.; x. 5–15, c.701 B.C.; xvii. 1–11, c.737–734 B.C.; xviii, c.701 B.C.; xxii. 1–14, c.701 B.C.; xxii. 15–

25, c.705 B.C.; xxviii. 1–4, c.724 B.C.; xxviii. 7–xxxi, c.701 B.C.; and the substance of vii, c.734 B.C., and of xx, c.711 B.C. The characteristic attitude of Isaiah is one of awe before the majesty of Yahwe, and fearless denunciation of all that is high and exalted on earth, of the disobedience to Jahwe's moral commands, the attempt to placate Him by sacrifice and temple worship, the dependence upon warlike preparations and political alliances rather than on Yahwe, and the lack of faith in His safe guidance. He was convinced that the mass of the people because of its infidelity would go under, and that only a remnant would turn to their God after severe affliction. So far as the people at large was concerned, he cherished no illusions as to the effect of his oracles; he realized that they would have a tendency to harden the hearts of many and goad them on to their doom. But he deposited his faithful testimony in the hearts of his disciples, and to this unknown circle of believers we probably owe the preservation of his prophecies. The terseness and vigor of his style, his command of all the resources of the language, his mastery of invective, sarcasm, and irony, the impetuousness of his speech, the grandeur and sublimity of his conceptions, and his uncompromising emphasis on the ethical demands, mark him as an extraordinarily gifted, powerful, and enlightened personality, as perhaps the greatest of all the Hebrew prophets. But the tremendous influence exercised by the book that bears his name is possibly due in even a larger measure to the remarkable prophet of an entirely different type to whom it is supposed that we owe the substance of the appendix (chaps. xl–lxvi). Some of his leading ideas became the heritage of his people and affected the development of religious thought in the Church to an extent that can scarcely be affirmed of any conception ascribed with certainty to Isaiah himself. There is no God but Yahwe, and Israel is His servant; the other gods are nothing but lifeless images; He alone can predict the future and reveal it to His prophets; He is the creator of the world, He has chosen Israel to be His people; through his knowledge and his suffering, which has redemptive value, the Servant of Yahwe, Israel, will establish Yahwe's law to the ends of the earth; the other nations are as nothing to Him; He exchanges them for Israel; He makes them lick the dust under the feet of His people, He overthrows them. These are the thoughts and sentiments repeatedly expressed. It is only necessary to remember the large place held in Judaism, Christianity, and Islam by the doctrines of monotheism, imageless worship, predestination, election for service and privilege, revelation, prophetic infallibility, and the rejection of the nations that know not God, to realize what a strong impact the grouping of these notions, whether original with the prophet or not, into a synthetic view of the world has made on religious thought in later generations. The reference to Isaiah in Ecclesiasticus xlvii. 22–25 shows that the author knew the appended chapters as a part of the book ascribed to the prophet; the Ode to Famous Men in which this reference occurs was probably written by Simeon Siracides, the son of Jesus Siracides, c.150 B.C. The book had practically its present form when it was translated into Greek in the first century B.C.

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ISANOMALOUS LINES (īs'ȧ-nŏm'ȧ-lŭs) (from Gk. *ἴσος, isos*, equal + Eng. *anomalous*, from Lat. *anomalus*, Gk. *ἀνώμαλος, anōmalos*, uneven, from *ἀν, an-*, priv. + *ὁμαλός, homalos*, even, from *ὁμός, homos*, same, Skt. *sama*, Goth., OHG. *sama*, Eng. *same*). Lines connecting places whose temperatures, pressures, etc., have equal departures from the average values appropriate to the respective zones of latitude. This term was first introduced by Dove.

ISAR, ē'zȧr. A tributary of the Danube and essentially the national stream of Bavaria. It rises in Tirol, a few miles north of Innsbruck, and, breaking through the Alps, enters Bavaria, where it flows at first north past the city of Munich and then northeast past Landshut, joining the Danube near Deggendorf (Map: Germany, E 4). Its total length is about 182 miles. Owing to its numerous falls and scarcity of water at certain points, the Isar is of little importance as a commercial waterway and is used mostly for the floating of timber.

I'SARA. The ancient name of the river now known as Isère (q.v.).

IS'ARD, or **IZ'ARD** (Fr., from Catalan *isart*, chamois, perhaps of Iberian origin). The chamois of the Pyrenees (*Rupicapra pyrenaica*), a smaller form, with shorter horns and a more foxy-red color than the typical gemse of the Alps. See CHAMOIS.

ISAROG, ē'sȧ-rôg'. One of the principal peaks of the island of Luzon, Philippines, situated in the southeastern part of the island in the Province of South Camarines, and occupying the isthmus between the Bay of San Miguel and Lagonoy Gulf (Map: Philippine Islands, D 4). It is an extinct volcano. Its height is 6450 feet; its base is 36 miles in circumference. Numerous streams have their sources on its slopes.

ISAU'RA. See ISAURIA.

ISAURIA, ī-są'rī-ȧ (Lat., from Gk. *Ἰσαυρία*). The ancient name for a region in Asia Minor on the north side of Mount Taurus between Cappadocia, Lycaonia, Cilicia, and Pisidia. The Isaurians were a half-barbarous people, living by plunder. They displayed an indomitable spirit from the earliest times; with their Cilician neighbors they ravaged the Eastern waters with their piracies. In 78 B.C. they were re-

duced to a temporary submission by the Romans, but soon renewed their raids. The Romans endeavored to surround their country with a chain of fortresses. In the third century A.D. the Isaurians formed one nation with the Cilicians, and one of their number proclaimed himself Roman Emperor, but was put to death. A native of Isauria, Zeno, was Byzantine Emperor at the time of the fall of the Western Empire. The capital, Isaura, at the foot of Mount Taurus, the only important city, was a large, rich, and well-fortified place. It was burned, together with its inhabitants, by the Isaurians when unable to withstand the siege of the Regent Perdiccas, in the fourth century B.C. The country was rocky and barren, producing chiefly the vine, which was cultivated with care. Consult: Sterrett, "Wolfe Expedition to Asia Minor," in *American Journal of Archæology*, vol. iii (Baltimore, 1888); Sir W. M. Ramsay, *Historical Geography of Asia Minor* (London, 1890); and the article "Nova Isaura," in *Journal of Hellenic Studies* (ib., 1905).

IS'CA DAMNO'NIO'RUM. See EXETER.

IS'CA SIL'URUM. See CAERLEON.

ISCHIA, ēs'kyä. An island of south Italy, lying between the Bay of Naples and the Gulf of Gaeta, 7 miles southwest of Cape Miseno, the nearest point of the mainland (Map: Italy, D 4). Area, 17½ square miles. The chief industries are the manufacture of straw hats, oil, pottery, bricks, and tile. There are fisheries and shipbuilding. It is of volcanic origin, and is rocky and mountainous throughout, the highest point being the volcano Epomeo (2588 feet). Nevertheless, it is very fertile and is famous for its wine as well as for its exquisite scenery and climate, which make it one of the favorite resorts of tourists. The island is connected by steamers with the mainland. It markets white wine and fruit. It contains the towns of Forio and Casamicciola, the latter being the one most visited by tourists on account of its mineral springs, which are famous. Their populations in 1911 were respectively 5618 and 3434. Ischia, the capital, has a cathedral, a castle, a good harbor, and (1911) 7430 inhabitants. The island was first settled by Greek colonists, who abandoned it on account of its dangerous volcanic activity. It has been a number of times visited by earthquakes, especially in 1883, when the towns of Forio, Casamicciola, and Lacco Ameno were destroyed, and 1700 persons killed. Pop., 1901, 26,891; 1911, 28,000.

ISCHL, ĭsh''l. A celebrated watering place, in the Crownland of Upper Austria, picturesquely situated in the centre of the Salzkammergut, 1533 feet above the sea level, on a peninsula formed by the rivers Traun and Ischl, 28 miles east-southeast of Salzburg (Map: Austria-Hungary, C 3). The fine parish church, built by Maria Theresa, a Kurhaus, a theatre, and a number of fine villas, including an Imperial villa, are the principal attractions. There are salt and sulphur springs, mud, pine-needle, vapor, and other baths, a whey cure, and a hydropathic establishment. Ischl is the summer residence of the Imperial family and is well patronized by the Austrian nobility as well as by foreigners, the annual number of guests being about 25,000. In the vicinity are extensive salt works, from which the brine is conducted to Ischl and there evaporated. Pop. (district), 1910, 28,611.

ISÉ, ē'sā. A central province of Japan, bordering on Isé Bay and adjoining Yamato on the west (Map: Japan, E 6). It is included in the Prefecture of Miye and contains several busy towns, the chief of which are Tsu, 36,408 inhabitants; Ujiyamada, 33,627; Yokkaichi, 30,140. Near Yamada are the celebrated Shinto shrines, called by the Japanese *Ryo-dai-jin-gu* (two-great-divine-temples), which rank first among all the shrines of Japan in point of sanctity, but not in point of antiquity. These shrines are annually visited by tens of thousands of pilgrims, who return with charms (consisting of chips of the wood), to be placed in the little shrine which stands on the *Kami-dana* (god-shelf) found in every Japanese house. Every six months there is a great festival, which is supposed to effect the purification of the whole nation from the sins of the preceding six months, and the possessor of a fragment of the cedar wands used in these festivals is protected from misfortune for the next six months. For a full account of the buildings, their arrangements, ceremonies, and the gods here honored, see the paper by Sir Ernest Satow in *Transactions of the Asiatic Society of Japan*, vol. ii (Yokohama, 1874).

ISEGHEM, ē'ze-gĕm. A town of Belgium, in the Province of West Flanders, 23 miles by rail from Bruges (Map: Belgium, B 4). It manufactures woolen, linen, and lace. Pop., 1900, 12,172; 1910, 14,158.

ISEGRIM, ISENGRIM, ISGRIM (MHG. *Isengrīm*, iron helmet). In German animal epos, the name of the wolf.

ISELIN, ēz'lăN', HENRI FRÉDÉRIC (1825–1905). A French sculptor, born at Clairegoutte, Haute-Saône. He studied under Rude in Paris and speedily made a name for himself by his portrait busts, which are distinguished for strong but sympathetic interpretation of character. He received the cross of the Legion of Honor in 1863. His "Jean Goujon" (1852) is in the Ministry of the Interior; "Picard, Dramatic Author," at the Institute; "Count Morny" and "Baron Poisson," at the Ecole Normale; "President Boileau," at the Luxembourg; "Donizetti," at the Conservatory of Music. Portrait statues by him at Versailles are "King Murat," "Prince Beauffremont," "The Duke de Morny," "Count Rambuteau," "Claude Bernard," and others.

IS'ENBRAS, or **IS'UMBRAS,** SIR. A hero of mediæval stories, originally presumptuous, but humbled by adversity.

ISEO, ē-zā'ō, LAKE, called also LAKE SEBINO (Lat. *Lacus Sevinus*). A lake in Lombardy, north Italy, 15 miles northwest of Brescia (Map: Italy, C 2). It is 605 feet above sea level, 15 miles long, from 1 to 3 miles broad, and its greatest depth is 984 feet. In shape it resembles somewhat the letter S. Through it flows the Oglio, a branch of the Po. In the middle of the lake is the island Siviano, 2 miles long, culminating in Mount Isola, 1965 feet above the sea. The population of the island in 1911 was 1167. Along the east side of the lake, over deep valleys and through lofty galleries, runs the highway from Iseo to Pisogne. North of the lake are to be seen the snow-covered Adamello Mountains. A steamer connects Sarnico and Iseo at the southern extremity of the lake with Pisogne and Lovere at the northern extremity. Iseo, which in 1911 had a population of 3521, markets wine, grain, olives, and chestnuts; it dyes and spins silk; and has several sardine and eel fisheries. There are an-

cient walls and a castle, also a communal theatre. Lovere, which in 1911 had a population of 4197, markets wine and cattle and spins silk. Its handsome church, Santa Maria in Valvendra, built in 1473 and restored in 1547, 1751, and 1888, contains frescoes by Ferramola and old paintings.

ISÈRE, ē′zâr′. A river of southeast France, rising in Savoy, at the west base of Mount Iséran (Map: France, S., K 3). It flows in a general southwesterly direction, forming great loops, through the departments of Savoie, Isère, and Drôme, past Albertville, Grenoble, the most important town on its banks, and Romans, and joins the Rhone 4 miles above Valence. The upper half of its course runs through a beautiful Alpine region around the foot of La Grande Chartreuse. A railroad follows its valley, which is the principal route to the most important Alpine passes south of Mont Blanc, and one of its upper tributaries leads to the Mont Cenis Tunnel. The entire length of the Isère is about 180 miles, for the last 90 of which, from Montmélian, it is navigable, but with difficulty, owing to its rapid flow and shoals and islands.

ISÈRE. A southeastern department of France, bounded on the north by the Department of Ain, on the west by the river Rhone, on the east by the Department of Savoie, and on the south and southeast by those of Drôme and Hautes-Alpes (Map: France, S., K 3). Area, 3179 square miles, of which nearly a half is arable land and a fifth under forest. Pop., 1901, 562,315; 1911, 555,911. The surface is level plateau land in the northwest, but mountainous in the south, where the scenery is very imposing. Pic Lory in the Oisans is 13,396 feet above the sea. The chief rivers, besides the Rhone, are the Isère, from which the department derives its name, and its affluents, the Drac and Romanche. The department is one of the richest in France in mineral products. Mines of iron, lead, silver, coal, and marble are worked. It has large forests and many mineral springs. Manufactures include gloves, silk, and paper. The vine is carefully cultivated in the valleys. Capital, Grenoble.

ISÈRE, Colombat de l'. See Colombat de l'Isère.

ISERLOHN, ē′zĕr-lōn′. An important manufacturing town of the Prussian Province of Westphalia, situated on the Baar, 15 miles by rail from Hagen (Map: Prussia, B 3). It manufactures chiefly needles, bronze, silver, and nickel wares, furniture, chemicals, wire (large electric cables), and machinery. Cadmium and zinc are dug from beneath the town. It has a Gymnasium and a training school for the metal industry. Pop., 1900, 27,265; 1910, 31,294.

ISERNIA, ē-zĕr′nyȧ. A city in the Province of Campobasso, Italy, 79 miles north of Naples, 1495 feet above sea level (Map: Italy, E 4). It has fine mineral springs. The ancient Samnite Æsernia was important because of its strong situation on an isolated hill. There are remains of huge polygonal walls and of an aqueduct. Isernia manufactures linen and pottery. It is the seat of a bishop. Pop. (commune), 1901, 9322; 1911, 9284.

ISERT, ē′sērt, Paul Edmund (1757–89). A Danish traveler. He went to the possessions of Denmark in Africa (1783) as chief surgeon at Fort Christiansborg, on the Guinea Coast, and three years afterward, because of having cured the sister of the Ashanti King, he was allowed to make extensive journeyings through the King's domain. He collected interesting details of native life and manners, and also visited the Antilles before returning to Denmark (1788). He was intrusted with the establishment of a colony in Africa and made an attempt upon the island of Rio-Volta, near Malfy; but he removed to Guinea, where he had landed all his accoutrements. There he and most of his company died of fever. The letters he had written to his family and friends were published at Copenhagen (1788) under the title *Reise nach Guinea und den caraibischen Inseln in America.* They are also contained in the Danish collection of Gyldendal (iii, 1790) and translated into Danish, Dutch, Swedish, Spanish, and French.

ISEULT, ē-sōōlt′, **ISOLD, ISOLDE,** ĭ-sōld′, **ISOND,** ĭ-sōnd′, **ISOUD,** ĭ-sōōd. A character in mediæval romance. The name occurs in a great variety of forms. 1. Iseult the Fair, wife of Mark, King of Cornwall, who through philtre is made to love his nephew, Sir Tristram. 2. Iseult of the White Hands, a princess of Brittany, the wife of Sir Tristram. See Tristram.

IS'FAHAN′. See Ispahan.

I'SHAM, Samuel (1855–1914). An American portrait and figure painter, born in New York. He graduated from Yale University in 1875 and studied law, but after being admitted to the bar he turned to art and studied in Paris at the Académie Julian. He exhibited at both Paris salons and at the larger American exhibitions, and became a member of the National Academy in 1906. His most important achievement, however, was his *History of American Painting* (New York, 1905), the best work on the subject. It deserves high praise for its adequate treatment, sympathetic but usually just appreciations, and pleasing style.

ISHBO'SHETH. 1. In the Old Testament, a son of Saul. 2. A character representing Richard Cromwell in Dryden's *Absalom and Achitophel.*

ISHIM, ē-shēm′ (Kirghiz *Isel*). A river of Siberia, the most important left affluent of the Irtysh, rising in the eastern part of the Territory of Akmolinsk. It flows in a westerly and then northeasterly direction till it empties into the Irtysh, after a course of about 1000 miles. It is free of ice about 190 days in the year, but is navigable for only 100 miles. It passes the towns of Akmolinsk, Petropavlovsk, and Ishim. The Trans-Siberian Railway crosses the river at Petropavlovsk.

ISH'IMO'TO, Sharoku (1854–1912). A Japanese soldier. He rose in the military service to the rank of major general in 1898 and licutenant general in 1904. For many years he had charge of the Tokyo arsenal, but in 1903 he gave up that post to become Vice Minister of War.

ISHMAEL, ĭsh′mȧ-ēl (Heb. *Yishmā'ēl,* God hears). The elder son of Abraham and reputed ancestor of a number of North Arabian tribes. His story is given in Genesis xvi and xxi. It is said that Sarah, being barren, gave Hagar, her Egyptian handmaid, to her husband Abraham. When Hagar saw that she was with child, she began to despise her mistress, and as a result was harshly treated. This compelled her to seek refuge in flight; but at the advice of an angel, who foretold the birth of a son and also his character, she returned. The child was born, and at the age of 13 was circumcised. By

this time Isaac was already born, and Hagar was driven out again with her son. The provisions given her by Abraham did not last long, and she had given up hope when an angel pointed out a well of water. Ishmael grew and dwelt in the wilderness of Paran, living by hunting. He married an Egyptian woman. The Egyptian origin of both Ishmael's mother and his wife has been questioned by some scholars, who regard the term "Mizrite" as signifying that they came from the region around Wadi el Arish (the Brook of Egypt) or, less probably, a district even farther east.

Scholars generally consider Ishmael, as thus portrayed, the personification of a group of tribes who were akin to the Hebrews and who at one time proved to be serious rivals. In making Ishmael the son of a bondmaid, the tradition reflects the Hebrew point of view, and it is noteworthy that among the Arabs, who regard themselves as descendants of Ishmael, it is Hagar who is the true wife of Abraham, and Ishmael is the favored son. (See HAGAR.) The home of the Ishmaelites was the wilderness to the south of Palestine, as far as the frontier of Egypt. Hebrew tradition accounts for this by having Abraham drive Hagar and Ishmael into the wilderness. Certain phases favorable to Ishmael could not be entirely obscured. Hagar and Ishmael are under the protection of the deity revealing himself at Beer-lahoi-roi. Power is promised to Ishmael and success in war, and his name (El hears) also points to the excellent terms of his relationship to the deity. In the representations of Hebrew writers a considerable section of central and northern Arabia is occupied by Ishmaelites. Their spread over this large territory is indicated in tradition by making Ishmael the father of 12 sons (Gen. xxv. 13–18). Hence we find among the Ishmaelites representatives of both types of the Arab—the fieree Bedouin and the Arab on the road to civilization, even engaging in commerce. According to Gen. xxxvii. 25, Ishmaelitish merchants carrying spices from Gilead bring Joseph to Egypt. (See JOSEPH.) This connection of Ishmaelites with Egypt or the territory immediately east of Egypt, to which name the Mizraim seems to have been also attached, is also introduced into the narrative which records that Hagar was an Egyptian and makes Ishmael also marry an Egyptian woman. It should, however, be added that the term Ishmaelite, like the term Midianite, comes to be used vaguely by Old Testament writers, and no conclusions are to be drawn from such usage as to genealogies of Arabic tribes. In a general way it was recognized that the clans of Arabia and the clans of Palestine were closely akin, and this was represented in tradition by tracing them back to the same ancestor, just as in another stratum of tradition Hebrews and Edomites are traced back to Jacob and Esau, who unite in the person of Isaac. See EDOM; JACOB; ISAAC; ESAU.

ISHPEMING, ĭsh'pĕ-mĭng. A city in Marquette Co., Mich., 15 miles west of Marquette, on the Duluth, South Shore, and Atlantic, the Lake Superior and Ishpeming, and the Chicago and Northwestern railroads (Map: Michigan, B 2). It is in the great Lake Superior mineral region and is the centre of the iron-mining district of the Marquette Range. Its interests are principally in iron mining, but gold and marble also are found in this vicinity and there are lumber mills. Settled about 1857, Ishpeming was chartered as a city in 1873. Among the noteworthy features are the Ishpeming and Lindgren hospitals, a Carnegie library, and Lake Michigamme, a summer resort. The government is administered, under a charter of 1891, by a mayor, annually elected, and a common council, of which the executive is a member. The waterworks are owned by the municipality. Pop., 1900, 13,255; 1910, 12,448; 1920, 10,500.

ISHTAR, ĭsh'tär. The name of the chief goddess worshiped by the Semitic Babylonians, the Assyrians, and apparently also by the Gutians and the Lulubians. Either because of the meaning of the name, which is unknown, or the important position gained by this deity, Ishtar became a generic name for goddess. It is uncertain whether she was originally the local numen of some Akkadian community in Babylonia or a goddess worshiped by the Akkadians before they invaded this country. The latter is suggested by the fact that the name, somewhat differently pronounced, is found in all parts of the Semitic world; *Athtar* in Arabia, *Astar* in Abyssinia, *Atar* among the Aramæans, *Ashtar* in Moab, *Ashtart* in Canaan and Israel. But it has been maintained that the Ishtar cult is likely to have spread from Babylonia in different directions. The circumstance that the sex varies, so that Athtar, Atar, Astar, and probably Ashtar represent a male deity, Ashtart a female, and Ishtar either a male or a female, seems to point to an object that could be conceived of as either. Such an object is the planet Venus, which, like sun and moon, is now male, now female, and with which the Arabian Atarsamain and the Canaanitish Ashtart are closely related as Ishtar. In the absence, however, of a satisfactory etymology it is impossible to determine whether Ishtar was originally a designation of Venus, characterizing it, perchance, as the one that "musters" the heavenly hosts, or the name of a deity concerned with the fertility of the soil and of animal and human life, only subsequently identified with the planet. In either case the name seems to have been given by the Akkadians to Sumerian goddesses like Nanai of Erech (q.v.), Anunit of Akkad (see ACCAD), and others. It probably supplanted a Nina of Nineveh and some local goddess of Arbela. Ishtar of Erech was especially connected with the evening star, while Ishtar of Akkad was connected with the morning star. The latter was regarded as male (*zikarat*), in distinction from the former as female (*zinnishat*), which shows the vacillation as to sex within Babylonia itself. The goddess of Erech is represented as unmarried, but having a number of lovers, the most famous of them Tammuz, to whom she brings death and destruction. She is surrounded by priestesses of different grades, who symbolize their devotion to her service by rites of an obscene character. She also had male hierodules. Withal she was a goddess of a violent type, who encouraged her subjects in the fray and punished those who disobeyed her with fatal diseases. This warlike side of her nature is emphasized by kings like Hammurapi (2124–2081 B.C.), who appeared prominently in the rôle of conquerors. Ishtar of Arbela seems to have preserved more of the character of the stern virgin goddess of the chase and of war, while Ishtar of Nineveh was more of a goddess of love. The former gave, through her prophets and prophetesses, oracles to the Assyrian kings.

In the theological system Ishtar is represented as the daughter of Anu or Enlil and as the sister of Shamash, forming a part of the triad Shamash, Sin, and Ishtar, but occupying a place after the sun god and the moon god. By virtue of this preeminence in the heavenly host, she is known as the queen or mistress of heaven. Besides being identified with the planet Venus, she at times appears as the goddess representing the star Sirius; and as both Shamash and Sin were regarded in Babylonia and Assyria as male deities, she became the great mother goddess, the mother of mankind. In the representations of the goddess both sides of her nature, the destructive and the life-giving, are brought out. Among the Assyrians she is pictured generally as clad in flames, with a quiver hanging to both sides, a bow in one hand, and a sharp sword in the other; while in Babylonia the type that early became popular was that of the naked goddess, with prominent breasts and the organs of generation strongly emphasized, or the mother with the child at her breast. At Ras el-Ain in Mesopotamia a veiled Ishtar has been found.

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ISIAC (ī'sĭ-ăk) **TABLE.** The name formerly given to a bronze plate, 4 feet, 8 inches long and 3 feet wide, on which are depicted three rows of Egyptian deities inlaid in niello and silver. It seems to have been found in Italy and was sold by a soldier of the Constable de Bourbon to a locksmith, who sold it in 1527 to Cardinal Bembo. It excited much curiosity and gave rise to considerable discussion before Egyptologists had learned to decipher hieroglyphics. It is now preserved in Turin, but is almost forgotten, being considered as at best an imitation dating from the Roman period.

ISIDORE OF CHARAX, kā'răks (Lat. *Isidorus Characenus*). A geographer of the first century A.D., born at Charax, on the Tigris, the author of *Travels in Parthia*, often quoted by Athenæus (q.v.), and of an extant work on a similar subject, entitled Σταθμοὶ Παρθικοί, which has survived. It is better known under its Latin title, *Mansiones Parthicæ*, and is published, with a Latin translation, in the series of *Scriptores Geographici* (Paris, 1839) and by Carl Müller, *Geographici Græci Minores*, vol. i (Paris, 1855).

ISIDORE OF SEVILLE, sĕ-vĭl', SAINT (?–636). An archbishop of Seville and one of the most distinguished ecclesiastics of the seventh century. He was born about 560 (or 570), probably at or near Cartagena, where his father, Severianus, had been prefect. Two of his brothers, Fulgentius and Leander, were bishops, the first of Astigi, the second of Seville; Isidore succeeded the latter in 600. The episcopate of Isidore is rendered notable by the two half-ecclesiastical, half-civil councils of Seville in 619 and of Toledo in 633, which were held under his presidency, and the canons of which may almost be said to have formed the basis of the constitutional law of the Spanish kingdoms down to the great constitutional changes of the fifteenth century. The decrees of councils and other Church laws anterior to his time, called by his name, are not from his hand. He died at Seville, April 4, 636. Isidore was the most learned man of his time, and his works are in the most various departments of knowledge—theological, ascetical, liturgical, scriptural, historical, philosophical, and scientific. The most complete edition is that of Arevaio (7 vols., Rome, 1797–1803), reprinted with addition of the canons and liturgy in Migne, *Patrologia Latina*, lxxxi–lxxxvi. We are indebted to Isidore for many fragments of Greek and Latin authors, among the number several of whom hardly any other remains have been preserved. In 1722 Benedict XIV made him one of the doctors of the Church. His *Sentences*, largely from Augustine and Gregory the Great, suggested Peter Lombard's *Sentences*, and his *Etymologies*, in 20 books (ed. by Otto, Leipzig, 1833), and by W. M. Lindsay (2 vols., Oxford, 1911), treating of the terms used in all the departments of knowledge in his time, was the great mediæval encyclopædia. Consult F. J. G. La Porte du Theil, "Notice de l'ouvrage d'Isidro de Seville sur les origines," in *Bibliothèque Nationale, Notices et Extraits des Manuscrits*, vol. xiv (Paris, 1798), and Ernest Brehau, *An Encyclopedist of the Dark Ages* (New York, 1912).

I'SIDO'RIAN DECRETALS. See PSEUDO-ISIDORIAN DECRETALS.

IS'IDO'RUS (Lat., from Gk. 'Ισίδωρος), SAINT (c.370–c.440). A monk, often called *Pelusiota* or *of Pelusium*, from the monastery of which he was abbot. He was born probably at Alexandria, and tradition makes him a pupil of Chrysostom, but this is not certain. He is best known by his letters, of which about 2000 remain. They contain a mass of exegesis, often valuable in itself and always of importance for the construction of the early history of interpretation. They are edited in Migne, *Patrologia Græca*, vol. lxxviii (1860). Consult H. A. Niemeyer, *De Isidori Pelusiotæ Vita, Scriptis et Doctrina* (Halle, 1824), and P. B. Glück, *Isidori Summa Doctrina Moralis* (Wurzburg, 1848).

ISIN, DYNASTY OF. See BABYLONIA, *History*.

ISINGLASS, ī'zĭn-glăs (from MDutch *huysenblas*, Dutch *huisblad*, Ger. *Hausenblase*, isinglass, sturgeon bladder, from MDutch *huysen*, Dutch *huizen*, OHG. *hūss*, Ger. *Hausen*, sturgeon + MDutch *blas*, Dutch *blad*, OHG. *blāsa*, Ger. *Blasen*, bladder, dialectic Eng. *blaze*, pimple; associated by popular etymology with Eng. *glass*). The dried swimming bladders of several varieties of fish. The amount of gelatin in isinglass is from 86 to 93 per cent and even more. It is prepared by tearing the air bladder or sound from the back of the fish, from which it has been loosened by striking several blows with a wooden club, and washing in cold water. The black outer skin is removed with a knife, again washed, and spread on a board to dry in the open air, with the white shiny skin turned outward. To prevent shriveling or shrinking, the bladders must be fastened to the drying board. The best quality of isinglass comes from

sounds that are dried in the sun. After drying, the sound is again moistened with warm water, and the interior shiny skin is removed by hammering or rubbing. Finally, it is rolled between two polished iron rollers. If it is desired to extract the gelatin, the isinglass, while still in a moist condition, is immersed in a solution of sulphuric acid, in which it swells up to a colorless jelly which later is dissolved in warm water. On cooling and drying, a clear and colorless gelatin is obtained. The chief places of manufacture are Russia, Canada, Brazil, the West Indies, the East Indies, and Manila. The Russian varieties, which are supposed to be the best on the market, are made chiefly from the sturgeon; but elsewhere the bladders of cod, hake, and other fish are also used. Isinglass should be of a bright or light-yellow color, thin and transparent, and without any odor or taste. The latter naturally indicates the presence of impurities. When steeped in cold water and dissolved by heating, there should remain but a very small residue, and the jelly which is formed should be clear and colorless. Isinglass may be used for the same purposes as gelatin (q.v.). It is employed chiefly for clarifying beer and wine, for culinary purposes (in jellies and soups), for making cement, etc. The adhesive quality of court plaster is due to isinglass.

I'SIS (Gk. *Ἶσις*, Egyptian, *'Ise-t*, a name of obscure etymology). An Egyptian goddess, the daughter of Seb (Earth) and Nut (Heaven) and the sister and wife of Osiris (q.v.). Herodotus identified her with Demeter and described her as the greatest of the Egyptian goddesses. After the treacherous murder of her husband by his brother Set (q.v.), Isis fled to the swamps of the Delta, accompanied by seven scorpions. On one occasion the mistress of a house in which she sought shelter, fearing the scorpions, turned the goddess from her door, and the scorpion Tefen crept into the house and stung the son of the woman so that he died. But Isis, moved by the woman's grief, laid her hand upon the child and restored him to life. Shortly after this Isis gave birth to her son Horus, whom she placed in the charge of Buto, the goddess of the north. Buto guarded him carefully, but in spite of all her care he was stung by a scorpion, and his mother found him lying lifeless on the ground. At her prayer the sun god Rê stopped his ship in midheaven and sent down Thoth, the god of wisdom, who soon brought Horus back to life. Leaving her young son in the Delta, carefully hidden by Buto from the malevolence of his uncle Set, Isis next went through the world seeking the body of her husband, Osiris, which, inclosed in a chest, had been borne out to sea by the Nile. In her wanderings she was accompanied and protected by Anubis (q.v.), the son of Osiris by his sister Nephthys (q.v.). After a long search she found the body of Osiris. The chest inclosing it had drifted ashore near Byblos, on the Phœnician coast, and had become embedded in the trunk of a great tree which had grown around it. The King of the country, ignorant of the presence of the chest, had caused the tree to be cut down and made of it a pillar for his house. Isis entered the King's service as nurse to his child and endeavored to confer immortality on the infant. Every night she burned away his mortal part with celestial fire, while she herself, in the form of a swallow, flew round the pillar lamenting her husband. One night the Queen, Astarte, came upon her while thus engaged, and crying out in terror at the sight of the child surrounded with flames, destroyed his chance of immortality. Isis now revealed herself, drew the chest from the pillar, and conveyed the body of her husband by ship to Egypt, where she hid it and went to visit her son. Set, however, found the body of Osiris and tore it to pieces, which he scattered in every direction. Learning of this misfortune, Isis took a boat, and seeking her husband's scattered members throughout the land, found all the pieces except the phallus, which had been eaten by fishes. Wherever she found a portion of the body she buried it, and in aftertimes each of these spots was revered as the burial place of Osiris. His head, e.g., was buried at Abydos, and his backbone at Busiris, in the Delta. Isis reared her son Horus in concealment, and when he reached mature age he defeated Set and ascended his father's throne. In the legends of the sun god Rê, Isis is represented as possessing special skill in magic and in the healing art; in this character, as the "great mistress of enchantments," her aid is frequently invoked in the Egyptian magical texts. Her sacred animal was the cow, and she is sometimes represented with the head of a cow, though more frequently she wears only the horns. She is also very commonly depicted as a woman wearing upon her head a throne—the ideogram used in writing her name. In later times she is often represented as seated and holding the infant Horus to her breast.

Isis was very generally worshiped throughout Egypt, but special honor was paid to her at Abydos and Busiris. In later times the centre of her cult was in Philæ (q.v.), where magnificent temples were built to her. Here she was still revered as late as 453 A.D., long after paganism had been suppressed in other parts of the land by edict of Theodosius, her special worshipers being the savage Blemmyan tribes who constantly menaced the safety of Egypt. From Alexandria, where the worship of the triad Serapis (q.v.), Isis, and Harpocrates (q.v.) overshadowed that of all other Egyptian deities, the cult of the goddess spread throughout the whole Hellenic world, and temples were erected to her in many places. It was introduced into Rome in the time of Sulla (86 B.C.) and soon became fashionable, but was brought into ill repute by the licentiousness of its priests, and the government made occasional attempts to suppress it. Under the Empire the cult of Isis became very popular, and Domitian, Commodus, and Caracalla were among the priests of the Egyptian goddess. At the opening of spring (March 5) both Greeks and Romans held a festival in which a ship was carried in solemn procession in honor of Isis. In the Roman Calendar the day of this festival was designated as *Navigium Isidis*.

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ISIS. A name sometimes applied to the upper course of the English Thames (q.v.).

ISIS AND SER'APIS, TEMPLE OF. A great temple in ancient Rome, situated on the Campus Martius near the baths of Agrippa. The temple itself, a pure Egyptian structure, was built of material transported from the Nile. It was inclosed by a peristyle dating from Domitian's time and closely resembling the inclosing wall of his forum, and was approached by a sacred avenue, on the sides of which many great works of Egyptian art were set up. At each end of the avenue stood a gateway with two obelisks, of which one now stands in the Piazza della Rotonda, one in the Villa Mattei, and one in the Piazza dei Cinquecento. Many important works of art have been discovered on the site of the temple, chief among them the Tiber statue, in the Louvre, and the Nile group, both of which were carried away by the French in 1803. The Nile was returned after Napoleon's fall and now stands in the Vatican Museum. Other important finds were the reclining statue of the Ocean, in the Naples Museum, two sphinxes, various portrait statues, relief columns, and other architectural remains. See SERAPEUM.

ISKANDER, ĕ-skän'dĕr. 1. The Turkish form of Alexander. 2. The nom de plume of Alexander Herzen (q.v.), a Russian politician and publicist.

ISKANDERUN, ĕ-skän'dĕ-rōōn'. A city of Turkey in Asia. See ALEXANDRETTA.

ISLA, ēs'lä, JOSÉ FRANCISCO DE (1703–81). A Jesuit preacher and satirist, born in Villavidanes, in the Kingdom of León, Spain. He was a man of acute wit and intense humor. He ridiculed a royal pageant (held, in honor of the accession of Ferdinand VI, at Pamplona in 1746) in his *Triunfo del amor y de la lealtad: Dia grande de Navarra,* an ironical eulogy so artfully disguised that at first it was regarded as an honest adulation, but upon its burlesque character becoming known he was compelled to leave the city. His most important satire was the *Historia del famoso predicador Fray Gerundio de Campazas, alias Zotes* (1758), in whose adventure he held up to public contempt the ignorance and audacity of the itinerant friars of the time and ridiculed unmercifully their debased pulpit oratory. It was condemned in 1760 by the Inquisition on the clamor of the lower clergy, but the second part appeared surreptitiously in 1768. Of Isla's other productions may be mentioned: the *Juventud triunfante* (1727), a work written in collaboration with Luis de Lovada, and one in which the satirical aim is most cunningly hidden; the *Cartas de Juan de la Encina* (1784), which assails the charlatanry of Spanish physicians; his *Cartas familiares* (2d ed., 1790); the *Sermones* (1792), not so attractive as his satirical treatment would lead one to expect, but amply justifying his reputation as an effective preacher. Apart from the publication of the *Fray Gerundio,* Isla owes his chief fame to his translation of the picaresque novel of Le Sage, the *Gil Blas.* The text appeared in 1783, but it is now more widely read in the considerably modified arrangement by Evaristo Peña y Martín, which appeared in 1828. Consult: De Calas, *Vida de J. F. de Isla* (Madrid, 1803); selections from his works in *Biblioteca de autores Españoles,* vol. xv (Madrid, 1850); Policarpo Mingote y Tarrazona, *Varones ilustres de la provincia de León* (León, 1880); Claretie, *Lesage romancier* (Paris, 1890); Gaudeau, *Les prêcheurs burlesques en Espagne au XVIIIe siècle* (ib., 1891); Lintilhac, *Le Sage* (ib., 1893); V. Cian, *L'Immigrazione dei Gesuiti Spagnuoli letterati in Italia* (Torino, 1895); Alonso Cortés, *El supuesto autor del "Fray Gerundio"* in *Miscelánea Vallisoletana,* pp. 39–47 (Valladolid, 1912).

ISLA DE LÉON, ēs'lä dā lā-ōn'. An island in the Bay of Cadiz. See SAN FERNANDO.

ISLA DE PINOS. See ISLE OF PINES.

ISLA DE VIEQUES. See VIEQUES.

ISLAM, ĭs'lam *or* ĭz'lam, *Ar. pron.* ĭs-läm' (Ar., submission, from *salima,* to be safe). The name used by Mohammedans as the designation for their religion. It may be traced back to Mohammed. Literally, it means a causing to be sound or safe, or that which makes safe, but is commonly interpreted to mean complete and entire submission of body and soul to God (Allah), His will and His service, as set forth in the articles of faith, the commands and ordinances believed to have been revealed by God to His Prophet Mohammed. The more usual designation of the religion among Western peoples is Mohammedanism (q.v.).

ISLAMABAD, ĭs-lä'mâ-bäd'. A city of British India. See CHITTAGONG.

ISLAND (AS. *īglond, ēglond,* Icel. *eyland,* Ger. *Eiland,* from AS. *īg, ēg,* Icel. *ey,* OHG. *ouwa,* Ger. *Au,* island; connected with AS. *ēa,* Goth. *ahwa,* OHG. *aha,* Lat. *aqua,* water + AS., Icel. *land,* OHG. *lant,* Ger. *Land,* land; connected with Ir. *lann,* land, Welsh *llan,* land, OChurch Slav. *lendina,* waste land, OPruss. *lindan,* valley; influenced by popular etymology with the unrelated *isle*). A relatively small body of land entirely surrounded by water. Primarily it differs from a continent only in size, although continents have a physical and biological individuality which islands do not possess. Islands are formed in various ways. Those of continental character are separated by short stretches of usually shallow water from the mainland with which they have a geological similarity. They may be formed either by marine erosion or by subsidence of the coast beneath ocean level. The small islands off Norway, Scotland, Maine, and Patagonia are to be regarded as the remnants of hills and mountains, of which the basal portions and intervening valleys have been "drowned" by a general subsidence. The British Isles, Sicily, and Japan represent larger land masses, whose former union with the mainland is indicated by submarine banks; Madagascar, on the other hand, is separated by a deep channel from the African coast. Another type of continental islands owes its origin to the constructive work of rivers, such as the islands at the mouth of the Nile and the Mississippi (see DELTA), or to ocean currents, such as the sand bars along the Atlantic coast of the United States. Islands of coral formation are usually low and limited to the warmer regions of the oceans. (See CORAL ISLAND AND CORAL REEF.) Volcanic islands, consisting of active or extinct lava cones, occur in great numbers in the Pacific and Indian oceans, while in the Atlantic they are represented by St. Helena, Ascension, and the Azores. Submarine eruptions leading to the construction of cones above sea level have taken place in recent times. The island of Johanna Bogoslava in Alaska appeared in 1796 and four years later had grown to a height of 3000 feet. In 1907 a new volcano, known as McCulloch Peak, was blown up, and its place once more oc-

cupied by the sea. Another noted instance is Graham Island (Ferdinandea) in the Mediterranean, which was thrown up in 1831, reaching a height of 200 feet and with a circumference of 3 miles. This island soon disappeared. Oceanic islands—i.e., those situated far from continental lands—with but few exceptions, are of volcanic or coral growth.

Islands are subject to changes of form and contour by various physical agencies. They may be gradually consumed, owing to the erosive action of waves and currents, until their former existence is made known only by a submarine platform. Helgoland, in the North Sea, has suffered thus for many centuries; and the eastern coast of England is wasting at a rapid rate. Volcanic islands are liable to destruction by violent explosions, such as that occurring at Krakatoa in 1883. Under certain conditions islands lying near the coasts of continents may be united to the latter; the peninsula of Shantung, once insulated, has been connected with the mainland by the growth of the Hoang-ho delta.

Island Flora. The floras of isolated oceanic islands, such as the Hawaiian Islands and Galapagos Islands, are very different from the floras of the continents. These differences in most cases affect not only species but also genera, and in one or two cases there are even distinct families which are confined to oceanic islands; in fact, island floras are the most endemic (see ENDEMISM) of all floras. The reason for these phenomena is doubtless that islands have long been isolated from continents, and the progress of evolution has been peculiar to the various islands themselves and uninterrupted by outside invasions. Not only do islands show peculiar floristic types, as has been shown, but they are also rich in certain plant families, among which the ferns have a predominant importance. It is almost certain that the abundance of ferns on oceanic islands is due to the much greater ease of migration that ferns possess as compared with seed plants, by reason of the light spores that can be carried for long distances in the wind. Islands also have a large number of plants whose seeds are scattered by birds, by water currents, or by man.

Island Fauna. For the general characteristics of the fauna of islands, see ISOLATION. Examples of individual peculiarities in island faunas will be found under GALAPAGOS ISLANDS; ETC.

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ISLAND, FLOATING. See FLOATING ISLAND.

ISLAND CITY, THE. A name for Montreal.

ISLAND NUMBER TEN. An island which existed, until shortly after the Civil War, in the Mississippi River, about 40 miles below Columbus, Ky. (near the boundary line between Kentucky and Tennessee), thus named from its position in the series of islands below Cairo, Ill. After the first Confederate line in the West had been broken by the capture of Fort Henry and Fort Donelson (q.v.), the garrison at Columbus, Ky., constituting the Confederate left flank, was withdrawn to New Madrid (q.v.) and Island Number Ten and placed in command of General McCown, who was later replaced by General Mackall. Early in March, 1862, a Federal army under General Pope and a Federal fleet under Commodore Foote advanced against these positions. On the 16th New Madrid surrendered to Pope, who then marched about 25 miles down the river, and with the assistance of transports which had been brought through a laboriously constructed channel, across a peninsula formed by a loop in the Mississippi, from a point above the island to New Madrid, succeeded in attaining the Confederate rear at Tiptonville, the Confederate batteries along the east bank having been previously silenced by the gunboats *Carondelet* and *Pittsburgh*, which, under Captain Walke and Lieutenant Commander Thompson, had successfully run by the island on April 3 and April 7 respectively. Meanwhile Foote's fleet had kept up a fairly continuous though ineffective bombardment. The Confederate garrison, which numbered between 6000 and 7000, threatened in front and rear, and completely cut off from retreat by the Federal forces and impenetrable swamps, finally surrendered on April 7; many guns and stores were also captured. The Federal loss was less than a dozen men. The cutting of the channel across the peninsula formed by the loop in the river required great labor and considerable engineering skill, while the running of the batteries by Henry Walke (q.v.) was not only one of the most dramatic deeds of the war, but completely overcame the Confederate defense of this position. After the war the old Island Number Ten was gradually washed away by the river, and a new one was slowly formed on the opposite shore. Consult A. T. Mahan, *The Gulf and Inland Waters* (New York, 1898), and Johnson and Buel (eds.), *Battles and Leaders of the Civil War*, vol. i (ib., 1901).

ISLAND OF SAINTS (Lat. *Insula Sanctorum*). A name given to Ireland in the Middle Ages, from her great number of ecclesiastics and missionaries.

ISLAND OF THE SEVEN CITIES. A legendary island settled by seven bishops and refugees from Spain and Portugal at the time of the Moorish Conquest.

ISLANDS OF THE BLESSED (Lat. *Fortunatæ Insulæ*, Gk. *Al Tῶν Μακάρων Νῆσοι, Hai Tōn Makarōn Nēsoi*). According to an old Greek myth, certain islands situated towards the edge of the western ocean, where was the abode, not of departed spirits, but of certain favored mortals rescued from death by the gods. Here life was most easy, the climate soft and springlike, and there was abundance of all things. Homer does not refer to these islands, but speaks of the Elysian Plain, a place with like characteristics (*Odys.*, iv, 563: see ELYSIUM). Hesiod, *Works and Days*, 168, and Pindar, *Ol.*, ii, with later poets, speak of the islands. Later authors identified the islands with the Canaries, lying outside the Pillars of Hercules, in the Atlantic Ocean.

ISLAY, ī'lȧ. A Scottish island, one of the Inner Hebrides, included in Argyllshire, 15 miles west of the peninsula of Cantire, and southwest of the island of Jura, from which it is separated by the Sound of Islay (Map: Scotland, B 4). Area, 220 square miles, of which about 22,000 acres are under cultivation. The north of the island is hilly, and along the east shore runs a ridge rising from 800 to 1400 feet in

height of an ancient schistose character similar to the rocks of Argyll and Donegal of northwestern Ireland, indicating a previous connection. The central and west districts are undulating or flat, with great peat deposits. Whisky distilling is the principal industry. Pop., 1901, 6857; 1911, 6274.

ISLE'BIUS, MAGISTER. A name sometimes applied to Luther's disciple Johann Agricola (q.v.).

ISLE DE RHONDE. See GRENADINES.

ISLE OF LADIES. A poem attributed to Chaucer, which first appeared in Speght's edition (1597) of Chaucer. It is also called "Chaucer's Dream."

ISLE OF MAN. See MAN, ISLE OF.

ISLE OF PINES, or Sp. ISLA DE PINOS, ē'slȧ dȧ pē'nôs. An island belonging to Cuba, situated about 40 miles southeast of the south coast of the Province of Pinar del Río (Map: Cuba, C 5). It is almost circular in outline, with a diameter of about 40 miles and an area of 840 square miles. It is hilly and well forested with pine, cedar, and mahogany in the northern part, while the southern consists of a low marsh, similar to the Everglades of Florida, covered with mangrove thickets and presenting a luxuriant wealth of native flora and fauna. The soil of the northern part is sandy and favorable to the growth of pineapples and potatoes, the latter being of excellent quality. There are some mineral deposits, of which only the marble quarries are exploited. Cattle raising and the production of citrus fruits are the chief industries. Since the Spanish-American War the island has been exploited by Americans. It has been Americanized to a large extent, and unsuccessful attempts have been made to bring it under the jurisdiction of the United States. Pop., 1899, 4076; 1907, 3276, chiefly concentrated in the town of Santa Fé and the capital, Nueva Gerona, situated near the north coast.

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ISLE OF PORTLAND. See PORTLAND, ISLE OF.

ISLE OF THANET. See THANET, ISLE OF.

ISLE OF WIGHT. See WIGHT, ISLE OF.

ISLES, LORDS OF THE. A line of Scottish chiefs, celebrated in poetry and romance. Sir Walter Scott, in his notes to *The Lord of the Isles,* speaks of Somerled as Lord of the Isles; but it is probably more correct to speak of him as King of the Isles. The later lords of the isles traced their descent from him. He appears prominently in Scottish history in the middle of the twelfth century, during the reigns of David I and his grandson and successor, Malcolm IV. The race to which he belonged is uncertain; probably, like most of his subjects, he was of mixed descent, Norwegian and Celtic. One of his descendants, Angus of the Isles, gave his fealty to Bruce when the latter was most hard pressed at the beginning of his reign, receiving him into his castle of Dunaverty, and afterward fought under the Great King at Bannockburn. This chief is the hero of *The Lord of the Isles,* but his name, for the sake of euphony, was changed to Ronald. John Macdonald, first Lord of the Isles, son of Angus Og, received a grant from Edward Baliol of Mull, Skye, Isla, Giblia, Kintyre, Knapdale, and other lands. He married Margaret, daughter of Robert II, founder of the Stuart dynasty. During the troubled and disastrous reign of David II, John of the Isles was able to maintain himself in a state of practical independence of the Scottish crown. He was at last, however, compelled to submit. He met David at Inverness in 1369 and gave hostages for his fidelity. He died about 1386. The most powerful of this race was Donald, eldest son of John. He set the kings of Scotland at defiance and made treaties as an independent sovereign with the kings of England. He married Mary Leslie, daughter of the Countess of Ross. Mary's brother, Alexander, Earl of Ross, by his marriage with the daughter of the Regent Albany, left an only child, who became a nun. Donald claimed the earldom in his wife's right, and when his claim was refused by the Regent he prepared to maintain it by force. Taking possession of Ross, he marched at the head of a large army from Inverness, through Moray and Aberdeenshire, and threatened to destroy the burgh of Aberdeen. Donald fought a drawn battle at Harlaw with the Earl of Mar on July 25, 1411, but was compelled to retreat and renounce his designs. He died about 1420 and was succeeded by his son Alexander. John, son of Alexander, in 1462 made a treaty with Edward IV of England, by which he promised to assist the English monarch in the conquest of Scotland.

Throughout their history the Lords of the Isles plotted against the Scottish crown and were a constant menace to the tranquillity of the realm. The last regular lord was John, who forfeited his title in 1493. After him there were several spurious claimants, and at least one who was recognized for a time as Lord of the Isles. Consult: Skene, *Celtic Scotland,* vol. iii (Edinburgh, 1880); Lang, *History of Scotland,* vol. i (ib., 1900); Skene, *Highlanders of Scotland,* edited by Macbain (Stirling, 1902).

ISLES OF SHOALS. A cluster of seven barren, rocky islands and several rocks and ledges, in the Atlantic Ocean, off the coast of New Hampshire, from 5 to 6 miles southeast of Portsmouth. The two largest are Appledore, containing 400 acres, and Star, 150 acres. On these are large hotels chiefly for summer guests, who resort there for the sea air, boating, and fishing. A steamer runs daily from Portsmouth. On White Island is a revolving light 82 feet above the sea. These islands are inhabited by a few fishermen. Consult: J. S. Jenness, *The Isles of Shoals: An Historical Sketch* (New York, 1873); C. L. Thaxter, *Among the Isles of Shoals* (Boston, 1901); id., *My Island Garden* (ib., 1904); Rufus Emery, "The Isles of Shoals," in *Magazine of History,* vol. xiii (New York, 1911).

ISLES OF THE BLESSED. See ISLANDS OF THE BLESSED.

ISLETA, ē-slā'tȧ. An important pueblo of Tanoan stock, situated on the west bank of the Rio Grande, a few miles below Albuquerque, N. Mex. It ranks third among the pueblos,

coming after Zuñi and Laguna, with a population of 956. As in all other pueblos, the people are peaceable, industrious, and self-supporting, raising good crops of corn, vegetables, and fruit, all produced from an arid soil by aid of native irrigation.

Isleta del Sur is the name of a small pueblo on the north bank of the Rio Grande, about 14 miles below El Paso in Texas. It was originally established under mission auspices by refugees from the original Isleta, above noted, who accompanied the Spanish army on its retreat from New Mexico in the Pueblo revolt in 1680. Although considerably Mexicanized, the inhabitants still keep their Indian form of government, their dances, and foot races; and four or five persons remember some of the language. See PUEBLO; TANOAN STOCK.

ISLE VERTE, ēl vĕrt. A town, subdistrict, island, and river of Quebec, Canada. The town is the capital of Temiscouata County and stands on the right bank of the St. Lawrence at the mouth of the Isle Verte River and opposite the Isle Verte (Map: Quebec, J 2). It has a station on the Intercolonial Railway. The inhabitants are mostly French-Canadians. Pop. of census subdistrict, 1901, 2256; 1911, 2169.

ISLEWORTH, īz'l-wĕrth. A suburb of London. See HESTON AND ISLEWORTH.

ISLINGTON, īz'lĭng-ton. A metropolitan borough of London, in Middlesex, comprising four parliamentary divisions, 2½ miles north of St. Paul's (Map: London, D 7). In Liverpool Road is the Royal Agricultural Hall with a capacity of 50,000 persons, in which the national horse and cattle and other great shows are held. Here also are located Pentonville and Holloway prisons and the London School of Divinity. Pop. of borough, 1901, 334,991; 1911, 327,423.

IS'LIP. A town in Suffolk Co., N. Y., on Great South Bay, 43 miles east of New York City, on the Long Island Railroad (Map: New York, B 2). It is about 12 miles in length and 10 miles in width, comprising a number of villages. Islip is a summer resort with many costly residences. Great South Bay, attractive for sailing, is frequented also at other seasons for fishing and hunting. Within the limits of the town are the Central Islip State Hospital, St. Joseph's Convent, and a fish hatchery. Other points of interest are the Fire Island Lighthouse, 166 feet high, and Fire Island State Park. Blue Point oysters are shipped in great quantities. The government is vested in a supervisor, elected biennially, and a town board, made up of the justices of the peace, the town clerk, and the supervisor. Pop., 1900, 12,545; 1910, 18,346.

ISLY, DUC D'. See BUGEAUD DE LA PICONNERIE, THOMAS ROBERT, DUC D'ISLY.

ISMAIL, ês'mâ-ēl'. Capital of a district of the same name in the Government of Bessarabia, Russia, situated on the north bank of the Kilia, an arm of the Danube, and on the Rumanian frontier (Map: Russia, C 5). It carries on a considerable trade in grain and other agricultural products and has a customhouse. Its position on the frontier adds greatly to its commercial importance. Its manufacturing establishments include a large number of flour mills, brickkilns, a crockery kiln, tannery, etc. Steamships connect it with Odessa and other Black Sea and Danube ports. Pop., 1897, 33,607; 1911, 35,708. Ismail is mentioned in the sixteenth century as a fortress and was of great strategical importance under the Turkish rule. In 1632 it was sacked by the Cossacks. It was taken and destroyed by Suvaroff in December, 1790; came into the possession of Russia in 1812; was assigned to Moldavia by the Treaty of Paris, 1856, and transferred to Russia again by the Berlin Congress of 1878.

ISMAILIA, ês'mâ-ē'lē-â. A village of Africa. See GONDOKORO.

ISMAILIA. A town in the Isthmus of Suez, on the Suez Canal.

ISMAILIANS, ês'mâ-ē'lĭ-*a*nz. See MOHAMMEDAN SECTS.

ISMAIL PASHA, ēs'mâ-ēl' pâ-shä' (1830–95). Viceroy and Khedive of Egypt. He was the second son of Ibrahim Pasha (q.v.) and was born at Cairo, Dec. 31, 1830. He was educated in Paris and on his return to Egypt was dispatched on diplomatic missions to several European capitals. Subsequently he was appointed Regent by his uncle, Said Pasha, during his absence in Europe. In 1861 he was placed in command of the army and carried on a victorious campaign against the Sudanese tribes. On the death of Said Pasha in 1863 he succeeded him as Viceroy of Egypt. During the Civil War in America he acquired vast wealth by the production of cotton. Regarding the construction of the Suez Canal (begun under Said Pasha) as advantageous for Egypt, he actively encouraged the enterprise. In 1866 he secured from the Sultan the hereditary succession to the throne of Egypt in his direct line, and in 1867 he received the title of Khedive. Not satisfied with these privileges, he demanded more, threatening to withdraw the troops he had sent against the Cretan insurgents and to seize Crete if his demands were refused. By the advice of foreign Powers he recalled his demand. Nevertheless, by extending his rule over the regions of the upper Nile, by making foreign loans for the increase of his army and navy, and by proposing the neutralization of the Suez Canal, he made himself practically an independent sovereign. The Sultan commanded him to reduce his army, to recall his orders for ironclads and breechloaders, and to put a stop to the contraction of foreign loans, threatening him with deposition if he refused. Not receiving the expected aid from Russia and other Powers, Ismail submitted. Later he received new prerogatives, giving him control of his army and liberty to make loans and commercial treaties. By the building of public roads, the introduction of new methods of agriculture, and other innovations he endeavored to improve the economic condition of the country and to civilize the surrounding tribes. But the progressive measures of the Khedive were accompanied by a reckless extravagance which involved the country to the limit of its resources and made it dependent upon the great financial Powers. In 1879 the governments of France and England, in view of the wretched economic condition of Egypt and the large interests of their own citizens in the administration, determined to interfere in behalf of good government and united in demanding of the Porte that the Khedive should commit the portfolios of Finance and Public Works to English and French ministers. The Khedive resented any interference of the Western Powers with Egyptian affairs. The Sultan then offered to depose Ismail Pasha and to appoint Halim Pasha, Ismail's uncle, as his successor; but the Powers advised the Khedive to abdicate, promis-

ing to support his son Tewfik. The Sultan acquiesced in the course recommended, and on June 26, 1879, he signed the firman deposing the Khedive in favor of his son Prince Mohammed Tewfik. Ismail at once complied with the demand, and his son was proclaimed Khedive as Tewfik I. Ismail received an annual allowance of £50,000 and left Egypt for Naples. In 1888 he took up his residence in Constantinople, where he died March 2, 1895. See EGYPT.

ISMENE, ĭs-mē′nē (Lat., from Gk. *Ἰσμήνη*). In Greek mythology, the daughter of Œdipus and Jocasta and sister of Antigone (q.v.). In character she is a sharp contrast to her sister —strong, indeed, to suffer, but not fitted for bold deeds.

ISMID, ĭs-mēd′, or **IZMID,** ĭz-mēd′. The modern name of Nicomedia (q.v.).

ISNARD, ēs′nâr′, MAXIMIN (1758–1830). A French Revolutionist, born at Grasse. In 1791 he was deputy from Var to the National Assembly, in which he distinguished himself by his boldness and eloquence. He was reëlected in 1792 and was instrumental in forming the Committee of Public Safety. He joined the Girondists and was arrested in June, 1793, but escaped and concealed himself until the fall of Robespierre. He appeared again in the Assembly and afterward was a member of the Council of Five Hundred. From a violent radical he developed into an advocate of the coronation of Napoleon (see his *Réflexions relatives au sénatus-consulte du 28 floréal, an XII,* 1804) and served the Restoration so faithfully that he was pardoned (1816) for having voted for the death of Louis XVI.

ISOBAROMETRIC (ī′sō-băr′ō-mĕt′rĭk) **LINES** (from Gk. *ἴσος, isos,* equal + Eng. *barometric,* from Gk. *βάρος, baros,* weight + *μέτρον, metron,* measure), or ISOBARS. Lines joining the places at which the atmospheric pressure reduced to a common level is the same. Ordinarily the weather maps show the isobars for sea level, and by recent decisions of the International Meteorological Congress the barometric indications must also be corrected for the influence of the variations of gravity so that atmospheric pressures may all be expressed in uniform absolute measures. Formerly meteorologists avoided the troubles and uncertainties of the reduction to sea level by using the departures of individual barometric readings from the normal reading of the instrument. These isabnormal lines were then plausibly converted into isobarometric lines by assuming that the normal pressure at sea level was everywhere the same, viz., 760 millimeters or 30 inches, and adding the departures from the normal algebraically to this assumed normal. The resulting pressures were assumed to represent closely the result that would have been given by reduction to sea level. In 1857 Ferrel showed that the normal barometric pressure at sea level could not possibly be uniform, but must be lower in the polar and higher in the tropical regions. In 1868 Buchan showed that the pressures are higher over the continents in the winter and over the oceans in the summer. Since these dates the importance of correct isobars based upon a correct method of reduction to sea level has been more and more thoroughly appreciated.

The term "isobarometric" was applied by Kaemtz, about 1830, to lines representing the oscillations of the barometer or its range from maximum to minimum during any month or year, but this usage is now obsolete. These oscillations are greatest in regions subject to the passage of severe and numerous storms. They are greater in the northern portion of the Atlantic Ocean than in the southern portion or in corresponding latitudes on land.

The distance between two neighboring isobars is greater in proportion as the winds are less, and vice versa the distance is small when the winds are strongest. The rate of change of pressure in a unit of horizontal distance is called the gradient of pressure. This barometric gradient may be as large as 5 millimeters or 0.25 inch of barometric pressure per degree of a great circle when gales of wind prevail, and much greater in the narrow region around a storm centre within which hurricane winds prevail. The barometric gradients attending storm winds must not be considered as producing the winds. On the contrary the winds have a great influence in producing the gradients, and much steeper ones would occur if the resistances to the motion of the wind did not prevent. See METEOROLOGY.

IS'OBEL. An opera by Mascagni (q.v.), first produced in Buenos Aires, June 2, 1911; in Italy, Jan. 20, 1912 (Milan and Venice simultaneously).

I'SOBU'TANE. See BUTANE AND ISOBUTANE.

ISOCHEIMENAL (ī′sō-kī′mĕ-nal) **LINES.** Lines that connect places having the same winter temperature. See ISOTHERMAL LINES.

ISOCHRONISM, ī-sŏk′rō-nĭz′m (from *isochronous,* from Gk. *ἰσόχρονος, isochronos,* equal in time, from *ἴσος, isos,* equal + *χρόνος, chronos,* time). A pendulum is isochronous when its vibrations are performed in equal times, whether these vibrations be large or small; and it can possess this property by being constrained to move in a cycloidal arc. (See CYCLOID.) Huygens, who is believed to have first applied the pendulum to clocks (see CLOCK), made his pendulum isochronous by causing its string to wrap and unwrap itself round two equal cycloidal cheeks, the diameter of whose generating circle was equal to half the length of the pendulum. This device is no longer used, however, and isochronism is closely approximated in practice by causing the pendulum to describe a very small circular arc. The term is also used in connection with the balance of watches.

ISOCHRONOUS (ī-sŏk′rō-nŭs) **CURVE.** See CYCLOID.

ISOCLINIC, ī′sō-klĭn′ĭc (from Gk. *ἴσος, isos,* equal + *κλίνειν, klinein,* to incline), or ISOCLINAL LINE. A line supposed drawn on the earth's surface connecting the points at which the dip of a magnetic needle, or the magnetic inclination (q.v.), is the same. (See TERRESTRIAL MAGNETISM.) The isoclinic lines, or lines of equal magnetic inclination (q.v.), may be said to run roughly east and west. They encircle two points, one in the Northern Hemisphere and the other in the Southern, at which the magnetic inclination, or dip, is 90°. These points are defined as the "magnetic poles"; their approximate positions in 1914 were lat. 70° N., long. 97° W., and lat. 72° S., long. 153° E. There are also so-called "local magnetic poles" where, e.g., because of extraordinary local deposits of magnetic iron ore, the dip of the magnetic needle is 90°; the area of influence due to such poles is generally very restricted. The aclinic line, or line of no magnetic inclination, is usually called the "magnetic equator," as it

separates the north magnetic hemisphere (where the north end of the dip needle points downward) from the south magnetic hemisphere (where the north end of the dip needle points above the horizon or the south end points downward). Owing to the secular changes of the earth's magnetism, the isoclinic lines and the magnetic poles change their positions with the lapse of time.

ISOCRATES, ī-sŏk′rā-tēz (Lat., from Gk. *Ἰσοκράτης, Isokratēs*) (436–338 B.C.). Though one of the 10 Attic orators of the Alexandrian Canon (see CANON ALEXANDRINUS), Isocrates was rather a publicist and a pamphleteer than an orator. His long life, as De Quincey interestingly points out in his essay on *Style*, spans the century from Pericles to Alexander. In youth he was attached to the Socratic circle, and Plato in the *Phædrus* commends him, when he was still a youth, above other orators for a certain touch of philosophy that might lead to higher things. Elsewhere Plato seems to allude to him with irony as a rival teacher and the exponent of a competing ideal of culture. His first school, opened at Chios, was probably devoted to the professional rhetoric of the law courts, and he himself wrote forensic speeches, a few of which have been preserved. These, however, he was inclined to disavow in later days when his school at Athens came to represent (after 392 B.C.) what he regarded as the more broad and liberal training in essay writing and epideictic (display) oratory on large political and Hellenic themes. From personal participation in the combats of the law courts or the assembly he was shut out by a weak voice and an invincible timidity, though he seems not to have been lacking in moral courage. Isocrates stands for three things: 1. The idea that the Greeks should unite to conquer Persia. This is set forth in his most brilliant performance, the *Panegyricus*, which cost him 10 years and is supposed to have been published at Olympia in 380 B.C. Failing to influence Athens and Sparta, he appealed to individuals—Jason of Pheræ, the tyrant Dionysius, Philip of Macedon. The legend consecrated by Milton's sonnet that the "dishonest victory at Chæronea, fatal to liberty, killed with report that old man eloquent," is sufficiently refuted by the tone of the letter to Philip. Indeed, the conquest of Asia by Alexander, though not accomplished by a union of Athens and Sparta, was in many ways a striking fulfillment of the prophecies of the *Panegyricus*. 2. Isocrates' ideal of culture as a faculty of elegant disquisition occupying the happy mean between the narrow utilitarianism of the advocate and the unprofitable subtleties of a Plato is to us, as exemplified in his writings, a ridiculous and platitudinous thing. But nevertheless his school did as much as the Academy of Plato to make the Athens of the fourth century the schoolmistress of Greece. Dissertations have been written about his pupils. Among them were the historians Ephorus and Theopompus, and the orators Isæus, Lycurgus, and Hyperides. From that school, says Cicero, as from the Trojan horse, a company of naught but chieftains issued forth. 3. Isocrates, though not himself a great writer, holds a great place in the evolution of European prose. He was a pupil of the brilliant Sophist Gorgias (q.v.), who freely employed as ornaments of prose jingling assonance, alliteration, balanced antithesis of thought and expression, striking metaphor, and other rhetorical features of Greek poetry. Isocrates tempered the excess of these "Gorgian figures," but retained them so far as consonant with the genius of ornate but not extravagant prose. He also practiced and taught the smooth organic structure of the long rhythmical period, the avoidance of hiatus, the conscious variation of phrase and selection of synonym. These and many other traits of style employed by him in a mechanical and monotonous way were studied in him by the world's three great masters of prose—Plato, Demosthenes, and, later, Cicero. And Cicero has made them the common property of all educated men in theory if not in practice.

Isocrates' 21 orations and 10 possibly genuine letters fill two small volumes of the Teubner texts. They have been partly translated into English by Freese, part i (London, 1894). They are not entirely free from dullness. There is an ample analysis and account of all of them in R. C. Jebb, *Attic Orators*, vol. ii (London, 1876). Consult also: F. W. Blass, *Attische Beredsamkeit* (Leipzig, 1868–80; 2d ed., 1887–93); id., *Die Rhythmen der attischen Kunstprosa* (Leipzig, 1901); W. C. Wright, *A Short History of Greek Literature* (New York, 1907); Adams, "Recent Views of the Political Influence of Isocrates," in *Classical Philology*, vol. vii (Chicago, 1912); H. M. Hubbell, *The Influence of Isocrates on Cicero, Dionysius, and Aristides* (New Haven, 1913). There is a good English annotated edition of the *Panegyricus* by Sandys, and selected orations have been edited with German notes by Schneider (Berlin, 1888).

I'SODIMOR'PHOUS SERIES. See ISOMORPHISM.

ISODYNAMIC (ī'sō-dī-năm'ĭk) **LINES** (from Gk. *ἰσοδύναμος, isodynamos*, having equal power, from *ἴσος, isos*, equal + *δύναμις, dynamis*, power, from *δύνασθαι, dynasthai*, to be able). A line supposed drawn on the earth's surface connecting the points at which the intensity or strength of the earth's magnetic field has the same numerical value. There are three sets of these lines—the lines of equal horizontal intensity, the lines of equal vertical intensity, and, finally, the lines of equal total intensity. The first set show how the component (the horizontal one) of the earth's magnetic intensity acting on a compass needle varies from place to place; this component is a maximum in the equatorial regions and reduces to zero at the magnetic poles. The second set show how the component (the vertical one) acting on the dip needle varies over the earth, this component being zero along the magnetic equator (see INCLINATION) and increasing with approach to the magnetic poles. The third set map out the numerical values of the total intensity, the minimum values occurring in the equatorial regions and the maximum in the high northerly and southerly latitudes. Owing to the earth's complex magnetization, the maximum values of the vertical and of the total intensity are not found at the magnetic poles. All three sets of lines are subject to change with the lapse of years. See TERRESTRIAL MAGNETISM; ISOCLINIC.

ISOGAMY, ī-sŏg′ă-mĭ (from Gk. *ἴσος, isos*, equal + *γάμος, gamos*, marriage). A condition in plants in which the pairing sex cells (gametes) are similar, i.e., they show no evident distinction into male and female. Only the lowest plants are isogamous. The contrasting term is heterogamy (q.v.). When gametes are rec-

ognized as male and female, this means that the former is a small and active cell, while the latter is a very large and passive cell. In isogamy, however, it must be realized that the two pairing gametes are physiologically unlike, or they would not pair. The real difference, therefore, is present in isogamy as well as in heterogamy. See FERTILIZATION.

I'SOGE'OTHERMS. The name given to imaginary zones beneath the earth's surface passing through points of equal temperature.

ISOGONIC (ī'sō-gŏn'ĭk) **LINES** (from Gk. *ἴσος, isos,* equal + *γόνος, gonos,* angle), or ISOGONAL LINE. A line supposed drawn on the earth's surface connecting the points at which the magnetic declination, or angle which the compass direction makes with the true meridian, is the same. The line of zero magnetic declination is called the *agonic line.* See COMPASS; DECLINATION; DECLINOMETER; TERRESTRIAL MAGNETISM; ISOCLINIC.

ISOGONISM, ī-sŏg'ō-nĭzm. See ISOMORPHISM.

I'SOGRAM (from Gk. *ἴσος, isos,* equal + *γράφειν, graphein,* to write). In mathematics, a diagram meant to show graphically a relation between three variables. Also a convenient name for all those lines used on charts and diagrams to connect points characterized by equality in some respect. Among the meteorological isograms may be mentioned isotherm, isobar, isabnormals, isohyet. Consult C. F. Talman, "Meteorological Isograms," in *Scientific American Supplement,* No. 1918 (New York, 1910). See ISOPLETHS.

ISOLA BELLA, ē'zō-lä bĕl'lä. One of the Borromean Islands (q.v.) in Lago Maggiore (q.v.), Italy.

ISOLA DEL LIRI, dĕl lē'rē. A city in the Province of Caserta, Italy, 96 miles northwest of Naples, on the rivers Liri (Liris) and Fibreno (Fibrenus), which furnish power for paper, carpet, cloth, and woolen factories and for machine works. As the name indicates, the main town is on an island in the Liri, which has magnificent waterfalls 80 feet high. Half a mile beyond the picturesque estate of M. Lefebvre, afterward the Count of Balsorano, are the twelfth-century church of San Domenico, about three-quarters of a mile north of Isola, and the tenth-century monastery where Gregory VII was once a monk. The former is supposed to rest on the site of a villa of Cicero, called Arpinas, and the Isola San Paolo is believed to be the Insula Arpinas, where the orator was born. (See ARPINO.) For a description of the villa and its neighborhood, see Cicero, *De Legibus,* ii, 3; the villa was supposed to be the scene of the dialogue *De Legibus.* Five miles west of Isola del Liri is the thirteenth-century abbey of Santi Giovanni e Paolo di Casamari, now state property. As an example of early Gothic it is rivaled in Italy only by the convent of Fossanova in Sonnino (q.v.). The name Casamari, attached to a place about 5 miles west of Isola, preserves the memory of the birthplace of Marius (q.v.). Isola has stone quarries and is lighted by electricity. Pop. (commune), 1901, 8202; 1911, 8416.

ISOLA GROSSA, grōs'sä. A long and narrow island off the coast of Dalmatia, Austria. Area, 35 square miles (Map: Austria, D 5). It is poorly watered, but nevertheless produces southern fruits, such as grapes, olives, and figs; it has also important fisheries. Pop., about 4000, mostly Croats. Its chief town, Sale, has a harbor, a lighthouse, and a population of 846.

ISOLA MADRE, mä'drā. One of the Borromean Islands (q.v.) in Lago Maggiore (q.v.), Italy.

ISOLANI, ē'sō-lä'nē, JOHANN LUDWIG HEKTOR, COUNT (1586–1640). An Imperial cavalry general in the Thirty Years' War, born at Görz, of a noble Cypriot family. He was taken prisoner by the Turks in 1602, and after his escape became commander of a regiment of Croats and fought against Mansfield. In 1632 he was put in command of all the Croatian forces; two years later he was made Count, after deserting Wallenstein, who had treated him well. A clever leader of light cavalry and a terrible raider, Isolani fought in Picardy and Burgundy (1636), then in Hesse, Pomerania, and along the upper Rhine (1639) against Guébriant.

ISOLATION, ī'sō-lā'shŭn *or* ĭs'ō-lā'shŭn (from *isolate,* from Fr. *isoler,* It. *isolare,* from ML. *insulare,* to separate, from Lat. *insula,* island, from *in,* in + *salum,* sea, Gk. *σάλος, salos,* surge). In evolution, the separation or segregation of any assemblage of plants or animals in a limited area, so that the incipient varieties or species are prevented from breeding with those of adjoining regions. Through such isolation the leveling effects of free crossing or mixing with allied varieties are prevented. Thus variations or nascent species become localized, with the result that there are many thousands of local races, varieties, and species.

Besides geographical isolation there are other kinds of segregation. Darwin suggested two forms: (1) arising from organisms breeding at slightly different seasons; (2) "from varieties of the same kind preferring to pair together." To the first of these may be added the inbreeding of butterflies of two different broods, a part of one brood being belated and flying with their "nephews and nieces." See DIGONEUTISM.

Lamarck was the first to broach the subject of the doctrine of isolation as a factor in species making in referring to man. Considering organisms in general, he points out that in reproductive unions the crossings between the individuals which have different qualities or forms are necessarily opposed to the continuous propagation of these qualities and their forms. He then instances man and says that, if distance of habitation did not separate men, the intermixture by generation would cause the general characteristics distinguishing different nations to disappear. Wagner (1868) has fully proved by numerous examples the importance of migration and isolation in species making. See MIGRATION, WAGNER'S LAW OF.

As a result of 15 years' collecting in the Hawaiian Islands of land shells belonging mostly to genera found nowhere else, Gulick established the fact that in each mountain valley of the forest region of Oahu there is a great number of local species (200, represented by 700 or 800 varieties) belonging to several genera, and that each of the 20 valleys contains one or more local varieties or species restricted to that valley. On tracing this wonderfully differentiated assembly from valley to valley it became apparent that a slight variation in the occupants of a valley as compared with those of the adjacent valley becomes more pronounced in the next or third valley, still more in the fourth, and so on. Thus he was able roughly to estimate the amount of divergence between the oc-

cupants of any two given valleys by measuring the number of miles between them (Romanes). Gulick thinks the evolution of these different forms cannot be attributed to differences in their external conditions. The forest area, covering one of the mountain ranges, in which the snails live, is about 40 miles long and 5 or 6 miles wide. He states that the rainfall on the northeast side of the mountain is somewhat heavier than on the opposite side, and the higher ridges of the mountains are cooler than the valleys, but the valleys on one side of the range have a climate the same in every respect. The vegetation in the valleys differs somewhat from that on the ridges, but the vegetation of the different valleys is much the same—the birds, insects, and larger animals are the same. Though, as far as we can observe, the conditions are the same in the valleys on one side of the range, each has a molluscan fauna differing in some degree from that of any other. He also adds that a genus is represented in several successive valleys by allied species, sometimes feeding on the same, sometimes on different plants. In every such case it appeared that the valleys that are nearest to each other furnish the most nearly allied forms, and a full set of the varieties of each species presents a minute gradation of forms between the more divergent types found in the more widely separated localities. After giving reasons for the belief that this variation is not due to differences in their external conditions, Gulick concludes that the difference is due to a corresponding difference in the time of separation of each variety, and also to what he terms "cumulative segregation," "segregate breeding," and "independent generation." In his interesting essay on *Physiological Selection* (1886 and 1897), Romanes states that the essence of the principle consists in *all* cases of the diversifying *effect* of cross-infertility, whensoever and howsoever it may happen in particular cases to have been caused. (See PHYSIOLOGICAL SELECTION.) It is to be observed that this is but little different from Gulick's "cumulative" or "intensive" segregation. See EVOLUTION, *Factors of Evolution;* CLASSIFICATION OF ANIMALS, *Species.*

After all the careful work done by Gulick it is yet to be doubted whether the chief or initial factors in the wonderful specialization which has taken place in the land shells of Oahu are not the result of migration into new regions, varying in natural conditions. For the present, then, Wagner's factors of migration into areas with differing conditions of life and isolation, and the consequent prevention of intercrossing with the original or parent forms, may be accepted as the essential causes of the origin of perhaps two-thirds to one-half of existing as well as extinct species.

Bibliography. J. T. Gulick, "On Diversity of Evolution under One Set of External Conditions," in *Linnean Society of London, Journal Zoölogy* (London, 1872); id., *Divergent Evolution through Cumulative Segregation* (ib., 1888); id., "Divergent Evolution and the Darwinian Theory," in *American Journal of Science* (New Haven, January, 1890); F. W. Hutton, "Place of Isolation in Organic Evolution," in *Natural Science*, vol. xi (London, 1897); id., *Evolution: Racial and Habitudinal* (Carnegie Institution, Publications, No. 25, Washington, 1905); Kellogg, *Darwinism To-Day* (New York, 1907); Dewar and Finn, *The Making of Species* (London, 1909); Jordan, "Isolation as a Factor in Organic Evolution," in *Fifty Years of Darwinism* (New York, 1909).

ISOLD, ISOLDE, ī-sōld′, **ISOND,** ī-sŏnd′, **ISOUD,** ī-sōōd′. See ISEULT.

ISOMAGNETIC (ī′sō-măg-nĕt′ĭk) **LINES** (from Gk. *ἴσος, isos,* equal + *μάγνης, magnēs,* loadstone). A generic term in terrestrial magnetism for the class of lines supposed drawn on the earth's surface connecting the points at which any particular magnetic element has the same numerical value. There are, thus, isogonies (lines of equal magnetic declination), isoclinics (lines of equal magnetic inclination), isodynamics (lines of equal horizontal intensity, lines of equal vertical intensity, and lines of equal total intensity). See TERRESTRIAL MAGNETISM; ISOCLINAL; ISOGONIC LINES; ISODYNAMIC LINES.

ISOMERISM, ī-sŏm′ĕr-ĭz'm. See CHEMISTRY; VALENCY; CARBON COMPOUNDS; STEREOCHEMISTRY; CYANIC ACID; ALLOTROPY.

ISOMET′RIC PERSPEC′TIVE. A system of conventional projection by which all three dimensions are represented to scale in a single drawing. Vertical lines are drawn vertical, and the two systems of horizontal lines at right angles to each other of a vertical cube are represented by lines at a fixed inclination, usually 30° to the horizontal, and drawn to the same scale as the verticals, or sometimes to a special scale indicated in the margin. Lines in other than these three directions are laid off by their relations to these. The term *Isometric Projection* is often used instead of *Isometric Perspective* and is more strictly correct.

ISOMETRIC SYSTEM. See CRYSTALLOGRAPHY, and Plate of CRYSTAL FORMS.

ISOMORPHISM, ī′sō-môr′fĭz'm (from *isomorphous,* from Gk. *ἴσος, isos,* equal + *μορφή, morphē,* form). The relationship existing between solid substances which are similar in their chemical composition and constitution, have similar crystalline forms, and are capable of forming homogeneous mixed crystals ("solid solutions"). A substance standing in an isomorphous relationship to another is capable of growing in a saturated solution of that other, the latter then forming a mantle around the first as a nucleus. Ostwald proposes to define the relationship between two isomorphous substances as the capacity of one to cause immediate crystallization in a *supersaturated* solution of another, just as a crystal of any substance is capable of causing its own supersaturated solution to crystallize immediately. It must, however, be observed that while the relationship of isomorphism certainly exists, our knowledge of its intimate nature is very vague, and neither of the above definitions gives adequate expression to all of the known facts. The ordinary carbonates of calcium (calcite), magnesium (magnesite), iron (siderite), manganese (rhodochrosite), and zinc (smithsonite), all form crystals of the same crystal system and for the most part of the same crystal class (see CRYSTALLOGRAPHY); and, further, their corresponding interfacial angles approach to the same values. Not all substances closely related in their chemical composition are isomorphous, and, exceptionally, substances which have no chemical relationship have similar symmetry of crystals and angles in close correspondence. (Such an

accidental resemblance of the crystal forms of chemically unrelated substances is described as isogonism.) In the case of salts the chemical component which seems mainly to condition the symmetry of the molecule is the acid radical, the metal having less influence upon the crystal's symmetry, though affecting the size of crystal angles. (See MORPHOTROPISM.) The metals of a series of isomorphous salts are said to be isomorphous elements, and it is found that for the most part they are of the same or related groups of elements. See PERIODIC LAW.

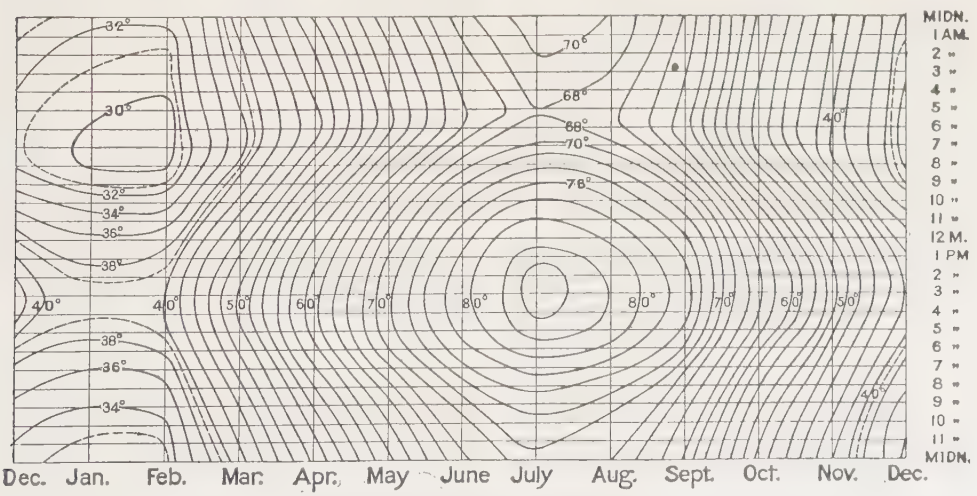
When a substance has been found to form crystals of more than one kind, it is said to be dimorphous, trimorphous, or polymorphous, the term "dimorphous" being used in a general sense to describe substances which exhibit three or more as well as two kinds of crystals. Sulphur crystallizes from fusion in long needle-like crystals of monoclinic symmetry, but from a solution in carbon bisulphide in orthorhombic crystals. Under other special conditions it assumes other kinds of symmetry. Carbonate of lime, which is generally found crystallized in nature as hexagonal (trigonal) crystals (calcite), is less frequently found in crystals of the orthorhombic system (aragonite) and with different physical properties from those of calcite. As explained above, calcite belongs in an isomorphous series with carbonate of magnesia, carbonate of iron, carbonate of zinc, etc. Aragonite, on the other hand, is a member of a different isomorphous group in which are carbonate of strontium, carbonate of barium, and carbonate of lead. A double group of this kind connected by a dimorphous substance (carbonate of lime as calcite and aragonite) is known as an isodimorphous group or series. See CRYSTALLOGRAPHY; CHEMISTRY; ATOMIC WEIGHTS.

ISOMURA, ē'sō-mōō'rä, KITTOKU (fl. seventeenth century). A Japanese mathematician. His chief work was the *Ketsugi-shō*, which appeared in five books in 1660 and was again published in 1684. The work makes some attempt at integration and contains a number of very ingenious problems and some interesting examples of magic squares, magic circles, and sets of magic wheels. Consult Smith and Mikami, *History of Japanese Mathematics* (Chicago, 1914).

ISOND. See ISHULT.

I'SOPER'IMET'RIC FIGURES (from Gk. *ἴσος*, *isos*, equal + *περίμετρον*, *perimetron*, perimeter, from *περί*, *peri*, around + *μέτρον*, *metron*, measure). Plane figures having equal perimeters. In the seventeenth century all problems which demanded the statement of a maximum or minimum property of functions were called isoperimetric problems. To the oldest problems of this kind belong especially those in which one curve with a maximum or minimum property was to be found from a class of curves of equal perimeters. That the circle, of all isoperimetric figures, gives the maximum area is said to have been known to Pythagoras. In the writings of Pappus a series of propositions relating to figures of equal perimeters is found. In the fourteenth century the Italian mathematicians also worked on problems of this kind. But Johann Bernoulli (1696) and Euler (1744) applied the calculus of variations to these problems, and Euler gave a purely analytic treatment in his celebrated work, *Methodus Inveniendi Lineas Curvas*. . . . This theory culminated in the calculus of variations, Lagrange supplying the appropriate notation. An illustration of problems of this class is that of Jakob Bernoulli—of all curves of the same length described on a given base, to determine one such that the area of a second curve, each of whose ordinates is a given function of the corresponding ordinate or arc of the first, may be a maximum or a minimum. See MAXIMA AND MINIMA.

I'SOPLETHS (from Gk. *ἴσος*, *isos*, equal + *πλῆθος*, *plēthos*, number). These are curves connecting those points in a diagram which have the same numbers or values. This name might be logically applied to any isogram (q.v.), as it is a synonymous word. In practice it is restricted to the lines drawn through points of equal value in a diagram made by inserting the proper value for any given element at the proper intersections of a coördinate net having hours along one axis (usually ordinates) and days of the year along the other axis (abscissæ). If the average temperatures for this net are prop-



THERMO-ISOPLETHS FOR WASHINGTON, D. C.
Degrees, Fahrenheit.

erly entered thereon, the lines connecting equal temperatures would be called *thermo-isopleths*, and they would present what may be regarded as a contoured topographic map of the temperature surfaces prevailing at the locality of observation (e.g., Washington, D. C.) throughout the average or "normal" year. The figure on the preceding page presents such a diagram for Washington, D. C.

The advantages of this graphic method for presenting any climatological element are that it furnishes very characteristic, comparable, graphic pictures of the same element in different localities; it permits one to seize at a glance the distribution of the element throughout the two ranges of time, or time and space, employed and the relation it bears to time and season; and it furnishes convenient graphic interpolations and comparisons between neighboring records of differing lengths. Similar constructions are very instructive in the study of hydrologic phenomena, and they have been very useful in revealing the process of the seasonal overturning of the waters of lakes and reservoirs.

Consult: Erk, "Ueber die Darstellung der stündlichen und jährlichen Vertheilung der Temperatur durch ein einziges Diagramm," in *Meteorologische Zeitschrift* (Berlin, 1885); Fassig, *Climate and Weather of Baltimore* (Baltimore, 1907); Cox, *Weather and Climate of Chicago* (Chicago, 1914); Hann, *Lehrbuch der Meteorologie* (Leipzig, 1914).

ISOP'ODA (Neo-Lat. nom. pl., from Gk. *ἴσος, isos*, equal + *πούς, pous*, foot). An order of malacostracous crustaceans of the section Arthrostraca, mostly aquatic—some marine, some inhabitants of fresh waters—but some terrestrial, inhabiting damp places, as the wood louse and the like. They are easily recognized by the fact that the body is flattened dorsoventrally, and many of them—e.g., the sow bug or pill bug (*Porcellio*)—have the habit of rolling up into a ball with the head tucked safely inward. The first segment of the thorax is fused with the head, but the remaining seven are free and bear limblike appendages without gills. In females the basal joints of several of these appendages bear lamellæ, which form a brood pouch for the eggs. There is never any carapace. The maxillipeds, of which there is only a single pair, usually fuse to form a sort of lower lip. The abdominal appendages are biramose and serve for swimming and breathing; the most anterior pair are usually thick and form an operculum which serves to protect the more delicate appendages behind. The heart is situated chiefly in the abdomen, but extends forward a short distance into the thorax. While most of the species lead a free life, some of the marine forms (*Cymothoa*, etc.) are parasitic on fishes or on other crustaceans, or bore into wood, etc. See Illustration under GRIBBLE.

One group (Bopyridæ) are parasitic, living under the carapace of various shrimps. The females of *Bopyrus palæmoneticola* (Packard) are many times larger than the males and are much degenerated, the head being without eyes and appendages; they retain their position on their host by means of the sharp, hooklike legs around the edge of the body. The male in general appearance shows but slight modifications and is about one-fifth as large as the female, and is lodged partly out of sight under the ventral plates of its consort.

Some of these forms are notably degenerate. The Isopoda are a comparatively small group and are generally small individuals, few species reaching a length of 1 inch, except in the colossal deep-sea *Bathynomus giganteus*, dredged in the Caribbean Sea from a depth of nearly a mile. The colors are usually dull, blackish, gray, or brown; but some of the marine forms are highly colored, red or brown, according to the hue of the seaweed they rest on.

Fossil isopods, though of little geological importance, are known from rocks as early as the Upper Devonian and Carboniferous; also from the Jurassic limestones of Bavaria and other Mesozoic formations. Most of them have some superficial resemblance to the marine *Sphæroma* and to the terrestrial wood lice of modern time. See CRUSTACEA.

Bibliography. Georg Leichmann, *Beiträge zur Naturgeschichte der Isopoden* (Cassel, 1891); Harriet Richardson, *Key to the Isopods of the Pacific* (Washington, 1899); id., *Key to the Isopods of the Atlantic Coast* (ib., 1901); H. F. Moore, *Report on Porto Rican Isopods* (ib., 1901); Harriet Richardson, *Isopods Collected at Hawaiian Islands by United States Steamer Albatross* (ib., 1903); id., *Contribution to the Natural History of the Isopoda* (ib., 1904); id., *Monograph on the Isopoda of North America* (ib., 1905); id., *Isopods Collected in the North West Pacific* (ib., 1906).

I'SOQUIN'OLINE. See QUINOLINE.

ISOSPONDYLI, ī'sō-spŏn'dĭ-lī (Neo-Lat. nom. pl., from Gk. *ἴσος, isos*, equal + *σπόνδυλος, spondylos*, vertebra). An order of teleost fishes, the soft-rayed fishes. They have the anterior vertebræ simple, unmodified; the mesocoracoid arch is always well developed, and the strong shoulder girdle is connected with the cranium. There are no auditory ossicles. The scales usually are cycloid, the ventral fins abdominal. It is a large group, comprising the tarpons, ladyfishes, herrings, shads, sardines, anchovies, menhadens, salmons, trouts, whitefishes, and related families, and, in the opinion of some, the Iniomi (q.v.) also. Consult Jordan and Evermann, *Fishes of Northern and Middle America* (4 vols., Washington, 1896–1900).

ISOS'PORY. See HOMOSPORY.

ISOS'TASY. A theory of the structure of the earth that postulates that all equal areas in a surface at a certain depth below sea level (found by geodetic investigations to be about 122 kilometers, or 76 miles) are subject to the same pressure, and that below that surface the earth's materials are in a state of equilibrium. It is assumed that there is the same mass or amount of material in each unit column which extends from the actual surface of the sea or land to the depth stated. Therefore that material of a continent which is above sea level is compensated or counterbalanced by a deficiency of mass in the lithosphere (outer part of the earth) below it, while the deficiency of mass in the space occupied by the water of the oceans is counterbalanced by an excess of matter in the lithosphere under the ocean. The condition of isostasy obtains because of the yielding of the earth's materials to long-continued strains, though they may be rigid or unyielding to stress differences acting for a short time only.

The great inequalities of elevation between the continental lands and the oceanic basins, according to this theory, are maintained not so much by rigidity of the rock materials as because of differences in density—the projecting

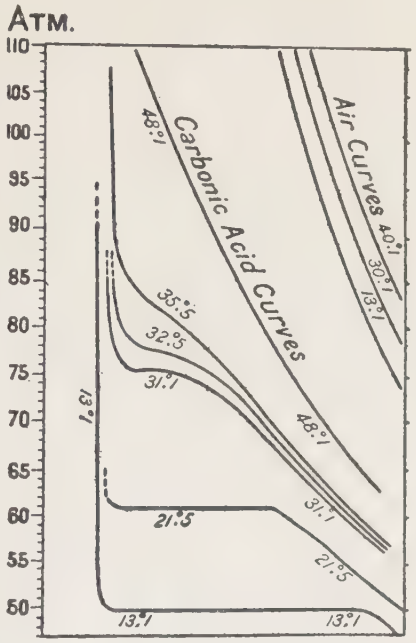
land areas being composed of lighter materials than the depressed sea bottoms. The mountain masses which rise 15,000 feet or more above sea level are buoyed or floated, as it were, on the substratum. From a geological standpoint the most important consequence involved is that any change of load upon one part of the crust finds compensation by a movement in the substratum from the area of increased pressure towards that of diminished pressure. Thus, elevated regions which are being eroded and worn down at the surface tend to rise, while the oceanic depressions which receive the weight of sediment gradually sink. The shifting or movement of the underlying material affords an explanation for the crumbling and folding of rocks. The principle of isostasy, as explained by Dutton, has received strong support recently from the series of investigations made by the United States Coast and Geodetic Survey under Hayford. Measurements of the force of gravity at widely distributed stations show actual variations of density that, on the whole, conform with it.

Consult: J. F. Hayford, *Figure of the Earth and Isostasy from Measurements in the United States* (Washington, 1909); id., *Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy* (ib., 1910); Hayford and Bowie, *Effect of Topography and Isostatic Compensation upon the Intensity of Gravity* (ib., 1912); and other publications of the United States Coast and Geodetic Survey. See DEFLECTION OF THE PLUMB LINE; GEODESY.

ISOTELUS (ī-sŏt′ē-lŭs) **DEKAY.** A genus of trilobites belonging to the Asaphidæ and for a time considered as identical with *Asaphus* (q.v.), but distinguished from it by the smooth cephalon and pygidium, with depressed borders. Some species attain such great size that they belong to the giants among the trilobites. The most common American forms are *Isotelus gigas* and *Isotelus maximus*. The former has become widely distributed in museums, the specimens coming from the Trenton limestone at Trenton Falls, N. Y. The genus occurs abundantly in the Ordovician rocks of America, but is rare in Europe.

ISOTHERAL (ī-sŏth′ēr-*al*) **LINES,** or **ISOTHERÆ,** ī-sŏth′ēr-ē (from Gk. *ἴσος, isos,* equal + *θέρος, theros,* summer). Lines that connect together places that have the same mean summer temperature.

ISOTHERMAL, ī′sō-thēr′*mal* (from Gk. *ἴσος, isos,* equal + *θέρμη, thermē,* heat). In physics, an isothermal is a line drawn on any diagram so as to represent the successive values of the properties of a body as it undergoes certain changes, the temperature being kept constant. Thus, if the properties of the body which are to be observed and noted are its pressure and volume, the isothermal curves are drawn on a diagram having pressure and volume as ordinates and abscissæ. The isothermals of a typical substance, carbonic-acid gas, CO_2, in the form of vapor and liquid, are given in the accompanying figure. Considering any of the lower curves—i.e., the isothermals for temperatures less than 31° C.—it is seen to consist of three parts: the nearly vertical portion is the isothermal for the liquid; the horizontal portion, for the process of evaporation of the liquid, when the liquid occupies the lower portion of the containing vessel and the vapor the upper; the curve at the right, which is nearly an hyperbola, is for the vapor after all the liquid has evaporated. The isothermals for temperatures higher than 31° C. do not have any horizontal portion, showing that as the gaseous substance is compressed at these temperatures it never condenses and becomes a liquid—if it did condense, the curve would become horizontal, because when the temperature is kept constant



the pressure of the condensing vapor does not change. (See HEAT.) Therefore, if the gas is to be liquefied, it must be at a temperature lower than 31° C.—i.e., lower than the temperature corresponding to the first isothermal which does not have a horizontal portion. This temperature is called the "critical" temperature.

It is evident that, if the vapor at any temperature higher than the critical one is compressed, the temperature being kept constant, its volume may be made very small; and if its temperature be now lowered below the critical value, thus making its volume less, it may become a liquid. But in the actual experiment it would be impossible to tell when the change took place, because the vessel containing the vapor (or liquid) is *full* all the time. Not until, by a suitable increase in volume, the condition of the matter is given by a point on the horizontal portion of the isothermal, can one tell by observation that there is liquid in the vessel, for then one can see the surface of the liquid.

ISOTHERMAL LINES, or ISOTHERMS. In meteorology, lines that connect places having the same temperature for a day, month, or for any given interval of time. Systems of isothermal lines for daily maps, as well as for monthly and annual means, present in a very graphic manner the prevailing temperature conditions and are therefore of universal use in meteorology. They seem to have been first used by Alexander von Humboldt in 1817; but lines of equal departure from normal values were independently used by Brands in his studies of the daily weather map and the storms of Eu-

rope. Isothermal lines coincide only accidentally, if at all, with small circles of latitude, owing to the great influence of the distribution of land and water on the temperature of the air. The temperatures observed at the respective stations must be corrected or reduced to the standard level surface of the globe, in order that they may be comparable with each other. This reduction introduces discrepancies, but there are many reasons for retaining it. The rate of reduction adopted by Hann and other climatologists is 0.50° C. per 100 meters, or 1° F. for 370 feet. If a chart has been constructed using this rate of reduction, and one should desire to know the temperature at the top of a mountain, whose altitude is given, we have but to read from the chart the temperature at sea level, apply the reduction to the given altitude, and get at once approximately the temperature of the summit. The accuracy of this method is, however, limited by the fact that the rate of diminution of temperature varies so much that the adoption of an average rate is liable to lead us astray. Charts of isotherms for each month of the year and for the whole globe have been constructed, first by Buchan, and afterward by the United States Weather Bureau, and were published in full in 1900 in elegant style in Bartholomew's *Physical Atlas*.

Isothermal lines can be calculated and drawn for the upper levels of the atmosphere by using observations on mountain tops and in balloons and kites. Lines of this character were first drawn by Hergesell for Europe for certain days in 1898–1900, on which sufficient data were collected by means of balloons and kites. These lines show that large variations in temperature occur at the highest attainable levels, and that the atmosphere in general is a mixture of masses of descending cold air and ascending warm air. See charts under TEMPERATURE, TERRESTRIAL; and DISTRIBUTION OF ANIMALS; also articles CLIMATE; DISTRIBUTION OF ANIMALS; ISOPLETHS; METEOROLOGY.

ISOUARD, ē'zōō'ăr', NICCOLÒ, known as NICCOLÒ DE MALTE in France (1775–1818). An Italian composer and musician, born in Malta. He was educated for the navy and afterward entered commercial life; but meanwhile he studied the piano under Pin in Paris, and harmony under Vella and Azopardi in Malta. Later, while in Italy, he received further instruction from Amendola, Sala, and Guglielmi. In 1795 he produced his first opera, *L'Avviso ai maritati*. The reputation gained by several works of the kind obtained for him the position of chapelmaster to the Order of St. John of Jerusalem in Malta. In 1798 he went to Paris and met there Rodolphe Kreutzer, who collaborated with him in two of his operas. One of his first successes was *Michel-Ange* (1802). He also became known as a pianist. He wrote for the Opéra Comique until Boieldieu's growing popularity, and the election in 1817 of that composer to the Academy, an honor which Isouard coveted, caused him to abandon himself to dissipation. The next year he died of consumption. He had much dramatic tact; his music is always simple and gay, never trivial or vulgar, and he had the excellent librettos of Hoffmann and Etienne to work upon. Of his 33 operas, the following are the best known: *Le médecin turc* (1803); *L'Intrigue aux fenêtres* (1805); *Cendrillon* (1810); *Le siège de Mézières*, with Cherubini, Catel, and Boieldieu (1814); *Joconde* (1814); *Jeannot et Colin* (1814); and *Aladin, ou la lampe merveilleuse*, completed by Benincori (1822).

ISOUD. See ISEULT.

ISPAHAN, ĭs'pà-hän', or **ISFAHAN.** The former capital and one of the largest cities of Persia, situated on the Zendeh-rud (river), over 200 miles south of Teheran, the present capital (Map: Persia, D 6). The surrounding country is of remarkable natural beauty and presents a striking contrast to the half-ruined city. Only a small part of the area inclosed by the ancient and now ruined walls is inhabited, the remainder being a succession of ruined castles, mosques, and schools, which testify to the former splendor of the city. The centre of the city is occupied by a magnificent plaza laid out by Shah Abbas (1585–1628) and formerly surrounded by fine structures. Of the few buildings which have survived the ravages of time, the palace of Shah Abbas, known as Chehel Sutun, or Hall of Many Columns, is probably the finest. A row of 20 graceful cedar columns extends along the front portal, supporting a magnificently ornamented roof. Behind the columns is a spacious hall with mirror-covered walls and a fountain in the centre. Besides this hall there is a large room containing six large oil paintings depicting scenes from the life of Shah Abbas. On the southeastern side of the plaza stands the great mosque, Mesjid-i-Shah, erected in the beginning of the seventeenth century and presenting, even in its ruined state, a fine example of Eastern architecture. On the western side of the royal grounds is situated a magnificent palace known under the name of Hasht Behesht, or Eight Paradises, built by Shah Suleiman at the end of the seventeenth century. It is surrounded by beautiful gardens ornamented with fountains. On the western side is the mosque of Sheikh-Lutfallah, with its dome of enameled tiles, and at the northwestern end is the entrance to the extensive covered bazars of the city, which have a total length of over 2 miles. Another important monument is the school (medresseh) and caravansary of Mader-i-Shah Sultan Hussein, built by that Sultan 1700–10.

The Zendeh-rud, on which the town is situated, is crossed by five bridges, of which that of Allah Verdi Khan is especially remarkable, both for its size and for its architectural beauty; it is 388 yards long, with a paved roadway 30 feet broad. On the farther bank of the river is the graceful Mirror Pavilion (Aineh-Khavé), similar in style to the Chehel Sutun, but less extensive. Industrially Ispahan is still a town of some importance. Its chief products are silk, woolen and cotton goods, jewelry, arms, leather goods, and footwear. The town derives also considerable commercial importance from its position on the main route from Abushehr to Teheran. A little way south of Ispahan is situated the Armenian settlement of Julfa, which contains the entire European colony of Ispahan. It was founded in the beginning of the seventeenth century and at one time had an Armenian population of 30,000, which was reduced through persecution to about 2000. It has a number of Christian churches and several schools. Its population is estimated at upward of 80,000. It is said by Persian writers to have been founded by some of the Jews who were led into captivity by Nebuchadnezzar. It was a trading town of importance, and the capital of Irak, under the caliphs of Bagdad. It

was taken by Timur in 1392, when 70,000 of the inhabitants are said to have been massacred. During the seventeenth century, under Shah Abbas the Great, it became the capital of Persia and reached the climax of its prosperity. It is said to have had between 600,000 and 1,000,000 inhabitants; the smaller figure is given by Jean Chardin (q.v.), who long lived at Ispahan. It was then the emporium of the Asiatic world; the merchandise of all nations enriched its bazars, and ambassadors from Europe and the East crowded its court. In 1722 it was devastated by the Afghans, and towards the close of that century the seat of government was transferred to Teheran (q.v.). Its commerce has greatly declined.

ISPICA, ē'spē-kȧ, Val d'. A valley in southeast Sicily, 5 miles southeast of Modica. It is 7 miles long and is famous for its grottoes, containing graves. In the fourth century, as numerous inscriptions show, these grottoes were used by Christians as tombs.

ISRAEL, ĭz'rȧ-ĕl. See Jacob.

ISRAEL, Kingdom of. See Jews.

ISRAEL IN EGYPT. An oratorio by Handel (q.v.), first produced in London, April 4, 1739; in the United States, Feb. 13, 1859 (Boston).

ISRAELITES, ĭz'rȧ-ĕl-īts. See Jews.

ISRAËLS, ēs'rä-ĕls', Jozef (1824–1911). The foremost Dutch genre painter of the nineteenth century. He was born at Groningen, North Holland, Jan. 27, 1824, the son of a well-to-do Jewish merchant. Intended for a commercial career, he early showed a taste for art and was sent to Amsterdam, where he studied under Kruseman and Pieneman. He then spent three years in Paris, studying under Picot, and at the Ecole des Beaux-Arts under Delaroche, but frequenting the ateliers of various Romantic painters. In 1848 he returned to Amsterdam and for several years painted historical pictures which show no especial talent or individuality. His real style was not revealed until his return from Zandvoort, a fishing village near Haarlem, where he had gone for his health. There he realized for the first time the beauty of humble life, especially of the fisher folk; the tragic aspects of this life particularly impressed him. He continued to live principally at Amsterdam until he settled at The Hague in 1870. In 1862 his pictures "The Cradle" and "The Shipwrecked Mariner," exhibited in London, excited much interest. "The Cradle," with its intimate charm, and touch of agreeable sentimentality, was typical of many of the interiors, both in oil and water color, that he executed afterward. An example of this later painting is "Expectation," in the Metropolitan Museum of Art, New York. It is a moving, homely picture of the genre he made famous by "Interior of the Orphan Asylum at Katwijk" (1867); "The Frugal Meal," Vanderbilt collection (Metropolitan Museum, New York); "A Dutch Interior," Walters collection, Baltimore; "The Silent House," Glasgow Museum; "An Interior," Dordrecht Gallery; "Alone in the World," Rijks-Museum, Amsterdam (another version in Mesdag Museum, The Hague); "A Son of God's People," Municipal Museum, Amsterdam; "Before Parting"; "Through Darkness to Light"; "David before Saul"; "Children of the Sea"; "When One Grows Old"; "The Jewish Scribe"; and many others. He also painted portraits of great power, among the best of which is one of himself (1908). He is best represented in various Dutch galleries, and many of his paintings are in the United States. As he grew older, his work gained in breadth and poetic power. The studies of fisher folk, by which he is equally well known, include the rather melodramatic "Shipwrecked Mariner"; "The Zandvoort Fisherman," in the Amsterdam Gallery; and his great canvas, "The Toilers of the Sea," which with "Between the Field and Seashore" and "The Bric-à-Brac Dealer," won medals of honor at the Paris Exposition of 1900. He received many other distinctions, was corresponding member of the French Institute and of nearly all the principal European academies. His treatment was increasingly broad and realistic, and his color, at first pronounced, was afterward modified with peculiar, misty atmospheric effects. Like Rembrandt, he was rather an artist in light and shade than a colorist, and a poet as well as a painter. He has often been compared with Millet, whom he resembles in subject as well as in a certain weakness in the purely technical sides of painting. Israëls excelled also in water color, and his etchings are notable for their simplicity and sureness of touch. He wrote a book of travels, *Spanien,* published in German translation at Berlin in 1900.

Bibliography. F. G. Dumas, *Illustrated Biographies of Modern Artists* (2 vols., Paris, 1882–88); Philip Zilcken, *Peintres hollandais modernes* (Amsterdam, 1892–93; new ed., 1899); J. de Meester, in Maximilien Rooses, *Dutch Painters of the Nineteenth Century* (London, 1898); Max Liebermann, *Josef Israëls* (2d ed., Berlin, 1902); P. J. Veth, "Modern Dutch Art, the Work of Josef Israëls," in *The Studio,* vol. xxvi (London, 1902); Fritz Stahl, in Martin Buber, *Jüdische Künstler* (Berlin, 1903); Georg Brandes, "Josef Israëls," in *Kunst und Künstler,* vol. iii (ib., 1905); C. L. Dake, *Josef Israëls* (ib., 1910); Max Eisler, *Von juedischer Kunst* (Cologne, 1910).

ISRAFIL, ĭz'rȧ-fēl. The archangel of music, who, according to later Mohammedan belief, will sound the last trump on the day of resurrection, standing upon the rock of the temple at Jerusalem calling mankind to the last judgment. His playing will be one of the delights of paradise. The name does not occur either in the Koran or the Hadith (q.v.). He is, however, supposed by commentators to be the angel mentioned in Suras xx, 107, 1, 40, and liv, 6. Like much of the angelology of Mohammedanism, this represents a superstructure due to later Jewish and Christian influences.

ISSA, ĭs'ȧ. See Lissa.

ISSACHAR, ĭs'sȧ-kär. One of the tribes of Israel, descended, according to the Book of Genesis (xxx. 17), from Issachar, the ninth son of Jacob and fifth of Leah. The name is explained as meaning "there is reward" and is interpreted by a reference to the "mandrakes" with which Leah "hired" her husband from her sister Rachel (Gen. xxx. 16), or as Leah's reward for giving her handmaid Zilpah to Jacob (xxx. 18). The subject condition of the tribe at some period of its history (cf. Gen. xlix. 14–15) may have suggested the meaning of "hired laborer." The original significance of the tribal name was probably lost at an early time, and it may have been confounded with the name of some local divinity. The tribe's lot in Palestine included the Plain of Esdraelon, but the Canaanites were but imperfectly dis-

possessed. Deborah and Barak are supposed to have belonged to the tribe, also Baasha, third King of Israel (1 Kings xv. 27). The reference to Issachar in the blessing of Moses (Deut. xxxiii. 18–19), "they [Zebulon and Issachar] to their mountain nations call; they bring right sacrifices there," has been thought to refer to Tabor, where there probably was a sanctuary visited by various peoples from whom the tribe of Issachar at one time may have drawn considerable profit. Consult Nathaniel Schmidt, *Messages of the Poets*, pp. 346–347 (New York, 1911).

ISSACHAR. A character in Dryden's *Absalom and Achitophel.*

ISSI, ĭs'ī. See ISSUS.

ISSLAND, ĭs'lând. In the Nibelungenlied (q.v.), the kingdom of Brunhilda.

ISSOI, ĭs'oi. See ISSUS.

ISSOUDUN, ē'sōō'dŭn'. The capital of an arrondissement in the Department of Indre, France, situated on the river Théolle, 22 miles southwest of Bourges (Map: France, N., G 6). It has a municipal college, a library, and a museum, the latter installed in an ancient building known as the White Tower. It has quarries of lithographic stone and manufactures textiles, bristles, parchment, and machinery. There are also several large breweries. The town dates from ante-Roman times, but it has preserved few ancient remains, as it has often been ravaged by wars and has been several times destroyed by fire. Pop., 1901, 14,222; 1911, 10,246.

ISSUE (OF. *issue, eissue, essue,* Fr. *issue,* from OF. *issir, eissir,* to go out, from Lat. *exire,* to go out, from *ex,* out + *ire,* to go). In legal procedure, the stage of an action when, in the course of pleading, the parties come to a direct conflict, i.e., a point which is affirmed by the one and denied by the other. The litigants are at issue. The term is also used to designate the point or question thus raised by the pleadings. In this sense the issue may be one either of law or of fact. If the former, it is decided by the court without the intervention of a jury; if the latter, it is, in the ordinary courts of common law, usually determined by a jury or, in equity practice, by a judge. In some of the States of the Union issues of both kinds may by consent of parties be tried by a referee. An issue of fact arises when a material matter of fact is asserted by one party and denied by the other. An issue of law arises when one party, admitting for the purposes of the issue that the facts alleged by his adversary are true, denies that they are sufficient in law to constitute a cause of action or a defense.

When a court of law or equity is sitting without a jury, it sometimes happens that a question of fact arises upon which the decision of a jury is desired. A fictitious suit is thereupon framed, involving the point in question, and brought to trial before a jury summoned for the purpose. The verdict rendered, being returned to the court, is accepted as a settlement of the issue of fact, and the trial of the cause out of which that issue grew thereupon proceeds. In some States a feigned issue in such cases is not required, the actual question as it arises being submitted to a jury specially impaneled by order of court. See GENERAL ISSUE; and consult the works referred to under PLEADING.

ISSUE. In English and American law, the lineal (as distinguished from the collateral) descendants of a person. It comprehends grandchildren, etc., ad infinitum, as well as the immediate offspring, but does not include adoptive children. A devise of land to a person and "his issue" is deemed the equivalent of a gift to such person and "the heirs of his body" and results in the estate known as a fee tail (q.v.). The phrase "failure of issue" signifies an ultimate failure, as by the death of the last surviving lineal descendant, and, under the rules of interpretation of deeds and devises developed by the courts of common law and equity, the same signification attaches to the expression "if he shall die without issue." Thus, if lands are given to A and his heirs and, if A die without issue, to B and his heirs, the gift is regarded as vesting in B only upon a complete and final failure of A's issue, whenever this may happen. See REAL ESTATE; and consult the authorities there cited.

IS'SUS, or **ISSI** (Lat., from Gk. *Ἰσσός, Ἰσσοί, Issos, Issoi*). An ancient seaport on a gulf of the same name (now the Gulf of Iskanderun) in Cilicia, Asia Minor. It possessed great strategic importance in ancient times on account of its position on the narrow defile leading from Syria into Cilicia (q.v.; see also CILICIAN GATES). At Issus, Alexander the Great overwhelmed Darius (333 B.C.). Near by, Septimius Severus overthrew Pescennius Niger, his rival for the Imperial throne (194 A.D.), and in the neighborhood the Emperor Heraclius defeated the Persians in 622 A.D. The exact site of Issus has not been determined. See BATTLE OF ISSUS; ALEXANDER THE GREAT.

ISSY, ē'sē' (Fr. *Issy-les-Moulineaux*). A town in the French Department of Seine, situated about 1½ miles southwest of Paris, with which it is connected by a street railway, and on the left bank of the Seine (Map: France, N., A 2). It has a seminary, a museum, a castle, and a home for the aged. There are manufactures of silk, paint, oil, chemicals, cement, and shoes. The fortifications of Issy suffered considerably during the siege of Paris in 1870–71, but have since been restored. Pop., 1901, 16,639; 1911, 20,043.

ISSYK-KUL, ĕs'sĕk-kōōl'. A lake in the Province of Semiryechensk, Russia, lying to the south of Lake Balkash (Map: Asia, K 4). It is about 38 miles in width and 112 miles long, with an estimated area of over 2000 square miles, but rapidly being desiccated. It receives a number of small streams, and its water is brackish; its shores are low and sparsely inhabited. The chief settlement is Przhevalsk, situated on the east shore and named in honor of the famous explorer Przhevalsky.

ISTEL, ĭs'tel, EDGAR (1880–). A German composer and writer on music, born at Mainz. He studied violin and composition under Fritz Volbach, at the same time attending the Gymnasium of his native town. After graduation in 1898 he went to Munich to complete his musical studies with L. Thuille and to enter the university, where he devoted himself to the science of music and to psychology, receiving the degree of Ph.D. in 1900. He wrote the operas *Der fahrende Schüler* (1906) and *Des Tribunals Gebot* (1914); a *Singspielouvertüre; Hymnus an Zeus* for chorus and orchestra; mixed choruses; and songs. His chief importance, however, rests upon his literary works, of which the following are the principal: *Peter*

Cornelius (1906); *Die Entstehung des deutschen Melodramas* (1906); *Die komische Oper* (1906); *Das Kunstwerk Richard Wagners* (1909); *Das Libretto* (1914).

IS'TER. The ancient name of the Danube in its lower course.

ISTHMIA, ĭs'mĭ-â, or **ISTHMIAN GAMES.** See ISTHMUS.

ISTHMIAN CANALS. See NICARAGUA CANAL; PANAMA CANAL.

ISTHMIAN ODES (Gk. *Ἰσθμιονῖκαι, Isthmionikai,* victors in the Isthmian Games). Poems of Pindar (q.v.) celebrating the victors in the Isthmian Games, for which see ISTHMUS.

ISTHMUS, ĭs'mŭs (Lat. *isthmus,* from Gk. *ἰσθμός, isthmos,* narrow neck of land between two seas). In geography, a narrow neck of land joining two portions of land. The name isthmus was by the ancients often employed without any addition to designate the Isthmus of Corinth, joining the Peloponnesus to continental Hellas. In the southeastern part of the isthmus was a sacred precinct containing temples of Poseidon and Palæmon-Melicertes, where were celebrated the Isthmian Games, one of the four great national festivals of Greece (see INO). According to legend, they were established by Poseidon or Sisyphus in honor of Melicertes (q.v.), or by Theseus after his victory over Sinis, in honor of Poseidon, a version which explained the right of the Athenians to the seats of honor at the Isthmian Games. The regular celebration of the games was dated from 582 B.C. The games seem to have been held every two years, in the spring of the second and fourth years of each Olympiad. The prizes were a palm branch and wreath of parsley during the Greek period, but under the Roman Empire a wreath of fir was substituted. The games were in charge of the Corinthians, and the contests seem to have been those usual at Olympia (see OLYMPIC GAMES), to which musical competitions were added later. After the fall of Corinth (146 B.C.) the Sicyonians continued the games, until the reëstablishment of Corinth by Julius Cæsar. The contests were open to all Greeks except the Eleans. The site of the games has been excavated by the French. Near the site of the isthmian sanctuary can be seen remains of the *Diolkos* or railway by which, in ancient times, small ships were transported across the isthmus; and somewhat to the north can be traced the ancient wall by which, at various times, the Peloponnesus was protected against invasion. The extant remains belong chiefly to the later Roman Empire or the period of Venetian rule. Consult: *Gazette archéologique,* vols. ix–x (Paris, 1884–85); *Ἐφημερὶς Ἀρχαιολογική* (Athens, 1884–85); the article "Isthmia" in Smith, *A Dictionary of Greek and Roman Antiquities,* vol. i (3d ed., London, 1890); Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909). For the Isthmian Games, consult Gardiner, *Greek Athletic Sports and Festivals* (London, 1910). See CORINTH; CORINTH, GULF OF; CORINTH CANAL.

ISTIB, ĕ-stēp', or **SHTIPLIE,** shtĭp'lyĕ. A town of southeastern Servia, situated about 18 miles east of Köprili and 110 miles south of Nish (Map: Balkan Peninsula, D 4). It has a number of mosques and a fine bazar. Its trade is of considerable importance; the population is estimated at 13,000. For over four centuries it belonged to the Turkish Empire, being included in the Vilayet of Kossovo, but during the Balkan War (q.v.) it was captured by the Servians (October, 1912) and confirmed to them by the Treaty of Bucharest (Aug. 10, 1913).

ISTRIA, ĭs'trĭ-â. An Austrian margraviate and crownland, forming part of the modern administrative district of Küstenland (Coastland) (Map: Austria-Hungary, C 4). It consists of a peninsula, the ancient Histria, projecting into the northeast part of the Adriatic Sea, and the islands of Veglia, Cherso, and a few others, covering a total area of 1913.6 square miles. The peninsula is bordered on the north by Triest, Görz and Gradisca, and Carniola, on the east by Fiume, Croatia, and the Bay of Quarnero, and on the south and west by the Adriatic. The peninsula has well-indented coasts and is traversed by a chain of rocky mountains from north to south, culminating in the peak of Monte Maggiore, nearly 4600 feet high. The shores are generally precipitous. The chief streams are the Arsa in the east and the Quieto in the west. The climate is very warm and dry. The severe winds along the coasts are greatly feared by the inhabitants. Istria has little land adapted for tillage, but its pasture lands are extensive as well as its forests. In 1910, out of a total of about 495,600 hectares, arable land amounted to about 55,900 hectares, gardens 14,500, vineyards 29,600, meadows, pastures, etc., 214,200, woodland 165,400, lakes and marsh 630, unproductive (untaxed) 15,300. The climate is favorable to the cultivation of southern fruits, such as olives and figs. Istria also produces an excellent grape, and its wines are famous. Of mineral products it yields chiefly alum, lignite, and salt. The large forests furnish good material for ships, and shipbuilding is a very extensive industry. The sea fishing is also important. The manufacturing industries are as yet undeveloped. Owing to its numerous harbors, Istria is one of the most important commercial districts of Austria, and Pola, at the southern end of the peninsula, is the chief naval station of the monarchy. The total shipping entered at Istrian harbors amounts to about 6,700,000 tons annually. Istria has a separate Diet of 47 members and sends 6 representatives to the Lower House of the Austrian Reichsrat. For administrative purposes it is divided into seven districts and the Municipality of Rovigno. The population in 1900 was 345,050, the increase for the decade being about 8.4 per cent; in 1910 (census of December 31), 403,261, the increase being 16.95 per cent. The total was about 1.41 per cent of the population of Austria. In 1910 the inhabitants of Austrian nationality numbered 386,463, of whom Serbo-Croatian was the vernacular of 168,184 (43.52 per cent), Italian-Ladin 147,417 (38.15), and Slovene 55,134 (14.27). Of the total population present in 1910, 399,870, or 99 per cent, were returned as Roman Catholic. The principal towns include Pola (pop., 58,562), Rovigno (12,323), Capodistria (11,765), Isola (6101), Dignano (6087), and Parenzo, the seat of the Diet (4263). The ancient Istrians belonged to the stock of Illyrians, like them were pirates, and were conquered by the Romans under C. Claudius, 177 B.C. Part of their country was later united to Italy, part to Illyricum (q.v.). It fell into the hands of the Goths in the fifth century. In the seventh century Slavic peoples penetrated into the region. In the course of the Middle Ages parts of Istria were at different times under the rule of the Byzantine emperors, the Franks, the dukes of Carinthia, margraves

of various petty German houses, the Patriarch of Aquileja, the Venetians, the counts of Görz, and the house of Austria, the bulk of the peninsula finally remaining in the hands of the Venetians and the northeastern or German portion in those of Austria. On the extinction of the Venetian Republic, in 1797, the whole of Istria became an Austrian possession.

IS'TRIANS. See ISTRIA.

ISTURIZ, ē-stōō'rēth, FRANCISCO XAVIER DE (1790–1871). A Spanish statesman, born at Cadiz. An ardent patriot during the War of Independence (1808–14), he was a leader in the revolution of 1820, and three years later presided at the Cortes and voted against the Royalists. This stand caused his exile, and he remained in England until the amnesty of 1834. In 1836 he was made Minister of Foreign Affairs and Premier. Forced to yield his portfolio during the revolution of the following August, he became president of the Cortes in 1838. He was now devoted to the cause of Queen María Christina and continued to advance her interest and the French alliance by every means in his power. Premier again in 1846, his ministry was of short duration, but he had much to do with bringing about the marriages of Isabella II and her sister María Luisa to Francisco de Asís and the Duke of Montpensier respectively, and afterward he represented his country as Minister at the Court of St. James's (1850–54) and at St. Petersburg (1856). In 1858 he became President of the Senate and ten days later was made President of the Council and Minister of State. Sent as Ambassador to Paris (1863), he held that post until October, 1864, when he resigned and retired to private life.

IS'UMBRAS. See ISENBRAS.

ISWARA, ēsh'wā-rā (Skt. *íśvara*, lord). An epithet applied to different Hindu divinities, but in mythological acceptation it mostly designates Siva (q.v.).

ITA, ē-tä'. Same as AËTA (q.v.).

IT'ACOL'UMITE (from *Itacolumi*, a mountain in Minas Geraes, Brazil). A schistose, light-colored rock composed largely of quartz grains, but also containing mica, chlorite, talc, and other minerals. It occurs in thin plates, which commonly possess the property of flexibility and can be bent backward and forward like a piece of sole leather. The cause of this flexibility is generally assigned to the peculiar form of the quartz grains; the latter, according to some observers, are elongated and have reentrant and projecting surfaces which articulate like joints. Itacolumite is associated with the crystalline schists of Brazil, where it covers large areas, and is also found along the southern Appalachians in the United States. The source of the Brazilian diamond has been referred to itacolumite.

ITAGAKI, ē'tà-gä'kē, TAISÜKE (1837–). A Japanese statesman, called the "Rousseau of Japan." He was born in the Province of Tosa in the island of Shikoku. He received the usual education of a samurai, or military gentleman, and when a young man became a strenuous advocate of the Mikado's supremacy as against the historic usurpation of the Shogun in Yeddo. In the Civil War of 1868 he was aid-de-camp to the Imperial general Arisugawa-no-Miya, and was especially active in the campaign against Aidzu in northern Hondo. After the Restoration in Tokyo he was made one of the privy councilors to the Emperor, and held that office from 1871 to 1873. He resigned because he, with Saigo Takamori of the Satsuma clan, advocated war with Korea on account of the refusal of the latter to continue the tribute which had been paid for centuries to the Shogun's government, and the further refusal of Korea "to acknowledge the Mikado as Emperor of Japan or to have any official relations with his government, which it held to be in league with the Western barbarians." The war party failed, however, and Itagaki, believing that his countrymen would have favored such a war had any political machinery existed for making known their views, became an ardent advocate of representative government based on the system of Great Britain or the United States. When, in 1877, the Satsuma Rebellion broke out under Saigo, Itagaki made fresh efforts, by peaceful agitation, for constitutional government. He organized the first political party in Japan (*Jiyu-to*, or Liberals), contending that in the constitution promised by the Emperor it should be provided that the ministry should be responsible to the Parliament and not to the throne. In 1878 he was Minister of Public Works, and Minister of the Interior in 1880. After much hesitation he accepted the title and decoration of Count in 1887. In 1898 the Liberals, under Itagaki, united with the Progressives under Okuma, and the fusion was called the Constitutional party, which had a large majority in the Lower House. The Emperor thereupon invited Counts Okuma and Itagaki to form a cabinet (Itagaki holding the portfolio for Home Affairs), which, however, lasted but six months, when the ministers resigned and the party resolved itself into its old elements. Itagaki was an uncompromising advocate of the adoption of the British or United States constitutional system as against that based on the German, drafted by Ito and adopted in 1889. He became a Christian and was long an officer of the Church.

ITALA, ĭt'ä-lä. The name given to the Latin versions of the Bible current before the famous Latin version by Jerome (q.v.). Consult Schanz, *Geschichte der römischen Literatur*, part iii, § 772 (2d ed., Munich, 1905). See BIBLE: (IV) *The Versions—The Latin Version.*

ITALIAN ARCHITECTURE. A term used by certain English writers to designate the Renaissance style of architecture because it originated in Italy. More properly it designates the architecture of Italy since 1800, as all that precedes that date is called by particular names of styles and periods. Modern Italian architecture displays few important works of original design, owing partly to political and industrial conditions, but more to the overwhelming influence of the past. Hence the best Italian work has been archæological in character, like the splendid façade of Florence Cathedral by De Fabbris. The most ambitious of recent works is the gigantic monument of Victor Emmanuel at Rome; stupendous in size and cost, but suffering from a lack of simplicity and restraint, a lack which is apt to characterize Italian work, as is seen also in the great Palace of Justice in the same city. See also GOTHIC ARCHITECTURE; RENAISSANCE ART.

ITALIAN ART. According to the general plan of the NEW INTERNATIONAL ENCYCLOPÆDIA, the art of modern European countries, which is essentially international in character, is treated under the headings of the great epochs

of its development. (See ART.) The art of Italy, therefore, falls under various headings: the ancient under ETRUSCAN ART and ROMAN ART; the mediæval under EARLY CHRISTIAN, ROMANESQUE, and GOTHIC ART. The architecture of the Renaissance is likewise treated under the collective heading RENAISSANCE ART; but Italian sculpture and painting, which during this period became independent of architecture, are best treated under the general articles PAINTING and SCULPTURE, which cover the entire modern development. The local aspects of Italian painting are noticed in special articles like FLORENTINE, VENETIAN, and UMBRIAN SCHOOLS OF PAINTING (and others). The decorative arts of Italy are treated under such separate headings as DECORATIVE ART; FURNITURE; TAPESTRIES; JEWELRY; PLATE; ETC.

ITALIAN BAND. See AUGUSTUS' BAND.

ITALIAN LANGUAGE. A term used generically to denote those modern types of Latin speech spoken in the Italian peninsula, in Sicily, Sardinia, Corsica, and Malta, along the northeastern Adriatic shore (Istria, Dalmatia, Illyria), and on the southern watershed of the Alps as a whole (including the Münster, Gardena, and Gardera valleys). The Italian language on the Continent thus extends beyond the political boundaries of Italy into Austria, Switzerland, and France (Savoy). In Adriatic Austria and Italian Friuli Italian has for some decades been yielding to Slavic pressure, finding compensation in the gradual extinction of the German communes in Venetia and in strong colonies in South America (Argentina), in the United States, and in Libya (Africa).

Specifically the term denotes that type of language which is the common medium of expression in these different regions—a language of which the minuter characteristics cannot be rigidly defined, but in which the predominant element is the dialect of Tuscany (Florence, Siena, Pisa, Lucca) or, more strictly still, of Florence. In this sense the term "Italian language" is relatively modern (sixteenth century), replacing the term "Tuscan," which was, as it still sometimes is, inaccurately used to distinguish the literary language from other dialects; and the term "vulgar" (*volgare*), formerly used in opposition to school Latin.

Italian is one of the *Romance* (also called *neo-Latin*, or *Romanic*) languages (q.v.). The others are French, Provençal, Spanish, Portuguese, Rumanian. The Italian dialects of the eastern Alps are so peculiar, however, that they are sometimes classified as a separate language, *Rhæto-Romanic* or *Ladin* (from *Latinum*). A great Italian philologist, Ascoli, wished similarly to isolate the western Alpine dialects as the *Franco-Provençal* language. Still others would so treat *Sardinian*.

THE ITALIAN DIALECTS

In proportion as the Roman Empire extended, the language of the city of Rome was imposed upon her conquered territories. In Italy Latin came to supplant the Gallic languages in the north, Etruscan in the centre, Oscan, Umbrian, and allied types as well as Greek in the south. But meanwhile the language of Rome was undergoing many internal changes. Contact with the culture of the Gauls, Germans, and Greeks introduced many new words into Latin. The ancient dialects of Italy (*Italic dialects*) as they disappeared left traces behind them in the language of the capital. A certain proportion of modern Italian vocabularies is derived from these ancient sources, often anterior to the barbaric invasions. Furthermore, in Rome itself there had been from early times more or less rigid class distinctions. Economic and clannish antagonisms isolated various groups from each other. The cultivated patrician spoke a language somewhat different from the uneducated plebeian and the cosmopolitan mob. This cultivated language came to be adorned with imposing literary monuments which established standards of taste and ultimately shackled itself with a preceptualistic grammar. Conservatism thus became the rule in the literary tongue, while the populace went on adapting its linguistic expression to the most varied national and regional influences. As early as the late Empire there is a wide gap between popular, vulgar Latin and that of classic literature. It was this vulgar tongue that merchant, soldier, and colonist spread over the non-Roman Latin world in a pronunciation, a morphology, a syntax, that Cicero and Vergil would not have recognized.

This vulgar Latin, spoken by the vast hordes of the Roman populace, survived the fall of the Roman Empire and is still spoken in its Italian and other Romance forms. With the fifth century classic pagan culture, essentially aristocratic, succumbs to Christian culture, in its origins popular. The Latin of Christianity shows extensive concessions made by the classic tongue to the vulgar speech. But neither of these cultures possessed adequate machinery for educating the poorer classes, who developed their own languages without disturbance from above. The ancient cultural tradition remained, however, strongest in Italy. This fact, together with the relatively slight racial changes in Italy, perhaps explains the greater similarity of Italian to ancient Latin types.

Nevertheless, the destruction of national life broke down the intimate mutual relations of the provinces of the Empire. Regional traits in language became accentuated. Diversity increased as intensity of communication lessened. The parish differentiated itself from the town as a whole, the town from the surrounding country, one geographical or economic unit from another. Thus, the Latin tongue, which proceeded from Rome with more or less unity, broke up into thousands of types. We may classify these types for convenience into languages, dialects, and patois; but such delimitations have no absolute value. Were we to take account of all the slightest variations of speech, there would be almost as many types as there are speaking individuals. In the city of Venice there are two distinct linguistic "spheres"; the language also of a Venetian proper differs from that of a citizen of the Venetian mainland, who would in turn find even difficulty in talking with a Lombard or a Furlano and be driven to despair or to delight in Genoa and Palermo. Time has much the same effect as distance. In Italy, however, there is not so great a gap between the old dialects and their modern forms as is found in France.

For the characteristics of vulgar Latin as opposed to the classic tongue, see the article on ROMANCE LANGUAGES. Here we shall outline summarily the general linguistic types that show more or less widely distributed developments from this vulgar Latin.

I. Dialects showing more or less dependence on Romance types outside of Italy.

1. Franco-Provençal dialects (Savoy, Wallensia, the upper valleys of the two branches of the Dora, of the Orco and the Stura). Distinctive characteristics: (*a*) Latin palatal + *a* = *e* or *i* (capream = *zevra*). (*b*) Preservation of Latin pluperfect indicative and imperfect subjunctive (portaveram = *portaro;* haberem = *avre*). (*c*) Preservation of *t* in third person singular of verbs (portat = *portet*). (*d*) Lat. *ca* = *che* or *che*, as in French (carum = *zir*).

2. Ladin dialects (Swiss Grisons, Münster, valleys of Gardena and Gardera, Noce, Avisio, Corievole, Boite, upper Piave, the Province of Friuli, the upper Ticino, upper Mera, Val Fiorentina, and Cadore). Characteristics: (*a*) Lat. *ca* and *ga* are palatalized (capillum = *chavel*). (*b*) Lat. groups *pl*, *cl*, *gl*, etc., remain intact (claves = *clefs*). (*c*) Plurals are formed with *s* (rami = *rames*). (*d*) Lat. accented *a* = *e* (canem = *zen*). (*e*) Lat. accented *ū* = *ü*, as in French (mulos = *müles*). (*f*) Diphthongization of the other accented Latin vowels *in position* (before two consonants): *e* = *ie;* *e* and *i* = *ei;* *ō* and *ŏ* = *ue* = *ue*, *ö* (like French *eu* and *œu*) (nivem = *neif;* oculi = *oeje;* modum = *möd;* infernum = *infiern*).

II. Dialects independent both of French and strictly Italian systems. These embrace the group formerly called *Gallo-Italian* (Ligurian, central in Genoa; Piedmontese, central in Turin; Lombard, in Milan; Emilian, in Bologna). Here belongs also Sardinian, with three types corresponding to the regions of Logudoro, Campidano, and Gallura.

1. Gallo-Italian group. Characteristics: (*a*) Final unaccented Lat. vowels drop in Pied., Lom., and Emil. (retem = *red;* vocem = *votsh*). (*b*) Pretonic Lat. vowels drop in Pied. and Emil. (dinerum = *dnê*), sometimes developing a prosthetic vowel (rumorem = *armor*). (*c*) Lat. accented *ū* = *ü* and *ō* = *ö* in Pied., Lig., and Lom. (durum = *dür;* novum = *növ*). (*d*) Lat. accented *ĕ* and *ĭ* = *ei* in Pied., Lig., Emil. (habere = *aveir*); the diphthong *ie* from Lat. *ĕ* does not, however, appear. (*e*) Lat. accented *a* = *e* generally, except in Lig. (andare = *ander*). (*f*) Nasalization of *n* generally (panem = *pân*). (*g*) Vocalization of palatal in Lat. group *ct* (factum = *fait* and *fatch*), which is also confused with *pt* (scriptum = *screihtor*). (*h*) Disappearance of intervocalic *d* generally and in Lig. of *l* and *r* (ridere = *rie;* dolorem = (in Genova) *durur* = *dü* through step *duu*). (*i*) Lat. *g* between back vowels (*a* or *o*) = *j* (in Piedmontese) (braga = *braja*). (*j*) In Lig. *pl* (Lat.) = *ch* (as in Eng. *church*), *bl* = Eng. *j* (as in *joy*), *fl* = *sh* (plus = *chü;* rabies = *rajja;* florem = *shü*). (*k*) In Lig. a final Lat. *s* often becomes aspirate *h*, as is regular in Sanskrit and as occurs also in the dialect of Bergamo (grossum = *groh*). (*l*) A Latin final *i* causes umlaut generally (bonum = *bön*, but boni = *boin*). (*m*) In Emil. verbs show large use of present subjunctives in *-pa* (siam = *sipa*) and of preterits in *-p* (fuit = *fop*). (*n*) Subject pronouns are triplicated or duplicated generally (cantas = *ti te cantet*, that is really Lat. *te te cantas tu*).

In these dialects the presence of nasal vowels and of the French *ü*, the summary justice done to unaccented vowels and the reduplication of pronouns have been ascribed to ancient Celtic influences. Their unintelligibility is a standing joke among educated Italians, who see their sonorous *fiore* and *dolore* reduced to squeaky monosyllables, *shü* and *dü*.

2. Sardinian group. Characteristics: (*a*) The Latin accented vowels are all preserved, i.e., *ĭ* and *ŭ* do not blend with *ē* and *ō* (nucem = *nughe;* pilum = *pilu*). (*b*) Similarly the unaccented final vowels (see ib.). Sardinian thus furnishes corroboration of the derivation of Romance nouns from Latin accusatives, since the treatment of accusative *-um* and ablative *-o* is different, whereas in Italian generally they would be the same. (*c*) Final *t* and final *s* survive (plantas = *plantas*, amat = *amat*). (*d*) Lat. *c* and *g* remain hard before *e* and *i* (facis = *faghes*). This phenomenon, of questionable antiquity however, has been held as proof of the Latin pronunciation of *c* and *g* in this situation. (*e*) Initial *cl*, *bl*, etc., survive (clarum = *claru*). (*f*) Lat. *ny* = *nzh* (melius = *mezhus*). (*g*) Lat. *qua*, *gua*, *cu*, and *gu* = *bba* or *bb* (aquam = *abba*). (*h*) Lat. *ll* = *dd* (bellum = *beddu*). (*i*) Lat. *s* + consonant prefixes, when initial, a permanent *i-*, which is movable in Italian generally (stellam = *istella*). (*j*) Phonetic changes are widely determined by position of words in the sentence (*Satzphonetik*): *su ove* = *the ox*, but *sos boves* = *the oxen*, the *b*, i.e., dropping between vowels. (*k*) The definite article derives from *ipsum* (= Sard. *su*, plural *sus*), not from *illum* (= It. *il*, *lo*, Fr. *le*, etc.). (*l*) Lat. imperfect subjunctive survives in verbs (cantarem = *cantere*). (*m*) Preference of preterits in *-si* (cantavi = *cantesi*). (*n*) Future formed by Lat. *habere* + preposition *ad* + infinitive (habeo ad manducare = *hapo a mandigare*, I shall eat). This is conclusive corroboration of the etymology of the Romance future.

Sardinian in general seems to represent an earlier stage of vulgar Latin than other Romance languages. It is one of the most important and interesting for linguistic study.

III. Dialects with pronounced affinity to the Tuscan system.

1. Venetian (Venice, the Venetian estuary, and mainland as far as the Adige, the Alps, and Friuli). Characteristics: (*a*) Loss of intervocalic *d* (crudum = *cruo*). (*b*) Intervocalic *k* = *g* (amicum = *amigo*). (*c*) Lat. *cl* = *ch* (as in Eng. *church*) (ecclesia = *cesa* for It. *chiesa*). (*d*) Lat. *sc* before *e* and *i* = *ss* (piscem = *pesse*). (*e*) Intervocalic *ly* = *j* (like *z* of Eng. *azure*) (familia = *famegia*). (*f*) Third singular replaces third plural in verbs (cantant = *i canta*). (*g*) Preference for participles in *-esto* in second and third conjugations (vedutum = *vedesto*). (*h*) The *s* of Lat. second person singular is preserved in interrogation (habes = *ti a*, but habes tu? = *astu*). (*i*) Intervocalic *l* tends to disappear in contemporary dialect (insalatam = *insaaa*). (*j*) Lat. *est* = *xe*. (*k*) Double consonants become single (bellum = *belo*). The great similarity of this dialect to the literary tongue has given its literature a ready diffusion outside of Venetia.

2. Corsican. There is a Sardinian trend and a Tuscan trend: (*a*) Lat. gu = *bu* (gunna = *bunna*, It. *gonna*). (*b*) Lat. first conjugation is sometimes attracted to third (laxare = *leche*). (*c*) Unaccented vowels survive, with *u* for *o* and *i* for *e* (lactem = *latti*, pilum = *pilu*). (*d*) Lat. accented *ar* + cons. = *e* (carnem = *chern*). (*e*) Lat. *ll* = *dr* (bellum = *bedru*, It. *bello*). (*f*) The suffix *-one* is diminutive, as in French (fratellonem = *fratedronu*, little brother).

3. South Italian dialects—Sicilian, Neapolitan, Roman (Umbria, Marche, Roman Province). General characteristics: (*a*) Intervocalic *t* survives (setam = *seta*). (*b*) Intervocalic *d* = *r* (ad duos = *a roi*). (*c*) Lat. *nd* = *nn* (discendere = *scennere*), so also *mb* = *mm* and *nv* = *mm*. (*d*) Lat. *pl* = *ky*, *bl* = *j* (Eng. *joy*), *fl* = *sh* (plus = *chiu*, rabiem = *raggia*, florem = *sciuri*, It. *fiore*). So also for *py*, *by*, *fy* (sepia = *secchia*). (*e*) Lat. *ce*, *ci* = *tts* (glaciem = *iazzu*). (*f*) Dropping of initial vowels (intendere = *'ndennere*). (*g*) Double consonants are preserved, and many single consonants are doubled (de post = *doppu*). (*h*) *Satzphonetik* (see above) is prevalent (dominam = *donna*, but unam dominam = *'na ronna*). Special characteristics:

A. Sicilian. (*a*) Lat. *ĭ* and *ŭ* survive, but Lat. *é* = *i* and *ó* = *u* (pilum = *pilu*, *credere* = *criditi*, solem = *suli*). (*b*) Intervocalic *ly* = *ghy* (filiam = *figghia*). (*c*) Intervocalic *ll* = *dd* (bellum = *beddu*).

B. Neapolitan (principal variations: Calabrian, Abruzzese, Otrantine, Leccese, Basilisk for the Basilicata, Neapolitan for region of Naples). (*a*) All Sicilian characteristics more or less prevalent (filium = *figghiu*, vocem = *vuci*, caballum = *cavaddu*). (*b*) Lat. *fl* = *hy* (florem = *hyuri*). (*c*) Lat. *ŏ* = *ue* (corem = *cueri*) and unaccented often = *au* (honorem = *anaure*). (*d*) Accented Lat. *a* = *e* (capum = *ghepe*). (*e*) In Abruzzese a general dropping or weakening of unaccented vowels (satisfactionem = *sfaziaune*), which is limited more usually to finals (bonum = *buone*). (*f*) Neapolitan follows the Romance tendency for Lat. *i* = *e* (venis = *viene*), following Sicilian, however, for accented Lat. *o*, *u* and *e*, *i*. (*g*) Accented Lat. *ĕ* and *ŏ* diphthongize in position, i.e., before two consonants (apertum = *apierte*, mortem = *muorte*). (*h*) Creation of consonants between vowels in hiatus (alterum = *avotre* through steps *autro*, *aultro*). (*i*) General diffusion of Lat. pluperfect indicative (feceram = *faceru*). (*j*) Traces of ending *t* in third singular of verbs (habuit = *ebbeti*). (*k*) In Abruzzese third singular replaces third plural. (*l*) Lat. neuter plurals in *-ora* survive (tempora = *tempora*).

C. Roman and Umbrian. (*a*) Lat. *ld* = *ll*, *nd* = *nn*, *mb* = *mm* (plangendum = *piannenne*, calidum = *callu*, plumbum = *piommo*). (*b*) Diphthongization of *ĕ* and *ŏ* in position (tempus = *tiempi*, dominam = *duonna*). (*c*) Survival of Lat. *intus* and *apud* influencing prepositions *ad* and *in* (ad = *ta*, in = *me* before article). Here also a wide diffusion of Tuscan elements on the one hand and Neapolitan on the other.

IV. The Tuscan dialects (Florentine, Pisan, Lucchese, Sienese, and Aretine). Characteristics: (*a*) Lat. *c* between back vowels = *h* (illam casam = *la hasa*). (*b*) Lat. *ly* = *gghi* (filiam = *figghia*) or disappears (alium = *aio*). (*c*) Lat. *l* + *consonant* = *i* and *u* (alterum = *ailtro* and *autro*). (*d*) Intervocalic *t* = *h* (adripatum = *arrivaha*). (*e*) In Lucca *tj* = *ss* (plateam = *piassa*). (*f*) Also Lat. *s* = *th* (preso = *pretho*). (*g*) Lat. -unct = *-ont* (unctum = *onto*). (*h*) Unaccented *e* = *e* (te = *te*, It. *tu*). (*i*) Frequent interchange of *l* and *r* (mortem = *molte*). (*j*) Assimilation of pretonic vowel to the tonic, and of post-tonics to the final (utilem = *utele*, ridiculam = *ridiquala*). (*k*) Palatalization of *t*, *d*, *l*, *n*, before a final *i* (quarti = *quarkye*, cani = *kegne*). (*l*) Metathesis of *i* between vowel and consonant (medietatem = *meità* = *metià*, vocitum = *voito* = *votio*).

THE LITERARY TONGUE AND THE "QUESTION OF LANGUAGE"

While Latin held almost undisputed sway in the written document and in interregional communication, these dialects reigned undisturbed in their respective territories. The earliest popular Italian documents (tenth century) are dialect in language. And when, in imitation of the popular literature of France and Provence, the Italians set about conscious artistic production, each Italian thought of writing only in his native dialect. Thus, in the thirteenth century the poetry of the court of Frederick II is notably Sicilian and at any rate Southern in language; the epic poetry of the north is markedly Venetian, while Umbrian forms the base of the splendid Franciscan dialogues in verse. Had Venetian imperialism, e.g., succeeded in unifying Italy politically, doubtless Venetian would to-day be the Italian language just as the language of the Capetian estates of the Ile de France became the French tongue. But Italy was destined to attain cultural unity long before political independence, though the linguistic hegemony of Tuscany has never been as undisputed as the present political leadership of the house of Savoy.

Its earliest rival was the hybrid Southern language of the Sicilian court, which was raised to some dignity by a fairly extensive literature in the thirteenth century. But this language, in this literature, rested on the artificial foundations of the culture that characterized the court of Frederick II; and its development ceased with the dispersion of that court. A variety of causes gave, already at this early date, the predominance to the Tuscan dialect. Tuscany occupies a central position in Italy. Its dialect of all the Italian group departs least in phonology and morphology from classic Latin, and therefore best of all the dialects it harmonized with the traditions of Latin culture. The aggressiveness of Florentine commerce is only secondary in its influence to the great fact in the history of the Italian language that Florence developed a local culture worthy of taking up the heritage of the Sicilian poets and capable of producing the three literary artists who summarize Italian thought and feeling of the early Renaissance and late Middle Ages—Dante Alighieri, Francesco Petrarca, and Giovanni Boccaccio.

The *Divine Comedy* of Dante was the only book of its age able to hold in popular culture the position of Vergil in the Latin tradition. It alone was sufficient to turn the whole current of cultivated expression into one channel. But Tuscany was fortunate again in producing Petrarch, whose cosmopolitan training and distinctly modern outlook were likewise able to cast in a Tuscan mold all the intellectual aspirations of a new age that might have found Dante outworn. While thus the two supreme models of Italian poetry were Tuscan, Boccaccio came to complete the series with the brilliancy of his prose. Italians who saw in Dante and Petrarch poets equal to Vergil and Horace and in Boccaccio a rival of Cicero readily came to see in the language of these men a peer of Latin. As early as 1435 the doctors of Pope Eugene's court were debating on the "regularity" of the vulgar tongue (Tuscan), and the *certame coro-*

nario (poetic contest) of Florence (1441), though its productions cast little glory on the Italian language, at least signifies the existence in learned circles of the conviction that the language of the "Three Crowns" (Dante, Petrarch, and Boccaccio) was as "noble" as Latin. It was to demonstrate this equality, particularly to show that the categories of Latin grammar were applicable with the same preceptual force to Italian, that the earliest grammars were written (Lorenzo il Magnifico (?), c.1490; F. Fortunio, 1516).

But the examination of the linguistic question in Italy soon revealed a very troublesome situation. Italians outside of Tuscany, as they attempted to write in the language of Petrarch and Boccaccio, could not free themselves from the consciousness of their own native dialects. Dialectical tendencies in the literary tongue were especially strong in the regions closely kindred to Tuscany (Venetia, Rome, South). Moreover, in Tuscany itself Latin culture had eliminated from the literary language the most prominent and "barbarous" dialecticisms ($s =$ *h*, *ly* = *ggli*, *st* = *sht*', $l = r$, *unct* = *ont*, etc.; see above). What theoretically was to be the status of these different elements? The Italian grammarians of the Renaissance had, as their most effective instrument in answering this question, the rhetorical theory of imitation, and they grouped themselves into schools according to the manner in which they applied it. The most fortunate of these early groups was that of classic purism, headed by Cardinal Pietro Bembo, whose book of *Prose* (1525) rigidly defined Italian as the language of the Three Crowns, which Bembo brilliantly illustrated in his own writings. This theory, in effect, made Italian really a "dead" language, since in vocabulary and syntax it was not to exceed the limits of Dante, Petrarch, and Boccaccio, in which triad Petrarch and Boccaccio for their cosmopolitanism in language were recognized as primates. This weakness was soon discerned and violently combated by the Tuscan school (Machiavelli, Claudio Tolomei, G. B. Gelli, and P. F. Giambullari), who recognized the Tuscaninity of the Three Crowns and concluded that a living language, in harmony with the cultural tradition, should follow the living Tuscan speech as spoken by cultivated Tuscans. This group also had a Sienese wing (C. Cittadini, O. Lombardelli, S. Bargagli), originators of the apothegm "lingua fiorentina in bocca senese," which succeeded definitively in coupling Siena with Florence as the fountain of "pure" Italian. But the pretensions of these Tuscan schools ran contrary to the regional sentiments of most other Italians, and their resentment at the very term "Tuscan" first gave currency to the term "Italian language," previously called either "vulgar" or "Tuscan." Nevertheless, all grammarians, whatever the color of their doctrine, accepted the theory of imitation, and it was the theory of Bembo, modified by admitting to parity with the Three Crowns all "good writers" (e.g., Sannazaro, Bembo himself, Ariosto, Tasso, Della Casa), that ultimately triumphed. This wider classicism, first codified by Salviati on a Florentine basis, has been the guiding principle of the Accademia della Crusca, which since its foundation in 1583 has in its successive dictionaries pretended with some success to the rôle of arbiter in Italian linguistic matters. In the seventeenth and eighteenth centuries the Crusca had several antagonists: its theory of the authority of classical usage was attacked in the individualistic system of G. B. Vico, in the doctrine of "logic" and analogy which gained currency under the influence of French philosophy, more subtly again in the theories of "gallantry" and "taste" that filled the pre-Revolutionary academies. The Crusca itself has been profoundly modified in the last 50 years by the Manzonian theory of Italian. Alessandro Manzoni, in his criticism and in the polishing of his famous romance *I promessi sposi* (The Betrothed), compromises between the doctrine of classic purism and Tuscan usage, correcting the "barbarisms" of Tuscany by means of the classic tradition, but reconciling the inconsistencies of the classic authors and providing for growth by adopting such usage as is justified by the living language as spoken in Florence. This is the doctrine that at present is forming the literary Italian language and that is exemplified in the grammar of Luigi Morandi-G. Cappelletti that the Italian government has imposed upon elementary schools.

In this literary tongue the intensely Latin quality of the Florentine dialect is preserved. Italian *accented* vowels follow in general the simpler changes of vulgar Latin ($a = a$, $\bar{u} = u$, $\breve{u} = o$, $i = i$, $\bar{i} = e$, $\bar{o} = o$, $e = e$). Of the diphthongs from $\breve{e}$ and $\breve{o}$ (*ie*, *uo*) in free position (followed by one consonant), the second (*uo*) is tending to revert to *o* (pedem = *piede*, novum = *nuovo* and now frequently *novo*). The simple vowel changes occur also in unaccented vowels, where, however, pretonic *e* is often *i*, and where the influence of labials is often felt (demandare = *dimandare*, but regularly *domandare*). The most radical of the consonantal changes affects the groups *bl*, *cl*, *pl*, which become *bi*, *ki* (spelled *chi*), *pi* (clamare = *chiamare*, planum = *piano*, blondum = *biondo*); but assimilation of other groups is general: *ct* = *tt*, *pt* = *tt*, *gd* = *dd*, etc. (factum = *fatto*). This phenomenon is most disfiguring of Latin when the assimilation takes place after the loss of an intervening unaccented vowel (venire habeo, I shall come = *venirò* = *venrò* = *verrò*). As in other Romance tongues, the Lat. groups *ce*, *ci*, and *ge*, *gi* have palatalized (*c* = *ch* in Eng. *church*, *g* = *g* of Eng. *gem*). Purely Latin, on the other hand, is the preservation of double consonants (gallum = *gallo*, i.e., *gal-lo*). In morphology, Italian has reduced the Latin noun cases to two, accusative singular and plural, and the total number of verb tenses and moods to eight simple and seven compound tenses, supplying the deficiency by means of prepositions (homini = *all' uomo*, to the man) and auxiliary verbs (fecerat = *aveva fatto*, he had done). While the vocabulary of Latin has been made to meet all the conditions of Italian life in its changing history, the simplicity of the phonetic and morphological changes, coupled with a fairly perfect phonetic orthography, has made the acquisition of Italian easy for a person who knows Latin or any of its modern Romance forms.

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ITALIAN LITERATURE. The literature written in the Italian language (q.v.). [In view of the necessarily restricted space allotted to minor authors in our biographical articles, we shall treat Italian literature, especially the earlier period, with somewhat greater detail and length than the corresponding portions of English and French literature.] Two salient facts characterize the early history of Italian literature: its relatively late beginning (as compared with French, Spanish, and the Germanic literatures) and its extraordinarily rapid rise in less than a century to the heights of Dante, Petrarch, and Boccaccio. Both these facts are due to the tenacity of the Latin tradition in Italy. From Boëthius and Cassiodorus (sixth century) down through the Middle Ages, Italians read the Latin classics and wrote Latin even with elegance—all the more because the barbaric invasions did not cause ethnological and social disturbances so violent and thoroughgoing as those beyond the Alps. There was in Italy no central political power. Life developed regionally and municipally rather than nationally; there was no national spirit to develop an Italian epic literature, no feudalism to foster a Provençal chivalry. The cultivated classes turned rather to the history of their ancient glories, to science and philosophy, and their productions in these fields were for the learned public rather than for the populace. Here Latin was the traditional and the efficient tongue. This culture, moreover, had roots in the laity as well as in the clergy. By the middle of the thirteenth century science and philosophy had attained a high degree of excellence, with all the vigor of civic and intellectual life attendant upon them. Early Italian literature reflects this culture rather than the untaught emotions of a naïve and ignorant populace. So in a sense Italian literature was born full grown.

Thus until the first half of the thirteenth century Latin continued to serve in Italy for the writing of chronicles, historical and narrative poems, heroic legends (many of them introduced from France; e.g., the story of Charlemagne and his knights, of Arthur and his Round Table, the mediæval account of the fall of Troy, and the history of Alexander the Great), religious legends and lives of the saints (cf. the famous collection of the Bishop of Genoa, Jacopo da Voragine (1230–98), known as the *Legenda Aurea*), didactic and scientific works (grammars, encyclopædias, and treatises on morals and philosophy), religious lyrics (hymns like the "Stabat Mater" and the "Dies Iræ"), and liturgical plays and mysteries (the prototypes of the first Italian dramas, the *rappresentazioni sacre*). But Latin was not the only language written in Italy before the time when Italian was thought dignified enough for literary use. The poets of southern France had already wandered into Italy before the end of the twelfth century, and when the Albigensian Crusade drove them forth in the early years of the fourteenth century, the troubadours crossed the Alps in still greater numbers and sang throughout the land of the Apennines their Provençal songs of love and political strife. There soon arose a school of Italian poets who imitated the methods of these Provençal troubadours and, disdaining their native tongue, wrote in the foreign Provençal. Prominent among them were Alberto Malaspina (c.1165–1210), Lanfranco Cigala (c.1200–c.1260), Bonafacio Calvo (c.1200–70), Bartolomeo Zorzi (c.1250), and especially Sordello (c.1200–c.1270), made immortal by Dante. Like the speech and song of southern France, the speech and verse of northern France also entered Italy at an early date. The jongleurs brought the *chansons de geste* into the north of Italy, and there, especially in the domain of Venice, great currency was given to the stories of Charlemagne, of his mother Berte, of his knights, like Ogier le Danois, and the heroes of the Carolingian cycle. The *chansons de geste* were introduced in their native speech. Soon, however, Italians took them up and told the stories in an Italianized form of French (cf. Niccolò da Verona's *Prise de Pampelune*), and later still certain of the *chansons* were related by Italians in a mixed speech, in which Italian predominated. The epic matter thus worked over in Italy was to become of great importance for the history of the poems of chivalry in the fifteenth century. From northern France there were imported also the *fabliaux*, the stories of Reynard the Fox, and the great allegorical and satirical *Roman de la rose*, all of which played a part in the formation of the literature of Italy.

The great popularity of such literature in the thirteenth century, especially of Provençal poetry, seems first to have impressed upon Italians the possibility of doing similar things in Italian. We have, indeed, specimens of written Italian that date back almost to the middle of the tenth century, but they have no literary significance. Nor does the eleventh century show anything of importance, and the more substantial documents ascribed to the twelfth century, such as the *Cantilena bellunese*, the *Ritmo cassinese*, and the *Cantilena di un giullare toscano*, have even less artistic worth than the isolated attempt at writing Italian verse on the part of a foreigner, the Provençal poet Raimbaut de Vaqueiras, in his jocose bilingual *contrasto*. With the thirteenth century, however, Italian assumes literary significance. In all parts of Italy the popular language is now used for the composition of verse, which for half a century remains much more important than prose in the vernacular.

It was at the court of Frederick II (1194–1250) in Sicily that the Provençal lyric manner was first imitated in Italian. Hence the early

Italian poets are generally grouped together as the Sicilian school, although in point of fact they were not all Sicilians, but had Apulians and Tuscans among them. Chief among their number were the Emperor Frederick himself, his son Enzo (c.1225–72), his Chancellor, Pier della Vigna (died 1249), and Giacomo da Lentino, who, one of the most fertile of all, was regarded by Dante as one of the best of the school. These and the other members of the movement simply wrote Provençal poetry, but in their native tongue, so true is it that, aside from the language, there is nothing Italian in their verses, as indeed there was nothing Italian in the society this school reflects. It was unfortunate, too, that the poetry of Provence had by this time itself passed from the spontaneous character of fresh psychological analysis into a decadent conventionalism. Here and there one may find among these Italians a trace of the warm gentleness that was the discovery of Provençal chivalry, but more often they sing with a gallant banality. They adopted the *canzone* (q.v.) as their stock poetic form, and from them the manner spread into central Italy and Tuscany, finding acceptance especially in the towns having close relations with Frederick's court. Thus Arrigo Testa in Arrezzo, Folcacchiero de' Folcacchieri in Siena, and many more reëchoed the Sicilian note. In at least one writer of this class, Buonagiunta Orbicciani, there is manifest a tendency to depart somewhat from the methods of the Sicilian school and to introduce elements of Tuscan origin. This tendency becomes a certainty about 1260–80, in the lyrics of two sets of poets, the one belonging to Tuscany, the other to Bologna, and both representing a transition period during which prominence is given to the sonnet as well as to the *canzone*.

In this second phase the Provenzalizers (*Provenzaleggianti*), as they are called, read into the hackneyed praises of their ladies philosophical and religious meanings. Human love is studied as to its origin and nature and its resemblances in cause and effect to divine love. So the lady who inspires human love comes to symbolize the divine power that inspires love of God, and thus to assume a part in the process of salvation itself. So at this early date Italian poetry tends towards erudition and intellectuality, characteristics that are permanent. Aristocratic and impersonal, it is nevertheless henceforth associated with the national culture.

Of the Tuscan poets the most important was Guittone del Viva of Arezzo (1220–94), one of the noncelibate friars called *Frati godenti*. In his earlier poems he adhered closely to the strict Provençal manner. In the later ones, replete with Latinisms in vocabulary and construction, he introduces speculation of a moral, religious, and philosophical nature, and, with a new and healthy outlook, he addresses to his fellow citizens remarks on matters of contemporary political interest. This attention to political matters of the day is stressed also in other members of the Florentine group, of whom Monte Andrea and Frescobaldi may receive a passing mention. The greatest departure from the mannerisms of the Sicilian school was made by the Bolognese group of writers, and the best of all these was Guido Guinicelli (c.1230–76). From his *canzone* beginning *Al cor gentil ripara sempre amore* may be said to date the manner called the *dolce stil nuovo*, or sweet new style, which reached its height of excellence in the sublime poetry of Dante. Love and nobility (*gentilezza*), says Guinicelli, are as inseparable as light and fire. So the loved one, bearing the semblance of an angel, awakens nobility in the heart (inherently noble) through love. It remained still for Dante's idealism to proclaim that love could create nobility even in the ignoble heart. The methods of Guittone and Guinicelli were adopted by the Florentine Chiaro Davanzati (c.1230–?), whose conception of love is, however, rather a matter of Christian symbolism than of philosophy. Among the Tuscans the most Tuscan of all for direct contact with life are Rustico di Filippo (c.1220–c.1280) and Cecco Angioleri (1255–?), who have some affiliations with Provençal idealism, but who also wrote satirical sonnets of a high order of humor.

Meanwhile the influence of Northern French literature was also making itself felt in Italy. But yielding the lyric to Provence, it is rather in didactic literature that this other foreign model prevailed. From Milan, Gherardo Patecchio (Girardo Pateg, c.1228) explained the "Proverbs of Solomon." If he takes anything from Provence, it is still the biting, moralizing satire of his *Noie* (Ennuis). The catechism is turned into verse by Uguccione da Lodi (Uguccon' de Laodho). More pretentious in scope was the didactic poetry of Bonvesin da Riva and Giacomino da Verona, of whom the latter contributed to vision literature the *Libro delle tre scritture* (black for hell, red for redemption, and gold for salvation). Of the same class is an anonymous poem, styled vaguely as *Atrovare* from Reggio d' Emilia. A similar dreary didacticism appears again in the *Sermoni* of Pietro de Barsegapé. Thus early the practical unimaginative character of the north stands out against the more idealistic tendencies in the south. And the two trends, likewise permanent characteristics of Italian literature, meet in Florence for their perfection. For the best writer in this didactic genre is Brunetto Latini (c.1220–c.1294), whom a too literal interpretation of a statement made by Dante (*Inferno*, xv) has caused to be considered as the latter's tutor. He was certainly a great factor in promoting culture in his own time. To Brunetto Latini, in addition to prose works and certain minor poems, there must be ascribed the allegorical poem called the *Tesoretto*. He intended this to be a sort of preface to his encyclopædic work, *Li livres dou tresor*, which he wrote in French. The initial motive to Brunetto's poem was probably furnished by the *Consolations* of Boëthius, but here, as in all this literature, the great formative influence was the *Roman de la rose*.

To northern Italy, a favorite haunt of the wandering jongleurs, belongs also at this time much narrative verse in Italian showing the Northern French material of the *chansons de geste* (cf. the *Buovo d' Antona*, almost wholly Italian in treatment) and the beast epic (cf. *Rainardo e Lesengrino*, in two Venetian versions), thoroughly acclimated in Tuscany, as we shall see, after having passed through Franco-Italian intermediary forms. This epic material, though borrowed from abroad, was essentially popular in appeal. But it had to combine with another native Italian tradition, substituting the octave stanza for the ponderous French *laisse*, before it lost its savor of ex-

oticity. Proofs are not lacking of the early existence and independent origin of a thoroughly popular Italian poetry, occasional in its nature and dealing with love or matters chiefly of local significance. For samples of this poetry we must go to the works of more consciously artistic poets who imitated it, or else judge of it from similar productions of later date. Thus Giacomino Pugliese adopted some of its forms, and a charming bit of it has come down to us attributed to Cielo d' Alcamo, one of the Sicilian group. This is a *contrasto*, or dialogue, between lover and lady: his passion is impudently spurned by a coquetry that is only too ready to yield. These characters, clearly objectified, spar back and forth with delicious humor.

But for really great, and at the same time thoroughly native, poetry we must turn to the Umbrian school of popular Franciscan poets. Drunk with the religious fervor of St. Francis of Assisi, these monks carried the good message to the multitude in its own language and its own poetic forms. They brought the Holy Office from the church to the market place, not with the cumbersome machinery of the French mystery, but in the simple narrative of the Gospels condensed into its most tragic and human essences. The *laudi* (Praises) of the Umbrians have an historical importance for the Italian theatre, especially in relation to Lorenzo il Magnifico and Poliziano. But the *Crucifixion* and the *My Lady Poverty* of Jacopone da Todi are masterpieces in their own right.

Italian prose of literary moment did not appear until the second half of the thirteenth century. As has been said, many narrative and didactic works were written in Latin. Moreover, like Brunetto Latini, certain other Italians adopted French for their productions; thus, Aldobrando, a Tuscan, composed in French prose his little treatise *Le régime du corps* (1256), and Rusticiano da Pisa employed the same language in his compilation of tales about Arthur and his knights (c.1270) and in his account of the journey of Marco Polo. Italian prose was first used to any great extent in translations of Latin didactic, moral, and historical works, and of French legends of an heroic or a religious nature. Original prose works began to appear later. Among them were the letters of Guittone d' Arezzo (1220–94), which display an unmistakable attempt to create a sort of poetical prose in Italian; the didactic works of Guidotto da Bologna (c.1266), of Tommaso Gozzadini (second half of the thirteenth century), of Ristoro d' Arezzo (1282), and especially the *Introduzione alla virtù* of Bono Giamboni (second half of the thirteenth century); certain chronicles and historical accounts; and, most interesting of all, certain collections of tales. Already in the thirteenth century professional tellers of tales (*favolatori, novellatori*) wandered about northern and central Italy relating stories derived from all possible sources. Written collections of their tales or of similar ones were the *Conti di antichi cavallieri* (second half of the thirteenth century), consisting at least in part of rather free versions of matter originally French and Latin, and the *Novellino*, worked over in many versions even before the end of the thirteenth century and displaying no little skill in the art of story-telling, which Boccaccio was to develop to the fullest before another century had passed.

This summary review of the pre-Dantesque Italian literature makes clear the fact that by this literature alone we are entirely unable to explain the genius of Dante. Had he left only his minor works he might be intelligible on the basis of the literary tradition: the poetry of Guinicelli, Davanzati, and Fra Guittone leads up to the *Vita nuova* (c.1290) and the *Canzoniere*. Had Dante stopped here he would have been noteworthy among the fairly ordinary poets of the sweet new style: Guido Cavalcanti, Dante's first friend, who philosophizes on the nature of love with a graceful idealism, Lapo Gianni, Dino Frescobaldi, Gianni Alfani, and Guido Orlandi, who likewise sing of ladies angelified and form a manner that hastens to a conventional degeneration in their immediate and younger followers. The *Convito*, too, would be notable, simply for its unusual competence, alongside of the commentaries of Francesco Barberino (1264–1348) and the treatises of Domenico Cavalca (1270–1342). The *De Monarchia*, in Latin, might in part seem probable after the chronicles of Dino Compagni (q.v.) and in connection with those of Giovanni Villani (1275–1348), both of whom reflect the political temper of Dante's age. But what shall we say of the *De Vulgari Eloquentia*, of which the philological acumen has no parallel till we reach the eighteenth century in Italy, and then in the isolated case of Giambattista Vico? Or of the *Commedia*, which stands on a solitary pinnacle not only in Italy, but in the civilization of the world? The *Comedy* of Dante is an allegorical poem, and we might cite in a similar category the *Intelligenza* or the *Fiore*, anonymous poems in the sequence of the *Roman de la rose*, which might lead rather to poems of the calibre of the Dantesque imitations of Cecco d' Ascoli (Francesco Stabili, 1257–1327), who wrote the *Acerba;* of Dante's son Jacopo, who wrote the lumbering *Dottrinale;* or Francesco degli Uberti, author of the *Dittamondo*. To understand the possibility and the full meaning of Dante's *Comedy* we must go outside the field of Italian belles-lettres and penetrate into the essence of all mediæval culture. We must follow him into the scientific movement shown in part in the works of Albertus Magnus, into philosophy that had been treated with synthetic vision by Thomas Aquinas, into the mysticism of St. Bonaventura and the democratic exaltation of St. Francis of Assisi. Nor could we stop here. There would still remain the plastic sensibility and imaginative sweep of concept of a Giotto or a Niccola Pisano, the serene splendor of the Ducal Palace in Venice, the simple elegance of Santa Croce. There would still remain the civic life of Florence that was pushing upward out of feudal anarchy into proletarian democracy on the basis of an industrial wealth, developing for itself vast lines of foreign trade. If, then, we take the essential elements of each of these aspects of mediæval life, isolate its basic problems of science and philosophy, catch its political and social emotions at fever heat, visualize its exterior traits with luminous clarity, and then conceive of them all as coordinated into a unit by the dominance of an unclouded intellect, and expressed with a training chastened and beautified by a sense of classic form, we shall have arrived at some appreciation of the *Comedy* of Dante.

The *Comedy* of Dante is the complete and crowning expression of mediæval culture. The

Canzoniere of Francesco Petrarca looks, on the other hand, towards the future and expresses the feeling, even if it does not with equal completeness exhaust the mind, of Italians for four centuries to come. Between the two men there were certain affiliations. Petrarch may have met Dante at Pisa in 1311, when Petrarch was seven years old. He knew, admired, and felt a certain emulation of the *Comedy*. Petrarch's poetry has more than one reflection of the manner of the sweet new style, and he was in personal contact with the later poets of that school, some of whom were equally intimate with Dante. Here especially we must recall Cino da Pistoja (Sinibaldi), a jurist of Siena (died 1336), known particularly to Americans in the tales of Maurice Hewlett. He shows the philosophizing acumen of Dante's school as regards love, becoming most distinctive, however, in his poems on the death of his lady Selvaggia. Petrarch also felt high regard for Sennuccio de Bene (died 1349) and Franceschino degli Albizzi (died 1348), contemporaries of Matteo Frescobaldi, who make up the principal figures in the later period of the school. Petrarch's Latin works, too, show indebtedness to the same religious spirit, the same aprioristic concept of ethics and of the supreme objects of life that we find in Dante. This spirit was producing a rich literature in the fourteenth century. The sermons of Fra Giordano da Rivalto (died 1311) have come down, with the treatises of Jacopo Passavanti, as florid specimens of ascetic eloquence; but richer than these in philosophical depth, classic elegance, and contact with contemporary life are the works of Domenico Cavalca (*Medicina del cuore*, treatises on foolishness, sin, patience, spiritual discipline, etc.). Noteworthy are the letters of the beatified Giovanni Colombini, though far less famous in England and America than the burning religious epistles of St. Catharine of Siena (1340–87) and the *Fioretti* [Little Flowers] *di San Francesco*, a collection of Franciscan legends compiled about 1350.

But there are vast differences between the asceticism of Petrarch and that of these authors or of Dante. Otherworld preoccupations are indeed strong in the poet of Arezzo, but they are combated, as we see not only in the famous *Confessions* but in the *Canzoniere*, by a spirit which is less of skepticism than of intense love of this life itself. Whereas Dante strives to abstract from his love of Beatrice a vision of universal experience and truth, Petrarch is content with the enjoyment and pain of love as a simple human experience; and his sense of the beauties of human impulses as it comes in contact with the ascetic ideals which sought to repress them, and in which as a devout Christian of his own age he believed, creates a mood of tender melancholy, of impatient sensualism, with flights towards exaltation and plunges into profound despair. Historically the most important trait that detaches itself from these conflicting states of mind in Petrarch is his individualism. The *Canzoniere* revealed to Italians the existence and richness of their own individualities. Human emotions came to have a value per se without reference to the perspective of eternity. And this new field of artistic exploitation was made all the more attractive to aristocratic society by his mastery of polite manners, his delicate sense of chivalric gallantry, his urbane banalities, his language, singularly close to the classic Latin, free from obtrusive Tuscanity, and therefore far more cosmopolitan in tone than the picturesque idiom of Dante. With the fourteenth century Italian society was passing from a bourgeois, democratic stage into an individualistic, aristocratic temper. This new society was dominated in poetry by the *Canzoniere* and the *Trionfi* of Petrarch.

Much, perhaps, of this new feeling in Petrarch was stimulated by his passionate devotion to antiquity. As a humanist his part in Italian culture is even greater than his rôle as an Italian poet. He was one of the first to bring into classic studies the critical attitude, reconstituting imperfect texts, weighing conflicting authorities, reconstructing ancient personalities as distinctive psychologies. But especially in his own voluminous Latin works he sets the standard of humanistic Latin composition. Mediæval Latin was in a sense a living language in that it adapted itself to new conditions by enlarging its vocabulary and conforming syntax to the vulgar tongues. Petrarch strives for the purest Latin of the best classic authors, keeping closely to them in locutions, syntax, and vocabulary. This tendency, if it did tend to develop the scientific spirit, nevertheless came to make Latin composition a mechanical mosaic of phrases borrowed from the ancients, thereby stressing erudition over imagination, exalting the grammarian over the thinker, and turning Latin into a dead language.

In political theory there is a distinct break between Dante and Petrarch: the one with his theory of universal empire under God, with his two independent agents, Emperor and Pope; the other characteristically a republican. Dante sees the foundation of the Empire as the beginning of Rome's glory, which for Petrarch ended with the fall of the Republic. But the civic spirit of Petrarch has a much less practical bearing than that of Dante: he is always the visionary, enthusiastic, e.g., at the prospects of Rienzi's republic, or the erudite, who tries in vain to weigh classic memories, as in his pleas to the Venetian Senate, against actual interests of state. For something of Dante's grasp of events we have to turn in the fourteenth century to Dino Compagni (1257–1324) and Giovanni Vallani (died 1348), the vigorous style of which is in strong relief amid the many similar productions of the time, some mere compendia of Villani (Malespini, A. Pucci, Marchione Stefani), others of more personal tone (Donato Velluti, 1313–70), most, finally, of the older mediæval style (Simone della Tosa, *Le istorie pistolese*).

With Giovanni Boccaccio's *Decameron* this, the most glorious period of Italian letters, is perfected. Only in the sonorous involution of his prose—not without tremendous and generally bad influence on later writers—does Boccaccio contribute to the Petrarchian tendency that gradually divorced literature in Italy from fresh contact with life. Appreciated as a genius by Petrarch, he became in his later years one of Petrarch's dearest friends—perhaps the most remarkable relationship recorded between writers of supreme rank. On Dante he published one of the most authoritative of the early biographies. His humanistic work, composed late in life after a deep religious experience, is not of the high quality of Petrarch's and is more mediæval in method and tone. The minor works

of his youth, on the other hand, the sentimental psychological romances and lyrics based to an important degree on personal experiences in love, have great interest in the history of literary forms—the prose romance, the pastoral romance, the octave poem, the allegory, etc.—as well as for inherent artistic qualities. From the thirteenth century there continued into the fourteenth all manner of popular tales recited in verse and prose, and from French and Latin this fund of material was being widely enlarged. Important here for the extent and the social significance of their appeal are the vulgarizations of Ovid (e.g., of G. Buonsignori, Arrigo Simintendi, Domenico da Montecchiello, C. Figiovanni, etc.). Domenico Cavalca was epitomizing sacred writings. Filippo Ceffi translated the story of Troy of Guido delle Colonne, Guido di Pisa wrote the "Life of Æneas," Bosone da Gobbio that of Cæsar. Bartolommeo da San Concordio considered with wealth of illustration cases of conscience. Add to these the anonymous *Book of the Seven Counselors* (*Libro dei sette savi*) and the *Libro di Fioravanti*, the latter from the French, and other importations from the romances of the *Matière de Rome la grant*. All this literature shows its effects in the earlier productions of Boccaccio, who, in this regard, finds his nearest rival in Antonio Pucci, though Pucci is essentially a popular and Boccaccio more of a court writer. But the interest of the *Decameron* is far different and greater. Its dominance in Italy as the model of prose writing, its almost encyclopædic illustration of the possibilities of situation in story-telling, the far-reaching sources from which it was drawn, its reflection of contemporary Italian manners and life, all give it great historical importance. But, writing with the clearest powers of visualization, Boccaccio has created therein characters that are alive and complete in their reactions to situations that occur in the lives of all humanity. In this sense Boccaccio, in his own world, is as great as Dante—the world of the everyday life of Florence, minutely objectified by the artist and as frankly described with a sense of humor that dominates everything, even the sense of pathos which is the important undertone in the *Decameron*.

In his reflection of private life Boccaccio is the most brilliant example of an important tendency in this literature of the fourteenth century. An occasional flash of Boccaccio's manner appears in his imitator, Franco Sacchetti (1330–1400), who has left some proverbial types in Italy: Basso della Penna, symbol of the *loica piacevole*, or stickling on literal meanings of words, Dolcibene, the practical joker, and Gonnella the buffoon. Other imitators of Boccaccio are Giovanni Fiorentino in the *Pecorone* and Giovanni Sercambi (1347–1424), who was utilized by Shakespeare. Pieraccio Tedaldi (c.1300–1350) is remembered best for his satires on matrimony, just as Cecco Angiolieri, earlier in the century, expressed in eternal form all the rebellion of wayward youth against parental authority. So Alessio Donati, Francesco Landini (1325–97), Antonio Pucci, Pietro Fattinelli, in their verse and prose, help to complete the picture of that social order which soared to paradise with Dante and laughed and tippled in brothel and wineshop with Boccaccio—just as its chivalric aspects appear in the beautiful *Months* of Folgore di San Geminiano and its national aspirations in the lyrics of Fazio degli Uberti (Pisa), Francesco di Vannozzo (panegyrist of the Italic ambitions of the Visconti), Antonio Beccari (1315–63), a whimsical genius who boldly substituted the worship of Dante to that of Christ, Simone Serdini (1360–1420) from Siena, not to speak of local groups, the Venetians (Giovanni Quirini) and the Aretines (Braccio Bracci). In this minor production of the trecento (fourteenth century) it is worth while to mention several poetic forms that have become famous: the *cantari* (narrative ballads) illustrated particularly by Pucci and Piero Caterino da Siena; the *serventesi*, verse in the general rhyme scheme AAAb, BBBc (11 and 7 syllabled lines), used in poetry of occasion; the *frottole* (irregular poems using great variety of verse length: 11, 7, 5, and even 3 syllables). And especially in popular literature we find the lament, the prophecy, the legend, the *novella* (tale in verse or prose), the *noie* (Provençal *enuech*), humorous satires on the petty irritations of life, cultivated especially by Pucci, the *caccia* (hunt), a variation of the *frottola*, not to omit the chivalric romance destined to such glory later, and in dramatic literature the *lauda* that in the next century was to attain the splendor of the *sacra rappresentazione* of Florence.

The Renaissance, heralded by Petrarch and Boccaccio, becomes all-important in the fifteenth century, when the humanists, aided by the recently invented printing press, diffused a knowledge of the literature of ancient Greece and Rome through the length and breadth of the land and ultimately through the whole Occident. Florence is still to the fore in this period, but there are now other important centres of learning and literary productivity, such as Naples, where the house of Aragon ruled; Ferrara, where the dukes of Este were the patrons of men of letters; Rome, Mantua, Venice, Bologna, and Milan. In other words, although the Florentine influence still remained predominant, the literature of this period is more truly a national one in that it is not confined to a single region, but comes into being all through the peninsula. Here we cannot enumerate the many writers engaged in translating from Greek and Latin or writing only in the latter language. The connecting link between them and Petrarch is Coluccio Salutati (1331–1406), the leading figure in the first generation of humanists, in whom mediæval forces, as regards methods and ideas, are strong. In the first half of the century scientific classicism triumphs in Poggio Bracciolini (1380–1459), Niccolò Niccoli (1364–1437), Leonardo Bruni (1370–1444), and Antonio Traversari (1386–1439), all working principally in Florence, where Cosimo dei Medici was laying the groundwork for the brilliant tyranny of Lorenzo the Magnificent. Outside of Tuscany we have the Istrian Pier Paolo Vergerio (1370–1444), Antonio Loschi (1360–1441) at Milan; from Bergamo came Gasparino Barsizza (1359–1431), and from Verona, Vittorino da Feltre (1378–1446). It is not only that in these men the passion for antiquity becomes dominant over everything else, but that passion comes in their followers to modify the whole view of life. Pagan ideals assail Christian ethics, and a sensuous and elegant æstheticism replaces the ascetic aspirations of the previous age. Scientific research calls in question the documentary bases of religion. More than one

humanist actually laid aside his faith. In letters, humanism at first aggressively despised the traditional literary forms of the vulgar tongue, leveling an attack even at Italian itself. But the popular traditions soon asserted themselves against this aberration: the *certame coronario* (poetic competition) of 1441, in which even humanists (Leone Alberti, Leonardi Dati) participated, signalized the reconciliation between Italian and Latin letters, though the classic spirit was destined to dominate productions in the vulgar tongue for generations.

In fact the Italian literature of this century shows much the same happy compromise between the old and the new that we see in painting and sculpture. The ancient dramatic *lauda* takes on a classic brilliancy in the sacred representations of Lorenzo il Magnifico, while the same popular form clothes the purely classic *Orfeo* of Poliziano. Meanwhile in the universities and courts the scholars were examining the memories of the ancient stage, and Vergerio, Bruni, Alberti, and others were writing plays in Latin in imitation of Seneca and Plautus, whose actual works were occasionally reproduced before audiences—all this preparing the way for the imitative erudite comedy and the classic tragedy of the following century. Similarly the chivalric romance, which had thoroughly Italianized itself in the readings of men like Andrea Barberino (c.1370–c.1432), passes from the purely popular style of the *Reali di Francia, Rinaldo di Montalbano, Buovo d' Antona* to the artistic elaboration of the *Morgante maggiore* of Luigi Pulci (1432–84). Here Pulci preserves much of the naïve, elementary exuberance of the popular legends of Charlemagne, but as a man of the elegant world he laughs at his own creation throughout, so that his work remains as a masterpiece of humorism. Humor, too, is an important motive in the *Orlando innamorato* of Matteo Maria Boiardo (1434–94), but his view of the subject is essentially different from that of Pulci. On the Carolingian materials he grafts the spirit of the legends of the Round Table: the love motive comes into the foreground and with it richer psychological exposition. Classic allusions bedeck his octave stanzas with reminiscences and imitations of beautiful passages in the Latin poets, and a savor of actual life pervades his poem from his use of frequent situations from the very human popular tales. All this is to suggest the method, as indeed to furnish the subject matter, of the great masterpiece of Ariosto a half century later. The lyric also shows progression, for it is the skilled humanist Leonardo Giustiniani (1388–1466), who, in the popular forms of the *strambotto* and the so-called *giustiniane*, strikes some of the sweetest harmonies in Italian poetry. In this century, however, we begin the series of the famous Italian learned ladies with Isotta Nogarola (1418–66), Costanza Varano (1426–47), and, most famous of all, Cassandra Fedele (1465–1558), all of them humanists and pedants, all of them frail attempts to incarnate the new spirit of idealism that was growing in the aulic views of woman. The manifesto of this idealism was Gerolamo Benivieni's *Canzona dello amore celeste et divino* (1488), pedantically illuminated by the notes of Pico della Mirandola and inspired by the Platonism of Marcilio Ficino (died 1499). In one of its aspects this revival of Plato represents a healthful reaction against the dead codifications of the mediæval theology of the Aristotelians. But in its reflections in polite society—the society of eleemosynary poets and idle courtiers—it becomes merely the cloak for a sophisticated and hypocritical sensualism, from which only the French Revolution could free aristocratic Europe. The love lyric follows woman into this atmosphere of denaturized love, and the great master is Petrarch. Petrarchists were Antonio Tebaldeo (1463–1537), Serafino Aquilano (1466–1500), Cariteo (Benedetto Gareth, 1456?–1514), and Bernardo Accolti; and Petrarchists with different degrees of nearness but of similar insipidity will be all the Italian lyrists for three centuries thereafter. It is true that in the preciosity of this age there were elements of seriousness—respect for intellect, admiration of wit, love of social grace; and some even of its deeper emotional moods are present in the *Arcadia* of Jacopo Sannazaro (1458–1530), which has great historical importance as a mirror of its time, though it remains for our age one of the dreariest books in Italian literature. This pastoral romance tries to create the mood of naïve simplicity—one of the hypocritical ideals of this age sated with refined splendor.

It is perhaps by reaction from this aristocratic delicacy that the popular literature presents almost a studied coarseness, as in Burchiello (1404–49) singing with special gusto of "fleas, bedbugs, and many lice" in a cryptic dialect now unintelligible. This burlesque poetry had numerous cultivators (Alessandro Braccese, T. Baldinotti, Luigi Pulci, Matteo Franco), of whom the most famous for variety of subject and vividness of observation is Pistoia (Antonio Cammelli, 1440–1502). Some of Boccaccio's malice, if not of his power, runs on in the *novella* (tale), which counts among its principal exploiters Poggio Bracciolini (*Liber facetiarum*), Giovanni Mainardi (1396–1483, *Le facezie dell' Arlotto*), Gentile Sermini, Masuccio Salernitano, Sabbadino delli Arienti, and Antonio Manetti (*Novella del grasso legnaiuolo*). Whatever the inclinations of the humanists towards skepticism, there was no dearth of religious literature, whether in prose (Feo Belcari, 1416–84) or poetry. This was the age of Savonarola (1452–98). But read the *De partu virginis* of Sannazaro, the sacred poems of Filelfo, of Jacopo Gradenigo and Candido Buontemponi, and the extent of the transformation of the religious consciousness from the time of Dante will become apparent.

As regards mental temper, the quattrocento best reveals itself in Lorenzo Valla (1407–57), a mind inquisitive, hostile to tradition in science, philosophy, and literary scholarship, original in every sense, and finding a permanent place in the history of civilization from his attack on the principle of authority. So also the best illustration of its æsthetic temper might be found in the personality of Lorenzo il Magnifico, especially in the *Stanze per la giostra*. The cinquecento (sixteenth century) continues and develops the preceding age in all its essential characteristics, but with an intellect more aggressive and conscious of its own power. Machiavelli deliberately sets aside the search for conditions that "the imagination might conceive as ideal"—thus he disposes of the otherworld morality of Dante—and seeks in "facts as they are actually observed" the laws to govern conduct in statecraft. Leonardo da Vinci abandons memorization of the physics of Aristotle for

actual studies from nature. Pomponazzi considers not the immortality, but the mortality, of the soul. From an obscure monastery near Naples, Giordano Bruno disputes the triune nature of God and goes on to the acceptance of the Copernican system. The spirit of religious reform comes over the Alps from Germany and flames in Naples, Ferrara, and Lucca. Catholicism itself is overhauled and repaired, receiving a new ardor in Vittoria Colonna, a new austerity in the order of the Capuchins, a new and encyclopædic intellectual outlook in the Italian counter-reform that crystallizes in the Council of Trent.

The cinquecento had a predominating admiration for the active intelligence and for originality. But if this spirit led on the one hand to the experimental method, it was conditioned on the other by its too eager expression in erudition and its tendency towards generalization. In literature we find an outreaching to embrace the whole of life, but at the same time a growing belief in definite absolute forms capable of definition both as to their essential character and as to the means of attaining to them. *Arte* came to have a precise meaning, "the way of doing things," and it was the function of the *ingegno* "constructive intelligence," which was a purely intellectual faculty. Aristotle furnished the limits of these forms, and the rules of the *arte* were deduced not only from ancient theorists (Aristotle, Horace), but from classical authors who were presumed to have applied them (Homer, Vergil, Seneca, Plautus). Latin and Greek literature presented, accordingly, forms that appeared fixed and language that appeared regular, or at least reducible to rules. If the quattrocento had vindicated the right of Italian letters to exist side by side with the classics, the cinquecento had to demonstrate that Italian literature should be evolved along the same lines and the Italian language restricted within the same grammatical categories. Thus came about the triumph of classicism in æsthetics and of preceptualism in language, and the aggressive originality of the cinquecento mind spent itself in ingenuity of imitation with Dante, Petrarch, and Boccaccio as models, instead of rushing out, as did the Romanticists of a later age, into all the infinitude of human nature.

So the sixteenth century, which believed in the *genres*, marks the appearance of regular epics, regular tragedies and comedies, regular lyrics, and even its best thought comes to express itself in the Platonic dialogue. Of all this production, most brilliant is the chivalric epic, relatively free from the disturbance of classic rules in Lodovico Ariosto (1474–1533) and consciously regular in Torquato Tasso (1544–95). Ariosto's *Orlando furioso* marks the apogee of chivalrous poetry in Italy. Starting where Boiardo's *Orlando innamorato* ends, and presupposing that the reader is acquainted with the story there unfolded, Ariosto develops still further the love affair of Orlando and Angelica, interweaving with it many other romantic episodes, especially that of Ruggiero and Bradamante. For his idealistic, ethical subject matter Ariosto is indebted to French poems and romances of the Middle Ages, to Latin classic verse, and to Italian writers of the Renaissance period; but he is most original in the way in which he has breathed new life into the old material, analyzing in various moods, pathetic, humorous, sensuous, ribald, the various reactions of humanity to love. His style has a charm due in no slight degree to the skill with which he has combined the pomp of classic diction with a simplicity of expression peculiarly his own, and his versification is satisfactory because of the ability with which he has handled the *ottava rima*. Ariosto had many imitators, but their poems, like that of his predecessor Boiardo, are now little read. Several attempts were made to remodel the *Orlando innamorato*, the most successful being that of Francesco Berni (c.1497–1535), a master of style.

Ariosto's contemporaries, who were entranced by his genius, were, however, not slow to perceive his "irregularity." To avoid this fault was the purpose of the critic Gian Giorgio Trissino (1478–1550) in his *Italia liberata dai Goti*, the first classic epic, which scholars remember for the perfection of its regularity, and which every one else has forgotten for its perfect insipidity. Through the *Amadigi* of Bernardo Tasso (1493–1569), the *Girone cortese* of Luigi Alamanni (1495–1556), the *Ercole* of Giraldi Cinthio (1504–73), we arrive at the *Gerusalemme liberata* of Torquato Tasso, the son of Bernardo, the greatest Italian writer of the second half of the sixteenth century, who sums up many of its tendencies and creates much of the mood of the two following generations. A man of extraordinary genius, which reveals itself in all his works, as well in his masterpiece, *La Gerusalemme liberata*, as in his lyrics, dramas, dialogues, and letters, he suffered at times from a mental disorder which, though it necessitated placing him under restraint, did not impair his literary productivity. His poem, *Rinaldo*, is a youthful work of the category of chivalrous poems, dealing with the adventures of the Carolingian hero Renaut de Montauban. But Ariosto had uttered the supreme word in chivalrous story, and Tasso was to gain his laurels by perfecting a new *genre*, that of the crusading or Christian epic. This he did with his *Gerusalemme liberata*, a poem of markedly serious intent, primarily concerned with the Crusades in which Godfrey of Bouillon played a part. The author did not disdain to admit as subordinate elements certain features of the chivalrous romance, especially in connection with the love episodes, just as he also drew from his favorite authors of classic antiquity. Like Ariosto, whom he resembles very much in his imitation of passages of ancient writers, he uses the *ottava rima* with ease and grace. An individual note in Tasso's work is that of melancholy, which, springing in several episodes (*Sophronia*, *Clorinda*) from the juxtaposition of love and death, is really an echo of the man's personal experience and of his mental anguish. Nevertheless, in its most characteristic aspects this epic interprets with masterly vision the highest religious aspirations of the Italian counter-reform, and the poem is otherwise remarkable for the sustained dignity and poise of its execution. Although contemporaries, like posterity, applauded the *Gerusalemme liberata*, Tasso was not satisfied with his work, and, yielding to religious impulses of an ascetic nature, he published a remodeled form of it, *La Gerusalemme conquistata*, which is much inferior to the original poem and is, therefore, neglected, while the *Gerusalemme liberata* remains dear to the whole Italian people.

In lyric verse the impulse of the sixteenth century towards originality declared itself in revolt against the too conventional nature of the Petrarchistic verse of the preceding period. In his *Rime*, Pietro Bembo (1470–1547) showed how better results could be obtained in lyric song by going directly to Petrarch for inspiration, and Bembo's example was followed by a host of poets. But the true animus of the Bembistic reform is made apparent in his *Prose della volgare lingua*, where he stresses the importance of having a general literary speech for the land, that unity of style may be attained and the character of the literature be made national. This he does by promoting the theory or rigid classicism on the basis of imitation in general and of Dante, Petrarch, and Boccaccio in particular. Bembo's charming personality, his exalted ecclesiastical rank, his powerful friendships gave his ideas great weight. Their culminating triumph appears in the manifesto of Arcadia nearly two centuries later, where the whole devastating force of his doctrine becomes apparent in the motto "not nobility of substance, but excellence of imitation." Central in Venice, Bembo's native city, and in Urbino, where he long resided, this movement caused a revived worship of Petrarch which amounted almost to a religion. Its earliest and most distinguished poetic converts were, in Venice, Domenico Venier (1517–82), Girolamo Molin (1500–69), and Bernardo Capello (1498–1566). But the fervor spread generally through the peninsula. The vast mass of production in verse that ensued—mediocre always and generally arid—need be mentioned only in some of its curious manifestations: the *centoni*, patchwork poems, made entirely of verses of Petrarch rearranged; the "replies of Laura," imaginary answers to each of Petrarch's sonnets; the *spiritualizations*, in which, in tone with the Catholic reaction, the earthly love of Petrarch is retreated, sonnet by sonnet, as of religious character and import. Typical authors are Angelo di Costanzo (1507–91) and Bernardino Rota (1509–75); less typical, for an occasional flash of originality, are Luigi Tansillo (1510–68), whose verses were plagiarized and "philosophied" by Giordano Bruno, Galeazzo di Tarsia (1520–53), Cardinal Giovanni della Casa (1503–56), and Annibale Caro (q.v.). On a solitary eminence for a lyric expressing his own vigorous personality is Michelangelo Buonarotti (1475–1564), and with him is associated, for a tender and beautiful friendship, Vittoria Colonna (1490–1547), the death of whose husband, the Marquis of Pescara, inspired in her a poetic vein remarkable for its religious intensity. In this Petrarchistic movement the learned woman stands out even more conspicuously than in the preceding century: Laura Terracina, Lucia Bertani, Laura Battiferri have been forgotten beside the happier fortunes of Tullia d'Aragona (1506–56), Veronica Franco (1546–91), courtesans both, and of the gentlewomen Veronica Gambara (1485–1550), Gaspara Stampa (1523–54), and Barbara Torelli. The Platonic idealism which accompanied and glorified for its authors the Petrarchistic conception of love and which expresses itself most tritely in the *Asolani* dialogues of Bembo, most subtly in the *Dialogo di amore* of Tullia d'Aragona, and most philosophically in the *Eroici furori* of Giordano Bruno, had a strong appeal for all the aristocratic circles of Europe. Its influence appears in the poetry of the *Pleiade* (Ronsard, Du Bellay, De Baïf, Saint-Gelais) in France, of Juan Boscán, Garcilaso de la Vega in Spain, of Francisco de Sâ in Portugal, and of Wyatt and Philip Sidney in England. There were, to be sure, some discordant voices in this Petrarchian adoration: Giordano Bruno, who rebelled against everything, rebelled against this also, but his genius had no special fecundity in verse; Pietro Aretino satirized the new movement with some positiveness; Antonio Broccardo, with an admiration for the popular poetry of the quattrocento, and, more deliberately, Cornelio Castaldi, lacked only genius in their reactions against it in verse. The revolt that manifests itself in the attempts to revive Latin and Pindaric metres—the blank verse of Trissino, the odes and *selve* of Bernardo Tasso, the elegies of Ariosto, B. Tasso, and L. Alamanni—was scarcely thoroughgoing, inasmuch as it too was a form of imitative classicism.

Towards the century's end lyric verse runs completely into a slough of despond, when, with the Catholic reaction losing its fervor and tending towards a caducous conventionalism in faith, poetry is turned largely into religious channels. But this verse belongs in spirit to the age that follows. For the best work in Italian poetry, if we wish to leave the masters Ariosto and Torquato Tasso, we must turn to the burlesque and the satire, to the irrepressible laughter of Francesco Berni (1497/8–1535) in his jocose sonnets which created the style called *bernesque*, or to that of his imitator Anton Francesco Grazzini (called *Il Lasca*), the first in a long series of *bernesque* poets (Giovanni Mauro, Gianfrancesco Bini, even Tansillo and L. Dolce), worthy all, to adapt a phrase of Pietro Aretino, of crowns "of four kinds of sausages." Teofolo Folengo (1496–1544), immortal under his pseudonym Merlin Cocai, and for his numerous affiliations with Rabelais, is in a different category; for in his Latinized Venetian-Italian, called *macaronic* Italian (or Latin, as you will), in his rollicking *Baldus*, followed in joyous succession by the *Zanitonella*, the *Orlandino*, the *Chaos del Triperuno*, the burlesque epic is informed by a spirit of deep artistic seriousness and no mean ethical ideal, which was notably lacking in the *pasquinades* of Pietro Aretino (1492–1556), a curious specimen of the cynicism of this period, who achieved fame in this type of epigram (so styled from the statue of Pasquino in Rome, where they were posted as public libels). The *pasquinades* of Italy, collected by the German Ulric von Hutten, spread through Europe all the motives of Latin wit and satire, and the ultimate sources of the stock in trade of all modern comic journals are to be found in them. Nor should we, if we seek vitality alone, neglect the narrative verse inspired by the wars against the Turk and particularly by the battle of Lepanto (1570), and, in quite a different field and in Latin, the *Syphilis* of Girolamo Fracastoro (1483–1553), and, to turn to popular poetry, the *canti carnascialeschi*, as well as the *stanze* of the Tuscan Campagna; whereas the definitive value of the classical satire (Ariosto, Pietro Nelli, Luigi Alamanni, Ercole Bentivoglio) is more difficult to fix, since it shows on the one hand all the pedantry of cinquecento classicism, and on the other some of the vigor of the *sermoni* of the fifteenth century, from which, in a certain sense, it springs.

One sad result of the æsthetic theory of the

Renaissance was the contempt of the aristocrats for the old dramatic form known as *rappresentazioni sacre*, which disappeared from the towns in the early part of the sixteenth century and withdrew to the cloisters and the country districts. Its place was taken by prose translations of ancient dramas, which paved the way for Italian imitations of the works of antiquity. The first Italian tragedy, and in fact the first regular tragedy, in all modern literature, was the *Sofonisba* (1515) of Gian Giorgio Trissino. This was followed by many tragedies, one sadder than the other and nearly all modeled on the works of Euripides, Sophocles, and Seneca, e.g., the *Rosmunda* and the *Oreste* of Giovanni Rucellai, the *Canace* of Sperone Speroni (1500–88), the *Orbecche* of Giraldi Cinzio (1504–73), the *Orazia* of Pietro Aretino (1492–1556). Even Torquato Tasso perpetrated the *Torrismondo*, which deals with matter of Germanic origin. Most of the tragedies were composed in blank verse (*versi sciolti*). Something better may be said for the regular comedies of the time, nearly all based on Plautus and Terence, and a few original, which were written sometimes in verse and, more often and more successfully, in prose. The masterpiece among the comedies was the *Mandragola* (1513) of Niccolò Machiavelli (1469–1527). Let us say this in deference to the opinion of Macaulay; and, moreover, the theme of the *Mandragola* has survived to this day as a universal tale. But the *Candelaio* of Giordano Bruno had a literary fortune no less remarkable, as did the *Pedant* of Francesco Belo, the comedies of Pietro Aretino, and *Gli intronati* of the Academicians of Siena. Ariosto, too, is historically of much importance as the first cultivator of the regular comedy and because his *Suppositi* is as little of a mere name as, let us say, *Ralph Roister Doister* in English literature. But read any play you wish of Giambattista della Porta (1535–1615)—the reading will not be entirely wearisome—or any one of the recent Bari anthology (Bari, Laterza, 1912) of cinquecento comedies; there is present there, in an alloy not overrefined to be sure, much of the wit of the *pasquinades*, much of the elementary sense of action that has been the true base of comedy in every age. What is dead, on the contrary, is the Plautan type personage, who substitutes linguistic play for realistic self-revelation. But even these are not entirely dead: the braggart soldier was a distinctive figure in sixteenth century society; the doctor, too, with his colleague the pedant, recurs in life even to-day; and in these written comedies (*commedie erudite* they were sometimes styled) much interest attaches to them from the fact that they are the clearest presentation we possess of similar figures, similar *masks*, who died on the stage of the improvised play (*commedia dell' arte*, professional comedy) with the voices of the actors who created them. The *commedia dell' arte*, which originated during this century, is one of the most important phenomena in the history of the modern theatre. Produced from a simple outline (*scenario*), with lines largely extemporized, though each character had his specialty thoroughly conventionalized, this type of comedy enjoyed in Italy a life three centuries long. In its stock personages—Pantaloon the merchant, Gratiano the doctor, Arlecchino the sly servant, Lelio the lover, etc.—the Italians saw the idiosyncrasies of their varying regional life portrayed, satirized, with a perennial life and humor. Their wandering troops of actors wandered into Spain and France; in Paris they established a permanent theatre; and if not, assuredly, from their philosophic depth, at any rate from their *dramatic* vision, Molière learned his trade as comedian and playwright, and from them sprang in a still more intimate relation the immortal productions of Carlo Goldoni.

Poetry succeeded in expressing possibly some of the moods and certainly all the affectations of the Italian cinquecento. Its real spiritual and intellectual life appears in prose. It is the current fashion of literary historians to ignore thinkers as thinkers; we must ignore the dialogues of Giordano Bruno (1542–1600) as preeminently philosophical and the treatises of Leonardo da Vinci (1452–1519) as predominantly scientific. But somehow the lucid intellect of Niccolò Machiavelli (1469–1527) has made politics a department of literature; since his wonderful style is, after all, only the incisiveness of his grasp of political science, based on a rigidly empirical method, which he applies with merciless disregard of aprioristic ethics to the successful formation of tyrannies in the *Prince* and, with the same merciless disregard, in the *Discorsi sopra la prima deca di Tito Livio*—a work too often overlooked, especially by our own time—to the successful formation of republics. As a historian Machiavelli (*Istorie fiorentine, Vita di Castruccio Castracani*) has the virtues and defects of a method: that of writing of facts with a too general regard for their bearing on the principles of conduct in which he is interested. But this method, as followed out by him, has been of inestimable influence on modern thought; for by virtue of it his two principal works are of service to-day, many of his general inferences have withstood the test of modern history, and though Machiavellianism has come to be synonymous with selfish opportunism, Machiavelli, one of those least tainted with Machiavellianism, by directing attention to the materialistic forces that govern human events, established also the study of the processes that control them, and in actual effect has contributed as much as any other modern thinker to all libertarian movements after him. Francesco Guicciardini (1483–1540), in his *Storia fiorentina*, his *Discorso del reggimento di Firenze*, his diplomatic reports, memoirs and critique on Machiavelli, was a more orderly historian and possessed as well most of Machiavelli's ideas, lacking only the emotional fervor and the aggressive intensity of his greater contemporary. Close in their footsteps followed Donato Giannotti (1492–1573) in works on Florence and Venice, which show greater interest in minute details of political history, but less originality and clarity of thought, though something of Machiavelli's spirit. The writings of these men, taken with those of the less powerful Benedetto Varchi (1503–65) and Paolo Paruta (1540–98), an anti-Machiavellian idealist, form the most portentous contribution of Italy to modern thought, the most glorious monument to Italian mentality, of this period.

One other body of prose production has proved scarcely less influential in its own field—that of literary criticism and applied æsthetics. As regards insight into the nature of art, there is probably more value in the first dialogue of Bruno's *Eroici furori* and in a few verses of Aretino than in all the voluminous theoretical

production which begins with the *Prose* of Pietro Bembo and the Italian grammar of Fortunio (*Regole*) and runs down through Lodovico Castelvetro (superb as a philologist), Girolamo Muzio, Cinzio Giraldi, Benedetto Varchi (who definitely codified the Italian classic tongue), Sperone Speroni (who was plagiarized by Du Bellay in his famous *Défense de la langue française*), Giovanni Minturno, and Francesco Patrizi to the establishment of the Academy of the Crusca, to the poetic codes of the Academy of Arcadia of the next century, and to Giambattista Vico, the founder of æsthetic science, who wrote in the eighteenth century. The work of this literature we have briefly characterized above; suffice it here to note that it established, one may say, for the whole of Europe, down through Lessing to the Romantics of the nineteenth century, the principles of neoclassicism, which experience has indeed modified in part and even as regards rigorous precept destroyed, but which nevertheless have deeply enough colored the æsthetic thought of the modern world as to resist the assaults of German philosophy and the more self-conscious attacks of our own contemporary Benedetto Croce, the rejuvenator of Vichian æsthetics.

But if we restrict ourselves to the narrower view of belles-lettres, the prose of the sixteenth century is no less remarkable. For here, not to mention Giorgio Vasari's (1511–74) *Lives of the Painters and Sculptors*, we have the autobiography of Benvenuto Cellini (1500–71), an astonishingly frank self-revelation of one of the most interesting of men, a book, moreover, that is even to-day as much read as any other of the century in any language. More academic is the vogue of the *Cortegiano* of Baldassare Castiglione (1478–1529), who there expounds the theory of court taste as the norm of good usage in language, but whose most interesting aspect, aside from the value of his work as a source for cultural history, is in his reflection of the Platonic idealism that lies behind much of the aristocratic poetry and the aristocratic art of his time. Only less comprehensive is the *Galateo* of Cardinal della Casa, which enjoyed an even more extensive fortune as a practical guide to good manners. The tales of Matteo Bandello (c.1480–c.1562) are not without some artistic merit, but their chief value is, again, historical, whether from their reflection of manners or from their influence on later writers (Shakespeare), to which latter consideration the importance of the *Hecatomithi* of Giraldi is almost exclusively due. And much the same might be said of the *Piacevoli notti* of Gianfrancesco Straparola, of Parabosco (*Diporti*), of Firenzuola and Fortini. The *Diaries* of Marin Sanudo (1466–1535) stand, both for substance and form, in a class by themselves. Meanwhile epistolography became in the sixteenth century a fine art, with Pietro Aretino, who in his letters completely exposes the dark recesses of his personality, as a typical example. It is a racier, but no less individual, flavor that we find in the correspondence of Andrea Calmo (1510–71).

It has been the fashion for some generations past to ridicule the manner that rules Italian literature in the seventeenth century, and which has been dubbed with an opprobrious term, *seicentismo*. The unanimity of the lamentation which invariably saluted its mention was only slightly disturbed by the recent publication from Bari (1911) of Croce's *Lirici marinisti*, and perhaps rightly so; for surely it would be strange if, out of the endless flood of poetry from veritably thousands of poets, some 600 passable pages could not be selected. Nevertheless, the phenomena of *seicentismo* have been too summarily derided, as indeed they have been too mechanically explained. Obscenity, arrogance, a lack of logic approaching aberration, hostility to real thought, ponderous and misapplied erudition, slavish adherence to tradition and authority coupled with almost impudent boasts of originality, these are the ethical traits that underlie this century's most distinct characteristic in art: the *concetto*. But this age, which burned Bruno and gagged Galileo, produced also Thomas Campanella and Fra Paolo Sarpi; and if it worked the *concetto* to death, it also invented the telescope and realized the experimental scientific method. It was primarily an age of intellectual unsettling and struggle, full of contrasts in emotion and thought, which in architecture it expressed by adorning Parian marble with the black *pietra di paragone*, and from the gloom of which it took refuge in an unbridled sensualism.

To grasp this age in its historical sequence we must return to the later aspects of the cinquecento: it is foreshadowed, as regards literary technique, in the accentuated preference for antithesis in the style of the *Gerusalemme liberata* and, as regards mood, almost to perfection in the delicate, sophisticated, but none the less intense, sensualism of Tasso's *Aminta*. It is useless to call this the first great pastoral drama; its closest affinity spiritually is found in the *lascivia* (sensualism) of the *Adonis* of Giambattista Marini. So its religious hypocrisy appears already in the pious songbooks of the sixteenth century, and we may begin—if Aretino's asceticism seems sacrilegious—with the *Tears of Saint Peter* of Tansillo. As for literary theory, there is nothing new, save an extraordinary increase in the number of the *genres* and a new statement of an old quibble hacked over as a quarrel between ancients and moderns. So the lyric is subdivided into love, moral, trivial, obscene, piscatory, marinaresque, and forest poetry, and each new *genre* has numerous claimants for the credit of inventing it. Tommaso Stigliani struts about as the first "to sing Spanish deeds in Tuscan accents." Tassoni invents the mock-heroic epic as though Folengo had never existed. Out of all this dross one thing of beauty—the musical drama, the opera, in its special aspect called the *melodramma*, which in music by Francesco Cavalli and Claudio Monteverdi, with librettos by Gian Francesco Busenello and others, still survives. In prose the *concetto* is rampant likewise, rolling out from church pulpit, academic parlor, and senatorial chamber in sonorous vacuity. The comedy sleeps in Cicognini, waiting for Goldoni to make over the *commedia dell' arte* into artistic comedy. The tragedy sleeps even sounder still. What had happened to the vigorous outreaching after life that characterizes the great Italian Renaissance? Some answer: Spanish influence; but Spain owed as much to Italy as did Italy to the Spanish occupation. Others answer: the Renaissance theory of ornamentation as the essence of art; but this theory the cinquecento itself possessed. Others, again: the progressive divorcing of literature and life by theories of imitation, by admiration for erudition, by the establishment of oversophisticated cultural

ideals, that operated all through the sixteenth century. Others, finally: the Italian counter-reform in faith, the very rigidity of which stifled individual religious feeling, rewarded demonstrative hypocrisy, and generally tended towards ritualism and formalism. There is some truth in all of these explanations and much in their combined effect. Except that *seicentismo*, as a manner, is not confined to the Italian seicento: it is paralleled in the preciosity of France, the Gongorism of Spain, the euphuism of England. It breaks out in late Latin literature, in mediæval poetry, in Persian poetry, in folklore of all ages and peoples—all of which suggests that *seicentismo* is a phenomenon recurring in a certain set of intellectual circumstances, of which perhaps the most cogent trait is the restriction of the intellectual outlook by dogmatic boundaries of various, of any kinds, which force the aggressive mind to turn inward upon its own past achievements instead of going on to new discovery, and thus substitutes ingenuity of recombination for creative originality.

Let us ignore for the seicento the literature that merely repeats the previous age: the numerous followers of Tasso in the epic—of Tasso who reigns in the seventeenth and eighteenth centuries, as had Petrarch before him; the thousands of Petrarchists of varied hue of doctrine; the hundreds of academies, all equally pretentious and equally insipid; the hundreds of playwrights, of whom scarcely one, save here and there a brilliant extemporizer of the Andreini family, feels a breath of life; the petty polemics of myriad critics equipped with astonishing erudition and equally astonishing lack of common sense. For the seicento did a few things well. It enjoyed Gabriello Chiabrera (1552–1638), who left some enduring flashes of tenderness in his *canzonette*, though a pedant in his metrical exercises in classic forms. It understood and visualized every phase of sensualism, as witness the brilliant production and the interesting career of Giambattista Marini (1569–1625), author of the *Adone*, which his age, with the reserved assent of posterity, has called the "marvelous poem." It surprised itself in producing one litterateur of serene intellect and sober judgment, Trajan Boccalini (1556–1613), whose *Dispatches from Parnassus* are a classic of humoristic social, political, and literary criticism. Its humor, in fact, is as vital as its sensualism: it is still possible to read the *Rape of the Bucket* of Alessandro Tassoni (1565–1635), whose national spirit burns nobly in the *Philippics* against Spain, and who illustrates the curious mental perversity of his age in his *Pensieri diversi*. While Galileo was breaking ground for Isaac Newton, Francesco Redi was founding modern bacteriology in his studies on parasites (1626–98), and Fra Paolo Sarpi (1552–1623), author of the fundamental *History of the Council of Trent*, was establishing with definitive precision the legal relations of church and state, sustaining laic jurisprudence against an effete canon law, vaunting freedom of speech against ecclesiastical interference. What of the tyrannical rationalism of Tommaso Campanella's (1568–1639) *City of the Sun*, the manifesto of a socialistic communism? In it as in his stately verses there is something of the emancipated intelligence which the pyre of Bruno could not destroy. Dialect literature never quite lost its intimate touch with reality in Giambattista Basile, in Maggi, in Busenello. Historians of art assert that out of the florid, the exuberant experimentation of the roccoco style, so absurd in itself, sprang much of the discovery of modern technicians. So underneath its grotesque literary expression one feels in the seicento an impatient, a palpitating, however disoriented, intellectual vigor. It comes to the surface in these men, of whom any age might well be proud, whom the seicento even admired, but whose trail it refused to follow in order to give birth with volcanic contortions, to that mouse of literature, the Academy of the Arcadia.

Christina of Sweden founded it in 1690 around the elegant personalities of Giovammaria Crescimbeni (1663–1728) and Gian Vincenzo Gravina (1664–1718), the latter, in his way, no mean thinker. It aimed to react against *seicentismo*, a term which its later devotees invented, as illustrated in the followers of Marino; it actually clarified the atmosphere of the final manifestations of Petrarchistic idealism, now at last running in decadence to expire in the French Revolution. Its mood may be described best in its method: if the lover fixed his eyes on eternity and filled his mind with platitudes on divine love, he could attain to the maximum of sense stimulation with a modicum of sex indulgence. This is the spirit that finds its social reflection in the institution of *cicisbeismo*, the system of the serving cavalier and Platonic soul mate, which needed constant demonstration to itself of the truth of its idealistic convictions, by daily seeking out the temptations of the boudoir, which, as is asserted and as a little good will may readily believe, they successfully resisted. Once more in Italian poetry—flaccid echoes of the age of Dante—we find ladies angelified, descending from heaven to lift the humble lover to an exalted eternity. There is the quintessence of gallantry, revealing itself not in the bald superlative of the duecento, but in an involved intellectual tour de force that shuns every shock of crudity, every suggestion of materiality. Meanwhile the vocabulary of Petrarch and the sixteenth-century poets (and grammarians too) must be learned by rote; every head must be stuffed, till it could hold nothing else, with classic quotations; no gentleman worthy of the name but could give offhand any rhyme series in Italian with completeness. So Arcadia, which bridges the seventeenth and eighteenth centuries and becomes predominantly typical of the latter, marks the age of facile composition and—to us miraculous—extemporization; for could not Corilla Olimpica (Maria Maddalena Morelli) treat offhand and viva voce in any metric form any problem from the nature of God to whether feather beds are more conducive than beds of straw to the attainment of a well-ordered temperament? No age, not even the cinquecento, ever laid greater store on cleverness. Fortunes were won by a witticism and careers were made with a sonnet, as well as ruined by a single faux pas. Let us bundle together here the Perfettis, the Bertolas, the Crudelis, the Frugonis. The Arcadian virus was both fertile and tenacious. Even Vincenzo Monti, in an age that ought to have known better, began in its manner, as did the Metastasios, the Goldonis, the Gozzis, the Parinis. Let us signalize only Jacopo Vittorelli, at once typical and individual, for the melancholy sweetness of his Anacreontics to Irene.

For the eighteenth century in Italy looks not

only backward to Petrarch, but forward to Napoleon Bonaparte. And this renaissance of mentality appears even in some of the traditional literary forms. Or rather, if not mentality, it is at least a clear artistic vision that comes into the melodrama with Apostolo Zeno, a fine scholar and a fair poet (1668–1750), and in that most settecentistic of all the writers of the settecento, Pietro Metastasio, who, discovered by Gravina, was supported by Marianna Bulgarelli, who carried the splendor of Italian poetry to Vienna as court dramatist, who in his serious melodramas shows the utter inability of his century to be serious, and finally leaves to the folk music of Italy many a melancholy or sensuous air culled from his opera librettos. The *Didone*, the *Clemenzia di Tito*, the *Attilio Regolo*, even the *Siroe* with its involved intrigue, are, in their genre, masterpieces, not of the gigantic outlook, but of the delicate sentiment, intensely felt, perfectly apprehended by the creative spirit. Dignity, if not compelling passion, sustains the classic tragedies of Scipione Maffei, especially the *Merope*, well worthy to stand beside Racine's better, and above Voltaire's best, dramatic poems. Pier Jacopo Martelli (1655–1755), imitating the French Alexandrine verse, hits on the languid yet fecund rhythm of the 14-syllabled *martellian couplet*, which has ever since resounded on the Italian stage. Jocose poetry, too, sensed from a distance the new burst of life, though none will exaggerate the value of Forteguerri's *Ricciardetto* or of Casti's *Animali parlanti*, both famous enough in their own day. But the Bernesque poetry of the settecento has too often behind it the spirit of gossip and malice, not the animal violence of the sixteenth century or of Boccaccio. A gossip was Bartolommeo Dotti, a tattletale was Pietro Buratti, and is even Carlo Gozzi any too free from such things? Meanwhile, even in the most reactionary writings, the spirit of rebellion rumbles: there is an aggressive tone in the reactionary *Lettere Virgiliane* of Saverio Bettinelli; the *Granelleschi* of Venice, in their defense of antiquated forms, had, in the nature of things, to be fighters; and Carlo Gozzi, to demonstrate the value of the old, has to give it a novelty that in his *Fiabe* (folklore dramas) has a vitality as fresh in the Germany of the nineteenth century as on the New York stage in 1914.

In contradistinction to the monotonous mediocrity of the seicentisti, towards the end of the eighteenth century strong personalities begin to come forward. There are the adventurers, with lives more involved in reality than romance would dare invent in fiction. Lorenzo da Ponte slept with beggars and stood before kings, got a living on his wits, and died at peace, a professor in Columbia University. Giacomo Casanova, genius that he was no less in swindling than in love and literature, saw every grade of fortune and every recess of life in the gay century which he portrays with photographic accuracy in his memoirs. His autobiography is more interesting simply in quantity and scope of experience than that revealed in the *Memorie inutili* of Carlo Gozzi and the memoirs of Goldoni. Giambattista Vico (1668–1744) has had to wait till the twentieth century for the recognition of the originality and intrinsic worth of his *Scienza nuova* in the fields of anthropology, æsthetics, and sociology. The Christian socialism of Antonio Muratori (1672–1750) is less important than his scholarship in the *Rerum Italicarum Scriptores*, a work more vast surely, but certainly not more useful, than Forcellini's Latin lexicon, in which Zeno, Maffei, and Muratori all had a hand. England for a moment seemed disposed to hang Giuseppe Baretti (1719–89), to whom it came to owe some insight into Italian culture. Baretti is one of the first critics in the modern sense, fighting in his *Frusta letteraria* the vacuities of Arcadia, hailing the return in literature to serious substance, and hitting on moments of definitive vision in his artistic appreciation. Gasparo Gozzi (1713–86), in his *Osservatore*, was a follower of Addison, more tainted than Baretti with tradition, but nevertheless quite as gifted with common sense; and the changing mood of the century is apparent especially in his *Difesa di Dante*. This return to the spirit of the Middle Ages is paralleled by a whole movement towards *exotism:* some interest is manifested in German poetry, the relations with France become extremely intimate; most important of all, Melchiorre Cesarotti (1730–1808) translates Ossian (Macpherson) from English, and in him the first seeds of Italian romanticism are sown. The French philosophic spirit was more immediately productive: it appears particularly in historical writing, in the attempt to organize all human experience, as revealed in jurisprudence, governmental forms, the arts and sciences, manners and customs, into logical, coherent systems with fixed universal principles. This method, which is after all a retrogression from Machiavelli's empiricism, goes often astray in Gravina (*De Origine Juris*) and is too mechanical even in Giannone (*Storia del regno di Napoli*); but from it Vico derived much of his impetus, and it produced that most human of all libertarian documents, the *Treatise on Crimes and Punishments* of Cesare Beccaria. This work grew out of the vigorous intellectual movement in Milan, central in the group which edited the *Caffè*, of which the public-spirited Alessandro Verri, author of *Le notti romane*, was a leading figure.

But Goldoni, Parini, Alfieri—in these names the Italian eighteenth century was crowned and epitomized. The smile of Goldoni belongs as much to America as to Venice, his native city. For Mirandolina has charmed us in the creation of Mrs. Patrick Campbell; Giannina has rippled and pouted from many a university stage; and now the most comprehensive production in the literature around Carlo Goldoni has come from Chicago in the biography written by Mr. Chatfield-Taylor (New York, 1914). Goldoni's plays, unsubsidized by the academic world, are more often acted on their own merit than those of any author anterior to 1800. In them there is much of the old: Goldoni's comedy gushes florid from the essence of the *commedia dell' arte*, but Pantaloon incarnates the morality of Venice and the good sense of all the world. Goldoni is best, to be sure, in his native element, the life of the lagoons, which he seizes in its characteristic traits and portrays with brilliant reality. *I rusteghi, The Quarrels of Chioggia, Sior Tonin Bonagrazia, Noble of Torcello, Le donne curiose* (this too an American favorite) are his most genial inspirations, but *The Liar* has a perennial vogue. *The Family of the Antiquary, The Mistress of the Inn, The Café, The Friend, A Strange Occurrence*, while they show little of Molière's philosophic grasp

of life—the comparison, after all, is unfair to both—possess an even superior excellence of visualization, of characterization. In this respect Goldoni overshadows all his predecessors and obsesses perhaps to an excess the next generations of comedy in Italy. His conscious fight for the comedy of character—so misunderstood by the Gozzis, the Pietro Chiaris, the Granelleschi as a group—did not, after all, destroy the *commedia dell' arte*. What it did destroy, and effectually, was the classic imitative comedy; the popular extemporized play, rather, it transformed with a serious purpose and vivified with a transplantation of its roots into the fresh ground of observation of life. In this sense Goldoni fulfilled, rather than betrayed, the promise of the *commedia dell' arte*.

In Goldoni's lashing of aristocratic vices and his propaganda for middle-class virtues some have seen the rise of a revolutionary consciousness. Goldoni himself would have been shocked at this interpretation of his work. His satire is the reaction of common sense to social phenomena as they are; and in this respect he is like another good-natured and frank-souled contemporary, Giuseppe Parini (1729–99). Surely the social cancer that the French Revolution was cutting out with the sword was never explored with a more cutting probe than in the *Giorno* of this Milanese cleric. But, again, it is rather a clear and sincere confidence in the ethics of the past than a programme for actual reform that we have in this vigorous satire. Parini, in fact, was taken completely aback by the storm that swept across the Alps. And in the midst of the turmoil of 1797 he fled with a sigh of relief to the academic harmlessness of his sculpturesque odes, dictating the lines of mellow sadness to the *Inclita Nice*, and returning with delight to the classic imagery of *L' Educazione*. Vittorio Alfieri was, on the other hand, a fighter, as witness many a passage in the *Misogallo*, the autobiography, and his classic tragedies themselves. His dramatic works for a half century taught to Italian youth hatred of tyrants and love of liberty and justice—emotions that to us have become both unimaginative and trite in their more universal forms. As unimaginative and trite we should probably now characterize much of Alfieri's work. *Saul* alone has passed, with a few lyrics, into world literature, for its noble and stately portrayal of a soul that, through sin or error, has lost its grip on life and stands face to face with a self-created despair.

Napoleon's proclamation of Rimini in 1797 brought Italians, as from a dream of idleness and gayety, into the tragic reality of a new order of things. And the dominant question was what, as Italians, they were going to do about it. Vincenzo Monti (1754–1828) was one of the many not ready with an answer and one of several distinguished intellects who never really found a satisfactory one. His panic-stricken disorientation, that appears in his life, shows also in his literary work, largely indebted to Arcadia, now rushing out to the Napoleonic vision, now reacting against Revolutionary excesses, settling down finally to a contemplation of democracy, but feeling most safe in the uncompromising atmosphere of classic translations. Himself quite satisfied with escaping unharmed, his vacillation was rewarded with a reputation for exquisite artistry in his tragedies, in the satirical *Bassvilliana* and his version of the *Iliad*. Stendhal, better than any one else, has understood the conflicting trends of feeling at this period. What we see in his *Letters from Rome, Naples, and Florence* is a society passing from a static, gay, complacent, aristocratic system to the tumultuous aggressiveness of an ambitious middle class. A giddy intoxication overcame the suppressed social strata with the first descent of Bonaparte, but after Waterloo came the restoration of the old régime. The national consciousness was strong, but its hopes had been cruelly deluded. It is this hope and this delusion that give distinctive character to Italian literature in the first half of the nineteenth century.

Its production was vast and much of it has a cogent vitality. But its most dominant tendencies are best expressed in three men: Ugo Foscolo (1778–1827), Alessandro Manzoni (1785–1873), and Giacomo Leopardi (1798–1837). Foscolo was a man of the backward outlook upon the grandeur of ancient Italy, surrounded with the hazy splendor of Grecian islands. He came from Zante, the ancient Zachinthos, and the hopes of the present were for him realized in the Venetian Republic, considered not as a finality, but as a promise of a great Italian future. He hailed in a strong ode the Napoleon that spoke at Rimini, and he lashed the tyrant that betrayed at Campo Formio. Turning to violence for a moment, he was swept by defeat into an exile full of bitter reflection and despair. It is true that the earlier redaction of the *Letters of Jacopo Ortis* is preëminently sentimental, going not much beyond the horizon of Goethe's *Werther*, by which it was inspired. But in the second form of this romance the patriotic motive is much more powerful: it is a deluded national consciousness, as well as an unhappy love, that leads to suicide. As a matter of fact Foscolo found solace for his disappointment in the elegance of classic art, expressing itself in his tragedies and in his masterpiece, the *Sepolcri*. Here there is a mood made up not only of classicism, but of a spirit steeped in English romanticism (particularly Ossian). In the hymn to the *Graces* classic æstheticism holds uncontested sway.

The refuge that Foscolo found in art, as a national heritage, Manzoni found in religion, as an institution no less national. For surely the intense religious devotion that characterizes especially the Milanese school of the early ottocento satisfied not only a craving for security of spirit, but a patriotic pride in the Church as well. This feeling, in fact, was strong enough to form a political party and create a slogan under Pius IX. It meant everything to Manzoni. In the *Cinque maggio* the conqueror of Europe, dying at St. Helena, finds peace from the turmoil of life in the arms of faith. In the ode on *Pentecost*—this is the real gem of the *Inni sacri*, which, though surely competent, attain elsewhere no exceptional heights of inspiration—he again returns to the portrayal of the confidence in life, the impregnability of hope, that comes over the soul entirely submissive to the consciousness of God's presence within. And thus made sure of himself, Manzoni goes on to grapple with immediate practical problems: he was too big a man to be restricted within one mood and too vigorous to exhaust himself with Foscolo in a contemplative inaction. He attacks the philosophical problems presented by the new age in science and in the new outlook

on ethics. The national culture attracts him as an æsthetician and critic. So he throws himself particularly into the question of the national language, and the Manzonian theory is triumphant to-day. His doctrine reconciles the prevalent Tuscaninity of the Italian language with the cultural tradition as a whole; for he favors a liberal standard of speech, recognizing additions from dialectical or literary sources, but, where questions of alternative are involved, choosing the usage of the spoken language of Florence. The principal instrument in this propaganda has been his famous romance *I promessi sposi* (The Betrothed). This novel rests on a remarkable historical study of the seventeenth century, particularly of the conditions surrounding the plague of 1630. It aimed to express also the idealism of the Italian romantics. In some of its aspects Italian romanticism is only a reflection of the ideas of the romantics in France and Germany—thus so far as the attitude towards preceptual classic forms and limitations of subject are concerned. In other respects it is distinctively Italian, Italian in that it identified itself with the political unification of Italy and with Catholic ideals. It crystallized as a school in the group that published the journal *Conciliatore* at Milan. Its manifesto was written by Giovanni Berchet (1783–1851), who, in the famous *Letter of Grisostomo*, announced its æsthetic principles and who illustrated its methods in his ballads. Here let us stress the *Hermit of Mont Cenis* as the most enduring, though it was Berchet's patriotic poems that endeared him to his own and the following generation. Manzoni's tragedies, too, violated consciously the classic unities; but their revolt is superficial, for his mind was here dominated by the classic dignity of Alfieri, which permeated the tragedy down through S. Battista Nicolini (1788–1855) and Pietro Cossa (1830–81) and is not wholly inefficacious to-day. *I promessi sposi* is, however, the great masterpiece of this movement: intrinsically, because of its graphic description of the plague, the portrait of the vicious and repentant noble called the Innominato, for the unswerving monk Fra Cristoforo, the human, vacillating Don Abondio; historically, for its numerous epigones, the romances of Massimo d' Azeglio (1798–1866, *Ettore Fieramosca, Niccolò de' Lapi*), of Francesco Domenico Guerrazzi (1804–73, *L' Assedio di Firenze, Battaglia di Benevento, Beatrice Cenci*), Cesare Cantù (*Margherita Pusterla*). Everybody wrote historical romances, inspiring hatred of oppression, love of Italy, and, more often than not, religious resignation, as indeed everybody wrote his *Memoirs*. This is particularly true after 1850, when liberty was no longer a dream; but though composed in later periods, they reflect the temper of the first half of the century. Here the best specimen—worth more than an army corps for the cause of freedom—was *Le mie prigioni* of Silvio Pellico (1789–1854), an Alfierian in his tragedy *Francesca da Rimini*, who here narrates the horrors of an Austrian prison system with a sobriety that compels conviction and a religious humility that explains much. It is a good-natured and thoroughly moral bourgeois that D' Azeglio described in himself in *I miei ricordi*. Historical and philosophical writings did not go much beyond the limits that Manzoni embraces in his own personality: dominated by the method of the eighteenth century, it set as its main problem the vindication of Catholic idealism against the eighteenth-century philosophic rationalism, attempting at the same time to free Catholicism itself from Jesuitical control and ideas. Thus the historian Carlo Botta (1766–1837), thus the critic Pietro Giordani (1774–1848), thus the philosopher Rosmini, and, in a higher order still, Vincenzo Gioberti (1801–52), whose writings, collected under the title *Nuova protologia*, exhaust the middle-class mind of the early nineteenth century.

Leopardi's delusion was a delusion not to be anæstheticized in the art of Foscolo nor cajoled by the religion of Manzoni. He considered it rather the vindication of his dignity as a human being to look his delusion in the face and, finding his life problem—whether as an Italian or as a man—unanswerable, to live and die with consciousness alive in the fullest possible measure to his delusion. This is the anguished nobility that cries in the ode to the *Ginestra*. And with the same melancholy, even desperate, determination he looks in his idylls and *canzoni* upon love, upon patriotism, upon the life around him. The triumphant middle class of the last decades, that has passed out of oppression to material prosperity, and in that prosperity has found the justification of its ethical ideals and metaphysical formulas, finds Leopardi a problem. Whence this morbidity of temperament, this insanity that all is genius? And the answer has been found in his diseased and distorted body, his unfortunate experiences in love and life, even in the sentimentality of his grandfather. But is there not, at least, the chance that some other criticism may come to take Leopardi at his own evaluation and see in his work the expression of a serene intellect, that before the problem of human destiny will accept no compromises, content, like the Vergil of Dante's *Purgatory*, in the presence of the enigma to bow its head?

There was in Leopardi as much of plastic vision and æsthetic sincerity as in Foscolo; and in Leopardi's philosophy there was even more inaction. The freedom of Italy was won not so much by such men as by men like Giuseppe Giusti (1809–50), whose smashing satire—read the galloping verses of the *Stivale* (The Boot), the *Steam Guillotine*—filled the Italian youth with the eagerness to leave philosophic meditation to their grandfathers and go out and make Italy. This had been done virtually by 1860, though, to cite a famous epigram, when Italy had been made, there still remained the problem of making Italy. With this latter task, in its intellectual bearings, contemporary Italian literature is still engaged. Production has been enormous in bulk and high in quality, though we are still, perhaps, too near it to keep all its aspects in true proportion. Two figures at least stand out with permanent distinctness: Giosuè Carducci (1836–1907) and Gabriele d' Annunzio (1864–). Carducci, above all, represents the attainment by the Italian middle class to its own self-consciousness. He has the Leopardian strain and the Manzonian strain, and his Hellenism—is it not already foreshadowed in definite outline in Foscolo? His mind is obsessed by Italy's past, which for him reaches back to Hellenic origins, of whose culture ancient Rome was the legatee and of which modern Italy will be the transmitter to the civilization of the future. Or rather, Carducci's

atavism is not exactly an obsession, so completely is it dominated by his spirit, assimilated by his intellect, and directed towards action by his will. The revival of ancient glory presented itself at first to Carducci polemically as a reaction against romanticism; polemically also, later, as a question of form: in the *Odi barbare* he leaves rhyme and traditional metrical forms for old Greek and Latin measure. But the notion of propaganda is soon swallowed by his artistic vision itself. The ode to *Aurora* drips with light in which Carducci revels for its own glory. With this splendor he clothes all the past of Italy and Greece. In its behalf he fights the ascetic gloom of Christianity. The *Hymn to Satan* (Satan is progress; Jehovah, the Church, is reaction, darkness) is lacking, perhaps, in depth. But the odes *To the Springs of the Clitumnus*, *In a Gothic Church* are immortal poems to faith in national destiny and faith in the joy of life, as opposed by "impious" religious terror. In the *Church of Polenta* he sings the palinode, recognizing the unifying force of the Church in Italian consciousness. The ode *At the Station*, the sonnet *The Ox*, the poems *Before San Guido*, *Niccola Pisano*—their number could be much increased—are each masterpieces for objectivity and aspiration.

D'Annunzio's Hellenism is even more intense, as indeed it rests on a vaster Hellenic culture, though less pedantic, than Carducci's. In his indefatigable production, as varied as his life has been troubled, one trait seems always to appear: it has well been called a sensualistic dilettantism. D'Annunzio has often gone out to ideas from abroad: Tolstoy left a trace on the *L'Innocente*, Nietzsche on the *Triumph of Death*. He has felt German philosophy as well as English, French, and Greek poetry. For it is his task in life to *feel* everything. He revels in sensation of every sort, in color, in sound, in smell, in touch, and he is fascinated by, just as he thoroughly understands, the minutest emotional reactions to sensation. *Il piacere* (Desire), for all its ugly theme, is in this respect one of the most solidly packed romances since Thackeray in England and Flaubert in France, just as *Fuoco* (Fire) is one of the most remarkable for lyric splendor. Fortuitous circumstances largely have stressed the importance of his dramas (*La gioconda*, *La città morta*, *La gloria*, *Francesca da Rimini*, etc.), that almost never go beyond the scope of his earlier poetry and romances, which remain most truly representative of his surprising genius.

In sharp contrast with D'Annunzio's pagan sensualism stands the Catholic idealism of Antonio Fogazzaro (1842–1909), who shows will triumphant over passion in the beautiful romance *Daniele Cortis*, but who more comprehensively in a trilogy of novels—*Piccolo mondo antico*, *Piccolo mondo moderno*, *Il santo*—tries to deal with the paramount questions of modern Italian life. There he sustains nationalism, patriotism, as the fundamental necessity, but also a progressive nationalism broadening out the prospects of the individual life, integrating everything in faith and Christian ethics, stripped of formalism and lived in action.

Around these men we may group a host of less distinct personalities and systems, the poets Giovanni Prati (1815–84) and Aleardo Aleardi (1812–78) of the older group, classic in manner, romantic in substance; Mario Rapisardi (1844–1911), Arturo Graf (1848–1913), Ada Negri (1870–); among the more recent. Giovanni Pascoli (1851–1913) has attained greater distinction, perhaps, for his brilliant classicism; Lorenzo Stecchetti (1845–) for his method called realism or verism. Domenico Gnoli has recently shifted the classic elegance of his earlier poetry to a manner of exquisite romantic tenderness. In the novel, from Ippolito Nievo (1832–61), who may be said to have begun the serious psychological study of contemporary problems, through Edmondo de Amicis (1848–1908), who struck the ethical keynote for the younger generation, through Enrico Castelnuovo (1839–), with his subtle humor, through the Barrilis, the Farinas, the Rovettas, the Seraos, we come down to the contemporary field, where we may say the short story of regional life shares with the drama the place of chief interest in contemporary literature. Regional life has in Italy always found a free-flowing channel of expression in dialect literature: one thinks, e.g., of Meli for Sicily, of Porta for Milan, of Ruzzante, Calmo, Maffio Venier for Venice, of Burchiello for Florence—all these from the older literature. The sonnets of Giuseppe Gioachino Belli in the Roman dialect of the epoch around 1850 set the method for the flourishing contemporary schools. Its dean is Renato Fucini, who, in his tales *Le veglie di Neri* and *All' aria aperta* and in his Pisan sonnets, has portrayed the life of the Tuscan Campagna with consummate art. Trilussa and Pascarella have been, again in Roman dialect, doing the same for Rome. One may say that the Neapolitan plays and poems of Salvatore di Giacomo are among the most beautiful productions of recent Italian literature. But the output has been both rich and solid in the tale in Italian: Grazia Deledda for Sardinia, Giovanni Verga for Sicily, Antonio Beltramelli for Umbria. Luigi Pastonchi and Ugo Ojetti are doing splendid work of the same sort, largely as journalists. The Italian comedy long felt the influence of Goldoni. It left its imitative manner for a time in Paolo Ferrari (1822–89) and in Vittorio Bersezio, who reflects the life of Piedmont. It came to great excellence in Giuseppe Giacosa (1847–1904), whose *Come le foglie* (Like Falling Leaves) has enjoyed a permanent vogue. Giacosa most deeply felt the problems occasioned by the spirit of commercialism in its fight with the sounder middle-class virtues. For these in a sense he fought, while it is again the cause of faith and Christian morality that inspires the deeply serious drama of E. A. Butti (1875–1910). Butti has written comedies and romances of a high order on contemporary aristocratic life, but perhaps his most charming and intense play is *Fiamme nell' ombra*. The Neapolitan Roberto Bracco is, on the other hand, an observer who holds no thesis, but catches with wonderful sense of situation what he sees. *Astray in the Dark*, *Ghosts*, *The Saint*, *Don Pietro Caruso*, *Snow-Storm*—these are all gems of literature that enable Italy to compare well with other European nations on the contemporary stage. Italian criticism has in the nineteenth century felt the full force of the historical method; with Alessandro d'Ancona (1835–1914) the most venerable figure of this school has passed away. Its greatest name is Francesco de Sanctis, well qualified to stand beside Sainte-Beuve and Taine for the value, if not for the bulk, of his work. The method and ability of De Sanctis descended

upon Benedetto Croce, who, through the splendid essays in his journal *La Critica*, is exerting at present perhaps the most pronounced influence upon æsthetic theory and critical method of any one in Europe. Cesare Lombroso (1836–1908) has similarly developed Italian criminology, and his broad outlook stimulated to a great degree Guglielmo Ferrero, who, after important works on jurisprudence and Roman history, has been an important international figure through his criticism of contemporary life in Europe and America.

Italian literature to-day is national still rather than cosmopolitan in character: its chief function is the consolidating of the different regional tempers into a national Italian unit; its chief materials are the memories of a great cultural history in the past, a great spiritual institution, the Church. In this work its besetting danger is atavism. The more violent elements of the bourgeoisie have sensed this danger and created *futurism*. It remains to be seen whether the new nationalism, which for some years now has been conscious of itself, can turn into new channels the deep-lying artistic sense of the people, its ready hospitality to new ideas, its belief in literature. As it stands, Italy's most influential contributions to world literature have been the *Comedy* of Dante and the Italian Renaissance.

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ITALIAN MOLIÈRE, mō'lyâr', The. A name given to the Italian dramatist Goldoni (q.v.).

ITALIAN PINDAR, The. A name given to the lyric poet Chiabrera (q.v.).

ITALIAN POLITICAL PARTIES. See Political Parties, *Italy*.

ITALIAN REPUBLIC. See Cisalpine Republic.

ITALIAN SOMALILAND. See Somaliland; Protectorate.

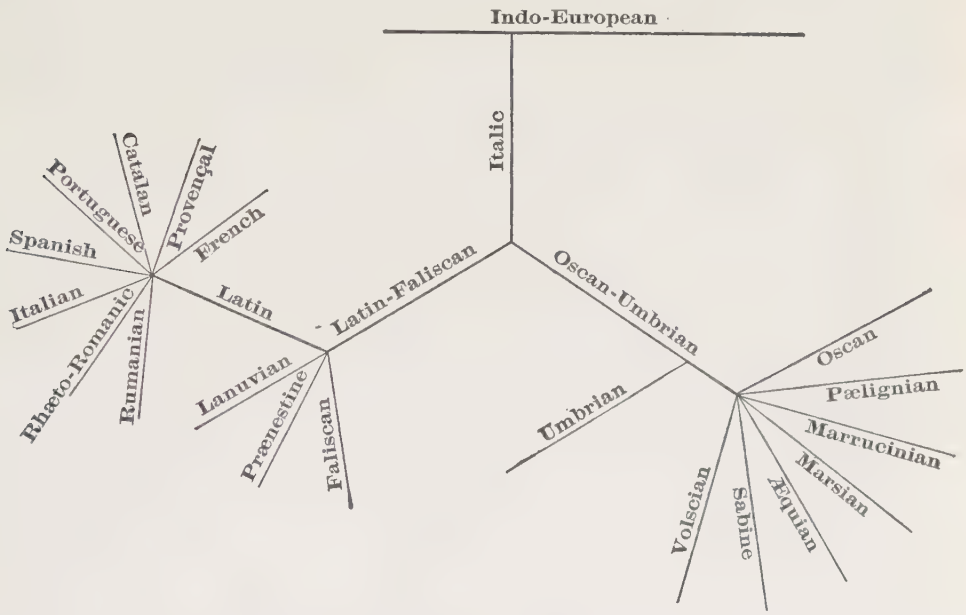
ITALIAN VERSIONS. See Bible.

ITALIC LANGUAGES. A group of closely related languages of which Latin and the modern Romance tongues are the best-known representatives. At the dawn of history the group was confined to Italy, unless, as some scholars suppose, the language of the Siculi was Italic. Many of the languages anciently spoken in the peninsula were not Italic languages; the Greek dialects which were in use at many points along the southern coast, the Messapian of Iapygia, the Gallic in the north, and the Etruscan in the centre are certainly to be excluded from the group, and so probably are the Ligurian and Venetian of the north. Next to Latin and its descendants the most important Italic language is Oscan, which in the fourth and third centuries before Christ was spoken in Samnium, including the country of the Frentani and Hirpini, northern Apulia, Lucania, Bruttium, and the Sicilian city of Messana. North and northwest of the Oscan terrain and south, east, and northeast of Rome were spoken Pælignian, Marrucinian, Vestinian, Volscian, Marsian, Æquian, Sabine, and some other less important dialects. In the immediate neighborhood of Rome were spoken Prænestine, Lanuvian, and other dialects of the Latini, while a few miles to the north of the city, surrounded by Etruscan territory, was the Italic language of Falerii (Faliscan). The northernmost member of the group was Umbrian, the language of Umbria; our knowledge of it is almost exclusively based upon documents from the town of Iguvium, and we do not know how numerous or extensive the local variations from Iguvian usage were.

The Italic languages form a branch of the Indo-European languages (otherwise called Aryan or Indo-Germanic, q.v.). They are more closely related to the Celtic languages (q.v.) than to any other known group of Indo-European. Although there is very little obvious resemblance between Latin and any one of the Celtic languages of which we have extensive documents, this is due partly to the fact that these are known only from comparatively recent times and partly to the unusually numerous changes which the Celtic languages have suffered; if we had documents as early as the earliest we have for Indian and Iranian, Italic and Celtic might appear almost identical. At any rate there is no doubt that Italic and Celtic are to be grouped together as forming the Italo-Celtic branch of Indo-European. Among the most striking of their common features are the following: (1) abstract nouns formed by the suffix *ti* with an extension in *n*, e.g., Lat. *menti-on-em*, OIr. *ermi-ti-u;* (2) superlatives in *is-omos*, e.g., Lat. *ægerrimus* from **ægr-isomos*, Gall. *οὐξισάμη*, 'highest'; (3) the use of the *o*-stem locative in *ei* (Lat. *ī*, Celt. *ī*) as a genitive, e.g., Lat. *agri*, OIr. (Ogam inscription) *maqi*, 'of a son'; (4) the fusion of the Indo-European aorist and perfect; (5) the formation of passives and deponents in *r*, e.g., Lat. *sequitur* = OIr. *sechithir;* (6) the formation of the preterit passive from the past passive participle in *to*, e.g., Lat. *monitus*, 'he was advised,' OIr. *roléiced*, 'he was left.' A remarkable fact which may or may not be significant is that the Celtic languages, like the Italic, are divided into two groups, one of which represents Indo-European *qu* by *p* and the other by *qu* (later *c*). The resemblances between Latin and Greek, which formerly led scholars to assume a close relationship between the Italic and Hellenic (see Greek Language) branches of Indo-European, are due chiefly to extensive borrowing within historical times, and partly also to the fact that Greek and Latin are the only languages of the western grand division (*centum* languages) of the family from which we have ancient documents.

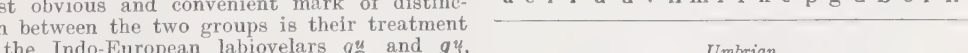
Features which distinguish the Italic languages from Celtic are the following: 1. The original diphthong *eu* became *ou*, while in the earliest-known Celtic (Gallic) the two were still distinct, e.g., OLat. *douco*, Goth. *tiuhan*, Indo-European **deuk-*. 2. The Indo-European aspirates (*bh, ph, gh, kh*, etc.) became spirants (*f, h*, etc.), whereas in Celtic they lost their aspiration and became *b, p, g, k*, etc., e.g., Lat. *fert*, OIr. *berid*, Skt. *bhárati*. 3. The ablatival suffix *d* was extended from the *o* stems to the other declensions, e.g., OLat. *sententiad*, Osc. *toutad*, "civitate." The case system of the known Celtic languages is so meagre that one cannot say positively that early Celtic did not share in this innovation. 4. The Indo-European interrogative pronoun came to be used as a relative; Celtic relative clauses are so different from anything else in Indo-European that one may suppose that there was no relative pronoun in the Italo-Celtic period. 5. The extensive changes of the Indo-European verb which yielded the four Latin conjugations are most of them common to all the Italic languages, but only a few of them are to be found in Celtic. 6. Italic formed a gerundive in *ndo*, e.g., Oscan úpsannam, "faciendam." 7. In the realm of syntax we may mention especially the construction of the accusative with the infinitive.

The Italic languages fall into two groups, the Oscan-Umbrian and the Latin-Faliscan. The most obvious and convenient mark of distinction between the two groups is their treatment of the Indo-European labiovelars *qu̯* and *gu̯*, which appear in Latin as *qu* and *v* (*gu* after nasals), but as *p* and *b* in Oscan-Umbrian. At the beginning of our records Latin-Faliscan was confined to the Roman Campagna, the Alban Hills, and the town of Falerii, while Oscan-Umbrian covered all the rest of the Italic territory. There is reason to suppose that dialects of the Latin-Faliscan type had once been spoken through a much wider region, and that they had been supplanted by the invading Etruscan and Oscan-Umbrian. The rise of Rome, then, rescued a type of speech that was apparently on the verge of extinction and spread it over half the civilized world. Oscan-Umbrian is divided into two main branches, one of which consists of Umbrian, while the other includes Oscan and the minor dialects which occupy the territory between Oscan and Umbrian. These minor dialects are sometimes grouped together under the name Sabellian, but they do not seem to have any closer affinity with each other than with Oscan. The Latin-Faliscan includes Latin, the other dialects of the Latini, of which Prænestine and Lanuvian are the best known, and the Faliscan of Falerii. From Latin are descended the modern Romance languages. The mutual relationship of the Italic languages is roughly represented by the following table:



Alphabet. The Italic dialects employed several different alphabets, all of them based on the Greek alphabet of the Chalcidian colonies in Italy, especially on that of Cumæ. Two forms were derived from this source, the Latin-Faliscan and the Etruscan-Oscan-Umbrian. The Oscan and Umbrian alphabets consisted of 21 and 19 letters respectively, and were read, like the oldest Latin and Greek, from right to left. The letters were as follows:

Oscan



Umbrian

Oscan V is a modification of V, which is used in the later inscriptions to represent the *o* sound. This sound is represented in early Oscan and in Umbrian by the unmodified V. Oscan ⊢ represents an open *e* sound. There were a few numerical signs, Oscan-Umbrian | for 1, X for

10, Oscan V for 5,) for 100. Both Oscan and Umbrian, however, frequently employed the Latin alphabet. In modern linguistic works the words in Oscan-Umbrian script are usually printed in bold-faced or spaced Roman type, those in Latin letters are represented by italics, as Oscan **faksiad** or **f a k s i a d**, 'let him make,' *fefacust*, 'he will have made.' In addition the oldest Italic inscriptions are in many cases written in the Greek alphabet. Punctuation in the inscriptions is capricious and frequently neglected; the usual system, however, is one or more dots.

Oscan-Umbrian. The Oscan-Umbrian languages possess many features in common besides their treatment of the Indo-European labiovelars: *nd* became *nn*, e.g., Osc. **úpsannam**, "operandam"; *s* was retained before nasals and liquids, e.g., Osc. **físnam**, "fanum"; *f* from Indo-European *bh* and *dh* was retained even in the interior of a word, e.g., Umb. **tefe**, "tibi"; final *ā* was changed in the direction of *ō*, e.g., Osc. *molto*, "multa"; the nominative plural of the first and second declensions retained the original endings *ās* and *ōs;* the genitive singular of the first declension retained the original ending *ās*, and the genitive singular of the third declension was *eis*, the original ending of the *i* stems. In all of the common features of Oscan-Umbrian which we have mentioned those languages differed from Latin; in many of them, however, Oscan-Umbrian merely retained the Italic form or usage, while Latin suffered some change. In some cases of the latter sort Prænestine, Lanuvian, and Faliscan, or some of them, were like the Oscan-Umbrian group in retaining the primitive state of affairs; thus, *f* appears in the interior of the word in Faliscan *carefo*, "carebo," and Prænestine *nefrones*, "kidneys." Early Latin as well as Prænestine seems to have retained *s* before nasals, for the Duenos inscription which was found at Rome has the word *cosmis*.

Oscan. As already stated in detail, Oscan was spoken in a very large part of central and southern Italy. Although a few local dialectic peculiarities have been detected, the language is remarkably homogeneous in view of its wide extension. The system of writing is very clear and regular; it is the sort of writing that one expects for a highly cultivated language, and in some details it shows unmistakable traces of the work of the schoolmaster. Oscan was the official language of the powerful Samnite state, and it was spoken in the wealthy and highly civilized cities of Campania, where early Greek influence upon Italian civilization was strongest. We have, in short, all the conditions for the production of a literature, and we find some of the effects which a literature might exert upon the language. It is not surprising, then, to learn that the Romans got their *fabella Atellana* from the Oscans (Livy, 7, 2, 12: *quod genus ludorum ab Oscis acceptum;* cf. Cicero, *Fam.*, 7, 1, 3, and Tacitus, *Ann.*, 4, 14). Strabo tells us (5, 3, 6, p. 233) that even in his day the Oscan language was to be heard on the stage. The poet Ennius boasted that he had three souls because he spoke Latin, Greek, and Oscan (Gellius, 17, 17, 1); he did not boast of a Messapian soul, although Messapian was his native language, doubtless because there was no Messapian literature. Oscan was still in use at Pompeii when that town was destroyed in 79 A.D.

The Oscan inscriptions number about 230. Most of them, however, contain exclusively, or almost exclusively, proper names, and only four —the Bantine tablet, the Cippus of Abella, the tablet of Agnone, and the Curse of Vibia—are of any considerable length. The first of these, the Tabula Bantina, discovered in 1793, is the longest. It is a mutilated bronze plate about 15 by 10 inches and bears on one side an inscription of 38 lines in Oscan and on the other a Latin text 32 lines long. The tablet deals with legal regulations concerning the city of Bantia in Lucania. The Cippus of Abella, found near Avella in 1745, is a block of hard limestone 6 feet, 5 inches high, 1 foot, 8 inches broad, and 11 inches thick. It contains in 58 short lines of letters about 1½ inches high an agreement between the towns of Abella and Nola concerning the joint use of a temple of Hercules. The tablet of Agnone, discovered in 1848, is of bronze, with a handle and chain by which it may be hung up, and measures 11 × 6 inches. It is inscribed on both sides with 47 very short lines, which contain the names of the deities to whom statues in a certain sacred grove belonged. The Curse of Vibia, found at Capua in 1876, consists of 13 lines, written on a lead plate about 8¾ × 3 inches. As a specimen of Oscan, the following passage may be taken from the Bantine tablet, 5–7:

Oscan: *deiuatud sipus comenei perum dolom mallom, siom ioc comono mais egm(as touti)cas amnud pan pieisum brateis auti cadeis amnud, inim idic siom dat sena(teis) tanginud maimas carneis pertumum.*

Latin: iurato sciens in comitio sine dolo malo, se ea comitia magis rei publicæ causa quam cuiuspiam gratiæ aut inimicitiæ causa, idque se de senatus sententia maximæ partis perimere.

The most striking peculiarity of Oscan is the conservatism of its vowel system. If extensive remains of the language are ever discovered, it will be as important as Greek as a witness to the vocalism of Indo-European. The long diphthongs are shortened, but the original quality of all diphthongs is retained, except that *eu* becomes *ou* and *əu* and *əi* become *au* and *ai*. Intervocalic *s* remains a sibilant which in the native alphabet is not distinguished from *s* in other positions, but is written *z* in the Latin alphabet, e.g., the genitive plural ending *azum*, Umb. *aru*, Lat. *ārum*. Anaptyctic vowels are developed between liquids or nasals and mutes, e.g., **aragetud**, "argento." After a dental *u* becomes *iu;* e.g., **tiurrí**, "turrim."

Pælignian was spoken in a small mountainous district north of Samnium. More than 30 Pælignian inscriptions are known, but the only one of any length is the Herentas inscription. It was unearthed in a grave at Pentima, the ancient Corfinium, in 1877. It is written on the side face of a block of travertine, 2 feet, 7 inches long, 2 feet, 5 inches from front to back, and about 11¼ inches high, and is the epitaph of a priestess named Vibia. As a specimen of Pælignian, we may cite from the Herentas inscription, 5–6:

Pælignian: *sua aetatu firata fertlid praicime Perseponas af ded.*

Latin: suam ætatem feneratam fertiliter in regnum Persephonæ abdidit.

Pælignian agrees with Oscan more closely than any other known dialect. It shares the retention of the intervocalic sibilant and the development of anaptyctic vowels.

Marrucinian. This dialect, spoken to the northeast of Pælignian, seems from its very scanty remains to be closely akin to the latter. It is known from two inscriptions, one from

IGUVINE TABLET, 1 a.

Teate, the centre of the Marrucinian territory, containing merely two proper names, and the other from Rapino, written in 12 short lines on a rusty bronze tablet about 6 inches square. This dates from about 250 B.C. and is concerned with certain sacrificial rites. Lines 1–5 of the bronze of Rapino may be quoted to give an idea of this dialect:

Marrucinian: *aisos pacris totai Maroucai lixs. asignas ferenter auiatas toutai Maroucai.*
Latin: dis propitiis civitati Marrucæ lex. Prosiciæ feruntur auspicatæ civitati Marrucæ.

Marsian. The remnants of the Marsian dialect, spoken around Marruvium, on Lake Fucinus, are contained in a few very brief inscriptions. The dialect shows, in its monophthongization of original diphthongs, a close resemblance to Umbrian. In other respects Marsian seems to have been very similar to Pælignian and Marrucinian.

Æquian. Of the dialects of the Æqui, who centred around Cliternia and Nerea, no inscription has been preserved which is free from suspicion. If **prufatted** (Latin *probavit*) is really an Æquian form, the dialect would seem to have shown a marked affinity to Oscan (cf. Osc. **prúfatted**).

Sabine. Of Sabine also the remains are too scanty to give any information regarding the dialect. Only one inscription, which is very brief, has been preserved. It has been shown from literary evidence that *d* sometimes became *l* in Sabine, and that such Latin words as *lacrima* (Gk. *δάκρυ*), *olor* (beside *odor*), *solium* (beside *sedeo*) are Sabine loan words. The considerable number of such words in Latin indicates that the Sabine dialect exerted a powerful influence upon Latin; but our almost complete ignorance of the tongue makes it impossible to detect Sabine elements in our Latin documents, except in the case of words with *l* from *d* and words such as *catus*, which the Romans themselves call Sabine. Another peculiarity of Sabine was the conversion of *gh* into *f* where Latin has *h*.

Volscian. The Volsci, whose capital was Velitræ, have left one inscription of four lines, known as the Tabula Veliterna, discovered in 1784 and inscribed on a bronze 1⅜ × 9⅛ inches. If we may draw conclusions from this tablet, Volscian stood the nearest of all the Sabellian dialects to Umbrian. The scantiness of our sources, however, forbids any hard and fast conclusion. As a specimen of Volscian, the third line of the tablet of Velitræ may be quoted:

Volscian: *sepis toticu couehriu sepu ferom pihom estu.*
Latin: siquis publico conventu secutus erit (?) ferre pium esto.

The resemblance to Umbrian consists in (1) the monophthongization of diphthongs, e.g., *toticu*, Umb. *totar*, Osc. *touto;* (2) the loss of final *d;* and (3) the assibilation of *k* before *e* (?) and *i*, e.g., *faȥia*, Umb. **façia**, Osc. **fakiiad**.

Umbrian. The remains of Umbrian are of far greater extent than those of any other ancient Italic language except Latin. Practically all the texts in this dialect are contained in the Iguvine tablets, discovered in 1444 at Gubbio, on the site of the ancient town of Iguvium or, as it was called in the Middle Ages, Eugubium. The Iguvine tablets were originally nine, although but seven are now preserved. The tablets are of bronze, inscribed, with the exception of the third and fourth, on both sides. They vary in size, the first two being about 22 × 15 inches, the third and fourth about 16 × 12 inches, the fifth about 18 × 14 inches, and the last two about 33 × 22 inches. The entire number of lines is 449. The first four and about two-thirds of the fifth are written in the national Umbrian alphabet, while the last third of the fifth tablet, as well as the sixth and seventh, are written in Latin characters. It seems tolerably certain, both on epigraphical and linguistic evidence, that the portion in the Roman alphabet is later than that in the epichoric script. The date of the inscriptions, however, apart from this relative one of the several parts with each other, is doubtful. Possibly one will not be far astray in dating them between the third and first centuries B.C. The difference between the Old Umbrian, which is written in the national script, and the New Umbrian, which was inscribed in Latin letters, was probably more apparent than real. Since the Umbrian alphabet lacked signs for *o*, *g*, *d*, *b*, they used instead *u*, *k*, *t*, *p*. On the other hand the Latin script could represent the sound of the Umbrian *ř* only by *rs*. New Umbrian showed, however, a marked deviation from Old Umbrian in the change of final *s*, retained unchanged in the earlier form of the dialect, to *r*, as OUmb. **tutas**, 'of the city,' but NUmb. *totar*. There are a few other distinctions which are of minor importance, such as the more closed pronunciation of *ē* in New than in Old Umbrian (as NUmb. *habitu*, 'let him have,' but OUmb. **habetu**; NUmb. *verir*, *vereir*, 'at the gates,' but OUmb. **veres**). The Iguvine tablets are ritualistic in subject. The texts I a (which is reproduced on the accompanying plate) to I b, and VI a to VI b 47 deal with the purification of a high place near Iguvium, while the remainder of I, VI, and all of VII a treat of the purification of the city itself. The last two tablets, however, are much more detailed than the Old Umbrian. The second tablet is concerned with a lustral sacrifice for the priestly college of the Atiedii, with an optional sacrifice to an infernal deity, and with the rites to be performed at the semiannual gathering of decuries from 10 towns or clans. The third and fourth tablets give in detail the rites for sacrifice to Jupiter, Pomonus, Vesuna, and certain other deities, while the fifth is devoted to resolutions of and enactments concerning the same college of Atiedii, who figure so prominently in these inscriptions. To show the difference between Old and New Umbrian, the following passage, taken from I a 11–13 and VI b 1–2 may be cited:

Old Umbrian: **preveres Tesenakes tre buf fetu Marte Krapuvi fetu ukripe Fisiu, tutaper Ikuvina. arviu ustentu vatuva ferine fetu, puni fetu, kutef pesnimu.**
New Umbrian: *pre verir Tesenocir buf trif fetu Marte Grabouei ocriper Fisiu, totaper Iiouina. aruio fetu, uatuo ferine fetu, poni fetu, tases persnimu.*
Latin: pro portis Tessinacis tres boves facito Marti Grabovio pro arce Fisia, pro civitate Iguvina. frumenta facito, exta in ferculo facito, posca facito, tacitus precator.

Umbrian, like Latin, is characterized by a large number of phonetic changes; some of these are found also in one or another of the related languages, while others are peculiar to Umbrian alone. We have already noticed the parallelism between Umbrian and Volscian in the simplification of diphthongs, the loss of final *d*, and the assibilation of *k* before *e* and *i*. Faliscan and Prænestine agree in part with Umbrian in the simplification of the diphthongs, while Latin follows a different method of simplification, and most of the other dialects retain the diphthongs

unchanged. Umbrian is like Latin in converting *s* between vowels to *r;* e.g., genitive plural *aru,* Lat. *arum,* Osc. *azum.* Intervocalic *d* became a sound which was written *rs* (ř in the Umbrian alphabet), e.g., *persi,* **peři,** Lat. *pede* (cf. the Sabine change of *d* to *l*). Initial *l* became *v,* e.g., **vutu,** Lat. *lavito.* Several other changes were scarcely less important than these.

Latin-Faliscan is distinguished from Oscan-Umbrian in (1) the treatment of the Indo-European labiovelars, e.g., Lat. *quando,* Falisc. *cuando,* Osc. **pũn,** "cum"; (2) the retention of final *a,* e.g., Lat. *multa,* Falisc. *Pola,* "Paulla," Osc. *molto;* (3) the formation of the genitive singular of the third declension, which in Latin shows *is* (from *es*) or *us* (from *os*), in Faliscan *o* (from *os*), but in Oscan *eis,* e.g., Lat. *nominis, Cæsarus,* Falisc. *Arunto,* "Arruntis," Osc. *aeteis,* "partis"; and (4) the formation of futures in *f,* which in Latin becomes *b,* e.g., Falisc. *carefo,* Lat. *carebo.* If the remains of Faliscan and the dialects of Latium were more extensive, it would no doubt be possible to point out other features common to all Latin-Faliscan dialects but not possessed by Oscan-Umbrian. In the main, however, the divergence of Latin from Oscan is due to relatively late changes in Latin itself, and the somewhat wider gap between Latin and Umbrian is due to still later changes in both Umbrian and Latin.

Latin is usually said to be the language of Latium, and that is no doubt the original meaning of the word. The Latin of the Roman Empire, however, the language in which the Latin literature is composed, was originally the language merely of the city of Rome. The rest of Latium was occupied by a considerable number of other dialects, some of which probably differed from Latin almost as widely as did Faliscan. In fact Prænestine seems to have resembled Faliscan rather more closely than it did the language of Rome. It seems best, therefore, to restrict the name Latin to the language of the city of Rome and the later language of the Roman Empire, and to regard the other ancient dialects of Latium as coördinate with it.

Faliscan was the language of the ancient town of Falerii, situated about 30 miles north of Rome and about 2 miles west of the Tiber. Although the town belonged to the Etruscan confederacy from the beginning of our records, its language and some of its customs were Italic. The 37 inscriptions are very brief and consist for the most part of proper names, excepting the younger Faliscan texts, which, although longer, contain so large an element of Latin that they are of no linguistic importance. The following inscription on the patera found near Cività Castellana, the ancient Falerii, in 1887 is a good example of this dialect:

Faliscan: *foied uino pipafo cra carefo.*
Latin: hodie vinum bibam cras carebo.

Faliscan was differentiated from Latin by the following features: (1) the retention of medial *f,* which Latin and some of the dialects of Latium changed to *b,* e.g., *carefo,* Lat. *carebo;* (2) the representation of initial Indo-European *gh* by *f,* where Latin and also Oscan-Umbrian had *h,* e.g., *foied,* Lat. *hodie;* (3) the change of initial *f,* from Indo-European *bh* or *dh,* to *h,* e.g., *haba,* Lat. *faba;* (4) the retention of intervocalic *s* as a sibilant, written sometimes *s* and sometimes *z,* e.g., *Folcozeo, Folcosio, Halæsus, de zenatuo sententiad.* (5) To some extent at least Faliscan corresponded with Umbrian rather than with Latin in the simplification of the diphthongs; *loferta,* "liberta," shows *o* for Italic *ou* (Pæligian *loufir*), whereas Latin changed *ou* to *ū.*

Prænestine. The dialect of Præneste is known from a number of early inscriptions. These texts consist for the most part of lists of names of deities inscribed on brass mirrors and cylindrical caskets found in Prænestine tombs. The most interesting relic of the dialect is the famous Prænestine fibula, a gold brooch of about the sixth century B.C., which gives, therefore, one of the earliest of all Italic inscriptions. It is as follows:

Prænestine: *Manios med fhefhaked Numasioi.*
Latin: Manius me fecit Numerio.

We do not know that this inscription contains any feature which did not belong to Latin of the same date. In other Prænestine documents, however, we find medial *f* for Latin *b* and initial *f* for Latin *h,* as in Faliscan (e.g., *nefrones, Foratia,* "Horatia"). Prænestine, like Faliscan, shows the Umbrian method of simplifying the diphthongs, e.g., *losna* for *lūna* (from **louksnā*), *Hercole* for *Herculī* (from **-ei*). Like Faliscan again is the extensive Etruscan influence to be seen in the confusion of the voiced and voiceless mutes in *Alixentros* for *Alexander, Casentera* for *Cassandra,* etc.

Other Dialects of Latium. We know even less about the other dialects of Latium than we do about that of Præneste. Lanuvian *nebrundines* beside Prænestine *nefrones* shows that the Latin change of medial *f* to *b* was not entirely confined to the city of Rome. The grammarians cite "rustic" forms such as *prētor* for *prætor, spēca* for *spīca* from **speica, ōrum* for *aurum.* A fair inference is that the Umbrian method of simplifying the diphthongs was rather widespread in Latium.

Latin is treated under LATIN LANGUAGE; see also GRIMM'S LAW; VERNER'S LAW; INDO-GERMANIC LANGUAGES. It is necessary here only to point out the extensive influence which the other Italic languages have had upon the dialect of the city. In case a Latin word displays a feature that is known to be foreign to Latin and native to one or several of the related idioms, we may safely conclude that the word in question has been borrowed. Thus the name *Pompeius* is related to Oscan **pompe* instead of to the equivalent Latin *quinque,* which yielded the genuine Roman names *Quin(c)tius, Quin(c)tilius,* etc. *Albius* is the Latin form of the dialectic *Alfius. Rūfus* must come from a dialect which retained medial *f* but changed *ou* to *ū* as Latin did; the synonym *rōbus,* on the other hand, implies a dialect which changed medial *f* to *b* but which changed *ou* to *ō* in the Umbrian fashion. Very likely both words came from dialects of Latium. Plautus's *monerula* for *monedula,* and *dispennite* and *distennite* for *dispendite* and *distendite,* display Umbrian sound changes.

The modern Italian dialects preserve some traces of the ancient Italic languages. Neapolitan *attrufe* comes from Oscan **octufer,* not from Latin *October.* The modern Italian assimilation of *nd* to *nn* covers about the territory once occupied by the Oscan-Umbrian languages.

Bibliography. The most convenient and reliable work on Oscan and Umbrian is C. D. Buck, *Grammar of Oscan and Umbrian* (Boston, 1904). The fullest grammatical discussion of Oscan-Umbrian, including the minor dialects, but not

Faliscan or the dialects of Latium, is Von Planta, *Grammatik der oskish-umbrischen Dialekte* (Strassburg, 1892–97). The fullest collection of material, with brief discussion and including Faliscan, is R. S. Conway, *The Italic Dialects* (2 vols., Cambridge, 1897). A full but uncritical treatment of Faliscan is Deeke, *Die Falisker* (Strassburg, 1888). The influence of the other Italic languages upon Latin is discussed in Ernout, *Les Éléments Dialectaux du Vocabulaire Latin* (Paris, 1909).

ITALIENS, ē'tà'lyăN', Boulevard des. The most frequented and fashionable of the boulevards of Paris, named from the old Théâtre des Italiens.

ITALIENS, Les. See Théâtre des Italiens.

ITALY. The central of the three great peninsulas of south Europe. It stretches out in a southeast direction and is bounded on the north by Switzerland and Austria-Hungary; on the east by Austria-Hungary, the Adriatic, and the Ionian Sea; and on the southwest and west by the Mediterranean and France. It is separated from the Balkan Peninsula by the Strait of Otranto, 47 miles in width, and is nearly walled off from the great body of the continent by the lofty ranges of the Alps. With its continuation, the island of Sicily, it nearly reaches across the Mediterranean and is thus exceptionally favored with convenient commercial routes in all directions. Its position also especially adapts Italy for a large sea trade, because it is in the line of the shortest route from west and central Europe to Oriental countries. Although Italy is separated from the northern lands by the Alps, they are no longer a barrier to Italy's commerce, for several lines of railroad cross the mountains. Extending from northwest to southeast about 700 miles, and with an average breadth, except in the extreme north, of 100 miles, the mainland has an area of 91,161 square miles; to this Sicily, Sardinia, Elba, and smaller islands add 19,389 square miles, making the total area of the kingdom 110,550 square miles. The mainland is about twice as large as Pennsylvania or New York and extends from lat. 38° N. to lat. 46° 40′ N. and from long. 6° 30′ E. to long. 18° 30′ E.

Topography. The coast, 4160 miles in length (inclusive of the islands), is easily accessible from every part of the country. No settlement is remote from salt water, four-fifths of Italy being within 62 miles of the sea. In the north of the Adriatic the coast is low and sandy, bordered by shallow waters, and, except at Venice, not easily accessible to large shipping. Farther south, near Rimini, spurs from the Apennines reach the shore, which becomes high and rocky. The south and west coasts are generally high, rocky, and picturesque, with many bold promontories. The middle of the west coast, however, has three stretches of low and marshy land, known as the Maremma, the Campagna, and the Pontine Marshes. The west coast is varied by bays, gulfs, and other openings, and is therefore most favorable for commerce. In the northwest is the Gulf of Genoa, on which the wealthy city of Genoa stands. About the middle is the deep embayment with the fortress port of Gaeta. Next is the Bay of Naples, celebrated for its beauty. Beyond this is the Gulf of Salerno, at the head of which stands the port of Salerno. The southeast end of the peninsula is deeply indented by the Gulf of Taranto, which cuts off the so-called heel of Italy (ancient Calabria) from the toe (modern Calabria). The population is dense on all coasts where fever does not prevail, about 17 per cent of the inhabitants of Italy living within 3 miles of the sea.

The Kingdom of Italy falls geographically into three parts, differing from each other in surface features and climate and, as a consequence, in productions. One part to the north is continental, another to the south is peninsular, and the third is insular. The north portion contains the great plain of Lombardy, the valley of the Po, bordered on the west and north by the Alps. The Italian Alps are usually named after the provinces of the neighboring plains, as Piedmont, Lombardy, and Venetia. The peninsula is almost completely filled by the Apennines, which stretch through central and south Italy and are continued through Sicily.

The Alps, beginning at the Gulf of Genoa, extend first to the west, then to the north, and finally to the east, towering in lofty summits covered with snow fields. Their slopes are deeply scored by valleys, and they present a very abrupt face towards the plain of the Po. The rainfall on them is, as a result, rapidly transferred to the plain, making protective works along the river banks necessary in order to restrain the periodical floods.

The northern Apennines, which touch the Ligurian Alps, curve round the Gulf of Genoa and extend to the source of the Tiber. Their highest summit is Monte Cimone, 7110 feet. The central Apennines, beginning at the source of the Tiber, soon divide into several chains, forming the rugged mountain district of the Abruzzi, on the eastern verge of which is the Gran Sasso (9580 feet), the highest peak of the Apennines. The southern Apennines stretch to the southeast from the Abruzzi to the coast of the Gulf of Taranto, where they assume a southerly direction, with summits culminating in Monte Polino 7450 feet. The rugged and unfertile Apennines form the watershed of the peninsula; they are bordered, especially on the west side, by lower and more productive mountain districts that are grouped under the name of the sub-Apennine region. A number of passes through the Apennines are utilized by the highways across the peninsula. The Italian peninsula contains the only active volcano on the continent of Europe, Vesuvius.

The mountain regions of Italy, with their ruins, cloisters, storied castles, towered cities, the quietude of their rural scenes, and their picturesque aspects, are among the great charms that draw tourists to the country. Italy's beauty is enhanced by the singular clearness of the air, which causes the lines of tower and church and castle to stand out with clear-cut perfection and makes mountains that are miles away appear to be almost within touch.

The Italian islands are also mountainous. Sicily, nearly filled with the continuation of the Apennines, has the loftiest volcano in Europe (Mount Etna, 10,740 feet). It has not, however, figured so prominently in the history of volcanoes as Vesuvius, near Naples. The mountains of fertile but unhealthful and neglected Sardinia rise only a little over 5000 feet in height. The Lipari Islands are wholly volcanic in character.

Only about one-third of the surface of Italy is made up of plains, most of it being the great plain of Lombardy, or the plain of the Po.

This plain is encircled by a steep mountain wall in the form of an arch. The largest and richest farming area and the greatest industrial development belong to this low, almost flat plain. It is watered by the rivers of the Po system, which are fed by many Alpine and Apennine streams, with which the cereal and other crops are irrigated. The plain is a long narrow trough formed by subsidence between the Alps and Apennines and built up by the alluvial deposits of streams from the Alps and Apennines. It is steadily encroaching on the sea, because the Po for centuries has been extending its delta into the Adriatic. During six centuries the Po delta has increased 198 square miles in area. Recent surveys show that the increase is actively maintained at the present day. According to the calculations of Professor Marinelli, it will take over 100 centuries at the present rate of increase for the Po to fill up the whole of the north Adriatic north of lat. 40° 45′ N. The former port of Adria, which gave its name to the Adriatic, now stands about 15 miles inland. The Lombard plain has a more dense population and far more active manufacturing and business interests than the peninsula. Among the small plains of the peninsula are those of Tuscany and Apulia, the fertile plain to the north of Naples (the Campania of the ancients), that bordering on the Gulf of Manfredonia, and the Roman Campagna.

Hydrography. Italy has many streams, although it has only one great river, the Po. The most important streams, the Po and the Adige, flow into the Adriatic Sea. The Po is fed on one side by the snows of the Alps, on the other by the heavy rains of the Apennines, and drains an area of about 30,000 square miles, of which nearly 11,000 are level and, indeed, almost flat. Its course marks the line at which the sediment and débris from the Alps meet the sediment and débris from the Apennines. The Po is navigable to Turin and with its tributaries affords about 600 miles of navigation. The Adige enters Italy from Tirol and flows eastward to the Adriatic. The beds of both these rivers are constantly but very slowly being elevated by the alluvial deposits brought down from the mountains. The rivers of the peninsula are of little importance for navigation or industry. The beds of most of them are dry in summer, so that they cannot be relied upon for water power. The most important among them are the Arno, which rises in the Apennines and flows west past Florence and Pisa through a lovely and well-cultivated valley. It has a short course of only 150 miles. The Tiber rises not far from the sources of the Arno, the two rivers being connected by a canal through the tributary called the Chiana, whose waters flow partly into the Arno and partly into the Tiber. The canal system is thoroughly developed in the basin of the Po and is utilized not only for transportation, but also for the irrigation of hay and rice, so that the farmer in the great plain is almost independent of rain. There are many lakes where the mountains merge into the great plain; also a considerable number in the peninsula, some of which are crater lakes. The chief lakes of north Italy are, in the order of their size, Garda, Maggiore, and Como. These are not only important as pleasure resorts, but they form the great reservoirs for the rivers of the plain. Lago di Garda covers an area of 140 square miles and is very deep. Lago Maggiore is longer than Como, but not so large as Garda; a part of this lake is in Switzerland. Lago di Como is one of the loveliest lakes in the world. Other considerable lakes are Lugano and Iseo.

Climate. Italy may be divided into four climatic regions—northern, eastern, western, and southern. The first, coinciding with the valley of the Po, has a warm summer and a large daily range of temperature. The greatest extremes of temperature are in the Po basin; but even here, except in Piedmont, the mean winter temperature does not descend below 35° F. The great wall of the Alps protects it from the north winds and continental influences. Peninsular Italy is divided climatically into the eastern and western regions. The extremes of temperature diminish towards the south; on the east slope of the Apennines the mean annual temperature is about 57° F., while the west slope is a trifle warmer. South Italy, Sicily, and Sardinia form the last climatic division, with a mean annual temperature varying from 61° F. to 64° F., the difference between summer and winter being only 25°. The mean summer temperature at any station in the whole kingdom does not exceed 80° F., and, except in the elevated valleys of Piedmont, it is nowhere lower than 70°. As in all the Mediterranean countries, the largest rainfall occurs in the fall and winter months, after the growing season, when the westerlies prevail, so that irrigation is required in nearly all parts of the kingdom. The soils are excellent, particularly in the Lombard plain, which is among the richest agricultural lands in the world. Many once fertile parts of the Apennines, however, have been denuded of their soil.

The greatest climatic drawback of Italy is found in the swampy lands of the lower Po, the Maremma, the Campagna, the Pontine Marshes, and some other regions where intermittent malarial fevers prevail during the summer months. Only six of the provinces, including Genoa and Florence, are wholly free from malaria. Large sums of money have been spent in attempts to overcome this evil by means of drainage canals and pumping machines and by draining the breeding places of the mosquito. The extensive planting of the eucalyptus is believed also to have had a favorable effect upon the salubrity of these malarial regions.

Flora. The flora of the central and southern lowlands is typical of the Mediterranean countries, with the olive as the most characteristic tree. The great extent of the mountains and highlands, however, causes the myrtle, olive, and other evergreens to be confined to the coasts, especially in north Italy, where the olive is excluded from the plain by the colder winter weather. In the northern plain are maize, wheat, vines, and mulberries. Rice is grown on the irrigated fields near the Po. The flora of the Apennines is very much like that of central Europe. The shores of the Tyrrhenian Sea present almost a continuous growth of orange, olive, and lemon trees. In the extreme south the vegetation is subtropical; the sugar cane, the Indian fig, and the date palm are found. Forests have almost everywhere been destroyed, but the chestnut tree clothes the sides both of the Alps and the Apennines, the nut in some districts supplying the chief food of the inhabitants.

Fauna. Italy is very low in the scale of European countries with regard to its fauna. The bear, genet, weasel, and some rodents are almost the only conspicuous examples in the way

NAPLES
AND VICINITY
SCALE OF MILES
0 1 2 3 4 5
BAY OF NAPLES
Bocca Grande
VENICE
AND VICINITY
SCALE OF MILES
0 1 2 3 4
AUSTRIA
SWITZERLAND
LOMBARDY
PIEDMONT
VENETIA
TRENTINO
TUSCANY
MARCHES
UMBRIA
ABRUZZI
ROME
CORSICA
LIGURIAN SEA
GULF OF GENOA
GULF OF VENICE
ADRIATIC SEA
Venice
Naples
Milan
Turin
Genoa
Florence
Bologna
Ancona
Trieste
Udine
Padua
Verona
Brescia
Bergamo
Parma
Modena
Reggio
Ferrara
Ravenna
Forli
Rimini
Pesaro
Lucca
Pisa
Leghorn
Arezzo
Perugia
Siena
Grosseto
Civitavecchia
Rome
Pescara
Chieti
Aquila
Sangro R.
Biferno R.
Carnic Alps
Rhaetian Alps
Lepontine Alps
Pennine Alps
Cottian Alps
Maritime Alps
Apennines
Rhine R.
Drave R.
Save R.
Po R.
Mouths of the Po R.
Po di Primaro
Tiber R.
Arno R.
Metauro R.
Potenza R.
Tronto R.
Volturno R.
Garigliano R.
Taviganano R.
Ombrone R.
Elba I.
Corsica
Sardinia
Capraja I.
Gorgona I.
Pianosa I.
Giglio I.
Giannutri I.
Monte Cristo I.
Formica I.
Lissa I.
Lesina I.
Curzola I.
Lagosta I.
Meleda I.
Pelagosa I.
Grosa I.
Incoronata I.
Zirona I.
Brazza I.
Cherso
Arbe
Veglia
Pola
Rovigno
Parenzo
Pirano
Montona
Capodistria
Isola
Muggia
Monfalcone
Gradisca
Gorz (Goritz)
Cividale
Tolmino
Laibach
Klagenfurt
Villach
Sillian
Brunecken
Brixen
Meran
Botzen
Trient
Roveredo
Riva
Arco
Ala
Rovereto
Feltre
Belluno
Conegliano
Vittorio
Asiago
Bassano
Treviso
Castelfranco
Montebelluna
Oderzo
Portogruaro
Latisana
Palmanova
Cividale
Gemona
Tarvis
Pontebba
Tolmezzo
Paularo
Auronza
Pieve di Cadore
Agordo
Feltre
Primolano
Arsiero
Schio
Thiene
Bassano
Marostica
Cittadella
Camposampiero
Este
Monselice
Legnago
Rovigo
Adria
Chioggia
Comacchio
Argenta
Ostiglia
Sermide
Revere
Governolo
Borgoforte
Suzzara
Guastalla
Reggiolo
Correggio
Carpi
Mirandola
Finale
Cento
Budrio
Imola
Faenza
Forlimpopoli
Cesena
Savignano
Rimini
Cattolica
Fano
Sinigaglia
Falconara
Osimo
Loreto
Recanati
Macerata
Tolentino
Fermo
Montefalco
Foligno
Spoleto
Terni
Rieti
Narni
Orvieto
Todi
Perugia
Assisi
Nocera
Gubbio
Urbino
Fossombrone
Pergola
Jesi
Fabriano
Camerino
Matelica
Sarnano
Amatrice
Aquila
Sulmona
Solmona
Atessa
Lanciano
Vasto
Ortona
Pescara
Penne
Civita S. Angelo
Teramo
Giulianova
Ascoli
Campli
Norcia
Cascia
Spoleto
Terni
Rieti
Magliano
Montalto
Corneto
Civitavecchia
Toscanella
Orbetello
Montefiascone
Viterbo
Ronciglione
Castellana
Sutri
Nepi
Civita Castellana
Monterotondo
Tivoli
Palestrina
Velletri
Albano
Frascati
Ostia
Fiumicino
Leghorn (Livorno)
Porto Ferrajo
Piombino
Follonica
Porto Longone
Porto S. Stefano
Talamone
Pitigliano
Sovana
Acquapendente
Grosseto
Arcidosso
Massa
Carrara
Pontremoli
Sarzana
Spezia
Lerici
Portovenere
Chiavari
Rapallo
Sestri
Genoa
Voltri
Savona
Albenga
Oneglia
Porto Maurizio
Ventimiglia
Nice
Antibes
Cannes
Monaco
Mentone
Tenda
Coni
Cuneo
Mondovi
Ceva
Garessio
Ormea
Savigliano
Saluzzo
Fossano
Alba
Asti
Acqui
Novi
Tortona
Alessandria
Valenza
Casale
Vercelli
Chivasso
Ivrea
Aosta
Ivrea
Biella
Varallo
Novara
Arona
Domo d'Ossola
Sesto Calende
Varese
Como
Lecco
Bergamo
Treviglio
Crema
Lodi
Milan
Monza
Gallarate
Busto Arsizio
Legnano
Rho
Abbiategrasso
Vigevano
Mortara
Voghera
Pavia
Stradella
Broni
Casteggio
Voghera
Piacenza
Fiorenzuola
Borgo S. Donino
Fidenza
Busseto
Soragna
Colorno
Parma
Sala
Langhirano
Borgotaro
Pontremoli
Fivizzano
Carrara
Massa
Lucca
Pisa
Leghorn
Empoli
Pontedera
Volterra
Poggibonsi
Siena
Montepulciano
Chiusi
Montalcino
Montepulciano
Arezzo
Cortona
Castiglione
Perugia
Assisi
Foligno
Spoleto
Terni
Rieti
Aquila
Sulmona
Solmona
Atessa
Lanciano
Vasto
Ortona
Pescara
Penne
Civita S. Angelo
Teramo
Giulianova
Ascoli
Campli
Norcia
Cascia
Spoleto
Terni
Rieti
Magliano
Montalto
Corneto
Civitavecchia
Toscanella
Orbetello
Montefiascone
Viterbo
Ronciglione
Castellana
Sutri
Nepi
Civita Castellana
Monterotondo
Tivoli
Palestrina
Velletri
Albano
Frascati
Ostia
Fiumicino
Campi Flegrei
Pozzuoli
Baiæ
Bagnoli
Mt. Vesuvius
Torre del Greco
Torre Annunziata
Castellammare
Sorrento
Capri
Ischia
Procida
Misenum
C. Misenum
Posilipo
Grotta
Portici
Resina
Pompeii
Gragnano
Agerola
Amalfi
Salerno
Vietri
Cava
Nocera
Sarno
Scafati
Torre Annunziata
Torre del Greco
Portici
Resina
Pompeii
Castellammare
Gragnano
Agerola
Sorrento
Capri
Ischia
Procida
Misenum
C. Misenum
Posilipo
Grotta
Mt. Somma
Mt. Vesuvius
Observatory
Ercolano
Somma
Ottaiano
S. Giuseppe
Terzigno
Boscotrecase
Boscoreale
Pompeii
Gragnano
Agerola
Sorrento
Capri
Ischia
Procida
Misenum
C. Misenum
Posilipo
Grotta
Portici
Resina
Pompeii
Castellammare

ITALY
SCALE OF STATUTE MILES
0 10 20 40 60 80 100 120
SCALE OF KILOMETERS
0 20 40 60 80 100 120 140 160 180 200
Important towns are shown in heavy face type
Railroads
Canals
TYRRHENIAN SEA
MEDITERRANEAN SEA
IONIAN SEA
ADRIATIC SEA
GULF OF TARANTO
G. of Gaeta
G. of Salerno
G. of Policastro
G. of S. Eufemia
G. of Squillace
G. of Catania
Bay of Naples
Naples
Salerno
Palermo
Trapani
Messina
Catania
Syracuse
Taranto
Bari
Brindisi
Cagliari
Sassari
Trapani
Marsala
Mazzara
Girgenti
Caltanisetta
Augusta
Milazzo
Reggio
Gallipoli
Otranto
Lecce
Gaeta
Capua
Benevento
Caserta
Foggia
Barletta
Andria
Corato
Molfetta
Bitonto
Monopoli
Polignano
Fasano
Ostuni
Ceglie
Francavilla
Squinzano
Grottaglie
Manduria
Copertino
Maruggio
Salandra R.
Busento R.
Crati R.
Neto R.
Alaeantara R.
Platani R.
Gurretta R.
Belice
Simeto
Volturno R.
Garigliano
Sele
Ofanto
Basento
Agri
Sinni
Crati
Lao
Noce
Amato
Mingardo
Tanagro
Calore
Ufita
Cervaro
Fortore
Trigno
Biferno
Sangro
Pescara
Aterno
Tronto
Chienti
Potenza
Metauro
Foglia
Marecchia
Savio
Lamone
Reno
Panaro
Secchia
Enza
Taro
Ticino
Adda
Oglio
Mincio
Adige
Brenta
Piave
Tagliamento
Isonzo
Arno
Ombrone
Cecina
Fiora
Tiber
Liri
Sacco
Aniene
Nera
Velino
Pescara
Sangro
Trigno
Fortore
Ofanto
Bradano
Agri
Sinni
Crati
Neto R.

of mammals. The Alps and Apennines, and the swampy maremme of Rome and Tuscany, afford some refuge for wild life; but otherwise almost everything above an insect is killed for food or wantonly by the people. This has been the rule so long that the country is nearly bare even of small birds. Upon certain great estates a few animals, such as the native fallow deer, are preserved. Were not Italy, by its extension towards the south, a highway of migration to and from Africa for the birds, their absence would be still more complete. The autumn flight of quails from Tunis is a period of feasting. The sea life along the shores of the southern part is wonderfully varied and plentiful.

Geology. In its geological structure Italy represents a portion of the great system of mountain folds which extend across the Eurasian continent, and which are here diverted from the normal east and west direction to north and south. There is reason for believing that the peninsula once formed a continuous land bridge across the Mediterranean, thus uniting the ranges of the Alps with the Atlas. The uplifting of the Apennines took place at a comparatively recent geological period; Mesozoic and Tertiary strata including limestones, marls, and sandstones are the predominant formations. The islands off the coast of Tuscany, together with Corsica, Sardinia, and northeast Sicily, represent a much older land mass (Tyrrhenia), which, previous to the Tertiary period, occupied a large part of the depression now filled by the Tyrrhenian Sea. The great crustal movements that have determined the present configuration of Italy were accompanied by volcanic eruptions on an enormous scale. Evidences of these ancient outbursts are found in the Euganean and Brescian hills, near Padua; in the numerous vents along the west coasts of middle Italy, including Monte Amiata and the Alban Hills; and in the Phlegræan Fields of Campania. On the mainland Vesuvius is the only volcano now active, although eruptions have occurred in the Alban Hills within historical times. Sicily contains the great cone of Mount Etna (q.v.), and the Lipari Islands are dominated by Stromboli —both active volcanoes.

Mineral Resources. Italy has no great mineral wealth. A small quantity of anthracite is mined in Piedmont, and lignite in Umbria, Tuscany, and Sardinia; the total output of coal in 1912 was 663,812 metric tons, valued at $1,179,000. The most important mineral is sulphur, the output of which constitutes in value nearly one-third of all the mineral products, though the production has declined considerably. The richest sulphur mines are in the Sicilian provinces of Girgenti, Catania, and Caltanissetta; smaller deposits occur on the mainland, in the provinces of Forlì, Ancona, Avellino, and Pesaro e Urbino. Over 17,000 persons are engaged in extracting this mineral. The methods employed in procuring the sulphur range from the most primitive to the latest and most improved. Almost the entire world's supplies of this mineral are drawn from the Italian mines. In 1911 the production amounted to: sulphur ore, 2,682,766 metric tons, valued at $6,002,000; raw sulphur, 414,161 tons, valued at $7,775,000; refined sulphur, 166,802 tons, valued at $3,592,000; and powdered sulphur, 158,977 tons, valued at $3,847,000. The island of Elba yields an especially good quality of iron ore, which is largely exported to other countries. In 1912 the output of iron ore was 582,066 tons, valued at $2,395,000. Rich deposits of zinc ore are worked in Lombardy and Sardinia; the output of this mineral ranks second in value to that of sulphur, the total in 1912 being 149,776 tons, valued at $3,529,000. Quicksilver is mined in Tuscany, copper in Piedmont, Tuscany, and the Venetian Alps, and lead in the provinces of Genoa, Lucca, and in Sardinia. Small quantities of gold, silver, and antimony are also produced. Sicily and Calabria contain deposits of rock salt, while sea salt is made along the coast of Sicily and Sardinia. The marble quarries of Carrara, Massa, and Serarezza have a world-wide reputation. The quarries of Italy employed in 1912 nearly 71,000 persons, and their total output, including marble valued at $5,000,000, was valued at $12,402,000. The petroleum deposits of the Apennines, near Piacenza and other places, have been exploited since about 1893. The output of crude oil in 1911 reached 22,906,000 pounds.

Mineral waters suited for medicinal and bathing purposes are found at numerous localities in the Apennines and the volcanic regions. Among the popular resorts are Abano, Acqui, Bonino, Bagni di Lucca, Ischia, San Giuliano, San Pellegrino, Montecatini, and Posetta.

Fisheries. The sea and fresh-water fisheries of Italy are considerable and give employment to about 130,000 persons. The number of fishermen officially reported for the year 1911 was 127,792, of which total 6477 were engaged in deep-sea or foreign fishing, the remainder chiefly in the Mediterranean and gulf waters adjacent to the shores of Italy. The number of vessels and boats engaged in the same year was 28,402. The Mediterranean furnishes immense quantities of tunny, anchovies, sardines, mullet, pilchards, and mackerel. The Italian fisheries yielded about $4,830,000 in fish in 1911, but the imports of fish exceed the exports. The value of fish imported in 1912 was $11,020,000. This consisted almost entirely of fish dried or prepared in oil. Coral fishing formerly netted over $400,000 per annum; in 1910 it yielded only $14,500. It is carried on mainly along the coasts of Sicily and Sardinia. Sponges are obtained around Trapani and off the coast of Tunis. Tunny fishing produced $793,000 in 1910.

Agriculture. Agriculture is the principal industry. The area of Italy comprises 70,820,197 acres, only 7.4 per cent of which is unproductive land; 45.4 per cent being tilled land, 25.6 per cent pasture land, 4.9 per cent vineyards, orchards, etc., and 16.2 per cent forests. The most fertile and best cultivated lands are in the northern plain, drained by the Po, in Tuscany, in Campania, and in north Sicily, near Palermo. The poorest agricultural sections are in the country east of the Apennine Mountains, the marshy lowlands of south Tuscany and Rome, the plains of Apulia, and the hilly interior of Sicily. Extensive swamp areas, and the large, unproductive stretches of arid land which could be turned into fertile gardens and fields with proper irrigation, have made it necessary for the government to undertake large drainage and irrigation works, which have added about 6,000,000 acres to the productive area of the country.

The agricultural lands are, as a rule, divided into comparatively small holdings, though large farms exist in the vicinity of Rome, Milan, Pavia, and Cremona. Peasant proprietorship of the

lands is common in Piedmont and Liguria, while in Tuscany, Umbria, and the Marches a system of partnership between owner and cultivator is practiced. In Lombardy and Venetia the rental system prevails.

Crops. Italy is favored above most countries by climatic conditions and is comparable to California in the great range of crops that can be grown, including both temperate-zone and tropical varieties. Like Florida, its peninsular position gives it the advantage of an insular climate, and though it is in a more northern latitude (Naples being on the same parallel with New York), it is not subject to severe freezes such as sometimes occur in Florida, the Alps to the north protecting it from the southward sweep of cold north winds. From the agricultural table appended it will be seen that wheat production has materially increased, the product of 1913 being nearly 50 per cent greater than in 1900. The production does not meet the domestic demand, and annual importations are necessary. Corn is also raised throughout the kingdom, the two most important districts being the provinces of Milan and Caserta. The other important provinces are Brescia, Cremona, Udine, Treviso, and Padua. This crop also shows an increase as compared with earlier years, but does not fully supply the home consumption, necessitating some importations. The cultivation of rice has somewhat increased within recent years and amounted in 1913 to 26,612,000 bushels. Oats, barley, and rye are also important cereal crops. Potatoes, turnips, beetroot, and sugar beet are of considerable importance. The production of hay, both from the natural grass meadows and the various cultivated varieties, is very extensive. Some hemp and flax are grown, but cotton cultivation has been reduced to insignificance.

YEAR	Wheat (bushels)	Corn (bushels)	Rice (bushels)	Wine (gallons)	Olive oil (gallons)	Silk cocoons (pounds)	Tobacco (pounds)
1870–74*	144,448,524	88,471,812	27,806,724	727,497,763	87,783,691	.....	8,340,974
1879–83*	132,142,956	84,188,018	20,663,478	971,088,920	89,553,630	91,651,636	13,531,281
1890	131,456,160	74,974,284	17,887,914	778,165,569	81,522,862	89,890,360	5,057,815
1900	127,795,140	86,275,200	16,886,100	789,868,300	39,440,581	111,342,300	12,401,148
1910	153,405,000	101,723,000	21,457,000	773,841,000	36,577,000	95,520,000	16,100,000
1912	165,721,000	98,669,000	21,532,000	1,165,599,000	24,172,000	91,933,000	39,683,000
1913	199,498,000	108,388,000	26,612,000	1,579,736,000	.....	72,312,000	.....

* Annual average.

In the agricultural economy of Italy fruit plays a more important part than cereals. The vines covered (1912) 11,002,368 acres. The government is spending large sums of money in combating the phylloxera and maintaining schools for teaching the art of wine making. The vine is grown all over the country, especially in the provinces of Bari, Alessandria, Lecce, Foggia, Rome, Catania, and Florence. The wines of Italy are of many kinds, but, owing to the defective methods of preparing them, they deteriorate with age and are to a great extent unfit for export. The best-known wines are the Marsala of Sicily, the Chianti of Tuscany, and the Asti of Piedmont. These are quite largely exported. The wine crop of 1913 was nearly double that of 1900. The olive tree thrives best in Liguria and throughout central and south Italy, as well as on the islands of Sardinia and Sicily. It occupies an area nearly one-half as large as that under the vine.

Luxuriant groves of orange and lemon delight the eye of the traveler in Sicily and Sardinia, adorn the coasts of Liguria, and thrive in the coast provinces of south Italy. The provinces of Messina, Palermo, Catania, Syracuse, Trapani, Calabria, Salerno, Catanzaro, Foggia, Caserta, and Naples are famous for the delicious fruit they produce. In 1911 the orange and lemon orchards had an area of 110,456 acres. Almonds are grown in south and insular Italy, and other fruits, such as figs, dates, melons, and pistachio nuts, are produced in large quantities and exported. Silk culture is no less prominent, giving Italy first place in Europe as a raw-silk producer and second only to China and Japan in the world. Its output makes up 80 per cent of the total European production and nearly one-fifth of the world's product. In 1913 the production of silk cocoons amounted to 72,312,000 pounds, which, however, was materially less than that of 1900. Silkworms are raised chiefly in north and middle Italy. The cultivation of mulberry trees is extensive, having developed in connection with the silk industry. The following table shows the fluctuations in the chief crops since 1870:

The agricultural methods prevailing in north Italy are essentially the same as in other countries of western Europe, being characterized by intensive cultivation, the use of modern machinery, and the employment of the best methods of irrigation and fertilization. On the contrary, south Italy, though essentially an agricultural country, suffers from crude, primitive methods of cultivation. The Italian peasant is among the poorest in Europe. The prevalence of large estates and the presence of tenants and hired laborers who cultivate the land are characteristic features of Italian agriculture. No definite statistics are gathered on the subject, but it is estimated that the agricultural producers are made up of 40 per cent laborers, 40 per cent tenants, and 20 per cent owners. Since about the year 1900 a system of collective farming, i.e., leasing of farms by groups of laborers, has spread quite rapidly in the north, particularly in Emilia.

Stock Breeding. This industry is in a backward state. The only branch that may be said to be carried on in a rational way is the breeding of horses and horned cattle in the northern part of the country. The exports of horses, cattle, sheep, and swine, though small, exceed the imports. The production of wool is not sufficient to satisfy the domestic demand. Sheep raising is carried on most extensively in the poorer provinces of south Italy. In north or continental Italy extensive methods of cattle raising are followed, and stall feeding is common, but in peninsular and insular Italy open-field grazing prevails. In the north there is a considerable trade in dairy products, especially

cheese—Gorgonzola, Parmesan, and Stracchino being among the famous brands. Coöperative methods are extensively used in the dairy industry. The raising of goats is confined to the hilly regions. Poultry and eggs are produced in large quantities and exported. The following table shows the number of live stock in Italy at different periods:

YEAR	Horses	Mules	Asses	Cattle	Sheep	Goats	Swine
1875–76	657,544	293,868	498,766	3,489,125	6,977,104	1,688,478	1,553,562
1881–82	660,123	302,428	674,246	4,783,232	8,596,108	2,016,307	2,064,000
1890	720,000	300,000	1,000,000	5,000,000	6,900,000	1,800,000	1,800,000
1908	955,878	1,238,060	1,238,060	6,198,861	11,162,926	2,714,878	2,507,798

The value of the products of the live-stock industry of Italy is estimated at about $285,000,000 per annum.

Forestry. About 11,277,000 acres, or 16.2 per cent of the total area of Italy, are under forests. Of this total area, 1,611,000 acres are in chestnuts. Only 129,095 acres of forests belong to the government, but a great part of the forest land is under government supervision, which is exercised by the Ministry of Agriculture through a staff who are unable, however, to prevent the devastation of forests. Since 1867 the government has been trying to offset the loss by planting new trees. The total value of the forest products is nearly $30,000,000 per annum.

Manufactures. The manufacturing industries of Italy have materially improved, owing to the utilization of the plentiful water power, especially at the north, by which electricity is rendered available for the operation of factories and small workshops. The industrial census of 1911 showed a total of 243,988 establishments employing 1,305,000 persons in the provinces having each as many as 5000 establishments. The most important branch of manufacture is the production of raw silk, which has been referred to under *Agriculture* in this article. The industry thrives especially in Piedmont, Lombardy, and Venetia. More than 500,000 people are employed in the raising of silkworms. Silk spinning and weaving are carried on mostly in the north—Lombardy, and especially the Province of Como, being the centre of the industry. The spinning and weaving of wool and cotton are on the increase, but the production is not sufficiently large to satisfy the home demand. The same is true of the manufacture of linen and jute articles. In 1911 the textile industries employed 657,190 persons. The iron and steel industry employs about 100,000 people exclusive of those employed in the mines. While it has reached such proportions, no great progress can be recorded in regard to its growth, owing largely to Italy's lack of sufficient mineral deposits.

In the manufacture of small metal ware, and especially of finer articles of bronze, silver, and gold requiring high artistic skill, Italy has long enjoyed a wide reputation, the beautiful work turned out by the workshops of Milan, Venice, Genoa, Rome, and Naples finding ready purchasers among lovers of art throughout the world. The same may be said of the finer varieties of pottery and glassware, especially the terra cotta, majolica, and faïence, and the mosaic, enamel, and pearl work of Venice, Genoa, Leghorn, Florence, and Rome. The marble and alabaster products are no less famous. Altogether some 90,000 people are employed in the above industries. The chemical industry employs over 6000 persons and turned out in 1912 about $55,000,000 worth of products, the most important single article of that industry being sulphuric acid. The paper and leather industries employ about 25,000 people, and the manufacture of straw hats and other straw-plaited goods gives employment to several thousand persons.

The manufacture of tobacco and of salt are government monopolies. The annual output of the former fluctuates between 37,500,000 and 40,000,000 pounds; that of the latter increased from 267,000 tons in 1871 to 389,000 tons in 1881, 419,000 tons in 1891, and 521,453 tons in 1911. The manufacture of alcohol, beer, and liquors, sugar, glucose, chicory, powder and other explosives, mineral oils, matches, gas, and electricity is subject to government supervision. None of these industries, however, has reached any large proportions. The sugar industry shows more signs of vitality than any other, although but of recent date in Italy. In 1898 there were only four sugar refineries, with an annual output of 8000 tons; in 1912 their number increased to 37, and the output to 159,000 tons.

Transportation. In 1913 Italy had a railway system with a total length of 11,015 miles. The mileage is the smallest of any leading country in Europe and is less per square mile of area than is common in western European countries. As a result of the peninsular position of Italy, the traffic of its railroads is mainly local, which has not justified the construction of a large mileage and is partly responsible for the financial difficulties which have overtaken the operation of the system, as below described. The Apennines, extending through the length of Italy, divide the railway system into two distinct groups, called the Mediterranean and Adriatic respectively. Each of these, as well as the respective lines of Sicily and Sardinia, was operated under the Law of 1885 by separate companies until July, 1905, when the government resumed the management of the state lines. The first railway in Italy was built in 1839, to connect the city of Naples with Portici, a distance of 5 miles. In 1860 there were 1118 miles, about one-fifth of which belonged to the state, the remainder being owned by seven railway companies. In 1869 the state undertook the construction of new railways and by 1870 owned nearly two-thirds of the total, 3962 miles. By 1879 the mileage had increased to 5228 miles, and as the growth of the system did not keep up with the needs of the country, there was a popular clamor for a more rapid construction of railways by the government. In 1879 a law was enacted with a view to meeting this demand, providing for the construction of upward of 3728 miles, at an expense of about $240,000,000. As the government found insuperable financial difficulties in trying to carry out this provision,

it was compelled to give up the undertaking in a few years.

In 1885 an agreement was reached with three private railway companies, whereby the latter were to take over the three principal lines of the kingdom and were to be designated as the Mediterranean, the Adriatic, and the Sicilian Railway companies. By virtue of this agreement these companies were to have the operation of the government lines for a period of 60 years, either side, however, to have the right to terminate the contract at the expiration of 20-year periods. The companies paid the government the total sum of $53,000,000—$28,800,000 to be rebated by the latter for the extension and improvement of existing lines, and the remainder to be spent for the purchase of additional rolling stock and the construction of new lines. The companies paid all operating expenses, and, in addition, from 10 to 15 per cent of the gross revenue of each road was put into the reserve fund to offset the wear and tear on roads and rolling stock. The state received, moreover, 27½ per cent of the gross revenue of the continental roads, and 3 per cent on the Sicilian roads as rent, besides an equal share of all profits in excess of an annual dividend on the capital stock of 7½ per cent. The government might demand from the companies an annual expenditure of not more than $20,000,000 for new railway construction. The money was raised by issuing 3 per cent bonds guaranteed by the government. Upon the reversion of the lines to the government the companies were to be reimbursed the sums originally paid by them for the railways, with due allowance for the depreciation of the property.

This scheme had not resulted in a more rapid development of the railway system of Italy, the cost of construction having proved so high that it involved the government in financial difficulties. A parliamentary commission appointed in 1895 to investigate the method employed in the construction of nine lines elicited the information that the actual expense incurred exceeded the amount originally authorized by $30,000,000, the respective figures being $70,600,000 and $40,600,000, making an excess of 74 per cent over the sum authorized.

The length of the state lines now under government management is 8540 miles. The number of passengers carried annually increased from 34,040,515 in 1881 to 64,898,078 in 1902 and 82,407,600 in 1910.

Highways. Italy has an elaborate system of highways, divided into national, provincial, and communal, according to the source of their maintenance. In 1910 the length of the roads was about 92,200 miles; of which 5160 miles were national, 27,757 provincial, and 59,283 communal.

Communication. The postal and the telegraph systems are both in the hands of the government, though certain concessions are granted to railway and tramway companies in the telegraph service. For the year ending June 30, 1911, the number of letters and post cards transmitted, not including the governmental official letters, was 470,251,000. The number of private telegrams inland for the same year was 13,593,000, and an additional 3,322,000 were sent or received from abroad. The telegraph system includes a large number of submarine cables which connect different parts of the country. A net revenue is realized annually from the operation of the postal and telegraph systems. Both systems have been greatly extended and their use increased in recent years. The number of radiograms received by the wireless stations in 1911 was 14,129; number sent, 4470.

Commerce. The volume of Italian commerce was in 1913 more than double that of 1900. The remarkable growth is shown by the table which follows:

FOREIGN COMMERCE OF ITALY

YEAR	Imports	Exports
1871	$192,739,688	$217,091,913
1880	245,128,834	226,457,838
1890	275,457,286	192,520,070
1900	340,047,133	267,649,250
1905	369,209,000	308,221,000
1910	626,473,360	401,435,634
1913	702,089,724	483,255,329

The above figures apply to special commerce only, i.e., imports for home consumption and exports of domestic products. The transit trade is equal to about one-tenth of the special commerce. In 1888 a law was passed regulating the foreign commercial relations of Italy. This law, with some additional clauses, has remained in force down to the present time and is of a protectionist character. In 1891 and 1892 special treaties were concluded with Germany, Austria-Hungary, and Switzerland. They have proved beneficial to Italy. On the other hand, the commerce with France fell off considerably. Coal, raw cotton, wheat, and other cereals constitute over three-tenths of the import trade. Next in importance are machinery, silk (unbleached, raw, or twisted), timber for building purposes, hides (raw or dried), woolen manufactures, raw wool, and fish. Silk constitutes nearly one-fifth of the total exports. Next in the order of importance are cotton manufactures, fruit, wines, cheese, hides, raw hemp, eggs, sulphur, and olive oil. Germany occupies the first place in the Italian import trade, furnishing about one-sixth of its total imports. The United Kingdom and the United States follow with about one-seventh each. Then come France, Austria-Hungary, and Russia. The largest exports go to Germany and Switzerland, about 13 per cent and 11 per cent respectively. Switzerland secures its high rank in the export trade of Italy by virtue of its large importation of raw silk. Next in order of importance are the United States, France, Austria-Hungary, Great Britain, and Argentina.

In our own foreign commerce Italy holds the tenth place in the import trade and the sixth place in the export trade. The table below shows the development of Italian-American commerce since 1890:

YEAR	Exports to United States	Imports from United States
1891	$21,678,208	$16,046,925
1895	20,851,761	16,363,125
1900	27,924,176	33,256,620
1901	24,618,384	34,473,189
1903	36,246,412	35,032,680
1905	38,628,579	38,740,067
1910	49,868,367	53,467,053
1913	54,107,364	76,285,278
1914	56,407,671	74,235,012

The largest items of export to the United States are raw silk, sulphur, macaroni and vermicelli, olive oil, oranges and lemons, conserves, dry fruits, and marble. Unmanufactured cotton annually makes up about one-half of the total imports from the United States.

Shipping and Navigation. Italy has a large and active merchant marine. In 1911 it numbered 757 steamers of 697,000 tons capacity, and 4713 sailing vessels of 411,000 tons. The tonnage of sailing vessels is on the decrease, while the steam tonnage is increasing, as is shown by the table below. The peninsular position of Italy fits it admirably for a commercial nation. In the mediæval times, when the Oriental trade was prominent in European commercial life, the Italian ports attained the first rank. But with the decreasing relative importance of the Mediterranean traffic, when new trade routes were opened and new commercial fields became important, the Italian cities ceased to play a leading part in the world's commerce, and the Italian merchant marine is now inferior to that of either Germany or France.

THE MERCHANT MARINE OF ITALY

YEAR	Total vessels	Net tonnage	STEAMERS		SAILING VESSELS	
			No.	Net tonnage	No.	Net tonnage
1878...	8,590	1,029,000	152	63,000	8,438	966,000
1890...	6,732	821,000	290	187,000	6,442	634,000
1900...	6,074	873,000	409	315,000	5,665	558,000
1905...	5,596	1,032,614	513	462,259	5,083	570,355
1910...	5,459	1,107,187	718	674,497	4,741	432,690
1911...	5,470	1,107,985	757	696,994	4,713	410,991

These figures show at first a decline, which was not checked until 1897. Even the increased tonnage in 1900, viz., 873,000 tons, was far below the tonnage of 1878, which was not attained again until 1904. Still, Italy does a much larger part of its own shipping than some nations having a larger maritime trade. In the foreign oversea trade of Italy England has the first place, carrying (1912) nearly 36 per cent of the incoming and over 15 per cent of the outgoing merchandise. Italy itself controls about 21 per cent of the incoming and 41 per cent of the outgoing tonnage in the foreign trade. The remainder is distributed chiefly among Greece, Austria-Hungary, Germany, Norway, Spain, Holland, and Denmark. In coastwise shipping Italy controls about 98.6 per cent of all the merchandise transported. About 340,000 persons are employed in the merchant marine—an increase of more than 12 per cent in the last five years. Millions of dollars have been ineffectively paid out of the Italian treasury in ship subsidies to shipowners. The chief ports are Naples, Genoa, Palermo, Leghorn, Messina, Catania, and Venice. Ancona and Brindisi are also well-known seaports.

Banking. The banking system of Italy has been very unsatisfactory, owing to the general financial distress of the country and to mismanagement. Previous to 1893 there were six banks of issue—the National Bank of the Kingdom, the Bank of Naples, the National Bank of Tuscany, the Tuscan Bank of Credit, the Roman Bank, and the Bank of Sicily. In 1892 disclosures of illegitimate manipulations of bank funds and the collapse of the Bank of Rome precipitated a financial crisis. This institution was put into liquidation in 1903, and by the law of that year the National Bank of the Kingdom and the two Tuscan banks were consolidated as the Bank of Italy. The right of issuing bank notes was limited to this bank, the Bank of Naples, and the Bank of Sicily, which were chartered for 20 years from January, 1894. By the Law of Dec. 31, 1907, the amount of bank-note circulation, to be covered by a metallic reserve of 40 per cent, allowed to these banks was fixed at $175,244,000. The allotment to the Bank of Italy was $127,380,000, or 72⅔ per cent of the total, the remainder being divided between the other two banks. The banks, however, may issue notes in excess of their allotment when they have sufficient security in bullion or when advancing money to the government. The Bank of Italy was soon charged with the gratuitous handling of all the fiscal transactions of the Treasury in the provinces, saving to the state $240,000 annually. Thus, without being really a state bank, it performs some of the functions usually intrusted to such banks in other countries of Europe and is under strict government control and regulation. The capital stock of the Bank of Italy is nominally $60,000,000, although the paid-up capital amounts to only about $42,000,000, part of the difference having been absorbed by the losses of the Bank of Rome. The combined capital of the other two banks exceeds $21,000,000. The financial condition of the three banks of issue at the beginning of 1914 was as follows: cash and reserve, $291,400,000; deposits, $587,500,000; notes in circulation, $440,700,000; total assets and liabilities, $1,250,000,000.

In addition to these Italy has developed, with great success, a system of popular coöperative banks. These are associations of people of small means who combine their savings for mutual loans and credit and do a general banking business on a comparatively small scale, discounting commercial paper, workingmen's liens, treasury checks, etc.; keeping current accounts, and advancing loans "on honor," i.e., without any security whatever, to needy people who can bring recommendations of two members of the association.

The first bank of this kind was opened in 1865 in Milan as the result of the agitation of Signor Luzzatti. Ten years later there were 82 such banks with a membership of more than 77,000 and a capital and reserve fund of more than $9,000,000. In 1886 their number increased to 516, the membership to more than 250,000, and their working capital to nearly $18,400,000. In 1912 they numbered 862, with a proportionately increased capital and membership. Other banks operating in Italy are credit banks, agrarian credit companies built on the plan of the popular coöperative banks, crédit-foncier banks, savings banks, and government postal savings banks.

In 1912 there were 9799 post-office savings-bank offices, with 5,780,010 depositors and total deposits amounting to $376,072,000. There were in the same year 186 offices of the ordinary savings banks, with 2,363,832 depositors and deposits aggregating $480,965,000. At the beginning of 1913 the savings deposited with the coöperative savings banks and ordinary credit companies amounted to $244,423,000.

There are seven clearing houses in Italy, which

increased in volume of business in the four years 1907–11 from $9,942,358,000 to $11,833,218,000, or about 19 per cent.

Finances. The finances of Italy are in a somewhat unsatisfactory state owing to the heavy interest payment on the large national debt and the heavy expense of its standing army and modern navy. Although the annual budgets of the government usually show a surplus, this is often achieved with the help of loans and always through burdensome taxation. It is an undoubted fact that Italians are heavily burdened with taxes of all kinds, and yet they apparently prosper and accumulate wealth. The indirect taxes include excise, customs, and octroi duties. To these should be added the revenues derived from the tobacco, salt, quinine, and lottery monopolies. These taxes and revenues altogether yield more than 45 per cent of the total revenue. The direct taxes, including a land, an income, and a house tax, furnish about 21 per cent of the total revenue. The inheritance tax, registration and stamp duties bring in about 13 per cent more. The remainder (21 per cent) is obtained from incomes from all kinds of public property and government works, such as public domains, railways, telegraphs, posts, etc.

The largest item of expenditure is the interest on the public debt—over $100,000,000 per annum, or about one-fifth of the total ordinary expenditure. The next largest item is the army and navy, which reached $206,500,000 in 1912–13 (or nearly two-fifths of the total expenditure). By contrast the expenditure on public instruction during the same year was $28,717,000 (or about 5 per cent), and on agriculture, industry, and commerce combined, but $6,098,000 (or slightly more than 1 per cent). Since 1885 the revenue and expenditure of the government have remained practically the same until recently, as is shown by the following table of the budget since the existence of the kingdom in its present limits:

YEAR	Revenue	Expenditure	Surplus (+) or deficit (−)
1871.....	$249,847,591	$241,243,022	+$8,604,568
1881.....	303,707,093	293,529,645	+10,177,447
1891–92.....	349,590,318	359,218,079	− 9,627,761
1895–96.....	367,950,702	368,277,331	− 326,629
1899–1900....	349,585,629	348,543,552	+ 1,042,097
1901–02.....	362,384,902	358,191,956	+ 4,192,946
1906–07.....	387,905,000	382,672,000	+ 5,233,000
1911–12.....	477,743,438	499,326,729	−21,583,291
1912–13.....	488,072,566	537,768,532	−49,695,966

The figures for the last two years show "effective" revenues and expenditures only. By means of financial operations the budget for 1911–12 was made to balance at $557,444,004, while the final accounts for 1912–13 showed a surplus of $633,802. To what an extent all other public interests have been neglected for the sake of military expenditure may be seen from the table in the next column, which shows the increase of expenditure for military purposes, for the payment of the debt, and the total expenditure.

The expenditure for military purposes decreased since 1896, when it reached $86,000,000, owing to the defeat of the troops in Africa and the consequent contraction of military operations. But the increase of expenditure on that item in recent years has been enormous, to the detriment of such vital interests as public institutions, sanitation, industry, agriculture, commerce, etc. The expenditure of the state for public instruction amounts to about $26,000,000 annually, mostly on higher education.

YEAR	Expenditure army and navy	Service of public debt	Total expenditure
1871.....	*33	*88	*241
1881.....	45	97	293
1891–92.....	67	128	359
1901–02.....	77	138	358
1906–07.....	80.4	128.8	382.7
1911–12.....	163	98.4	499.3
1912–13.....	206.5	101.3	537.8

* Millions of dollars.

Local Finances. In both commune and province expenditure is classified as "obligatory" and "optional," the former including the maintenance of roads, education, police, and matters considered indispensable. In 1899 the revenue of the communes of Italy amounted to $128,401,829, while that of the provinces was $26,335,265. No complete data are available for later years. In 1907 the ordinary revenues of the communes amounted to $97,386,107. The largest items in the communal revenue are (1) the gate tax, or octroi, which is partly a duty on certain articles not otherwise taxed, and partly a surtax not to exceed 50 per cent of that levied upon certain commodities at the frontier; and (2) a surtax upon lands and buildings, also limited to a maximum of 50 per cent of that levied by the state. Of less importance are the levies made upon family incomes, live stock, etc. The bulk of the provincial tax is secured from a surtax upon land and buildings, which is likewise limited to 50 per cent of the state assessment. The expenditure and indebtedness of both the communes and the provinces have greatly increased during the last two decades.

As an illustration of the immense tax burden in Italy may be cited the land tax, which altogether, national, provincial, and communal, amounts to nearly one-fourth of the landowner's revenue. Under the cadastral survey which served as the basis of the land assessment prior to 1886, the burden of this tax fell with great inequality upon different parts of the country. But a law passed in 1886 authorized a new survey, which was quickly made in the provinces which were unjustly burdened, thereby securing a measure of relief. But the provinces which would not profit by the survey have been slow to make it (in some provinces the increase amounted to over 90 per cent). Hence the revenue yielded by the land was lessened in consequence of the law. The income tax, which is proportional, does not apply to incomes obtained from the land, but only upon those from movable capital and from labor.

Public Debt. The growth of Italy's debt and interest charges thereon since 1870 has been as follows:

YEAR	Debt	Interest
1870.....	$1,663,744,800	$77,682,800
1890.....	2,413,513,400	111,468,600
1900.....	2,529,057,800	115,967,000
1904.....	2,403,772,000	110,785,000
1913.....	2,754,420,000	96,585,000

(The seeming discrepancy between the interest figures in the above table and the one preceding

is due to the fact that the one gives the interest charges only, while the other gives the total service of the debt, which includes amortization.) The table shows that the debt increased more than 65 per cent in the period indicated, making it the fourth largest public debt in the world. It is next to that of France, of Great Britain, and of Russia, all of which countries have far greater resources than Italy. In fact the per capita debt of Italy, $78.16 in 1913, is greater than that of any of the countries mentioned except France, where it was $160.25 during the same year. It is, however, less than in some countries, e.g., Spain, where the figure is $90.97; Portugal, $174.74; Belgium, $108.92.

Navy. The Italian navy was formed by the consolidation of the fleets of Sardinia and the Two Sicilies (1861). The importance of naval power to the newborn kingdom was fully appreciated. A dozen armor-clads and a large number of cruisers and smaller vessels were built in the next half-dozen years. The largest of the armor-clads, the *Re d'Italia* and the *Re di Portogallo*, of 5700 tons, were built at Webb's Yard, New York. Of the others, six were of about 4000 tons, two of 2700, and two of 2200.

The overwhelming defeat at Lissa in 1866 was a severe blow to Italian naval development. But early in the next decade the reorganization and rebuilding of the navy began. From that time until the present the Italian navy has led the way in many of the greatest advances in battleship construction. The *Duilio*, launched in 1876, was not only larger than any existing warship, but she carried much heavier armor and enormously larger guns. The *Duilio* was quickly followed by a sister ship, the *Dandolo*, and a little later by two larger and faster vessels with less armor. In some respects these may be regarded as the prototype of the battle cruiser of to-day.

By 1890 the Italian navy had advanced to third place in fighting strength, and the annual expenditure to nearly $25,000,000. The financial condition of the nation then demanded economy, and no more large ships were launched until 1897. The cessation of building caused the Italian navy to decline in relative power. At present it is sixth in strength and is very nearly equal to that of Japan. In 1901 two battleships were put in the water, two in 1904, one in 1905, one in 1907, and four heavy cruisers in 1907–08. In 1910 the first dreadnought was commenced, followed by three in 1911 and two in 1913; two have been commenced, and two more will be laid down before the middle of 1915.

The present building programme, approved by the Italian Parliament, provides for the immediate laying down of four battleships to be completed in 1917 and thence onward to begin one each year. This programme will result in the permanent maintenance of a fleet of 20 first-class battleships of less than 20 years of age. The necessary numbers of cruisers, destroyers, submarines, auxiliary vessels, and air craft are included in the programme.

The head of the navy is the Minister of Marine (an admiral), who is assisted by the superior council of the navy, which is composed of one vice admiral (or admiral) president, three vice admirals (or rear admirals), one director general of the civil *personnel*, members; one rear admiral (or captain) who is a member and secretary; and lastly, the chief of the bureau or office whose affairs are under consideration. The Navy Department is divided into the following branches: (1) cabinet of the Minister, which coördinates the branches; (2) general staff, which has charge of the preparation of plans and arrangements for everything that pertains to the readiness of the fleet for war, including operations, exercises, manœuvres, strategy, tactics, organization, mobilization, etc., and it is also concerned with the composition of forces afloat, building programmes, and design of ships—as many of these matters are determined by special boards, the chief of the general staff is a member of the boards; (3) *personnel;* (4) naval construction; (5) armament and equipment; (6) merchant marine; (7) hydrographic service; (8) medical department; (9) military engineering (fortifications, works, etc.); (10) office of revision; (11) accounts. The naval academy and college are located at Leghorn. The principal dockyards are at Spezia, Castellamare, Venice, Taranto, and Naples, and there are naval stations at Genoa, Messina, Licata, Cagliari, and Palermo.

The fleet is organized as follows:

[Note. Displacements are given in thousands of tons; thus, 12.5d is 12,500 tons; 4g12 means that 4 12-inch guns constitute the main battery; 30k means 30 knots' speed; 3t, 3 torpedo tubes; a.c., armored cruiser; b.s., battleship; c., cruiser; des., destroyer; sub., submarine; * means dreadnought b.s. or c.]

First Squadron

First division

B.S.

*Dante Alighieri: 19d–12g12–23k
*Giulio Cesare: 22d–13g12–23k
*Leonardo da Vinci: 22d–13g12–23k
*Conte di Cavour: 22d–13g12–23k

SCOUT

Nino Bixio: 3.5d–6g4.7–29k

DES.

Four: 0.68d–2t–30k

Second division

A.C.

Giuseppe Garibaldi: 7.2d–1g10, 2g8–20k
Varese: 7.2d–1g10, 2g8–20k
F. Feruccio: 7.2d–1g10, 2g8–20k
Vettor Pisani: 6.4d–12g6–19k

SCOUT

Coatit: 1.2d–12g3–23k

DES.

Four: 0.38d–3t–29k

Third division (Training)

B.S.

Benedetto Brin (gunnery): 13d–4g12–20k
Regina Margherita: 13d–4g12–20k

A.C.

San Marco (gunnery): 9.6d–4g10–23k
Carlo Alberto: 6.4d–12g6–19k

GUNBOATS

Liguria
Miseno
Palinuro

SECOND SQUADRON

FIRST DIVISION

B.S.

Regina Elena: 12.5d–2g12, 12g8–22k
Vittorio Emanuele do
Roma do
Napoli do

C.

Quarto: 3.2d–6g4.7–28k

DES.

Four: 0.68d–2t–30k

SECOND DIVISION

A.C.

Pisa: 10d–4g10–23k
Amalfi: 10d–4g10–23k
San Giorgio: 9.6d–4g10–23k

C.

Marsala: 3.5d–6g4.7–29k

DES.

Four: 0.38d–3t–29k

Two battleships of 9600 tons are placed in reserve and three older ones (12d to 15d) relegated to coast defense. There are 14 small cruisers available for service, some in commission, others in reserve. There are 43 destroyers completed, 3 building; 20 submarines, 6 building; 75 small torpedo boats, many unfit for service; and 37 large merchant steamers are subventioned and may be taken into service in case of war. An aviation service was organized in 1912.

The *personnel* of the navy consists of 1 admiral, 18 vice admirals, 14 rear admirals, 131 captains and commanders, 1331 other line officers (including engineer officers, recently combined with the line), 257 medical officers, 239 pay officers, 110 naval constructors, 1136 warrant officers, and 38,000 enlisted men. The naval estimates for 1914–15 are 260,284,575 lire ($50,234,922.98), which sum is slightly less than that voted for the previous year. The outbreak of the Great European War may cause a considerable increase in these figures. See NAVIES.

Army. The Italian military system is complicated and requires a careful study of the conditions of service to arrive at a nearly correct estimate of the number of fully trained men available for the initial mobilization. Owing to the custom of granting unlimited leave to large numbers of men, the regular army is often short, by several thousand, of the full number provided by law for the peace establishment. Owing to insufficient budgets, the training of the several categories of militia has often been incomplete or altogether omitted.

Service, though universal and compulsory, is not the same for all the men of military age. Liability extends from the 20th to the 39th year. The men of 20 each year are divided into three classes and disposed of as follows: first, those that fill the vacancies in the regular army, in which service is for two years; then six years in the reserve on unlimited leave; then four years in the mobile militia; then seven years in the territorial militia, making a total liability for service of 19 years, ending at the age of 39. Second, the eligible men of 20 for whom there are no vacancies in the regular army are assigned to the *complementary force* for eight years, where they receive from only two to six months' training for the entire period. They then pass to the mobile militia and then to the territorial militia for four and seven years respectively, which completes their 19 years' service. Third, the men of 20 who are exempted from active service are assigned direct to the territorial militia, where they receive only 30 days' training. The men who have passed through the regular army are supposed to receive about 30 days' training per year while in the reserve and mobile militia and a less amount while in the territorial militia.

Higher Organization.—These are 12 army corps (25 divisions) and 3 cavalry divisions organized in peace.

Infantry.—Typical formations are 4 companies to the battalion, 3 battalions to the regiment, 2 regiments to the brigade, 2 brigades to the division. To each division is attached 1 regiment of field artillery (5 batteries of 6 guns each). Total war strength of the division, about 14,000 men, 1400 horses, 30 field guns. To the army corps of two divisions are attached 6 light batteries, 3 heavy batteries, a regiment of cavalry, and a regiment of light infantry (Bersaglieri), having 4 battalions, one of which is a cyclist battalion. In addition to the above there are 26 battalions of Alpine infantry, to which are attached 36 mountain (pack) batteries. The war strength of the infantry company varies from 120 to 150 in Bersaglieri and Alpine troops to 250 men in the line companies. Total peace strength of infantry (389 battalions and 88 district headquarters), 7627 officers, 162,000 men.

Cavalry.—There are 3 independent cavalry divisions, each consisting of 2 brigades of 2 regiments each and 2 horse batteries. Total cavalry, 150 squadrons and 29 depots, making a total of 1006 officers, 27,416 men, 25,467 horses. A regiment in peace consists usually of 5 squadrons of about 150 men each, with 4 officers.

Artillery.—There are 263 field batteries (light, heavy, and mountain) and 110 companies of coast and fortress artillery, also 51 artillery depots; total, 2359 officers, 49,256 men. The light field-artillery regiment may have 5 or 6 batteries and 2 battalions; the battery, 6 guns. The strength of batteries varies from 3 officers and 90 men to 5 officers and 150 men; companies from 3 officers and 107 men in peace to 5 officers and 200 men in war. All artillery officers are on one list, from which they are assigned to field, fortress, and seacoast artillery.

Engineers are organized as 6 regiments: 2 of pioneers, 1 each of pontoon troops, telegraph troops, sappers, and railway troops. The 82 companies and 10 train companies amount to a total of 630 officers and about 11,000 men. The companies vary in strength from 3 officers and 110 men in peace to 5 officers and 250 men in war.

Sanitary Troops.—There are 12 companies. Total, 769 officers and about 3700 men.

Supply Train.—There are 12 companies, one for each of the 12 army corps. Total, 452 officers and about 4000 men.

Military Police.—The Carabinieri are organized as 12 legions, with a total of 709 officers and about 30,000 men. About 4000 are mounted. In war they would furnish about 1 infantry brigade of 7000 officers and men for field service.

Special Formations.—For administration, staff duty, military schools, etc., there are 1284 officers and about 1900 men.

Aëronautical Service.—This is being developed and at the end of 1914 is to supply 30 field squadrons of 7 aëroplanes each, or a total of 210, for use with the field army. In addition there are about 10 serviceable airships. The *personnel* is organized into sections, battalions or squadrons, in accordance with the duties required. There are a specialist battalion of 5 companies, an experimental section, a flying battalion of 2 companies, and the field squadrons above mentioned.

Total Peace Strength.—According to the latest data available in 1914, this amounted to 15,172 officers, 289,500 men, 64,345 horses. Owing to the system of giving unlimited leave to men supposed to be serving with the colors, it is doubtful if more than 250,000 men were actually with their regiments at any one time.

Total War Strength.—The complex system, insufficient budget, and indefinite leaves to individuals of all the categories, before training is completed, render it difficult to estimate Italy's strength in *fully trained* men. On paper she could mobilize 3,500,000 men, actually not more than 1,500,000 *fully trained.* Assuming that the *initial mobilization* would be confined to existing organizations of the regular service, the fighting strength of the three arms on initial mobilization would be: infantry rifles, 325,000; cavalry sabres, 25,000; field guns (all calibres), 1600.

Arms.—Infantry, Mannlicher Carcano rifle, 6.5 mm. calibre, using a magazine. The territorial militia uses the old Vetterli. The field artillery is being rearmed (1914) with the De Port gun and carriage, considered the best in Europe. See FIELD ARTILLERY.

Colonial Troops.—In addition to the troops already mentioned Italy maintains colonial troops in her African possessions, as follows: in Libya (Tripoli and Cyrenaica), about 3000 Italian and 10,000 native troops; in the Colony of Eritrea (Erythræa), about 600 Italian and 8000 native troops; in Italian Somaliland, about 4700 soldiers in all, mostly native. The native troops have a proportion of Italian officers.

Budget for 1913–14, $71,110,000.

The critical political position of Italy between the opposing influences of the Triple Alliance and the Triple Entente, in the European War of 1914, undoubtedly induced Italy to put her military house in order for any eventuality.

Frontiers.—The total land frontier adjacent to France, Switzerland, and Austria-Hungary is about 1200 miles. The coast line, including Italy proper, Sicily, Sardinia, Elba, and other small islands, is a little over 4000 miles. Land fortifications are located in the principal passes of the Alps and in the basin of the river Po. Among the latter are Casale, Piacenza, Verona, Mantua, Venice, and Alessandria. On the coast of the peninsula and islands there are Vado, Genoa, Spezia, Monte Argentaro, Gaeta, all strongly fortified. Taranto, in the Strait of Messina, is also fortified. The naval station of Maddalena consists of a number of fortified islands. Rome is also protected by forts.

Government. The existing constitution of the Kingdom of Italy is the *Statuto fondamentale del Regno,* which was originally issued (March 4, 1848) as the constitution of the Kingdom of Sardinia. When Sardinia expanded into united Italy, its organic law was adopted by the new nation. This constitution has never been formally changed or revised; in fact, no provision exists for its amendment, and constitutional changes have been made by the ordinary methods of legislation, as in England, which has been the political model of the Italians.

The throne is hereditary in the house of Savoy on the principle of the Salic Law; the King attains his majority at the age of 18. The official residence of the royal family is the Palazzo del Quirinale in Rome. The King's salary is 16,050,000 lire a year, from which he returns to the government 1,000,000 lire. His person is declared inviolable. Like the King of England, the Italian monarch's powers are great in theory, but very much limited in practice; for Italy, according to her constitution, is a "representative monarchical government." The King does not veto any bills passed by Parliament, although he has a theoretical right to do so, and very seldom does he attend cabinet meetings. Only in the field of foreign affairs does he exercise any real influence. The reigning monarch, Victor Emanuel III, is very democratic in his ideas and manners and is popular amongst all classes of Italians, even with the Republicans and Socialists.

The cabinet consists of 11 members and their undersecretaries. These are: Foreign Affairs, War, Marine, Finance, Education, Internal Affairs, Treasury, Public Works, Justice and Ecclesiastical Affairs, Commerce, Industry, and Agriculture, Posts and Telegraphs. According to the constitution an Italian citizen does not need to be a member of Parliament to be chosen a cabinet minister, although it is customary to choose only members of Parliament, particularly from the Lower House. Like the British and French cabinets, the Italian is directly responsible to the Chamber and must resign on an adverse vote. The Premier is generally the leader of the most powerful political group. In theory it is the King who chooses the cabinet; in practice it is the influential politicians in the Chamber. The cabinet administers the laws, appoints officials, conducts foreign affairs, and initiates all important legislation. In no country, not even in England, is the cabinet so powerful as it is in Italy, where it dominates Parliament, which has not the same prestige as it has in England and in France. Frequently administrative ordinances issued by the cabinet take the place of parliamentary legislation.

The Senate is at present composed of 383 members, appointed for life by the King on nomination by the cabinet. A seat in the Senate is not hereditary, and it is required by law that appointments should be made from certain categories, like high officials in church and state, men distinguished in art, science, or literature, and wealthy property owners. No man below 49 years old can be appointed. The Senate is a body of great dignity and influence, but of little legislative authority, as the parties in power often resort to swamping the Senate with their friends and adherents. Seldom does it initiate legislation or even seriously oppose bills sent up from the Chamber; it contents itself mainly with revising, amending, and suggesting. In legislative authority it is inferior even to the French Senate. Proposals to reform the Italian Upper House are constantly being made, and an elaborate report on this subject was submitted to Parliament in 1910, which suggested the inclusion of an elective element and a widening of its powers. The President and Vice President of the Senate are named by the King, i.e.,

the ministry. The Senate is empowered to act as a High Court of Justice to try cases of treason and impeachment.

The Lower House, or Chamber of Deputies, is composed of 508 members chosen by the legally qualified voters as determined by the Franchise Law of 1912. At first the suffrage was restricted to those having property and education, but it has been gradually extended until now there is virtually universal suffrage. The great electoral reform carried through by the Giolitti ministry in 1912 gave a vote to all male citizens over 21 years of age who can read and write and to all illiterates over 30 years old. Many Italians abstain from voting partly because they are not as yet accustomed to parliamentary government and partly because of the attitude of the Catholic church towards the nation. In 1883 Pope Pius IX issued the decree *Non Expedit*, which forbade faithful Catholics to participate in the elections, in order not to recognize what the Pope claimed as a "usurping" government. In recent years the growth of Socialism in Italy has so frightened the papacy that Pius X issued a decree in 1905 permitting voting by the faithful, but only by the special consent and direction of the hierarchy. The Chamber is elected by secret ballot in single-member constituencies. Candidates must receive a majority of all the votes cast in order to be declared elected. If not, second balloting takes place one week later between those who came out on top of the poll. Although the term of office is five years, the Chamber may and often is dissolved before its term has expired. Sessions are public. Interpellations are frequent, but a vote on the question must be taken only after an interval of several days. This has prevented frequent changes of ministry.

In Italy, as in all other countries of continental Europe, there are no two powerfully organized political parties striving for the control of the government; instead, there are a number of loosely organized groups that combine and recombine whenever it suits their temporary interests, which are largely personal in character. A striking feature of Italian politics is the absence of a historical conservative party, because in 1870 the most conservative elements of society were opposed to the unification of Italy. Hence the Liberal party is split into Right and Left wings. In recent years, because of the fear of Socialism, a conservative clerical party has been organized. There is still in existence a Republican group advocating the ideals of Mazzini, but it exerts very little influence in Italian politics. The popular parties, like the Radicals and Socialists, are a rapidly growing force, particularly the latter, which rose from 12 seats in the Chamber in 1895 to 78 in 1913. The petty and personal character of Italian politics disgusts many electors, who either do not vote at all or are glad to give their support to comprehensive principles as embodied in Socialism, which is most ably expounded by distinguished writers like Labrioli and Ferri. As no single party has a majority in the Chamber, the government must find its support in a coalition of groups, which is called a *bloco*. This at present consists of Liberals and Radicals.

The administrative system, both central and local, is fashioned largely after that of France. Historical subdivisions have been replaced by artificial areas, and local self-government is superseded by a centralized administration. The power of the higher administrative officials to issue ordinances for the purpose of supplementing the statutes has been carried even further than in France and in many cases has the effect of suspending or displacing the statutes. An organ of restraint upon the action of the government in this respect is found in the Council of State and the several courts of accounts. The former is chiefly an advisory organ, but it also has power to prevent arbitrary action of the central government in the removal of local officials; the courts of accounts exercise supervision over various activities of the administration, and their approval is necessary to the validity of all decrees and orders which involve the expenditure of more than 2000 lire. The seat of government of Italy is Rome. From 1865 to 1871 the capital was Florence, which had superseded Turin.

For the purpose of local government Italy is divided into artificial circumscriptions called provinces, circondari, mandamenti, and communes. The chief executive officer in each province is the prefect, appointed by the King, and under the control of the Minister of the Interior. He is therefore the agent of the central government, and in this as in other respects corresponds to his French prototype. He is charged with the publication and execution of the laws, takes measures for the public safety, disposes of the armed forces, issues police ordinances, and supervises and directs the subordinate officials of the province. To advise and assist him in the discharge of his duties a prefectural council over which he presides is provided. The deliberative assembly of the province is the Provincial Council, chosen for five years by an electorate which is somewhat restricted, but which has been extended. The size of the Council varies according to the population of the province. It meets at the capital of the province once a year, it elects its own officers, and all resident taxpayers are eligible to its membership. Its sessions are opened by the prefect, who has the right to preside over them and to suspend them for a limited period. It has a wide power of local legislation relating to such matters as the creation of highways, establishment of societies, public institutions, the care of provincial property, schools, poor relief, the budget, loans, besides a supervisory authority over the civil service. There is also in each province a provincial deputation elected by the Provincial Council and presided over by the prefect. It represents the Council during its recess, superintends the enforcement of its resolutions, prepares the budget, exercises a disciplinary control over inferior officers, and performs a variety of local duties under the direction of the Council.

The circondario plays an unimportant part in the local administration. Its chief officer is an underprefect, who represents the central power. The mandamento is a judicial district for the pretor, and, like the circondario, is of little consequence as an administrative area.

The commune is the lowest administrative unit, and, like the province, has its own elected council. The chief executive officer in the commune is the syndic or mayor. By a recent law the syndics of all the communes, irrespective of their population, are chosen by the communal councils from their own membership. The functions of the syndic are twofold: he is the local

municipal magistrate and at the same time the agent of the central government in the commune. As mayor, he presides over the Council, executes its ordinances, is the custodian of communal property and institutions, and takes measures for the public health and safety. As agent of the central government, he publishes and executes the national laws and ordinances and performs various duties which relate to matters of central concern. The Communal Council is chosen by the same electorate as that which selects the Provincial Council and for the same term. It meets ordinarily twice a year and is presided over by the syndic. It is subject to central control and may be dissolved by the King. Its duties include a large control over the communal civil service, the care and management of communal property and institutions, and the administration of a large number of purely local matters. In each commune is also an organ known as the municipal junta, composed of the syndic and a number of assessors elected by the Communal Council. It corresponds to the deputation in the province, i.e., it conducts the affairs of the commune when the Council is not in session.

The judicial system of Italy, like the administrative system, is modeled largely on that of France. The lowest judicial functionaries are the consigliatori, one of whom is appointed by the King for each commune. He serves for three years and without pay. His jurisdiction extends to civil actions in which only a small amount is involved. Above this officer is the pretor, whose territorial jurisdiction is the mandamento, a district comprising several communes. His competence in civil matters extends, among others, to all actions in which the amount involved does not exceed 1500 lire, and he has an appellate jurisdiction over the decisions of the consigliatore. In criminal matters his jurisdiction extends to all misdemeanors and crimes punishable by imprisonment for a period not exceeding three months, or banishment not exceeding one year, or by fine not exceeding $200. Above the Court of the Pretor is the Civil and Correctional Tribunal, which is divided into chambers, one of which sits in each of the most important cities of Italy. Its jurisdiction in civil matters extends to appeals from the decisions of the pretor and to those civil actions for which neither the pretor nor the consigliatore is competent. Together with a number of men prominent in trade and commerce, it sits as a court for the adjudication of commercial disputes. It is also a criminal court for offenses not cognizable by the pretor and has appellate jurisdiction over appeals from the decisions of the pretor.

There are 20 courts of appeal in Italy, each of which is divided into chambers. Their appellate jurisdiction extends to decisions of the civil and correctional tribunals. In each appellate court district there are one or more courts of assize, composed of a judge of the Court of Appeal and two assessors, and generally a jury of 14 men. The criminal jurisdiction of the Court of Assize extends to crimes punishable by imprisonment for a long period of time, to offenses against the security of the state, and to press offenses.

The highest judicial tribunals in Italy are the courts of cassation, of which there are five—one at Florence, one at Naples, one at Palermo, one at Turin, and one at Rome. Each is composed of a first president, several presidents of sections, and from 8 to 16 judges. Each is divided into two chambers—one civil, the other criminal. Each is the court of last resort within its own district, but, unlike the Supreme Court of the United States, has power only to quash the decisions of the lower courts on account of errors in law and send them back for rehearing. Like all European courts, they have no power to declare statutes null and void on account of their repugnance to the constitution. As in France, the so-called separation of justice from administration exists, and a series of administrative tribunals, modeled after those of France, have been created. The highest of these is the judicial section of the Council of State. A source of danger to the Italian judiciary is its lack of independence as over against the administration. The judges are irremovable after three years of service, but they may be transferred to less desirable judicial stations by the Minister in the "interest of the service." It is claimed that this power has been abused to the detriment of the judicial service.

Colonies. The history of the colonial expansion of Italy is the same as of its military expansion—an attempt to keep abreast with the Great Powers in the most costly and ruinous of activities without having first developed the productive sources at home. The colonial policy has been advocated by Italian statesmen as a means of increasing foreign commerce, because in other countries it has served as an outlet for overflowing industry and trade. The result has been disastrous to the government and country alike. After spending about $75,000,000 on the African possessions Italy has been forced to abandon most of its ambitious schemes. See section *History* in this article.

In September, 1911, after a quarrel with Turkey, Italy invaded Tripoli. Turkey ceded the territory to Italy by the Treaty of Ouchy, signed Oct. 18, 1912. The area of the territory annexed is estimated at about 406,000 square miles; native pop., 523,176 (census of 1911). According to a recent statement by the Minister of the Treasury, the Libyan campaign, the occupation of the Ægean Islands, and precautionary measures cost the government $222,000,000 up to Dec. 31, 1913. The other Italian possessions include the Colony of Eritrea on the Red Sea, with an area of about 45,800 square miles and a population of about 450,000; and Italian Somaliland, with an area of 139,000 square miles and a population of 400,000. The government has to contribute more than $1,000,000 annually to cover the deficit of the administration.

Money, Weights, and Measures. As a member of the Latin Union, Italy has the same monetary system as France (so far as the standard of money and coinage is concerned, not the method of issuing paper money). The amount of fractional silver coinage to which Italy is entitled under the provisions of the Union has been fixed at about $46,000,000. The coins are the same in value, size, and fineness as those in France, except that the name "lira" (pl. lire) is substituted for "franc," and "centesimo" for "centime." The metric system applies to all weights and measures.

Population. Italy ranks sixth among the countries of Europe with respect to population, coming after France. The following table shows the area and population by provinces in 1881, 1901, 1911, and estimates for 1913:

PROVINCES AND COMPARTIMENTI	Area in square miles	Population 1881	Population 1911	Population 1913 (est.)
Alessandria	1,964	729,710	807,696	809,212
Cuneo	2,869	635,400	646,719	654,500
Novara	2,553	675,926	756,326	759,630
Turin	3,952	1,029,214	1,213,709	1,229,169
Piedmont	11,338	3,070,250	3,424,450	3,452,511
Genoa	1,582	760,122	1,050,052	1,070,940
Porto Maurizio	452	132,251	147,179	147,335
Liguria	2,034	892,373	1,197,231	1,218,275
Bergamo	1,065	390,775	511,237	523,911
Brescia	1,807	471,568	596,411	608,229
Como	1,105	515,050	616,212	625,968
Cremona	678	302,138	348,749	350,419
Mantua	903	295,728	349,048	353,277
Milan	1,221	1,114,991	1,726,548	1,779,523
Pavia	1,288	469,831	512,340	512,803
Sondrio	1,232	120,534	129,928	131,929
Lombardy	9,299	3,680,615	4,790,473	4,886,059
Ancona	748	267,338	319,709	325,887
Ascoli Piceno	796	209,185	253,635	256,787
Macerata	1,087	239,713	258,393	261,640
Pesaro e Urbino	1,118	223,043	261,516	264,233
Marches	3,749	939,279	1,093,253	1,108,547
Umbria, Prov. Perugia	3,748	572,060	686,596	696,612
Latium, Prov. Rome	4,663	903,472	1,302,423	1,338,382
Aquila degli Abruzzi	2,484	353,027	407,005	413,283
Campobasso	1,691	365,434	349,618	351,445
Chieti	1,138	343,948	366,593	372,083
Teramo	1,067	254,806	307,490	312,040
Abruzzi e Molise	6,380	1,317,215	1,430,706	1,448,851
Avellino	1,172	392,619	396,581	401,504
Benevento	818	238,425	254,726	258,894
Caserta	2,033	714,131	791,616	797,182
Naples	350	1,001,245	1,310,785	1,324,871
Salerno	1,916	550,157	558,282	560,555
Campania	6,289	2,896,577	3,311,990	3,343,006
Bari delle Puglie	2,065	679,499	891,624	908,357
Foggia	2,688	356,267	467,020	473,324
Lecce	2,623	553,298	771,507	789,318
Apulia	7,376	1,589,064	2,130,151	2,170,999
Basilicata, Prov. Potenza	3,845	524,504	474,021	480,571
Belluno	1,293	174,140	192,793	197,645
Padua	827	397,762	519,358	532,130
Rovigo	685	217,700	257,723	261,441
Treviso	956	375,704	491,166	505,407
Udine	2,541	501,745	628,081	648,825
Venezia	934	356,708	466,752	478,035
Verona	1,186	394,065	475,049	483,645
Vicenza	1,056	396,349	496,438	504,749
Venetia	9,478	2,814,173	3,527,360	3,611,877
Bologna	1,448	457,474	577,729	588,888
Ferrarra	1,012	230,807	307,924	315,028
Forli	725	251,110	301,408	307,870
Modena	1,003	279,254	353,051	361,669
Parma	1,250	267,306	326,163	332,341
Piacenza	954	226,717	256,233	260,611
Ravenna	715	225,764	248,356	252,262
Reggio nell' Emilia	885	244,959	310,337	316,728
Emilia	7,992	2,183,391	2,681,201	2,735,398
Arezzo	1,273	238,744	283,663	286,405
Florence	2,265	790,776	999,423	1,011,848
Grosseto	1,738	114,295	146,634	150,905
Livorno	133	121,612	135,765	137,547
Lucca	558	284,484	333,011	338,369
Massa e Carrara	687	169,469	212,430	219,449
Pisa	1,179	283,563	342,250	346,107
Siena	1,471	205,926	241,530	243,222
Tuscany	9,304	2,208,869	2,694,706	2,733,852
Catanzaro	2,030	433,975	483,235	493,565
Cosenza	2,568	451,185	474,001	480,723
Reggio di Calabria	1,221	372,723	444,915	456,066
Calabria	5,819	1,257,883	1,402,151	1,430,354
Caltanissetta	1,263	266,379	342,557	347,517
Catania	1,917	563,457	789,147	802,451
Girgenti	1,172	312,487	393,804	400,903
Messina	1,246	460,924	517,248	525,717
Palermo	1,948	699,151	795,631	795,007
Syracuse	1,442	341,526	476,765	487,704
Trapani	948	283,977	357,106	361,190
Sicily	9,936	2,927,901	3,672,258	3,720,489
Cagliari	5,186	420,635	520,213	527,109
Sassari	4,123	261,367	332,194	336,106
Sardinia	9,309	682,002	852,407	863,215
Kingdom of Italy	110,688	28,459,628	34,671,377	35,238,997

The following list shows the increase of population, during the nineteenth century, within the present territory of the kingdom:

1816	18,383,000
1848	23,618,000
1862	25,000,000
1872	26,801,154
1882	28,459,628
1901	32,475,253
1911	34,671,377

In 1921 the population was estimated at 40,070,161. With respect to density of population, 318.8 people per square mile in 1913, Italy ranks third among the countries of continental Europe, coming after Belgium and the Netherlands. In general, the northern portion of Italy, extending as far south as Florence, is more densely populated than the remaining portions. The population is remarkably homogeneous, the number of distinctly non-Italian inhabitants being small and concentrated in a few districts; as, e.g., the 80,000 people of French origin in the Province of Turin, 90,000 Albanians in Sicily and southern Italy, 30,000 Greeks in Calabria and on the Adriatic coast, 30,000 Slavs in northeast Italy in the vicinity of the Austrian frontier, 11,500 Germans living mostly in the north, and some 10,000 Spanish in Sardinia.

The number of foreigners residing temporarily in Italy is very small—about 61,600 in 1901. There is a slight excess of males over females in Italy.

The following table includes all towns having a population of over 100,000 in 1911:

	1901	1911
Naples	564,000	678,000
Milan	491,000	599,000
Rome	463,000	542,000
Turin	336,000	427,000
Palermo	310,000	341,000
Genoa	235,000	272,000
Florence	205,000	233,000
Catania	150,000	211,000
Bologna	152,000	173,000
Venice	152,000	161,000
Messina	150,000	127,000
Leghorn	98,000	105,000
Bari	77,000	104,000

The estimated population for 1915 is 697,917.

Emigration. The unsatisfactory condition of public affairs is responsible for the enormous

tide of emigration. More than 5,500,000 Italian emigrants are living in foreign countries, and their number increases from year to year by hundreds of thousands. The growth of emigration in the last four decades was as follows:

1876	108,771
1880	119,901
1885	157,193
1891	293,631
1896	307,482
1900	352,782
1905	726,331
1910	651,475
1911	538,844
1912	711,446

It will be seen that the emigration increased more than fivefold in the period indicated. As the conditions responsible for this exodus from the country do not seem to improve much, there are no reasons to expect any decline of emigration in the near future. The region contributing most to the emigration is the less productive and more poorly developed southern portion of the peninsula from Naples southward, and the emigrants are chiefly peasants or representatives of other lower classes. The Province of Genoa contributes more than any other province in the north to the stream of emigration. The country most vitally interested in this question is the United States. As late as 1888 less than 12 per cent of all the Italian emigrants went to the United States, while more than 33 per cent went to Brazil, and about 23 per cent to Argentina, Uruguay, and Paraguay. In 1910 the proportion was reversed, the number of emigrants to the United States, Brazil, and Argentina being 263,000, 19,000, and 105,000, or 40.3 and 16 per cent respectively. By a ministerial Decree of July 30, 1911, immigration to Argentina was suspended until Aug. 24, 1912. The result was that in 1911 only 32,719 emigrants, or 6.13 per cent of the total, went to Argentina. About four-tenths go to European countries, especially France, Switzerland, Austria, and Germany. The majority of these ultimately return home, and the remainder finally embark for America.

Births, Deaths, and Marriages. The birth-rate of Italy, although fully up to the normal, has been slowly declining. While it annually exceeded 37 per 1000 inhabitants prior to the last decade of the nineteenth century, in 1911 it was only 31.54. On the other hand, the death rate has declined much more rapidly, having decreased from 28.1 per 1000 inhabitants in 1887 to 21.42 in 1911, the Italian government justly priding itself on the sanitary improvements which have made such results possible. The excess of births over deaths, which was only 7.19 per 1000 inhabitants in 1872, increased to 10.12 in 39 years.

Religion. The great bulk of the inhabitants of Italy belong to the Roman Catholic church. Especial prominence attaches to the church in Italy from the fact that the seat of the central administration of the church is in Rome. The welfare and harmony of the church, however, suffered greatly through the bitter contention that arose over the question of temporal power of the Pope and the possession of property by religious orders. There is still a Clerical party, the influential portion of which consists of the clergy, who would have the temporal power of the church reëstablished. Pius IX refused to recognize the validity of the claims of the Italian government to the possession of the papal territories, and always insisted upon the rights of the papacy to the States of the Church. Leo XIII steadily pursued the same course, and declined the consideration of any modus vivendi which did not admit the papacy's rights to the temporal power. Pius X followed, and Benedict XV is following, the same policy. This unyielding attitude against compromise has considerably hampered the political work of the government in internal affairs and weakened it in its policy against the alarming aggressiveness of the Socialist party. The great majority of the upper classes are strongly opposed to the realization of the claims of the Clerical party. It is probable that the antipathy to the political ambition of the Clericals is largely responsible for the indifference which the majority of the better classes show towards all religious principles and for the widespread prevalence of free thought. The clergy, however, have a very considerable following from the ranks of the ignorant classes of the population. Miracles and mysteries play an important part in the worship of the lower classes, particularly in south Italy. In 1866 a law suppressing all religious houses was passed, applicable to the entire kingdom. Their property was sold by the state, the greater part of the proceeds being turned into an ecclesiastical fund for the support of public worship, though a part of the proceeds is granted as pensions to some members of the suppressed religious institutions. In 1899 there were still over 13,000 persons receiving pension funds. Although their property was taken from them, the religious orders still have a large membership. The last census figures available (1901) return 65,595 Protestants and 35,617 Jews. Over a third of the Protestants were Waldenses. They are strongest in Piedmont. The Greek Orthodox church also has a small representation in Italy.

Social Betterment. The agricultural class, forming the greater part of the population, during the last decades of the nineteenth century suffered from all the ills that come in the wake of poor soil, antiquated methods of cultivation, defective land system, burdensome taxation, and want of capital. Since that time much has been done to improve conditions. After long and persevering efforts on the part of the people, strikes, and food riots, laws have been passed for the reclaiming of land by irrigation, for afforestation, and for the draining of the swampy district, in the endeavor to stamp out malaria. The most important work, however, has been done by the village banks (see *Banking*) and the coöperative agrarian societies. The former provide the capital, often on credit; the latter have an extensive and varied programme. They supply the people with modern implements, seed, and manure almost at cost price; they encourage the founding of agricultural schools and especially of traveling agricultural professorships. Emigration to North and South America has had a good effect on labor conditions in rural districts. By lessening competition it has raised the wage; and, better still, emigrants returning from America have brought with them new ideas and a higher standard of living, together with increased demands.

The position of the industrial worker in Italy is worse than that in any other western European country, except Spain. But he has raised himself considerably by economic organization and political action. The unit of activity is

not so much the trade-union, which, however, is growing to occupy a more important place, as the chambers of labor. The chambers are the foci of labor organizations and are usually subsidized by the municipalities. In 1898 most of them were dissolved by the conservative government. They were soon reëstablished, however, stronger and more numerous than ever. They fight on all occasions in the interest of the workingmen. In this way wages have been increased and hours have been shortened. Labor legislation is still backward, though much has been done through the efforts of the Socialists and Radicals in Parliament.

Laws have been passed forbidding children under 12 to be employed in factory or workshop; boys under 13 and women are not allowed to work underground or in unhealthy and dangerous trades; night work for women and boys under 15 is strictly forbidden. Women are required to abstain from work for one month after childbirth and receive maintenance during abstention. Besides laws of this type there has been constant extension of accident-insurance funds and old-age and invalidity pensions. The laws are excellent, but, as there is very little provision for enforcing them, they are to a great degree violated and evaded.

Italy now needs more thorough economic organization, legislation putting less of a burden of taxation upon the people, more labor legislation, and especially more rigid enforcement of laws, to come up to the level of the other European countries.

Charities. The extreme poverty of the population in Italy has given occasion for much activity in order to prevent distress. Formerly the income derived from the property of the religious orders was liberally, though not always wisely, spent for charitable purposes. Indeed, the belief that the sort of charity which the religious orders dispensed tended to foster pauperism was one of the motives which led to the selling of their possessions. The responsibility for the care of the poor now falls more definitely upon the state, which has become very active not only in the usual sphere of charitable endeavor, but also in the matter of improving the industrial and social conditions. (See below.) A large part of the government's annual expenditure for charitable purposes is by grants to charitable institutions which have permanent charitable endowments. In the course of years a large number of these have been established, the investigation of 1900 showing 27,078, with an aggregate capital of about $425,000,000. Large additions have been annually made since that time. The sum at their disposal that year amounted to $23,308,000. The charitable institutions include different kinds of hospitals and asylums, almshouses, workhouses, etc. Outdoor relief is also extensive and includes assistance in food or money, medical attention, and other objects, one of the most important being the giving of marriage portions. The Minister of the Interior is at the head of the charitable administrative system, the larger institutions being directly under charge of the provincial governments and the smaller ones in charge of the communes.

Education. Italy compares very unfavorably with north European countries in respect to the general diffusion of education. Since the nation is overburdened with debt and is lacking in national wealth, the educational system has not had the financial support necessary to its proper development. It would have been difficult to establish a high educational standard even had the government not been financially handicapped. It required much effort and time to do away with the extremes of illiteracy existing in some of the provinces when the present kingdom was established. In whole regions two-thirds of the population were illiterate, and in Reggio di Calabria and Catania the illiterates amounted to 93 per cent of the total population. A better condition generally prevailed throughout the north of Italy. The government, desirous of improving the educational status, made elementary education free and in 1877 passed a law making education compulsory between the ages of six and nine years. This has had a very beneficial influence, although, excepting in the northern provinces of Piedmont and Lombardy, the law has not been strictly enforced. Attendance is much the greatest in the winter months, when the schoolhouses are often overcrowded. The reduction of illiteracy has been aided by the introduction of the policy of giving elementary instruction to illiterate conscripts. The percentage of illiterates married decreased for males from 57.73 in 1871 to 24.8 in 1910, and for females from 76.73 in 1871 to 36.8 in 1910. In Basilicata the male illiterates at the time of marriage were still in 1910 over one-half of the total.

The national scheme of education comprehends the entire scope of education, including kindergarten, primary, secondary, technical, and higher instruction. In 1907–08 there were 343,563 children in attendance at kindergartens. Private societies and citizens, besides the communes, support the kindergartens. The primary course of instruction is divided into two grades. The first grade corresponds to the compulsory period, or the first three years of a child's school life. The second grade is a supplementary course of two years, but comparatively few pupils continue in this grade, the enrollment being less than a tenth of that in the lower grade. The attendance at the public primary schools in 1907–08 was 3,002,168, and at the private schools of the same rank 148,081. The private schools are required to follow the same programme as do the state schools. Many of the communes have established night or Sunday schools for the special benefit of children who do not continue into the second grade of the primary course and also for the benefit of adults. The enrollment at these schools in 1907–08 was 182,373. A still higher grade of schools has been established for the benefit of girls who wish to prepare for normal schools or for a practical career, the instruction including bookkeeping and technical branches. The attendance at these in 1910–11 was 19,678.

The elementary school buildings are generally throughout the rural districts of a very inferior and inadequate kind. Often rooms are rented for school purposes, and their selection is not infrequently made by officers who are incompetent or who subserve their personal interest. In many cities, however, the buildings and their equipment are of the most approved type. In 1877 religion was eliminated from the state schools. Religious instruction is only given when demanded by parents of the pupils. The private schools are generally in charge of religious orders. In the last years of the nineteenth century much progress was made in the

introduction of agricultural courses into the elementary school system. The communes bear the main burden of elementary education, although the state assists and to a small extent the provinces assist also. The state, provinces, and communes share in varying proportions in the support of other branches of education, the local Chamber of Commerce also sometimes aiding in the support of special schools. A large number of the secondary institutions are supported by religious denominations.

The attention given to higher education is remarkable, considering the backward condition of elementary education. In the last quarter of the nineteenth century the gain in graduates from the 21 Italian universities was about seven times the corresponding rate of increase of the Italian population. This result is largely due to the fact that public offices must be entered by way of the universities. Recently, however, the attendance has fallen off somewhat. The state maintains 17 universities, as follows: Naples, Turin, Rome, Padua, Bologna, Palermo, Genoa, Pavia, Pisa, Catania, Modena, Messina, Parma, Cagliari, Siena, Sassari, Macerata, which, together with the four free universities in Perugia, Camerino, Urbino, and Ferrara, had a total enrollment of 21,436 in 1911–12. The first eight of these exceeded an enrollment of 1000 each, and Naples had 4281. Besides the foregoing, there are separate university courses. Italy is known internationally for its art institutions, of which there were 13 government and 13 nongovernment in 1910–11, with aggregate enrollments of 2566 and 1162 respectively. There are five government and a number of private music conservatories. There are also a number of commercial, agricultural, and other industrial schools of academic rank.

For the training of teachers there are about 130 normal schools, the greater part of them being under the control of the government. The attendance at these in 1910–11 was 37,912, nearly all of it female. Compared with American or even north European standards, the teachers are underpaid, but their salaries do not compare unfavorably with those received by other classes of the Italian population. Male teachers of a superior degree receive from $200 to $264 a year in the cities, while female teachers of an inferior degree receive from $112 to $130 in the country. The provision of the law that calls for an increase in salary every six years of uninterrupted service is evaded by dismissing teachers before the expiration of that period. Provisions are made for the pensioning of teachers, both the communes and the teachers' salaries being levied upon for the pension fund.

The secondary educational system is divided into two groups—the classical and the technical, the latter having greatly increased in popularity during recent years. There are two kinds of classical schools—the ginnasi and the licei, the former being a five years' course and receiving pupils of the age period 10 or 11 to 15 or 16. The latter is only a three years' course. A few of the licei have recently reformed their curriculum by substituting mathematics and a modern language at the expense of Greek and the sciences. In 1910–11 there were 291 ginnasi, with 38,053 pupils, and 159 licei, with 14,342. The technical instruction is given at technical schools, of which there were 331 in 1910–11, with 82,406 pupils, and at technical institutes, of which there were 77 in the same year, with an attendance of 20,712. See MONTESSORI.

Ethnology. Of the Paleolithic epochs of culture stages of Europe there are few relics in Italy, yet the northern slopes of the Apennines are said to be rich in chipped implements of the *coups de poing* type. Scrapers also abound, and leaf-shaped objects of Solutrian type, but little of later Paleolithic forms. In places favorable to such life cave dwelling is not without its witnesses. The stone workers of the earliest human occupation of Italy were followed in the Neolithic period by dolichocephalic pottery makers and builders of pile dwellings on the lakes of the northern borderland, and by mound builders in the Po valley, who on the marshy lowlands built tumuli, called terramare (q.v.), with level tops, and on them erected dwellings and villages, which were protected by ditches. The germ of Italian culture lay in this epoch. The peoples were many, though in the regions separated by the Po they belonged to only two races. Industrialism had taken the place of savagery. The polished axe, the scraper, weights, and spindles of terra cotta, coarse and fine pottery, slate ornamented with etchings, toilet articles and domestic utensils of bone and antler, linen fabrics, acorns, hazelnuts, and seeds of flax, wheat, barley, poppies, and apples, all show that a mixed people then existed. The most ancient peoples of Italy known to the historian belonged to a dolichocephalic race. They may be classed in the Mediterranean species and called Ligurians. They were akin to the Iberians of Spain and the Pelasgians of Greece, a colony of whom, greatly modified by local mixture, became Etruscans. Towards the close of the Neolithic period there came into the north of Italy a brachycephalic people who brought with them copper and occupied most of the Po valley, founding there the Umbrian dominion. This short-headed race modified the biological characters, the customs, and the speech of this northern region. Thus arose a sharp division of the peninsula into two distinct ethnic areas —that of the broad-headed Alpine or Celtic type of central Europe, north of the Apennines, and the true long-headed Mediterranean or Ligurian type in the south. Later on appeared the tall, blond race from what is Germany and from the regions farther east, Cimbri, Goths, Ostrogoths, Visigoths, Saxons, and Lombards. These conquerors were long-headed also, like the Pelasgians. They did not profoundly modify the physical characters of the population. The skulls of the peoples along the Po are varied from place to place. Biologically the two divisions of Italy exist as they did before the Teutonic invasions. Venetians are 1.666 meters or 65.5 inches in stature, and the proportion of head width to head length among the Piedmontese is 0.86. In the other ethnological division of Italy Sardinian soldiers are only 1.619 meters or 63.68 inches in stature, and the ratio of head width to head length is 0.77.

History. For the history of Italy down into the fifth century A.D., see ROME, *History*. When Metternich, in 1845, said that Italy "represents simply a group of independent states, united under the same geographical term," he was describing a state of affairs which had existed ever since the downfall of the Roman Empire in the fifth century. This lack of unity makes it almost impossible to present the history of Italy under one head, but necessitates a study

of the separate states. (See especially the articles on VENICE; FLORENCE; GENOA; MILAN; LOMBARDY; SAVOY; TUSCANY; NAPLES; ROME; SICILY; PAPAL STATES.) Through the repeated invasions of the barbarians into Italy during the fifth century (see especially ALARIC; ATTILA; GOTHS; HUNS) many portions of the country had been depopulated and government had become very weak. The old free population had long since disappeared, and the land was chiefly in the hands of powerful nobles, who were able to maintain bands of retainers by means of which they could protect themselves against marauders. Finally in 476 the last independent Emperor of the West, Romulus Augustulus, was dethroned by Odoacer (q.v.), a chief of the German tribe of the Heruli. This event is usually taken as marking the end of the Roman Empire and the beginning of the Middle Ages. As a matter of fact, there was no abrupt transition; for Odoacer and his Germanic successors continued the old constitution, which, however, had ceased to be effective for some time before 476 and gradually disappeared, though for centuries it was invoked by all rulers of Italy. Odoacer did not enjoy his crown long, but was treacherously murdered in 493 by Theodoric the Great (q.v.), under whose leadership the Ostrogoths had invaded Italy. For the last time in many centuries Italy was prosperous; for Theodoric was just and wise, and the natives were treated mildly, being judged equitably and allowed to retain to a large extent their property. But the Italians, who were largely Catholics, were discontented under their Arian masters. The result was that, forgetting or underestimating Byzantine despotism, they welcomed the attempts of Belisarius (q.v.) and Narses (q.v.), the generals of the Byzantine Emperor Justinian, to drive out the barbarians after the death of Theodoric, in 526. In 552 the last of the Gothic kings, Teias or Teja, fell in the terrific battle at Mount Vesuvius, and the remainder of the Goths disappeared among the Italians.

The Byzantine sway was of short duration; for after the recall of the capable Narses in 565, the Lombards (q.v.), a Germanic people, invaded Italy, according to the account of Paulus Diaconus (q.v.), called in by Narses himself in revenge for his recall. Their King was Alboin, who made Pavia his capital, and from that city as a starting point expeditions were sent in all directions, so that soon nothing was left to the Byzantine Empire except the south and the Exarchate of Ravenna. After the death of Alboin, in 573, the Lombards for a time had no King, but separate bands united under various leaders, known as "duces." They were Arians, as the Goths had been before them, and hence there was continuous strife between them and the native Italians, which increased as the popes became more powerful and the real rulers of Rome. Finally a new King, Agilulf, who ruled from 590 to 616, became a convert to Catholicism, and for some time comparative harmony prevailed. But the Lombards from political necessity were driven to seek possession of the city of Rome, and thereupon the popes called in the Franks to aid them. These under the vigorous leadership of Pepin (q.v.) and Charles the Great conquered the Lombards, and finally in 774 Desiderius, the last King of the Lombards, was sent to die in a monastery, and Charles the Great had himself crowned with the Iron Crown (q.v.). This proved to be little more than a change of rulers, for, as generally in the Middle Ages, the laws of the victors were not imposed upon the conquered. Out of gratitude for the royal title which the Pope had bestowed on him after the deposition of the last of the Merovingian kings, Pepin granted to the holy see the possession of a strip of territory in central Italy, comprising the Exarchate of Ravenna, the March of Ancona, and the Romagna, the former two conquered from the Lombards. This donation of Pepin (q.v.), later confirmed by the donation of Charles the Great, was momentous for the history of Italy in that it marked the beginning of the temporal rule of the popes and introduced into Italy one of the most powerful factors of national activity. On Christmas Day, 800, Charles the Great was crowned Emperor by Pope Leo III, and for centuries the history of Italy turned upon the conflict and interrelation between the two great powers which disputed with each other the primacy in mediæval life, the empire and the papacy. By the Treaty of Verdun (843), in which the Frankish realm was partitioned between the grandsons of Charles the Great, Italy was included in the share given to Lothair. During the years of confusion that followed, the Saracens overran south Italy and even threatened Rome. The history of Italy for many years is nothing but the rise of one petty king after another, many of them aspiring to the Imperial title. Among these may be mentioned Guido of Spoleto, Berengar of Friuli, and Hugo of Provence. With them the papacy intrigued and plotted, for the successor of Peter was now the puppet of different factions in Rome.

The period of anarchy ended in 962, when Otho the Great (q.v.), after obtaining possession of north Italy and the Lombard crown, was crowned Emperor. This marked the establishment of the Holy Roman Empire of the German Nation (see HOLY ROMAN EMPIRE), and until the end of the Middle Ages the Emperor theoretically ruled over Italy, though the Imperial authority was completely set aside by the beginning of the fourteenth century. For a long time the emperors came to Rome to be crowned by the Pope, and until that had been done their title was not considered to be complete. Meanwhile the south of Italy was still in the possession of the Byzantines and Lombards, whom the German emperors were unable to oust, until finally in the eleventh century they were driven out by the Normans, who in 1127 united their conquests in Italy with Sicily, which they had wrested from the Saracens. (See SARACENS; NORMANS; GUISCARD, ROBERT.) In the time of the Emperor Henry IV (1056–1106) the papacy had become strong and powerful again, and the great investiture struggle broke out, the papacy finding an indomitable champion in Gregory VII. See INVESTITURE.

Simultaneously with the increasing power of the popes a great barrier to the continued rule of the Germans was being erected in the rising city states. In Italy the feudal system had never attained the high development so characteristic of France and Germany, which was due to a great extent to the survival of Roman traditions and the many cities in Italy, for feudalism was chiefly rural, not urban. The cities of Lombardy defied the power of the Emperor Frederick Barbarossa, of the house of Hohenstaufen, who waged bloody wars with them to

no purpose. In 1167 the Lombard League (q.v.) was formed. In 1176 Frederick was vanquished at Legnano, and in 1183, in the Peace of Constance, the cities secured the recognition of their liberties. A last attempt to crush both the papacy and its allies was made by Frederick II, the last great ruler of the house of Hohenstaufen (1215–50); but, though he controlled Naples and Sicily, as well as the Empire, even his great ability was unable to change the state of affairs. Italy itself was rent by the struggles between the opponents and the partisans of Imperial rule, known respectively as Guelphs and Ghibellines (q.v.), names which continued to be the designation of fiercely contending parties long after the emperors had lost their hold on the country.

In the second half of the thirteenth century a new foreign power came to play an important rôle in Italian affairs. Charles of Anjou, brother of Louis IX of France, summoned by the Pope to aid him against the Hohenstaufen, undertook the conquest of the Kingdom of Sicily and Naples (The Two Sicilies), and overthrew Manfred, the son of Frederick II, in 1266. Conradin, the last of the Hohenstaufen, was defeated in an attempt to recover the Kingdom in 1267 and put to death. But in 1282 (see SICILIAN VESPERS) Sicily rose against the French and placed itself under the power of Aragon.

In the north the cities, having secured independence from the central authority, entered into contests with the nobles, who claimed authority over them. Gradually the various nobles were defeated, compelled to abandon their castles in the country, and to live in the cities. By commerce the cities had grown very wealthy and had established oligarchical governments, which were tending to become democratic. Venice by her share in the Fourth Crusade had secured extensive possessions in the East. (See BYZANTINE EMPIRE; DANDOLO.) Pisa, Genoa, Milan, and Florence had acquired great power. In 1278 the Emperor Rudolph of Hapsburg recognized the Papal States, which included Emilia, Romagna, the March of Ancona, the Patrimony of St. Peter, and the Campagna of Rome. In 1284 the naval power of Pisa was crippled by Genoa. Before this Genoa had engaged in a fierce struggle for ascendancy with her rival, Venice, which finally ended in favor of Venice towards the close of the next century. In every city of north and central Italy the population was divided into Guelphs and Ghibellines. In a general way the former may be said to have represented the progressive party; the latter, the conservative. In the cities civil strife was incessant, and the triumph of either party frequently resulted in the expulsion of the hostile faction from the city. Often the exiles attempted to regain power with the aid of other cities, and city warred against city, producing throughout the later Middle Ages a shifting succession of alliances, conquests, and temporary truces. This condition of affairs was inimical to commerce and manufacturing, which were the chief interests of the citizens in the north. In the cities the podestà (q.v.), who had been created as an arbitrator between the different parties, had proved inefficient and now became mainly a judicial officer. His place as head of the city was taken by a "captain of the people," representing the dominant party. As military skill was essential in this position, it was held usually by a noble. The people, desirous of peace, acquiesced in the establishment of a strong power. Hence there arose in almost every city a "despot," or absolute ruler, an office which in many cases came to be hereditary in some noble family—with the Scalas at Verona, the house of Este at Ferrara, the Malatestas at Rimini, the Visconti and later the Sforzas at Milan. This period has been called fittingly "the age of the despots." Under their rule the arts prospered, literature flourished, life became more luxurious, wealth greater. But the people, who had fought so valiantly in the past, became unwarlike, and the cities placed their reliance in mercenary troops. (See CONDOTTIERI.) Gradually the smaller cities passed under the influence of the stronger states. By the middle of the fifteenth century Italy had reached a position of great prosperity and comparative tranquillity. She was in the van of European countries in all that pertained to culture, having led the way in the great revival of the arts and letters. (See RENAISSANCE.) Tuscany, which had produced Dante and Giotto, was preëminent in this revival. Amid all this splendor began a terrible period of foreign aggression in 1494.

Modern History. From the close of the Middle Ages until the nineteenth century there is no history of Italy as a united nation, but only of the different cities and states which composed it, their rivalries and their combinations with foreign powers. Chief among these states were the Duchy of Milan (which came to an end in 1535), and the republics of Florence, Genoa, and Venice in the north; the States of the Church, stretching, a bar to political unity, across the middle of the peninsula; and the Kingdom of Naples in the south. In addition to these more important political divisions there were many minor courts distinguished throughout Europe for their magnificence and intellectual brilliance. Some families, of whom the Medici of Florence are the most notable example, having amassed great wealth in banking or commerce, rose to the highest power in church and state. But at the close of the fifteenth century Italy entered an age of invasion in which she became the scene of fierce wars waged by France, Spain, Austria, and the Italian states and princes, culminating in the ascendancy of the Spanish and Austrian Hapsburgs. The discovery of America, which destroyed the commercial supremacy of Venice and therewith her political power; the fall of Granada, which increased the influence of Spain by giving it a free hand; the death of Lorenzo de' Medici in Florence—hastened this catastrophe. In 1494 Charles VIII of France undertook to conquer the Kingdom of Naples, then misruled by the house of Aragon. He was tempted by Ludovico Sforza, the Milanese usurper, and by the Florentines, who were ripe for rebellion against the tyranny of the Medici. He invaded Italy, made a treaty with Florence, which expelled the Medici, brought the Pope to submission, and marched on Naples, which was taken. Charles was, however, forced by a league formed against him by Venice, Spain, Milan, the Emperor Maximilian, and the Pope, to retire from Naples and fight his way out of Italy (1495–96). This French invasion had an importance transcending its political results in the dissemination of the Italian culture over the rest of Europe. Michelet has described it as "the revelation of Italy to the nations of the North." Louis XII,

the successor of Charles VIII, assumed the titles of King of Naples and Duke of Milan and entered upon a policy intended to support these pretensions. Allying himself with Venice, Louis invaded the territory of Milan in 1499 and was soon master of it. In 1501 a partition treaty was arranged between Louis and Ferdinand of Spain, by which the latter was to have Calabria and Apulia, with the title of Duke, and the King of France was to have the remainder of the Neapolitan Kingdom, with the title of King of Naples and Jerusalem. This treaty, which was on the part of Spain an act of the most cold-blooded treachery towards an ally, was immediately carried out by force of arms. Quarrels soon arose between the two allies, and in 1502 France and Spain were again at war on Italian soil. Through the generalship of Gonsalvo de Córdoba (q.v.), the French were driven out and made a disastrous retreat to France. (See CERIGNOLA; GARIGLIANO.) But France was soon in the field again in north Italy. In 1508 the League of Cambrai was formed against Venice, which was reduced to great straits by the victory of the French at Agnadello in 1509. But in 1511 the Holy League formed by the militant Pope, Julius II, with Spain and Venice, was arrayed against France, whose forces were driven out of Italy in 1513. Two years later Francis I (q.v.), continuing the policy of his predecessors, reconquered Milan; but it was lost again in 1521, immediately after the outbreak of the great struggle between that monarch and his rival, the Emperor Charles V. Francis I was defeated and captured at Pavia in 1525. In 1527 the forces of the Constable de Bourbon (q.v.) took and sacked Rome, and Pope Clement VII (Giulio de' Medici) became the prisoner of Charles V.

A new invasion of Italy by the French under Lautrec in the same year, with the Florentines, Genoese, and Venetians as allies, was at first attended with success, but in the end resulted disastrously, and in the Peace of Cambrai of 1529 Francis renounced all claims to territory in Italy. He renewed the struggle with Charles V, but the hold of the Hapsburgs on Italy could not be shaken. In 1535, on the extinction of the Sforza dynasty, Charles V took possession of Milan, which became part of the Spanish realm. Naples was governed by Spanish viceroys and remained for over 200 years in the hands of the Spanish Hapsburgs. Of all the free city states of Italy only four survived, of which only Venice and Genoa are worthy of mention. In north Italy the authority of the Hapsburgs (Austria supplanting Spain) was not thrown off until after the middle of the nineteenth century.

The reactionary bigotry of Spain fell heavily upon the whole Italian peninsula. In pursuance of the energetic anti-Hapsburg policy of Richelieu (q.v.), France from 1635 to 1659 waged war against Spain in north Italy, having for its allies Parma, Mantua, and Savoy, which had become an independent state again in 1574 under Emanuel Philibert, who transferred the capital of the duchy to Turin, which thus became the nucleus of the unified Italy of to-day. Under Mazarin's administration France gave some assistance to the Neapolitan revolt, begun under Masaniello and continued under the inefficient leadership of Henry, Duke of Guise. The War of the Spanish Succession (1701–14) and the decline of France at the end of the reign of Louis XIV established the Spanish-Austrian rule in Italy without opposition. Lombardy and Naples passed from Spain to Austria, which also obtained Sardinia, and the house of Savoy received the island of Sicily, wrested from Spain. In 1720 Sicily was exchanged for Sardinia, and the Duke of Savoy took the title of King of Sardinia. The growth in strength and influence of the house of Savoy was the beginning of an efficient national power in Italy. Piedmont became the real centre of life of the new kingdom. In 1734–35 the Bourbons established themselves on the throne of The Two Sicilies, and in 1748 they obtained possession of Parma and Piacenza. The 45 years following the Treaty of Aix-la-Chapelle (1748), which terminated the War of the Austrian Succession, were years of peaceful development in all parts of Italy, which was better governed than it had been for some centuries. Many reforms were introduced, especially in Lombardy, Tuscany, and Sardinia, and although free institutions were not among them the people made economic progress under enlightened despotism. But the spiritual awakening of Europe which preceded the French Revolution had found expression in Italy in men like Alfieri, Beccaria, and other political philosophers. The events following the French Revolution meant the renewal of the struggle between France and Austria for the domination of Italy, but at the same time the revival of the consciousness of strength and unity in the Italian people. In 1792 Savoy and Nice were seized by the French. In 1796–97 the army of Bonaparte swept through north Italy, driving the Austrians before it. Through the Peace of Campo Formio in 1797 Lombardy, part of Venetia, Modena, the Romagna, etc., were constituted into the Cisalpine Republic (later known as the Italian Republic), and the Genoese dominions into the Ligurian Republic. The Venetian Republic, which had existed for 1100 years, was extinguished, and the bulk of its territories handed over to Austria. In 1798 a revolt was organized by French conspirators in Rome, and General Berthier (q.v.) proclaimed the Roman Republic, the Pope, Pius VI, being imprisoned in the French fortress of Valence, where he died the following year. The Neapolitan court, supported by Austria, having undertaken hostilities against the French in Italy in 1798, Naples was taken by the French, Jan. 23, 1799, and the Parthenopean Republic was erected. Piedmont and Tuscany had already been seized by the French. The two southern republics were short-lived. In 1799 the French were expelled from south Italy by the Second Coalition and were forced back in the north. The influence of the French Republic, which had aroused the democratic element in all the Italian states, was ended and was to give place to that of a purely military conqueror, Napoleon, to whom all Italy finally became subject. In 1800 the First Consul, having established his power in France, crossed the Alps and opened his second and most memorable campaign in Italy. The victory of Marengo forced the Austrians to sign an armistice followed by the Peace of Luneville, 1801, which left Napoleon a free hand for his reorganization of Italy on a military basis. Popular movements which had sprung up under the inspiration of the ideas of the French Revolution were henceforth sharply repressed. Certain reforms were, however, introduced, such as the Code Napoléon. In 1805 Napoleon was

crowned with the Iron Crown of Lombardy as King of Italy, this Italy including the northern regions. In 1806 Napoleon took possession of the Kingdom of Naples, which was given to his brother Joseph, and, when the latter became King of Spain in 1808, to Joachim Murat. In 1808 Rome became part of the French Empire. The breakdown of the domination of Italy by Napoleon followed his defeat at Leipzig (1813). The Austrians invaded northern Italy, and an English force occupied Genoa and exhorted the Italians to rise in behalf of their freedom. Murat, having joined the allies, was allowed to retain his throne, but in 1815 he took up arms for Napoleon and was defeated and expelled. The Congress of Vienna led to a restoration of the pre-Napoleonic order with only slight modifications and left Italy at the mercy of Austria and the papacy. The Sardinian Kingdom, augmented by the territory of the Genoese Republic, was returned to the house of Savoy; Austria recovered Lombardy and Venetia (having been stripped of the latter in 1805); Modena was restored to the house of Este (q.v.); the Duchy of Parma was conferred on Maria Louisa of Austria, wife of Napoleon, and Lucca was erected into a duchy for the dispossessed Bourbon dynasty of Parma; the Grand Duchy of Tuscany passed again to the house of Lorraine-Hapsburg; the Bourbon dynasty (which had maintained its rule in Sicily) was restored in the Kingdom of Naples; the tiny Republic of San Marino and the Principality of Monaco retained their independence. The period following the Napoleonic rule and extending to the final unification of Italy in 1870, was characterized by a constantly growing movement for Italian unity and independence, which has been named the Risorgimento.

The dominion of Austria and the rule of autocratic princes, upheld by the Hapsburgs and the Holy Alliance, could not endure in Italy forever. Crushed under an iron despotism, the country was pervaded by a network of secret societies, which kept up a constant agitation for constitutional government. (See CARBONARI.) The French rule had introduced into the country certain liberal and progressive ideas which made their impression upon the people. But the princes, strong in the support of Austria, refused all concessions and by means of an elaborate police system succeeded in checking the progress of liberalism. Risings promoted by army officers took place in Naples (1820) and Piedmont (1821). In Naples Ferdinand I was forced to grant a constitution, but yielded to Metternich at the Congress of Laibach, and in May, 1821, was reëstablished in his despotic sway with the aid of Austrian troops. He now entered upon a course of vindictive persecutions against the Liberals. In Naples Francis I, the son and successor of Ferdinand I, continued the iniquitous policy of his father. The government of the Papal States under Leo XII was oppressive, reactionary, and incapable. Tuscany alone, during the decade of 1820–30, enjoyed a fair measure of freedom and prosperity under its Grand Duke, Leopold II. The July revolution of 1830, which drove the Bourbons from the throne of France, had its echoes in Italy. In 1831 insurrections broke out in Modena and in the Papal States, and in Bologna a congress of representatives from the revolted Papal States, excepting Rome and a few cities in the March of Ancona, adopted a constitution establishing a Republican form of government. Austria promptly intervened, suppressed the revolutionary movement in the dominions of the Pope, and placed a garrison in Bologna. Upon the death of Charles Felix, in 1831, the succession in the Kingdom of Sardinia passed to Charles Albert (q.v.), Prince of Carignan, representative of the younger line of Savoy. There had been in Piedmont already a suggestion of national independence in the agitations of 1820–21. Now, the patriot Giuseppe Mazzini issued an address to the new King, who was known to hold more liberal views than others of his house, calling upon him to become the leader and liberator of Italy. From this time the idea of Italian unification and independence grew in strength and found its hope in the Sardinian monarchy, for it had become apparent that the cause of reaction had its strongest support in Austria, which must be driven from the peninsula by some power strong enough to assume the leadership in Italy. Mazzini at the same time founded the secret political society, Young Italy (q.v.), organized to support the principles of the Carbonari, whose propaganda was Republican, but also Nationalist, as Mazzini realized that freedom was only possible with unity. The impulse to a national uprising was afforded by Pope Pius IX, the first Pope to be elected without the influence of Austria. Immediately after his election in 1846, he entered upon an extensive series of reforms in the Papal States. An amnesty was proclaimed for political offenders, political exiles were permitted to return, the liberty of the press was established, the highest offices were opened to laymen, and a Council of Notables was summoned to initiate new reforms. The example of the Pope was followed by several Italian princes. Reforms were introduced in Lucca and Tuscany, and, above all, in Piedmont, where a great advance was made towards constitutional government (1847). Reform, however, was only preparatory to revolution. In January, 1848, the people of Palermo rose and drove out the Neapolitan garrison, and on February 10 Ferdinand II granted his people a constitution and summoned a separate parliament for Sicily. At the same time Leopold II issued a constitution for Tuscany, although his motive was rather hatred of Austria than sympathy with liberalism, and Pius IX, who had now begun to feel alarmed at the rapidity with which the course of reform was progressing, consented unwillingly to a constitution for the Papal States (March 14, 1848). The revolutionary outbreak in Vienna on March 13, 1848, which drove Metternich from power, was the signal for a rising in Milan (March 18). The Austrian troops, under Radetzky, were driven from the city after a five days' battle with the populace. On March 22 Venice rose under Manin and expelled the Austrians, and on the following day the Republic of St. Mark was reëstablished, with Manin at its head. The rulers of Parma and Modena were forced to flee. In Piedmont there was a clamor for war to drive the Austrians from Italy, and Charles Albert, after long hesitation, decided to mobilize his army and go to the assistance of Lombardy, which he entered March 25, acclaimed as the liberator of Italy. He was joined by 13,000 Neapolitan troops and contingents from Tuscany and Lombardy. On July 25 the Piedmontese suffered an overwhelming defeat at Custozza, and on August 6 Radetzky reëntered

Milan. An armistice was concluded on August 9, by the terms of which Charles Albert was to evacuate Lombardy, Venetia, and the duchies of Parma and Modena. Charles Albert, however, considered it his duty not to abandon the Lombards without making another effort to free them from Austrian domination, and in March, 1849, the armistice was suspended. The Austrians under Radetzky crossed the Ticino, and on March 23 overwhelmed the Piedmontese army at Novara. On the night after the battle Charles Albert abdicated in favor of his son, Victor Emmanuel II. In central and south Italy reaction was triumphant. Pope Pius IX, who saw that the revolutionary movement was fast getting beyond his control, became conservative, but a rising under Mazzini drove him from Rome. On Feb. 5, 1849, the temporal power of the Pope was abolished, and Rome was constituted a republic. In April a French army of 8000 men was dispatched under Marshal Oudinot to suppress the Roman Republic. Oudinot entered Rome in July, in spite of the heroic resistance of Garibaldi, and the papal authority was reëstablished.

The Kingdom of Sardinia, with the liberal constitution which Charles Albert had granted in 1848, remained the only refuge of nationalism and liberalism, though with its diverse and mixed population, alien to the rest of Italy, it was not the most promising ground for the national propaganda. Victor Emmanuel II adhered firmly to the constitution, retained the tricolor flag, the symbol of free Italy, continued the liberty of the press, and encouraged political refugees from the other states to make Piedmont their asylum. The advent of Cavour (q.v.) as head of the ministry (1852) opened a vigorous, aggressive policy, in which the Minister was fully supported by the King. Cavour contrived that Sardinia should enter into an active alliance with England and France, and, after she had rendered them effective assistance in the Crimean War (q.v.), he was able to urge, in the Congress of Paris in 1856, the necessity of the consideration of the condition of Italy as a matter of international concern and to secure an acknowledgment of the claim, in spite of the protest of Austria. He effected an understanding with Napoleon III in a meeting at Plombières in July, 1858, after the attempt of Orsini upon the life of the Emperor had impressed upon him the intensity of the Italian desire for freedom and his own responsibility for intervention, and proceeded to increase the armed strength of Piedmont, acting boldly with a view to bringing on a war with Austria. France came to the aid of Sardinia, and the allied armies won with some difficulty the battles of Magenta (June 4) and Solferino (June 24). All north Italy was preparing to join Sardinia, when Napoleon, through the influence of the Empress Eugénie and the Clerical party in France, deserted his ally and concluded the preliminary Treaty of Villafranca, July 11, 1859. By the Treaty of Zurich, November 10, between France, Austria, and Sardinia, Austria ceded Lombardy, with the exception of Mantua and Peschiera, to France, which was to transfer them to Sardinia. The people of the duchies and the Romagna in a plebiscite (March, 1860) declared for a union with Sardinia. As the price of French assistance, Napoleon exacted the cession of Savoy and Nice, which became a part of France. The situation created by the victories in the cause of national freedom in the north half of Italy invited the great patriot leader Garibaldi to undertake the task of liberating the south. In April, 1860, Palermo rose against Francis II, the successor to the odious Ferdinand II on the throne of The Two Sicilies. On the 6th of May Garibaldi, with about 1000 volunteers, embarked at Genoa, bent on the conquest of Sicily and Naples. After performing miracles of valor Garibaldi succeeded in conquering Sicily and declared himself dictator of Sicily in the name of Victor Emmanuel, "King of Italy." On July 20 he defeated the Neapolitans at Milazzo. Messina, the last stronghold of the Bourbons in Sicily, fell on July 25, and Garibaldi with 5000 men crossed into Italy (August 20–21), meeting with no resistance. On September 7 he entered Naples with a small escort, Francis II having fled to Gaeta, after making a vain attempt to save his throne by the grant of a constitution and the promise of many reforms. The liberator proclaimed the reign of Victor Emmanuel. The Sardinian government had been openly in sympathy with Garibaldi, but had carefully abstained from affording any pretext for the intervention of the foreign Powers. This diplomatic position, however, seemed to be threatened when Garibaldi, not satisfied with conquering The Two Sicilies, prepared to invade the States of the Church. In the meanwhile, the Sicilies, Umbria, and the Marches declared by plebiscite for annexation to Sardinia (October, 1860), and on Feb. 18, 1861, the first Italian Parliament was opened in Turin by Victor Emmanuel. On February 26 the Parliament conferred the title of King of Italy upon Victor Emmanuel, who formally assumed it on March 17.

The death of Cavour, June 6, 1861, at this crucial period, was a heavy loss to the new kingdom. A ministry under Baron Ricasoli had a brief term of office, and was succeeded, March 31, 1862, by the ministry of Rattazzi, whose subserviency to France caused much distrust among the Italian Liberals. The restlessness of Garibaldi, who was impatient of delay in the acquisition of Venetia and Rome, and had even had under consideration for this end a plan for raising a revolt in the Balkans and Hungary, was a grave cause of disquiet for the government, as it was highly important that the new state should not hastily involve itself in a new struggle without outside support. After traveling about Italy, engaging in the organization of "rifle clubs," the irrepressible patriot went to Sicily with the avowed intention of organizing an expedition against Rome. A royal proclamation (dictated by the fear of French intervention) declaring him to be in rebellion did not deter the Sicilians from rallying around the Garibaldian standard, and on Aug. 22, 1862, Sicily was declared in a state of siege, the Liberal clubs were dissolved, and an armed force was dispatched to disperse the volunteers, since the advance of Garibaldi was considered to be a danger to the Monarchist cause. Garibaldi, having landed in Calabria, was met by the Sardinian troops at Aspromonte (August 29), and after a slight engagement, in which he was severely wounded, was forced to surrender. In spite of the temporary check to the conquest of the Papal States, their acquisition was inevitable. In 1865 Florence became the capital of Italy. This was but a step nearer towards Rome. In 1866 Italy allied herself with Prussia against Austria, and although her army was defeated at

Custozza (June 24), and her fleet at Lissa (July 20), she was enabled to participate in the Prussian triumph, and in October Venetia became part of the Kingdom of Italy. (See SEVEN WEEKS' WAR.) The protection of the papal territory by France alone stood in the way of that completion of unification which required for its fullest expression the establishment of the government in the Eternal City. In 1867 Garibaldi headed a new expedition against the papal territory; but Napoleon III, from motives of policy, refused to permit the extinction of the temporal power of the Pope. A French force defeated the Garibaldians after a severe engagement at Mentana (November 3), and this event destroyed the good feeling which had prevailed between Italy and France since 1859. At last, in 1870, the urgent necessities of the Franco-German War compelled the Emperor Napoleon to withdraw his forces, and once more Italy profited by Prussia's victories. The Italian forces entered the lands of the church on September 11, and on the 20th made their entry into Rome. The Roman people declared for union with Italy in October by 133,000 votes against 1500, and on July 2, 1871, Rome became the capital of United Italy.

The problems of the new state were not simple ones. The task of political organization and consolidation was complicated by the great diversity in economic, cultural, and social conditions between the north and the south. The inhabitants of southern Italy, kept for centuries under a burdensome despotism, showed themselves, on the whole, deficient in training for self-government, which comes more naturally to the Tuscans, Lombards, Piedmontese, and Venetians.

The six years which followed the first Italian Parliament in 1871 witnessed the disintegration of the moderate conservatism which had characterized the policy of Cavour and the other great leaders in the struggle for national unity, and the new monarchy found itself confronted with sectional, social, and ecclesiastical problems of the greatest complexity, in addition to that of securing the newly created nation a voice in the councils of Europe. The ecclesiastical problem was that of a satisfactory settlement between the papacy and the monarchy. The Pope had refused to be reconciled to the arrangement of 1870 whereby the papacy was to be indemnified for the loss of its temporal power by the acquisition of certain privileges and immunities and the receipt from the state of a generous annual income. The papacy has ever since maintained its irreconcilable attitude, and the Pope has considered himself a prisoner in the Vatican, while Catholic citizens have been encouraged to abstain from active participation in political affairs. Within the last 10 years, however, there have been signs of a change of policy upon this last point. See ROMAN CATHOLIC CHURCH.

A more complex problem was that of the economic development of the country and the adjustment of the social and sectional difficulties connected therewith. With small resources in coal and other minerals, Italy is, and bids fair to remain, despite all efforts to develop its industries, chiefly an agricultural country, with the exception of the north, where a more intelligent population has taken up the ideas of co-operation, rural banks, and improved methods of cultivation; in the south, and especially in Sicily, agricultural progress has been slow for various reasons. The high percentage of illiteracy, the overtaxation, and the antiquated land system, in which absentee landlordism is combined with a high rate of emigration among the agricultural workers, have united to produce a state of poverty and unemployment which has been aggravated at frequent intervals by disasters of appalling magnitude, volcanic eruptions, landslides, and earthquakes, such as that at Messina in December, 1910, when 170,000 people perished. The large emigration has created peculiar economic conditions: on the one side whole populations are being largely supported by the money sent from relatives in America, on the other side a new form of usury is being created to supply passage money and landing capital to emigrants. The bad economic conditions are accompanied by social and political degeneracy, as exemplified in criminal societies such as the Mafia and Camorra (qq.v.).

With the development of factory industry and the growth of towns a large body of industrial workers was created whose dissatisfaction with their wages and conditions of labor has been the source of constant industrial disturbances. This industrial dissatisfaction combined with the agrarian unrest has found expression in a strong Republican movement, whose growing strength has been shown in frequent strikes and riots both industrial and agrarian, whereas the attitude of the government has grown continually more lenient. A serious agrarian insurrection in Sicily in 1893–94 was suppressed arbitrarily by Crispi. In 1898 riots occurred at the funeral of the Radical leader Cavallotti in Milan and Rome and spread quickly over several provinces. In the so-called "Three Days" at Milan 82 people were killed. The Zanardelli-Giolitti ministry was the first cabinet which abstained from the former attitude of repression and adopted the policy of nonintervention in labor troubles, which was severely strained by the gas strike in Turin in 1902 and a threatened general strike of railway men. The measures taken by the government in the face of a general strike in Rome in 1903 were applauded by the Conservatives and resented by the Extreme Left, which brought about the downfall of the cabinet by starting an agitation against the Czar's proposed visit to Italy and by preferring charges of maladministration in the Navy Department. An attempted reconstruction of the cabinet was met by the Radicals by the appointment of a committee of resistance to declare a general strike and bring about the cabinet's resignation in 1904. The threat was not taken seriously, and the general strike broke out, paralyzing the cities of Milan, Venice, Genoa, and Turin, and disturbing Rome, Florence, and Naples. Railway lines were destroyed, and flags were torn down in denunciation of the monarchy. Giolitti succeeded in mastering the situation by a clever handling of the troops without committing bloodshed. The terrorized middle class, however, joined hands with the clergy, and in the next elections radicalism was completely routed. There have been recurrences of industrial and agrarian disturbance since that time, especially in 1907, 1908, 1910, 1911, and 1914; but, although the social aims of these movements have remained as serious as before, the position of the monarchy seems to be less threatened. Victor Emmanuel I died Jan. 9, 1878, and was succeeded by his son Humbert (Umberto), who inherited his father's courage but not his genial

personality and force of character. He was well-meaning and loyal to his coronation oath; but his political outlook was a narrow one, and towards the end of his reign he suffered a small clique of military and reactionary politicians to blind him to the signs of the times. Moving freely among the people in a rather excited period regardless of warning, he was murdered, on July 29, 1900, at Monsa by Angelo Bresci, an Italian anarchist from America. The Prince of Naples, who ascended the throne as Victor Emmanuel III, while steadily opposing any reduction in armaments, has frankly accepted the more enlightened policy that the country demanded and has by this and by the simplicity of his manners and the sincerity of his character improved the somewhat sinister outlook for monarchical rule in Italy.

At the same time a certain amount of democratic progress has been peacefully won by the electoral reforms of 1881 and 1912, which considerably enlarged the electorate. The reform of 1912 granted the franchise to illiterates who had reached the age of 30 and had performed military service. The elections held in 1913 on the basis of this reform indicated a notable movement of the Italian people in the direction of the programmes and the principles of the radical parties—the Liberals having won 16, the Socialists 40, votes.

Other domestic reforms have been the nationalization of railways, attempted somewhat rashly in 1905 and not without some economic maladjustment. More successful in the field of public finance proved Luzzatti's conversion of the debt from 4 to 3½ per cent; but the serious problem of taxation, involving the questions of securing a general relief from overtaxation and a more equitable regional distribution of taxes, the south being at present heavily overtaxed, has proven difficult, owing to the large expenditure for armaments, in which Italy has tried to keep a middle course between the great Powers and the small.

Colonial Policy. The colonial policy of Italy started as a consequence of the forward policy of France in Africa and of England in Egypt. Secured by the Triple Alliance from attack by land and by agreement with Great Britain from attack by sea, the government decided upon a forward policy in Africa. Early in 1885 Beilul and Massowah were occupied by an Italian expedition, but subsequent operations on the mainland evoked protests from King John in Abyssinia. In the anarchy that followed the death of the latter, in 1889, one of the Abyssinian pretenders was promised Italian aid against his rival in an ambiguous treaty which was interpreted by the Italian government to involve the suzerainty of Italy over Abyssinia, and money was coined with the impress of King Humbert wearing the Ethiopian crown. In 1890 the African possessions were consolidated into a colony, Eritrea. Led on by the first brilliant victories over the dervishes in 1893 and 1894, Crispi planned a vast African Empire; but in 1896 an Italian expeditionary force met with complete disaster at Adowah, and the suzerainty over Abyssinia had to be abandoned. In February, 1890, an Italian protectorate was established over the Somali Coast south of British Somaliland. After unsuccessful attempts by two private companies to administer the colony, the government took over the whole control in 1905. In 1906 an agreement was signed by Italy, France, and Great Britain. It was also with the connivance of France and Great Britain that Italy undertook the annexation of Tripoli in 1911. The international situation being favorable to Italian action, the government took advantage of the agreements relating to north Africa concluded with Great Britain and France, and an ultimatum was delivered in Constantinople September 27 which gave the Porte 48 hours in which to accept the occupation of the provinces of Tripoli by Italian troops and an Italian administration, with the provision that the Sultan's sovereignty should be secured and an annual subsidy paid by the new protectorate to the Porte. The Porte declined, and Italy proceeded to the occupation and blockade of the Libyan coast, while the Turks retreated into the interior, taking up the offensive and harassing the Italian lines. Austria deprecated any attack on the eastern coast of the Adriatic, and Russia took the same position with respect to the Dardanelles. As a result of the Italo-Turkish War, Turkey bound herself to withdraw her troops from Tripoli, but did not recognize the sovereignty of Italy. She was to have a representative to look after the interests of the Mohammedans in Tripoli, while Italy pledged herself to restore to Turkey the Ægean Islands occupied by the Italian troops and to pay that part of the Ottoman public debt which is guaranteed by the revenue of Tripoli and the Cyrenaica.

Foreign Policy. In foreign policy the prevailing tendency of Italian diplomacy in the decades following the unification of Italy was in the direction of an alliance with Germany. This was due in part to the attitude of France, because, until the defeat of the clerical and monarchical parties, there was always the danger of a French reoccupation of Rome. Furthermore, the energetic naval policy of Italy was held by France to endanger her interests in the Mediterranean. Italian ambitions with regard to Tunis, first stimulated by Austria and Russia at the Congress of Berlin (1878), were frustrated by the French occupation of that region as a colony in 1881 with the connivance of Great Britain and Germany. As the latter fact was unknown at the time in Italy, Bismarck contrived to utilize the strong resentment of Italy against France to bring about a rapprochement between Italy and Austria in spite of the strong Irredentist (see IRREDENTISM), anti-Austrian feeling in Italy, and, May 20, 1882, the famous Triple Alliance was concluded which has been renewed at various periods and for the last time in 1912 for 1912–17.

Relations with Austria, which had always been difficult on account of the movement for the restoration of the Italian provinces still held by Austria and the conflict between Austrian clericalism and Italian anticlericalism, were complicated still further after 1897 by the Italian distrust of the Balkan policy of Austria. The Austrian annexation of Bosnia and Herzegovina in October, 1908, agitated public opinion greatly, and the storm of indignation was only reduced slightly by economic arrangements for Italian railways in the Balkans. The menace of an Austrian Albania which often arose was settled by the agreement between the Powers for the preservation of Albania's independence in 1912. But the efforts made by Germany to reconcile Austria and Italy proved only of temporary value, and upon the outbreak

of the war between the Triple Entente and the Dual Monarchy and Germany in 1914 loud demands were made upon the Italian government to fulfill the wishes of the Italian Irredentists and take Triest and Trent for Italy. As Italy had not been consulted in the negotiations leading to the Great War of 1914, she decided to remain neutral and not join Germany and Austria. This attitude of Italy was of great value to France because no troops were necessary to protect the Italian frontier. See WAR IN EUROPE.

On the other hand, the relations between Italy and the western European Powers have gradually improved in recent years. Since the close of the tariff war with France in 1898 and after the agreement of France on the Italian policy in Tripoli, a strong current of popular opinion expressed itself in sympathy with closer relations with France. As a result, agreements on Mediterranean and African affairs between Italy, France, and Great Britain were arranged, and in 1902 the French Ambassador at Rome declared that a conflict between the two Latin nations was no longer possible. The visit of President Loubet to Rome in 1904 confirmed these friendly relations, and Italian diplomacy supported France at the Algeciras Conference, although this antagonism to the aims of Germany in Morocco was rather resented by the latter. This same popular sentiment for France seems to have had a strong influence on the attitude of Italy at the outbreak of the European War of 1914. See NATIONAL COATS OF ARMS; NATIONAL FLAGS.

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ITALY, Free Church in, known also as the Evangelical Italian Church. An organization established by the Italian patriot and reformer Alessandro Gavazzi (q.v.) in 1870. He brought together 23 scattered independent congregations in a General Assembly. In 1874 a confession of faith was prepared, and the name Free Church in Italy was adopted. This confession was a declaration of the principles held by all evangelical Christians, and the Free Church is in harmony with the Waldensian and other Protestant churches. The constitution is partly Presbyterian and partly Congregational or Independent, the General Assembly being composed of deputies from the churches, and each church independent of all the others in local affairs. The General Assembly appoints the committee that superintends the entire work, and the funds collected by the commissioners are remitted directly to that committee. In 1891, by royal decree, the title Chiesa Evangelica Italiana was given to the church. It has spread rapidly. The church is divided into 10 districts, embracing about 40 congregations and 2000 communicants. It maintains elementary and Sunday schools. Among its buildings is the old church of San Jacopio in Florence, bought and presented by friends in Great Britain. The theological seminary, in which Gavazzi was professor of sacred rhetoric, was originally near the Vatican in Rome, but in 1891 was removed to Florence. The city of Florence gives an annual bounty to one or more of the Free Church schools.

ITASCA, ī-tăs'kȧ, Lake (so named by Henry R. Schoolcraft, from the barbarous Lat. *veritas caput*, true head or source; Indian name, *Omuskosesagauegoum*). The largest of several small lakes, lying in a basin in Beltrami Co., Minn. (Map: Minnesota, B 3). It consists of three long, narrow arms—one extending to the north, from which emerges the Mississippi River (q.v.); one to the southeast; and one to the southwest. The arms are of about equal length; their combined shore length is about 13 miles, and the area of the lake is 1130 acres. The lake was discovered in 1832 by Henry R. Schoolcraft (q.v.). Itasca State Park, a tract including 19,700 acres, was created by an Act of the Minnesota State Legislature in 1891. For a detailed description of this region and its history, consult J. V. Brower, *Itasca State Park* (St. Paul, Minn., 1904).

ITA'TA AFFAIR. In American history, an affair rising from the seizure by the United States in 1891, for an alleged infraction of her neutrality laws, of a vessel, the *Itata*, owned by insurgents against the government of Chile. In April, 1891, this vessel was ordered to California for the purpose of receiving a large quantity of arms and munitions which an agent of the insurgent party had purchased in the United States with a view to sending them to Chile for the use of the insurrectionary forces. During her voyage to California the *Itata* had on board several small cannon and a few old muskets and at a Chilean port took on board 12 soldiers to serve as stokers. At Cape San Lucas the cannon and ammunition, together with the arms and uniforms of the soldiers, were packed in the hold of the vessel. The arms and ammunition purchased in New York, having been shipped to San Francisco, were loaded on a schooner, afterward were transferred to the *Itata* off the southern coast of California, and in due time the vessel proceeded on her way to Chile. By direction of the Attorney-General of the United States an effort had been made to detain her, on the ground that the neutrality laws of the country were being violated, but she succeeded in escaping from the officers left in charge of her. The cruiser *Charleston* was then sent in pursuit. The *Itata* was overtaken on June 4, was compelled to surrender to Rear Admiral Brown, and was given over to the custody of the United States District Court at San Diego for trial, on the charge of violating the neutrality laws of the United States. Upon trial it was held that the facts, as set forth above, did not constitute the fitting out of a hostile expedition against a government with which the United States was at peace, and that the mere purchase and transportation of arms to a party of insurgents in a foreign country in the ordinary course of trade was not a violation of the neutral duty of the United States or a violation

of her neutrality laws. The affair aroused considerable excitement in the United States, and loud complaints were made of the manner in which the authority of the United States was defied by the officers of the vessel at San Diego.

ITATIAIA, ē'tà-tyī'à. The highest mountain in Brazil. It is 9739 feet high.

ITCH (AS. *gyċþa*, from *giccan*, OHG. *jucchan*, Ger. *jucken*, to itch), also called SCABIES and PSORA. A parasitic disease of the skin, due to the presence of the larvæ or mature specimens of the *Acarus* (or *Sarcoptes*) *scabiei*, which burrows into the integument. The lesions are caused more by the scratching of the patient than by the presence of the insect. The resulting eruption is multiform, papules, vesicles, and large enchymatous pustules occurring, besides crusts and scratch marks. In mild cases or early in an attack the symptoms are itching, which is worse at night, and a few papules or vesicles. The diagnosis is established by the discovery of the *caniculus*, or burrow, left by the female insect in the skin in the course of depositing her eggs. This appears as a minute, dotted, brownish-black line, curved or sinuous, from ⅛ to ½ of an inch long, rarely several inches long. These burrows may easily be seen by rubbing a little ink over the surface and then wiping the skin clean. The male insect remains on the surface. The female enters the skin at once and may advance $\frac{1}{20}$ of an inch a day. See ITCH MITE.

Scabies is said by Bulkley to be fairly common in the United States, forming 4.05 per cent among 200,000 cases of skin disease collected by the American Dermatological Association. It is more common in Europe, especially among the poor and uncleanly, though found in all classes. The disease is conveyed by direct bodily contact or by means of infected clothing or bed linen. Though other places may be first attacked, the earliest lesions are commonly found between the fingers and on the palmar surface of the wrist. The genital region, abdomen, thighs, anterior fold of the axilla, as well as all parts where there are warmth and pressure (as the waist and buttocks), are generally attacked, and in women the neighborhood of the nipples is early invaded by the eruption. The eruption may be looked for wherever the skin is thin. The dermatitis resulting from the parasite and from the scratching caused by the itching is a simple inflammation of the skin, resembling that caused by heat, cold, or mechanical irritants. The entrance of microörganisms into the abraded surface may cause pustular lesions. The treatment for the condition is first directed to killing the insects and their eggs. This result is effected by the use of sulphur. Naphthol, ichthyol, oil of cade, and carbolic acid are also used to allay the itching and reduce the inflammation. Reinfection from the patient's own gloves, muffs, bedding, etc., is possible—an accident which may be obviated by baking or boiling the articles.

DHOBIE ITCH, also called *Indian*, *Chinese*, or *Burmese ringworm*, is a form of tinea which attacks the opposite and inner sides of the thighs and the region of the genitals, the folds of the buttocks, the skin under the breasts or in the axilla, causing great suffering from the extreme itching and tenderness which accompany the appearance of the eruption. This variety of tinea (*Tinea trichophytina cruris*) occurs commonly in warm climates, though found in the United States. The treatment, which seldom fails, is the use locally of genuine sulphurous acid. The application of this remedy is to be followed by an ointment of tar and zinc, or compound tincture of green soap. See also BARBER'S ITCH; PRURIGO; RINGWORM.

ITCH. A parasitic disease of horses, dogs, and other animals. See MANGE.

ITCHANG. See ICHANG.

ITCHEN, īch'en. A growing town and suburb of Southampton, England, on the estuary of the Itchen. Pop., 1901, 13,097; 1911, 19,484.

ITCH MITE, *Acarus scabiei*, or *Sarcoptes scabiei*. Although the itch was undoubtedly known both to the Greeks and Romans, there is no certain evidence that a mite was recognized as the cause of the disease earlier than by Avenzoar, an Arabian physician of the twelfth century. Throughout the Middle Ages and till the nineteenth century the necessary connection between the disease and the mite was universally recognized. During the early part of the last century the existence of the itch mite was distrusted, until in 1834 Renucci, a Corsican student, demonstrated the existence of the creature. A case reported in 1892 by Dr. Robert Hessler, of Indianapolis, attracted much attention. The skin of the patient was estimated to contain 7,000,000 eggs and 2,000,000 mites.

The itch mites of the lower animals were formerly considered to be distinct from the species affecting human beings; but Raillet, the latest authority, believes them to be only varieties, and it seems therefore that human beings may be infested from certain of the domestic animals. The true human itch is *Acarus scabiei*, now known as *Sarcoptes scabiei hominis;* the Norway itch, *Sarcoptes scabiei crustosæ;* that of the horse, *Sarcoptes scabiei equi;* of the sheep, *Sarcoptes scabiei ovis*, etc. All stages of the parasite occur on the host, upon which it is absolutely dependent for existence.

The adult female mite is considerably larger than the male; it is visible to the naked eye and forms a roundish, grayish-white corpuscle, not unlike a starch granule; it is about ⅓ of a line in length and $\frac{1}{7}$ in breadth. When seen under the microscope, it presents a truncated tortoise-like shape and is seen to be studded with hairs and bristles. The head terminates in two pairs of mandibles, and these mandibles afford good characteristic distinctions of the species. The males are much scarcer than the females.

Consult Raillet, *Zoölogie medicale* (Paris, 1895), and Osborn, *Insects Affecting Domestic Animals* (Department of Agriculture, Washington, 1896). See ITCH; ACARUS FOLLICULORUM.

ITCHWEED. A North American marsh plant with poisonous properties. See HELLEBORE.

ITENEZ, ē-tā'nāz. A river of Brazil. See GUAPORÉ.

ITH'ACA. An island in the Ionian Sea, the home of Ulysses (q.v.). See ITHAKI.

ITHACA. A city and the county seat of Tompkins Co., N. Y., at the head of Cayuga Lake, 56 miles northwest of Binghamton, on the Delaware, Lackawanna, and Western, the Lehigh Valley, and the Central New York Southern railroads, and on a branch of the New York State Barge Canal (Map: New York, D 6). The State in 1913 constructed in Ithaca a canal terminal basin. The city's situation is one of natural beauty. In addition to the scenery of Cayuga Lake that of numerous

gorges and waterfalls in the vicinity adds to its attractions, the most noted of the falls being Ithaca, Triphammer, Buttermilk, Enfield, and Taughannock. The last, 215 feet in height, is the highest waterfall in the United States east of the Rocky Mountains. Cornell University (q.v.), which includes the New York State College of Agriculture and the New York State Veterinary College, is picturesquely situated on East Hill, about 400 feet above and overlooking the lake and the city. Other features are preparatory schools, the Cornell Library and reading room (founded by Ezra Cornell, q.v.), Ithaca Conservatory of Music, the United States Weather Bureau Station, and Renwick Park. Ithaca is in a productive farming and fruit-growing region. Its industries include the manufacture of chains for power transmission, guns, castings, calendar clocks, advertising signs, paper, gasoline engines and boats, bricks, and cement. There are also several plants for the manufacture of salt, which is derived from driven wells. The city owns and operates the water works. Under the charter of 1909 the government is vested in a mayor biennially elected, a council, a board of public works, and administrative officials, who, with the exception of the board of education, which is chosen by popular election, and of the city clerk, who is appointed by the board of public works, are appointed by the mayor. Among the public buildings are a city hospital, homes for aged women and children, and the public library. There are a charities association and a civic association organized for the purpose of affording playgrounds for children and of making the streets and parks of the city more attractive. Pop., 1890, 11,097; 1900, 13,136; 1910, 14,802; 1914 (U. S. est.), 15,510; 1920, 17,004. Settled in 1789, Ithaca was variously called The Flats, The City, and Sodom, until about 1806, when Simeon De Witt gave it its present name. In 1821 it was incorporated as a village and in 1888 was chartered as a city. At Buttermilk Falls, near Ithaca, stood the Catawba Indian village Coreorgonel, built about 1753 and destroyed in 1779 (September 24) by a division of Sullivan's army. A bronze tablet now marks the location of one of Sullivan's encampments. Ithaca was for many years an important canal port because of its early connection with the Pennsylvania coal fields by the Cayuga and Susquehanna Railroad and its situation at the head of Cayuga Lake. It was a port of lading for barges carrying coal cargoes westward on the Erie Canal. Its traffic declined as through lines of railroad were built. Consult Selkreg (ed.), *Landmarks of Tompkins County* (Syracuse, 1894).

ITH'AKI (formerly *Ithaca*, Gk. *Ἰθάκη, Ithakē*). One of the Ionian Islands, situated east of Cephalonia, from which it is separated by a narrow channel (Map: Greece, B 5). It is oblong in shape and has an area of about 38 square miles. Its surface is generally mountainous, rising in the northern part to an altitude of 2600 feet. The coasts are well indented, and the mountain slopes are covered with vines, olives, and other southern fruits. Besides the production of currants and oil, the natives also engage in seafaring and fishing. Administratively Ithaki forms a part of the Greek Nomarchy of Cephalonia and had in 1907 a population of 13,000. The chief town, Vathi, is the seat of a Greek bishop and in 1907 had a population of 6837. Ithaki is celebrated as the home of Ulysses, and some cyclopean ruins near Porto Molo are popularly reputed to be the remains of the castle of Ulysses.

ITHOME, ĭ-thō'mē (Lat., from Gk. *Ἰθώμη*). In Greek mythology, one of the nymphs by whom the infant Zeus was nursed. The Messenian hill and fortress of the same name, known now as Vurkano, were called after her. See MESSENIA. Consult Pausanias, 4, 33, 1, with the notes on the passage by Metzig-Blümner.

ITHURIEL, ĭ-thū'rĭ-ĕl. 1. In Milton's *Paradise Lost*, one of the two angels sent by Gabriel to discover Satan, who had secretly entered the Garden of Eden to beguile Adam and Eve. Ithuriel accomplished this by his magic spear, which revealed deceit. 2. In Klopstock's *Messiah*, the guardian angel of Judas Iscariot, and, after his fall, the second angel of Simon Peter.

ITIN'ERANCY (from *itinerant*, from Lat. *itinerari*, to journey, from *iter*, OLat. *itiner*, journey, from *ire*, Gk. *ἰέναι, ienai*, Skt. *i*, to go). A term applied to the system of limited pastorates in the Methodist church. It originated with Wesley. To accomplish what he considered necessary for the revival of religion in England, he traveled from town to town and, remaining but a day or two in a place, adopted the plan of commissioning a few competent men to preach in the societies which he had organized. These helpers, as he called them, rapidly increased; but, the societies increasing still more rapidly, he found it necessary to extend and methodize their labors and accordingly appointed them to definitive circuits for a year. At first the whole country was divided into seven of these itinerant districts, and at Wesley's death there were 72 in England, 3 in Wales, 7 in Scotland, and 28 in Ireland. The circuits were long, and the preachers were changed from one circuit to another every year or two. The system was well adapted to conditions in America among the feebler churches and generally among the frontier settlements of the West. In course of time it came to be looked upon with disfavor by many in the Methodist Episcopal Church North of the United States. The length of time that a minister might remain in one place was lengthened from six months to a year, then to two years, next to three years, and then five years, and at the General Conference held in Chicago in 1900 the time limit was removed; but preachers are still appointed from year to year by the bishop.

ITINERA'RIUM. See ITINERARY.

ITIN'ERARY (Lat. *itinerarium*, from *iter*, OLat. *itiner*, journey). The name given by the Romans to a table of the stopping places between two cities of importance, with the distances from one to another. The itineraries of the ancients contribute much to our knowledge of ancient geography, and all seem to date from the later period of the Roman Empire. Of these the most important are the *Itineraria Antonini* and the *Itinerarium Hierosolymitanum*. The *Itineraria Antonini* are two in number, the *Itinerarium Provinciarum* and the *Itinerarium Maritimum*—the former containing the routes through the Roman provinces in Europe, Asia, and Africa; and the latter the principal routes of navigators, who then sailed mainly along the coasts. They take their name from Antoninus Caracalla, by whom they were first published, as corrected up to his time, but they seem to have been originally prepared at an earlier date. The *Itinerarium Hierosolymitanum*,

or *Burdigalense*, was drawn up 333 A.D., for the use of pilgrims from Burdigala (Bordeaux) to Jerusalem. Among other examples is the *Itinerarium Alexandri*, in which the route of march of Alexander the Great is laid down; this was prepared in connection with the expedition of Constantius against the Persians (340–345 A.D.). A collected edition of ancient *Itineraria* was published in Paris in 1845 by D'Urban, *Recueil des itinéraires anciens*. Besides, the Antonine and Jerusalem itineraries are edited by Parthey and Pinder (Berlin, 1847); the *Itinerarium Alexandri* by Volkmann (Naumburg, 1871); that of *Antoninus Placentinus* by Gildemeister (Berlin, 1889). The itineraries thus far named belong to the *Itineraria Adnotata* or *Scripta;* they are in the nature of books, without maps. The famous so-called *Peutingerian Table* (q.v.) should be mentioned here as the chief example of the *Itineraria Picta* (Illustrated Itineraries); it is a traveler's map of all the great highways of the Roman Empire. It exists in a manuscript of the thirteenth century, but was originally compiled in the third or fourth century A.D., and is published by Miller, *Die Weltkarte des Castorius* (Ravensburg, 1888). At the mineral springs *Aquæ Apollinares*, near Vicarello in Tuscany, were found four silver cups in the form of milestones, inscribed with lists of the stopping places on the journey from Gades (Cadiz) to Rome. See ANTONINUS, ITINERARY OF.

IT IS NEVER TOO LATE TO MEND. A novel by Charles Reade (1856).

ITIUS PORTUS, ĭsh'ĭ-ŭs pôr'tŭs. The place whence Cæsar (54 B.C.) set out on his second expedition to Britain, probably the modern village of Wissant or Duessant, on the coast of France, near Boulogne. Consult T. Rice Holmes, *Ancient Britain and the Invasions of Julius Cæsar* (Oxford, 1908), and "Last Words on Portus Itius," in *The Classical Review*, vol. xxiii (London, 1909); the latter article corrects and supplements the earlier discussion.

ITO, ē'tō, HIROBUMI, MARQUIS (1841–1909). A Japanese statesman, born in the Province of Choshu. Under the patronage of the progressive daimyo Mori, he, with Inouye (q.v.) and others, eluded the vigilance of the Yeddo spies and in 1861 reached England, where they spent two years as students, but hurried home to dissuade the Choshu officers from war with the combined fleet of British, United States, Dutch, and French men-of-war at Shimonoseki (1864). Though unable to prevent hostilities, he assisted in the negotiations which followed, and helped to open the eyes and set the faces of his beaten clansmen to a new goal, the unity of all Japan under the Mikado, with enlarged powers and with new forms of civilization patterned after Western models. In 1871 he studied the coinage system of the United States, and his report resulted in the adoption of a decimal system of money and the establishment of the mint at Osaka. As one of the vice ambassadors, he accompanied Iwâkura (q.v.) round the world in 1872, in an effort to obtain from the Powers some modification of the treaties. He was made Minister of the Interior in 1878, and in 1882 visited Europe and the United States for the purpose of familiarizing himself with representative institutions preliminary to the establishment of a parliamentary régime in Japan. In 1885 the cabinet was reconstructed according to modern ideas, and in 1886 Ito became Minister President of State and carried out radical economic reforms. In 1888 he retired to prepare the long-promised written constitution, and on Feb. 11, 1889 (the anniversary of Jimmu Tenno), this magnificent instrument, more liberal in its provisions than some European governments allow, was promulgated. Ito is well called "The Father of the Constitution," and his volume of *Commentaries*, in illustration and defense of Japan's fundamental law, is worthy to rank with the *Federalist*. As Premier, he carried the nation through the Chino-Japanese War of 1894–95, and, on resigning in favor of the Yamagata régime in 1896, was created Marquis. He was again Premier from January to June, 1898, and from October, 1900, to June, 1901, and in the last year traveled in Europe and the United States, receiving the degree of LL.D. from Yale University. In St. Petersburg he is believed to have labored for an understanding with Russia and, failing, set on foot negotiations which resulted in the alliance with Great Britain in 1902. In 1903 he became President of the Privy Council. After the outbreak of the Russo-Japanese War he went to Korea as special adviser to the Emperor in accordance with the treaty of alliance between the two countries concluded Feb. 23, 1904. During the progress of the war the advice of Marquis Ito was largely effective in shaping the course of diplomatic events. To his influence was generally attributed the action of the government in concluding peace at Portsmouth on terms profoundly distasteful to the great mass of the Japanese nation. In November, 1905, he negotiated with Korea a convention by which the foreign affairs of that country were placed under the control of a Japanese resident general, receiving the appointment in 1906. On Oct. 26, 1909, he was assassinated by a Korean at Harbin. Consult: J. W. Foster, "Marquis Ito, the Japanese Statesman," in *International Quarterly*, vol. ix (New York, 1904); G. T. Ladd, *In Korea with Marquis Ito* (ib., 1908); J. H. Longford, "Reminiscences of Prince Ito," in *National Review*, vol. liv (London, 1909); K. Nakamura, *Prince Ito, the Man and Statesman* (New York, 1910).

ITO, YUKO (or SUKENORI), COUNT (1843–1914). A Japanese naval officer, born in Satsuma Province. He studied at the Kaisei Naval College in Tokyo and entered the Imperial navy in 1868. In the civil war of 1877 he commanded the *Nisshin*. He was promoted captain in 1882, rear admiral in command of the standing squadron in 1886, and vice admiral and chief of the Yokosuka naval station in 1892. In the war with China, as commander in chief of the combined squadron, he fought the battle of the Yalu. He was made Viscount in 1895 and Count in 1907, having been chief of the naval general staff from 1895 through the war with Russia and being appointed fleet admiral in 1905.

ITONAMAN, ē'tō-nä'man. A stock of northeast Bolivia, South America. Consult Chamberlain, in *Journal de la Société des Americanistes de Paris*, vol. vii (n. s., Paris, 1910).

ITRI, ē'trē. A town in the Province of Caserta, Italy, 90 miles southeast of Rome, about 6 miles northwest of Formia. It has a ruined castle and houses built from the masonry of the ancient Via Appia. It was the native place of Fra Diavolo, whose history is echoed in Auber's opera and in Washington Irving's *The*

Inn of Terracina. Cicero was murdered near Itri, and a large tower on the outskirts of the town is supposed to be his tomb. Pop. (commune), 1901, 5797; 1911, 6077. Consult Baedeker, *Southern Italy and Sicily* (16th Eng. ed., Leipzig, 1912).

I-TSING, ē'tsĭng', or YI TSING (635–713 A.D.). One of the three great Chinese Buddhist travelers in India. The names of the other two were Fa-Hien and Hiuen Thsang (see HWEI-SANG). I-Tsing was born in the year 635 at Fan-Yang, near Peking, and he became a devoted follower of the Buddhist religion. In 671 he went on a pilgrimage to India in order to journey through the holy land of Buddhism, and he spent nearly 25 years visiting scenes connected with Buddha's life, at the same time collecting texts and material relating to the faith. He returned to China in 695 and devoted the remainder of his life to translating, in more than 100 volumes, the treatises and books which he had gathered. In this way he became the founder of a school for the study of Buddhist literature in China. His work is of special importance also as a record and description of India and the Malay Archipelago at the time when he lived. His death occurred in 713. His account of India has been translated by J. Takakusu, *A Record of the Buddhist Religion as Practiced in India and the Malay Archipelago* (Oxford, 1896). Another work giving an account of the travels in India of 60 Chinese pilgrims of the seventh century B.C., was published by Chavannes, *Les religieux éminents qui allèrent chercher la loi dans les pays d'occident* (Paris, 1894).

ITSUKUSHIMA, ĭt'sụ-kụsh'ē-mȧ. See MIYAJIMA.

ITÚ, ē-to͞o'. A town in the State of São Paulo, Brazil, situated in a fertile region on the Tieté River. It has a Franciscan monastery, a hospital, iron and bronze foundries, cotton manufactures, and a trade in coffee; it is one of the most important industrial centres of Brazil. Pop., 11,000.

ITUCALEAN, ē-to͞o'kȧ-lā'an. A stock on Rio Chambera, Ecuador and Brazil, South America. Consult Chamberlain, in *Journal de la Société des Americanistes de Paris,* vol. vii (n. s., Paris, 1910), and Beuchat and Rivet, in *Zeitschrift für Ethnologie* (Berlin, 1909); the latter suggest that the Itucale may be Panoan.

ITURÆA (ĭt'ū-rē'ȧ) **AND THE ITURÆANS,** ĭt'ū-rē'anz. A border people and district between Syria and Arabia, referred to frequently by classical writers, by ancient historians, and mentioned once in the New Testament (Luke iii. 1). The people doubtless go back to Jetur, one of the sons of Ishmael (Gen. xxv. 15; cf. 1 Chron. i. 31, v. 19). Because of their seminomadic character they had for a long time no permanent region of abode, so that it is not until the fourth century of the Christian era that we find any reference to a specific district, *Ituræa*—Luke's phrase (iii. 1) describing an undefined border region, partly Ituræan and partly Trachonitic, as in Acts xvi. 6. At the same time these people moved within a somewhat defined territory, located in the Anti-Lebanon country, with Chalcis as their capital —a territory which in 105 B.C. spread southward to the borders of Galilee and doubtless southeastward towards Trachonitis, as indicated in the Lukan phrase (iii. 1). They were Arabians, whose old home was to the northwest of Medina, but who at a very early period moved northward in search of new quarters. Some time before the exile they came in conflict with Israelites east of the Jordan. In the second century B.C. Aristobulus I, King of Judæa, conquered some of their bands and annexed their territory to Judæa. Their first-known ruler was Ptolemy, son of Mennæus (c.88–40 B.C.). He controlled the valley between the Lebanons, and his influence extended nearly to Damascus. Later he was conquered by Pompey, from whom he secured immunity by a payment of 1000 talents. In 40 B.C. he was succeeded by his son, Lysanías, whom Mark Antony confirmed in his position, but afterward (36 B.C.), at Cleopatra's instigation, put to death, and gave his dominions to the cruel and covetous Queen. The extensive domain was leased to Zenodorus, as tetrarch, but, because of his implication in the robber raids of Trachonitis, a part of his tetrarchy was taken from him and given to Herod, a grandson of Herod the Great. Another portion, with its capital at Abila (see ABILENE), was placed under the rule of the Lysanias mentioned in Luke iii. 1. On the death of Zenodorus (20 B.C.) what remained of his domain was added to Herod's kingdom. At Herod's death (4 B.C.) it fell to his son Philip (Josephus, *Ant.,* xv, 10, 3), who is called by Luke (iii. 1) tetrarch of the Ituræan and Trachonitic region. Philip held this region until his death in 34 A.D. In 37 A.D. Caligula gave the two tetrarchies to Agrippa I, with the title of King. Agrippa was confirmed in this possession by Claudius (41 A.D.) and secured from him in addition the entire kingdom of his grandfather Herod. On Agrippa's death (44 A.D.) his dominion was incorporated into the Roman Province of Syria. The Ituræans were warlike, famed as archers, and from the days of Cæsar many of them served in the Roman armies. Cicero accused Mark Antony of seeking to terrify the Senate with his Ituræan guards (*Philippics,* ii, 19, 112; xiii, 18), and cohorts of Ituræan troops are frequently mentioned in the inscriptions of the first and second centuries. Consult Schürer, *History of the Jewish People in the Time of Jesus Christ,* vol. i (New York, 1896), and G. A. Smith, *Historical Geography of the Holy Land* (11th ed., ib., 1904).

ITÚRBIDE, ē-to͞or'bē-dȧ, AGUSTÍN DE (1783–1824). Emperor of Mexico. He was the son of a nobleman of Navarre, who emigrated to New Spain shortly before the birth of his son, who was born at Valladolid (since 1828 known as Morelia), Sept. 27, 1783. Don Agustín entered the army in 1798 and during the insurrection of 1810 fought for the Spanish cause. He was advanced to the position of commander in chief of the provinces of Guanajuato and Michoacan in 1815, but this post was soon taken away from him.

From 1816 to 1820 Itúrbide was out of the military service. When in this latter year, and by order of the Cortes, the constitution of 1812 was proclaimed, the Viceroy gave him command of the Spanish Army of the South, with orders to proclaim the absolute power of Ferdinand VII; but Itúrbide began a series of intrigues with the revolutionary leaders, which culminated in his proclamation of Feb. 24, 1821, the so-called Plan of Iguala, wherein complete independence of Spain under a prince of the royal family was offered to the people. This plan rapidly gained adherents. From a small

force of some 2500 men, with which he had left Mexico in November, 1820, his army had increased, by the spring of 1821, to 6000. He gained possession of Vera Cruz and Puebla, and on September 21 entered the city of Mexico at the head of 16,000 men. The Viceroy signed a treaty with the insurgents, providing for the adoption of the Plan of Iguala, and stipulating, in addition, that in case of the refusal of the princes of the royal family to occupy such a position, the Mexicans should choose an emperor for themselves. A regency was formed, with Itúrbide at its head, and he was at the same time appointed commander in chief of the army. A national congress was convened at Mexico. The new government avoided harsh measures and succeeded in establishing peace, but dissensions broke out in the regency, the troops became clamorous for pay, and the congress refused to meet their wishes. Itúrbide turned to the monarchical party and was by them proclaimed Emperor on May 18, 1822. He was crowned, with the title of Agustín I, July 21, 1822. Harsh measures of repression led to open rebellion. On Dec. 2, 1822, Santa Anna, colonel of a regiment stationed at Vera Cruz, declared for a republic, and his example was followed by Guerrero and Bravo in the south. Itúrbide saw himself deserted by those in whom he had placed most confidence, and sought to make his peace with the country by summoning the congress which he had shortly before dissolved. His influence, however, had disappeared, and in March, 1823, Itúrbide offered his abdication to the congress. He received a pension of $25,000 and was ordered to reside in Italy. He accordingly left Mexico, spent the next year in Italy and England, and in May, 1824, sailed for Mexico from London, unaware that the Republican government had outlawed him, and led by the representations of his partisans to believe that Mexico would rise in arms to welcome him. He landed at Soto la Marina, July 14, but was immediately arrested, taken before the provincial congress of Tamaulipas, condemned as a traitor by that body, and shot in the public square of the town of Padilla, July 19. The Mexican government provided a pension for his wife, who resided for a number of years in Philadelphia, died there, and was buried in St. John's (R. C.) Church. His grandson, Agustín, was adopted by the Emperor Maximilian as his heir in 1864. Consult, for a full account of Itúrbide, with descriptive lists of authorities cited, H. H. Bancroft, *History of Mexico*, vol. iv (San Francisco, 1890); Agustín de Itúrbide, *Statement of Some of the Principal Events in the Public Life of Agustín de Itúrbide*, translated by M. J. Quin (London, 1824; Fr. trans. by J. T. Parisot, Paris, 1824); C. M. de Bustamente, *Historia del Emperador Itúrbide hasta su muerte, y sus consecuencias, y establecimiento de la República Federal* (Mexico, 1846). See MEXICO.

ITURUP, ē'tụ-rōōp'. An island of Japan. See ETOROFU.

I'TYS (Lat., from Gk. Ἴτυς). In classical mythology, the son of Tereus and Procne, killed by his mother and served in a dish to his father. See PHILOMELA.

ITZÁ, ê-tzä'. An important people of Mayan stock, occupying the country about Lake Petén, in northern Guatemala. Their dialect is the Maya proper. The ruined city of Chichén-Itzá (q.v.) in Yucatan takes its name from them, and, according to their own tradition, they removed thence on the breaking up of the Maya kingdom about 1420 and built a new city on an island in the lake. They were visited by Cortés in 1525, but maintained their independence until 1697, when their country was invaded by the Spaniards under Ursua, who stormed their island capital, slaughtering or driving into the lake great numbers of their people, and razing to the ground the 21 temples on the island. Among other spoils taken from the house of the King was a library of sacred books, written in hieroglyphics upon bark fibre, and containing their historical traditions, calendars, and rituals, all of which were probably destroyed by the conquerors. The earlier history of the Itzá is closely woven into that of the great Maya civilization. The Maya chronicles, called Books of Chilan Balam, relate to them more than to any other tribe and carry their records back into the fifth century A.D.

ITZAMNÁ, ĭt'sâm-nä'. The mythic culture hero of the Maya of Yucatan, who, according to their traditions, ruled over them as King at an early period, building cities, devising a code of laws, and inventing their calendar and hieroglyphic system. He was also claimed as a teacher of agriculture, a miraculous healer, and the ruler of the winds and rains. His shrine at Izamal was a noted resort of pilgrims throughout the whole territory occupied by the tribes of Mayan stock. From the fact that he is said to have come from the East, and from an analysis of his various titles, among which are Lord of the Eye of the Day, Lord of the Wheel of the Months, etc., some scholars conclude that Itzamná is a personification of light. In the objective studies which have been made on Maya manuscripts and sculptures there is a very important god who appears in the guise of a benevolent old man and who is called God D, or the Roman-nosed God. This is probably to be identified as Itzamná, whereas the equally important Long-nosed God may be Kukulcan. Consult Shellhas, "Representation of Deities of the Maya Manuscripts," in *Papers of Peabody Museum*, iv, no. 1 (Cambridge, Mass., 1904), and Spinden, "Maya Art," in *Memoirs of Peabody Museum*, vi (ib., 1913).

ITZCOATL, ēt'skō-ä't'l, **IZCOHUATL**, ēs'kō-wä't'l, or **IZIOCATL**, ē'sē-ō-kä't'l (?–1440). First Emperor of the Aztecs. He began to reign in 1427 and joined with the princes of Acolhua and Tlatelulca in an attempt to throw off the yoke of Maxtla, Emperor of Tepanec. They succeeded after a campaign of nearly four months and captured the tyrant, of whom they made a sacrifice. Itzcoatl afterward did much for the mental and material improvement of his own state and people. Consult H. H. Bancroft, *Native Races*, vol. v (San Francisco, 1882).

ITZEHOE, ĭt'se-hō. A town in the Province of Schleswig-Holstein, Prussia, situated on the Stör, 32 miles northwest of Hamburg (Map: Prussia, C 2). It contains a twelfth-century church, a Rathaus dating from 1695, a memorial to Kaiser Wilhelm I, and a home for the aged, founded in 1240. There are manufactures of sugar, nets, Portland cement, soap, carpets, textiles, dyestuffs, machinery, iron, chicory, and cigars; it also builds ships. There is an extensive trade in cereals, cattle, lumber, and wine. Pop., 1900, 15,649; 1910, 16,547. Itzehoe, the oldest city of Holstein, had its origin in a castle erected in 809 during the reign of Charlemagne as a barrier against the Danes. The

town received Lübeck rights in 1238 and was the residence of the counts of Holstein.

IUKA, ī-ū′kȧ. A city and the county seat of Tishomingo Co., Miss., 114 miles east by south of Memphis, Tenn., on the Southern Railroad (Map: Mississippi, J 1). It is known for its mineral springs and has a coeducational normal institute. There are some lumbering interests. The electric-light plant is owned by the city. Pop., 1900, 882; 1910, 1221.

On Sept. 19, 1862, during the Civil War, it was the scene of a battle between a Federal force of about 10,000 under General Rosecrans and a Confederate force of about 12,000 under General Price, the latter retreating during the night, though neither side gained any decisive advantage. The Federal loss in killed, wounded, and missing was between 700 and 800, and the Confederate loss was about the same.

IU'LUS, ī-ū′lŭs. The son of Æneas, later called Ascanius. (Consult Vergil, *Æneid*, bk. i.) According to some, the son of Ascanius also bore the name of Iulus. See ASCANIUS.

IVAN, *Russ. pron.* ē′van′ (Russ., John). The name of a number of Russian grand dukes and czars, of whom the most notable were the first, third, and fourth.

IVAN I KALITA (?–1341) laid the foundations of the Muscovite Kingdom. Though one of the younger princes by birth, he obtained through extreme subserviency to the Tatars the title of Grand Prince (1328). His influence was still more strengthened when he was appointed by the Khan collector of the Tatar vikhod (tax) for all the principalities of Russia. In this capacity he became practically the Khan's plenipotentiary in his relations to the Russian princes, and he made use of his position to weaken his antagonists. He also managed to accumulate great wealth (hence his nickname Kalita, i.e., bag of money). He extended considerably the limits of his originally small principality by the purchase of land, villages, and even of entire town districts (like Bieloe, Ozero, Galitch, etc.), as well as by conquest and diplomatic negotiations. His high position with the Tatars helped him to accelerate this process and to raise Moscow from the position of an obscure village to that of the leading city of Russia. The *Chronicle* calls him "the first to knit the Russian soil together" and particularly praises him for having stopped the Tatar raids and thus having brought peace to the land. He was also strong enough to "rid the country of robbers" and to secure public safety. The introduction into Russia of the Byzantine criminal code and of agrarian laws (the "Law of Landowners") is also attributed to Ivan Kalita. One of his achievements was the transference of the seat of the Metropolitan to Moscow (in 1326), which made it the religious as well as the political centre of Russia. This act greatly increased the prestige of the Moscow government, whose acts henceforth seemed to be sanctioned by the chief religious authority of the country.

IVAN III THE GREAT (1440–1505) was coruler of his father Vasili the Dark and succeeded him as Grand Prince in 1462. He successfully continued the policy of his predecessors which aimed to unite all Russia under the leadership of Moscow and to strengthen the power of the princely dynasty. He suppressed the appanage principalities and the democratic commonwealths, threw off the Tatar yoke, abolished the privileges of the boyars (see BOYAR), and entered into a long struggle with Lithuania in order to regain some of the Russian districts which had joined the latter country. The free city of Novgorod had already been devastated by Ivan's father and predecessor Vasili, who had exacted from the city 15,000 rubles and an oath of loyalty to Moscow. To find protection against Muscovite oppression, the leading political party of Novgorod had sought the help of Lithuania. A treaty was concluded in 1471 with the Lithuanian King, Kasimir, which secured for Novgorod all its former privileges and liberties under the protection of a Lithuanian viceroy. Ivan III grasped this opportunity to declare the people of Novgorod strangers and traitors to "orthodoxy," and in two punitive expeditions of 1475 and 1477 he conquered Novgorod and annexed it to Moscow. The democratic institutions of the ancient free city were abolished, thousands of its best families were transported into the interior parts of Muscovy, and Muscovites were settled in Novgorod. With its freedom Novgorod also lost its commercial significance. The independent princes of Yaroslav and Rostov voluntarily joined Moscow, while Iver and Viatka were conquered by force of arms in 1485 and 1489. The people of the minor principalities at this period often desired union with Moscow, and the territorial extension began to assume a national and religious character. In 1480 submission to the Golden Horde (q.v.) was completely cast off, though it had been but nominal for some time; somewhat later the once terrible Golden Horde was demolished by the Crimean Khan (1502). The wars with Lithuania (1492–94 and 1500–03) resulted in the annexation to Russia of the cities of Chernigov, Rilsk, and Starodub in the ancient Russian territories of Smolensk and Sieversk. This territorial extension brought Muscovite Russia face to face with Poland and western Europe. The external relations of the country, hitherto confined within the circle of the various principalities of Russia, developed now into important diplomatic relations with western Europe—with Poland, Lithuania, Sweden, the Teutonic and Livonian Order of Knights, the Emperor of Germany, the Pope, etc. The forcible and successful foreign policy resulted in the strengthening of the idea of national unity under the leadership of an absolute monarch. The second marriage of Ivan III with Sophia Paleologue, niece of the last Byzantine Emperor, in 1492, favored the growth of these ideas. Sophia never gave up her title of Byzantine Princess, transferred her prestige to Moscow, sharing it with her husband, and "taught him to penetrate the secrets of autocracy." From this time on, the double eagle took its place in the Russian arms and Russia claimed to be the legitimate successor of Constantinople as head of the Empire and Greek church. Ivan's full title now read: "Ivan, by the Grace of God, Emperor of all Russia, Grand Duke of Vladimir and Moscow and Novgorod and Pskov and Tver and Perm and Urga and Bolgari and the rest." Ivan took great interest in internal improvements. In 1497 he issued the *Sudebnik* (q.v.), a uniform code of laws for the country which laid down definite rules of judicial procedure. He invited also artists and craftsmen from Italy to encourage Russian industry and art and embellished Moscow with buildings, the most famous of which is the Uspensky Sobor

(cathedral of Assumption). Ivan III died in 1505 and left to his eldest son and successor, Vasili, 67 of his towns and districts and but 30 to all his other sons. In his will Ivan set forth a new rule of succession according to which the domains of all his kinsfolk after their death were to pass directly to the reigning grand duke instead of reverting, as before, to the prince's heirs.

IVAN IV THE TERRIBLE (1530–84), son of Vasili, was born in 1530 and was three years of age when his father died, his mother, Elena Glinski, being left as Regent. The government fell into the hands of the turbulent boyars and passed from the hands of one notable family of boyars to those of another. This gave rise to struggles which were marked by atrocities and numerous executions. These impressions of his youth and his "wretched" education turned Ivan into a dissolute, unbalanced, and cruel man, who was however swayed from time to time by good and noble impulses. These circumstances and his education were also responsible for his hate of the boyars. The Archbishop Macarius, author of the famous *Chetee Minei* (Lives of the Saints), was the only enlightened man near Ivan. He inspired Ivan with love for reading, developed his intellect, suggested to him the idea of Moscow being the third Rome, and encouraged him in his ambition to raise the Grand Duchy to an "Orthodox Czardom." Ivan had hardly reached his majority when he declared his desire to marry and to be coronated as Czar (q.v.). The solemn act was performed in 1547; the same year he married Anastasia of the house of Romanov (q.v.). The great fire of Moscow and the ensuing revolt of the people "brought fear into Ivan's soul"; he took new councilors, chief among whom were a priest Silvester, a nobleman Adashev, and several notable princes, as Kurbsky, Vorotinsky, etc. By this "chosen council" the government was directed for 13 years, which form the first successful and happy period of the reign of Ivan IV. In 1550 the first Zemski Sobor (q.v.), or National Assembly, was summoned. The Sobor considered and sanctioned a new and improved code of laws. In 1551 an Ecclesiastical Sobor codified the rules of church administration and of religious life in general in a book of 100 chapters. As a result of these Sobors, local self-government and administration were radically reformed and developed. In 1552 Kazan was conquered, and in 1556 the conquest of Astrakhan followed. The subjugation of these Tatar Khanates secured peace for the eastern frontier of Muscovy and opened up the gates to the east beyond the Ural Mountains by way of the rivers Kama and Viatka. In 1560 the young wife of Ivan died and Silvester, Adashev, and his "chosen councilors" lost their influence on the Czar; some of them were exiled or imprisoned, others entered the service of Lithuania. Ivan began a life and death struggle against the boyars. In 1564 the Czar left Moscow for the suburb Alexandrovo, and in 1565 he addressed to the capital two gramotas (letters, edicts)—one to the clergy and boyars, and the other to the "Orthodox Christians" of Moscow City. In his first gramota the Czar enumerated "the treasons of the boyars, the voyevodas (chiefs of town districts) and of all prikaznikh (officials)." In his second gramota, which was read in the public forum, Ivan thanked the people for their loyalty. The appeal to the people had its effect: a deputation of Muscovites, headed by the clergy, succeeded in gaining Ivan's consent to return to Moscow, on the condition, however, that he should be free to deal with his enemies as he saw fit, and to establish an oprichnina, a sort of separate estate for himself and his household administered by his bodyguard, or oprichniki. With the oprichnina well organized the Czar began his campaign of making the boyars "harmless." One by one he subjected to the jurisdiction of the oprichnina the cities and districts which were situated in the territories of the former udiels (appanages), transferring the descendants of the princely families to the borderlands, where there were no appanage traditions. Their hereditary estates were distributed among his favorites and loyal bodyguards, who thus became landowners. For nearly 20 years, to his very death, Ivan continued this policy, reducing nearly half of the country to the status of oprichnina. The other half, called, in distinction of the oprichnina, zemchina, continued to be governed as formerly by the Boyarskaya Duma (council of boyars). The oprichnina accomplished the task of humiliating the ancient nobility of princely origin and of reducing them to the status of "men of service." The process was accompanied by many cruelties, which gained for Ivan the sobriquet "Terrible." The oprichnina strengthened absolutist tendencies, but it weakened the country and may be held responsible for the disastrous end of the wars with Lithuania and Sweden. The subjugation of Kazan and Astrakhan by the Russians brought Russia into contact with the Sultan of Turkey, who repeatedly demanded the return of the Khanates. In 1571 the Crimean Khan, a vassal of Turkey, entered and burned Moscow. But when the Tatars appeared the following year near the river Oka, they suffered a terrible defeat. These events, however, led the Russian government to consider the defense of its southern frontier. Heretofore the southern frontier of Muscovy had been along the middle Oka. During the reign of Ivan many Russians settled beyond the Oka on the "ukraina" (border), or in the "wild field." These colonists were known as "free Cossacks"; they did not recognize any governmental authorities, except their own elected atamans (chiefs). In 1571 the Muscovite government began to settle her own colonists and to fortify the "wild field." Towards the end of the sixteenth century the entire field to the rivers Vorskla and northern Donetz was dotted with towns and fortresses and became an integral part of Muscovy. This secured protection against Tatar raids and opened the way for the colonization of the rich black-soil territory of modern middle Russia. The "free Cossacks," however, to avoid submission to Muscovite authorities, left these places and settled in the country at the mouth of the river Don, where they gave rise to the Cossacks of the Don. (See COSSACKS.) The decline of Novgorod made it necessary for Russia to have a port on the Baltic Sea. The Knights of Livonia handicapped the commercial and industrial development of Russia by prohibiting Russian merchants from passing through their territory and preventing foreign merchants, artisans, and artists from going to Russia. In 1558 Ivan began a war with Livonia. To avoid annexation to Muscovy, Livonia divided and in separate parts joined Sweden, Lithuania, and Poland (1560–

61). In 1576 Stephen Bathory was elected to the Polish-Lithuanian throne and defeated the Muscovites several times. In 1581 peace was concluded through the mediation of the papal emissary, Possevin. Ivan had to give up all his claims in Livonia and to return to Lithuania all the territory formerly conquered by his armies. In 1583 a treaty was made with Sweden according to which Russia had to give up several cities (Yam, Koporie, and Korelu). Two other important events took place during the reign of Ivan IV. In 1553 an English expedition, headed by Chensler, seeking a northwest passage through the Arctic Ocean, made its appearance at the mouth of the northern Dvina. Chensler found his way to Moscow, was favorably received, and returned two years later as the first English Envoy to Russia. In 1584 the city of Archangel was built, and commercial relations with England were entered into. The other important historical event was the beginning (1582) of the conquest of Siberia (q.v.) by Yermak.

Some historians, like Professors Chistowitz and Kovaleoski, find in Ivan the Terrible signs of insanity. In a fit of fury he killed his eldest son, Ivan (1580). Ivan was married seven times. He died in 1584, leaving only two young sons. Consult Kazimierz Waliozewski, *Ivan the Terrible* (Philadelphia, 1904), containing a bibliography, and A. S. Rappoport, *Mad Majesties, or Raving Rulers and Submissive Subjects* (London, 1910).

IVANGOROD, ē-vän'gŏ-rŏt. A fortified town at the confluence of the Wieprez with the Vistula in the Province of Sedcle, Russian Poland, about 60 miles southeast of Warsaw (Map: Russia, B 4). With Warsaw, Novo-Georgievsh, and Brest-Litovsk, it forms the important Polish "quadrilateral." Pop., 1912 (est.), 5500. Ivangorod was the high-water mark reached by the Germans during their first drive on Warsaw in the European War which broke out in 1914. Here the Russians stopped the combined Austro-German offensive movement, compelling them gradually to retire from Russian Poland. See WAR IN EUROPE.

I'VANHOE. A novel by Sir Walter Scott (1819) and the name of the hero.

IVAN IVANOVITCH, ē-vän' ē-vä'nŏ-vĭch (Russ., John Johnson). See NATIONAL NICKNAMES.

IVANOVO-VOZNESENSK, ē-vä'nŏ-vō väz'nyĕ-syĕnsk'. A manufacturing town of Russia, in the Government of Vladimir, situated on the river Uvod, 25 miles by rail north of Vladimir (Map: Russia, F 3). It consists of the village of Ivanovo on the right bank of the river and Voznesensk on the left bank, incorporated in 1871 as the town of Ivanovo-Voznesensk. It is the second important centre of the Russian cotton manufacture, which gives employment to a great part of the inhabitants, not only of the town, but also of the surrounding district. There are also large cotton-printing and chemical establishments in the town, as well as large ironworks both in the suburbs and in the town. Ivanovo-Voznesensk is connected by a branch line with the Moscow and Nizhni Novgorod Railway. Pop., 1897, 53,900; 1912, 167,726.

IVARA. See JUVARA, FILIPPO.

IVERACH, ē'vĕ-räk, JAMES (1839–1922). A Scottish philosopher and theologian, born in Caithness. He was educated in Edinburgh at the University and New College; was ordained minister of the United Free Church at West Calder in 1869; was minister at Ferryhill, Aberdeen, from 1874 to 1887; and in the United Free Church College at Aberdeen was professor of apologetics from 1887 to 1907, then professor of New Testament language and literature, and principal after 1905. Iverach was moderator of the United Free church in 1912–13. He contributed many articles to the *Spectator* and published: *Evolution and Christianity* (1884), *Life and Times of St. Paul* (1890), *The Truth of Christianity* (1895), *Theism in the Light of Present Science and Philosophy* (1899), *Descartes, Spinoza, and the New Philosophy* (1904).

IVER'NA. See HIBERNIA.

IVES, īvz, FREDERIC EUGENE (1856–). An American inventor, born at Litchfield, Conn. In 1874–78 he had charge of the photographic laboratory at Cornell University. He did much pioneer work in developing photographic processes, with special reference to orthochromatic and trichromatic photography and to photo-engraving. Among many devices invented by Ives is the parallax stereogram. He received the Cresson and Scott Legacy medals of the Franklin Institute, Philadelphia, the Progress and Science medals of the Royal Photographic Society, London, and the Rumford medal of the American Academy of Arts and Sciences.

IVES, HALSEY COOLEY (1846–1911). An American artist and museum director, born at Montour Falls, N. Y., and trained at South Kensington, London, and under Piatowski. He had charge of the Art Department at the Chicago World's Fair in 1893, and in 1904 of the corresponding department at the St. Louis Exposition, where he received a grand prize for services to art education. He several times represented the United States government as a commissioner abroad with reference to art matters. In 1896 he became director of the Museum and School of Fine Arts at St. Louis.

IVES, LEVI SILLIMAN (1797–1867). An American theologian. He was born at Meriden, Conn.; was brought up on his father's farm in Turin, N. Y.; served during the first year of the War of 1812 and studied at Hamilton College; but in 1819 left the Presbyterian for the Episcopal church, and after study in New York was ordained in 1823. He preached at Trinity Church, Philadelphia, from 1823 to 1827; at Christ Church, Lancaster, Pa., in 1827; and in Christ Church, New York, until 1831, when he became Bishop of North Carolina. There his Tractarian views brought him into trouble; he recanted, but again embraced them, and was declared deposed by his act of submission to the Pope in 1852. His apologia, *The Trials of a Mind in its Progress to Catholicism,* was published in 1854. Ives spent his last years as a professor in St. Joseph's Seminary.

ÍVIZA, or **ÍBIZA,** ē'bē-thà. The larger of the two Pityusæ Isles of the Balearic group, belonging to Spain (Map: Spain, F 3). It is situated about 60 miles from the mainland and 56 miles southwest of the island of Majorca. Area, about 230 square miles. The island is mountainous and well wooded, with fertile valleys. The principal industry is the production of salt by the evaporation of sea water led into large shallow lagoons. Pop., 1900, 23,556; 1910, 24,608. The chief town, Iviza, on the southeast coast, has a fair harbor and a large trade in salt. Pop., 1900, 6327; 1910, 6225.

IVO OF CHARTRES, shär'tr', SAINT (c.1040–

1116.) A mediæval Churchman, Bishop of Chartres, sometimes called Yvo Carnotensis. He was born in Beauvais, studied at Bec, where he was a companion of Anselm, rose to the provostship of the canonry of Saint-Quentin in Beauvais, and in 1090 was consecrated Bishop of Chartres by Pope Urban II. Ivo is one of the heroic figures in French mediæval history, appearing now as the dauntless opponent of royal injustice and now as the determined foe to clerical wrongdoing. He figures in the investiture controversy of his time as one of the mediating and mollifying forces, endeavoring to see that both church and state were properly treated. (See INVESTITURE.) He compiled a collection of canon law which is one of the most important precedents to Gratian's, edited by Fournier (Chartres, 1896–97). His letters are one of the sources for the history of his time; a French translation, edited by Merlet, was published at Chartres, 1885. His works are in J. P. Migne, *Patrologia Latina*, vols. clxi, clxii (Paris, 1854–55).

I'VORY (OF. *ivurie, ivoire*, Fr. *ivoire*, It. *avario*, ML. *ebureum*, from Lat. *ebur*, ivory, from Egypt, *ābū, āb*, Copt. *ebou, ebu*, elephant). The name formerly given to the main substance of the teeth of all animals, but it is now restricted to that modification of *dentine*, or tooth substance, which in transverse sections shows lines of different colors running in circular arcs and forming by their decussation minute lozenge-shaped spaces. By this character, which is represented by every portion of any transverse section of an elephant's tusk, true ivory may be distinguished from every other kind of tooth substance and from every counterfeit, whether derived from tooth or bone. Although no other teeth, except those of the elephant, present this characteristic, many other animals, such as the walrus, narwhal, and hippopotamus, possess teeth, horns, or tusks which, from their large size and from their density, can be used for the same purpose in the arts as those for which true ivory is employed. In the case of the elephant the tusk is formed by the prolongation of the upper incisor, while the tusk of the hippopotamus and other animals is a prolonged canine. Perhaps with the ancients "ivory" was used in the broader sense, for Pliny tells us that in Ethiopia ivory was so plentiful that it was used for doorposts, fences, and cattle stalls. The ivory of the tusks of the African elephant is held in the highest estimation by the manufacturer, on account of its greater density and whiteness. The tusks are yellow or brown on the outside, but inside are snowy white. The tusks are of all sizes from a few ounces in weight to more than 100 pounds each. Russia, and especially Siberia, obtains large quantities of ivory from the tusks of fossil elephants. This product, called fossil ivory, is composed of calcium phosphate, 64; organic matter, 24; water, 11.15; calcium carbonate, 0.10. There are various chemical processes by which it may be dyed various colors, as black, blue, green, yellow, red, and violet. Ivory articles can be made flexible and semitransparent by immersion in a solution of phosphoric acid of specific gravity 1.130, till they become translucent. They are then to be taken out, washed with water, and dried with a soft cloth, when they are found to be as flexible as leather. They harden on exposure to dry air, but resume their pliancy when immersed in hot water. The opacity and elasticity of old ivory may sometimes be restored by boiling it in gelatin, but no satisfactory method for restoring its whiteness has yet been discovered.

The tusks of the elephant have from very early periods constituted an important article of trade, in consequence of their great beauty as a material for ornamental manufactures and even works of fine art. Ivory is frequently mentioned in the Old Testament. Solomon had a throne of ivory and gold. The Egyptians and Assyrians made much use of this material in ornamental work. With the Greeks it became a most important material, and by the hands of the sculptor Phidias a statue was produced of the Olympian Jupiter of such marvelous beauty and imposing majesty that it was considered a misfortune to die without having seen it. The pupils of Phidias made many of these colossal images (chryselephantine statues), the bodies being in ivory and the drapery in gold. It was also extensively used by the Romans, who were supplied from Africa, and by them its use was diffused over the whole of Europe. In fact it was through the consular diptychs or carved ivory tablets, joined by hinges, containing within a wax record on which are inscribed official names and portraits, that the traditions of classical art were passed along to more barbarous times, while later they figured in Christian art as covers of missals and reliquaries.

During the Renaissance ivory was much used for inlaid work in furniture, and the art of carving it was brought to a high state of skill. Caskets, statuettes, mirror cases, chessmen, and many other articles were made of this material. The town of Dieppe in France has had its ivory factories since the fifteenth century. At present the demand for ivory is increasing, owing to the great taste and skill of some of the artists who work in this material, and, as the supply increases but very slowly, it is likely to become very costly. The art of working in ivory doubtless had its origin in India, where it has always been a much valued material. In China and Japan, especially the former country, the decorative value of ivory is highly prized, and infinite care and patience are shown by the Chinese in his carving on this material. Piano keys supply the principal use of ivory, and unless the imitation products were drawn upon, the natural article would not suffice to meet this single demand. Ivory is difficult to cut, requiring the hardest and sharpest tools, but it is easily sawed or filed. Large plates of veneer are obtained by cutting a spiral shaving round the tusks with what is known as a reciprocating saw. It is polished with various powders. Every scrap of material is saved in the manufacture of ivory, the scraps, shavings, and dust being converted into ivory black or artists' pigments.

The tusks of the African elephant furnish at once the greatest and best parts of the ivory of commerce, and for this purpose it is estimated that annually some 70,000 elephants are killed. At the same time there are many old tusks that find their way into commerce. In addition to tusks obtained from killing elephants and those derived from various old supplies, fossil ivory derived from Siberia, China, Alaska, and elsewhere figures prominently, though statistics as to its amount are not available. African tusks sometimes reach a length of 9 feet and weigh 200 pounds or more, one pair from German East Africa weighing 459 pounds and the larger

measuring 10.16 feet in length. The tusks are sold on the basis of weight. Those of the Indian elephant are smaller, averaging under 50 pounds, the largest tusks measuring not over 4 or 5 feet in length outside curve and about 16 inches in circumference at the gum and weighing about 74 pounds.

Prime ivory consists of tusks, each of more than 20 pounds' weight. Scrivelloes are tusks weighing less than 20 pounds each; ball scrivelloes are suitable for the manufacture of billiard balls; bagatelles, not large enough for the production of balls; while the other classes are hollows, cores, and defectives. Walrus teeth, an inferior class of ivory substitute, commands relatively a very low price and is derived in large amounts from Alaska. Tusks of extinct mammoths have been found 12 feet long and weighing 200 pounds. The three great ivory markets of the world are Antwerp, London, and Liverpool, the first named being since 1895 the most important, and the receipts usually exceeding those of London.

On account of the opening of the Congo Free State and the efforts of King Leopold to bring the ivory trade to Belgium, that country became the world's greatest ivory mart, and usually more ivory came to Belgium from the Congo and Angola than to England from all over the world. Not only is the amount of ivory not increasing, but it must gradually sink to nothing with the extermination of the elephant, and at the same time its uses grow, so consequently various substitutes must be employed, such as celluloid and vegetable ivory (qq.v.), the latter being a product of increasing use. The world's production of ivory fluctuates greatly.

Germany is the greatest consumer of ivory and is usually followed by India, where ivory working is considered as a religious rite, in addition to being an important industry carried on in Mysore, Travancore, Burma, in the town of Murshidabad, and in Bengal and Delhi. In 1913 India imported 243,941 pounds of unmanufactured ivory valued at $663,613, most of it from Africa, as except in Burma this product is preferred to that of India or Ceylon.

Germany imports largely from England, and in 1912, of total imports of 315.7 tons of raw ivory, 102 tons came from England. In the United States a tariff of 20 per cent imposed by the Act of 1913 on raw ivory affected the American industry. Recent imports of ivory by the three countries are indicated in the accompanying tables.

UNITED STATES IMPORTS OF ANIMAL IVORY (AND MANUFACTURE OF) IN ITS NATURAL STATE

By fiscal years ending June 30

IMPORTED FROM	1909		1910		1911		1912		1913	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Europe:										
Belgium	227,468	$597,967	208,548	$517,875	207,162	$505,433	202,448	$508,309	311,604	$817,537
France	270	1,302	176	993	.....	.....	.....	.....	.....	.....
Germany	36,950	111,277	15,574	40,073	16,507	40,380	26,261	74,151	42,947	141,005
Italy	.....	.....	.....	.....	.....	.....	.....	.....	14	40
Netherlands	6,200	12,617	.....	.....	.....	.....	.....	.....	.....	.....
Norway	.....	.....	.....	.....	.....	.....	.....	.....	28	84
Spain	.....	.....	.....	.....	80	352	.....	.....	.....	.....
United Kingdom:										
England	311,045	874,539	202,253	595,205	178,891	473,914	179,590	484,153	232,378	554,493
Scotland	3,275	2,330	837	596	2,375	1,469	.....	.....	.....	.....
North America:										
Canada	184	85	530	135	.....	.....	.....	.....	292	119
Greenland	.....	.....	.....	.....	550	1,100	.....	.....	.....	.....
Newfoundland and Labrador	11	25	.....	.....	.....	.....	.....	.....	.....	.....
Asia:										
Aden	23,312	71,329	32,832	115,976	17,179	49,367	23,996	70,128	8,922	26,957
Russia in Asia	16,120	11,410	17,282	9,807	14,269	7,997	12,647	6,519	27,286	13,838
Africa:										
British Africa, E.	141,891	394,619	114,444	316,608	97,187	263,543	71,131	191,702	44,449	131,889
Turkey in Africa, Egypt	.....	.....	.....	.....	.....	.....	2,841	6,117	54,267	135,396
Total	766,726	$2,077,500	592,476	$1,597,268	534,200	$1,343,555	518,914	$1,341,079	722,187	$1,821,358
RECAPITULATION										
Europe	585,208	$1,600,032	427,388	$1,154,742	405,015	$1,021,548	408,299	$1,066,613	586,971	$1,513,159
North America	195	110	530	135	550	1,100	.....	.....	292	119
Asia	39,432	82,739	50,114	125,783	31,448	57,364	36,643	76,647	36,208	40,795
Africa	141,891	394,619	114,444	316,608	97,187	263,543	73,972	197,819	98,716	267,285

As showing the range of ivory and ivory substitutes, as well as their relative cost, prices for the London sale of April 23 and 24, 1913, may be cited. Walrus teeth, good mixed sizes, brought 45 to 62 cents per pound; defectives, 8 to 27 cents per pound. Rhinoceros horns, best, ranged from $1.75 to $2.75; medium, $1.87 to

QUANTITY, VALUE, AND AVERAGE PRICE OF IVORY IMPORTED INTO THE UNITED KINGDOM OF GREAT BRITAIN AND IRELAND

	1906	1907	1908	1909	1910	1911	1912	1913
Quantities, cwt. (112 lbs.)	9855	10,787	9345	11,555	11,200	10,746	10,949	10,154
Value, £	407,843	560,552	431,894	534,066	494,398	409,653	504,039	487,698
Average price per cwt., £	41.08	51.97	46.22	46.22	44.14	46.50	46.04	48.23

$2.18; short, mixed, 87 cents to $1.31 per pound. Sea-horse teeth, mixed, curved, straight, fair, and cracked, 12 to 31 cents; bears' tusks, 11 to 17 cents per pound. Zanzibar, Abyssinian, and East Indian teeth and scrivelloes, per hundredweight (112 pounds), ranged from $403.91 to $428.25 for sound tusks weighing on the average 80 pounds and over, to $194.66 to $199.52 for soft defective tusks of from 3 to 5 pounds. Egyptian and Malta teeth and scrivelloes brought, per hundredweight, $389.32 to $408.78 for soft sound tusks of 80 pounds and over, down to $214.12 for average-weight tusks of from 3 to 5 pounds. Gabun, Congo, Niger, and other West African teeth and scrivelloes brought, per hundredweight, for sound tusks averaging 70 pounds or over, $296.85 to $330.92, while several tusks averaging from 3 to 5 pounds brought from $107.06 to $111.92. Consult Maskell, *Ivories* (New York, 1905). See ELEPHANT; VEGETABLE IVORY.

GERMAN IMPORTS OF IVORY

CLASSIFICATION AND SOURCE	1911	1912	CLASSIFICATION AND SOURCE	1911	1912
	Tons	Tons		Tons	Tons
Raw ivory, including walrus tusks:			Ivory sheets or pieces:		
Total importations	310.6	315.7	Total importations	17.9	21.3
From Great Britain	125.9	102.0	From France	2.5	4.0
From British India	70.3	73.8	From Great Britain	8.9	10.3
From Congo	38.7	73.5	Ivory in plates or pieces:		
From Belgium	27.8	13.2	Total importations	76.1	85.8
From Kamerun	6.8	8.2	From France	13.7	11.4
From Abyssinia	1.7	6.5	From Great Britain	62.6	74.2
From Austria-Hungary	6.0	6.4			

IVORY, SIR JAMES (1765–1842). A Scottish mathematician, born at Dundee and educated at the University of St. Andrews, where he exhibited special proficiency in mathematics and graduated M.A. in 1784. In 1786, after further study at Edinburgh, he abandoned the theological career for which he was preparing, taught in the Dundee Academy for three years, and from 1789 to 1804 engaged in commercial pursuits as manager and partner of a flax-spinning mill. In his leisure hours, however, he continued his mathematical studies; became known by learned contributions to the Royal Society of Edinburgh; and in 1804 received the appointment of professor of mathematics in the Royal Military College, then at Marlow, Buckinghamshire. He retired in 1819 on a pension which was augmented in 1831, when he was knighted. His essays and memoirs, published from 1796 to 1842, in the *Transactions* of the Royal Societies of Edinburgh and London, evince remarkable and acute analytical power. His resolution of the attractions of ellipsoids, enunciated in 1809, has been known ever since as "Ivory's theorem." In 1814 he received the Copley medal from the Royal Society for "a new method of determining a comet's orbit"; in 1826 the Royal medal for a paper on refractions, which was eulogized by Laplace for its masterly analysis; and again in 1839 the Royal medal for his "Theory of Astronomical Refractions." He was elected to honorary membership in several learned societies of Great Britain and other lands.

IVORY, VEGETABLE. The fruit of a handsome palm, *Phytelephas macrocarpa,* which grows in the Peruvian Andes, on the banks of the river Magdalena, and in other parts of South America. The stem is short and procumbent, but from its crown is developed a magnificent tuft of light-green pinnated leaves, which rise like immense ostrich feathers to a height of from 30 to 40 feet. The flowers are on a crowded spadix and have neither calyx nor corolla. The fruit, which is as large as a man's head, consists of six or more four-celled aggregated drupes and contains numerous somewhat triangular nuts as large as a hen's egg. The kernels of

THE IVORY-NUT PALM.

these nuts, called *corrozzo* nuts in commerce, are so hard and white, and resemble ivory so greatly, that the name "vegetable ivory" is particularly applicable. They have of late come into extensive use with turners in the manufacture of buttons, umbrella handles, and small trinkets.

a, NUTS IN HUSK; *b*, A SHELLED NUT.

The imports into the United States in 1913 were 29,206,278 pounds valued at $977,525. See also ATTALEA; COQUILLA NUT.

I'VORYBILL'. The great Southern woodpecker (*Campephilus principalis*), now confined to the cypress swamps of the Gulf States and nearly extinct. It is one of the largest of the

tribe and so impressed Linné by its size (length, 20 inches) and grandeur that he called it "prince." Its plumage is glossy black, with the secondaries and shorter primaries pure white, and a white stripe down each side of the neck and along the scapulars, meeting in the middle of the back. The long crest of the male is

HEAD OF IVORYBILL.

scarlet, but that of the female is bluish black; the bill is ivory yellow, straight, and chisel-like, capable of drilling holes in hard wood and reaching the deeply buried grubs upon which it mainly feeds. This fine species was formerly a resident from the Potomac and Ohio rivers southward, and the early ornithologists have much to say of it. Audubon says its food included grapes, and that its nest was a hole, like that of other woodpeckers, dug by the alternate labor of both mates, always in a living tree. He remarks its graceful flight—the bird seems merely to swing itself from the top of one tree to that of another in an elegantly curved line—and describes its notes as clear, loud, yet very plaintive. These birds were never very numerous, since they were constantly killed by the Indians, who valued highly their heads as ornaments and as symbols of dignity and courage. The frontiersmen, with barbaric love of color, copied the custom and adorned their shot pouches and caps with the gaudy crests, and ignorant Southern farmers killed them and all woodpeckers under the mistaken notion that they were destroying the forest trees.

IVORY CARVING. Under this head must be included sculpture in bone, in vegetable, in walrus or narwhal ivory, and in fossil ivory, as well as that carved in the ivory of the elephant. It is therefore the whole subject of delicate and minute ornamental carving, except as done in wood and in fine hard stones. At all ages of artistic development it seems to have been practiced. The earliest specimens, chiefly from the Dordogne in France, are the work of cave dwellers and date from the time when the mammoth and the reindeer roved in southern Europe. They show considerable artistic skill, manifested in a restrained realism and an astonishing comprehension of life and movement.

Ancient Ivories. The earliest Egyptian ivories go back at least to the first and second dynasties (3400–2980 B.C.). In later Egyptian tombs there have been found statuettes, handles of weapons, boxes, and the like, very delicately sculptured; and others have been found in Nineveh, especially tablets, now in the British Museum, carved with significant figures in low relief, dating from the tenth century B.C. The Greeks used ivory for a great variety of decorative purposes; but its most famous use in antiquity was in connection with the chryselephantine (q.v.) statues, which were the most magnificent and sacred in Greece. Among the many uses which the Romans, particularly during the late Imperial times, made of carved ivories, the most important was the consular diptychs, tablets of ivory given by the consuls as mementos to their patrons and friends. A number of private diptychs, some of fine artistic quality, also survive. The luxury of the later Empire, particularly in the East, made use of carved ivory as panels for doors, in chairs, etc. The dwellings of the wealthy were filled with furniture of ivory and silver.

Byzantine Ivories. It was in fact in the Eastern Empire that ivory carving attained its most perfect development, especially in connection with ecclesiastical usage. The history of sculpture from the fourth to the eighth century can best be studied by means of these small but highly finished works. The diptych was developed into the wonderful carved book covers which adorn many ancient manuscripts and into devotional tablets with interior instead of exterior carvings. Ivory was also used for pyxes, shrines, crosiers, crucifixes, panels to ornament doors, seats, especially thrones, like that of Archbishop Maximianus in the cathedral of Ravenna. The earliest period of Byzantine ivories closed with the iconoclastic movement (726–842 A.D.). At this time secular ivories became the rule: caskets, of which there is a fine ninth-century example in the Victoria and Albert Museum, London; delicately carved hunting or drinking horns, called oliphants, and usually showing Oriental influence; mirrors, combs, seals, chessmen, and a variety of other objects. The Macedonian and Comnenian periods (from 842 till the sack of Constantinople by the Crusaders, 1204) form a second golden age of Byzantine ivories, of which a fine example is the triptych d'Harbaville in the Louvre. Even the last period of Byzantine art, terminating with the capture of Constantinople by the Turk in 1453, produced works of great excellence. Throughout its career Byzantine ivory carving was imitated by the craftsmen of the West, and this lasted until the advent of the Gothic period. This is true of the Carlovingian Renaissance (ninth century) in Germany and France, which produced fine book covers, and of German ivory carving in the time of the Ottos (tenth century). During this period and even in the eleventh century ivory carving was the most important form of sculpture, and was often determinative for the stone sculpture, particularly of the façades of Romanesque cathedrals in southern France. But with the revival of sculpture in stone during the late Romanesque epoch ivories gradually began to lose their unique importance, and from about the close of the twelfth century they in turn become subordinate to sculpture in stone.

Gothic Ivories. In the mighty revival of all art during the Gothic epoch ivory carving had an important share, rivaling in its achievements the Byzantine epoch. All the objects of ecclesiastical use mentioned above, and others besides, were produced in great numbers. Diptychs, and especially the more popular triptychs, were marvels of minute workmanship or of delicate openwork and traceries. The most popular subject, however, was the Virgin and Child, of which numerous specimens survive in all the principal collections. One of the finest known of ivory carvings is a Madonna of unusual size, gilded

and tinted, in the little church of Villeneuve-les-Avignon. During the fourteenth century secular ivories were increasingly produced—elaborate mirror cases, caskets carved with scenes from the mediæval romances, plaques for thrones, like the delicately carved fragment of the throne of Jayme I, King of Aragon and Minorca, in the Morgan collection (Metropolitan Museum, New York). Practically all Gothic ivories, like the Byzantine before them, were polychrome, producing a rich, enamel-like effect. France, and in especial Paris, was the great centre, till the close of the fourteenth century, when Burgundy rose into prominence. Germany and England, much less productive, were influenced by French models; southern Europe was comparatively inactive, except that in Italy, at the close of the fourteenth century, fine altars and caskets were carved of bone, and in Spain the Moors carved caskets and other objects of great beauty.

Modern Ivories. Although a few fine examples were produced during the later fifteenth and sixteenth centuries, ivory carving gradually sank into disuse. But during the baroque period it was again abundantly practiced, especially in Germany and the Netherlands. Of particular interest are the rich and elaborate German tankards, to be seen in all museums; while in Flanders the infant bacchanals of Francis Duquesnoy achieved a wide reputation. During the eighteenth century France, where an important school was established at Dieppe, again took the lead, but by c.1750 the art ceased to attract men of talent. The school of Dieppe continued a desultory activity; and in the early nineteenth century James Pradier (q.v.), among other sculptors, carved many figures in ivory. But the real revival came about 1890 in connection with the goldsmith's art; for the rich mellow tint of ivory lends itself admirably to combination with the nobler metals and with precious stones. "Objets d'art," as such sculptures are generally called, were first introduced and have been designed most of all in Paris, where prominent artists like Vever, J. Dampt, Théodore Rivière, and especially Lalique, have made a specialty of them. In Belgium, also, the acquisition of the Congo territory by King Leopold II, who offered important medals for carving the ivory it produced, led to an important revival, in which artists like Constantin Meunier, van der Stappen, Hosemans, and Rombeaux participated. The Belgian expositions and the activity of local centres and schools gave an impetus to the art in Germany, where the sculptor Lewin-Funcke deserves especial mention. In the recent revival of decorative art in Great Britain ivory carving also played a part. Its most notable use, however, has been in the polychromatic sculpture of great artists like George Frampton and Alfred Gilbert.

The Orient. In India the art of ivory carving has been practiced from earliest times. The innumerable figurines of the Hindu pantheon have little besides a decorative interest; but beautiful caskets and similar objects were made in the south. On the east coast of India the inhabitants of Goa and other Portuguese possessions produced interesting hybrid wares for the European market. All the Saracenic peoples made use of the ivory, especially in their remarkable inlay work. But by far the best known and the most valuable Oriental ivories are those of China and Japan. Japanese art seems indeed to have followed its strong predilection for minuteness in undertaking the artistic treatment of very small masses of these hard materials. The little netsukes (see NETSUKE) are more often of ivory than of any other substance, and their almost infinite variety and their spirited character are well known. Less known are the highly wrought boxes carved with reliefs, both high and low, and adorned with little figures in the round which serve as knobs for the cover or the feet of the piece.

Important Collections. Among the museums richest in ivories are those of Vienna, Berlin, Dresden, and Munich; the Musée de Cluny and the Louvre, Paris; the Victoria and Albert Museum and the British Museum, London; the municipal museums of Bologna, Brescia, Milan, and Ravenna; the Museo Nationale, Florence; the Museo Kircheriano, Rome; and the Museo Cristiano of the Vatican. The treasuries of certain cathedrals like Milan, Monza, Ravenna, possess rich specimens of the art. Ivory book covers are generally preserved, often along with other ivories, in the important libraries, such as the British Museum, the Bibliothèque Nationale, Paris, the Royal libraries of Berlin and Munich, at Saint-Gall, and especially in the Vatican. The most important collections in the United States are those of the late George A. Hearn and J. P. Morgan, the latter (on exhibition in the Metropolitan Museum, New York) one of the most important and representative in existence.

Bibliography. The best general account of the diverse and scattered aspects of this subject is by Emile Molinier, *Histoire générale des arts appliqué à l'industrie*, vol. i (Paris, 1896). The most complete English manual is Alfred Maskell, *Ivories* (London, 1905), which contains a full bibliography and many photographic reproductions of noted pieces, including a discussion of consular diptychs. Indispensable to a thorough study of the subject are the important researches and photographic publications of Dr. Hans Graeven, published, as well as elsewhere, in *Jahrbuch der kunsthistorischen Sammlungen des allerhöchsten Kaiserhauses*, vols. xx, xxi (Vienna, 1899–1900); id., *Frühchristliche und mittelalterliche Elfenbeinwerke in photographischer Nachbildung* (Rome, 1898–1900); G. C. Dutt, *Monograph on Ivory Carving in Bengal* (Calcutta, 1901). The best work on the antique period is also by Hans Graeven, *Antike Schnitzereien in Elfenbein und Knochen* (1st series, Hanover, 1903). For mediæval ivories, consult: William Maskell, *Ivories, Ancient and Mediæval* (New York, 1876); A. M. Cust, *Ivory Workers of the Middle Ages* (London, 1902); O. M. Dalton, *Byzantine Art and Archæology* (Oxford, 1911). For the Renaissance and modern: Scherer, *Elfenbeinplastik seit der Renaissance* (Leipzig, 1903). The catalogues of the ivories of the great collections are valuable by reason of good introductory sketches as well as descriptions; such as those of the Berlin Museum by Vöge (Berlin, 1900), the Hearn collection (New York, 1908), the British Museum by Dalton (London, 1909), the Hoentschel (now J. P. Morgan) collection by Pératé (Paris, 1911), and those of the Metropolitan Museum of Art, New York.

IVORY COAST (Fr. *Côte d'Ivoire*). A colony constituting a part of the Government-General of French West Africa, bounded on the north by the French Colony of Upper Senegal and Niger, on the east by the British Colony of the

Gold Coast, on the south by the Gulf of Guinea, and on the west by Liberia and the Colony of French Guinea (Map: Africa, D 4). The boundary with Upper Senegal and Niger varies from about 9° 30′ N. to about 10° 40′ N., the western part extending farther north than the eastern. The most southerly portion is at the western limit of the coast, about 4° 20′ N. On the northeast the boundary is formed by the Black Volta River; the southern part of the western boundary, by the Cavally River. The coast line is about 380 miles in length. The area of the colony is estimated at 325,200 square kilometers (125,560 square miles). The coastal strip, averaging about 35 miles in width, is flat and contains the well-known lagoons, which for the most part are navigable. Beginning on the east, these lagoons are: Aby (sometimes called Assinie), Tendo, Frambo, and Assinie (properly so called); Ebrié (called also Grand-Bassam), which is about 90 miles long and has branches known as Lagoon Potou and Lagoon Ono—on it are situated the towns of Grand-Bassam, Bingerville, Abidjan, Dabou, and Jacqueville; Lahou, north of the port of Grand-Lahou; and Fresco. The rivers are not of very great commercial importance, though there is some navigation on the Comoë, Bandama, Bia, Sassandra, and Cavally. North of the low-lying coastal strip the land rises, but no great elevations are found except in the west. Here a range about 30 miles in length, with an east-and-west direction, culminates near Nzô in Mount Nimba, on the boundary with French Guinea a little north of the Liberian line. Nimba has an altitude of 1644 meters (5393 feet) and is the highest mountain of French West Africa. South of this range, between the deep valleys of the Sassandra and Cavally, is a second mountainous region, where the highest peak reaches about 1400 meters (about 4600 feet). The colony is notable for its vast and dense forest, which has been its chief material resource and at the same time the most formidable obstacle to exploration and development. In extent the forest is not quite so great as was formerly believed. Beginning near the shore of the sea or the lagoons, it extends in the west to 8° N. and in the east to about 7° 30′ N., while in the centre of the colony it is indented by a large area between the N'zi and Bandama rivers (which are confluents). North of the forest region wooded areas may still be found, especially along the streams; but there are large savannas, where grazing and agriculture are somewhat developed. This Sudanese region is too remote from centres of communication to attract the enterprise of whites, but it holds out fair promise to native development.

The climate is generally hot and, at least in the coastal and forest regions, unhealthful. Rains are excessive (they are more frequent in the forest than on the coast), and the humidity is always great. There are four seasons: the main dry season (with a mean temperature of over 82° F.), from mid-December to mid-April; the main wet season, from mid-April to mid-July; the short dry season, from mid-July to September; the minor season of rains, from September to mid-December.

The colony produces mahogany and other woods, palm kernels, palm oil, rubber, manioc, and ground nuts; some corn and rice are cultivated by the natives. Imports and exports (general commerce) amounted to 7,619,000 and 8,052,000 francs respectively in 1900; in 1905, 13,895,000 and 7,636,000; in 1910, 16,049,000 and 15,750,000; in 1911, 20,567,000 and 18,249,000; in 1912, 17,534,000 and 17,616,000. In 1912 imports from France were valued at 6,316,000 francs, and from the United Kingdom, 7,200,000 francs; exports to France, 6,853,000 francs, and to foreign countries 10,763,000 francs. The chief imports in 1912 were: cotton tissues, 4,642,000 francs; rice, 1,111,000 francs; machinery and iron manufactures, 1,058,000 francs; distilled liquors, 942,000 francs. The principal exports are palm oil and rubber, while palm nuts and mahogany are important. The chief ports are Grand-Bassam, Grand-Lahou, and Assinie.

A railway is projected to extend through the colony from south to north. It starts from Abidjan on the north shore of Lagune Ebrié and passes through Dimbokro (183 kilometers), near the confluence of the N'zi and Bandama; in September, 1912, it was opened to traffic as far as Bouaké in the centre of the colony, 316 kilometers (196 miles) from Abidjan. Telegraph lines connect the principal towns and extend to adjoining colonies.

The colony is divided into 17 circles. It is administered by a Lieutenant Governor, under the Governor-General of French West Africa. The capital is Bingerville. The budget for 1914 showed an estimated revenue and expenditure of 7,265,000 and 6,093,000 francs respectively.

The population of the Ivory Coast was estimated in 1911 at 1,132,941. For 1913, the indigenous population is reported at 1,416,043, divided as follows: Agni, 357,212; Senoufo, Dioula, and Malinki, 334,932; Bete, Gouro, Dan, and races of the upper Cavally, 312,608; Attië, Abbey, and other races of the lagoons, 62,386; Krumen, 19,056; Ashanti-Fanti, 3098; various races, 332,751. Of the total, 1,329,568 were returned as fetishists, 79,334 as Mohammedans, 4139 as Protestants, and 3002 as Roman Catholics. The Agni, who comprise some 15 tribes (including the Baule), are allied ethnologically to the Ashanti and inhabit, roughly speaking, the southeastern quarter of the colony. They probably came from the north of the present Gold Coast Colony about 1730. They are fetishists; their society is patriarchal and admits polygamy. The Dioula and Senoufo are comprised in a group known as Mande. The Dioula, a conquering race, are Mohammedans; the Senoufo, probably autochthonous, are fetishists. The various races of the lagoons, some of whom are related to the Ashanti, are in a state of savagery, being much inferior to the Agni or the Mohammedans of the north. The inhabitants of the southwest quarter of the colony, the Krumen, Bete, Gouro, etc., are in a low state of civilization. The Ivory Coast has no large towns. In 1913 Grand-Lahou had a population of 3050 indigenes and 78 Europeans; Grand-Bassam, 2832 and 164; Tiassalé, 1548 and 17; Aboisso, 1241 and 38; Assinie, 1135 and 38; Bingerville, 780 and 38; Abidjan, 613 and 110.

The French occupation of the Ivory Coast dates from 1842, when treaties were concluded placing the inhabitants about the Lagune Ebrié under the protection of France. In 1850 factories were established at Grand-Bassam and Assinie, and two years later a fort was erected at Dabou. The factories were abandoned in 1871. In 1878 a French Resident was appointed,

but the hold of France on the country was slight until 1893; in that year, as a result of the explorations of Binger and Treich-Laplene in the eighties and of Marchand in 1892, a decree was issued organizing the Colony of the Ivory Coast. With the subjugation of Samory's kingdom in the northwest, which began in 1893 and ended with the capture of Samory in 1898, French authority became paramount. Subsequently assassinations of French officials were not infrequent, and in 1910 the Abbey revolted; but French supremacy is practically established throughout the country. Consult: Binger, *Du Niger au Golfe de Guinée par le pays de Kong et le Mossi, 1887–1889* (2 vols., Paris, 1892); Clozel and Villamur, *Les coutumes indigènes de la Côte d'Ivoire* (ib., 1902); Maurice Delafosse, *Les frontiers de la Côte d'Ivoire, de la Côte d'Or, et du Soudan* (ib., 1908); official monograph, *Côte d'Ivoire* (ib., 1908); Sonolet, "Lettres d'Afrique Occidentale," in *Journal des Debats* (ib., 1909–11); F. Lambert, "La Côte d'Ivoire," in Société de Géographie d'Alger et de l'Afrique du Nord, *Bulletin*, vol. xvii (Algiers, 1912).

IVORY SHELL. A gastropod of the genus *Eburna*, so called from its white, solid, smooth shell. The epidermis is usually wanting. The white shell is sometimes spotted with dark red, and the animal is spotted like the shell. The species inhabit the Red Sea and Indian Ocean, as well as the coasts of the Cape of Good Hope, Japan, China, and Australia.

IVREA, ē-vrā'ȧ. An episcopal city in the Province of Turin, Italy, 38 miles north-northeast by rail of the city of Turin, on the left bank of the Dora Baltea, which is crossed here by a Roman bridge (Map: Italy, A 2). It has an extensive castle (now used as a prison), a tenth-century cathedral, a ruined abbey, a lyceum, and a town hall. Its educational institutions include a Gymnasium, a technical school, and a theological school. Ivrea markets wine, grain, and fruit, spins silk and weaves cotton, and has ironworks and dye works. On this site stood the ancient town of Eporedia, a place of importance because of its position at the junction of various roads; there were gold mines, too, near by. It was colonized by the Romans in 100 B.C. to command the roads over the Great and Little St. Bernard. The town of Ivrea was the capital of the Margraviate of Ivrea which Charlemagne substituted for the Lombard Duchy. The margraves of Ivrea, Berengar II, his son, Adalbert II, and Arduin of Ivrea, were raised to the Italian throne. The last was finally obliged to yield before Henry II, who in 1019 annexed the margraviate to the Empire. In 1248 Ivrea was given as a fief to Count Thomas of Savoy, to whose posterity it descended. The French captured the town in 1554, 1641, and 1704. From 1800 to 1814 it was the capital of the French Department of Doire (Ital., Dora). Pop. (commune), 1901, 11,696; 1911, 11,330. Consult Baedeker, *Northern Italy* (14th Eng. ed., Leipzig, 1913).

IVRY-LA-BATAILLE, ē'vrē'-lȧ-bȧ'tī'y'. A village of France in the Department of Eure, on the river Eure, 40 miles west of Paris. Though it has a ruined abbey, and manufactures of musical instruments, combs, and leather goods, its chief interest is as the scene of the great victory of Henry IV of Navarre, March 14, 1590, over the Duke of Mayenne. The battle has been commemorated by an obelisk as well as a poem by Macaulay. Pop., 1901, 1034; 1911, 1190.

IVRY-SUR-SEINE, sụr-sȧn'. A manufacturing town in the Department of Seine, France, on the left bank of the Seine River, 1 mile south-southeast of the fortifications of Paris (Map: Paris and Vicinity). Its forts form part of the defenses of the capital. It has increased rapidly in industrial importance. Here are located the great workshops of the Orléans Railroad; and there are manufactures of machinery, pottery, organs, wall paper, and rubber. Much garden truck is produced. Its principal manufactures are musical instruments, soap, and chemical products. Pop., 1901, 28,585; 1911, 35,445.

IVY (AS. *ifig*, OHG. *ebarvi, ebah, ebahewi*, Ger. *Epheu*, of uncertain origin). A name applied to a number of climbing, creeping, and trailing plants, among them the English or common ivy, Boston or Japanese ivy, Virginia creeper, ground ivy, and poison ivy. The common or English ivy (*Hedera helix*) is a well-known native of Europe, rare in the northern countries, which has been extensively introduced into the eastern United States between latitudes 30° and 40°. Its long, creeping, branched stem, which climbs on trees and walls to a great height and closely adheres to even very hard substances by means of abundant rootlets which it develops along its whole length, acquires in very aged plants the thickness of several inches. Its five-lobed, shining, stalked, evergreen leaves, clothing bare walls with green luxuriance, serve to throw off rain, and the rootlets of the stem extract moisture from the

COMMON OR ENGLISH IVY.

walls to which they cling, contrary to a common prejudice that ivy tends to produce dampness in walls. The flowering branches of ivy have ovate, entire leaves, very different from the others. Its small greenish flowers are produced in the beginning of winter, and the small black berries are ripened in the following year. The berries are eagerly eaten by many birds, although they have a pungent taste and contain a peculiar bitter principle called hederin and an acid called hederic acid, which are also found in a gummy exudation obtained by incisions from the stem and occasionally used in varnish mak-

ing and in medicine as a depilatory and a stimulant. In Egypt the ivy was sacred to Osiris, in Greece to Bacchus (Dionysus), whose thyrsus was represented as surrounded with ivy; the Romans mingled it in the laurel crowns of their poets.

Several of the 60 or more horticultural varieties of ivy are planted for ornamental purposes, of which that generally known in Great Britain as Irish ivy and on the European continent as English ivy is particularly esteemed for its large leaves and luxuriant growth. The Boston or Japanese ivy (*Psedera tricuspidata*) and the Virginia creeper (*Psedera quinquefolia* or *Ampelopsis quinquefolia*) belong to the same family as the grape. They are shrubby, hardy ornamental climbers, cling by tendrils opposite the leaves, and are especially attractive in their autumnal coloration. The Boston ivy has three-lobed or trifoliate leaves, the Virginia creeper five leaflets upon rather long petioles. The Boston ivy clings closely to walls, is of rapid growth, and is one of the best hardy vines for city growing. Both the common and Boston ivy grow readily from cuttings. The ground ivy (*Nepeta glechoma*) is a plant of the mint family that trails over the ground. The poison ivy or poison oak (*Rhus toxicodendron*) somewhat resembles the Virginia creeper in the appearance of its leaves and is sometimes mistaken for it. Its leaflets, however, are three in number and are not palmately arranged upon a common leafstalk. This plant possesses an irritant poison, and bathing the affected parts in an alcoholic solution of lead acetate is highly recommended as a remedy. The German ivy (*Gynoxys cordifolia*, or *Senecio mikanioides*) is a plant belonging to the family Compositæ. The Kenilworth ivy is *Linaria cymbalaria*. The name "ivy" is also applied in the southeastern United States to *Kalmia latifolia*, an evergreen shrub.

IVY GERANIUM. See PELARGONIUM.

IVY LANE CLUB. A club founded in 1749 by Dr. Johnson. Its meetings were held at the King's Head, in Ivy Lane, London. See CLUB.

IVY OWL. A fanciful name for the English tawny owl (*Syrium*, or *Strix, aluco*), which frequents ivy-grown ruins. See OWL.

IVY POISONING (DERMATITIS VENENATA). An inflammation of the skin produced by poisonous plants, chiefly poison ivy or oak (*Rhus toxicodendron*) and poison sumach or dogwood (*Rhus venenata*). Individuals differ very widely in their susceptibility to this form of poison. Some appear to be entirely immune even after handling the plants, while others are affected by the mere neighborhood of poison ivy, without actual contact. An attack may come on in a few hours or days after exposure. The skin becomes red and swollen, innumerable vesicles and blebs then appear, and there is severe burning, tingling, or itching. The eruption is carried to other parts of the body by auto-inoculation. The disease lasts from one to four weeks. Treatment consists in the application of mildly astringent and sedative lotions; hyposulphite of sodium, boric acid, fluid extract of grindelia robusta, and zinc, being favorite remedies. When large areas of the body are affected, alkaline baths are grateful. See IVY.

IWÁKURA, ē-wä′kōō-rà, TOMOMI, PRINCE (1835–83). A Japanese statesman, born in Kyoto, of one of the illustrious families of the great Minamoto (q.v.) clan. He became a chamberlain in the Imperial household of the Mikado Komei (1847–66), father of the late Emperor, Meiji Tenno (q.v.). He was one of the 88 out of the total number of 136 kugé, or court nobles, who opposed the opening of the ports to foreign commerce. In the ebb and flow of the troubled politics of the time Iwákura fell into disgrace and was banished. Later he became the agent and firm ally of the revolutionary leaders, and was the means of carrying through the palace revolution of January, 1868, by which the men in the progressive party got possession of the person of the Emperor and reconstructed the government. In this Iwákura became one of the highest officers, and thenceforth one of the chief progressive leaders of the Empire, carrying through the abolition of the feudal system with vigor and wisdom. He never saw a foreigner until middle life; yet as Minister of Foreign Affairs he proved himself a match for the foreign envoys, and in 1872 led the great embassy to the treaty powers of the world to secure if possible some modification of the treaties with them. On his return he opposed the proposed war with Korea, and carried through the measure which commuted the hereditary pensions of the samurai (q.v.), by which the Treasury was relieved of heavy financial burdens and the nation enabled to enter upon a new phase of development. On the night of Jan. 14, 1873, an attempt was made by nine assassins to kill him, but he escaped. He remained the Mikado's chief councilor until his death. His son, Prince Iwákura Tomosada, became one of the chief officers of the court.

IWAO, OYAMA. See OYAMA, IWAO.

IWEIN, ē′wân. 1. A knight of Arthur's Round Table, whose story was used in the twelfth century by Chrestien de Troyes in his *Chevalier au Lion.* 2. The most important and complete work of Hartmann von Aue. It is an independent and free adaptation of Chrestien de Troyes's *Chevalier au Lion.* Consult Chrestien de Troyes, *Sämtliche Werke*, edited by W. Foerster (Halle, 1884–99).

I. W. W. See INDUSTRIAL WORKERS OF THE WORLD.

IXI′ON (Lat., from Gk. *Ἰξίων*). In Greek legend, a king of the Lapithæ (q.v.). He married Dia, the daughter of Deïoneus, and later by treachery caused the death of his father-in-law. When no one would purify him from the murder, he prayed to Zeus, who pardoned him, invited him to his table, and gave him immortality. Intoxicated by the nectar, he sought to seduce Hera, but was deceived by a cloud in her image, and by this became father of the centaurs (q.v.). As a punishment, he was fastened by serpent bonds to a fiery wheel perpetually rolling through the air. Later writers transferred the scene of his punishment to Tartarus. The story is later than the Homeric and Hesiodic poetry.

IXTACCIHUATL. See IZTACCIHUATL.

IXTAPALAPA, ē′stà-pà-là′pà. A suburb of Mexico City (Map: Mexico, D 9). It was an important place at the time of the conquest by Cortés. Pop., about 5000.

IXTLILXOCHITL II, êst-lēl′sô-chē′t'l (c.1500–c.1529). A chief of the Tezcucans, the most civilized among the primitive races of Mexico. Ixtlilxochitl was the son of the famous King Netzahualpilli, and at his father's death (1516) he disputed the right of his elder brother to the throne, seeking help to establish

himself as King (1520) from the Spaniards, who had arrived to begin their career of conquest. He supported them throughout, thus gaining the hatred of other native princes, of his kindred, the Aztecs, and even of his own people.

IXTLILXOCHITL, FERNANDO DE ALBA (c.1568–c.1648). A Mexican historian. He was a grandson of the last native chief or King of the Tezcuco tribe and of his principal wife, who was a daughter of Cuitlahuatzin, the successor of Montezuma. After graduating at the College of the Holy Cross (Santa Cruz) at Tlaltelolco, he was appointed interpreter to the viceregal court for trying native cases, a position in which he was able to render great assistance to the former subjects of his family. His birth and position enabled him to gather a great amount of invaluable information relating to the past history of the two native peoples from whom he was descended. He mastered the hieroglyphics of Anahuac, made large collections of manuscripts, familiarized himself with the traditions and folklore of the country, and drew his information in some instances from those who had come into contact with the *Conquistadores*. All these data he carefully preserved in his numerous *Relaciones históricas,* which to a large extent are repetitions and condensations of each other. The *Historia Chichimeca* is the most important of his writings and was completed in 1616. His works, edited by Señor Alfredo Chavero, were published by the Mexican government, *Obras de Ixtlilxochitl,* vol. i, *Relaciones,* vol. ii, *Historia Chichimeca* (2 vols., Mexico, 1891–92); but in manuscript form they were used by Prescott in his *Conquest of Mexico.* Furthermore, the *Historia* had appeared twice before the aforesaid edition by the Mexican government, and the *Relaciones* once: *Voyages, relations, et mémoires originaux pour servir à l'histoire de la découverte de l'Amérique, publiés pour la première fois en français par H. Ternaux-Compans* (trans. from the Spanish manuscript and containing only the *Historia,* 2 vols., Paris, 1840); and Edward King, Viscount Kingsborough, *Antiquities of Mexico* (9 vols., London, 1830–48; vol. ix, pp. 197–468 containing the Spanish text of the *Historia* and of the *Relaciones*).

IYEMITSU TOKUGAWA, ē-yā′mĭt′sụ tō′kōō-gä′wȧ (1604–51). A Japanese statesman of the seventeenth century, grandson of Iyeyasu, the founder of the Tokugawa line of shoguns. He succeeded to the title in 1624 and proved himself the ablest, after Iyeyasu, of the 15 shoguns of the line. He continued, and completed in 1638–41, the policy of his grandfather in excluding all foreign influences, not only expelling all foreigners and eradicating every trace of Christianity, but also forbidding all natives, under penalty of death, to leave the country; and, the better to secure this end, he ordered the destruction of all seagoing vessels. The Dutch were confined to the little artificial island of Deshima in Nagasaki harbor, and their intercourse with the outer world was limited to two ships a year. The English had already retired from Hirado. The persecution of the Christians was fierce and bloody, and, in 1638, 37,000 of them were hurled from the precipitous cliffs of Pappenberg near Nagasaki, and hundreds more were tortured to death. He rebuilt and greatly enlarged Yeddo and erected the gorgeous shrines at Nikko, where he lies beside his illustrious grandfather. Consult W. E. Griffis, *The Mikado's Empire* (11th ed., New York, 1906).

IYEYASŬ (or **IEYASŬ**) **TOKUGAWA,** ē-yā′yȧ-s' tō′kōō-gä′wȧ (1542–1616). A famous Japanese general and statesman, the first shogun of the Tokugawa line, and the founder of the peace and order under which the Japanese lived from the year 1604 to 1868. Though a descendant of the famous Minamoto clan, his father was a humble peasant. He served with distinction under both Nobunaga and Hideyoshi (qq.v.). On the death of Hideyoshi, in 1598, great dissensions arose among the territorial barons or daimyos in regard to his successor. Many, including Iyeyasu, had sworn to protect Hideyoshi's son Hideyori, then a child of six, and to secure his succession; but many more opposed his claim as the son of a person of low birth, and sided with Iyeyasu when a movement against him compelled him to take up arms. In a bloody battle at Sekigahara, on Oct. 16, 1600, Iyeyasu utterly routed his enemies, killing 10,000 of them. Wholesale confiscations followed, and with these lands he rewarded his adherents in such a way as to secure his own authority throughout the country. Later he captured the castle at Osaka, where the child Hideyori was with his mother, and in 1603 reported to the Mikado, receiving from him the appointment of head of the Minamoto clan, and that of Seii-Taishogun (or Barbarian-quelling-great-general). Not long after he received the submission and homage of the barons at Yeddo, which he made his capital. The better to maintain his authority, he ordained that each of the daimyos should, with a certain number of his armed retainers, remain in Yeddo six months of the year, and their wives and families should be left as hostages when they visited their own domains. He then began extensive internal improvements; he enlarged the castle at Yeddo, made streets and canals, built bridges, erected buildings, drained marshes, constructed the great highway called Tokaido, which runs along the eastern coast from Yeddo to Kyoto, and effected many other great and lasting improvements for the betterment of the country. In 1605 he concluded peace with Korea, reëstablished friendly relations with China, and retired in favor of his son Hidetada, reserving to himself, however, a large measure of control. He then took up his abode in his castle at Sumpu (now Shidzuoka), in the Province of Suruga, occupying himself with the collection of books and manuscripts, and the composition (as is believed) of the document, in 100 sections, known as *The Legacy* (or Testament) of Iyeyasu, containing laws or rules to be observed in governing the country. His policy, which aimed at the unification of the country, included as one of its features the exclusion of aliens and the alien religion, Christianity. In 1614 he issued a proclamation ordering all Romish propagandists and leaders of churches to be deported, their churches to be destroyed, and compulsory recantation of the faith by the converts. Large numbers were deported, and thousands were massacred in the persecutions that followed. The Portuguese and Spanish were expelled, but the Dutch and English, who first arrived in Japan during this period, received commercial privileges—the former being allowed to settle at Nagasaki and the latter at Hirado.

Iyeyasu died at Sumpu and was buried at Kunosan in Suruga, but later his remains were

interred in a mausoleum at Nikko. He was canonized as To Sho Dai-Gongen, but is commonly spoken of as Gongen Sama. His festival falls on the 17th day of the fourth month. Consult: Lowder, *The Legacy of Iyeyasu* (Yokohama, 1874); Grigsby, in the *Transactions of the Asiatic Society of Japan*, vol. viii (Tokyo, 1875); J. J. Rein, *Japan: Travels and Researches* (London, 1884).

IZABAL, ē'sȧ-bäl'. Capital of the Department of Izabal, Guatemala, situated in a mountainous but very fertile district on the south shore of Lake Izabal (or Golfo Dulce), which is connected with the Caribbean Sea by the Río Dulce (Map: Central America, C 3). The river is not navigable for large vessels, and Livingston, at the mouth of the river, has become the port through which Izabal exports ebony, rosewood, and other fine cabinet woods, sarsaparilla, cacao, and coffee. Pop., about 4000.

IZABAL, Lake. An inlet of the Gulf of Honduras in the eastern part of Guatemala, Central America (Map: Central America, C 3). It extends in a southwestern direction for 36 miles and has a width of about 11 miles. Its depth is sufficient for large steamers, but the bar at the mouth makes it difficult of navigation.

IZAK, Heinrich. See Isaak, Heinrich.

IZALCO, ē-säl'kō. A remarkable volcano, near the Pacific coast, 36 miles northwest of the city of San Salvador, Guatemala. It suddenly burst out of the plain in 1770 and since then has been active at regular intervals. Great quantities of material have been ejected, and the cone has gradually risen to the height of about 6000 feet. It is one of the series known as the San Salvador group of volcanoes that forms a prominent feature of the Guatemalan coast.

IZAMAL, ē'sȧ-mäl'. A town in the State of Yucatan, Mexico, situated 41 miles by rail east of Mérida (Map: Mexico, P 7). It is noted chiefly for its ancient ruins, which have interested many eminent archæologists, among others Charnay and Bourbourg. Pop., about 6000.

IZ'ARD, George (1776–1828). An American soldier, son of Ralph Izard. He was born at Richmond, Surrey. He graduated at the College of Pennsylvania in 1792; then went to England, where he entered the military school at Kensington, and after a short stay there studied at Edinburgh, Marburg, and Metz. He was lieutenant of engineers in the United States Army (1794–96); returned finally to America (1797); was sent to Charleston as the engineer of Castle Pinckney, and later commanded Fort Mifflin and West Point. He was then for a short time Secretary of the American Legation at Lisbon. He resigned from the army in 1803, but at the beginning of the War of 1812 reentered it as colonel of the Second Artillery and rose to the rank of major general (1814). He was ordered to the northern frontier, where he served at first under Gen. Wade Hampton and later (in August, 1814) relieved General Brown in the command on the Niagara frontier. In October he crossed the Niagara with about 8000 men and moved against General Drummond, on the Chippewa. After a sharp skirmish (October 19) near Cook's Mills, on Lyon's Creek, General Drummond withdrew his troops to Fort George and Burlington Heights. Izard failed to follow and retired to Black Rock; and this conduct, though approved by the government, aroused popular criticism. This led to his publishing in 1816 a volume entitled *Official Correspondence with the War Department, 1814–15.* President Monroe appointed him Governor of Arkansas Territory in 1825, a post which he held until his death.

IZARD, Ralph (1742–1804). An American patriot of the Revolutionary period, born near Charleston, S. C. He inherited a large estate, was educated at Cambridge, England, and on his return to America passed his time chiefly in New York as a young man of fashion. Returning to England in 1771, he lived in London until 1774, when he went to the Continent because of the impending war between England and her American Colonies. From 1776 to 1779 he was nominally Commissioner of the United States to Tuscany, but remained during the greater part of this period at Paris and took an active part in the controversy between Franklin and Arthur Lee, siding with the latter and vigorously attacking the former. In 1780 he returned to America and soon afterward pledged his valuable estate to enable Congress to procure ships of war from Europe. He was instrumental in securing the appointment of General Greene to the command of the southern army. He was a delegate to the Continental Congress (1782–83), and was a member of the United States Senate from 1789 to 1795. His correspondence was published by his daughter in 1844.

IZCOHUATL, ēs'kō-wä't'l. See Itzcoatl.

IZ'DUBAR'. See Gilgamesh.

IZIOCATL. See Itzcoatl.

IZMAILOV, ēz'mȧ-ē'lŏf, Alexander Efimovitch (1779–1831). A Russian poet and writer of fables, born in Moscow. He was educated at the School of Mines and shortly after was appointed Governor at Archangel, then at Tver. He is chiefly known by the 120-odd fables in which he portrays Russian characteristics. A collection of them was published in 1814. He also contributed to periodical literature and wrote romances such as *Biednaia Matcha* (1801). The seventh edition of his poems appeared in 1849, and his complete works were issued in 1849.

IZMID, ĭz-mēd'. See Nicomedia.

IZRAIL, ĭz'rā-ĭl. See Azrael.

IZTACCIHUATL, ēs-täk-sē'hwä't'l, or **IXTACCIHUATL.** A lofty mountain in Mexico, just north of Popocatepetl, 40 miles southeast of the city of Mexico. It is of volcanic origin, but has no crater. It is oblong in shape, and its summit is covered with perpetual snow; its profile resembles a woman lying wrapped in a white shroud, whence its name, which means White Woman. Its height is about 17,000 feet. On a clear day, from the valley of Mexico, it is a most impressive and inspiring sight.

IZÚCAR, ē-sōō'kär. A city and district of Puebla, Mexico, situated 35 miles southwest of the city of Puebla, at the base of Popocatepetl (Map: Mexico, K 8). It is in the midst of a rich sugar region and has railway communication with Puebla. Pop., about 12,000.

J

J The tenth letter of the English alphabet, and the latest letter added to our script. In form *J* was at first merely a variation of *I*, and both characters were used interchangeably for either vowel or consonant. A differentiation later followed in the value of the symbols. *J* was appropriated to represent the consonant sound, *I* was confined to the vowel. In English this usage did not become established until the seventeenth century. In the minuscule letter the dot over the *j* is a proof of its original identity with *i*. The Latin *I* came from the Greek *ἰῶτα, iota*, which itself was derived from the North Semitic *Yod*. This latter originally represented the consonantal sound *y*, but later was used also to indicate the vowel *i*.

Phonetic Character. In English *j* has the composite sound of *d* + *zh*, as in *judge*. It is thus a combination of the voiced dental explosive and the voiced palatal spirant. In French, however, the spirant value (*zh*) alone is given the letter, as in *jour* (*j* pronounced as the *z* in English *azure*); in German *j* has the original *y*-sound of the Latin *i*-consonant; in Spanish the *j* has a sound resembling a guttural *ch*. As to its source, the English *j* appears chiefly in words derived from the Romance languages, and hence from the Latin *j* (*i*) or *di*. Thus, the English word "to judge" has its *j* from the OF. *jugier*, Lat. *judicare;* on the other hand, Eng. "journal" is through the Fr. *journal* from the Lat. *diurnalis*. Before the differentiation of *J* and *I* in English the combination *Gi* for *J* was sometimes used in Middle English, as in *Giwes* for *Jews*, no doubt under Romance influence; cf. Ital. *Giovanni*, from Lat. *Johannes*.

JA'BAL. A son of Lamech and brother of Jubal and Tubal Cain, according to Gen. iv. 20. He is said to be the father, or ancestor, of those who dwell in tents and with cattle. The name is supposed to designate him as shepherd or herdman and has been connected with the Hebrew and Phœnician word *jobel*, 'ram.' It is also supposed by some scholars to be another form of Abel (q.v.), to which the same meaning is naturally assigned; but the evidence for this is not conclusive. Jabal's brother Jubal is said to have been the father, or ancestor, of such as handle the harp and pipe.

JABALPUR, jŭb'ŭl-pōōr', or **JUBBULPORE.** A division of the Central Provinces (q.v.), British India (Map: India, D 4). It comprises the districts of Jabalpur, Saugor, Damoh, Seoni, and Mandla and has an area of 18,953 square miles. Pop., 1901, 2,081,480; 1911, 2,421,064. Capital, Jabalpur.

JABALPUR, or **JUBBULPORE.** The capital of a district and division of the same name in the Central Provinces and one of the most important railroad junctions of British India, near the Nerbudda River, 200 miles southwest of Allahabad (Map: India, D 4). It is 1306 feet above the sea, picturesquely situated in a hilly, rock-encircled basin marked with numerous gorges. Education is carried on in a government college, the law school, an engineering school, normal schools for both sexes, and an industrial school. The town has wide and straight streets, and a garrison is stationed here. It manufactures cotton goods, carpets, wire netting, brass work, and statuary, and its export and import trade is of considerable importance. It was formerly the great centre of the Thugs (or stranglers), who were eventually suppressed by the British government. The Marble Rocks, 11 miles distant, is a favorite excursion place and a scene of great natural beauty and interest. Pop., 1901, 90,533; 1911, 100,651.

JAB'BOK (Heb. *yabbōk*, copious river, probably from *bākak*, to pour forth). A stream of the East Jordan country, which rises near Rabbath Ammon and after a course of about 65 miles, not taking into account its numerous windings, empties into the Jordan 23 miles north of the Dead Sea (Map: Palestine, D 3). The modern name is Nahr ez-Zerqa (blue river). It affords some of the most picturesque scenery of Palestine. Before the conquest of Canaan it separated the territories of Ammonites and Amorites (Josh. xii. 2) and later flowed through the Land of Gad. On its banks Jacob is represented as having had his encounter with the mysterious antagonist (Gen. xxxii. 24–25).

JABIRU (Brazilian name). 1. A large stork (*Mycteria americana*, or, as modern taxonomy has it, *Jabiru mycteria*), common in tropical America and occasionally found as far north as Texas. It is about 4 feet long and 7 feet across the wings. The plumage is pure white, but the head and neck are destitute of feathers and are black, with a reddish or flesh-colored ring around the base of the neck. The bill is a foot long, very thick at the base and slightly bent upward at the tip. The jabiru is the only true stork (sub-family Ciconiinæ) found in North America. 2. Two other storks, one Oriental and the other African, which are so closely allied that, were they not widely separated, they would probably be considered as members of a single genus. The former is the black-bellied jabiru of Australia (*Xenorhynchus asiaticus* or *australis*), represented in south-

eastern Asia by a similar species or variety; and the latter is the handsome "saddle-billed" stork (*Ephippiorhynchus senegalensis*) of the Sudan, one of the most common and conspicuous wading birds of the marshy region of the upper Nile.

JABLOCHKOV, yä′blŏch-kôf, PAUL (1847–94). A Russian electrical engineer and inventor, born at Serdobsk in the Government of Saratov. In 1871–75 he was director of the telegraph lines between Moscow and Kursk, and in 1876 he moved to Paris, where he devoted himself to experiments with electric arc lamps. He succeeded in inventing the "candles" known by his name, that were in general use for a few years. He returned to Russia in 1894 and there died in poverty.

JABLOCHKOV CANDLE. See ELECTRIC LIGHTING.

JABLONOWSKI, yä′blŏ-nŏv′skĕ, JOSEPH ALEXANDER PRUSS, PRINCE (1712–77). A Polish-German patron of letters. He was Waywode (administrative chief) of Nowogrodek, and left his fatherland in 1768. He went to Leipzig, where he endowed the Jablonowski Scientific Association and offered three prizes for monographs on Polish history, economics, and mathematics or physics. This association began its work in 1774 and after an interval of inactivity was revived in 1828. It published *Acta Societatis Jablonovianæ* (1772–73), *Nova Acta* (1802–45), and the series of prize monographs (1847 et seq.).—STANISLAS (1634–1702), of the same family, was one of the conspirators against King Michael, and a leader of the Poles in the war with Turkey. He was made a German prince by the Emperor Leopold for his services at Vienna. Jonsac's *Histoire de Stanislas Jablonovski* was translated into Polish by a second PRINCE STANISLAS (1799–1878), a Polish artillery officer.

JABLONSKI, yä-blŏn′skĕ, DANIEL ERNST (1660–1741). A Polish Protestant theologian, born at Nassenhuben, Prussia. He studied at the University of Frankfort and in England and the Netherlands. In 1683 he took charge of the Reformed Church in Magdeburg, where he distinguished himself as a preacher. From 1886 to 1891 he was rector at the Moravian College, Lissa. Frederick I chose him for his chaplain (1691–93), and by 1699 he was the leading bishop of the Moravian church. That year he published his *Hebrew Bible*, and he also brought out an edition of the *Talmud* (1715–21), besides translating into Latin Bentley's sermons on "A Confutation of Atheism," which formed the first course of the Boyle lectures. His knowledge of Oriental languages was one of his qualifications for the presidency of the Berlin Royal Academy of Sciences (1733), and he labored long, though unsuccessfully, to bring about a union between the Swiss, German, and English Protestants.

JABON, hä-bōn′, or **JABONCILLO,** hä′bŏn-the′lyō. See SOAPFISH.

JAB′ORAN′DI. A name given in South America to several species of plants used as diaphoretics. The plants grow chiefly in Brazil and are most known in the neighborhood of Pernambuco. Those recognized by the Pharmacopœia of the United States are *Pilocarpus selloanus* and *Pilocarpus jaborandi.* (See ALKALOIDS.) When bruised, the leaves are aromatic and taste somewhat bitter. The important constituents are a volatile oil and two alkaloids called pilocarpine and jaborine. The latter alkaloid somewhat resembles atropine in its action. An infusion of the leaves or a fluid extract or tincture may be given internally; or one of the salts may be administered with a hypodermic syringe. When an infusion of 90 grains of the dried leaves is swallowed, it produces in the course of two or three minutes a flushing of the face, and in the course of five or six minutes drops of sweat appear on the forehead and soon afterward on other parts of the body and limbs. When sweating is established, the face becomes pale, and a profuse secretion of saliva and nasal and bronchial mucus is poured out upon the mucous surface, and often there is an abundant secretion of tears. The salivation is often so profuse as to interfere with speech. The average duration of sweating is about one hour and a half, and the temperature usually falls 1° F. The average loss of fluid by sweating is nearly two pints, but the loss is said sometimes to be four quarts if the salivary and mucous secretions are included. Sometimes, though rarely, sweating does not take place, but salivation is more frequently absent than sweating. When one of these is diminished, the other is increased. Vomiting is a usual occurrence, but the nausea is not great. The quantity of urine secreted during the sweating is diminished and is passed with pain. Urea appears in the perspiration and saliva. The pulse is quickened at first and later slowed, and the arterial tension is increased. Larger doses later cause marked cardiac depression. The sight frequently becomes dimmed—an effect attributed to the action of the drug on the muscles of accommodation belonging to the lens. (See EYE.) Jaborandi is an effective galactagogue, or promoter of the lacteal secretion. The hypodermic injection of one-sixth or one-fifth of a grain of pilocarpine or the hydrochlorate produces much the same effects as the internal administration of the infusion of the leaves, but the action is more prompt as well as more lasting. With the hypodermic injection sweating always takes place, and vomiting is less frequent. Applied locally to the eye, it causes marked contraction of the pupil and diminution of intraocular tension. In general it may be said that the action of pilocarpine is antagonistic to that of atropine.

The medical uses of jaborandi are few, and it should be used internally only with caution, on account of its depressing action upon the heart. It has been employed to cause absorption of effusions into the serous cavities, either those of inflammatory origin, such as pleurisy, or those due to circulatory failure or insufficient action of the kidneys, such as hydrothorax and dropsy. It may be said that other remedies may be found which are quite as efficacious and lack the depressing effect. In uræmia and eclampsia it has been used, but *Veratrum viride* is now preferred. In conjunction with morphine it is employed as an antidote in atropine poisoning. Its chief use, however, is in glaucoma (q.v.), in which its local application to the eye causes diminution of the intraocular tension. It is generally given as pilocarpine hydrochloride for this purpose. It is sometimes employed to break up adhesions of the iris by contracting the pupil. For this purpose it is alternated with atropine, which causes dilatation. It is used internally and locally to cause a thicker and coarser growth of hair.

JABOTICABA, zhä-bō′tē-kä′bä. An edible

fruit produced by the Brazilian tree *Myrciaria cauliflora* and other species. The trees attain a height of 35 to 40 feet and produce on their trunks and larger branches large numbers of maroon-purple fruits ½ to 1½ inches in diameter. The fruits resemble grapes somewhat, but have a thicker, tougher skin. The trees flower several times during the year, depending on rains or water supply, and the fruit ripens within three or four months. An attempt has been made to grow the trees in Florida, but the introduction was so recent that its adaptation cannot be affirmed.

JACA, jä′kȧ. A tropical tree, closely related to the breadfruit. See JACK TREE.

JAC′AMAR (Fr., Sp. *jacamar,* from Brazilian *jacamarica*). One of the birds of the tropical American family Galbulidæ, of which about 26 species are known, all inhabitants of the region east of the Andes. They are comparatively small, are brilliant in plumage, resemble the bee eaters of the Old World, and in their habits are like the arboreal insectivorous kingfishers. The Brazilians call them "foolish" on account of their stupidity. Jacamars nest in holes in banks or stumps and lay only two white eggs.

JACANA, jȧk′ȧ-nȧ, *Portug. pron.* zhä′sȧ-nä′ (Brazilian *jaçaná*). One of the small, raillike plovers of the family Parridæ, remarkable for their carpal spurs and for the extraordinary length of their toes and claws, adapted to the bird's habit of seeking its food (green sprouts of rice and the like, insects, and small aquatic animals) by walking on the floating leaves of the water plants in weedy lakes and slow rivers. They belong to the tropics of various parts of the world. The common species of South America (*Jacana spinosa*), abundant in Guiana and Brazil, is about 10 inches long; black, except the back and part of the wings, which are of a bright chestnut color. Another species is found in tropical America and extends its range as far north as Texas. The prevailing color of the plumage is rich purplish chestnut. Their general habits are much like those of the gallinules, which they resemble in bodily appearance. The strong spur with which the bend of each wing is armed is a formidable weapon in the fighting that seems incessant among them.

Of the 10 or 12 Old World species, one or two need special mention. The pheasant-tailed jacana, or water pheasant (*Hydrophasianus chirurgus*), is a familiar bird throughout the Oriental region and, like another species (of northern Australia), is often called lotus bird, because of its fondness for places where that plant prevails. Its colors are pleasing, and its tail is prolonged by four very long feathers, which suggest those of a pheasant. During the rains, in their favorite haunts, each pair forms a rude flat nest of weeds and grass, interwoven beneath with the long shoots of aquatic plants, which support it buoyantly on the surface. All the family lay rich olive-brown eggs, closely marked with dark lines. This bird is a favorite subject for representation in the native art of all the countries from India to Japan. The genus *Metopedius,* hardly different from the American jacana, has representatives in Africa, Madagascar, and India; and the genus *Hydrolector* belongs to northern Australia and the neighboring islands. Consult authorities for South America, India, and the East, mentioned under BIRD. See Plate of RAILS, ETC.

JAC′ARAN′DA WOOD (Brazilian name). A hard, heavy, brown South American wood, which from its faint odor is also called rosewood. It is derived from several species of *Jacaranda,* of the family Bignoniaceæ. Several species, locally called caroba, etc., are employed medicinally in many South American countries.

JACARÉ, jȧk′ȧ-rā′, *Portug. pron.* zhä′kȧ-rā′ (Portug. *jacaré, jacareo,* from the Brazilian name). Any of the caymans or alligators (qq.v.) of tropical America, the species of which are distinguished by some qualifying word. Thus, the jacaré tinga is the small six-foot *Caiman trigonatus,* with the slender muzzle and black-banded tail; jacaré nassu is the great *Caiman niger,* sometimes 20 feet long. Used alone, the name usually means the common, or spectacled, cayman (*Caiman sclerops*), which is very numerous from southern Mexico to northern Argentina. It is of medium size and is distinguished especially by the fact that the upper eyelid is rugose, partly ossified, and often produced into a small horn. All these alligators spread into the flooded forests in the wet season and congregate in the river courses during the dry season. They do vast damage to stock and kill many human beings; but their hides are of commercial value, and their flesh is eaten by all the Amazonian Indians.

JACCOUD, zhȧ′kōō′, FRANÇOIS SIGISMOND (1830–1913). A French physician, born at Geneva. He went to Paris about 1850 as a music teacher; studied medicine, winning a gold medal in 1859 and his degree in the same year; and in 1863 became assistant in the medical faculty. He was appointed titular professor of pathology in the faculty of medicine in 1876, became permanent secretary of the Académie de Médecine in 1877, and in 1883 began to teach in the medical clinic at the Pitié. He wrote: *De l'organisation des facultés de médecine en Allemagne* (1864), a report on his official investigation; *Leçons de clinique médicale* (1867–88); *Traité de pathologie interne* (7th ed., 1883); *Du froid comme cause de pneumonie* (1887); and a translation from Graves, *Clinique médicale* (1861–62); and he edited the *Nouveau dictionnaire de médecine et de chirurgie* (1864–86).

JACHIN (jā′kĭn) **AND BOAZ.** The names of the two brazen pillars which Solomon set up in the porch of the temple (1 Kings vii. 15–21).

JACHMANN, yäg′mȧn, EDUARD KARL EMANUEL (1822–87). A Prussian naval officer, born at Danzig. He entered the service in 1845 and became a captain 14 years later. In 1862 he took part in the expedition to East Asia and China, and in 1864 defeated the Danes near Jasmund, on the island of Rügen, whereupon he was promoted to be rear admiral. Placed at the head of the Navy Department in 1867, he was made vice admiral in the following year, and in the Franco-German War was commander of the Prussian fleet in the North Sea. He was Minister of the Navy in Von Stosch's cabinet (1872), but retired a year later.

JACINI, yä-chē′nē, STEFANO, COUNT (1827–91). An Italian economist and statesman. He was educated in Switzerland, in German universities, and at Milan. During the Austrian rule of Lombardy in 1849–59 he engaged in economic investigation, writing *La proprietà fondiaria in Lombardia* (1856) and *Sulle condizioni economiche della Valtellina* (1858). For his writings on the evils of Austrian rule, he was made Minister of Public Works under Cavour in 1860–

61 and later held the same office in 1864–67. He helped to bring about the alliance with Prussia for the war against Austria in 1866, participated in the organization of Italian railroads, and was president of the Agricultural Commission of 1881–86. He was made Senator in 1870 and Count in 1880.

JACITARA (jäs'ĭ-tä'rȧ) **PALM** (South American Indian), *Desmoncus macroacanthos*. A palm found in the lowland forests of the Amazon. It has a slender, flexible stem which often climbs, by means of hooks, to a height of 60 or 70 feet. The outer part of the stem, cut into long strips, is much used to make the plaited cylinders in which grated cassava root is squeezed in the process of extracting the starch. These wicker cylinders, which are very durable, will outlast two or three made from other fibers. The material seems suitable for many other purposes.

JACK. A piece of mechanical apparatus for raising heavy weights short distances. Jacks are made in a variety of forms, but may be divided into lever jacks, screw jacks, hydraulic jacks, and geared jacks. The lever jack is the device used from a remote antiquity for lifting wagon axles so as to free the wheel from the ground. A long lever swings upon a pin in a post as a fulcrum, and the short arm goes under the axle. There is a device like a ratchet or a linked chain to hold the axle from falling when the lever is no longer depressed. In the screw jack a nut is similarly supported on a hollow post, and a lever turns the screw in the nut and, the latter being held from turning, the screw is advanced with great power, owing to the slow motion axially through the nut. Hydraulic jacks are portable forms of hydraulic presses. In geared jacks a combination of levers and gearing takes the place of the simple lever or screw of the other jacks and the water of the hydraulic jacks. The essential requirement of a jack is that it shall be of compact and sturdy construction and shall be conveniently portable. The ordinary screw jack is an excellent illustration of all these qualities. Jacks are much used in railroad wrecks or accidents and in house moving and shoring and in erecting machinery. See HYDRAULIC PRESS.

JACK. In the United States navy, a blue flag with white stars, corresponding in all respects to the similar portion of the national flag, which is sometimes called the *union*. In Great Britain and Germany the *jack* is a flag which is similar to the upper quarter of the man-of-war flag which is nearest the staff. In countries which have no union in their man-of-war flag, the jack more nearly resembles the colors carried at the stern except in size. It is set on a staff at the stem, or on the bowsprit cap of rigged ships. It has no particular significance at the present time, but is usually hoisted in port. The United States naval jack is carried in the bow of a boat when an ambassador, minister, or chargé d'affaires of the United States is being carried by it. See FLAG, and Colored Plates with the articles NATIONAL FLAGS and UNITED STATES.

JACK, or **JACKFISH.** A name applied, often in connection with some qualifying word, to many fishes, usually marked by liveliness of action. 1. A pickerel, especially the Eastern green pickerel. 2. One of the Californian rock fish (*Sebastodes paucispinis*). 3. Either of two West Indian amber fishes (*Seriola lalandi* or *Seriola dumerili*), more often called amber jacks. 4. Any of various scads and crevalles, especially the jurel (q.v.).

JACK, CAPTAIN. A picturesque character in American frontier life about the middle of the eighteenth century, called also the Black Hunter or Black Rifle. After the massacre of his family and burning of his home on the Juniata by Indians, he devoted himself unceasingly to vengeance and gathered about him a band of daring men who in Indian dress engaged in a relentless pursuit of all Indians and in the defense of white settlers.—The name is applied also to KI-ENT-POOS, the principal leader of the Modoc Indians (q.v.) in northern California in the War of 1872–73. He acquired notoriety by the deliberate murder of General Canby while attending a peace conference, for which he and others concerned in the attack on the commissioners were hanged, on the final suppression of the outbreak.

JACK-A-GREEN. See JACK-IN-THE-GREEN.

JACKAL, jăk'ȧl (OF. *jackal, jakal*, Fr., Sp. *chacal*, from Ar. *jaqāl*, from Pers. *shaghāl*, from Skt. *srgāla*, jackal). The common name of a number of species of the genus *Canis*, abounding in Asia, Africa, and southeastern Europe. They agree in all their most important characters with wolves and dogs (see CANIDÆ), although the form and tail are somewhat foxlike. The head is narrow and the muzzle pointed. The ears are erect and rather large. The tail is not so long as in foxes, but is almost equally bushy. All the jackals are of small size, as compared with wolves, seldom exceeding 15 inches in height at the shoulder. Their colors are buff and tawny, more or less grizzled; the tip of the tail is always dark. They make holes for themselves in the ground, or take possession of such as already exist among rocks or ruins; and in these they spend the day, not venturing abroad, as a rule, till the dusk of evening. They hunt during the night in troops, and their howlings are described by all who have heard them as peculiarly unpleasant. The notion that the jackal is the "lion's provider" is one of the exploded fables of natural history, although it may have some foundation in the lion occasionally following a troop of jackals in full cry and appropriating "the lion's share." Jackals are not only ready to devour any animal which they can run down, but any carrion that they may find. They follow armies; they dig up the ill-buried dead; they rob henroosts and outhouses; but they are as omnivorous as domestic dogs, and eat farinaceous or other vegetable food when it comes in their way; they are even said, like foxes, to enter vineyards and devour the grapes. They have a very offensive smell, which, however, is said to diminish through domestication, and they are domesticated without difficulty. Everywhere jackals interbreed with native dogs, and doubtless they contributed essentially to the early stock. The foregoing applies especially to the "common" jackal (*Canis aureus*), which is spread, with many variations, throughout the semidesert region from the Sudan to Afghanistan, India, and Burma, and also is common in Europe as far north as Heves Comitat, Hungary, and on the plains of Greece and European Turkey. In northern India it is known as pheal, and in southern India as bhalu, and many weird stories are told of it and its relations to the tiger. The African variety is rather larger and grayer than the Asiatic.

The black-backed jackal or tenlie (*Canis mesomelas*) is a very distinct species, of bright coloration. The sides and limbs are red to reddish yellow; the back and end of the tail are black. It is widely distributed throughout eastern and southern Africa, and its handsome fur is highly prized. A third African species, the side-striped jackal (*Canis adustus*), called rubuyo on the West Coast, and canduc eastwardly, is widely scattered south of the equator and differs from the others in having rather shorter and much darker ears and the sides marked with one or more curving light bands bordered with black—a feature, however, which is highly variable. Cf. Dog; Fox; Wolf; and see Plate of Foxes and Jackals.

JACK-A-LANTERN. See Ignis Fatuus.

JACK-AMEND-ALL. A nickname given to Jack Cade (q.v.).

JACK AND JILL. A nursery song. The name Jill is a corruption of the Norman Julienne, once common in England in the form Gillian. The prototypes of Jack and Jill in Norse mythology are two children rescued by the moon from their father, who forced them to draw water all day. The Scandinavian peasantry still see in the spots on the face of the moon the children with their pail.

JACK AND THE BEAN STALK. A nursery legend found in the folklore of many peoples. The harp has been interpreted as the wind, the bags of treasures as the rain, the red hen as the sun.

JACKASS. A domestic donkey; often abbreviated into jack, especially to designate an entire male. See *Donkey* under Ass.

JACKASS KINGFISHER. See Laughing Jackass.

JACKASS PENGUIN. Any penguin of the genus *Spheniscus*, so called from their cry, which is similar to the braying of a donkey. See Penguin.

JACK BRAG. A pretentious character in Theodore Hook's novel of the same name (1837).

JACK'DAW. A familiar Old World crow (*Corvus*, or *Colœus*, *monedula*), very widely distributed in Europe, Asia, and North Africa. It is 13 or 14 inches long and deep black in color, appearing dark gray on the neck, but with a steel-blue gloss elsewhere. It frequents towns and villages and makes its home in towers, steeples, old chimneys, and similar places. It is more or less gregarious and social, is easily domesticated, and exhibits great shrewdness in all its actions. Like other crows, it has considerable power of mimicry and makes an interesting and often an amusing pet. It builds a large nest of sticks and twigs, lined with wool and other soft substances, and lays four to seven eggs, similar to those of American crows.

JACKDAW OF RHEIMS, rēmz, The. One of the best known of the *Ingoldsby Legends*, the story of a jackdaw which stole the ring of a cardinal and, through the curse laid by the cardinal on the thief, was afflicted until he restored the ring. It has been made into a "comic cantata" with very effective music by George Fox.

JACK'ET (OF. *jaquette*, *jaquet*, dim. of *jaque*, Sp. *jaco*, It. *giaco*, Eng. *jack*, cheap coat of mail). A long cylinder of steel surrounding the tube of a gun for about half its length from the breech end and projecting slightly beyond the latter. See Ordnance; Guns, Naval.

JACKFISH. See Jack.

JACK FROST. The personification of frost or cold in nursery tales.

JACK HORNER. An old and familiar English nursery rhyme. Various explanations of its origin have been given. It is said that the abbot of Glastonbury sent to Henry VIII or to the commissioners, when the estates of the monasteries were seized, the title deeds to certain manors, and for safety inclosed them in a pasty, which was intrusted to a messenger. The latter opened the crust and extracted the deeds of the manor of Wells, and the abbot was punished for having withheld them. The rhyme is said by Halliwell to be derived from "Jack and his Stepdame," an older production.

JACKING. A form of night hunting and fishing formerly much resorted to, but now generally discountenanced by American sportsmen and forbidden by statute in most of the United States. Jacking deer was done from a rowboat or canoe, preferably the latter, because a paddle can be used noiselessly. Any light which could be kept concealed until it was needed would serve. Sometimes this light was arranged in the bow of the craft, sometimes it was a lamp fitted into a specially made helmet-like hat. Such a light flashed suddenly at a deer heard feeding or drinking at the water's edge will almost always cause the animal to stand still for a few moments, either in terror or out of curiosity, and its eyes will show plainly in the rays of the jack. Under such conditions it is practically impossible to be certain of killing the animal outright, even with a shotgun. Similar devices are used at night to lure fish to the surface, where they are speared.

JACK-IN-THE-GREEN. The name of one of the principal characters in the May Day festivities in England. The part is usually taken by a boy, whose costume is profusely adorned with wreaths of flowers or greens. Sometimes called *Jack-a-green*. Consult Joseph Strutt, *Sports and Pastimes of the English People*, edited by Hone (London, 1830) and often revised since then. See May.

JACK-IN-THE-PULPIT.

JACK-IN-THE-PULPIT, Indian Turnip (*Arisæma triphyllum*). An American perennial

herb of the family Araceæ, common in moist, shady woods. It has a rather large, flattish corm or tuber noted for its acridity, due to the mechanical effects of needle-like crystals called raphides, and often used in domestic medicine; usually two leaves of three leaflets each; and a club-shaped spadix covered by a green or purple spathe which falls away in early summer and exposes the conspicuous red berries at maturity. When properly cooked, the corm resembles in flavor a well-boiled Irish potato. When planted in cool, moist, rich soil, the plant succeeds well in gardens.

JACK KETCH. A former familiar title for the hangman in England, dating from the time of John Ketch (died 1686), public executioner during the reign of James II. At the time of its origin the title was also often closely associated with the notorious Judge Jeffreys. The name is said to be a corruption of Jacquett's, from the name of the lord of the manor of Tyburn. In France the headsman is euphemistically styled M. de Paris.

JACK-O'-LANTERN. See Ignis Fatuus.

JACK PUDDING. The English equivalent of the German Hanswurst.

JACK RABBIT. See Hare.

JACK ROBINSON. A name occurring in the phrase "Before you can say Jack Robinson," with the meaning of "instantly." The origin of the phrase is unknown. It has been referred to a humorous song by Hudson, a London tobacconist; to a Jack Robinson distinguished by the briefness of his visits to his neighbors and his hasty departures; and by Halliwell to an old play, in which it is cited under the form "as easie . . . as tys to saye *Jacke! robys on.*"

JACKS, Lawrence Pearsall (1860–). An English theologian. He was born in Nottingham, was educated at the University School there and at the University of London, Manchester College, Göttingen, and Harvard. He entered the Unitarian ministry in 1887, was an assistant at Bedford Chapel to Stopford A. Brooke (whose daughter he married in 1889), preached at Renshaw Street Chapel, Liverpool, and at the church of the Messiah, Birmingham, and in 1903 became professor of philosophy in Manchester College, Oxford. From its foundation in 1902 he was editor of the *Hibbert Journal*, an important Unitarian review. Among his brilliant sketches and essays are: *Mad Shepherds, and Other Human Studies* (1910); *The Alchemy of Thought* (1910); *Among the Idol-makers* (1911); *All Men are Ghosts* (1913).

JACK SALMON. The wall-eyed pike. See Pike Perch.

JACK SNIPE. 1. A sportsman's name in America for the pectoral sandpiper (*Tringa*, or *Pisobia, maculata*) of the books, also called meadow snipe and grass snipe. It is 8½ to 9 inches long; the wing 5 to 5½ inches. Its color is yellowish brown, striped with blackish above; the scapulars have chestnut edgings; belly and chin white; throat and breast ashy, shaded and sharply streaked; rump blackish; bill and feet greenish. It is migratory in the United States, winters to the southward, and as a rule breeds only in sub-Arctic Canada and Alaska, where it is very numerous in summer west of the Mackenzie, growing rare towards the east. It is very abundant, however, in Labrador in summer. Its course of migration seems to be mainly eastward of the cordillera and plains, for it is never numerous west of Manitoba. It is different from most sandpipers in its snipe-like behavior; i.e., it does not go much in flocks, but appears upon the marshes singly or in pairs.

2. The jack snipe or half snipe (*Gallinago*, or *Limnocryptes, gallinula*) of Great Britain is a true snipe (q.v.), about half the size of the common typical species of Europe. It is rather infrequent in England and is noted for lying so close as almost to be trodden upon before rising. See Pectoral Sandpiper, and Colored Plate of Shore Birds.

JACKSON. A city and the county seat of Jackson Co., Mich., 76 miles by rail west of Detroit, on the Grand River and on the Michigan Central, the Lake Shore and Michigan Southern, the Grand Trunk, the Michigan United Traction, and the Cincinnati Northern railroads (Map: Michigan, E 6). It is built on both sides of the river; the principal streets are paved with brick; and among more prominent features are the State prison, an Odd Fellows Home, a Carnegie library, fine parks, and a fine government building. Jackson is the centre of a productive farming region, and coal and fire clay exist in the vicinity. It has a considerable trade in agricultural produce, and is also an important wholesale distributing point, especially for reaping and mowing machines. Its extensive manufactures include foundry and machine-shop products, agricultural implements, automobiles, stoves, refrigerators, brass, steel, and iron castings, automobile accessories, drop forgings, milling machinery, flour, sewer pipe, fire brick, paper, corsets, etc. The Michigan Central Railroad has large car and machine shops here. The city owns and operates its water works. In 1914 it adopted the commission-manager plan of municipal government. Jackson was settled in 1829, but it did not develop rapidly until after railroad communication was opened by the Michigan Central in 1841. It was chartered as a city in 1857. Pop., 1900, 25,180; 1910, 31,433; 1914 (U. S. est.), 34,097; 1920, 48,374.

JACKSON. The capital of the State of Mississippi, on the Pearl River, 181 miles north of New Orleans, La., on the Illinois Central, the New Orleans Great Northern, the Alabama and Vicksburg, the Yazoo and Mississippi Valley, and the Gulf and Ship Island railroads (Map: Mississippi, E 6). Besides the State capitol, some prominent structures are the Governor's mansion, government building, Millsaps College (Methodist Episcopal), founded in 1892, Bellhaven College for young ladies, Jackson College, Campbell College, State institutions for the deaf and dumb, the blind and the insane, hospitals and sanitariums, James Observatory, a Carnegie library, and the State library. Among the points of interest are the remains of fortifications erected at the siege of Jackson in 1863, the old capitol, a Confederate monument, and a statue of Jefferson Davis. The city is in a cotton-growing region, with very fertile soil, but not far from the sandy, long-leaf-pine region, and has considerable trade and valuable manufactures, including cottonseed products, lumber and lumber products—staves, hubs, spokes, etc. —brooms, machinery, plows, and harrows. Jackson adopted the commission form of government in 1913. The city owns its water works. Settled about 1830, Jackson was incorporated 10 years later. During the Civil War it was occupied in 1863 by General Grant, and in 1864 was for the most part destroyed by General Sherman.

Pop., 1900, 7816; 1910, 21,262; 1914 (U. S. est.), 26,990; 1920, 22,817.

JACKSON. A city and the county seat of Jackson Co., Ohio, 95 miles south by east of Columbus, on the Hocking Valley, the Baltimore and Ohio Southwestern, and the Detroit, Toledo, and Ironton railroads (Map: Ohio, E 7). There are coal and iron mines, iron furnaces, foundries, a shoe factory, pipe works, auger-bit factory, railroad shops, plow works, etc. Jackson, settled as early as 1795 and incorporated in 1847, is governed by a mayor, elected every two years, and a council. Pop., 1900, 4672; 1910, 5468.

JACKSON. A city and the county seat of Madison Co., Tenn., 85 miles by rail northeast of Memphis, on the south fork of the Forked Deer River and on the Nashville, Chattanooga, and St. Louis, the Illinois Central, the Birmingham and Northwestern, and the Mobile and Ohio railroads (Map: Tennessee, B 3). Union University, Lane College (colored), and the Memphis Conference Female Institute are situated here, and there are Carnegie and collegiate libraries, an Elks Home, two hospitals, and several court buildings. Highland and Lancaster parks are places of scenic interest and summer amusement resorts. The city is an important truck-shipping centre, carries on an extensive cotton trade, and among its industrial establishments are large cotton and cottonseed-oil mills, railroad shops, boiler and engine works, furniture, heading, spoke, skewer, and plow factories, grain mills, and manufactories of porch columns, overalls, veneers, tile and brick, automobiles, etc. Settled in 1819, Jackson was incorporated in 1854 and adopted the commission form of government in 1915. The city owns and operates its water works and electric-light plant. Pop., 1900, 14,511; 1910, 15,779; 1920, 18,860.

JACKSON, Abraham Reeves (1827–92). An American physician, born in Philadelphia. He graduated at the Pennsylvania Medical College in 1848; practiced in Stroudsburg, Pa., and Chicago, Ill.; founded and became surgeon-general of the Woman's Hospital of Illinois; was made professor of gynæcology in the Rush Medical College, Chicago, in 1872; later became president of the College of Physicians and Surgeons in Chicago; and at the time of his death was president of the American Association of Gynæcologists. He was an honorary member of several medical societies and author of numerous papers, among which may be mentioned *Removal of Large Urethro-Vesical Calculus* (1858); *Successful Removal of Both Ovaries* (1866); *Removal of Fibrous Tumor of Uterus* (1872).

JACKSON, Abraham Valentine Williams (1862–). An American Indo-Iranian scholar, born in New York City. He graduated at Columbia in 1883, there held a fellowship in letters from 1883 to 1886, and was instructor in the Anglo-Saxon and Iranian languages from 1887 to 1891. After advanced study at the University of Halle, Germany (1887–89), he was appointed adjunct professor of English language and literature in Columbia (1891). In 1895 he was selected to occupy the chair of Indo-Iranian languages, then newly founded. He became well known as a lecturer on various subjects appertaining to English literature and the Orient, and in 1901, during a visit to India and Ceylon, received special attention from the Parsis, who presented to Columbia a valuable collection of Zoroastrian manuscripts in recognition of the instruction there given by him in their ancient texts. In 1903, 1907, and 1910 he traveled in Persia and Central Asia, and in 1911 again visited India. He was elected a director of the American Oriental Society and published *A Hymn of Zoroaster* (1888); *An Avesta Grammar in Comparison with Sanskrit* (1892); *An Avesta Reader* (1893); *Zoroaster, the Prophet of Ancient Iran* (1898); *Die iranische Religion* (1900); *From Constantinople to the Tomb of Omar Khayyam* (1911); *A Catalogue of the . . . Persian Manuscripts Presented to the Metropolitan Museum . . . by A. S. Cochran* (1914), with A. Yohannan.

JACKSON, Andrew (1767–1845). An American general and seventh President of the United States. He was born March 15, 1767. There has been much controversy between North Carolinians and South Carolinians regarding the place of his birth. There is a tradition that he was born at the Waxhaw Settlement in Union Co., N. C., but Jackson himself thought that he was born near the Waxhaw Creek in Lancaster Co., S. C., and in the opinion of his most thorough biographer "the weight of evidence seems to favor the South Carolinians." His father, Andrew Jackson, a poor farm laborer of Scotch-Irish stock, emigrated from Carrickfergus, Ireland, with his wife in 1765 and settled on Twelve Mile Creek in North Carolina. In 1767, a few days before his son's birth, the elder Jackson died, and his widow immediately removed to the home of her sister, Mrs. James Crawford, in South Carolina. In his boyhood Andrew was a leader among the wild youths of his neighborhood and easily surpassed them in quick temper, quarrelsomeness, and enthusiasm for such sports as cockfighting and horse racing. He had little or no schooling except such as is acquired from rough contact with the world. Though but eight years old when the battle of Lexington occurred, before the war was over he had taken some part, being once captured by the British. The death of his mother from a fever, caught while nursing Americans held in prison at Charleston, and of his two brothers at the hands of the British, left him alone in the world. It is not certain what means of support he had, but after working a few weeks at the saddler's trade, in 1784 he began to study law at Salisbury, N. C. While he was yet under 20 he was admitted to the bar as attorney and counselor, and in 1788 was appointed public prosecutor in the region now forming the State of Tennessee. It was a new and wild country, and in the prosecution of his duties Jackson needed chiefly force and persistence, qualities which gained him strong enemies, but equally strong friends. In 1791 he married Mrs. Rachel Robards, a daughter of John Donelson, one of the pioneer settlers of Tennessee. The marriage was the cause of considerable severe comment, from the fact that the bride had been divorced under peculiar circumstances. The parties took what was only a legislative warrant for a trial to be an actual divorce, and were married two years before the actual divorce was granted. They were married a second time, but the unfortunate matter was a sensitive point to Jackson all his life.

In 1796 he was a member of the convention to frame a constitution for Tennessee. In the same year he was chosen to Congress. His political sympathies were with Jefferson, and he went so far as to incur the condemnation of

being one of the 12 who opposed the address to Washington at the close of his administration. While in the House, he secured the payment of a claim which Tennessee had for expenses in an Indian war, adding thereby greatly to his popularity. In 1797 he was elected to a seat in the Senate, but he resigned the next year, having little pleasure in political life. From 1798 to 1804 he was a "Judge of the Supreme Courts" of Tennessee. In 1802 Jackson was chosen major general of the militia over ex-Governor Sevier. On the purchase of Louisiana (1803) Jackson was an unsuccessful applicant for the appointment of Governor. From 1804 to 1811 he was engaged in business, storekeeping, and planting. The abuses of credit in the border State, where there was little money and much land speculation, got him into embarrassments, and his own self-centred personality caused him many quarrels. Besides a quarrel with Sevier he had two duels, in one of which he killed Charles Dickinson, who had been drawn into a quarrel originating in a proposed horse race, and received himself a wound which maimed him for life.

When Burr appeared in the Southwest in 1805, he received cordial support from Jackson until the latter suspected that some disloyalty to the United States was involved. Jackson gave no further help to the enterprise, though he was later convinced of the innocence of Burr's motives, for he appeared as a witness for him at his trial and made a public speech against Jefferson relative to the matter.

The declaration of war against Great Britain in 1812 brought Jackson his opportunity. As soon as he heard the news, he offered his own services and the coöperation of 2070 militia under his control. In January, 1813, he set out under orders for New Orleans, which was regarded as a probable point of attack. In March he was at Natchez, organizing his force with great energy and skill, when suddenly he received orders to disband his forces, neither pay nor rations being furnished for these men, 500 miles from home. Jackson hired transportation on his own responsibility and led his men home in a body. His friend Thomas H. Benton, afterward the Missouri Senator, secured the repayment of this expense, but a slight discord which this good turn might have eased was aggravated by Jackson's standing second for another man in a duel with Jesse Benton, brother of Thomas H. After a fiery quarrel Jackson threatened to horsewhip Thomas H. Benton, and when he met the two brothers in a tavern in Nashville, a bloody fracas took place. Jackson was shot twice, and Jesse Benton was badly stabbed.

Ever since the earliest attempts to remove the Georgia Indians from their territory, there had been intermittent wars. Emboldened by the war between the United States and England, the Creeks in 1813 made further trouble and committed many outrages, the chief of which was the massacre at Fort Mims (q.v.) on August 30. Intense excitement followed, and the whole Southwest was aroused. The Tennessee Legislature called for volunteers and resolved to exterminate the troublesome tribe. In spite of the wound which Jesse Benton had given him, Jackson was soon in the field, and with Colonel Coffee, his former partner, defeated the Indians severely at Talladega and at Tohopeka or Horseshoe Bend on the Tallapoosa River. Jackson distinguished himself in these military operations by his boundless energy. Besides the foe, Jackson had to contend with discord among the officers, insubordination among his men, and scarcity of food, and he manifested not only a sympathetic understanding of the situation, but a great decision of action. This campaign began Jackson's national career; in August, 1814, he was in command at Mobile, a major general in the regular army.

The British attacked Fort Bowyer on Mobile Point, September 14, and were repulsed. They then, entering Spanish territory, retired to Pensacola, which Jackson had already asked orders to attack; acting now on his own responsibility in default of an answer from Washington, Jackson stormed the town with 3000 men. His success was very important, for it now rendered possible the defense of New Orleans, where Jackson arrived Dec. 1, 1814. The place was without defenses, and but for their own slowness and Jackson's almost frenzied energy, the British might easily have taken the town. Jackson proclaimed martial law, made the utmost of his means, and inspired his men with his own enthusiasm. The army was a motley one, being composed of regulars, militia from the neighboring States, a few pirates, and a battalion of negroes. On Jan. 8, 1815, the British made their grand assault on Jackson's works and were repulsed with great slaughter, the Americans having not only the better leadership, but remarkably good fortune due to various accidents. The British withdrew with the loss of their commander, Sir Edward Pakenham, and more than 2000 men. The American loss was only 8 killed and 14 wounded. The treaty of peace had been signed at Ghent, Dec. 24, 1814, two weeks before the battle. This victory was the greatest American success on land during the War of 1812, and the position it gave Jackson was preeminent. Besides his personal popularity among the frontier people, whom he so thoroughly understood, he had now a national reputation. A mutiny in September, 1814, arising from a misunderstanding as to enlistment, resulted finally in the execution of six men in February, 1815. This unprecedented sternness seems to have been justified, but when an attempt was later made to manufacture out of it political capital, Jackson, contrary to his usual method of action, disavowed responsibility. For the arrest of a Judge Hall during the prevalence of martial law Jackson was fined $1000 for contempt, but 30 years later this was refunded by Congress.

In April, 1815, Jackson was appointed commander in chief of the Southern Division, and Congress voted thanks for his services. His next active work was in the war against the Seminoles in Florida, in the course of which occurred another of his acts which created no little excitement. He arrested and put to death, on the charge of inciting the Indians, two British subjects, an English adventurer, Ambrister, and a Scotch trader, Arbuthnot. At the same time Jackson hanged two Indian chiefs and then seized Pensacola (1818), in spite of the remonstrance of the Spaniards. These proceedings created intense excitement in England, but after much angry correspondence there was a peaceable settlement. In Congress Jackson's conduct was very generally condemned, but all attempts to pass a vote of censure failed. On the cession of Florida to the United States he was appointed Governor (1821), and during his brief term of office had some serious difficulties in consequence

of the arrest of a judge for issuing a writ of habeas corpus. Efforts in Congress to pass censure for this act were not successful.

The Seminole War closed Jackson's military career, and with no inclination of his own he was again taken into political life. He was elected to a seat in the United States Senate in 1823. In 1822 and again in 1824 the Legislature of Tennessee nominated him for President. At the election the latter year there were four candidates, who received electoral votes as follows: John Quincy Adams, 84; William H. Crawford, 41; Henry Clay, 37; Jackson, 99. No one having a majority, the House of Representatives elected Adams, and Jackson retired to private life. But four years afterward he was supported by all the opponents of the administration and elected by an immense majority, the vote being Jackson, 178; Adams, 83. Calhoun was re-elected Vice President. The contest was one of the most personal and bitter in American political history, because Jackson, taking as a personal matter the party slander which accused Adams of buying Clay's support in the preceding election by the promise of the portfolio of State, threw his whole force into the struggle. Jackson was reëlected in 1832, his principal opponent being Henry Clay. In his second term Van Buren was Vice President.

Jackson's eight years' administration of the government meant the rise of the people to power. Jefferson, Madison, Monroe, and even J. Q. Adams had also been affiliated with the Democratic Republican party, but they had been trained statesmen, who administered the government in the interests of all classes. Now a man sprung from the people, relying upon them and thoroughly representing them, held the reins of power. He happened to be more or less of an autocrat, but it was inevitable that his successors would become more and more servants of the people or of the politicians who controlled the people. A new régime much more purely democratic had begun, and it was the people of the Union as a whole, not of the States as units, that had risen to power.

A prominent feature of the new régime was the large number of removals from office, which Jackson may have believed to be necessary to the cleansing of the public service from the corrupting influence of executive patronage. Unfortunately, however, many of his appointments showed that he was not always a good judge of men, and in the pursuit of this policy he unwittingly promoted the evils of the spoils system. (See CIVIL-SERVICE REFORM.) The leading events of Jackson's two administrations were the scandal concerning Mrs. Eaton (see EATON, MARGARET), whereby the cabinet was broken up; the veto of the United States Bank charter; the removal of the deposits of public money from that bank; and particularly the prompt and complete crushing of the nullification movement in South Carolina in 1832. This movement was started in opposition to a high tariff, and Jackson himself was opposed to such a tariff, but he gave South Carolinians to know that while the laws remained unrepealed they should be enforced at any hazard. Before any serious conflict had occurred the matter was settled, chiefly through the influence of Henry Clay. During his second term Jackson was engaged in the bank war. He ordered the Secretary of the Treasury to stop making deposits of public money in the United States Bank and its branches. The cabinet was not favorable to such a policy, and Jackson put William J. Duane at the head of the Treasury; but as he declined to do the required services, he was displaced, and Roger B. Taney was appointed. Taney obeyed Jackson's order, and, in retaliation, the Senate refused to confirm his nomination as Secretary, and he was subsequently made Chief Justice of the United States Supreme Court. Feeling ran so high in this bank war that the Senate passed a resolution of censure on the President, a proceeding unheard of till then. In 1837 this resolution was by vote expunged from the record. The bank war closed in 1836–37; the old bank was not rechartered; and after some time the independent treasury or subtreasury system was invented to take its place as a depository for public money. During Jackson's terms the national debt was entirely paid off; the Indians were removed from Georgia and nearly all of them from Florida; and two States, Arkansas and Michigan, were admitted to the Union. The chief disturbing element was the question of slavery, and the great financial panic of 1837 was just beginning when he left the chair. His personal ascendancy allowed him without opposition to name his successor, Martin Van Buren, who had skillfully won his friendship. On quitting office he published a farewell address and retired to the Hermitage, as his home near Nashville was called, where he passed the remainder of his life, always, however, taking a deep interest in public affairs. He died June 8, 1845.

Jackson seems to have been very amiable when things were going his way, but when opposition arose his violence of temper and action was ungovernable. He was essentially a man of action and not a thinker, although in his often-assailed bank policy he seems to have been nearer right in some respects than his critics. He was, take him all in all, one of the most commanding personalities in American history, but it seems clear that many of his decisions were determined by the way of manipulation by friends—known as the Kitchen Cabinet—who shrewdly used his force and popularity.

Bibliography. The best biography of Jackson is that by J. S. Bassett (2 vols., New York, 1911). Consult also: J. H. Eaton, *Life of Andrew Jackson* (Philadelphia, 1828); William Cobbett, *Life of Andrew Jackson* (New York, 1834); J. T. Headley, *Lives of Winfield Scott and Andrew Jackson* (ib., 1852); Benton, *Thirty Years' View* (ib., 1854); C. E. A. Gayarre, *Sketch of General Jackson by Himself* (New Orleans, 1857); James Parton, *Life of Andrew Jackson* (3 vols., New York, 1861); S. K. Bolton, *Famous American Statesmen* (ib., 1888); Oliver Dyer, *General Andrew Jackson, "Old Hickory"* (ib., 1892); James Parton, *General Jackson* (ib., 1893); Peck, *The Jacksonian Epoch* (ib., 1899); W. G. Sumner, *Andrew Jackson*, in the "American Statesmen Series" (ib., 1899); W. G. Brown, *Andrew Jackson* (Boston, 1900); A. C. Buell, *Life of Andrew Jackson* (2 vols., New York, 1904); A. S. Colyar, *Life and Times of Andrew Jackson* (2 vols., Nashville, 1904); C. T. Brady, *True Andrew Jackson* (Philadelphia, 1906); MacDonald, *Jacksonian Democracy* (New York, 1906); A. H. Lewis, *Andrew Jackson* (ib., 1907); T. E. Watson, *Life and Times of Andrew Jackson* (Thomson, Ga., 1912). The best-known monuments to Andrew Jackson are those by Clark Mills, in Washington with

replicas at New Orleans and Nashville, and by John Frazee, in Memphis, Tenn.

JACKSON, Benjamin Daydon (1846–). A noted British botanist, born in London and educated at private schools. He is perhaps best known as the compiler of *Index Kewensis* (q.v.), a reference book on which he worked for nearly 14 years, which appeared from 1893 to 1895 (supp., with Durand, 1901–06), and which was long a standard authority for the names of flowering plants. From 1880 to 1902 he was secretary of the Linnean Society, and then became general secretary. Among his other works are: *Guide to the Literature of Botany* (1881); *Vegetable Technology* (1882); *Glossary of Botanical Terms* (1900; 2d ed., 1905); *Life of George Bentham*, in "English Men of Science" (1906); *Darwiniana* (1910); *Index to the Linnæan Herbarium* (1912); *Catalogue of Linnæan Specimens of Zoölogy* (1913). He also edited works by C. B. Clarke and wrote numerous articles for botanical journals.

JACKSON, Charles (1775–1855). An American jurist. Born at Newburyport, Mass., he graduated at Harvard in 1793, studied law with Chief Justice Parsons, and began to practice in 1796 at Newburyport. In 1803 he removed to Boston, where, associated with Judge Hubbard, he had the most lucrative practice in the State. He was judge of the Massachusetts Supreme Court from 1813 to 1824, a member of the State Constitutional Convention of 1820, and one of the commissioners to revise the State laws in 1833. His *Treatise on the Pleadings and Practice in Real Actions* (1828) is a standard work on the law of property.

JACKSON, Charles Loring (1847–). An American chemist, born in Boston and educated at Harvard, Heidelberg, and Berlin. In 1868 he became assistant, in 1871 assistant professor, and in 1881 professor of chemistry at Harvard. In 1911 he retired. He published a number of papers, mainly on topics of organic chemistry, in the *Proceedings of the American Academy* and in the *American Journal of Science*. He studied the organic compounds of selenium, the preparation of borneol, of the fluorine derivatives of benzoic acid, of benzene-trisulphonic acid, and other important organic substances.

JACKSON, Charles Thomas (1805–80). An American scientist, born at Plymouth, Mass. He graduated at the Harvard Medical School in 1829 and during the last two years of his course made a mineralogical and geological survey of Nova Scotia in company with Francis Alger of Boston. An account of this expedition is contained in the *Memoirs of the American Academy of Arts and Sciences*. He went to Europe in 1829 and spent three years studying in Paris, varied by occasional trips to Germany and Italy. In 1833 be began the practice of medicine in Boston, but soon abandoned it to devote himself to chemistry, mineralogy, and geology. He was State geologist of Maine in 1836, of Rhode Island in 1839, and of New Hampshire in 1840. In 1837 he had a violent controversy with Morse, to whom he claimed to have given the idea of the telegraph. He explored the wilderness on the southern shore of Lake Superior in 1844, and from 1847 till 1849 was United States surveyor of mineral lands in Michigan. He claimed to be the discoverer of the anæsthetic properties of ether, and this involved him in a dispute with Dr. W. T. G. Morton. His claim was supported by many Boston physicians, and a committee appointed by the French Academy of Sciences to investigate the matter decided that both men were entitled to recognition. Dr. Jackson published elaborate reports of his work as a State geologist and as a member of the United States Geological Survey; contributed articles to the *American Journal of Science and Arts*, to the *Comptes Rendus*, and to the *Bulletin de la Société Géologicale de France;* and wrote a *Manual of Etherization, with a History of its Discovery* (1863).

JACKSON, Cyril (c.1858–). An English sociologist and educator, educated at Charterhouse and at New College, Oxford. He studied law; worked at Toynbee Hall from 1885 to 1895, becoming a member of the London School Board in 1891; was inspector general of schools for Western Australia in 1903–06; acting agent general for Western Australia in 1910–11; and in 1913 became an alderman of the London County Council. His important published works are reports on educational and industrial subjects, notably those on "boy labor" and "assistance to the unemployed" in the Report of the Royal Commission on Poor Laws; he also wrote *Unemployment and Trade Unions* (1910) and *Outlines of Education in England* (1914).

JACKSON, Dugald Caleb (1865–). An American electrical engineer. He was born at Kennett Square, Pa., graduated as civil engineer from the Pennsylvania State College in 1885, and studied at Cornell University in 1885–87. He was then vice president and engineer of the Western Engineering Company at Lincoln, Neb., until 1889, for a time was connected with the Edison interests, and then entered private practice as a consulting engineer. In addition to professional duties, from 1891 to 1907 he was also assistant professor of electrical engineering at the University of Wisconsin, and thereafter had charge of the department of electrical engineering at Massachusetts Institute of Technology. In 1905 he was elected president of the Society for the Promotion of Engineering Education, and in 1910 president of the American Institute of Electrical Engineers. He is author of *A Text-Book on Electricity and Magnetism and the Construction of Dynamos* (2 vols., 1893–96) and *Electricity and Magnetism* (1895), and coauthor of *Alternating Currents and Alternating Current Machinery* (1896; rev. ed., 1913) and *An Elementary Book on Electricity and Magnetism and their Applications* (1902).

JACKSON, Fort. See Fort Jackson.

JACKSON, Frederick George (1860–). A British Arctic explorer. He completed his education at the University of Edinburgh. His earliest polar experiences were those of a whaling voyage in 1886–87. In 1893 he made a sledge journey of about 3000 miles, during which he crossed the Siberian tundra (frozen, marshy prairies) between the Obi and the Pechora rivers. In 1894 he was given command of the expedition sent by Mr. Alfred Harmsworth (later Baron Northcliffe) to explore Franz Josef Land exhaustively and to attempt to reach the North Pole. Although the *Windward* was carried farther north than any vessel previously in these waters, the polar attempt was abandoned when Nansen met Jackson on his remarkable retreat from the *Fram*. Remaining at Franz Josef Land from 1894 to 1897, Jackson explored the archipelago between long. 42° and 56° E. and to lat. 81° 20′ N. His observations of the fauna, flora,

and physical conditions of Franz Josef Land were extensive and valuable. For this work he was awarded a gold medal by the Geographical Society of Paris and was made Knight of the Royal Order of St. Olaf. Serving in the Boer War, he attained the grade of captain and was later promoted major. His narratives of Arctic travel appeared under the following titles: *The Great Frozen Land* (1895); *A Thousand Days in the Arctic* (1899).

JACKSON, Frederick John Foakes. See Foakes-Jackson.

JACKSON, George (1864–). A Canadian Methodist clergyman and educator. He was born in Grimsby, England, and was educated at the Wesleyan Methodist College, Richmond, and at London University. He began pastoral work in 1887 on Clitheroe Circuit, but in 1888 removed to Edinburgh, where he was pastor of a mission church until 1906. In the latter year he removed to Ontario, and in 1906–09 was pastor of the Sherbourne Street Methodist Church, Toronto. In 1909 he was appointed professor of the English Bible in Victoria University. He resigned in 1913. His publications include: *Judgment, Human and Divine* (1902); *Young Man's Religion; The Old Methodism and the New; Memoranda Paulina: The Teaching of Jesus* (1903); *The Fact of Conversion* (1908); *Studies in the Old Testament* (1909); *The Preacher and the Modern Mind* (1910); *In a Preacher's Study* (1914).

JACKSON, George Thomas (1852–1916). An American dermatologist, born in New York City, a brother of Samuel Macauley Jackson. He studied at the College of the City of New York, for two years in Berlin, Vienna, and Strassburg, and in 1878 graduated from the College of Physicians and Surgeons, Columbia University. Until 1884 he was in general practice. After that he devoted himself exclusively to dermatology, a subject which he taught at the Woman's Medical College of the New York Infirmary (1890–99), the University of Vermont (1895–1900), and Columbia (instructor, 1890–1908; professor, 1908–13). He is author of: *Diseases of the Hair and Scalp* (1887, rev., 1893); *The Ready Reference Handbook of Diseases of the Skin* (1893; 7th ed., rev., 1914); *Treatise on Diseases of the Hair* (1912), with C. W. McMurtry.

JACKSON, Helen Fiske Hunt (1831–85). An American poet and novelist, better known by her pen name of H. H. She was born at Amherst, Mass., Oct. 18, 1831. Her father was Prof. N. W. Fiske. At 21 she married Major Edward B. Hunt of the United States Engineers, who died in 1863. She married afterward (1875) William S. Jackson, a banker of Colorado Springs, Colo. She died at San Francisco, Aug. 12, 1885. Helen Hunt was educated at Ipswich, Mass., and in New York and began to write for periodicals during her residence as a widow at Newport, R. I. Her poems won her friends, and in 1870 she published a volume of "Verses by H. H.," which was read widely. From this time her pen was constantly employed. The most ambitious of her works are the novels *Mercy Philbrick's Choice* (1876), *Hetty's Strange History* (1877), both in the "No Name Series"; *A Century of Dishonor* (1881), a plea for better treatment of the Indians; and the romance on the same theme entitled *Ramona* (1884). Mrs. Jackson also wrote some books for children, and several posthumous volumes were brought out shortly after her death, among them *Sonnets and Lyrics* (1886). The "Saxe Holm Series" are said to be hers. Her poems probably constitute her best claim to remembrance, and such good judges as Emerson—in the preface to *Parnassus* (1874)—and Thomas Wentworth Higginson have admired her lyrics. For an appreciation of her genius, consult T. W. Higginson, *Contemporaries* (Boston, 1900).

JACKSON, Henry (1839–1921). An English classical scholar. He was born in Sheffield and was educated at Cheltenham and at Trinity College, Cambridge, of which he became fellow in 1864. From 1875 to 1906 he was prælector in ancient philosophy at Cambridge and then became Regius professor of Greek. He received honorary degrees from St. Andrews, Aberdeen, Glasgow, Oxford, Manchester, Sheffield, and Berlin. His special field being Greek philosophy, particularly Aristotle (the Ethics) and Plato, he contributed articles on Greek philosophers to the *Encyclopædia Britannica* and to classical periodicals and edited the fifth book of Aristotle's *Nicomachean Ethics* (1879) and *Texts to Illustrate the History of Greek Philosophy from Thales to Aristotle* (1901).

JACKSON, Henry Rootes (1820–98). An American diplomat and soldier, born in Athens, Ga. He graduated at Yale in 1839 and in the following year was admitted to the bar in Georgia, where he was for several years United States district attorney. During the Mexican War he commanded the First Regiment of Georgia Volunteers. He was judge of the Superior Court from 1849 to 1853, when he was sent as the United States chargé d'affaires to Vienna. There he was Minister Resident from 1854 until his resignation in 1858. After his return to Georgia he aided the United States district attorney in prosecuting the owners of the slaveship *Wanderer*. Jackson was one of the Democratic delegates who seceded from the Charleston convention in 1860. When his State seceded, he became a colonel on Governor Brown's staff and was active in securing the United States arsenal at Augusta with its stores of arms and ammunition. He was then appointed major general by the Governor and was placed in command of all the State troops, but soon resigned this commission to accept one as brigadier general in the Confederate service and went to western Virginia, where he succeeded General Garnett upon the latter's death. Recalled by Governor Brown to aid in the defense of Georgia's seacoast, and unable to obtain leave of absence from the Richmond authorities, he resigned his Confederate commission and was reappointed by the Governor major general and commander of all the State troops. This office he held until the Georgia State troops were turned over to the Confederacy in 1862, when he was left without a commission. He was not again received into the Confederate service until near the close of the war, when he was made a brigadier general in Hood's army and, after taking part in the battle of Franklin, was captured with his whole brigade in the battle of Nashville (q.v.) and was a prisoner during the remainder of the war. He was appointed United States Minister to Mexico in March, 1885, but resigned about a year later because of his disagreement with the government in the matter of the seizure and sale by the Mexican authorities at Tampico in January, 1884, of the American schooner, *Rebecca*. Secretary Bayard held that the charge

against this vessel of attempted smuggling was not substantiated. He published *Tallulah and Other Poems* (1851).

JACKSON, Howell Edmunds (1832–95). An American jurist, born at Paris, Tenn. He graduated at the University of Virginia in 1854 and at the law department of Cumberland University in 1856 and then began to practice law in Jackson, Tenn., removing to Memphis in 1859 and returning to Jackson in 1876. He was strongly opposed to secession, but went with his State, and after the establishment of the Confederacy was appointed receiver for West Tennessee property confiscated by the new government. At the close of the war he became a member of the Tennessee Court of Referees, a provisional Supreme Court created to hear the cases which had accumulated during the Civil War. In 1880 he was elected to the Tennessee Legislature and the next year to the United States Senate, where he served until April, 1886. He resigned to accept the appointment of United States Circuit Court judge for the Sixth Federal Circuit, and in February, 1893, President Harrison appointed him an associate justice of the United States Supreme Court. When stricken with fatal illness, he forced himself to attend the second hearing of the income-tax law, and his vote would have caused it to become effective had not Justice Shiras (q.v.) reversed his previous decision.

JACKSON, James (1757–1806). An American soldier and political leader, born at Moreton-Hampstead, Devonshire, England. He went to Georgia in 1772 and began the study of law. He joined the "Liberty Boys," took part in the defense of Savannah in 1776, was a member of the first constitutional convention of Georgia in 1777, was made brigade major of the Georgia militia in 1778, and again engaged in the defense of Savannah. After its surrender he went to South Carolina, served with Sumter, Pickens, and Morgan, and was publicly thanked by the last named after the battle of Cowpens. He participated in the siege of Augusta and was left in command after the capture in 1781. Later he organized a partisan legion, which he commanded. When Savannah was recaptured, the Legislature voted him the forfeited house of a Tory. In 1788 he was elected Governor, but declined on account of youth and inexperience. He sat in the First Federal Congress and was elected United States Senator in 1793. This office he resigned in 1795, and was elected to the State Senate in order to force the revocation of the Yazoo land grants. He was an influential member of the constitutional convention of 1798 and was elected Governor the same year. In 1801 he returned to the United States Senate and sat until his death. He was a follower of Jefferson in politics.

JACKSON, James (1777–1867). An American physician, brother of Charles Jackson the jurist. He was born in Newburyport, Mass., graduated at Harvard in 1796, and studied medicine with Dr. Holyoke of Salem and in London. In 1800 he began practice in Boston. He was the first physician of the General Hospital in Boston, which, with Dr. Warren, he had established. In 1810 he was chosen professor of clinical medicine in Harvard and in 1812 professor of theory and practice there. He was several times elected president of the Massachusetts Medical Society. He wrote: *On the Brunonian System* (1809); *Remarks on the Medical Effects of Dentition* (1812); *Letters to a Young Physician* (1885). Consult Putnam, *Memoir of Dr. James Jackson* (Boston, 1905).

JACKSON, James Streshly (1823–62). An American soldier, born in Madison Co., Ky. He was graduated at Jefferson College in 1844 and in 1845 at Transylvania University, where he had studied law. He practiced in Kentucky before and after the Mexican War, in which he fought as a lieutenant of volunteers enlisted by himself. He served in the Thirty-seventh Congress from March, 1861, until the following December, when he resigned to enter the Federal army, for which he raised a company of cavalrymen. He became colonel of the Third Kentucky Cavalry on Dec. 13, 1861, and brigadier general of volunteers the following July, and was killed on Oct. 8, 1862, at the battle of Perryville, where he was one of the division commanders under General McCook in the Army of the Ohio.

JACKSON, John (1778–1831). An English portrait painter, born at Lastingham, Yorkshire. His father was a tailor, who brought him up to the same trade; but Lord Musgrave, who met the youth at Whitby, was impressed by his artistic talent and gave him encouragement. Another patron, Sir George Beaumont, lent him a Reynolds to copy and in 1805 gave him £50 a year to study at the Royal Academy, of which he was elected a member in 1817. Between 1804 and 1830 he exhibited 146 pictures at the Academy and 20 at the British Institution. His best portrait is considered to be that of Flaxman. In the National Gallery, London, are his portraits of the Rev. William Holwell Carr and of James Northcote, R.A.; in the National Gallery of British Art, a portrait drawing of David Wilkie, in red chalk on gray paper; in the Print Room of the British Museum, a collection of his drawings. His portraits are better in color than in drawing or characterization.

JACKSON, Sir John (1851–). An English contractor, born in York and educated at Edinburgh, being trained as a civil engineer. He built many public works, including the last section of the Manchester Ship Canal, with C. J. Mills (completed 1893), the London Tower Bridge (1894), the Dover harbor works, the Keyham dockyard extensions at Devonport (1907), the Simons Town (South Africa) harbor works. Jackson was knighted in 1895 and made a Companion of the Victorian Order in 1911. In 1910 he was elected as a Unionist to the House of Commons from Devonport.

JACKSON, John Adams (1825–79). An American sculptor, born at Bath, Me. He studied first in Boston and later with Suisse in Paris, opening a studio in New York on his return to America. At Florence, Italy, in 1853, he modeled busts of Adelaide Phillips and T. Buchanan Read. In 1854, at Boston, he made bust portraits of Wendell Phillips, George S. Hilliard, and Dr. Lyman Beecher. In 1860, being commissioned to make a statue in bronze of Kane the Arctic explorer, he went to Florence to execute the work and continued to reside in Italy. There he produced most of his ideal subjects; among them "Cupid Stringing his Bow," "Peace," "Musidora" and "Il Pastorello," an Italian shepherd boy. His "Eve and the Dead Abel" in the Metropolitan Museum represents him at his best, but lacks strength and originality.

JACKSON, John Hughlings (1834–1911).

A distinguished English neurologist. He received his early medical education in York Medical School; this was followed by a period of study at St. Bartholomew's Hospital, where he received the degrees M.R.C.S. and L.S.A. in 1856. In 1859 he became connected with the London hospital and in 1886 received his master's degree at the University of St. Andrews, where he became lecturer on physiology in 1864. Four years later he delivered the Croonian lectures of the College of Physicians, on "The Evolution and Dissolution of the Nervous System." In 1890 he was Lumleian lecturer, when he took for his theme "Convulsive Seizures," a subject which he had made his own. (See EPILEPSY, a certain type of which disease bears his name.) He received honorary degrees from the universities of Glasgow, Edinburgh, Leeds, Bologna, and Ireland. His literary work was extensive and solid and took the form generally of papers delivered before medical societies or published in medical journals. From a list of more than 200 titles the following may be cited: "Convulsions and Epilepsy," contributed in 1868 to *Reynolds' System of Medicine; Cases of Disease of the Nervous System in Patients the Subject of Inherited Syphilis* (London, 1868); *Clinical and Physiological Researches on the Nervous System* (London, 1873); *A Study of Convulsions* (1870); *Some Remarks on the Routine Use of the Ophthalmoscope in Cerebral Disease* (1879). Consult the obituary sketch in the *Lancet* (London, 1911).

JACKSON, MERCY BRISBEE (1802–77). An American physician. She was born at Harwich, Mass., and graduated at the New England Female Medical College in 1860, though she had previously practiced at Plymouth and Boston for more than 30 years. She was admitted to the American Institute of Homœopathy in Philadelphia in 1871 and was the first woman to obtain that honor. She afterward became a member of the Massachusetts and the Boston Homœopathic societies and in 1873 was made professor of the diseases of children in the Boston University School of Medicine, which position she was filling at the time of her death. She was married twice—first to the Rev. John Brisbee, and after his death to Capt. Daniel Jackson, of Plymouth. She delivered many lectures on the subjects of temperance and woman suffrage and was a contributor to the *Woman's Journal.*

JACKSON, PATRICK TRACY (1780–1847). An American cotton manufacturer, born at Newburyport, Mass., brother of Dr. James Jackson. He was apprenticed to a merchant, made several voyages to the Far East, and engaged afterward at Boston in the India trade, in which he acquired a fortune. With his brother-in-law, Francis C. Lowell, of Boston, he engaged in cotton manufacture and after several experiments succeeded in producing a model from which a power loom was constructed in 1814 by Paul Moody. They purchased their first mill in 1813 at Waltham—the first that converted the raw cotton into cloth. In 1821 he purchased land on the Merrimac River, on which the Merrimac Manufacturing Company erected a number of mills under his auspices. This was the nucleus of the present city of Lowell. In 1830 he obtained a charter for a railroad from Lowell to Boston, which under his direction was completed in 1835. He took a deep interest in the moral and intellectual welfare of his operatives.

JACKSON, SAMUEL MACAULEY (1851–1912). An American editor, born in New York City, a brother of George Thomas Jackson. He graduated in 1870 at the College of the City of New York, in 1873 at Union Theological Seminary, and in 1873–75 studied at the University of Leipzig. From 1876 to 1880 he was pastor of the Presbyterian Church at Norwood, N. J., and from 1895 to 1912 professor of Church history in New York University. He was connected as editor or contributor with a number of dictionaries and encyclopædias, including the first edition of the NEW INTERNATIONAL ENCYCLOPÆDIA. He was editor in chief of the *Concise Dictionary of Religious Knowledge* (1891), of the "Heroes of the Reformation Series" (9 vols., 1898–1906), of *Handbooks for Practical Workers in Church and Philanthropy* (9 vols., 1899–1904), and of the new *Schaff-Herzog Encyclopædia of Religious Knowledge* (12 vols., 1907–11). For the "Heroes of the Reformation Series," he wrote *Huldreich Zwingli* (1901, 1903), supplemented by *Zwingli Selections* (1901), and by *The Latin Works and the Correspondence of Huldreich Zwingli, together with Selections of his German Works,* in English translation, vol. i (1912).

JACKSON, SHELDON (1834–1909). An American Presbyterian missionary and educator. He was born at Minaville, N. Y., graduated from Union College in 1855 and from Princeton Theological Seminary in 1858, and, entering home mission work, organized the first Presbyterian churches in Wyoming, Montana, Idaho, Utah, and Arizona, and was especially prominent in Alaska. He was made government agent of education in Alaska in 1885; published the *First Annual Report on Education in Alaska* (1886); and conceived and carried out the plan of introducing reindeer into Alaska, working first with private and later with government support. In 1898 he was United States special agent to procure a Lapp colony in Alaska. Jackson was a successful speaker on missions, was moderator of the Presbyterian General Assembly in 1897, was author of *Alaska and Missions on the North Pacific Coast* (1880), and in 1896 assisted in the foundation of a missionary college in Utah. Consult R. L. Stewart, *Sheldon Jackson* (New York, 1908).

JACKSON, STONEWALL. See JACKSON, THOMAS JONATHAN.

JACKSON, THOMAS (1783–1873). An English Wesleyan clergyman and author, born at Sancton, Yorkshire. He entered the ministry in 1804. From 1824 to 1843, as editor of the *Wesleyan Methodist Magazine* and of the publications of the Methodist Book Concern, he accomplished an immense amount of work. From 1843 to 1862 he was theological tutor at the Richmond Theological Institution. He was twice president of the British Conference. A complete list of his own works includes 40 titles, and the works which he edited 12 more. An authority on all matters pertaining to Methodism and Methodist history, to him we owe the rescue of the manuscripts of the journals of John and Charles Wesley. A large library which he collected relating to early Methodism and especially rich in Wesleyana was presented by William Deering to Garret Biblical Institute, Evanston, Ill. Jackson's principal works are: *The Life of John Goodwin* (1822); *The Centenary of Wesleyan Methodism* (1839); *The Life of Charles Wesley* (2 vols., 1849); *The Journal of Charles*

Wesley (2 vols., 1849); *The Life of R. Newton* (1855). He edited the works of John Wesley (14 vols., 1829–31); *A Collection of Christian Biography* (12 vols., 1837–40); *The Journals of John Wesley* (4 vols., 1864); *The Lives of the Early Methodist Preachers* (6 vols., 1865). Consult his autobiography, *Recollections of my own Life and Times*, edited by B. Frankland (London, 1876).

JACKSON, Sir Thomas Graham, first Baronet (1835–). An English architect, born in Hampstead. He was educated at Brighton and at Wadham College, Oxford, of which he was a fellow in 1864–80. He studied architecture under Sir George Gilbert Scott and is best known for his academic buildings—e.g., Brasenose College, Lincoln, Corpus Christi, and Trinity at Oxford, the Law Library and Law School, the Archæological Museum, and the Psychological Laboratories at Cambridge, and buildings at Eton, Harrow, Rugby, and Uppingham—and for his restorations, notably, Winchester Cathedral, the Bodleian Library and St. Mary's and All Saints churches, Oxford. He designed bookplates and table glass, doing much to develop English glass blowing. Honorary degrees were conferred on him by Cambridge (1910) and Oxford (1911), and he was made Baronet in 1913. He wrote: *Modern Gothic Architecture* (1873); *Dalmatia, the Quarnero, and Istria* (1887); *Wadham College, Oxford* (1893); *Reason in Architecture* (1906); *Byzantine and Romanesque Architecture* (1913).

JACKSON, Thomas Jonathan, generally known as Stonewall Jackson (1824–63). A famous American soldier, born Jan. 21, 1824, of Scotch-Irish-English stock, at Clarksburg in western Virginia (now West Virginia). At an early age he was left to the care of an uncle, a farmer and miller, under whom he was trained in business methods and received some opportunity for study. When only 18, he became sheriff of the county, and soon after was admitted to West Point, where in 1846 he graduated No. 18 in a class of 70, which included McClellan, Reno, Gibbon, Pickett, Maury, A. P. Hill, and Wilcox. He was assigned as second lieutenant to the First Artillery, ordered to join Magruder's Battery (then serving in Mexico), almost immediately achieved prominence in the operations under General Scott, and was brevetted captain and major for gallantry at Contreras, Churubusco, and Chapultepec. From 1848 to 1851 he was stationed at Fort Hamilton and first became noted for that strong religious tendency which afterward caused him to be known as the Havelock of the Confederate army. On March 27, 1851, he resigned from the army and became professor of natural and experimental philosophy and artillery tactics in the Virginia Military Institute, at Lexington, Va. He was not a good teacher, but his influence on his students and on those with whom he was closely associated was profound. In 1856 he visited Europe. On April 21, 1861, soon after the outbreak of the Civil War, Jackson was ordered by direction of the Governor of Virginia to report with his corps of cadets at Richmond for active service. He was commissioned a colonel, was placed in command of the Virginia forces, and was sent to Harper's Ferry. In July of the same year his troops were organized into a brigade (afterward the Stonewall Brigade), and he was appointed a brigadier general. When the Confederates under Johnston moved from Harper's Ferry towards Manassas, Jackson's brigade was in the van and among the first to get into position. In the first battle of Bull Run the South Carolinians were sorely pressed, and their commander, General Bee, seeking to encourage them, is said to have cried out, "Look at Jackson—there he stands like a stone wall," thus originating the historic sobriquet. In September Jackson was promoted to be major general and was assigned to command the Confederate forces in the lower Shenandoah valley. The duty assigned him is thus described by General Johnston: "After it became evident that the valley was to be invaded by an army too strong to be encountered by Jackson's division, that officer was instructed to endeavor to employ the invaders in the valley, but without exposing himself to the danger of defeat, by keeping so near the enemy as to keep him from making any considerable detachment to reënforce McClellan, but not so near that he might be compelled to fight." In pursuance of this plan Jackson fell back up the valley before Banks, who occupied Winchester. Late in March, 1862, the Federal forces were withdrawn to Manassas, as an outpost of the defenses of Washington, and were closely followed by Jackson. Underestimating the strength of the Federal rear guard under General Shields, he made a sharp attack (March 23) upon that officer's position at Kernstown, 3 miles south of Winchester, but after a severe struggle of three hours was repulsed, retiring in good order, with the loss of several hundred men and one piece of artillery. While this affair was a reverse to the Confederates, the boldness shown by Jackson confirmed the Federal authorities in the determination to retain McDowell in front of the capital in spite of McClellan's protest. Jackson finally retired to Staunton, from which point (having increased his available force to 16,000 men) he confronted 30,000 men under Banks and Frémont with three columns, attacked the Federal detachments in detail, and succeeded in outmanœuvring them, particularly in the affair at McDowell (May 8). Banks, finding his communications threatened, fell back across the Potomac, closely followed by Jackson. Soon afterward Jackson reoccupied Winchester. About May 30, finding his communications with Richmond threatened by a fresh Federal force under McDowell, he began a rapid and masterly retreat up the valley, halting at certain favorable points and engaging his pursuers successfully, particularly at Cross Keys and Port Republic (June 6, 8, and 9). Jackson's valley campaign was a conspicuous illustration of his characteristics as a leader, the extraordinary mobility of his infantry earning for it the title of foot cavalry.

Early in April, 1862, the Confederate army, under Gen. J. E. Johnston, was lying in front of Richmond. McClellan, at the head of the Army of the Potomac, was marching up the peninsula to invest that city, meeting with but little opposition save at Yorktown and Williamsburg (qq.v.). Gen. R. E. Lee was placed in command of the Confederate forces after the battle of Seven Pines or Fair Oaks (May 31–June 1), in which Johnston had been severely wounded, and one of his first acts was to order General Jackson to join him with his corps. The junction was effected with Jackson's customary promptness and skill, and he suddenly appeared (June 26) at Mechanicsville, upon the right flank of the Federal army, which fell back

after a smart engagement to Gaines's Mill, where on the following day the battle was renewed. Jackson's corps took part in the movements attending McClellan's "change of base" and was especially prominent at Malvern Hill (July 1). Soon afterward Jackson confronted General Pope, who with the combined forces of Banks, Shields, and Frémont was assuming the offensive in northern Virginia. He first defeated Banks at Cedar Mountain, near Culpeper, Va., on August 9, and by a rapid and daring flank movement gained Pope's rear and his depot of supplies at Manassas Junction. On August 29–30 the Confederates under Lee and Jackson achieved a decisive victory over Pope in the second battle of Bull Run, which forced him to fall back upon the Potomac. In Lee's invasion of Maryland, which immediately followed, Jackson was detached to capture Harper's Ferry, which fell into his hands, together with more than 11,500 prisoners and considerable material of war. At Antietam, on September 17, he commanded the Confederate left wing, his corps bearing the brunt of the battle. At Fredericksburg, December 13, Jackson, who had recently been promoted to be lieutenant general, commanded the right of the Army of Northern Virginia and repelled the attack made by Burnside's left grand division under Franklin. In the following spring the new commander of the Army of the Potomac, General Hooker, crossed the Rappahannock and attempted to interpose his command between Lee and Richmond, sending nearly all his cavalry under Stoneman to cut the Confederate communications with Richmond. The Federal forces, drawn up at Chancellorsville, were greatly superior in strength and were strongly intrenched, excepting on the extreme right of their line. Taking advantage of this weakness, Jackson, on May 2, with Lee's consent, withdrew his corps from the front, made a long and rapid detour, came in unobserved on the enemy's right flank (Howard's corps), and, screened by the dense wood, advanced in three lines and burst like a tornado upon the unsuspecting Federals. After a slight effort at resistance the greater part of Howard's corps fled panic-stricken to the rear, hotly pursued by Jackson's men, who were, however, greatly impeded by the underbrush and lost their formation. With a small escort Jackson advanced in front of his lines, between eight and nine o'clock P.M., to reconnoitre. As he was returning, his party was mistaken for Federal cavalry and was fired upon by the Confederates. Jackson was severely wounded in the left arm and right hand. On the following day his left arm was amputated, and he seemed in a fair way to recover; but pneumonia set in, from which he died at Guinea Station, May 10, 1863. Jackson was conspicuous not only for his military ability but also for his personal virtues. Like Cromwell, he blended the devoutness of the Puritan with the severity of the soldier. He never began a battle without a prayer and after a victory publicly gave thanks to God. He was very gentle in his social relations, and he believed in making war with consideration for all noncombatants, but to the bitter end, relentlessly, against all enemies of his cause. He resembled Sheridan in the soundness of his judgment, quickness to seize an advantage, and personal magnetism, but, like that general, the full measure of his capacity was never tested. When Lee heard of his wounds, he exclaimed: "General Jackson has lost his left arm; I have lost my *right* arm."

In accordance with his own wishes, he was buried at Lexington, Va., where a statue and a memorial hall commemorate his connection with the place. There is a monument to his memory in one of the public parks in Richmond, erected by his English admirers; and the spot where he received his death wound is marked by a plain granite shaft bearing his name. Jackson was twice married—first to Miss Eleanor Junkin (died 1854), and second to Miss Mary A. Morrison.

Bibliography. Markinfield Addey, *Stonewall Jackson: Life and Military Career* (New York, 1863); R. L. Dabney, *Life* (ib., 1866); J. E. Cooke, *Stonewall Jackson: A Military Biography* (ib., 1876); M. A. M. Jackson, *Memoirs* (Louisville, 1895); M. L. Williamson, *Life of General Thomas F. Jackson* (Richmond, 1901); G. F. Henderson, *Stonewall Jackson and the Civil War* (2 vols., New York, 1902); McGuire and Christian, *Confederate Cause and Conduct in the War between the States* (Richmond, 1907); H. A. White, *Stonewall Jackson* (Philadelphia, 1909).

JACKSON, WILLIAM LAWIES, first BARON ALLERTON (1840–). An English politician. He was born in Yorkshire, was educated privately and at a school conducted by the Moravians, and entered upon a business career. In 1876 he sought election to the House of Commons as member for Leeds in the Conservative interest, but was defeated. In 1880 he was successful in North Leeds and was returned for that constituency until 1902. His abilities were recognized in 1885 in his appointment as Financial Secretary to the Treasury in Lord Salisbury's first administration, and he held the same office in the second administration of that statesman, formed in 1886. In 1890 he was appointed Privy Councilor and in 1891–92 served as Chief Secretary for Ireland. In 1902 he was created Baron Allerton of Chapel Allerton. While engaged in politics, he maintained his connection with business enterprises and was for many years chairman of the Great Northern Railway Company.

JACKSON SQUARE. A public square of New Orleans, La., formerly the Place d'Armes, and renamed for Andrew Jackson, who in 1815 defeated the British at New Orleans.

JACK'SONVILLE. A city and the county seat of Duval Co., Fla., 14 miles from the Atlantic Ocean and 138 miles by rail southwest of Savannah, Ga., on the St. Johns River, the Florida East Coast Canal, and on the Seaboard Air Line, the Georgia Southern and Florida, the Atlantic Coast Line, the Southern, and the Florida East Coast railroads (Map: Florida, E 1). Connected with New York, Charleston, and other Atlantic coast ports by steamship, it has, since the completion of the improvements in the river, become an important shipping point for lumber, shingles, crossties, cotton, phosphates, kaolin and clay, oranges, garden produce, naval stores, etc. The city has also a considerable wholesale and retail trade and important fruit-growing interests. Prominent among the industrial establishments are the Union Stock Yards, cigar factories, lumber and planing mills, mattress and palmetto-fibre factories, a fertilizer plant, carriage works, iron foundries, brickyards, shipyards, and steam-engineering works. Jacksonville has long been a popular winter

resort. It has ten public parks and is well paved, 75 miles of its streets with macadam and vitrified brick. Among the more notable buildings are the government building, city hall, county courthouse, armory, Union Depot, St. Luke's Hospital, United States Marine Hospital, Confederate Soldiers' Home, Daniel Memorial and St. Mary's orphan homes, several fine hotels, a high school, a Carnegie library, and the Central Grammar School. Hemming Park contains a Confederate monument. There are also large ostrich and alligator farms, and a Government Weather Bureau Station. The government is vested in a mayor and city council. A board of nine bond trustees have charge of all municipal plants, but appropriations are fixed by the council. Jacksonville has a 30-foot channel at mean low water to the sea. Work was begun in 1914 on the construction of municipal docks and terminals, which are to cost $1,500,000. The water works and electric-light plant are owned by the municipality. Jacksonville, named in honor of Gen. Andrew Jackson, Florida's first Territorial Governor, was founded in 1822. On May 3, 1901, a fire swept over 148 blocks of the city (450 acres), causing a loss of over $10,000,000. Pop., 1900, 28,429; 1910, 57,699; 1914 (U. S. est.), 70,173; 1920, 91,558.

JACKSONVILLE. A city and the county seat of Morgan Co., Ill., 93 miles north of St. Louis, Mo., on the Chicago and Alton, the Chicago, Peoria, and St. Louis, the Wabash, and the Chicago, Burlington, and Quincy railroads (Map: Illinois, D 6). Primarily a residential place, Jacksonville has numerous colleges and public institutions. It is the seat of Illinois College, founded in 1829 (the first institution of higher learning in the State); Routt College (Catholic); the Illinois Woman's College (Methodist Episcopal), opened in 1847; Illinois Conservatory of Music, connected with Illinois College; Illinois College of Music, connected with Illinois Woman's College; the Jacksonville State Hospital for the Insane; and State institutions for the blind and the deaf and dumb. There are also the Passavant Memorial Hospital, Hospital of Our Saviour, and a Carnegie library. Duncan Park and Nichols Park are here. The city hall, courthouse, and high school are prominent buildings, and Morgan Lake is of interest. The principal industrial establishments include railroad-car shops of the Chicago, Peoria, and St. Louis, woolen and planing mills, brickyards, several large cigar factories, and bridge works. Jacksonville, named in honor of Gen. Andrew Jackson, was founded as the county seat in 1825 and was first incorporated in 1867, this charter being still in operation. The government is of the commission form, the elective officers being a mayor and four commissioners. There are municipal water works and electric-light plant. Pop., 1900, 15,078; 1910, 15,326; 1914 (U. S. est.), 15,431; 1920, 15,713.

JACKSONVILLE. A town in Cherokee Co., Tex., 118 miles southeast of Dallas, on the International and Great Northern, the Texas and New Orleans, and the St. Louis Southwestern railroads (Map: Texas, E 4). It is the seat of the Alexander Collegiate Institute (Methodist) and of the Jacksonville Baptist College. The city is in a fertile agricultural district, is an important fruit and truck-shipping centre, and has oil, saw and planing mills, and basket and crate factories. The water works are owned by the municipality. Pop., 1900, 1568; 1910, 2875.

JACKSON WHITES. A settlement of mixed-blood Indians in northern New Jersey.

JACK SPRAT. A familiar English nursery rhyme, occurring in Halliwell's *Nursery Rhymes*, where Archdeacon Pratt occupies the place of the later hero, Jack Sprat.

JACK'STONES. A game played with five small pebbles, marbles, or pieces of specially shaped metal (iron). The popular forms of the game are as follows: (*a*) All five stones are tossed into the air and caught, so far as is possible, on the back of the hand; or else one of the stones at a time is tossed up and caught in various methods agreed upon. (*b*) Ones.—In this exercise the stones are at first held in the hand; the jack (any one of the five) is then tossed into the air; the remaining four are laid upon the floor, and the jack is caught before it can land. In *Twos*, *Threes*, and *Fours* the stones are picked up, while the jack is in the air, by twos, threes, or fours, as the case may be. Other games with jackstones are *Riding the Elephant*, *Set the Table*, *Peas in the Pod*, and *Horses in the Stable*. According to Aristophanes, jackstones was a girls' game and exceedingly popular. Other ancient writers say the game was originally played with the knucklebones of sheep.

JACK'STRAWS. A game played with from 20 to 100 little sticks of ivory or wood, of uniform size and between 4 and 6 inches in length, carved (with the exception of a few jackstraws which are left perfectly plain) to resemble weapons, implements, tools, etc. The game consists in letting the sticks fall together in a loose heap, each player in turn extricating as many straws as possible (one at a time) without moving perceptibly any other straw. The decision is in favor of the player with the most straws. Originally the name of the game was jerkstraws, and in England it is also called spillikins. In Germany it is known as *Federspiel*, and in France as *Jonchets* or *Honchets* (from *joncher*, to strew).

JACK-TAR. A common term for a sailor, derived from his tarpaulin garments, and frequently shortened to tar.

JACK THE GIANT KILLER. A nursery tale, the subject of which appears in various legends. The English version is adapted from an old British story of Corineus the Trojan, translated by Geoffrey of Monmouth. The theme of the tale is the superiority of skill to force.

JACK THE RIPPER. A name given to the unknown perpetrator of a series of 10 brutal murders which occurred in the East End of London between April and September, 1888.

JACK, jăk, **JAK,** or **JACA,** zhä'kä, **TREE** (East Indian *jaca*), *Artocarpus integrifolia*. An East Indian tree of the same genus as the breadfruit (q.v.), but larger. The fruit, which is very large and weighs from 5 to 50 pounds, sometimes 70 pounds, is produced in great abundance. It resembles the breadfruit, but has a pulp of somewhat unpleasant flavor. It forms a great part of the food of the natives in some parts of India, Ceylon, etc. The seeds, which lie immediately under the rind, are very palatable when roasted. The timber, which is yellowish, strong, and ornamental, is used for almost every purpose and is exported for making musical instruments, cabinetwork, the backs of brushes, marqueterie floors, etc. To supply the demand of it, the tree is being planted in many tropical countries.

JACMEL, or **JACQUEMEL,** zhäk'mĕl'. A seaport town on the south coast of Haiti, situ-

ated on a bay of the same name, 30 miles southwest of Port-au-Prince (Map: West Indies, D 3). The streets are generally very narrow, and the houses mostly of wood. The bay is open, and vessels anchor about half a mile from shore and discharge and load by means of lighters. It has a considerable trade with the United States and is visited regularly by the English Royal Mail steamers. The population of the commune is estimated at from 30,000 to 50,000. Jacmel is the residence of a United States consular agent.

JA'COB (Heb. *Ya'aḳōb*, probably 'he supplants,' or 'he deceives,' 'El' being understood as the subject; connected by Gen. xxv. 26 with *'āḳeb*, 'a heel,' and by Gen. xxvii. 36 with the root meaning 'to deceive'). One of the Hebrew patriarchs. The story of Jacob, with numerous insertions, is found in Gen. xxv–l and is as follows: He was one of the two sons born to Isaac and Rebekah. His character, quiet, peaceful, and home-loving, appealed to Rebekah, and she loved him more than she did Esau. Taking advantage of his brother's hunger, he bought his birthright (Gen. xxv. 29–34). Later, instigated by his mother, who had heard of Isaac's purpose to bless Esau, he impersonated his brother and received the blessing intended for the latter. As a consequence, Jacob had to flee from home, receiving another blessing from his father before his departure. By his father's command he went to Padan-Aram, to the house of Laban (Gen. xxvii–xxviii. 5). Here he served seven years for Rachel, but Leah was given to him instead. Undaunted, he served seven years more for Rachel (Gen. xxix). Of his two wives and two maids, Bilhah and Zilpah, Jacob had 12 sons and one daughter (Gen. xxix. 31–xxx. 24; xxxv. 16–18). Finally Jacob made up his mind to return home. His wives readily agreed, and they stole away from Laban, who pursued and caught up with Jacob, but did him no harm (Gen. xxx. 25–xxxi). On the way home he met Esau, who behaved magnanimously (Gen. xxxii–xxxiii. 16). After having put away the strange gods found in his camp, Jacob came to Bethel and made an altar on the place where God had appeared to him when he fled from his brother (Gen. xxxv. 1–15). He finally settled in Palestine, but afterward went to Egypt, where his son Joseph (q.v.) had preceded him (Gen. xxxvii, xlvi). Jacob died in Egypt at the age of 147, but was buried by his sons in the cave of Machpelah (Gen. xlix. 33; l. 13). In the course of his career there were three distinct places in which Yahwe or His messengers appeared to him. When fleeing from Esau, he halted at Bethel (Gen. xxviii) and was there assured in a dream, in which God Himself appeared standing beside a ladder on which heavenly beings ascended and descended, that he should come safely back to his native land. After his return he again visited Bethel, and God once more appeared to him, changed his name to Israel, and announced the future greatness of the Hebrew nation (Gen. xxxv). At Mahanaim he encountered angels of God (Gen. xxxii. 1, 2). Lastly, at Penuel he had an encounter with a divine being, who first fought with him and, when subdued, blessed the patriarch and announced that his name should henceforth be Israel, interpreted as one who prevails in the conflicts with gods and with men (Gen. xxxii. 24–32).

The first notable feature of the undoubtedly composite narrative, viewed as a whole, is the greater abundance of incidents than in the narratives of Abraham and Isaac, and the second is the various cycles of tales embodied in the Jacob narrative. We have in the first place (*a*) a series of Jacob-Esau stories; (*b*) Jacob-Laban stories; (*c*) a series of incidents connected with sanctuaries, Bethel, Mahanaim, Penuel, and Shechem; (*d*) stories of Jacob's children. There are good reasons for supposing that the Jacob-Esau and the Jacob-Laban stories existed independently, but have subsequently been combined. In this process the various incidents have been separated and inserted in the story of Jacob's career at points where they seemed best to fit in. It thus happens that the Jacob-Esau stories are not told consecutively; but after the account of the birth of Jacob and Esau it is explained how Esau lost his birthright, and the flight of Jacob is related (chaps. xxv–xxvii); the Jacob-Laban tales are then introduced (chaps. xxviii–xxxi), ending with a second flight of Jacob, this time from Laban; then the combination of the Jacob-Esau stories is again taken up and brought to a close (xxxii–xxxiii. 17), after which we have a series of miscellaneous incidents in Canaan and Egypt. Interspersed in these three sections of the narrative we encounter the incidents at the sanctuaries Bethel and Mahanaim; the marriages of Jacob and the birth of his children; incidents in the careers of his children, leading to the introduction of an entirely independent cycle of Joseph stories (Gen. xxxvii–xlvii. 1).

The elaborate and complex character of the narrative points to the union of various streams of tradition, and under the circumstances it is not easy to determine the centre to which Jacob belongs. That, like Israel, he is not an individual, but either represents some clan as the eponymous ancestor, or is the name of a local divinity, is thought to be certain; and the fact that in the name of one of the Hyksos kings, Jacob-her (Jacob is satisfied), Jacob appears to be a divine name has been quoted as favoring the latter alternative. The prominence of Bethel in the Jacob-Esau cycle points to this place as at one time at least the home of the tribe or the worshipers of the god. Some scholars think that the figure of Jacob was originally connected with the southern Bethel, or Bethuel, the modern Halasa. (See NEGEB.) The rivalry between Jacob and Esau is more easily understood if this is the case. It reflects the hostility between Hebrews and Edomites (see ESAU; EDOM) which marks the relation between those two groups, conscious throughout their history of the close genealogical ties that bound them together. Just as in the case of Ishmael (q.v.) features are found which place him in a more favorable light than Isaac, so in the Jacob-Esau cycle there is at bottom a series of traditions which originated in the Esau groups, and which Jewish tradition had to reshape so as to remove all features unfavorable to Jacob. The attempt, however, did not succeed altogether; and accordingly Jacob appears actually in the light of a deceiver and, what is more, is obliged to flee from Esau. This flight, if it means anything, points to the discomfiture at some time of the Jacob clan driven from its district by the more powerful Esau. An alliance is entered upon between Jacob and a distinct Aramæan clan, Laban. The marriages of Jacob into four groups and the birth of

numerous children indicate the gradual growth and extension of the Jacob clan until it feels itself powerful enough to cut loose from Laban and return to its former haunts.

But the old popular traditions have been made to serve the historical pragmatism. It was deemed necessary to connect the 12 sections of the Hebrew confederacy with patriarchal history, and hence the extension of the Jacob clan is depicted as though the confederates all sprang from him, whereas, as a matter of fact, the Hebrew confederacy represents the combination of heterogeneous elements having less in common than many of the groups have with others who did not join the confederation or were never incorporated into it. The adjustment of tribal traditions to the later religious and historical theory did not proceed without encountering hindrances. To secure the number 12 and make it work right on all occasions was especially difficult, and the narrators are not at all consistent in their method of obtaining this number. It is this attempted adjustment of popular stories, legends, and myths to later theory that accounts for the identification of Jacob with Israel, the eponymous ancestor of the *Bene Israel;* and in this process of elaboration and transformation of old stories it is also important to note the alternating traces of northern and southern Hebrew writers. It was the northern kingdom, formed of 10 tribes, that represented the real Israel; and the identification of Jacob with Israel and the favoritism shown by Jacob to Joseph (the father of Ephraim and Manasseh) represent the work of northern writers, who thus turn out to have had the larger share in the process of reshaping traditions. Rightly interpreted, the story of Jacob thus becomes the key to the history of Jewish tradition. In its details it not only conceals a large amount of valuable material for the earlier traditions of many of the clans forming the Hebrew confederation, but also enables us to trace the gradual progress of the transformation of the material and its adaptation to the purpose of writers imbued with strong likes and dislikes, who viewed the past from a very subjective point of view. To this point of view there must be added a religious theory which is the outcome of an uncompromising confidence in Yahwe and the zealous and exclusive devotion to His service. This theory is, in brief, that Yahwe established His covenant with the patriarchs, and that the history of the people back to its beginnings is an illustration and proof of this covenant. In some respects Jacob is a more important prop to this theory than even Abraham, certainly more important than Isaac. Indeed, it would seem that the story of Jacob thus worked out represents by itself a complete illustration of the theory, and that Abraham and Isaac are tacked on to it as appendices or links by means of which the theory can be joined to another originally independent series of traditions, again reshaped, elaborated, and made to take a definite direction.

Bibliography. For full discussion of the investigations of the Jacob narratives, consult the commentaries on Genesis of Dillmann, Holzinger, Gunkel, Skinner, and Driver, and the Hebrew histories of Wellhausen, Stade, Guthe, Kittel, and Piepenbring; also Stärk, *Studien zur Religions- und Sprachgeschichte des alten Testaments* (Berlin, 1899 et seq.). For the later Jewish legends about Jacob, consult the article "Jacob," in Hamburger, *Real Encyklopaedie für Bibel und Talmud* (Leipzig, 1897), and in The *Jewish Encyclopædia* (New York, 1904). Winckler, in his *Geschichte Israels* (Leipzig, 1895–1900), Stucken, *Astralmythen der Hebräer* (ib., 1896), and Jeremias, *Das alte Testament im Lichte des alten Orients* (ib., 1906), propose a mythological explanation of Jacob; but the theory as a whole has not been accepted, though it may be admitted that some mythical elements may have crept into the narrative.

JACOB, Giles (1686–1744). An English compiler, born at Romsey, Hampshire. He studied law and published a great number of technical works, such as *The Accomplished Conveyancer* (3 vols., 1714) and the *Compleat Chancery-Practiser* (1730), besides his dissertations on rural life, *The Compleat Court-Keeper* (1713), *The Country Gentleman's Vade-Mecum* (1717), *The Compleat Sportsman* (1718), and *The Land Purchaser's Companion* (1720); but his most important work was his *Poetical Register, or Lives and Characters of the English Dramatic Poets* (2 vols., 1719–20).

JACOB, John (1812–58). An English soldier and military author. He was born at Woolavington, Somerset, Jan. 11, 1812, and was educated at Addiscombe. He entered the Bombay Artillery in 1828, served in the Afghan War in 1839, and in 1841 took command of the Sind (or Jacob's) irregular horse, with which he enforced order in Upper Sind and Cutch, and under Napier distinguished himself at Miani and elsewhere. The injustice of William Napier's *Conquest of the Sind* roused Jacob to his own defense and to Outram's. In 1852 he became commandant of the native police of Upper Sind; negotiated a treaty with the Khan of Khelat (1854); in 1857 served under Outram; and, after his departure, was in sole command of the army in Persia. He died Dec. 5, 1858, at Jacobabad, which had been named in his honor. Jacob was a splendid organizer of native troops, an excellent cavalry officer, and the inventor of a rifle and an explosive bullet. He wrote many tracts on the defects of the British army and civil service in India; collected by Pelly, *Views and Opinions of General Jacob* (2d ed., 1858). Consult Shand, *General John Jacob* (London, 1900).

JACOB, zhȧ'kŏb', Louis Léon (1768–1854). A French admiral. He was born at Tonnay, Charente, was educated at Rochefort, and volunteered from a clerkship in the marine bureau to the navy (1784). He was promoted to ensign in 1793, commanded the *Ça Ira* in her brave fight against a superior English force (1795), and was taken prisoner. After his release he distinguished himself (1798) against Sir John Warren's fleet and was again captured but soon exchanged. He took part in the campaign in Santo Domingo in 1801, was commandant at Granville (1805) and at Naples (1806), and shared in the battle of Sables d'Olonne. He was made a rear admiral in 1812 and in 1814 defended Rochefort. He was retired on the Restoration, reëntered active service in 1820, was Governor of Guadeloupe from 1823 to 1826, prepared the expedition against Morocco and Algiers (1827), served on the Admiralty Board until 1834, when he became Minister of Marine, and was aid-de-camp to Louis Philippe until 1848. He introduced in 1805 a system of semaphores which was long used in the French navy.

JA'COB, Richard Taylor (1825–1903). An American soldier, born in Oldham Co., Ky. He was educated for a lawyer, but after travels in South America went West in 1846, and there enlisted a body of mounted men to assist General Frémont in taking possession of California. He served in the Civil War as colonel of the Ninth Kentucky Cavalry Regiment, raised by himself. For a time he was with Major General Buell and afterward he joined in the pursuit and capture of Gen. John Morgan. He accompanied General Shackelford on the Tennessee expedition that resulted in the capture of 2500 men under General Fraser at Cumberland Gap and was in the desperate struggle at Bean's Station. He was elected Lieutenant Governor of Kentucky in 1863, bitterly opposed the Emancipation Proclamation, and advocated the election to the presidency of General McClellan. His public criticism of the administration was so violent that he was arrested and conducted to Richmond, but was afterward unconditionally released by President Lincoln.

JACOBA, yȧ-kō'bä, Countess of Holland (1401–36). The daughter and heir of William II, Duke of Bavaria and Count of Holland, she was first married to John, Duke of Touraine and son of Charles VI of France. In 1417 her father and husband both died. Her possessions were disputed first by her uncle, John of Bavaria, Bishop of Liége, and then by John IV, Duke of Brabant, her second husband, whom she married in 1418. Humphrey, Duke of Gloucester, the third husband, whom she married in 1422, at first supported her claims, but three years later deserted her. Her cousin, Philip V, Duke of Burgundy, then claimed the inheritance, and although she rebelled against him in 1432 with the aid of her fourth husband, Francis of Borselen, she was defeated and thereafter had to live in retirement. Consult Paul Lacour, "Une princesse héroïque au XVe siècle," in *Nouvelle Revue*, vol. vii (n. s., Paris, 1900).

JAC'OBÆ'A, JACOBE, yȧ-kō'be, or **JACOBINE,** zhȧ'kō'bēn' (1558–97). A duchess of Jülich, daughter of the Margrave Philibert of Baden-Baden. Brought up a Catholic by her uncle, Albert of Bavaria, she married in 1585 John William, who, seven years later, succeeded his father as Duke of Jülich and soon after became insane. Jacobæa was accused of dissolute conduct and brought to trial before the Emperor by her enemies; but before he gave sentence she was found murdered in her bed. A German play by Kugler, *Jakobäa* (1850), dramatizes the story. Consult Stieve, *Zur Geschichte der Herzogin Jakobäa von Jülich* (Bonn, 1878), and Max Lassen, "Die Verheiratung der Markgräfin Jakobe von Baden mit Herzog Johann Wilhelm von Jülich-Cleve-Berg, 1581–85," in *Akademie der Wissenschaften, philosophisch-philologische und historische Klasse, Sitzungsberichte* (Munich, 1895).

JAC'OBE'AN ARCHITECTURE. The phase of English Renaissance architecture which developed during the reign of James I (1603–25) was a natural outgrowth of the Elizabethan style and, like it, found its chief expression in manor houses and collegiate buildings. The classic orders were more generally used, but in strangely fantastic and denatured versions; the *gaine*, which in the Elizabethan style was confined to interior decoration and furniture, appeared in place of pilasters on the exterior, together with strapwork and openwork in stone; while all distinctively Gothic details finally disappeared. Bramshill House in Hampshire is a typical example. The interior decoration shows an advance towards Renaissance types, but there was not yet any really classic feeling, and the change from this style to the Palladian introduced by Inigo Jones (q.v.) was abrupt. Consult: C. J. Richardson, *The Architectural Remains of the Reigns of Elizabeth and James I* (London, 1840); R. T. Blomfield, *A Short History of English Renaissance Architecture* (ib., 1897); A. T. Bolton, *Jacobean Architecture and the Work of Inigo Jones in the Earlier Style* (ib., 1911). See Elizabethan Architecture.

JACOB EV'ERTZEN. A quaint book name applied to the small, brightly colored grouper-like West Indian fishes of the genus *Bodianus*, otherwise known as guativeres and by other names. According to Bloch, the fish was named for Jacob Evertzen, a noted Dutch pilot in the middle of the eighteenth century, whose pock-marked face suggested to his fellow sailors the dark-spotted and freckled fishes (especially the *Bodianus guttatus*, the type of the genus). See Guativere.

JACOB FAITHFUL. A novel by Capt. Frederick Marryat (1839), appearing first in the *Metropolitan Magazine*.

JACO'BI, jȧ-kō'bĭ, Abraham (1830–1919). An eminent German-American physician, born at Hartum, Westphalia, Germany. He studied at the universities of Greifswald, Göttingen, and Bonn, obtaining his degree in medicine from the last-named institution. Because he had been an active participant in the struggle for free Germany in 1848 and thereafter, Jacobi was prosecuted for treason and was kept in Prussian prisons from 1851 to 1853. In the latter year, after spending a few months in Manchester, England, he came to America and established himself in New York City. He took an active part in founding the German dispensary (1857); was chosen (1860) to fill the first chair of diseases of children instituted in the United States, that of the New York Medical College; from 1865 to 1870 filled a similar chair in the medical department of the University of the City of New York (later University and Bellevue Hospital Medical College); helped found the German Hospital of New York (1868); and from 1870 until his retirement in 1902 was clinical professor of the diseases of children in the College of Physicians and Surgeons (Columbia University). He was the first to establish in New York City systematic and special clinics for the diseases of children, and very largely to him is due the recognition of pediatrics as a distinct branch of medicine. In 1895 he was urged to leave New York and become professor of pediatrics in the University of Berlin, but he declined the honor. He was for many years consulting physician to the New York City Department of Health, to the J. Hood Wright Memorial Hospital, and to the New York Skin and Cancer Hospital, and visiting physician to the Nursery and Child's Hospital. He served as physician to the Mount Sinai Hospital from 1860, to the Hebrew Orphan Asylum from 1868, to Bellevue Hospital from 1873, and to Roosevelt Hospital from 1898. In 1896 he was president of the Association of American Physicians and in 1912 president of the American Medical Association.

Dr. Jacobi's writings are very numerous. A

great number of his papers, principally on diseases of women and children, were published in medical and other periodicals in America and in Germany. His books include: *Cogitationes de Vita Rerum Naturalium* (1851); *Dentition and its Derangements* (1862); *Infant Diet* (1873; 3d ed., 1875); *A Treatise on Diphtheria* (1880); *The Intestinal Diseases of Infancy and Childhood* (1887); *Therapeutics of Infancy and Childhood* (1895; 3d ed., 1903). His contributions to Noeggerath and Jacobi's *Midwifery and the Discases of Women and Children* (1859) and his "Hygiene und Pflege der Kinder," in Gerhardt's *Handbuch der Kinderkrankheiten* (1877), are most noteworthy. In 1893 he published two volumes of miscellaneous essays and addresses on a variety of subjects, mostly medical, under the title *Aufsätze, Vorträge, und Reden* (1893); and in 1909 another collection of miscellaneous papers, entitled *Collectanea Jacobi*, was published in 8 volumes. In 1873 he married Miss Mary C. Putnam (see Jacobi, Mary Putnam); his daughter married George McAneny (q.v.).

JACOBI, yâ-kō'bê, Friedrich Heinrich (1743–1819). A German philosopher. He was born at Düsseldorf, Jan. 25, 1743, and was educated at Frankfort and Geneva with a view to preparing himself for a mercantile career, which he began in 1762. In 1772 he was appointed councilor of finance for the duchies of Berg and Jülich and, having married a woman of wealth, was enabled to devote himself to literary pursuits. In 1794 he moved to Holstein and in 1804 to Munich, where he had been appointed a member of the newly instituted Academy of Sciences, of which he became president in 1807. He died on March 10, 1819. His writings consist partly of romances and partly of philosophical treatises. The principal are *Woldemar* (2 vols., 1779) and *Eduard Allwills Briefsammlung* (1781), both philosophical romances which attracted much attention in their day, but have now no claim to special recognition, while his philosophical work has still considerable interest. *Ueber die Lehre des Spinoza in Briefen an Mendelssohn* (Breslau, 1785) is a polemic against logical methods of speculation in the search after the higher class of truths; and *David Hume über den Glauben, oder Idealismus und Realismus* (ib., 1787) continues the polemic and makes an attempt to demonstrate that the mind or nature of man possesses another faculty—viz., faith, or intuition—by which the higher truths are as firmly grasped and in the same way as the material world is grasped by it, since sense is incompetent to witness to the independent reality of that world. His collected works, including letters, appeared at Leipzig (6 vols., 1812–24). Further letters were published by Rudolf Zoeppritz (Leipzig, 1869) and by Leitzmann (Halle, 1892). Consult: Deycke, *F. H. Jacobi im Verhältniss zu seinen Zeitgenossen* (Frankfort, 1848); Fricker, *Die Philosophie des Friedrich Heinrich Jacobi* (Augsburg, 1854); Zirngiebl, *F. H. Jacobis Leben, Dichtungen und Denken* (Vienna, 1867); Harms, *Ueber die Lehre von F. H. Jacobi* (Berlin, 1876); Holtzmann, *Ueber Eduard Allwills Briefsammlung* (Jena, 1878); Lévy-Bruhl, "Jacobi et le Spinosisme," in *Revue Philosophique* (Paris, 1894); id., *La philosophie de Jacobi* (ib., 1894); Wilde, *F. H. Jacobi: A Study of the Origin of German Realism* (New York, 1894); Crawford, *Philosophy of F. H. Jacobi* (ib., 1905); Isenberg, *Der Einfluss der Philosophie Charles Bonnets auf F. H. Jacobi* (Tübingen, 1906), containing bibliography.

JACOBI, Hermann Georg (1850–). A German Sanskrit scholar, born at Cologne. He was educated there and at Bonn and Berlin, where he devoted himself to Sanskrit under Gildemeister and Weber. In 1889 he was made professor at Bonn, after serving as professor extraordinary at Münster (1876–85) and professor at Kiel (1885–89). Possibly his most important work is in Indian chronology: "The Computation of Hindu Dates in Inscriptions," published in *Epigraphia Indica* (1892). His dating of the Rig-Veda, *Ueber das Alter des Rigveda* (1893), on astronomical grounds, puts the time much earlier than the usual estimate. His other works, on comparative philology, Prakrit grammar, Sanskrit literature, and Jainism, include, besides contributions to various publications: *Kalpasūtra of Bhadrabāhu* (1879); *Acārānga Sūtra of the Çvetāmbara Jains* (1882); *Sthavirâvalî Charita* (1883–91); and translations of the *Acārānga, Kalpa, Uttarâhyayana,* and *Sutrakṛtāsga Sūtra,* in the *Sacred Books of the East,* vols. xxii and xlv (1884–95); *Ausgewählte Erzählungen in Māhārāshtrī* (1886; Eng. trans., *Hindu Tales,* 1909); *Das Rāmāyaṇa* (1893); *Das Mahābhārata* (1903); *Kompositum und Nebensatz. Studien über die indogermanische Sprachentwicklung* (1897); an edition of the *Samarādityu Sankhsepa* (1905); translations, published in the *Zeitschrift der deutschen morgenländischen Gesellschaft,* such as *Anandavardhanas Dhvanyāloka* (1903), *Umasvati's Tattvarthadighama* (1906), *Ruyyaka's Alamkarasarvasva* (1908), and many others.

JACOBI, Johann Georg (1740–1814). A German poet, brother of Friedrich Heinrich, born at Düsseldorf and educated at Göttingen. He was appointed professor of philosophy and oratory at Halle (1766) and soon afterward made the acquaintance of Gleim (q.v.), with whom he edited *Iris* (1774–76), to which Goethe, Heinse, Lenz, Sophie La Roche, and others were contributors. He was made professor at Freiburg in 1784. Jacobi's poetic style was sentimental and effeminate, save in a few of his last works. His collected works, with a biography by Von Ittner, one of his friends, were published at Zurich (8 vols., 1807–22); his correspondence with Gleim appeared in 1786; and Martin edited *Ungedruckte Briefe von und an Johann Georg Jacobi* (Strassburg, 1874). Consult: J. A. von Ittner, a biography in J. G. Jacobi, *Sämmtliche Werke,* vol. viii (Zurich, 1822); Georg Ransohoff, *Ueber Johann Georg Jacobis Jugendwerke* (Berlin, 1892); Joseph Longo, *Laurence Sterne and J. G. Jacobi* (Vienna, 1898).

JACOBI, Karl Gustav Jakob (1804–51). A German mathematician, the brother of Moritz Hermann Jacobi the physicist. He was born in Potsdam, studied in Berlin, and began his teaching there as privatdocent in 1824, but soon after went as professor of mathematics to Königsberg. He became a member of the Prussian Academy of Sciences in 1836 and in 1842 took up his permanent residence in Berlin, lecturing at the university. Jacobi's great work was in the theory of elliptic functions, of which he and Abel (q.v.) were the founders. He also contributed to the theory of numbers, to analytical mechanics, and to the study of determinants.

A very important determinant bears the name Jacobian. (See DETERMINANTS.) He also founded the theory of Abelian functions. The following important works appeared in his lifetime: *Fundamenta Nova Theoriæ Functionum Ellipticarum* (1829); *Canon Arithmeticus* (1839); *De Formatione et Proprietatibus Determinantium* (1841; ed. by Stäckel, 1896); *Mathematische Werke* (3 vols., partly posthumous, 1846–71). His *Vorlesungen über Dynamik* was published posthumously (1866; 2d ed., 1884). His *Gesammelte Werke* (7 vols. and suppl., 1881–91) were published by the Berlin Academy. His essay, *Über die vierfach periodischen Functionen zweier Variabeln*, etc., was translated from the Latin and edited by Weber (1895). Consult Lejeune-Dirichlet, "Gedächtnisrede auf Jacobi," in the *Abhandlungen der Berliner Akademie* (Berlin, 1852; printed in Jacobi's *Gesammelte Werke*, vol. i, ib., 1881), and Königsberger, *Carl Gustav Jacob Jacobi* (Leipzig, 1904).

JACOBI, jȧ-kō'bī, MARY PUTNAM (1842–1906). An American physician, born in London, England, the daughter of George P. Putnam (q.v.). She was the first woman to graduate from the New York College of Pharmacy, in 1862, and from the Women's Medical College of Philadelphia, in 1864. After teaching in New Orleans and writing for a year, she went to Paris, spent 18 months in hospitals there, was admitted by the Minister of Public Instruction to the Ecole de Médecine, and graduated in 1871, receiving the second prize for her thesis. She returned to New York to begin practice and to act as lecturer on therapeutics in the new Women's Medical College of the New York Infirmary. In 1873 she was married to the physician Abraham Jacobi (q.v.). Upon the founding of the New York Post-Graduate Medical School (1881) she became clinical professor of diseases of children; she served as visiting physician to the New York Infirmary and to St. Mark's Hospital; in 1874 she organized, and became president of, an association for the advancement of the medical education of women; and she was the first woman admitted to the New York medical societies and to the American Medical Association. Her writing on medical subjects was considerable and important. Harvard University awarded her the Boylston essay prize in 1876, and in 1891, when she contributed to *Women's Work in America*, she could record for herself, in the bibliography devoted to the writings of American women physicians, more than 40 titles of papers and treatises. Her books include: *The Question of Rest for Women during Menstruation* (1877); *Acute Fatty Degeneration of New-Born* (1878); *The Value of Life* (1879); *Cold Pack and Anæmia* (1880); *The Prophylaxis of Insanity* (1881); *Hysteria and Other Essays* (1888); *Common Sense Applied to Woman's Suffrage* (1894).

JACOBI, yȧ-kō'bê, MORITZ HERMANN (1801–74). A German physicist and architect, brother of Karl Gustav Jacobi. He was born at Potsdam. In 1835 he became professor of architecture at the University of Dorpat. Two years later he was called to St. Petersburg, where he became a member of the Academy of Sciences in 1842. He carried out numerous important researches in physics and suggested as a practical unit of resistance a copper wire of given dimensions. He also discovered (1850) that the action of the dynamo was but the converse of the motor. He wrote *Mémoire sur l'application de l'électromagnétisme au mouvement des machines*, a remarkable essay published in 1835, and *Die Galvanoplastik* (1840). Consult Wild, *Zum Gedächtnis an Moritz Hermann Jacobi* (St. Petersburg, 1876).

JAC'OBIN. A small, highly artificial pigeon, resembling the capuchin, in which the prolonged upright feathers of the neck and head form a sort of cowl about the face. See PIGEON, and Colored Plate of PIGEONS.

JACOBINE. See JACOBÆA.

JACOBINI, yä'kō-bē'nê, LUDOVICO (1832–87). An Italian cardinal and diplomat of the Roman Catholic church, born at Genzano. He was nephew of the Papal Minister of Public Works and was rapidly advanced in ecclesiastical honors. In 1870 he became Undersecretary of State, and in 1874 was made Archbishop of Thessalonica (Saloniki) in partibus. In the same year he was Nuncio to Vienna, where he first showed his diplomatic abilities. In 1879 he met Bismarck to obtain the revocation of the Falk laws passed by the Prussian Diet against the Catholics in 1873, a mission in which he was ultimately successful. He was appointed Cardinal in 1879, and in 1880 was made Papal Secretary of State.

JACOBINS, jăk'ō-bĭnz, *Fr. pron.* zhȧ'kō'băN'. A political club in France which exercised a profound influence on the progress of the French Revolution. It was organized at Versailles in May, 1789, by the representatives from the provinces to the States-General. It comprised in the beginning about 75 members, of whom some two-thirds belonged to the Third Estate and the rest to the clergy, and included among its members some of the most prominent leaders of the time, like Mirabeau, Barnave, Sieyès, Robespierre, Pétion, and the brothers Lameth. It met very frequently and in secret session for the purpose of deciding upon common action to be taken in the National Assembly, and it is probable that the great event of Aug. 4, 1789—the abolition of feudal privileges—and the enunciation of the Rights of Man were planned beforehand in the sessions of the club. Upon the removal of the National Assembly to Paris the sessions of the club were suspended for a time. In the winter of 1789–90 they were resumed in the refectory of the Jacobin convent in the Rue Saint-Honoré, whence the members of the club were derisively called by their opponents Jacobins. The name was changed from Club Breton to Société des Amis de la Constitution. Membership in the club was limited at first to deputies of the National Assembly, but soon the club was thrown open to prominent Parisians in the various walks of life whose sympathies were with the Revolution, and such men as Marie-Joseph Chénier, La Harpe, Cabanis, Lacépède, David, and Fabre d'Eglantine now joined the Jacobins. At this time the club was rather moderately radical, favoring merely constitutional monarchy. After May, 1791, the meetings of the club were held in the chapel of the convent. In November, 1791, its membership numbered more than 1200. The proceedings of the club were published after October, 1791. It had been the intention of the founders to make the club a nucleus for similar societies to be organized throughout France, and this object was speedily carried out. Affiliated societies sprang up in all the towns and in many

villages, and these at all times remained in close touch with the mother society. In May, 1791, the number of such societies was more than 400, and in the spring of 1794 it verged closely on 1000. The Jacobin leaders in Paris were able in this manner to carry on a most effective propaganda throughout the country, and, in fact, the perfection of their organization was such as to give the Jacobins the aspect of a political machine.

The attempted flight of Louis XVI in 1791 produced the same effect upon the Jacobin Club as it did upon the nation at large. The radical element began to gain the upper hand, and though it was still professedly monarchic in tone, the question of the deposition of Louis XVI was seriously raised. Upon this point the club split. In the hall of the Jacobins was drawn up the petition demanding the deposition of Louis XVI which brought about the massacre in the Champ de Mars on July 17. Although the leaders of the Jacobins disavowed all responsibility for the document, which they declared had been drawn up by a crowd that invaded the hall, the sanguinary outcome produced a schism in the club. The majority of members, including the most prominent leaders, seceded to form the club of Feuillants (q.v.), and of those who remained, Robespierre and Pétion were the most prominent. The Jacobins now entered upon a new phase, that of violent Republican propaganda. Together with the Girondists (q.v.) they planned the uprising of Aug. 10, 1792, the object of which was the overthrow of the monarchy. With the meeting of the Convention (September, 1792) the strife of parties began, Jacobins against Girondists. The former, as the representatives of uncompromising democracy, showed themselves the more fit to cope with the dangers of foreign invasion and internal insurrection which now confronted France. In the struggle against the Girondists they brought to bear upon the Convention the force of organized public opinion skillfully directed by the various societies throughout the country acting in implicit obedience to the mother society in Paris. With the fall of the Girondists the Jacobins became the practical rulers of France. No important action was taken in the Convention which had not been previously discussed in the sessions of the club, and, as a matter of fact, the meetings of the club came to be popularly regarded with greater interest than the sessions of the Convention. Of equal importance with the influence which it exercised upon the legislative activity of the Convention was the supervision which it exercised over the representatives of the government in the provinces. Its spies were constantly on the watch against treason to the Republican cause, and in many places where the action of the government officials seemed to lack the requisite revolutionary fervor the local Jacobin societies assumed virtual control. By this time the club, of course, had become thoroughly democratic, though perhaps the character of its members raised it above the mob contingents of Hébert and Collot d'Herbois. Robespierre became its master after the overthrow of Danton, and, with the Committee of Safety, it was one of the most efficient instruments in carrying out the Terror. The success of the Jacobins was due mainly to the fact that it always knew what to do and hesitated at nothing in order to do it. In the series of crises that confronted France during the Revolution, the Jacobins presented a solid front to the enemies without and to the traitors within. Success condoned many of their terrible deeds in the eyes of the patriotic revolutionaries. With the fall of Robespierre the importance of the Jacobins ceased. Its sessions were suspended for a time, resumed, and again abandoned. On Nov. 11, 1794, its hall was closed by order of the Convention. Once more reconstituted and meeting at the Panthéon, its sessions were forbidden by the Directory in February, 1796. In the provinces there was a short revival of Jacobin activity in 1799.

Bibliography. A great mass of literature concerning the Jacobins appeared between the years 1790 and 1796, the most important contributions being the *Journal des Amis de la Constitution* (Paris, 1790–93), the *Journal de la Montagne* (ib., 1794–95), and William Playfair, *History of Jacobinism* (2 vols., Philadelphia, 1796). There were also numerous pamphlets and poems published, such as *La Jacobinade*, *Le secret des Jacobins*, *Les crimes des Jacobins*. Of modern authorities, the best and most detailed is F. V. A. Aulard, *La Société des Jacobins* (4 vols., Paris, 1889–95). Consult also: Augustin Barruel, *Mémoires pour servir à l'histoire du Jacobinisme* (5 vols., Hamburg, 1803); Zinkeisen, *Der Jakobinerklub* (2 vols., Berlin, 1852–53); W. A. Schmidt, *Tableaux de la Révolution française* (3 vols., Leipzig, 1867–70); F. V. A. Aulard, *The French Revolution: A Political History, 1789–1804*, translated from the French by B. Miall (4 vols., New York, 1910). See FRANCE; ROBESPIERRE; DANTON; together with the works cited under these titles.

JAC'OBITES (from Lat. *Jacobus*, James). The name given to the adherents of the male line of the house of Stuart in Great Britain and Ireland after the revolution of 1688. Many of the more devoted royalists followed James II into France, but the greater part of the Jacobites remaining in their native land made a show of submission to the new government, while secretly supporting the cause of the Pretender. Their intrigues and conspiracies were incessant till the middle of the eighteenth century. Their hostility to the house of Hanover broke out in rebellions in 1715 and 1745, in consequence of which several of them lost their lives upon the scaffold, titles were attainted, and estates confiscated. After the overthrow of the Young Pretender at Culloden in 1746 their cause became so hopeless that it was not long before their activity ceased altogether; those who still retained their attachment to the exiled family finally acquiesced in the order of things established by the Revolution. In Scotland, where they were most numerous, the hopes and wishes of the Jacobite party were expressed in many spirited songs, which form an interesting part of the national literature. The Jacobites of England were also called Tories. They were generally distinguished by warm attachment to the Church of England, as opposed to all dissent, if they were not members of the Catholic church, and held very strongly the doctrine of nonresistance, or the duty of absolute submission to the King. The Jacobites of Scotland were also generally Episcopalians and Roman Catholics. In Ireland the Jacobite cause was that also of the Celts as opposed to the Saxons, or the native race against the English colonists, and of the Roman Catholics against

the Protestants. These diversities prevented a complete union and greatly weakened the Jacobites.

Bibliography. James Hogg, *Jacobite Relics* (Edinburgh, 1819–21); Chambers, *Jacobite Memoirs* (ib., 1824); J. Allardyce (ed.), *Historical Papers Relating to the Jacobite Period* (Aberdeen, 1895–96); Terry, *The Rising of 1745, with a Bibliography of Jacobite History* (London, 1900); F. W. Head, *The Fallen Stuarts* (Cambridge, 1901); Marquis de Ruvigny, *Jacobite Peerage* (Edinburgh, 1904); Vaughan, *The Last of the Royal Stuarts* (London, 1906); Hale, *James Francis Edward, the Old Chevalier* (ib., 1907); Grew, *The English Court in Exile* (ib., 1911).

JACOBITES. A name given to the Oriental sect of Monophysites (q.v.), belonging more especially to the Monophysites of Syria, Mesopotamia, and Babylonia, or the Old Syrian church. It is derived from a Syrian monk called Jacobus Baradæus (*Baradai*, 'ragged,' because he often traveled in the guise of a ragged beggar), who formed the Monophysite recusants of his country into a single party. He was chosen Bishop of Edessa in 541 and for more than 30 years traveled through Asia Minor and the East, organizing churches and ordaining bishops, priests, and deacons. The Jacobites were the Syrian national church, and during the Middle Ages were strong. Later many went to the Roman church (see *Uniats*), and now these number only about 80,000. At their head is the separate Patriarch of Antioch, whose choice must be confirmed by the Sultan. Under him are eight metropolitans and three bishops. Of the former, one, the Metropolitan of Jerusalem, called the Maphrian, ranks higher than the others. Both Patriarch and Maphrian live at the monastery of Zaferan, near Mardin. The Jacobites have monks, but no nuns. Their Monophysitic views make them heretics to the Greek church, but they have only minute ceremonial differences from the latter. They are in fellowship with the Coptic church. (See COPTS.) Since 1874 the Church of England has carried on mission work among the Jacobites. Consult W. F. Adeney, *The Greek and Eastern Churches* (New York, 1908), and F. J. Bliss, *The Religions of Modern Syria and Palestine* (ib., 1912).

JACOB OF EDES'SA (c.640–708). An eminent theologian and Syriac writer. He was born near Antioch. In early life he entered the monastic order and studied for a while in Alexandria. He was appointed Bishop of Edessa about 686, but resigned his office after four years, because of the insubordination of some of his clergy. He retired first to a monastery near Edessa and then, after 11 years, to one near Antioch. He applied himself to the study of the Syriac version of the Old Testament, revising the text and making many annotations. He had a thorough knowledge of Hebrew, Syriac, and Greek, and for his able translation of Syriac works into Greek he received the surname of "Interpreter of the Books." In his own country he was best known as a grammarian. In 708 he was induced to resume his see, but died four months later. Consult Kayser, *Die Kanones Jakobs von Edessa übersetzt und erläutert* (Leipzig, 1886), with biographical sketch, and William Wright, *Short History of Syriac Literature* (London, 1894).

JACOB OF HUNGARY. See PASTORELS.

JACOB OF SARUG (SĔRŪGH) (451–521). A Syriac writer, born at Kurtam on the Euphrates. When Amid was captured by the Persians in 503, he was a visiting presbyter at Haura in Sarug, and in 519 he became Bishop of Batnān in the same district. He is chiefly remembered as the author of some 763 metrical homilies. Most of his works are in manuscript, but in 1903–08 four volumes of his *Homiliæ Selectæ* were published at Paris and Leipzig.

JACOB OF TODI, tō'dē. See JACOPONE DA TODI.

JACOB OF VITRY, vē'trē', or **JACQUES** (c.1180–1240). Bishop of Acre and Cardinal Bishop of Frascati. He was born probably at Vitry, northern France. He studied in Paris, and was consecrated a priest there in 1210. For several years he lived at Oignies, a place in the present Belgian Province of Namur, attracted by the fame for piety and holiness of the Beguine Maria of Oignies. At Oignies he joined the Order of St. Augustine. At the request of the Pope he preached against the Albigenses, and afterward he preached a new crusade. His preaching was so successful that he was chosen Bishop of Acre in 1214 and consecrated in 1216 by Pope Honorius III. He fulfilled the duties of his bishopric with energy and success, in particular buying Christian slaves from the Saracens and caring for Mohammedan children who had fallen into Christian hands. Difficulties arising with the secular officials, he resigned his bishopric in 1225 and returned to Oignies. In 1227 Gregory IX made him Cardinal Bishop of Frascati. He died in Rome, May 1, 1240. Jacob was justly famed as a preacher in his own time and in later times is remembered as an historian and authority for manners and social conditions of the early thirteenth century. His great work was the *Historia Orientalis*, also called *Historia Hierosolymitana Abbreviata*. He also wrote a life of St. Maria of Oignies. His letters are interesting and valuable recitals of events of the Fifth Crusade, and his sermons have served as the model for many a preacher. A French translation of his *Historia* is in Guigot, *Collection des mémoires*, vol. xxii. Consult Barroux, *Jacques de Vitry* (Paris, 1885).

JACOB OM'NIUM. The pen name of the English essayist Matthew James Higgins (q.v.).

JACOBS, yä'kŏps, ALBERT MICHEL (1812–79). A Belgian marine painter, born at Antwerp. He studied at the Antwerp Academy, where in 1843 he was appointed professor. The National Gallery in Berlin contains his "Grecian Archipelago" (1848); the New Pinakothek in Munich, "Foundering of the Emigrant Ship *Floridian* on the Coast of Essex," "Sunrise in the Archipelago" (1852), and "View of the Harbor of Constantinople"; and the Museum at Brussels, "Waterfall of the Glommen in Norway" (1855).

JACOBS, yä'kŏps, CHRISTIAN FRIEDRICH WILHELM (1764–1847). An eminent German classical scholar, born at Gotha. After studying at the universities of Jena and Göttingen, he was made an instructor in the Gymnasium at Gotha (1785). After 1802 he held a position in the public library of the same city. In 1807 he was appointed a teacher of classical literature at the Munich Lyceum, and a member of the Academy of Sciences of that city, but returned to Gotha in 1810 as chief librarian and director of the collection of numismatics and antiques. From 1831 to 1842 he was director

of the art collections of Gotha. Besides many editions of ancient writers, including the *Antehomerica* of Tzetzes (1793), *Ælian* (1832), *Achilles Tatius* (2 vols., 1821), and the *Imagines* of Philostratus (1825), with Welcker, his numerous works include an edition of the *Anthologia Græca* (13 vols., 1794–1814), his most important classical work, remarkable for its profound learning and elegance of style, followed by a revised text, in three volumes, made from the Palatine manuscript (see ANTHOLOGY, 1); metrical translations of 700 poems of the *Anthology*, published under the title of *Tempe* (2 vols., 1803); translations from Demosthenes, *Staatsreden und Rede für die Krone* (1805); an elementary book on Greek, *Elementarbuch der griechischen Sprache* (1805; frequently republished); and numerous miscellaneous essays on classical philology, collected under the title *Vermischte Schriften* (vols. i–iii, 1823–24; vols. iv–viii, 1829–44). Of the later works, his *Geschichte des weiblichen Geschlechts* (vol. iv) is best known. Consult his sketch of himself in his *Personalien* (Leipzig, 1840); Wüstemann, *Friderici Jacobsii Laudatio* (1848) and *Hellas* (Berlin, 1852); Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

JA'COBS, HENRY EYSTER (1844–). An American educator and Lutheran theologian, born at Gettysburg, Pa. He graduated from Pennsylvania College in 1862 and from the Lutheran Theological Seminary at Gettysburg three years later. Between 1870 and 1883 he was professor at Pennsylvania College, successively of Latin and history, ancient languages, and Greek. He was then appointed professor of systematic theology in the Mount Airy Seminary, Philadelphia, where he also assumed the office of dean in the following year. He served as president of his church's board of foreign missions (1902–07), of the General Conference of Lutherans (1899, 1902, 1904), of the American Society of Church History (1907–08), and of the Pennsylvania German Society (1910–11). Besides translating various German theological works and editing the *Lutheran Church Review* (1882–96), a *Lutheran Commentary* (1895–98), and a *Lutheran Encyclopædia* (1899), he wrote: *The Luthcran Movement in England* (1891); *History of the Lutheran Church in America* (1893); *Elements of Religion* (1894); commentaries on Romans (1896) and 1 Corinthians (1897); *Life of Martin Luther* (1898); *The German Emigration to America, 1709–40* (1899); *Summary of the Christian Faith* (1905).

JACOBS, JOSEPH (1854–1916). A British-American author, born at Sydney, Australia. He graduated from St. John's College, Cambridge, in 1876, traveled in Spain (1888) and in the United States (1896), and is best known for his work in history and folklore. In 1900 he came to New York to become an editor of the *Jewish Encyclopædia*, which was completed in 1906. He served as president of the Jewish Historical Society and from 1906 to 1913 was professor of English literature and rhetoric in the Jewish Theological Seminary of America. Among his publications are: *English Fairy Tales* (1890); *Celtic Fairy Tales* (1891, 1894); *Indian Fairy Tales* (1892); *Æsop's Fables* (1894); *As Others Saw Him* (1895), a life of Christ from the Jewish standpoint; *Reynard the Fox* (1895); *Literary Studies* (1895); *Jewish Ideals* (1896). His scholarly editorial work includes Carton's *Æsop* (1889); Day's *Daphnis and Chloe* (1890); Painter's *Palace of Pleasure* (1891); Howell's *Familiar Letters* (1892). In addition, he translated Gracian's *Art of Worldly Wisdom* (1892) from the Spanish and (1899) certain tales from Boccaccio; for some time he edited *Folk-Lore*, and was editor of the *Jewish Year Book* (1896–99), the *Literary Year Book* (1898–99), and the *American Hebrew* (1906).

JACOBS, MICHAEL (1808–71). An American Lutheran clergyman and educator, born near Waynesboro, Franklin Co., Pa., and educated at Jefferson College, Canonsburg, where he graduated in 1828. In 1829 he became an instructor in Gettysburg Gymnasium (later Pennsylvania College) and was professor from 1832 till his retirement in 1865. He also entered the Lutheran ministry in 1832 and was prominent in the West Pennsylvanian Synod. A man of varied attainments, Jacobs invented (1845) a new method of canning fruit, made original studies in meteorology, contributed to the publications of the Smithsonian Institution, and wrote *The Rebel Invasion of Maryland and Pennsylvania* (1863).

JACOBS, yä'kôps, VICTOR (1838–91). A Belgian statesman and leader of the Clericals, born at Antwerp and educated in France, at the Jesuit College at Vaugirard, and the University of Brussels, where he studied law. He was elected deputy in 1863, having taken advantage of the popular disaffection to compulsory service in the army to strengthen the Catholic party; became Minister of Public Works and of Finance in 1870; and in 1884 received the portfolio of Interior and Public Instruction. While he held this post, Jacobs passed the denominational education bill which put the religious orders again in power and which forced its author from the government. But he was still manager and head of the Clerical party and presided at the Catholic congress at Malines only a short time before his death. He wrote several legal studies, including *Le droit maritime belge* (2 vols., 1889–91).

JA'COBS, W. W. (1863–). An English novelist of seafaring people, born in London and educated at private schools. In 1883 he entered the Civil Service, Savings Bank Department. During this period and after he wrote: *Many Cargoes* (1896); *The Skipper's Wooing* (1897); *Sea Urchins* (1898); *A Master of Craft* (1900); *Light Freights* (1901); *At Sunwich Port* (1902); *The Lady of the Barge* (1902); *Odd Craft* (1903); *Dialstone Lane* (1904); *Captains All* (1905); *Short Cruises* (1907); *Salthaven* (1908); *Sailors' Knots* (1909); *Ship's Company* (1911); *Night Watches* (1914). With Louis N. Parker he wrote also a three-act play, *Beauty and the Barge*, in which Cyril Maude played in New York in 1913.

JACOBS CAVERN. A natural cave, about 2 miles east of Pineville, McDonald Co., Mo., named in honor of its discoverer, E. H. Jacobs, of Bentonville, Ark. In 1903 the cavern was carefully examined by Jacobs and Profs. W. K. Moorehead and Charles Peabody. The surrounding rock formation was found to be St. Joe limestone, of the Subcarboniferous age. The opening is slightly more than 21 meters long by about 14 meters deep; the height of the roof from 1.20 meters to 2.60. Lines of stratification show plainly in the walls; the roof is of solid limestone. Dripstone appears in the

walls and in the deep bed of ashes on the floor. In these ashes were found a number of hammerstones, horn or bone awls, flint knives, charcoal, six human skeletons, and the bones of various large and small mammals, none of them yet extinct. The occupants are believed to have antedated the mound builders. Examination of the stalagmite formations indicates that the implements had been lying in the ashes for about 1900 years. Some of the relics found in the cavern are deposited in the Museum of Phillips Academy, at Andover, Mass., and are described by Professors Moorehead and Peabody in *Bulletin No. 1* of the Department of Archæology of that institution. Consult also the articles by Professor Peabody in the *American Anthropologist* for September, 1903, and by C. N. Gould in *Science* for July 31, 1903.

JACOBSEN, yä'kŏb-sen, Jens Peter (1847–85). A Danish novelist, born at Thisted in Jutland. He first became known as a botanist and as a translator of Darwin. In 1872 he published his novel *Mogens* (republished in a collection, 1882), followed by *Et Skudd i Taagen* (1875), and then *Fru Marie Grubbe* (1876), a fine study of seventeenth-century life. *Niels Lyhne* (1880) is modern, skeptical, and realistic. His last book was *Mogens og andre Noveller* (1882). The mixture of philosophy, science, and powerful imagination in his novels has made Jacobsen a favorite and influential writer. He created a new prose style for his native tongue. Consult: his *Letters*, edited by Georg Brandes (2d ed., Leipzig, 1899); Vilhelm Anderson, "Jens Peter Jacobsen," in his *Litteraturbilleder*, part ii (Copenhagen, 1907); Johannes Mayerhofer, "Jens Peter Jacobsen: sein Leben und seine Werke," in *Frankfurter Zeitgemässe Broschüren*, vol. xxxiii (Hamm, 1914).

JACOBSEN, Johan Adrian (1853–). A Norwegian traveler and ethnographical collector, born in Risö, near Tromsö. From 1867 to 1874 he sailed on a whaling ship along the Finmarken, Spitzbergen, and Murman coasts; in 1876–77 he visited Valparaiso and Patagonia; and for several years, while representative of Karl Hagenbeck of Hamburg, he traveled in the Arctic regions and returned with reindeer, families of Lapps and Eskimo, and various objects of interest. Between 1881 and 1888, for the Museum für Völkerkunde in Berlin, he traveled along the coast of America from Mexico to Bering Strait; through Siberia, Sakhalin, Korea, Japan, Borneo, Celebes, and Timor. In all he collected for the Berlin museum alone 18,000 ethnographical specimens. In 1889 he made collections in Germany, and in 1892 in Norway for the museum at Bergen. At the Chicago Exposition (1893) he exhibited collections from 25 non-European races. These became the foundation of the Field Columbian Museum in Chicago. His costly private collections he donated (1908) to the Ethnographical Museum in Christiania, Norway. He wrote *Reise an der nordwestküste Amerikas* (1884), *Eventyrlige farter* (1894), and *Reise in der inselwelt des Banda-Meeres* (1896).

JA'COB'S LADDER. 1. A ladder, reaching from earth to heaven, seen in a vision by Jacob (Gen. xxviii. 12). 2. On shipboard, a short rope ladder with iron or wooden rungs, to give easy access to the lower rigging, tops, etc. It is also the name of an apparatus for raising light weights a considerable height. One form, much used in breweries and distilleries, is an endless revolving chain of buckets, filling themselves at the bottom of the chain and emptying themselves at the top.

JA'COBSON, John Christian (1795–1870). A Danish-American Moravian bishop and educator, born in Burkall, Denmark. After completing his education at the German Moravian College, he came to the United States, at the age of 21, and occupied various positions till he became principal of the female seminary at Salem, N. C., in 1834. The academy grew and flourished under his control, but he left it to superintend a boys' boarding school in Nazareth, Pa., and to take the leadership of the Northern Moravian church, which made him a bishop in 1854. He retired three years before his death.

JACOB'S STAFF. 1. A kind of staff carried by pilgrims to the tomb of the Apostle James the Elder. The term is also applied to a dagger or sword concealed in a staff of this kind. 2. The three stars in a straight line in the Girdle of Orion. 3. Any stick used as a temporary mount for an instrument in preliminary surveys.

JACOB'S STONE, or **JACOB'S PILLOW.** The Stone of Scone, said to have served Jacob as a pillow when he had the vision of the ladder reaching into heaven. The stone is now preserved in the coronation chair (q.v.) of England.

JACOB'S WELL. The scene of the conversation of Jesus with the woman of Samaria. The well is near Nablus, in Syria, and is said to have been hewn in the rock by Jacob. A church built over the well is mentioned in the fourth century, but was destroyed during the period of the Crusades.

JACOB TOME INSTITUTE. An institution of secondary education at Port Deposit, Md., founded by Jacob Tome and opened in 1894. It comprises a kindergarten and junior school for boys and girls, a high school for girls, and a boarding school for boys, including two years of grammar school and four years of high school. It prepares for college, technical schools, professional schools, and business. Residents of Maryland are exempt from the annual tuition fee of $100. There are 20 buildings in a campus of over 160 acres. The library contains 10,000 volumes. The endowment exceeds $2,000,000, and the grounds and buildings of the institute have cost over $900,000.

JACO'BUS. A current but not official name for an English gold coin of the reign of James I (Lat. *Jacobus*), originally in 1603 valued at 20 shillings. The issue of a lighter sovereign of this denomination in 1604 increased the value of the Jacobus to 22 shillings, while in 1612 the value of the new coin was made 22 shillings, and the early coin rose to 24.

JACOBUS, Melancthon Williams (1816–76). An American Presbyterian minister and author, born at Newark, N. J. In 1834 he graduated from Princeton College and four years later from Princeton Seminary, where he was instructor in Hebrew for the year preceding his acceptance of the pastorate of the First Presbyterian Church in Brooklyn, N. Y. (1839). While absent in the Holy Land (1850–51), he was elected professor of Oriental and biblical literature in the Western Theological Seminary at Allegheny, Pa. This chair he held from 1852 until his death. He was pastor of the Central Presbyterian Church, Pittsburgh, Pa., from 1858 to 1870. In 1869 he was moderator of the last

General Assembly of the old-school branch of his church, and in 1870 presided, conjointly with Dr. Philemon H. Fowler, at the opening of the first Assembly of the reunited church He was secretary of the Sustentation Committee of the Presbyterian church from 1871 to 1874 and received the degrees of D.D. from Jefferson College, Pennsylvania (1852), and LL.D. from Princeton (1867). He published: *Notes on the New Testament* (4 vols., 1848–59); an *Address to the Churches* (1861); *Genesis* (2 vols., 1864–65); *Exodus* (shortly before his death).

JACOBUS, Melancthon Williams (1855–). An American theologian, born at Allegheny City, Pa., a son of the preceding. He graduated at Princeton in 1877, at Princeton Theological Seminary in 1881, from 1881 to 1884 studied at the universities of Göttingen and Berlin, and from 1884 to 1891 was pastor of the Presbyterian Church at Oxford, Pa. In 1891 he was appointed to the chair of New Testament exegesis and criticism in Hartford Theological Seminary (Congregational). He also served as acting president of the seminary in 1902–03 and as dean of the faculty after 1903. At Princeton Seminary he was Stone lecturer (1897–98) and at Mount Holyoke College lecturer on the New Testament (1901, 1903–04). In 1899–1900 he was acting pastor of the Centre Congregational Church at Hartford. The degree of D.D. was conferred on him by Lafayette College (1892) and Yale University (1910). His Stone lectures were published (1900) as *A Problem in New Testament Criticism.* He had charge of the New Testament department of the New International Encyclopædia, was chairman of the editorial board of the *Standard Bible Dictionary* (1909), edited an English translation of Zahn's *New Testament Introduction* (1909), and prepared a *Commentary on the Gospel of Mark,* for "The Bible for Home and School Series" (1914).

JACOBUS BAR'ADÆ'US. See Jacobites.

JACO'BUS DE BENEDIC'TIS. See Jacopone da Todi.

JACO'BUS DE VORAG'INE (c.1230–c.1298). An Italian writer, Archbishop of Geneva, and author of the celebrated Golden Legend (q.v.).

JACO'BY, Harold (1865–). An American astronomer, born in New York City. In 1885 he graduated at Columbia University, where he served as assistant, instructor, and adjunct professor from 1888 to 1904. He was appointed professor in 1904 and director of the observatory in 1906. In 1889–90 he was assistant astronomer on the United States eclipse expedition to West Africa in the United States steamship *Pensacola.* He became also a councilor of the New York Academy of Sciences, treasurer of the American Mathematical Society, editor of the *Transactions* of that society, and fellow of the Royal Astronomical Society of London. His technical papers on astronomical photography, star clusters, parallaxes, and other subjects appeared in the publications of the New York Academy of Sciences, the Academy of St. Petersburg, the Académie des Sciences of Paris, the Academy of Helsingfors, and the Royal Astronomical Society of London. He published *Practical Talks by an Astronomer* (1902), a collection of interesting essays, written in untechnical style, on "Navigation at Sea," "Galileo," "Photography in Astronomy," "The Moon Hoax," and other special topics. The department of astronomy in the first edition of the New International Encyclopædia was edited by him. He is also author of *Astronomy: A Popular Handbook* (1913).

JACOBY, yä-kō'bē, Johann (1805–77). A German politician, born in Königsberg, Prussia, of Jewish parents. He studied at Königsberg and Heidelberg, became a practicing physician at Königsberg in 1830, and wrote numerous pamphlets on questions of the time. His *Vier Fragen* (1841), in justification of the demand for a Prussian constitution, brought upon him accusation of high treason and a sentence to two and a half years' imprisonment, but in 1843 he was released and almost immediately came into conflict with the censor again. In 1848 he was elected to the Vorparlament of Frankfort as a reform member, and to the National Assembly of Prussia, where by his incisive speeches he identified himself with the Left. He was elected to the German National Assembly in 1849, took part in the Rump Parliament, and again was accused of high treason against the King personally. In 1863 he became a member of the Prussian Lower House, and both there and in the *Zukunft* journal, established by him, was an increasingly violent opponent of the government. He even styled German unity the death of freedom. In 1864 and again in 1870 he was sentenced to imprisonment. He retired from political life in 1871. His publications include a biography of Heinrich Simon (1865) and his *Gesammelte Schriften und Reden* (1872; an additional volume, 1877). *Der Geist der griechischen Geschichte* was published under the editorial supervision of F. Röhl in 1884.

JACOPO DA PONTE, yä'kō-pō dä pōn'tā. An Italian painter commonly known by the title Jacopo Bassano. See Bassano.

JACOPO DEI BARBARI, dā'ē bär'bä-rē (c.1440–50–c.1515). An Italian painter and engraver, called also the 'Master of the Caduceus' from the sign on his plates, and by contemporary Germans Jacob Walch. He was one of a family of painters and was brought up and worked in Venice, where he was probably a pupil of Bartolommeo Vivarini. About 1490 he went to Nuremberg and remained there for several years, exercising a strong influence upon Dürer and Hans von Kulmbach. By 1500 he was back in Venice, for at this time he executed a large bird's-eye view of the city, engraved on wood. From 1505 to 1510 he was active in various cities of Germany, as court painter to Emperor Maximilian, then in the service of Count Philip of Burgundy, and finally (1510) he became valet de chambre and court painter to the Regent Margaret of the Netherlands. He is mentioned as dead in 1516. There has been much discussion about the life and works of this artist. He was one of the first to engrave on metal and left 30 plates, of which some are of mythological and some of religious subjects. His paintings are of less importance, and he is also said to have been a sculptor. The interest of Barbari is largely on account of the curious union in him of the German and Venetian styles of art, most uncommon at that date. Consult the monographs by Galichon (Paris, 1861) and Ephrussi (ib., 1876). Reproductions of all his engravings and woodcuts are given in the admirable folio edited by Kristeller for the International Chalcographical Society (Berlin, 1896).

JACOPO DELLA QUERCIA. See Quercia, Jacopo della.

JACOPONE DA TODI, yä'kō-pō'nā dä tō'dē, JACOBUS DE BENEDICTIS (c.1230–1306). An Italian mystic and poet. He was born at Todi in Umbria, was a lawyer and successful in his profession. The sudden death of his wife, about 1268, wrought a complete change in his life. He abandoned his profession, distributed his goods among the poor, and sought the world's scorn by his strange behavior. At the same time he vigorously denounced the corruptions of the times and the ambitions of the lofty. After 10 years of penance he became a Franciscan monk, expressing his humility by remaining a lay brother. He joined the opponents of Boniface VIII, was captured at Palestrina in 1298, and kept in prison till the Pope's death in 1303. He died at Collazzone on Christmas night, 1306. Jacopone's poetry was most of it written in the Umbrian dialect. His hymns are characteristic of his time, full of the fervor and the same exalted enthusiasm which are to be found in those of St. Francis of Assisi. The hymn "Stabat Mater Dolorosa" is generally attributed to Jacopone, perhaps incorrectly. Consult: Sorio, *Poesie scelte di Fra Jacopone da Todi* (Verona, 1859); D'Ancona, "Jacopone da Todi, il giullare di Dio del secolo XIII," in *Studi sulla letteratura italiana de' primi secoli* (Ancona, 1884); Gebhart, *L'Italie mystique* (Paris, 1890); Macdonnell, *Sons of Francis* (London, 1902); Bruguali, *Fra Jacopone da Todi* (Assisi, 1907). He is the hero of a novel by Dorsey, *The Mad Penitent of Todi* (Notre Dame, Ind., n. d.).

JACOTOT, zhä'kō'tō', JEAN JOSEPH (1770–1841). The originator of a 'universal' method in education, born at Dijon, France, in 1770. He turned his attention at first to philology and, after having studied that subject for some time, became a teacher of the classic languages in his native town. Subsequently he took up the study of law and became an attorney. In 1792 he entered the army and rose to the rank of captain of artillery; he was then made secretary to the Minister of War, and finally a substitute director and professor of mathematics at the Polytechnic School in Paris. In 1815 he went to Brussels and three years later accepted the position of professor of French language and literature at the University of Louvain. In 1827 he became a director of the advanced military school in that city. He returned to France in 1830 and died in Paris.

His system of universal instruction was empirical, propounded in general rules which are unintelligible without his own explanation. It consists in directing the student's exertion to particular subjects, encouraging and exciting him in every possible manner to make use of his mental powers. The teacher is not to become an expounder, but, after setting the student on the right track, is to leave him to explain away his own difficulties. His ideas were an outgrowth of his own intellectual development and of his experience at Louvain, where he, though French and understanding no Flemish, taught the Flemish boys by books having French and Flemish in parallel columns, largely through one book, the *Télémaque*. There he saw that the pupils learned, though he did not teach them. This plan was applied to other subjects, with the idea that one could teach all subjects, even those of which he might have no knowledge himself. There were four steps insisted upon in the process of learning: first, learn; second, repeat; third, reflect; fourth, verify. His famous maxims, "Pupils must learn something and refer to that all the rest" and "All is in all," meant that all things in nature are united in one great whole, the knowledge of which may be acquired through any of its parts. His ideas are empirical approaches to the ideas of concentration, interest, etc., of Herbart, though expressed in exaggerated or paradoxical form. His method of language teaching is quite similar to the popular plans of Hamilton and of Ollendorf.

Jacotot expounded his ideas in *Enseignement universel* (1822) and in the *Journal de l'Emancipation Intellectuelle.* Others of his works are *Musique, dessin et peinture* (1824) and *Mathématiques* (1828). For his life and works, consult his English disciple Payne, *Lectures on the History of Education* (London, 1892), and Quick, *Educational Reformers* (New York, 1907).

JACQUARD, zhä'kär', JOSEPH MARIE (1752–1834). A French inventor, born at Lyons. He was the son of a weaver and at first followed his father's trade, but afterward was a bookbinder and typesetter. Still later, after the death of his father, he began experimenting with looms and lost his small inheritance (1772). In 1793 he fought in the Army of the Rhine, on the Rhone and Loire, and then went back to Lyons, where he completed his invention, known as the Jacquard loom, for which he was awarded a bronze medal at the Industrial Exposition of 1801. He continued to improve his loom despite the hostility of the Lyons silk weavers, who feared that his labor-saving device would throw them out of employment. In 1806 his invention was bought by the state and declared public property. Jacquard was rewarded with a pension and a royalty on each loom, and in 1840 a statue of him was erected at Lyons. See LOOM, for an account of his invention.

JACQUE, zhäk, CHARLES EMILE (1813–94). A French animal and landscape painter and etcher, one of the most eminent of the nineteenth century. He was born in Paris, was apprenticed to an engraver at 17, then worked in Antwerp and for two years in London, where he designed wood engravings, illustrating Shakespeare and a *History of Greece.* Returning to France, he joined the Barbizon group and became known as its great sheep painter, just as Troyon was its painter of cattle. Another favorite subject was poultry yards, on which he himself wrote a book entitled *Le poulailler* (1869). In 1867 he was decorated with the cross of the Legion of Honor and in 1889 received the Grand Prix for etching and a gold medal at the universal exposition of the same year for his paintings. His canvases, small in size, are big in conception, conscientious and virile in execution, and show mastery of landscape, especially the sky. But he is even more important as an etcher, by reason of his powerful influence upon the development of the art in France. His technique is well-nigh faultless in its delicate yet vigorous line, its mastery of chiaroscuro, and its harmonious tonal effects. In this medium the scope of his art was wider, including admirable landscapes and peasant subjects. Under the influence of Millet, whose most intimate friend he was, his art, which at first inclined to prettiness, became increasingly virile. His painting is represented in the Louvre by an imposing "Flock of Sheep" in the midst of a firm landscape and by three other examples;

in many French provincial collections; and in the Metropolitan Museum, New York, by four sheep subjects, including one in the Vanderbilt collection.

JACQUELINE, zhȧk'lēn'. The name given to grotesque mugs, in the shape of a woman seated, first made in Desvres, France, and later in Holland, Germany, and England.

JACQUEMART, zhȧk'mär', Henri Alfred Marie (1824–95). A French sculptor, born in Paris. He studied painting there under Paul Delaroche, but forsook it for sculpture, which he studied with Klagmann. He exhibited animal groups at the Salon from 1847 to 1879. His most important works are the equestrian bas-relief of Louis XII at Compiègne, the bronze statue of Mehemet Ali in Alexandria, the four colossal lions upon the bridge in Cairo, two griffins at the Fountain of Saint-Michel, Paris, and the statue of Mariette Bey at Boulogne-sur-Mer. He received the decoration of the Legion of Honor (1870).

JACQUEMART, Jules Ferdinand (1837–80). A French etcher, born in Paris. While he painted at least 110 water colors, of which three—"Japanese Art Objects," "Landscape near Nice," and "Flowers"—are in the Metropolitan Museum, New York, his reputation depends upon his etchings, the best of which were published in the *Gazette des Beaux-Arts.* The same magazine also reproduced many of his wood engravings and pen drawings. He was, first of all, an illustrative artist, etching 27 plates for the *Histoire de la porcelaine* (Paris, 1862) by his father, Albert Jacquemart; 12 plates for his father's *Histoire de la céramique* (ib., 1873); the series of 47 plates published by Techener (ib., 1864) under the title *Histoire de la bibliophile;* 60 for Barbet de Jouy's *Les gemmes et joyaux de la couronne* (ib., 1868); 88 for Loubat's *Medallic History of the United States of America* (New York, 1878), reproducing many medal portraits of famous Americans, among them George Washington, Horatio Gates, Anthony Wayne, Benjamin Franklin, John Paul Jones. Among the many famous paintings etched by Jacquemart were 12 owned by the Metropolitan Museum (London, 1871). He was one of the founders of the Société des Aquarellistes (Water Color Society), and almost from the moment he made his début in 1859 enjoyed an immense reputation. His etchings rank high as finished works of art, but lack boldness and strength. For a descriptive list of 395 of his etchings, with biographical and critical notes and many illustrations, consult Louis Gonse, "Jules Jacquemart," in *Gazette des Beaux-Arts* (Paris, 1875, 1876, 1880, 1881).

JACQUEMEL. See Jacmel.

JACQUEMINOT, zhȧk'mē'nō', Jean François, Viscount (1787–1865). A French general. He was born at Nancy, studied at the Ecole Militaire, entered the army in 1803 and, rising to the grade of colonel, distinguished himself at Austerlitz, Essling, Wagram, and the Beresina. When Napoleon returned from Elba, Jacqueminot was made commander of lancers. He made a brilliant charge at Quatre Bras and after Waterloo refused transfer to the service of the Bourbons, was imprisoned for a month, and after his release established at Bar-le-Duc a great silk factory, which gave employment to many of the veterans of the Republic. Elected to the House of Deputies in 1827, he joined in the protest of the Two Hundred and Twenty-one against Polignac, and with Pajol directed the Rambouillet expedition which led Charles X to leave France. In 1842 he succeeded Chaud as commander of the National Guards of the Seine. Louis Philippe made him Viscount in 1846. His indecision at the head of the Guards made possible the revolution of 1848, and he was retired in that year.

JACQUEMONT, zhȧk'môN', Victor (1801–32). A French traveler and botanist, born in Paris. He traveled in the West Indies in 1826 and two years later was appointed by the authorities of the Royal Gardens to undertake a voyage of exploration in India. After several delays caused by an insufficient outfit, he crossed the Himalayas, explored a portion of Tibet, and reached Chinese Tartary. He brought back many specimens of new plants. Shortly after his return he died in Bombay. Guizot edited his scholarly and entertaining *Voyage dans l'Inde* (1836–44), which contains much information on a variety of subjects. His *Correspondance* (1833) is particularly interesting from his gift for observation and the easy, familiar style in which he wrote.

JACQUERIE, zhȧ'krē' (from *Jacques Bonhomme,* the common epithet bestowed by the nobles in derision on the French peasant). The name given to the insurgent peasants in France in the middle of the fourteenth century, in the reign of John the Good. The insurrection of the Jacquerie broke out in the year 1358, when the French King was a prisoner in England and France in a state of the greatest disorder and anarchy as a result of the invasions by the armies of Edward III. The immediate occasion of it was a collision between adherents of some nobles and the peasants in the month of May in the neighborhood of Beauvais; but it was really caused by long-continued oppression on the part of the nobles. Suddenly rising against their lords, the peasants laid many castles in ruins, murdered some nobles, and pillaged the country—acting, as they said, on the principle of doing as had been done to them. For some days the region of the lower Marne and the Oise was entirely at their mercy, and the peasants were joined by the bourgeoisie in some of the towns; but the magnitude of the danger induced the quarrelsome nobles to make common cause against them, and on June 10 the peasants were defeated with great slaughter near Meaux by Charles the Bad of Navarre. This put an end to the insurrection. But the nobles took a terrible revenge, burning the villages and killing the peasants. In two weeks 20,000 are said to have been murdered. Froissart, who had no sympathy for the peasants, undoubtedly drew too dark a picture of the atrocities committed by the Jacquerie, while minimizing the sanguinary vengeance exacted by the nobles. Consult Flammermont, in the *Revue Historique,* vol. ix (Paris, 1879), and Luce, *Histoire de la Jacquerie* (ib., 1895).

JACQUES DE CUJAS. See Cujacius.

JACQUES OF VITRY. See Jacob of Vitry.

JACQUIN, zhȧ'kăN', Nikolaus Joseph, Baron (1727–1817). An Austrian botanist, born at Leyden. He studied medicine in his native city and in Paris and afterward went to Vienna, where he made a catalogue of the plants in the garden at Schönbrunn for Emperor Francis I. From 1755 to 1759 he traveled in South America. Some years after his return

he became professor of botany and chemistry at the University of Vienna. He was ennobled in 1774. Some of the more important of his works are: *Hortus Botanicus Vindobonensis* (1770–76); *Flora Austriaca* (1773–78); *Icones Plantarum Rariorum* (1781–93); *Plantarum Rariorum Horti Cæsarei Schönbrunnensis* (1797–1804).—His son, FRANZ JOSEPH (1767–1839), was also a botanist.

JAC'TITA'TION (ML. *jactitatio*, from Lat. *jactitare*, to utter, frequentative of *jactare*, to agitate, discuss, frequentative of *jacere*, to throw; connected with Gk. *láπτειν*, *iaptein*, to throw). The legal offense of falsely and maliciously asserting a legal claim or right to the detriment of another. The offense is not generally dealt with by the law as a crime, nor does it come within the class of wrongs, denominated torts, which are remediable by an action for damages, but it may by appropriate process be suppressed, and the rights of the injured party established by a decree. In English law the offense is cognizable only by the ecclesiastical courts and by the Probate, Divorce, and Admiralty Division of the High Court of Justice, and is confined to the false assertion of a right to tithes and to a seat in a church and to the false claim of marriage to another. In the last-named case the process is called *jactitation of marriage*. The action is of rare occurrence in England, but is more common in Scotland. It has never existed in the United States. Consult Sir William Blackstone, *Commentaries on the Laws of England* (4th ed., 2 vols., Chicago, 1899).

JACUARU, jä-kōō'ä-rōō. A Brazilian lizard. See TEJU.

JADASSOHN, yä'dä-sōn, SALOMON (1831–1902). A German musical composer and theorist, born at Breslau. He studied the pianoforte under Hesse and Liszt, the violin under Lüstner, and in 1848 entered the conservatory at Leipzig, in which institution he subsequently (1871) became professor of harmony, pianoforte composition, and counterpoint. He studied under Liszt in 1849, but his career as a teacher dates from 1852, after a course of private study under Hauptmann. His various works on the science of music have continued to be used as textbooks throughout the world. He is the composer of about 150 works in nearly every musical form, all written in faultless style. Although he will be remembered as a great theorist rather than as a great composer, many of his compositions bear evidences of permanent value. He was appointed conductor of the Psalterion Choral Society in 1866, and from 1867 to 1869 was kapellmeister of the Euterpe organization. Among his textbooks the following are noteworthy: *Harmonielehre* (Leipzig, 1883; Eng. trans., New York, 1893); *Kontrapunkt* (Leipzig, 1884); *Kanon und Fuge* (ib., 1884); *Lehrbuch der Instrumentation* (ib., 1889) (the above have also been translated into English at Leipzig); *Elementar-Harmonielehre* (ib., 1895).

JADE (Fr., Sp. *jade*, from Sp. *yjada*, *ijada*, side, from Lat. *ilium*, flank, groin; ultimately connected with Gk. *εἴλειν*, *eilein*, Lat. *volvere*). A name applied to various tough, compact minerals of the pyroxene and amphibole groups, chiefly jadeite and nephrite, of a white to dark-green color. These minerals were used by primitive man for utensils and ornaments, and among the Chinese they are highly prized as material for vases and other carved objects, which now are frequently seen in museums and art collections in Europe and America. Specimens of jade have been found among the remains of the lake dwellers of Switzerland, at various points in France, and in Mexico, Greece, Egypt, and Asia Minor. The chalchihuitl (q.v.) of the early Mexicans has been supposed by some to have been jade, but the present belief is that this name refers to the turquoise found in the mines in New Mexico. Consult H. R. Bishop, *The Bishop Collection, Investigations, and Studies in Jade* (2 vols., New York, 1906).

JADE, yä'de, or **JAHDE**. An inlet of the North Sea in the Grand Duchy of Oldenburg (Map: Germany, C 2). It owes its origin to coastal sinking combined with storm floods between 1218–1511. It is about 10 miles in diameter, and the greater part is shallow, with exposed mud flats at low tide; but at the narrow inlet it is deep enough for the largest men-of-war, and here a small territory a little over a mile in extent was acquired by the Prussian government from Oldenburg in 1854. On it was built the fortified port and naval station of Wilhelmshaven (q.v.).

JADLOWKER, yät-lōf'kĕr, HERMAN (1879–). A Russian tenor, born in Riga. In order to escape from a commercial career into which his father wished to force him, he ran away from home as a lad of 15 and finally went to Vienna, where he studied singing with Gänsbacher. In 1899 he made his début at Cologne in Kreutzer's *Nachtlager von Granada*. He then secured engagements in Stettin and Karlsruhe. Here Emperor William heard him and was so impressed that he offered him a five-year contract at the Royal Opera in Berlin. From there he went to Vienna. In 1910 he appeared at the Metropolitan Opera House, where he was one of the most versatile and reliable artists. In 1912 he returned to Berlin.

JADWIGA, yät'vê-gà. See HEDWIG.

JAD'WIN, EDGAR (1865–). An American military engineer, born at Honesdale, Wayne Co., Pa. He studied at Lafayette College in 1884–86 and graduated from the United States Military Academy at the head of his class in 1890. He was in local charge of the enlargement of Ellis Island, New York harbor (1890–91); was on duty with engineer troops and at the United States Engineer School (1891–95); and between 1893 and 1902, except during the Spanish-American War, was an assistant on government engineering works in connection with rivers, harbors, and fortifications. In the Spanish-American War he served as major and later as lieutenant colonel, Third Regiment U. S. V. Engineers, and was in command of the detached Third Battalion of the regiment at Matanzas, Cuba. From 1902 to 1907 Colonel Jadwin was in charge of river, harbor, and fortification work, first on the Pacific coast south of San Francisco and later on the Texas Gulf coast, having charge of the construction of the sea wall at Galveston. From 1907 to 1911 he worked on the Panama Canal, at first in the Chagres division; later he was in charge of breakwater construction at Colon, of the excavation of the sea-level canal from the Atlantic Ocean to Gatun, and of the rock and sand supply for the Gatun locks and spillway. He was promoted to a lieutenant-colonelcy in 1913. He contributed articles on military engineering to the first and second editions of the NEW INTERNATIONAL ENCYCLOPÆDIA.

JAEGER. See JÄGER.

JAEGER, or JÄGER, GULL. See SKUA.

JAEGERS, jā'gĕrz, ALBERT (1868–). An American sculptor. He was born in Elberfeld, Germany, came to America as a boy, and was self-taught in his art. He was represented at the Buffalo and St. Louis expositions and modeled statues for the new customhouse, New York, and the Fine Arts Building, St. Louis. He also executed a number of cleverly composed reliefs and fine portrait busts and won frequent competitions, including that for the Baron von Steuben Monument in Washington. A replica of the latter was presented by Congress to the German Emperor, who thereupon decorated Jaegers. He became a member of the National Sculpture Society.

JAÉN, hȧ-ān'. A former kingdom in Andalusia, south Spain, now the Province of Jaén, which includes a somewhat larger area (5205 square miles) than the old kingdom (Map: Spain, D 4). It is bounded by New Castile on the north, Murcia on the east, Granada on the south, and Cordova on the west. It lies in the upper basin of the Guadalquivir. The northern part is traversed by the Sierra Morena, now deforested and almost barren, while in the south and east are the rugged, lofty, and well-forested Sierras de Segura and Cazorla. The mineral wealth, especially of the northern mountains, is considerable, including lead, iron, copper, zinc, and salt. Though iron ore is plentiful, argentiferous lead is the only metal extensively mined, the production amounting to over 80,000 tons of ore annually. Agriculture is confined to the valley of the Guadalquivir; cereals and olives are grown; other industries are unimportant. The population of the province in 1900 was 474,490 and in 1910, 526,718. The largest city is Linares, and the capital is Jaén.

The Moorish Kingdom of Jaén arose in the eleventh century at the time of the dissolution of the Caliphate of Cordova. It was short-lived and of little importance. The region was conquered by Castile early in the fourteenth century.

JAÉN. The capital of the province of the same name, Spain, situated in the valley of the Guadalquivir, at the foot of Mount Jabalcuz, 58 miles east of Cordova and on a branch of the railroad between Madrid, Cordova, and Seville (Map: Spain, D 4). It is surrounded by the remains of old Moorish walls, with numerous towers and pinnacles. There are several old Gothic churches, a cathedral, and a few interesting remains of its heyday as a Moorish capital; the only really handsome buildings of the town, however, are among its private palaces, e.g., those of the counts of El Villar del Prado and of the Suárez family. The town has a high school or institute containing extensive art galleries and a fine library; it has also a theatre and a bull ring. In the neighborhood are the sulphur springs and baths of Jabalcuz. Pop., 1900, 25,566; 1910, 26,894.

JAFFA, yäf'fȧ (Ar. *Yafa*). A seaport town of Syria, Asiatic Turkey, situated in the Sanjak of Jerusalem, on a rocky coast, 35 miles northwest of Jerusalem, of which it is the port and with which it is connected by a railway line 54 miles long (Map: Palestine, B 3). It is irregularly built and possesses few points of interest. Its mosques and monasteries are of slight architectural merit, and its harbor is far from safe. The coast is skirted by a dangerous reef, through which the entrance is exceedingly narrow. In stormy weather it is often impossible to land for days at a time. As the port of Jerusalem, however, Jaffa is not without commercial value, and its importance is increasing with the development of the surrounding region. The chief exports of Jaffa are soap, fruits, wine, oil, and sesame, while the imports consist chiefly of cotton goods, rice, sugar, petroleum, tobacco, lumber, etc. The oranges of Jaffa are justly reputed the finest in the world. Jaffa is the seat of many consular agencies, including one from the United States. In the city is a German colony founded by the Friends of the Temple (q.v.); another templar colony is at Sarona, about 1 mile northeast of the city. In the vicinity of Jaffa is a Jewish colony of the Alliance Israélite, with a school of agriculture. There are several missionary hospitals and schools. The population is estimated at over 45,000, mostly Mohammedans, but it includes a colony of some 8000 Jews. See JOPPA.

JAFFÉ, yäf'fȧ, PHILIPP (1819–70). A German historian, born at Schwersenz in Posen and educated at Berlin under Ranke. He became an active editor of the *Monumenta Germaniæ Historica* and published *Geschichte des deutschen Reichs unter Konrad III.* (1845) and the very valuable *Regesta Pontificum Romanorum* (2d ed., 1881–86). Dissatisfied with his academic advancement, he took up the study of medicine. After passing his examination in medicine, he returned to his former scientific studies. His excellent contributions to the *Monumenta* were broken off in 1863, a year after his appointment to a chair in Berlin, by a quarrel with Pertz. He became a Christian in 1868, lost many of his earlier friends, and committed suicide at Wittenberg. His most important work was the *Bibliotheca Rerum Germanicarum* (1864–73).

JAFFNA, jäf'nȧ, or **JAFFNAPATAM,** jäf'-nȧ-pȧ-täm'. A fortified town situated on an island of the same name, lying off the northern coast of Ceylon, of which it is an administrative dependency, and from which it is separated by a narrow strait (Map: India, D 8). It has an old fort erected during the Portuguese occupation, a few interesting temples, and an old Dutch church. The natives engage in considerable trade in tobacco and Palmyra timber. Jaffna is identified with the Galiba of Ptolemy. Pop. (largely native), 1900, 33,860; 1911, 40,539.

JAFFRAY, jăf'rȧ, ROBERT (1832–1914). A Canadian legislator and capitalist. He was born near Bannockburn, Scotland, early engaged in business in Edinburgh, and went to Toronto, Ontario, in 1852. For 31 years he was in the grocery trade and afterward in a large number of financial, railway, insurance, and industrial undertakings, becoming president of, or director in, many corporations, including the Globe Printing Company. He was a Liberal in politics and in 1906 was appointed a member of the Dominion Senate. While not prominent in politics in the common acceptation of the term, he was the trusted adviser of Liberal leaders and by personal integrity and farsighted views exerted a strong influence upon their policy and legislation.

JAGANNATH, jŭg'ȧ-nät, **PURI,** pōō'rê, or JUGGERNAUT (Skt. *Jagannātha*, lord of the world, from *jagat*, world, going, pres. p. of *gam*,

to go + *nātha*, lord, from *nāth*, to seek help). 1. The name of a town on the coast of Orissa, Bengal, in lat. 19° 48′ N., long. 85° 50′ E., Puri being now the official name (Map: India, F 5). It is celebrated as one of the chief places of pilgrimage in India. For many centuries the Golden Tooth of the Buddha was preserved at Puri, but it owes its reputation now to a temple erected there in honor of Vishnu, under his aspect as Jagannath. 2. The deity of Jagannath is essentially a god of all people, and this fact, combined with the peculiarly attractive nature of Krishna, also an incarnation of Vishnu, is the chief cause for the reverence paid him. It seems probable that the "lord of the world" was originally a local godling of non-Indian origin, who was absorbed into the Vishnuitic form of Hinduism, which holds sway especially in eastern India. Jagannath has a magnificent temple in Puri and is exposed to view three days each year. On the first of these days (the *Suan jattra*, or bathing procession) the god is publicly bathed. Ten days later, on the *Rath jattra*, or car festival, he is drawn on an enormous and floridly ornate car to some neighboring temple, whence he returns in somewhat diminished pomp after a week. The fact that in the press and excitement of the enthusiastic multitude fatalities occasionally occur has given rise to the erroneous popular idea that devotees seek to be crushed to death beneath the car. Consult: Sir William Hunter, *Orissa* (London, 1872); Wilkins, *Modern Hinduism* (ib., 1887); *The Imperial Gazetteer of India*, under "Puri," vol. xx (Oxford, 1908); James Fergusson, *History of Indian and Eastern Architecture* (2 vols., London, 1910).

JAGELLONS, yá-gĕl'lonz. The name of an illustrious dynasty which reigned in Lithuania, Poland, Hungary, and Bohemia. This name is derived from Jagello or Jagellon, the last of a long line of hereditary grand dukes of Lithuania, who succeeded to his patrimonial possessions in 1381. Jagello in 1386 married Hedvig, daughter of Louis the Great, King of Poland and Hungary, who had succeeded her father on the Polish throne, and he was recognized as King by the Poles. He embraced Christianity and is known as Ladislas (Wladislaw) II of Poland. He died in 1434.—His son, LADISLAS III (q.v.), King of Poland (1434–44), was also elected King of Hungary after the death of Albert of Austria, in 1440, mainly through the agency of John Hunyady. He was succeeded in Poland by his brother, CASIMIR (1444–92), whose three sons, JOHN ALBERT (1492–1501), ALEXANDER (1501–06), and SIGISMUND I (1506–48), reigned in succession.—SIGISMUND II AUGUSTUS (1548–72), the son of this last and one of the wisest of the Polish monarchs, added Livonia to his kingdom. With him the male line of the Jagellons ended, but through his sisters descendants of the Jagellons ruled from 1587 to 1668.—LADISLAS, the son of Casimir IV of Poland, was elected King of Bohemia in 1471, on the death of George Podiebrad, and also succeeded Matthias Corvinus in Hungary in 1490. Ladislas died in 1516 and was succeeded in both kingdoms by his son, LOUIS II, who was defeated and slain by the Turks at Mohacs (Aug. 29, 1526), and with whom terminated the male line of the Jagellons of Bohemia and Hungary. His sister ANNA married Ferdinand I. See POLAND. Consult Roepell and Caro, *Geschichte Polens* (Hamburg, 1840), and Andrássy, *Development of Hungarian Constitutional Liberty* (Eng. trans., London, 1908).

JAGEMANN, yä'ge-mân, CHRISTIAN JOSEPH (1735–1804). A German scholar, born at Dingelstedt. After two years in Denmark, he spent several years in Italy, where he studied Italian literature. In 1774 the Elector of Mainz made him director of the Catholic Gymnasium of Erfurt, and afterward he was appointed private librarian of the Duchess Anna Amalie at Weimar, where he became a Protestant and married. His principal works were *Geschichte der freien Künste und Wissenschaften in Italien*, a revision of Tiraboschi's *Storia della letteratura italiana* (1777–81), and *Magazin der italienischen Litteratur und Künste* (1780–85), in which his translation of Dante's *Inferno*, in unrhymed iambic pentameter, appeared. His four-volume Italian-German and German-Italian dictionary appeared in 1790–91.

JÄGER, yā'gĕr, GUSTAV (1832–). A German naturalist and hygienist, born at Bürg in Württemberg. He studied at the Theological Seminary of Urach, at the Stuttgart Polytechnic, and at the Tübingen Hochschule. For about 10 years he was a teacher of zoölogy in Vienna. From that time until 1884, when he began to practice medicine, he was a director of zoölogical gardens or a teacher in various German schools. He wrote a number of books on natural science, but his fame rests chiefly on his advocacy of the use of none but wool clothing. His publications include: *Die Darwinische Theorie und ihre Stellung zu Moral und Religion* (1869); *Lehrbuch der allgemeinen Zoologie* (vol. i, 1871; vol. ii, 1878); *Die Normalkleidung als Gesundheitsschutz* (1880; 4th ed. as *Mein System*, 1885); *Die Uniform im Licht der Gesundheitslehre* (1887); *Ein verkannter Wohltäter* (1891); *Selbstarznei im Heilmagnetismus* (1908); *Leben im Wasser* (3d ed., 1908).

JÄGER, OSKAR (1830–1910). A German historian and educator, son of the scientist Georg Friedrich Jäger, born at Stuttgart and educated at Tübingen. He taught in the Gymnasia of Stuttgart, Ulm, and Wetzlar, and was rector and director at Mörs and Cologne. After being pensioned in 1901 he was made honorary professor of pedagogy at Bonn. His pedagogical works are: *Aus der Praxis, ein pädagogisches Testament* (1885–97); *Das humanistische Gymnasium* (1890); *Didaktik und Methodik des Geschichtsunterrichts* (1895; 2d ed., 1904). His more important historical works are: *John Wycliffe* (1854); *Geschichte der Römer* (6th ed., 1901); *Geschichte der Griechen* (6th ed., 1900); *Die punischen Kriege* (1869–70); *Weltgeschichte* (last ed., 1899); new editions of Schlosser, *Weltgeschichte für das deutsche Volk* (5th ed., 1904); *Auswahl wichtiger Aktenstücke zur Geschichte des 19. Jahrhunderts* (1893), with Moldenhauer.

JÄGERNDORF, yā'gĕrn-dôrf. A frontier city in the Austrian Crownland of Silesia, on the Oppa, 14 miles by rail northwest of Troppau (Map: Austria, E 1). It is finely situated, 1018 feet above the sea, has a castle built by the Prince Liechtenstein and a beautiful church. There are also several technical schools. The town is a centre of the woolen industry and has manufactures of paper, organs, machines, cordials, woolen and woven goods, and vinegar. It is an important market for the surrounding country. Pop., 1900, 14,675; 1910, 16,681,

chiefly of German descent. Jägerndorf was plundered by the Tatars in 1241. In 1745 it was the scene of two battles between the Prussians and the Austrians.

The town was the capital of the Principality of Jägerndorf, which was bought in 1523 by the house of Hohenzollern, but in 1623 it was given by the Emperor to Prince Charles of Liechtenstein, because its Prince, John George of Hohenzollern, had supported Frederick of Bohemia in his fight against the Emperor. The house of Hohenzollern, however, did not resign its claims, and by the Peace of Breslau (1742) Frederick the Great obtained from Austria the cession of a small portion of the principality, which now forms Prussian Jägerndorf.

JAG'GAR, THOMAS AUGUSTUS (1839–1912). An American Protestant Episcopal bishop. He was born in New York City, graduated at the General Theological Seminary, New York, and was ordained priest in 1863. He was rector of Anthon Memorial Church, New York (1864–68); of St. John's, Yonkers (1868–70), while there founding St. John's Riverside Hospital; and of Holy Trinity, Philadelphia (1870–75). For 30 years (1875–1905) he was Bishop of southern Ohio. After he had retired from charge of this diocese he still retained his seat and vote in the House of Bishops, and from 1908 until his death he was Bishop in charge of American churches in Europe. He published *The Personality of Truth,* Bohlen lectures for 1900, besides various essays, sermons, and addresses.

JAG'GERY (Anglo-Ind., from Hind. *shakkar,* from Prak. *sakkara,* from Skt. *śarkara,* sugar). The name given in the East Indies to the sugar obtained from palm sap. In the Philippines it is called pakaskas. In obtaining the sap the flower spathe is cut in the case of the coconut and nipa, or with the buri the head of the palm is tapped. The juices of the palms contain about 15 per cent of sugar. The sugar is generally consumed in the countries where it is produced and is very impure. Chemically much of it is identical with cane or beet sugar, but its production on a commercial scale has never succeeded. More recent experiments tend to show, however, that with modern sugar-making machinery the nipa palm may yield considerable amounts of a comparatively pure sugar. See CARYOTA.

JAGIĆ, yä'gĭch, VATROSLAV (1838–). A Slavic philologist, born at Warasdin and educated at Vienna. In 1860 he was appointed a teacher at Agram, and in 1870 he was elected member of the South Slavic Academy. But in the same year he was dismissed from Agram and became professor of comparative philology at Odessa. He resigned this position in 1874 to take the new chair of Slavic philology at Berlin, where he founded (1875) the *Archiv für slawische Philologie.* In 1880 he succeeded Sresnevski at St. Petersburg, and six years afterward became professor of Slavonic philology at Vienna. He retired in 1908. Jagić was chosen member of the Royal Servian Academy of Belgrade, of the Imperial Academy of Cracow, and of the Imperial Academy of St. Petersburg. His works, besides contributions to *Književnik, Rad, Starine,* the *Proceedings of the Vienna Academy,* and his *Archiv,* bear chiefly on the early history of the Slavs, on their languages and literatures; they are too numerous to mention, but a complete bibliography will be found in the *Festschrift* (*Sbornik*), written by his former pupils in 1908. Jagić is the editor of the *Slavic Philological Encyclopedia* (*Entziklopediia Slavionskoi Filologii*), published at St. Petersburg (1909 et seq.), to which he contributed a *History of Slavic Philology* (ib., 1910).

JAGO, jā'gō, RICHARD (1715–81). An English poet, born at Braudesert, who, after taking his B.A. and M.A. degrees at Oxford, became curate (1737) and then rector (1754) of Snitterfield, Warwickshire, where, although he received other and richer preferments, he mainly resided and where he died. Shenstone, his friend from university days, admired his poetry, especially his elegy "The Blackbirds." His poems, which had made their appearance in various ways and places, were finally posthumously published, as revised by the author, under the title *Poems Moral and Descriptive* (1784). Aside from his poetry, Jago's work is quite insignificant. Consult the notice of Jago prefixed to the 1784 edition of his poems, mentioned above, and F. L. Colvile, *Warwickshire Worthies* (London, 1870). Some of his poems will be found in A. Chalmers's *English Poems,* vol. xvii (ib., 1810).

JAGOW, yä'gō, GOTTLIEB VON (1863–). A German statesman, born in Berlin, son of the hereditary master of the hunt. He was educated at Bonn. In 1886–95 he held different local offices and then became attaché at Rome and in 1896 at Munich. In 1897 he was made Secretary to the German Embassy in Rome, where (after a year as Minister to Luxemburg) he became Ambassador in 1909 and in December, 1912, assisted in the renewal of the Triple Alliance. When he became Minister of Foreign Affairs early in 1913, succeeding Von Kiderlen-Waechter, it was supposed that his relations with Italy would assure Germany of that power's complete coöperation; but the next year the outbreak of the Great European War proved his plans faulty. Consult F. W. Wile, *Men around the Kaiser* (London, 1913). See WAR IN EUROPE.

JAGUA, hä'gwȧ. See CIENFUEGOS.

JAGUAR, jȧ-gwär' (from Brazilian *jaguara*), *Felis onca.* The largest, fiercest, and most interesting of all the wild cats of the New World. It is decidedly heavier than the puma, though the measurements usually given do not serve to bring out the difference. An average jaguar is 6 or 7 feet long, of which one-third or more is tail; the girth back of the shoulders is about 3 feet; the head is disproportionately large, and the limbs are massive. In color there is a very wide range of diversity, from a ground of dirty white or yellowish to almost black, southern animals being the lightest. In all cases, however, there are distinct and very characteristic markings, not unlike those of the leopard; but in the jaguar the rings cover more ground, are inclined to be more angular and broken, and each ring incloses one or more dark spots. See Plate of WILD CATS, accompanying article CAT.

The jaguar is found distributed very generally throughout South America, except in the colder parts of Patagonia (beyond lat. 40° S.) and on the highest mountains; it extends northward (or recently did) as far as Texas and possibly even into Louisiana and Arkansas, but apparently it has never crossed the Mississippi —at least not so as to get any foothold. The black variety is most common in Guiana, where

it is sometimes called "tapir tiger," from its supposed fondness for tapirs as an article of food. The skull may easily be distinguished by a prominent tubercle on the anterior or nasal edge of the orbit.

The jaguar is essentially an animal of the forest and remarkably fond of water; so that the half-flooded jungles of the Amazon valley are its true and most suitable home, and there, in the season when large districts are submerged, it easily maintains for weeks together an almost entirely arboreal life. Nevertheless, a race of jaguars exists on the Pampas, a cold, treeless, and waterless desert, where they lurk in the tall grass or river-side thickets, working destruction among the ranchmen's horses, cattle, and sheep, and pouncing upon deer and the smaller mammals and reptiles of the region. Another curious fact is the enmity between the jaguar and the puma of the plains (and perhaps elsewhere), leading to constant battles in which the jaguar is likely to be worsted by its more active and aggressive antagonist. Foxes and wolves torment the big beast also, by following it about in hope of feeding upon the remains of its feasts, as jackals attend the African lion.

Jaguars are likely to remain in certain localities, in the vicinity of which they prowl at night, lying asleep or in ambush most of the daylight hours, and they seldom attack man unless provoked. They feed chiefly upon mammals and large reptiles. Monkeys and capybaras make a large part of the diet. Deer, sloths, tapirs, and manatees are also hunted, but peccaries are seldom attacked. The jaguar is sometimes killed by the great anteaters, whose sabre-like claws tear its bowels open even while the anteater itself is in the throes of death. Along the tropical rivers the jaguars wait for and seize turtles that come ashore to lay their eggs, turn them over, and gnaw them out of their shells. Even alligators and boas are occasionally seized, killed, and devoured, and jaguars are expert at snatching fish from overhanging banks. Much of this prey requires hard chasing; but the animal prefers to lie upon the low limb of a tree, or the top of a rock commanding some game trail or drinking place, and thence to leap upon its victims. The female jaguar usually produces two or three kittens at a birth, which are as beautiful and playful as young leopards. These have sometimes been tamed; but this species is perhaps the most savage and intractable of the great cats, and the kittens become dangerous with increasing years. See HUNTING BIG GAME.

The fullest account of this cat is by J. H. Porter in *Wild Beasts* (New York, 1894). Consult also: Alston, "Mammals," in Sclater and Salvin's *Biologia centrali-americana* (London, 1879–92); A. R. Wallace, *Travels on the Amazon* (ib., 1889); H. W. Bates, *The Naturalist on the Amazon* (7th ed., ib., 1895); W. H. Hudson, *The Naturalist in La Plata* (4th ed., ib., 1903).

JAGUARONDI, jä'gwȧ-rön'dē, or **YAGUARONDI.** A tropical American wild cat (*Felis jaguarondi*), remarkable for its very long body and tail in proportion to the limbs and for its uniform coloration, also for its isolated habitats. It inhabits Guiana, eastern Brazil, and Paraguay, and also northeastern Mexico, but, so far as known, is not to be found in the countries between. Its body is about 30 inches long and its tail fully 25 inches. The skull is elongated and flattened, the pupil of the eye round, and the nose is, as it were, strongly pinched in laterally. Its fur is gray, varying in some individuals towards brown, in others towards red, and is wholly unspotted. Compare EYRA.

JAHDE, yä'de. An inlet of the North Sea. See JADE.

JAHN, yän, FRIEDRICH LUDWIG (1778–1852). A Prussian patriot and hero of the common people, an ardent advocate of German unity, and the father of popular gymnastics (Volks- or Vereinsturnen). He was born in the village of Lanz, developed a passion for Prussian and German history and the German language and literature during six years at the universities of Halle, Jena, and Greifswald, and interrupted his studies by frequent excursions to all parts of the country. His chief literary work, *German Nationality* (*Deutsches Volkstum*, 1810), falls in the period between the battle of Jena and the outbreak of the War of Liberation and gives fitting expression to his dominant idea. The years 1810–18 mark the culmination of his career. As a teacher in Berlin, he began to meet schoolboys outside the city gates on half-holiday afternoons for games and simple exercises, and then, as the numbers grew, an outdoor gymnasium was constructed and new exercises were devised, until in 1816 and 1817 more than 1000 "turners" were in attendance. Jahn saw in this active, wholesome, common life an opportunity to develop harmony and to kindle public spirit. Numerous gymnasia of the Berlin type were opened elsewhere in Prussia and other German states, with the help of Jahn's pupils and of *Die Deutsche Turnkunst* (1816), which he and they prepared. But the reactionary policy adopted by the Holy Alliance led to the general closing of these Turnplätze, and to Jahn's arrest (1819) on suspicion of "secret and most treasonable associations." Although finally acquitted (1825), he passed the remaining years of his life in comparative obscurity, most of them in the Thuringian town of Freyburg-on-the-Unstrut. There the Turnhalle has been built over his grave, and a Jahn Museum is near by. The Turnvereine in their present form began to appear after 1840, but they reflect the spirit and aims of Jahn.

JAHN, JOHANN (1750–1816). A distinguished Roman Catholic Orientalist and biblical critic. He was born at Tasswitz, Moravia, June 18, 1750, received his early education at Znaim and Olmütz and in 1772 entered the Premonstratensian convent of Bruck, where he took his vows in 1774 and was appointed professor of Oriental languages and biblical criticism. On the suppression of this convent, in 1784, Jahn was transferred to the same professorship in Olmütz, and finally (1789) to the University of Vienna, where after 1803 he also held the chair of dogmatic theology. So far as regards the modern Catholic literature of Germany, Jahn may be regarded as the father of biblical criticism. But the boldness of some of his opinions in his Einleitung aroused the alarm of the ecclesiastical authorities, and he was honorably removed from his chair in the university by being promoted to a canonry of St. Stephen's at Vienna in 1805. He continued, however, to pursue the same studies till his death, in Vienna, Aug. 16, 1816, and published many works in both departments, the most important of which, passing over his grammars, lexicons, and elementary books of the Hebrew, Syriac, Aramaic, and Arabic languages, are his *Einleitung in die*

göttlichen Schriften des alten Bundes (2 vols., 1792; and again in 4 vols., 1802–03; Eng. trans. by Turner and Whittingham, New York, 1827); *Biblische Archäologie* (5 vols., 1797–1805; Eng. trans. by Upham, 3d ed., Andover, 1832); *Enchiridion Hermeneuticæ* (1812); an appendix of dissertations to this work (1813–15); and an edition of the Hebrew Bible (4 vols., 1806). Five years after his death a collection of *Remains* was published at Tübingen, the genuineness of which, although seemingly without reason, has been called in question. In 1822 his *Introduction, Archæology, Enchiridion,* and *Appendix Hermeneutica* were put on the index.

JAHN, Otto (1813–69). A German philologist and archæologist. He was born at Kiel and studied at Kiel, Leipzig, and Berlin. In 1837 he visited Paris, in 1838 Italy, and in 1839 became privatdocent in Kiel, but was in 1842 called to Greifswald, where he remained till 1847, when he became professor at Leipzig. His activity in the revolutionary movements of 1848–49 offended the Saxon government, and in 1851 he was deprived of his chair at the university; but he remained at Leipzig until 1855, when he was appointed professor of classical philology and archæology and director of the Academic Museum of Art at Bonn. Here he remained until in 1867 he was called to succeed Eduard Gerhard at Berlin. But before he could enter upon his new duties his health gave way, and he died in Göttingen, Sept. 9, 1869. Jahn was a many-sided scholar and produced valuable works in many fields. In classical philology may be mentioned his editions of *Persius* (1843); *Censorinus* (1845); *Juvenal* (1851; 4th ed. of Juvenal, Persius, and Sulpicia by Leo, 1910); Sophocles' *Electra* (1861; 3d ed. by A. Michaelis, 1882); *Pausaniæ Descriptio Arcis Athenarum* (1860; 3d ed. by A. Michaelis, 1901); Plato's *Symposium* (1864; 2d ed. by H. Usener, 1876); and the *Treatise on the Sublime,* attributed to Dionysius or Longinus (1867; 2d ed. by J. Vahlen, 1887). He published also a collection of essays on music, *Gesammelte Aufsätze über Musik* (1866), and a very important *Life of Mozart* (1856–59; 3d ed. by Deiters, 1889–91; Eng. trans. by Townsend, 1891). But it was in the field of classical archæology that Jahn's influence was most strongly exerted as a teacher and writer. His writings are for the most part short articles, which appeared in periodicals as university programmes, or in the proceedings of learned societies, especially in the *Berichte der königlichsächsischen Gesellschaft der Wissenschaften zu Leipzig.* Some were collected in *Archäologische Aufsätze* (1845), *Archäologische Beiträge* (1847), and *Aus der Altertumswissenschaft* (1868). Among his more important works were: *Die Ficoronische Cista* (1852); *Beschreibung der Vasensammlung König Ludwigs* (1854), with an epoch-making introduction on Greek vases; *Ueber den Aberglauben des bösen Blicks* (1855); *Darstellungen des Handwerks und Handelverkehrs,* three papers dealing with reliefs, vases, and paintings (1861, 1867, 1868); *Griechische Bilderchroniken,* published after his death by A. Michaelis (1873). Jahn's importance in the study of classical archæology is due to the stress he laid on exact and scientific method, and recognition of the limits of exact knowledge, in opposition to the symbolical school of interpretation, which had led to the wildest hypotheses, and of which the chief representatives were Panofka, Gerhard, and Braun. Consult Michaelis, *Allgemeine deutsche Biographie,* vol. xiii (Leipzig, 1881), and Sandys, *A History of Classical Scholarship,* vol. iii (Cambridge, 1908).

JÄHNS, yāns, Friedrich Wilhelm (1809–88). A German composer and musical critic, born at Berlin. He was educated for the operatic stage, but became a teacher of vocal music and founder and head of a musical Verein. Of his compositions his songs are best known, but his most valuable work was his criticism of Weber, *K. M. von Weber in seinen Werken* (1871), which is the most authoritative of the biographies of Weber and includes a complete thematic catalogue of his works together with critical comments. Jähns's splendid collection of Weberiana is now in the Berlin Royal Library.

JAI-ALAI, hī'â-lī'. See Pelota.

JAIL DELIVERY, Commission of (OF. *jaiole, geole,* Fr. *geôle,* from Lat. *caveola,* dim. of *cavea,* cavity, cage, cave, from Lat. *cavus,* hollow, Gk. *κύαρ, kyar,* hole, from *κύειν, kyein,* to swell, to contain). One of the four royal commissions issued to judges of assize in England, under which they discharge their duties on circuit. The commission empowers the judges to try and deliver every prisoner who shall be in the jail when they arrive at the circuit town. It is directed to the judges, with whom are coupled the sergeants at law and king's counsel on the circuit, the clerk of assize, and the associate. Similar authority is conferred upon courts of oyer and terminer in the United States by general statutes. See Assize; Oyer and Terminer; and consult the authorities referred to under Criminal Law.

JAIL FEVER. See Typhus Fever.

JAÍME. See James.

JAÍME, hī'mâ (Jaíme-Juan-Carlos-Alfonso-Felipe de Borbón-Anjou), Don (1870–), Duke of Madrid. A Carlist claimant of the Spanish throne, son of the Bourbon Prince called Don Carlos (1848–1909) and of Marguerite of Parma. He was born in Vevey, Switzerland, received a military education in Austria and England, and entered the Russian army, in which he became a colonel. He made his residence at Frohsdorf, near Vienna. His father's death in July, 1909, left him the head of the royal Spanish house of Bourbon-Anjou, and for a time in 1909 and 1910 the apparent lack of harmony between the Vatican and the Spanish government gave rise to rumors of a new Carlist uprising.

JAINISM, jīn'īz'm (from Skt. *jāina,* from *jina,* conqueror, a name given to the founder of the religion, from *ji,* to conquer). The name given to a schismatic religion of early India, which arose as a protest against Brahmanism about the same time as did Buddhism and became an important rival of the latter, although resembling it in many respects. It still retains a position as one of the most important among the living sects of the Hindus and claims over 1,000,000 believers. Many adherents to its teachings are found in every province of Upper Hindustan, in the cities along the Ganges, and in Calcutta, but more especially to the westward, in the states of Mewar and Merwara, in Gujarat, and southward along the upper part of the Malabar coast and scattered throughout the peninsula. The Jains are among the wealthiest and most influential members of the Hindu com-

munity, as they are devoted largely to mercantile pursuits. Accordingly their temples, the most famous of which are those of Mount Abu, are among the finest in India. In their way of living they are refined and simple, and in their manners they are gentle and attractive. It is now generally believed that Jainism antedated Buddhism in its beginnings, and that its chief expounder, Vardhamāna Mahavira, was an older contemporary of the Buddha. The name *Mahāvira* itself is appellative and means 'the great hero.' He is also called *Kevalin* or *Sarvajna* (omniscient), *Siddha* (accomplished), *Tirthakara* (finder of the ford), etc. Another name given to the deified saints of the faith is *Arhat* (venerable, holy); accordingly the followers of these spiritual leaders are sometimes called Arhatas. Mahavira, the founder of Jainism, arose in the sixth century B.C. in the region not far from the holy city of Benares, which was the territory likewise that gave birth to Buddhism. His family name was Jnātriputra, and he is referred to in the Buddhist writings as Nataputta, which was the form of the name in his own dialect of Magadha (q.v.). His father's name in the same vernacular appears as Siddhattha; his mother's as Trisala. It is said that on their death, in his thirtieth year, he renounced his home and petty kingdom, gave up his wife and his daughter, and became a religious devotee and recluse. For 12 years he practiced the most rigorous kind of asceticism and then devoted the remaining 30 years of his life to preaching and teaching and, like Buddha, to organizing his faith and the religious order of his community. His death must have occurred before Buddha's, as the latter refers to that event. The reputed teacher of Mahavira was Parśva or Parśvanatha, who belonged to the pre-Buddhistic sect of the Nirgranthas (without bonds, free from ties, emancipated), and this religious master must have flourished not later than the seventh century B.C. There is evidence also of Mahavira's having also been influenced by a stern ascetic named Gosala, who was for a time his associate and pupil, but afterward his rival and the leader of another sect of minor importance.

The tenets of the Jainas or Arhatas are in several respects analogous to those of the Buddhists (see BUDDHISM), and like them go back to the principles of the Sankhya and Yoga (qq.v.) philosophy; but they resemble in others those of the Brahmanical Hindus. With the Buddhists they share in the denial of the divine origin and authority of the Vedas, and in the worship of certain saints, whom they consider superior to the other beings of the pantheon. They differ, indeed, from them in regard to the history of these personages, but the original notion which prevails in both worships is the same. With the Brahmanical Hindus, on the other hand, they agree in admitting the institution of caste, in performing the ceremonies called *Samskaras* (see SAMSKARA), and in recognizing some of the subordinate deities of the Hindu pantheon, at least apparently, as they do not pay especial homage to them, and as they disregard completely all those Brahmanical rites which involve the destruction of animal life. Their teaching, however, transcends the bounds of the Aryan world, being intended also for the despised Sudras and Mlechhas (Europeans). It deserves notice, too, that though rejecting in general the authority of the Vedas, they admit it and quote Vedic texts if the doctrines of the latter are conformable to the Jaina tenets. The Jainas are thoroughgoing hylozoists, recognizing a psychic element (*jīva*) in every material object. Apart from this they have no well-rounded-out metaphysical theory, as they hold the doctrine (*syād-vāda*) that "yes" and "no" may at the same time be predicated.

According to their doctrine, all objects, material or abstract, are arranged under nine categories, called *tattvas*, truth, or principles, of which the ninth and last is called *mōksa*, deliverance or liberation of the vital spirit from the bonds of action, i.e., final emancipation, salvation. It is identical with the Nirvana of the Buddhist. To reach such an emancipation the most stringent asceticism and self-mortification for 12 years are essential. Salvation can be obtained only through such observances and the "Three Gems," which are the treasures of the faith. These are "right knowledge, right conception, and right actions." These latter, which are synonymous with virtue, are fivefold: (1) noninjury (*ahiṃsā*); (2) kindness, and true but pleasant speaking; (3) uprightness, especially shown by nonstealing; (4) purity in thought, word, and deed; (5) renunciation of worldly interests. This freeing of the spirit from the bonds of material things will come through successive reincarnations; it will mean true release, but the spirit will retain its individuality.

The principles of faith, as mentioned before, are common to all classes of Jainas, but some differences occur in the practice of their duties, as they are divided into religious and lay orders, *Yatis* (which among the Svetambaras include women), and *Srāvakas* or *Upāsakas*. Both, of course, must place implicit belief in the doctrines of their saints; but the *Yati* has to lead a life of abstinence, silence, and continence. He should wear a thin cloth over his mouth to prevent insects from flying into it, and he should carry a brush to sweep the place on which he is about to sit, to remove any living creature out of the way of danger. Their highest law of duty is not to harm any living creature, and their doctrine of metempsychosis does not stop at animal existences, but it includes the inanimate world as well. The saintly *Yati* may dispense with all acts of worship; while the *Srāvaka* has to add to the observance of the religious and moral duties the practical worship of the saints and a profound reverence for his more pious brethren. The secular Jain must, like the ascetic, practice the four virtues—liberality, gentleness, piety, and penance; he must govern his mind, tongue, and acts; abstain at certain seasons from salt, flowers, green fruits, roots, honey, grapes, tobacco; drink water thrice strained, and never leave a liquid uncovered lest an insect should be drowned in it; it is his duty also to visit daily a temple where some of the images of the Jain saints are placed, walk round it three times, make an obeisance to the image, and make offerings of fruits or flowers, while pronouncing some such formula as "Salutation to the Saints, to the Pure Existences, to the Sages, to the Teachers, to all the Devout in the world." The reader in a Jain temple is a Yati, but the ministrant priest is not seldom a Brahman, and the presence of such Brahmanical ministrants seems to have introduced several innovations in their worship. In Upper India the ritual in use is often intermixed with formulas belonging more properly to the Saiva

and Sakta worship, and images of Siva and his consort have their place in Jaina temples. In the south of India they appear, as mentioned before, to observe also all the essential rites or Samskaras of the Brahmanical Hindu. The festivals of the Jainas are especially those relating to events in the life of their deified saints; but they observe also several common to other Hindus, as the spring festival, the Sripanchami, and others.

The Jains are divided into two principal divisions, *Digambaras* and *Svetambaras*. The former word means 'sky-clad,' or naked, and it is thought that the Gymnosophists, or naked devotees, to whom the Greek writers allude, were Jains; but this is not quite certain. (See GYMNOSOPHISTS.) They seem to be identical with the Niganthas (Nirgranthas) mentioned in Buddhist Pali writings and in an inscription of Asoka. If this identification is correct, Nataputta, a leader of the Nigantha sect, is identical with Jñātriputra Mahāvīra. At the present day ascetics of the Digambara class wear colored garments and confine the disuse of clothes to the period of their meals. *Svetambara* means 'one who wears white garments'; but the differences between these two very ancient divisions are far from being restricted to that of dress; it is said to comprehend a list of 700 topics, of which 84 are considered to be of paramount importance. In the south of India the Jains are divided into two castes; in Upper Hindustan they are all of one caste. It is remarkable, however, that among themselves they recognize a number of families between which no intermarriage can take place, and that they resemble in this respect also the ancient Brahmanical Hindus, who established similar restrictions in their religious codes.

As regards the pantheon of the Jaina creed it is more fantastic than that of the Brahmanic sects, whence it is borrowed to a great extent, but without any of the poetical and philosophical interest which inheres in the gods of the Vedic time. The highest rank among their numberless hosts of divine beings—divided by them into four classes, with various subdivisions—they assign to the deified saints, whom they call *Jina*, *Arhat*, or *Tirthakara*, i.e., prophet, besides a variety of other generic names. The Jainas enumerate 24 Tirthakaras of their past age, 24 of the present, and 24 of the age to come; and they invest these holy personages with 36 superhuman attributes of the most extravagant character. Notwithstanding the sameness of these attributes, they distinguish the 24 Jinas of the present age from each other in color, stature, and longevity. Two of them are red, two white, two blue, two black; the rest are of a golden hue or a yellowish brown. The other two peculiarities are regulated by them with equal precision, and according to a system of decrement, from Rishabha, the first Jina, who was 500 poles in stature, and lived 8,400,000 great years, down to Mahavira, the twenty-fourth, who had degenerated to the size of a man and was no more than 40 years on earth, the age of his predecessor, Parśvanatha, not exceeding 100 years. The present worship is almost restricted to the last two Tirthakaras; and these may be considered as historical personages. As, moreover, among the disciples of Mahavira there is one Indrabhati, who is called Gautama, and as Gautama is also a name of the founder of the Buddha faith, it has been thought that Gautama Sakyamuni, the Buddha, is alluded to; but this is not accepted, although Buddha calls himself by the title of Jina (the conquering one), and the Buddhist scriptures also sometimes speak of him as the twenty-fifth Buddha or Jina.

Jainism, in contrast to Buddhism, never spread beyond the bounds of India; on the other hand, it has lived longer than Buddhism in the land that gave it birth. Prakrit is the canonical speech of Jainism, but the sacred literature of the Jains is uninteresting or stupid.

Bibliography. Among the best older essays on the tenets, mythology, observances, and literature of this sect are those of Wilson, *Essays*, vol. i (London, 1862), and Colebrooke, in his *Miscellaneous Essays*, ed. by Cowell, vol. ii (ib., 1873). More recent and important is the sketch by Monier-Williams, in the *Journal of the Royal Asiatic Society*, vol. xx (London, 1888); Jacobi (q.v.), "Jaina Sutras," in the *Sacred Books of the East*, vols. xxii, xlv (Oxford, 1884–95); Bühler, *On the Indian Sect of the Jainas*, translated from the German by Burgess (London, 1903); "Eine Jaina Dogmatik," in *Deutsche Morgenländ. Gesellsch., Zeitschrift*, vol. lx, pp. 287–325, 512–51 (Leipzig, 1906); the excellent outline by Hopkins, "Jainism," in *Religion of India* (Boston, 1895); Schubring, *Acārāṅga-sūtra, erster Srutaskandha*, text and glossary (Leipzig, 1910); Jhaverī, *The First Principles of the Jain Philosophy* (London, 1910); Warren, *Jainism in Western Garb as a Solution to Life's Great Problems* (Madras, 1912). On Jaina literature, consult: Weber, *Sacred Literature of the Jains*, translated by Smyth (Bombay, 1893); Barodia, *History and Literature of Jainism* (ib., 1909). On Jain architecture: Fergusson, *Cave Temples of India* (London, 1880), and Burgess, *Buddhist and Jaina Caves* (ib., 1881–83). On Jaina epigraphy: Guérinot, *Répertoire d'épigraphie Jaina précédé d'une esquisse de l'histoire du Jainisme d'après les inscriptions* (Paris, 1908). For a bibliography, consult the *List of Sanskrit and Hindi Manuscripts Purchased by Order of Government and Deposited in the Sanskrit College, Benares, during the Years 1902, 1905–06, and 1909* (Allahabad, 1904-10); Guérinot, *Essai de bibliographie Jaina* (Paris, 1906); Hüttemann, *Die Jnataerzählungen im sechsten Anga des Kanons der Jinisten* (Strassburg, 1907); Barnett, *The Antagada-dasão and Anuttarovavāiya-dasão*, translated from the Prakrit (London, 1907); Guérinot, "Notes de bibliographie Jaina," in the *Journal Asiatique*, vol. xiv, pp. 47–148 (Paris, 1909).

JAINTIA (jīn'tī-ā) **HILLS.** A mountainous region of Assam, British India, covering an area of about 2000 square miles. With the Khasi Hills it gives its name to a governmental district. Coal and limestone are the chief mineral products; rice is grown. The hill villages are inhabited chiefly by Panars, a race which differs in language and creed from the Khasis, who call them Syntengs.

JAIPUR, jī-pōōr', or **JEYPORE,** -pōr'. A native Rajputana state, India, bordering on Bikanir, Bhartpur, Gwalior, Jodhpur, and other regions (Map: India, C 3). Area, 15,579 square miles. The surface is generally level except to the north and northwest, where it is broken by a spur of the Aravalli Mountains. It is sparsely watered, but this defect is gradually being overcome by extensive irrigation works. Corn, wheat, barley, cotton, tobacco, sugar cane, and the poppy are cultivated, and cattle are raised.

Woolen and cotton cloths, chintz, statuary, pottery, brass and lacquer work are manufactured. Copper, cobalt, black and white marble are found in the hills. Capital, Jaipur. Pop., 1901, 2,658,666; 1911, 2,636,647.

JAIPUR, or **JEYPORE.** The capital of the protected state of the same name, Rajputana. It is perhaps the handsomest and most regularly built of the native towns of India (Map: India, C 3). It lies 150 miles west of Agra. It is built on a plain surrounded by fort-capped hills, except to the southwest, where the plain merges into a desert. It was founded in 1728, is inclosed by a fortified wall, 20 feet thick, pierced by seven gates, and has paved streets 111 feet wide, laid out at right angles. The principal buildings are the Nahargarh, an almost inaccessible fort, dominating the city from the northwest; the palace of the Maharaja with its beautiful pleasure gardens; the Ishwari Minar (minaret piercing heaven); the splendid Maharajan chattris or cenotaphs; the observatory; Hall of the Winds; and the Mayo Hospital. Jaipur has municipal water works supplied by a tributary stream of the Chumbul, is lighted by gas, and its fine public park contains a zoölogical garden covering 70 acres. Its schools include the Maharaja's College, the Oriental College, the Sanskrit College, and a school of art. It is the seat of a British residency and is an important commercial and industrial centre with flourishing bazars and banking and trading establishments. Colored muslins, carpets, cloths, statuary, gold enamel ware, pottery, brass work, and jewelry constitute the chief manufactures. The town has two large cotton compresses. Pop., 1901, 160,167; 1911, 137,098. Amber, the ancient capital of Jaipur, 5 miles distant, has picturesque ruins of a fort, a palace, a mosque, temples, and tombs.

JAK. A tropical tree closely related to the breadfruit tree. See JACK TREE.

JAKIE, jā'kē (South American name). A South American frog (*Pseudis paradoxa*), of the family Cystignathidæ, remarkable for the relatively great size of its tadpoles. It is entirely aquatic and richly colored with bright green, bronze, and black above and shining yellow below, but all these colors disappear in a dull-brown hue immediately after death. The length of the adult is only from 2 to 2½ inches, yet its tadpoles reach a length of more than 10 inches, two-thirds of which consists of a thick, muscular tail. As the transformation proceeds, it shrinks steadily, until, when ready to leave the water, the tadpole is hardly more than 1 inch in length.

JAKJOKERTA, jäk'yŏ-kĕr'tȧ. A city of Java. See JOKJOKARTA.

JAKOB, yä'kŏp, LUDWIG HEINRICH VON (1759–1827). A German economist, born at Wettin. He studied at the University of Halle, where he became professor of philosophy in 1791. When the university was suppressed by Napoleon in 1807, he accepted the chair of political economy at Kharkov, Russia, was appointed to a commission to examine the finances of the Empire, and subsequently held other posts under the Russian government. In 1816 he returned to Halle as professor of political economy. His writings include: *Prolegomena zur praktischen Philosophie* (1787); *Grundriss der allgemeinen Logik* (1788; 4th ed., 1800); *Antimachiavell* (1794; 2d ed., 1796); *Grundsätze der National-ökonomie* (1805; 3d ed., 1825); *Entwurf eines Criminalgesetzbuchs für das russische Reich* (1818); *Einleitung in das Studium der Staatswissenschaften* (1819); *Staatsfinanzwissenschaft* (2 vols., 1821).

JAKUNS, jȧ-kōōnz'. A mixed race, inhabiting the protected State of Johore at the extreme south of the Malay Peninsula. They are the offspring of the Malays with the more aboriginal Sakai (q.v.) of the interior. The Jakuns seem rather taller, lighter in color, and finer-featured than the Sakai, who are generally classed as Negritos. Information concerning these people will be found in Stevens, "Anthropologische Bemerkungen über die Eingeborenen von Malacca," in the *Zeitschrift für Ethnologie* (Berlin, 1897).

JAKUTSK, yȧ-kōōtsk'. Another spelling for the name of a territory and its capital in Siberia. See under YAKUTSK.

JAL, zhȧl, AUGUSTE (1795–1873). A French author, born at Lyons. He was educated at the naval school in Brest and led a company of the cadets in the defense of Paris during the Hundred Days (1815). His first literary work was done on *Le Fureteur*, *Le Miroir*, and *La Pandore*, liberal journals. Afterward he became well known as an art critic. In 1831 he received official charge of the marine archives and wrote in this connection a nautical glossary and *L'Archéologie navale* (1839). The fruit of much of his labor is embodied in his great *Dictionnaire critique de biographie et d'histoire* (1864). He also wrote a memoir, published posthumously, *Souvenirs d'un homme de lettres* (1877), and several other works on art and archæology.

JALALABAD, jȧ-lä'lȧ-bäd'. A town of Afghanistan. See JELALABAD.

JALAL-UD-DIN (jȧ-lȧl'-ụd-dēn') **MU'HAM'MAD.** See AKBAR.

JALĀL-UD-DĪN RŪMĪ, rōō'mē (1207–73). A Persian philosopher and poet, and the greatest of all the mystics of the Orient. He was born at Balkh in Khorassan, of noble and wealthy parents, and under the careful training of his father, Baha-ud-Dīn, a scholar of wide repute, early became a visionary and a mystic. He subsequently studied at Aleppo and Damascus and in 1231 succeeded his father as the head of the college at Iconium (Konieh) in Asia Minor. He came for three years under the influence of a wandering dervish, Shams-ud-Dīn of Tabriz, whose mysterious death in 1247 he commemorated by founding the Maulaw Order of Dervishes, a Sufistic sect. For them he wrote the *Mathnawī*, a collection of tales and moral precepts containing 40,000 couplets, in six books, in imitation of similar poems by Senayi and Farid-ud-Dīn Attar. This didactic work, which surpasses its models, has been partly translated into English by Redhouse (London, 1881), Whinfield (ib., 1887 and 1901), and Nicholson (1901), and into German by Rosen (Leipzig, 1849). Another work, the *Diwān*, a collection of lyrics of high poetic merit and great originality, has also been preserved and was published, with a translation and notes, by Rosenzweig (Vienna, 1838). Of all the Persian Sufis, Jalāl-ud-Dīn is the most important. To him the Ego, the world, and the Divine are one (see SUFISM), and in his works for the first time in Persian mysticism we find the doctrine of transmigration taught. Consult: Ethé, "Neupersische Literatur," in Geiger and Kuhn, *Grundriss der iranischen Philologie*, vol. ii (Strassburg, 1896–1904); Browne, *Literary History of Persia* (New York, 1906); Davis, *The Persian Mystics, Jalál-*

w'd-dín Rúmí (ib., 1908); Wilson, *The Masnavi, Book II, Translated for the First Time from the Persian into Prose* (London, 1910).

JALANDHAR, jŭl'an-dĕr, or **JULLUNDER.** A division of the Punjab (q.v.), British India (Map: India, C 2). It comprises the districts of Kangra, Hoshiarpur, Jalandhar, Ludhiana, and Firozpur, and has an area of 19,394 square miles. Pop., 1901, 4,305,724; 1911, 3,967,724. Capital, Jalandhar.

JALANDHAR, or **JULLUNDER.** The capital of a district and division of the same name in the Punjab, British India, 260 miles northwest of Delhi (Map: India, C 2). It is in a productive agricultural and sporting district and anciently was a fortified place of importance, the capital of the Rajput Katoch Kingdom as early as the fourth century B.C. It manufactures silk, flour, cabinetwork, iron, and brass. Its fine cantonment, where a garrison of two batteries of artillery is stationed, inclosing the public gardens, covers 7½ square miles. Pop., 1901, 67,735; 1911, 69,318.

JAL'AP (Sp. *jalapa*). A well-known purgative medicine. It is the root of *Ipomœa jalapa*, a plant of the natural order Convolvulaceæ. It is found in Mexico, at an elevation of about 6000 feet above the level of the sea, in the neighborhood of the town of Jalapa, or Xalapa, from which its name is derived. It is a perennial twining plant, with large flowers and a turnip-like root, varying from the size of a hazelnut to that of a man's fist. The roots when fresh are white and fleshy and abound in a milky juice. They are prepared for the market by drying. Jalap was long confused with other plants, among them *Mirabilis jalapa*, known in flower gardens as *marvel of Peru.*

Jalap seems to have been first introduced into England as a medicine about 1609.

JALAP.

The dried roots are brown and wrinkled externally and of a deep yellowish-gray color internally; their odor is faint and disagreeable, and their taste is nauseous. The active ingredient is the resinous portion, which contains convolvulin. Jalap resin may be distinguished from common resin by its insolubility in volatile oils. Jalap is a valuable cathartic, but is seldom given alone. It is an ingredient of the compound cathartic pill of the United States Pharmacopœia. Its purgative action is increased by the addition of a little calomel, and its hydragogue action by bitartrate of potash, while its tendency to produce griping is obviated by the addition of a little ginger. In the form of compound jalap powder, which consists of one part of powdered jalap, two parts of bitartrate of potash, and a little ginger, it is of great service in some kinds of dropsy in consequence of its hydragogue action.

JALAPA, or **XALAPA,** hȧ-lä'pȧ. The capital of the State of Vera Cruz, Mexico, situated at an elevation of 4800 feet on the slope of the extinct volcano of Cofre de Perote, 60 miles northwest of Vera Cruz (Map: Mexico, L 8). The town is surrounded by gardens and is much frequented as a health resort by the people of Vera Cruz. It is well built, with a handsome plaza and beautiful promenades in the suburbs, and has a fine cathedral, containing paintings by the Spanish masters, a Franciscan convent built in 1556, various schools, and hospitals. It has several times been the capital of the state, and prior to the advent of railways had considerable importance, being on the route connecting Mexico City with Vera Cruz. It now carries on some trade in the agricultural products of the region and has a number of small cotton and cigar factories. Pop., 1900, 20,388; 1910, 24,816.

JALISCO, or **XALISCO,** hȧ-lē'skō. One of the states of Mexico, bounded by the Territory of Tepic and the states of Durango, Zacatecas, and Aguas Calientes on the north, Guanajuato and Michoacán on the east, Michoacán and Colima on the south, and the Pacific Ocean on the west (Map: Mexico, G 7). Area, 33,495 square miles. The narrow strip of coast land is low and well indented. The western part of the state rises towards the Sierra Madre in a series of terraced plateaus, on which are scattered a number of volcanic cones and isolated peaks, the two highest of which are the volcano Colima (12,750 feet) and the extinct Nevado (14,854 feet). The central portion is occupied by the Sierra Madre del Pacífico, which divides the state into two parts, the eastern half forming a part of the great Mexican central plateau, Anahuac (q.v.), with an elevation of over 5000 feet. Jalisco has numerous lakes, including the largest lake of Mexico, Chapala (q.v.), drained by the Río Grande de Santiago, which with its tributary, the Verde, is the chief river of the state. The climate is hot and unhealthful in the lowlands of the coast, but moderate in the interior. The soil is very fertile along the rivers and in the eastern part of the state. Corn, wheat, tobacco, cotton, sugar, and indigo are the chief agricultural products. Stock raising is also carried on extensively, and rich silver mines are worked. The chief manufactured products are coarse cotton and woolen goods, pottery, saddlery, tequila (a spirituous liquor), and products of tobacco. Pop., 1910, 1,208,855, consisting largely of Indians. The state is one of the most prosperous and wealthy of Mexico. The capital is Guadalajara (q.v.). Jalisco once formed part of the Kingdom of Nueva Galicia. Consult T. E. Smith, *Handbook of the Mineral Resources of the State of Jalisco* (Guadalajara, 1905).

JALUIT, jä'lo͞ot. See MARSHALL ISLANDS.

JAMAICA, jȧ-mā'kȧ. The largest of the British West Indian Islands, situated 90 miles south of Cuba and 100 miles west of Haiti, between lat. 17° 43′ and 18° 32′ N. and long. 76° 11′ and 78° 21′ W. (Map: West Indies, C 3). It is 144 miles in its greatest length and about 50 miles in its widest part. Area, about 4207 square miles. The surface rises gradually from the lowlands of the west coast

JAMAICA
CARIBBEAN SEA
CORNWALL
MIDDLESEX
SURREY
Montego Bay
Palmyra
Martha Brae
Falmouth
Duns Hole
Little River
Long B.
Cockle Bar Pt.
Falmouth Har.
Rio Bueno
Dry Harbor
Flag Pt.
St. Anns B.
Mammee B.
Ocho Rios B.
Frankfort Pt.
Cabicab
Eden
Port Maria
Annotto B.
Free Pt.
Buff Bay
Buff B.
Hope B.
Alligator Hd.
Port Antonio
Boston B.
North East End
Booby N.Pt.
Long B.
Darlingford
Manchioneal
Manchioneal Har.
Golden Gr.
Booby S.Pt.
Plantain Garden B.
Morant Pt.
Morant
Polosi
Rocky Point
Light
Cable to Bermuda
To Barbados
To Santiago, Cuba
Lucea Har.
Pedro Pt.
Green Har.
Mt. Sion
Lucea
Round Hill Bluff
Montpelier
Orange Pt.
Dolphin Hd.
Gt. Valley
N.Negril Pt.
Negril Har.
Negril or Long B.
S.Negril Pt.
West Pt.
Kings Valley
Springfield
St. Marys
Plain of Savannah
St. Pauls
Little B.
St. Johns Pt.
Savannah la Mar
Blewfields B.
Blewfields
Crab Pond Pt.
White Ho. Pt.
Luana Pt.
Black River B.
Black River
Droose Pt.
Parattee Pt.
NEW BANK
BLOSSOM BANK
Gt. Pedro Bluff
Lit. Pedro Pt.
Barnaculla
Alligator Pond R.
ALLIGATOR REEF
Lynch Vale
Mt. Hermon
St. Marys
Potsdam
St. Peters
Downs
Wigton
Mt. Plowden
2900
Snowdon
Round Hill
1180
Kemp Hill
420
Macarry B.
Dee Side
The Alley
Carlisle B.
Jackson B.
Portland Pt.
PORTLAND CAY
BRUNE BANK
Portland
Brazaletta Hill
Portland Bight
GOAT I.
SALT I.
Rocky Pt.
PIGEON I.
BIG PELICAN
BARE BUSH CAY
WRECK REEF
Cabrietta Pt.
Ft. Henderson
Old Harbor
Spanish Town
Guanaboa
The Angels
Liman Mt.
2268
Stony Hill
Cabre R.
Halfway Tree
Hope
Blue Mt.
Somerset
7300
Catherine Pk.
4897
Golden Spr.
Blue Mts. Trn. Ridge
KINGSTON
Bull Bay
Port Royal
Plum Pt.
Kingston Harbor
S.E.CAY
SOUTH CAY
Yallahs Pt.
St. Davids
LAMOTTES BK.
Rosette
Retreat
Yallahs
Morant B.
Ft. Lindsay
Rocky Point
Folly Pt.
Point
Bull B.
Garden
Bath
Negro R.
Plantain Garden R.
Clarendon
Four Paths
The Cross
Chapelton
Arthurs Seat
Bull Head
3140
Highgate Ch.
Thetford
Ewarton
Williamsfield
Highgate
Annotto
Middlesex
Sheerness
Retreat
Port Maria
Forges Pt.
Foster's Cove
Blowing Pt.
Guinea Pt.
Port Maria
Guys Hill
Vale of Pedro
Goshen
Bethany
Alderton
Montague
Rosetta
Tabernacle
Aboukir
Cave R.
Pedro
Thicket
Browns Town
Barracks
St. Anns
Tripoli
Bryan
Long Pond
Stewart Town
Retreat
Troy
Hector R.
Oxford
Mexico
Seaford
Accompong
Parkinsons Town
Queens Town
Ferris
Cathkin
Vauxhall
St. Johns
Robins R.
Clifton
Hope
Kings
Lacovia
Lilliput
Mill Gully
Mandeville
Porus
Goshen
Black River
Cockpit Country
Cockpit R.
Black R.
Cabarita R.
Maldon Mt.
Hunts B.
Luana R.
Mocha Mts.
St. Thomas R.
Carpenter Mts.
Cockpit Mts.
Rio Cobre R.
Rio Nuevo
Rio Minho
Milk R.
Gt. Pedro Pt.
Barracks
Bunkers Hill
Maroon Town
Cambridge
Palmers Town
The Black Grounds
Covey
Ivy
Ivy Green
Montego R.
Martha Brae R.
Duncan R.
Mangrove Pt.
Rio Bueno
Dry Harbor
Vale of Pedro
Sawyer R.
Cabarita R.
Milk R.
Rio Minho
Rio Cobre R.
Rio Nuevo
Cabicab
Eden
Port Maria
Annotto B.
Free Pt.
Palmetto Pt.
Buff Bay
Buff B.
Savannah Pt.
Hope B.
St. Margarets Hd.
Ship Hd.
Unity Bay
Alligator Hd.
Boston B.
Port Antonio
North East End
Booby N.Pt.
Long B.
Darlingford
CHRISTMAS I.
Manchioneal
Manchioneal Har.
Golden Gr.
Booby S.Pt.
Plantain Garden B.
Morant Pt.
Morant
Polosi
Rocky Point
Light
Cable to Bermuda
To Barbados
To Santiago, Cuba
To Colon
Cable to Colon
To Trinidad, Cuba
To Progreso
SCALE OF STATUTE MILES
0 5 10 20 30
SCALE OF KILOMETERS
0 5 10 20 30 40 50
Important towns are shown in heavy face type
Railroads
L. L. POATES ENGR'G CO., N.Y.
Longitude 77° 30′ West from 77° Greenwich
A 78°
B 77° 30′
C 77°
D 76° 30′
E 76°
18° 30′
18°
17° 30′
17°

towards the mountainous regions of the central part, where some of the peaks are over 7000 feet high. The most important chain is the Blue Mountains, occupying the east end of the island and containing the highest summits. Jamaica is favored with a well-indented coast line. There are about 16 harbors, the most important being on the south coast; besides, there are numerous smaller inlets affording safe anchorage for small vessels. The rivers of the island are numerous and flow north and south, the central mountain range forming the watershed between the two systems. Most of the rivers are unnavigable on account of their turbulence and occasionally cause disastrous floods. The most important are the Plantain Garden River, the Black River, Salt River, and Cabarita. Some of the streams are utilized for irrigating the sugar and fruit plantations. The soil is composed largely of sedimentary deposits derived from the red and white limestone formations which overlie the primitive granite that forms the main structure of the island. Some volcanic rocks in the eastern part of the island and a number of hot mineral springs afford the only evidence of volcanic action.

In the general characteristics of its flora and fauna Jamaica resembles the other West Indian islands. (See WEST INDIES.) Its flora, which is remarkably rich and varied, includes Jamaica cedar, logwood, fustic, plantain, mango, bamboo, cactus, and acacia. The allspice tree (*Pimenta officinalis*) is found almost exclusively here. Venomous snakes are unknown. Bird life includes humming birds, the green tody, cuckoos, tyrant birds, parrots, and buzzards. The climate of Jamaica is, next to its remarkable vegetation, the principal attraction of the island. Although it is quite humid and warm near the coast, the higher regions enjoy a delightfully mild, dry, and equable climate, with an annual range of temperature scarcely exceeding ten degrees, and with especially salutary effect in cases of pulmonary diseases.

The chief industry is agriculture. The mountainous regions are given up largely to pasture, while the plantations are found mostly in the lowlands. Of the total area, about 2,600,000 acres are reported as capable of productivity. The cultivated area in 1911–12 was stated at 941,708 acres; in 1912–13, 922,633 acres. The latter area comprised: tilled lands, 267,276 acres; guinea grass, 152,527; common pasture, 430,064; common pasture and pimento, 72,766. Of the tilled lands, bananas occupied 81,071 acres; ground provisions and mixed crops, 99,632; sugar cane, 31,753; coffee, 22,275; cocoanuts, 17,377; cacao, 11,236; oranges, 1715; other crops, 2217. The cultivation of sugar has declined in recent years, and that of fruit, especially bananas, has increased. The banana output in 1912 was nearly 13,400,000 bunches, valued at £1,241,000; coffee, £274,700; cacao, £139,800; sugar, £132,800; dyewoods, £88,500; pimento, £78,400; rum, £67,100. The land is divided into small holdings, those of five acres and less numbering over 60,600 out of the total number of about 80,000; but since the resumption of East Indian immigration in 1891, the large estates have been increasing in number. The chief industrial establishments are the sugar mills, oil presses, tanneries, etc.

The trade of the colony is chiefly with the United States and the United Kingdom, Canada ranking third; the former preponderance of the British trade has been lost in favor of the United States. Imports and exports increased from £2,014,477 and £1,543,267 respectively in the year 1903–04 to £3,050,479 and £2,709,283 in 1912. In the latter year imports from and exports to the United Kingdom were valued at £1,333,352 and £358,516; United States, £1,273,389 and £1,618,614; Canada, £291,363 and £148,943.

The chief exports are fruit, sugar, logwood extract, cacao, rum, coffee, and pimento. The proportion of sugar in the exports of the colony shows a decline from 30.6 per cent in 1879 to 5.1 in 1912; that of rum from 14.4 per cent in 1879 to 2.6 in 1912; coffee declined from 18.3 per cent to 10.7 during the same period; while fruit showed an increase from 2.9 per cent to 54.7 during the same period. The imports are composed chiefly of cotton manufactures, fish, and flour.

Jamaica is administered by a governor, assisted by a privy council, appointed by the crown, and a legislative council consisting of 10 members nominated by the governor, and 14 elected by limited suffrage, besides five ex-officio members and the governor. All financial measures must receive the approval of the governor before they are submitted to the consideration of the Legislative Council. For administrative purposes the island is divided into 15 parishes, administered by elective boards. Administratively attached to Jamaica are the Turks, Caicos, and Cayman islands, and Morant and Pedro cays. Justice is administered by a high court, circuit courts, and by resident magistrates in the parishes. The revenue and expenditure of the colony for the year 1912–13 amounted respectively to £1,432,400 and £1,549,667. A little over 30 per cent of the revenue was derived from customs duties. The public debt in 1912 was £3,843,974. The roads of the island are under the control of the government, which also owns and operates the railways. The railway extends from Kingston to Montego Bay (112.7 miles) and to Ewerton, in the other direction, by a branch from Spanish Town (17.2 miles); also to Port Antonio by a branch from Bogwalk, on the Ewerton branch (54.5 miles); and from May Pen to Chapelton (13 miles); total length open in 1914, 197.4 miles. There are numerous fortifications, and several ships of the royal navy are maintained at the North American and West India naval station.

The population of Jamaica, according to several censuses, is shown below:

YEAR	White	Colored	Black	Others	Total
1861...	13,816	81,065	346,374	.....	441,255
1871...	13,101	100,346	392,707	.....	506,154
1881...	14,432	109,946	444,186	12,240	580,804
1891...	14,692	121,955	488,624	14,220	639,491
1911...	15,605	163,201	630,181	*22,396	831,383

* East Indians, 17,380; Chinese, 2111; not stated, 2905.

Since 1891 there has been a considerable East Indian immigration; in 1912 the East Indians numbered 18,631, of whom 2841 were under indenture. In 1912–13 the birth rate in Jamaica was 38.8; death rate, 25.1; marriage rate, 3.7. The Maroons, the descendants of fugitive slaves, are few in number and do not mix with the other inhabitants of the island. The negroes are engaged principally in agriculture and are to

some extent peasant proprietors. The colored population is represented largely in the trades and professions, while the Chinese are chiefly shopkeepers. Education is optional and to some extent supported by the government. In 1912–13 there were 698 public elementary schools, with an enrollment of 100,179 and an average attendance of 60,900. There is no established church. Accurate religious statistics are not obtainable, but the most numerous churches are Anglican (237), Baptist (200), Wesleyan Methodist (127), and Presbyterian (82). The larger towns are Kingston (q.v.), the capital, with 57,379 inhabitants in 1911; Spanish Town, 7119; Port Antonio, 7074; Montego Bay, 6616; Savanna-la-Mar, 3400.

Jamaica was discovered by Columbus during his second voyage in May, 1494, and was taken possession of by the Spaniards in 1509. The office of governor was held by the descendants of Columbus till the extinction of the line. Under Spanish rule the native population rapidly dwindled away, and before the middle of the seventeenth century had become extinct. In May, 1655, a British expedition under Admirals Penn and Venables captured the island, and England was confirmed in the possession of it by the Treaty of Madrid in 1670. The sugar industry, which had its inception in 1673, soon developed into great importance, and the demand for plantation labor led to the importation of negro slaves. Between 1700 and 1786 more than 600,000 negroes were brought into the island. Many of them escaped to the forests of the interior, where they led a life of semibrigandage and threatened seriously the prosperity of the settlements on the coast. A fierce contest was carried on with them from 1715 to 1738, and they were not subdued completely till 1796. A negro insurrection in 1831 hastened the approach of emancipation, which had been agitated for a long time in England. In 1833 an Emancipation Act was passed, providing for the total extinction of slavery after Aug. 1, 1838, and awarding the sum of $29,987,000 (£6,161,927) as compensation to the owners of the liberated slaves, who numbered 309,338. The effects of emancipation on the economic condition of the country were disastrous at first. The freedmen abandoned the plantations in large numbers and took possession of the unoccupied lands in the interior. Labor to take their place could be obtained only with great difficulty, and bitter feelings of hostility between whites and blacks resulted. In October, 1865, the negroes at Port Morant, in the eastern part of the island, rose in resistance to the process of the courts; martial law was declared by Governor Eyre, and the insurrection was speedily put down—with excessive cruelty, as was maintained by the negrophiles, or with commendable firmness, as was asserted by a government commission sent out to investigate the affair. As a result of the social conflicts, the old parliamentary government of Jamaica was abolished in December, 1866, and the island was reduced to the grade of a crown colony. Representative government was partially reëstablished in 1884. On Jan. 15, 1907, an earthquake caused the death of over 600 persons and the destruction of much property. In November, 1912, a disastrous cyclone visited the western part of the island.

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JAMAICA. The county seat of Queens Co., N. Y., comprising the fourth ward of the Borough of Queens, New York City, 10 miles by rail from the centre of Brooklyn, on the Long Island Railroad (Map: New York City, Greater New York, G 6). It is essentially a residential suburb of New York and Brooklyn and contains King's Park, the City Training School, and many fine homes. There are also a number of carriage factories. Jamaica was settled by the Dutch as early as 1656, and several pre-Revolutionary structures still stand.

JAMAICA BARK. See EXOSTEMMA.

JAMAICA BULLACE PLUM. A West Indian fruit. See MELICOCCA.

JAMAICA KINO. A West Indian fruit. See SEASIDE GRAPE.

JAMAICA SORREL. See HIBISCUS.

JAMAK. See JANIZARIES.

JAMALTESA, hä'mål-tā'så, or **ESPINTO,** å-spēn'tō. The locality of a group of ruins, situated 20 miles north of Comayagua in Honduras. They exhibit a series of mounds whose summits are reached by flights of steps, above which are remains of considerable edifices. The largest of these mounds stands in the centre of a broad terrace, and the smaller ones are arranged at regular distances from it. Excavations in the surrounding country have brought to light many ancient vases and pieces of sculpture, which indicate, in the excellence of their workmanship, the existence of a high standard of art and marked ability.

JAMBLICHUS. See IAMBLICHUS.

JAMBOLI. See YAMBOLI.

JAMBRES. See JANNES.

JAMBUDVIPA, jăm'bụ-dwē'pà (Skt. *jambudvipa*, rose-apple tree island). In the Mahabharata, the first of the seven dvipas, or continents, into which the world is divided. It is surrounded by seven oceans and contains the dwelling place of the gods, the mountain of Meru, on which grows a great rose-apple tree, which gives the continent its name. Of the nine countries into which it is divided by mountain ranges, Bharata, or India, is the most important and in poetry and Buddhistic works bears the name of the whole continent.

JAMES (Lat. *Jacobus*, Gk. *Ἰάκωβος*, *Iakōbos*, Heb. *Ya'ăqōbh*). The name given certainly to three and probably to four men in the New Testament. Two of them—James, the son of Zebedee, and James, the son of Alphæus—were members of the Twelve (Mark iii. 17, 18). A third was a brother of the Lord (Gal. i. 19). The fourth, according to Luke (vi. 16; Acts i. 13),

was father of one of the Twelve, Judas by name (not Iscariot, John xiv. 22). 1. JAMES, THE SON OF ZEBEDEE, is named only in the Synoptic Gospels and Acts, but is alluded to in the appendix to John (xxi. 2). He was a Galilean fisherman, living in and probably a native of Capernaum, who, with his younger brother John, was called by Jesus to forsake his work and become a fisher of men (Mark i. 16 et seq.), a call which elicited a ready response. His mother's name was Salome, probably a sister of Mary, the mother of Jesus. He was one of the three intimate companions of Jesus in the apostolic circle (Mark i. 29; v. 37; ix. 2; xiii. 3; xiv. 3). This intimacy with Jesus doubtless emboldened Salome to make for him and his brother the ambitious request narrated in Mark x. 35–40. Jesus called James and his brother *Boanerges* (Mark iii. 17, sons of thunder, or noise, tumult), a characterization quite in keeping with the anecdotes related by Luke (ix. 54) and Mark (x. 35 et seq.). He was put to death by Herod in 44 A.D. (Acts xii. 21). (See BOANERGES.) According to legend, he preached in Spain, and after his death his body was carried thither and buried there. During the inroads of the Saracens he appeared in shining armor and terrified the Moslem hosts. As St. Iago (Santiago), he became the patron saint of Spain. 2. JAMES, THE SON OF ALPHÆUS, was so named by the Evangelists to distinguish him from James, the son of Zebedee. He holds the first place in the third group of four in all the lists of the Twelve. Beyond this fact we have no definite information, for his name is not certainly mentioned elsewhere in the New Testament. It is possible from Mark ii. 14 that he was a brother of Levi (or Matthew), who is there called son of Alphæus. If the Clopas of John xix. 25 be taken as a translation of Alphæus, then the Mary of Mark xv. 40 may have been the wife of Alphæus, and James the Less and the James mentioned in Mark xvi. 1, Luke xxiv. 10, and Matt. xxvii. 56 this other member of the apostolic circle. 3. JAMES, THE BROTHER OF THE LORD. The facts which are explicitly stated concerning him, or which may be inferred from the statements made, are as follows: According to Paul (1 Cor. xv. 7), he saw the risen Lord; was in Jerusalem three years after Paul's conversion (Gal. i. 19, where he is called the brother of the Lord to distinguish him from the son of Zebedee); was (with Peter and John) a leader in the Church at Jerusalem when Paul, 14 years later, went up thither (Gal. ii. 1–10, where he is called simply James, for the son of Zebedee had already been put to death); was a married man (1 Cor. ix. 5). According to the Book of Acts, he was a believer (i. 14); a leading spirit in the Church at Jerusalem before (xii. 17), at (xv. 13), and after (xxi. 18) the council at Jerusalem. According to the Gospels, he was a brother of Jesus (Mark vi. 3); did not believe in the Lord during His earthly life (John vii. 5); agreed with the family of Jesus in regarding the Lord as demented and came with them to take Him away from His active work (Mark iii. 21). Josephus records his death at the instigation of the Sanhedrin (c.62–63 A.D.). Tradition names him the Just and ascribes to him the homily, in the style of the Wisdom literature, generally known as the Epistle of James (q.v.). Some scholars hold that James was not a son of Joseph and Mary, but a son of Joseph by a former wife; others that this James is the same as James the Less, a son of Mary and Alphæus (= Clopas), and that the Mary here referred to was a sister of Mary, the mother of Jesus, i.e., that James was a cousin of the Lord. (See BRETHREN OF THE LORD, THE.) 4. Of the fourth James nothing is known beyond the fact that he was not the brother of Judas, the Apostle, as stated in the Authorized Version, on the authority of the Latin text of Beza, where the Apostle Judas is confused with the Judas mentioned in the Epistle of Jude, ver. 1, as the brother of James. See JUDAS, THE LORD'S BROTHER.

JAMES, Sp. **JAYME**, or **JAÍME**, hī'mă, **I**, called THE CONQUEROR (1208–76). King of Aragon from 1213 to 1276, son and successor of Pedro II. He was born at Montpellier. On the death of his father (1213), Simon de Montfort, who had charge of James, endeavored to use this position for his own advantage; but the Pope forced him to surrender the boy. James won the surname of *El Conquistador* by wresting the Balearic Islands in 1228–32, by capturing Valencia in 1238 from the Moors, and by achieving other successes over them in Murcia during the last 20 years of his life, in behalf of his son-in-law, Alphonso the Wise of Castile. His possessions were divided between his two legitimate sons by Yolande of Hungary. He wrote his own life in Spanish; there is an English translation by Forster, *The Chronicle of James I, Written by Himself* (London, 1883). Consult also F. D. Swift, *The Life and Times of James I, the Conqueror, King of Aragon* (Oxford, 1894), and Francesch Carreras y Candi, "Espases maravelloses en lo regnat de Jaume lo Conqueridor," in *Revue Hispanique*, vol. xv (Paris, 1906).

JAMES, JAYME, or **JAÍME II**, called THE JUST (c.1260–1327). King of Aragon from 1291 to 1327, second son of Pedro III. He succeeded his father in Sicily in 1285. When he succeeded his brother, Alfonso III, in Aragon in 1291, he resigned his claim to Sicily and received in its stead Sardinia. In 1319 he promulgated a constitution by which Aragon, Catalonia, and Valencia were to be under the same laws. So much was he trusted by the people that his royal power was less limited than that of his predecessors, and in 1307 he annulled the decree requiring an annual meeting of the Cortes and replaced it by a biennial act under which the King could name the place of meeting. See ARAGON.

JAMES I OF ENGLAND AND VI OF SCOTLAND (1566–1625). He was the son of Mary, Queen of Scots, and her cousin and second husband, Henry Stuart, Lord Darnley, and was born in Edinburgh Castle June 19, 1566. The following year his mother was forced to abdicate, and he became King. There were several regents during the minority, the best of whom was the Earl of Morton, whose fall was brought about by the influence of the Duke of Lennox and that of the Earl of Arran in 1581. Meanwhile James was receiving a thorough scholastic training, especially in Latin and theology, his most famous teacher being George Buchanan. After the fall of Morton there was a series of conspiracies, a French and an English faction each seeking to control the young King. In 1582 James was seized by the Earl of Gowrie and his allies, who were adherents of England. In 1583 James escaped and joined the party hostile to the Presbyterian clergy, but after some minor difficulties

an alliance with Elizabeth of England was signed in 1586. This treaty brought about a complete breach between James and his mother, whom, indeed, he had not seen since infancy. She now disinherited him in favor of Philip II of Spain, who was planning the conquest of England in the interest of Catholicism. But in 1587 she was executed in England, after James had interceded for her with Elizabeth in a half-hearted way. James's marriage to Anne of Denmark, in 1589, brought him into closer relations with the Protestants; but the King, as in everything else, cautious also in his foreign policy, maintained at the same time friendly relations with the Roman Catholic powers. In Scotland itself James had considerable trouble both with the Presbyterian clergy and the great Catholic nobles. There were several conspiracies against him, among which may be mentioned the Gowrie Conspiracy (q.v.) in 1600.

In 1603 James succeeded to the English throne as a descendant of Margaret Tudor, daughter of Henry VII, and one great object of his policy was thereby obtained. James was in favor of peace with Spain, and so he at once dismissed Sir Walter Raleigh (q.v.) from the Council and imprisoned him. He continued Robert Cecil (q.v.), the Minister of Elizabeth, in power, and as a result the old fines continued to be imposed on the Catholics, and the difficulties with them resulted in 1605 in the Gunpowder Plot (q.v.). Moreover, the Puritans also caused trouble. James finally consented to meet their representatives; but the result was unfavorable to the Puritans, on account of the similarity of their doctrines to those of the Presbyterians, with whom James had had so much trouble in Scotland. (See HAMPTON COURT CONFERENCE.) In foreign affairs James broke with the policy of Elizabeth, deserted the Dutch, signed (1604) a treaty with Spain, and began to seek a marriage alliance for his son with its royal house. At home James provoked national prejudices by seeking to bring about the political union of England and Scotland. Though he was unsuccessful in this, he obtained a judicial decision in 1608 whereby Scotchmen born after James's accession to the English throne, the so-called "post-nati," were subjects of the King of England. James believed himself independent of all control, but in reality was continually ruled by favorites. In 1607 a Scotchman named Robert Carr (q.v.) obtained control over James, and in 1616 he gave way to another favorite, George Villiers (q.v.).

With the outbreak of the religious wars in Germany, foreign affairs became all-absorbent. In the Cleves-Jülich troubles in 1609 James had allied himself for a short time with the Dutch, and in 1613 his daughter, Elizabeth, had married the Elector Palatine, the head of the Protestant Union of Germany. In 1617, however, James vigorously reopened negotiations for a Spanish marriage, and as a result the election of his son-in-law, the Elector Palatine, as King Frederick V of Bohemia in 1619, which marked the outbreak of the Thirty Years' War, was extremely annoying to him. The English nation desired to aid Frederick, but James refused to support the Protestants on the Continent. When the fortune of war went against Frederick, grave discontent broke out in England; and James, now that it was too late, sent some slight assistance. Meanwhile the negotiations with Spain went on. In 1623 Charles, who was Prince of Wales since the death of Prince Henry in 1619, together with Villiers, created in 1624 Duke of Buckingham, went to Spain to prosecute the suit. Buckingham, however, quarreled with the leading men of the Spanish court, the negotiations resulted in a war with Spain, and a marriage alliance was signed instead with France. James died on March 27, 1625. James was known as one of the best scholars of his time, though in him scholarship often assumed the form of ridiculous pedantry. The Authorized Version of the Bible was completed between 1604 and 1611, and the work was encouraged by the King. His vacillating policy and complete subserviency to the will of his favorites caused him to be regarded with contempt, and he was pithily described by the great French statesman Sully as the "wisest fool in Christendom." He believed fully in the divine right of kings and desired an absolute monarchy, but did not know how to manage his parliaments and was compelled to dissolve them on several occasions. Moreover, the House of Commons impeached his ministers, a notable case being that of his great Chancellor, Francis Bacon (q.v.). In Scotland the reign of James was fairly successful, for he understood the temper and spirit of that country better than that of England. The reign of James is also notable for the beginning of permanent English colonization in America and some unsuccessful expeditions, as that of Sir Walter Raleigh to the mouth of the Orinoco in 1616. See *History*, under UNITED STATES.

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JAMES II OF ENGLAND AND VII OF SCOTLAND (1633–1701). The son of Charles I and Henrietta Maria, he was born Oct. 14, 1633. While a mere infant, he was created Duke of York and Albany. In 1646 he was surrendered along with his father to the Parliamentary authorities, who held him in custody till he managed to escape to Holland in 1648. He served in several campaigns under Turenne; but as the treaty between Cromwell and Louis XIV provided for the removal of the English royal family from France, James entered the military service of Spain. Appointed Lord High Admiral of England at the Restoration, he twice commanded the English fleet in the ensuing wars with Holland. Although he showed some ability in this office, his weak, inconsistent character stood in the way of much-needed naval reform. On the death of his wife Anne—daughter of Sir Edward Hyde—as an avowed Catholic, he declared himself a convert to her faith. The Test Act of 1673 accordingly compelled him to resign his office. His marriage in this year with Mary

Beatrice, sister of the Duke of Modena, led him to favor close connection with Louis XIV. When great irritation against the Roman Catholics arose in England on the publication of Titus Oates's supposed discoveries, the Duke of York retired for a short time to Holland. The bill for his exclusion from the throne was twice read before the House of Commons and prevented from passing only by the prorogation of Parliament, May 26, 1679. In 1680 the Exclusion Bill passed the House of Commons, but was rejected by the Lords. On his return from abroad, and while this bill was before Parliament, the Duke was sent to govern Scotland. But when Charles II died (Feb. 6, 1685), James succeeded to the crown without opposition. At the beginning of his reign he incurred the hostility of Parliament by favoring Catholics, but, like his brother, Charles II, sought to become somewhat independent of Parliament by allowing himself to be a pensioner of Louis XIV. In Passion Week, 1685, the rites of the Church of Rome were openly celebrated at Westminster with full splendor. In the same year the suppression of the Duke of Monmouth's rebellion in England, and that of the Earl of Argyll in Scotland, was followed by great severities. On the western circuit alone, well known as the Bloody Assize, presided over by the infamous Jeffreys, 320 persons were hanged. When Parliament met (November 9) James requested extra supplies to maintain a standing army; but after a stormy debate he was refused. To aid his endeavors in favor of the Roman Catholics, he resolved to conciliate the Puritans, much as he hated them. On April 4, 1687, appeared the memorable Declaration of Indulgence, in which he announced his intention of protecting dissenters in the free exercise of their religion; and the nation beheld the extraordinary spectacle of the house of Stuart leagued with republican and regicide sects against the old Cavaliers of England. The attempt to conciliate the Puritans, however, was unsuccessful; and in March, 1687, it began to be evident that the war between King and church must soon reach a climax. At that time, a vacancy having occurred in the presidency of Magdalen College, Oxford, a royal letter recommended Anthony Farmer, a Roman Catholic, to the vacant place. For Farmer was afterward substituted Parker, a Bishop of Oxford, who, in addition to other legal disqualifications, was known to be a Roman Catholic, though not avowed. To place him in the office the King resorted to military force. On April 27, 1688, James published a second Declaration of Indulgence, which he ordered to be read in all the churches in the Kingdom. The clergy generally disobeyed, and seven of the bishops, for venturing on a written remonstrance, were committed to the Tower on a charge of seditious libel. On June 10 of the same year James's luckless son, known in history as the Pretender, was born. The certainty that the young heir to the throne would be trained in the Roman Catholic faith determined the country to be rid of the King. Public sentiment compelled the court to acquit the seven bishops, June 30, 1688. That very night an invitation was dispatched to William, Prince of Orange, signed by seven of the leading English politicians, to bring an army into England for the restoration of liberty and for the support of Protestantism. On November 5 William landed at Torbay with 14,000 men. James found himself deserted by the nobility, gentry, and army; even his own children turned against him. He retired to France, where he was hospitably received by Louis XIV, who settled a revenue upon him. Early in March of the following year he made a hopeless attempt to regain his throne by invading Ireland with a small army, with which he had been furnished by the King of France. He waged war on the island for more than a year, but was finally defeated at the battle of the Boyne, July, 1690. Returning to France, he continued to reside at Saint-Germain till his death, Sept. 6, 1701. During the greater part of his life he was as licentious as others of his rank, but in his last years of retirement he became a religious ascetic.

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JAMES I (1394–1437). King of Scotland from 1406 to 1437. He was the third son of Robert III and in 1402 became heir to the throne on the death of his elder brother, the Duke of Rothesay, supposed to have been murdered at the instigation of his uncle, the Duke of Albany. In 1404 or 1406, while on his way to France, the vessel in which he embarked was taken by the English, and James was carried to London and sent to the Tower. He was well treated, but held a prisoner for 18 or 19 years. In 1420 he accompanied Henry V in his expedition to France. On the death of Robert III, in 1406, the government devolved on the Duke of Albany, and on his death, in 1420, his son Murdoch succeeded to the regency. In 1424, James was allowed to return to Scotland on giving hostages for the payment of his ransom, which had been fixed at 60,000 marks (£40,000), but 10,000 marks were deducted because previous to leaving England he married Jane, daughter of the Earl of Somerset, a son of John of Gaunt. To the excellent education which he had received in England James probably was indebted for the development of his very considerable powers of mind. He was the author of *Kingis Quair* (i.e., the King's quire or book), which shows him to have been possessed of high poetic talent. *Christ's Kirk on the Green* and other poems have been attributed to him, but the authorship is disputed. With the acts of his first Parliament, in 1424, the regular series of Scottish

statutes begins. Many excellent laws were passed for the regulation of trade and for the internal economy of the Kingdom, while these were followed up by an executive vigor which Scotland had never known before. No sooner did James feel himself firmly seated on the throne than he resolved to execute vengeance on the Albany family. By a Parliament held at Perth in 1425, the late Regent Murdoch, the Earl of Lennox, and other nobles of their family were found guilty of certain crimes laid to their charge, and four of them were beheaded. The next few years of James's reign are among the most really peaceful in the history of Scotland previous to the union of its crown with that of England; the efforts of the King being entirely directed to the repression of the internal disorders of the Kingdom, especially of the Highlands, where scarcely any law except that of the strongest had hitherto been known. In 1436 James's eldest daughter, Margaret, was married to the Dauphin of France, afterward Louis XI. Among those whom the severe policy of the King had offended was Sir Robert Graham, who had been banished in 1435 and had suffered the loss of his estate. On Feb. 20, 1437, at Perth, the royal chamber was invaded by a band of armed men headed by Graham, and the King was dragged from his hiding place and put to death. James was unquestionably the most able of the Stuart family. Both his intellectual and his practical abilities were of a very high order. His works have been edited by Skeat for the Scottish Text Society (Edinburgh, 1884). Consult Andrew Lang, *History of Scotland from the Roman Occupation*, vol. i (New York, 1900).

JAMES II (1430–60). King of Scotland from 1437 to 1460. He was the son of James I and was crowned at Holyrood in the seventh year of his age. Sir William Crichton, the Chancellor, and Sir Alexander Livingstone competed to get possession of the person of the young King and consequently to wield the royal authority. The power of the house of Douglas was so great as almost to overshadow that of the crown. In the hope of curbing it Crichton had treacherously caused William, the young Earl of Douglas, and his brother to be put to death. The policy of the act proved to be as bad as its spirit, for by the marriage of the heiress of the murdered youth with her cousin the family was restored to more than its former power. The young King, weary of the rule of Crichton, put himself under the control of another Earl of Douglas. Under the rule of the Earl the Kingdom fell into complete anarchy and became a scene of violence and disorder. In 1449 James married Mary of Gelderland and began his real rule. Like most of the Stuarts, he possessed great animal courage; he seems also to have possessed much of his father's clearness of perception in framing laws and of his energy in enforcing their observation. Chafing at the power of Douglas, James treacherously murdered him in Stirling Castle (1452), and Douglas's brother, after a vain resistance, fled. In 1460 James infringed an existing truce with England by laying siege to the castle of Roxburgh, then in the hands of the English. On August 3 he was killed by the bursting of a cannon. Consult Andrew Lang, *History of Scotland from the Roman Occupation*, vol. i (New York, 1900).

JAMES III (1451–88). King of Scotland from 1460 to 1488. He was the son of James II and Mary of Gelderland. On the death of his father the government appears to have been conducted by his mother, who was under the influence of Archbishop Kennedy. On the death of the latter, in 1466, the young King fell under the control of Lord Boyd and his family. In 1467 they had acquired influence so great that James gave his sister in marriage to Sir Thomas Boyd, son of Lord Robert, Sir Thomas being at the same time created Earl of Arran. Before the King's marriage, however, in 1469, with Margaret of Denmark, power changed hands; Lord Boyd was obliged to flee, and even Arran was driven into exile. Soon after this James seems to have fallen under the influence of favorites. Conspicuous among these was a man named Cochrane, an architect. Through his wiles the Duke of Albany, brother of James, was forced to flee from the Kingdom, having been charged with witchcraft; while the Earl of Mar, also a brother of the King, was imprisoned on the same accusation and probably put to death. The banished Duke of Albany raised an army and invaded Scotland in 1482; a short-lived peace followed, and Albany died in exile in 1485. In 1487 Margaret of Denmark died. James's love of pursuits which for the age in which he lived were intellectual brought upon him the contempt of a warlike and barbarous nobility, on which the weakness of his moral character imposed no check. A conspiracy, the origin of which is obscure, ended in a rebellion having for its avowed object the dethronement of the King. Many of the peers, however, remained loyal, so that James was enabled to put himself at the head of a considerable force. But, mainly through the cowardice of the King, the royal army was defeated at Sauchieburn, June 11, 1488. James escaped from the field, but he was afterward discovered by one of the rebels and murdered. Boece's *Chronicle* is the fullest account. Consult Andrew Lang, *History of Scotland from the Roman Occupation*, vol. i (New York, 1900).

JAMES IV (1473–1513). King of Scotland from 1488 to 1513. The son of James III and Margaret of Denmark, he was born March 17, 1473. He was made the nominal leader of the rebel army by which his father was slain, and although but a youth at his accession he took from the first an active part in public affairs and aided personally in suppressing the rebellion headed by the Earl of Lennox. He won great popularity by his interest in the common people, and throughout his reign he labored to develop commerce and to build up a navy. In 1503 he married Margaret, daughter of Henry VII of England, and made a treaty with his father-in-law which secured peace between the two countries for a few years. Meantime James was passing laws for the better administration of criminal justice, for the annual election of magistrates, for confirming the privileges of the burghs, for the discouragement of beggars, and for the daily session of the council at Edinburgh. This city was now becoming the capital of the Kingdom. Not only is his reign important in the history of Scottish law, but he showed skillful diplomacy in securing friendly relations with the continental powers. From the accession of Henry VIII, however, trouble again arose between England and Scotland. In 1513 the English Parliament declared war against both Scotland and France. The Scottish King, who had long been making preparations, marched

with a large, well-equipped army to meet Surrey, the English commander, at Flodden. It was a "black day" for Scotland; she lost perhaps 10,000 men, a great number of nobles, and her King, who fell fighting in the ranks (Sept. 9, 1513). Though great in the history of Scottish civilization, he was an incompetent general, and the defeat was due chiefly to him. Not till after her union with England did his country recover from the loss. His fickle wavering between France and England also caused Scotland much trouble. James V, his only legitimate child, succeeded him. Consult: *Treasurer's Accounts*, *Exchequer Rolls*, and *Acts of Parliament* of his reign; Teulet, *Papiers d'état, pièces et documents inédits ou peu connus, relatifs à l'histoire de l'Ecosse au XVIème siècle, tirés des bibliothèques et des archives de France* (Paris, 1851–60); J. H. Burton, *History of Scotland* (8 vols., London, 1873); Brown, *History of Scotland*, vol. i (Cambridge, 1899); Andrew Lang, *History of Scotland from the Roman Occupation* (4 vols., New York, 1900–07).

JAMES V (1512–42). King of Scotland from 1513 to 1542. The son of James IV and Margaret of England, he was born April 10, 1512. The period of his long minority is one of the gloomiest in Scottish history. Such was the lawless state of the country that it was impossible to travel safely except in armed companies. The Duke of Albany, representing the interests of France, was chosen Regent by Parliament, but his government was almost powerless, owing chiefly to the jealousy and enmity of the Earl of Angus, who was friendly to England and had married the Queen mother. Ultimately Angus prevailed, and the Duke retired to France. For a while the Angus branch of the Douglas family ruled Scotland in the same manner as the elder branch had ruled it in the beginning of the reign of James II. In his seventeenth year the King, resolving no longer to brook the authority of the Earl, escaped from his custody. Angus and his family were banished, and their estates declared forfeited. In 1536 James visited the court of France, and next year married Madeleine, daughter of Francis I. She lived but a few weeks. Soon after her death the King married Mary of Lorraine, daughter of the Duke of Guise. Henry VIII, after declaring his independence of the Pope, wished his nephew to support him in the movement; but James remained true to his ancestral faith and strengthened the laws against heresy. Far from coming to an agreement on the subject of religion, the two Kings went to war against each other. In 1542 the English, while making an incursion across the border, were attacked and defeated with great loss by the Earl of Huntly and Home. To avenge this disaster, Henry sent the Duke of Norfolk into Scotland with an army of 20,000 men, who, however, retired on the approach of James with a superior force. The Scottish King desired thereupon to invade England, but the nobles would not follow him. There had long been strife between the crown and the nobility, but the breach was widening with the progress of the Reformation; for while the Lords adopted the new ideas, the King clung to the Church. He antagonized the nobles further by championing the Commons against them. Finally, Lord Maxwell and a few other western nobles consented to lead an army of 10,000 men across the border, but they were enraged at seeing Sinclair, the King's favorite, set over them as commander. In the disorder which followed this appointment the army was disgracefully beaten by a few hundred Englishmen. This dishonor to his arms seems to have broken the heart of James and to have affected his mind. He shut himself up in Falkland Palace, where he died, Dec. 14, 1542, a few days after the birth of his unfortunate daughter Mary. He was a protector of the poor and an excellent administrator, who made his power felt for good throughout Scotland; at the same time he was avaricious and licentious and unable to bear up against misfortune. Consult the bibliography for the preceding subject, and, in addition, for relations with the Pope: Theiner, *Vetera Monumenta Hibernorum et Scotorum Historiam Illustrantia, 1216–1547* (Rome, 1864); J. A. Froude, *History of England* (12 vols., New York, 1874).

JAMES VI OF SCOTLAND. See JAMES I OF ENGLAND AND VI OF SCOTLAND.

JAMES VII OF SCOTLAND. See JAMES II OF ENGLAND AND VII OF SCOTLAND.

JAMES, CHARLES (?–1821). An English soldier and author. He is remembered chiefly for his eyewitness account of the opening scenes of the French Revolution published under the title *Audi Alteram Partem* (1793), wherein he extenuates the conduct of the revolutionists. His other writings diverge widely, from *Petrarch to Laura: A Poetical Epistle* (1787) and *Poems* (2 vols., 1789) to *Hints Founded on Facts, or a View of our Several Military Establishments* (1791) and several other publications on military subjects.

JAMES, DANIEL WILLIS (1832–1907). An American merchant and philanthropist, born in Liverpool, England. In his youth he entered the employ of Phelps, Dodge & Co. in New York City. He became chiefly known for his benefactions, although he gave without ostentation and often anonymously. To Union Theological Seminary he gave $1,000,000 for the erection of new buildings on Morningside Heights in New York City, and during his lifetime he gave large sums also to Amherst and Oberlin colleges, Hartford Theological Seminary, Columbia University, and the Cathedral of St. John the Divine. By his will he left legacies of $100,000 each to Union Theological Seminary, Columbia and Yale universities, Amherst College, Cooper Union, the Children's Aid Society of New York, the American Board of Commissioners for Foreign Missions, Hampton Institute, the Cathedral of St. John the Divine, and the Presbyterian Hospital of New York. He presented to the town of Madison, N. J., a public park, a library, and an assembly hall.

JAMES, EDMUND JANES (1855–). An American political economist and university president, born at Jacksonville, Ill. He was educated at Northwestern and Harvard universities and at Halle, where he received the degrees of A.M. and Ph.D. in 1877. For several years he was principal of high schools at Evanston and Normal, Ill. From 1883 to 1895 he was professor of public finance and administration in the Wharton School of Finance and Economy, University of Pennsylvania, at the same time holding the chair of political and social science in the university. For five years (1896–1901) he was professor of public administration and director of the extension division at the University of Chicago. In 1902 he became president of Northwestern University, and in 1904 president

of the University of Illinois. He served as president of the American Economic Association; was a founder, and from 1889 to 1901 president, of the American Academy of Political and Social Science (editor of its *Annals*, 1890–95; associate editor, 1895–98); and from 1891 to 1895 was president of the American Society for the Extension of University Teaching. Among his writings are: *Outline of a Proposed School of Political and Social Science* (1885); *Relation of the Modern Municipality to the Gas Supply* (1886); *The Legal Tender Decisions* (1887); *The Federal Constitution of Germany* (1890); *The Federal Constitution of Switzerland* (1890); *The Education of Business Men in Europe* (1899); *Growth of Great Cities* (1900); *Government of a Typical German City—Halle* (1900); also a large number of papers in transactions of societies. While at the University of Pennsylvania, he edited its Political Economy and Public Law Series of Publications (1886–95).

JAMES, EPISTLE OF. The first of the so-called catholic Epistles of the New Testament. After the signature, address, and greeting (i. 1), the writer at once exhorts his readers to a proper endurance of "trials" (Gk. *πειρασμοί*, testings) and to a proper attitude towards "temptations" (same Gk. word), noting that the latter are not sent of God, but arise from human inclinations (i. 2–18). Next he points out that not only hearing, but doing the word is necessary (i. 19–27), after which comes a trenchant rebuke of the tendency to curry the favor of the rich and neglect the poor (ii. 1–13). This leads to a discussion of the relation between faith (i.e., formal assent to religious truth) and works, showing that faith must exhibit itself in deeds (ii. 14–25). Those eager to become teachers are reminded that it is in word or speech that one is most liable to fail or offend, and the tongue needs strong curbing (iii. 1–12). True wisdom shows itself in good conduct, especially peaceableness (iii. 13–18). He next admonishes against strife and quarrelsomeness (iv. 1–10), against backbiting and judging (iv. 11–12), to proper recognition of Providence (iv. 13–17), that the haughty rich be more considerate of the poor (v. 1–6), to patient waiting and endurance until the reward comes at the Parousia (v. 7–11), against swearing (v. 12), and finally to prayer and labor for the conversion of others (v. 13–20).

This epistle, or homily, is either one of the very earliest or one of the latest of the New Testament writings, and the solution of the problem of its date rests upon the determination of three questions, each of them interesting in itself, and all of them subject to debate among scholars to-day. 1. Is the writer of the Epistle the well-known James, the brother of the Lord, the head of the Jerusalem Church, or an unknown James of postapostolic times? 2. Were the recipients of the letter distinctively Jewish Christians, or Christians generally, Gentile as well as Jewish? 3. Does the situation of the readers betray the primitive condition of the Church before the Judaizing controversy of Acts xv, or the developed condition of the Church after that controversy had been forgotten? As to the first question, it would seem that the naïve way in which the author describes himself ("James, a servant of God and of the Lord Jesus Christ," i. 1) could be better understood of one who, like the Jerusalem James, was conscious of his recognized authority in the Church (cf. Gal. ii. 9, 12; Acts xv. 13; xxi. 18), and so needed no further titles to commend himself to those to whom he wrote, than of an unknown James who, if he followed the custom of the second century, must have made his message depend upon such titles as he could either honestly or falsely assume. There is naturally the query whether we can suppose the culture evident in the language and diction of the Epistle possible in the case of a Palestinian Jew, as the brother of the Lord must have been; but conclusions here are wholly conjectural and must yield to more definite indications furnished by other points. As to the second question, the wording of the address ("James . . . to the twelve tribes which are of the Dispersion, greeting," i. 1) makes apparently clear the distinctively Jewish character of the readers —an impression which seems to be confirmed by several hints throughout the letter (e.g., ii. 2, 19, 21; v. 4, 11, 17, 18). At the same time we cannot ignore the fact that terms similar to the address are used symbolically, both by Paul (Gal. vi. 16; Phil. iii. 3) and by Peter (1 Pet. i. 1; ii. 9); while the phrases referred to in the body of the letter might be possible with a Gentile readership (cf. Rom. iv. 1, ix. 29; 1 Cor. viii. 6). The third question is really the decisive one; since, if the situation shows itself necessarily that of primitive Christianity, the readers must be considered distinctively Jewish Christian, and the author becomes almost necessarily the Jerusalem James; while, if the situation is that of postapostolic Christianity, the readers cannot be exclusively Jewish, since a group of such churches in the Diaspora is scarcely supposable so long after Gentilism had become part of Christendom. Much less, on the supposition of such a later date, can the author have been the Jerusalem James.

The situation disclosed by the Epistle, however, is clearly that of early Christianity, while the Church was yet almost exclusively Jewish, and before the introduction of Gentiles into its membership had brought about the Judaistic controversy, considered in the Jerusalem Council (Acts xv) and discussed by Paul specifically in his Galatian Epistle. This is shown (1) not so much by the social customs of ii. 1–9 and community conditions of v. 1–6, the commercial life of iv. 13, the term given to their religious assemblies in ii. 2, and the oath formula described in v. 12, all of which indeed disclose a definite situation belonging to the readers that cannot be naturally understood save as Jewish; but rather (2) by the fact that there is such an absence of all reference to Gentile and Jewish differences in the Church as has its only legitimate explanation in the fact that the gospel had not yet been carried outside of Jewish circles to such an extent as to raise the questions which constituted the controversy of Acts xv; and, specifically, (3) by the fact that not only is the faith and works discussion of ii. 14–25 not a polemic against Paul, but it is not even a sympathetic explanation of his position. It belongs distinctively to a period previous to the Pauline propaganda, as is clear from the fact that the idea of "justification" which it embodies is specifically the Old Testament idea of the justification of the just, not the Pauline idea of the justification of the sinner; while its idea of "faith" is distinctively the idea seen in the Old Testament of intellectual belief in

monotheism, not the Pauline idea of spiritual trust in Jesus Christ. Against this uniquely Jewish conception of things it is of little moment to emphasize the moral degeneracy of the times supposed in the Epistle as impossible in the early years of Christianity. As such degeneracy was actual in Judaism itself (cf. Rom. ii. 17–29), the question is simply one of the possibility of the reaction of Jewish Christianity into its previous condition, and it is altogether too bold a claim to make that the 17 years between Pentecost and the Jerusalem Council were too short a period for this. 4. The absence of the conventional Christian terminology common to the Christian writings of the latter part of the first and the early part of the second centuries is also decisively in favor of an early date for this Epistle. The Epistle is, therefore, to be dated some time before 50 A.D., from somewhere in Palestine—most likely Jerusalem, by James, the head of the mother Church. It was addressed as an encyclical letter to the near-by Jewish Christian communities—probably those in the Syrian regions to the north, which were quite likely those first evangelized after the Stephen persecution (cf. Acts viii. 1, 4, 40; ix. 1, 2, 19–25; xi. 19). Its purpose was to encourage the readers in face of their peculiar trials, which were easily possible in the time succeeding the above persecution, and at the same time to warn them against their special degenerating tendencies, which were quite likely to follow upon these trials (cf. especially chaps. i and ii).

Bibliography. A full survey of the literature on James will be found in James Moffatt, *Introduction to the Literature of the New Testament* (New York, 1911), who states the case fairly for the late date and authorship by some unknown writer. The counter position is ably stated by Theodor Zahn in his *Introduction to the New Testament* (Edinburgh, 1909); and by J. B. Mayor in his *Epistle of St. James* (3d ed., London, 1910).

JAMES, George Payne Rainsford (1799–1860). An English novelist and historical writer, born in London, Aug. 9, 1799. He attended a school at Putney, where he acquired some knowledge of French and Italian, and subsequently educated himself by wide reading and extensive travel on the Continent. After he had won a place among the contemporary novelists, he was appointed Historiographer Royal under William IV and, later in life, Consul at Boston, at Norfolk, Va., and finally (Consul General) at Venice, where he died May 9, 1860. He began his literary career by writing Eastern tales, which were praised by Washington Irving. In 1829 he published *Richelieu*, an historical novel somewhat in the manner of Scott. Thereafter volume followed volume—and his novels were for the most part historical—in rapid succession, until the number of novels and tales reached almost 100. The best of them is, perhaps, *Mary of Burgundy*. He also wrote, or rather dictated, many biographies and histories, among which are *Memoirs of Great Commanders* (1832), *A History of Chivalry* (1843), and *Life of Richard I* (4 vols., 1842–49). Following the example of Scott, he collected his novels with elaborate prefaces (1844–49). Some of them are still obtainable in cheap editions. While in the United States, he wrote in connection with M. B. Field *Adrian, or the Clouds of the Mind* (1852). James was immensely popular in his own time, but his conventional moralizing and descriptions have long been out of date. His novels are all constructed on the same mechanical plan. They open with two horsemen riding through lovely scenes, or with an invocation to them before they appear, or with the variant of two men talking in subdued tones over their cups. Consult *Works* (new ed., New York, 1903), and A. H. Joline's consideration of James, in his *At the Library Table* (Boston, 1910). A burlesque of the style of G. P. R. James was written by Thackeray under the title of "Barbazure," in his *Novels by Eminent Hands* and first printed in *Punch* (London, 1847); also in Centenary Biographical Edition, vol. i (ib., 1911).

JAMES, George Wharton (1858–). An American explorer, ethnologist, and archæologist, born at Gainsborough, Lincolnshire, England. He spent many years in exploration in the Southwest of the United States, especially along the Grand Cañon of the Colorado River, and at the same time made extensive researches among the various Indian tribes of those regions. He became a popular lecturer on these subjects, using pictures made by himself. He was associate editor of the *Craftsman* (1904–05) and editor of the *Basket* (1903–04) and *Out West* (1912–). He is author of *In and Around the Grand Canyon* (1900; rev. ed., 1911); *Indian Basketry* (1900; 3d ed., 1903); *The Indians of the Painted Desert Region* (1903); *In and Out of the Old Missions* (1905); *The Story of Scraggles* (1906); *The Wonders of the Colorado Desert* (1906; 2d ed., 1911); *What the White Race may Learn from the Indian* (1907); *Through Ramona's Country* (1908); *The Grand Canyon of Arizona* (1910; rev. ed., 1912); *The Heroes of California* (1910); *A Little Journey to Strange Places and Peoples* (1911); *The Old Franciscan Missions of California* (1913); *The Prehistoric Cliff Dwellings of the South West* (1913); *California, Romantic and Beautiful* (1914); *Indian Blankets and their Makers* (1914).

JAMES, Sir Henry (1803–77). An English topographer, born at Rose-in-Vale, near St. Agnes, Cornwall, and educated at the Woolwich Military Academy. He became a probationer for the Corps of Royal Engineers in 1825, in 1826 was made lieutenant of engineers, and went thence into the ordnance department, where he made such good use of his opportunities for scientific study that he was appointed superintendent of the geological survey in Ireland in 1844. Two years later he was appointed to a position at the Portsmouth dockyards, was afterward made chief topographer and statistician of the War Office (1857), and was at the head of the British Ordnance Survey from 1852 to 1875. He published such technical works as *Principal Triangulations of the Earth* (2 vols., 1858), *Abstract of the Principal Lines of Spirit-Levelling in England and Wales* (1861), and *Plans and Photographs of Stonehenge and of Turnsachen in the Island of Lewis*, with *Notes Relating to the Druids, and Sketches of Cromlechs in Ireland* (1867). He is credited with having invented photozincography.

JAMES, Henry (1811–82). An American Swedenborgian theologian, lecturer, and author, father of William (1842–1910) and Henry (1843–1916) James. He was born in Albany, N. Y., graduated at Union College in 1830, studied at Princeton Theological Seminary until

1835, and then traveled abroad, where he met Sandeman, whose *Letters on Theron and Aspasia* he edited in 1839. James's earlier theological views are Unitarian, though he believed in the divinity of Christ. Later he was greatly influenced by Swedenborg, whose doctrines he accepted, but whose ecclesiastical system he combated. He lectured in New York in 1849 and 1852 and published: *Lectures and Miscellanies* (1852); *The Church of Christ not an Ecclesiasticism* (1854); *Christianity the Logic of Creation* (1857); *The Secret of Swedenborg* (1869). His *Literary Remains* were edited by his son William James in 1885.

JAMES, HENRY (1843–1916). A distinguished American novelist and essayist, born in New York City, April 15, 1843, the son of the eminent theologian, Henry James, and the younger brother of William James, the psychologist. He was educated privately in New York, in Switzerland, in England, and in France, and in 1862 he entered the Harvard Law School. He preferred, however, the lectures of James Russell Lowell to the regular work of his courses. After one or two short stories of his had been published, he turned his attention definitely to literature. His contributions to periodicals began as early as 1866. Between 1871 and 1903 he produced more than 40 books, some of them books of essays, but the major part of them works of fiction. Even his early work showed him a resourceful master of language; his style at first was simple, supple, and natural, and the movement of his stories was steady, though not rapid. The substance of his plots was the development of character rather than dramatic incident. The persons whom he chose to portray were selected from the classes that are subject to subtle impressions, and the evanescent emotions of such characters are expressed accurately in Mr. James's work. In his early books, e.g., *Roderick Hudson* (1876), *The American* (1877), *Daisy Miller* (1879), and *The Portrait of a Lady* (1881), he chose as subject the contrast between the vigorous and kindly but simple Americans abroad and the polished arrogance of the members of older races with whom they came in contact. In fact, after 1869 Henry James himself lived abroad, traveling on the Continent and maintaining residences in London and at Rye, Sussex. His popularity increased with *The Bostonians* (1886) and *The Princess Casamassima* (1886), in both of which the subtlety of Mr. James's exposition of character was apparent. In later works, with increased insight into the complexities of the individual and of society and in the effort to render these complexities, there came a development of complexity in the style of the author, exemplified, e.g., in *The Sacred Fount* (1901), which illustrates also a tendency of Mr. James's to turn plot and action into a standing pool of analysis and mystification. In his later works the theme also has changed; the author apparently became interested in the rapid trend towards unconventionality which took place in the last part of the nineteenth century in London, and many of his books dealt with phases of that change. Perhaps the most striking examples of his works which deal with subjects that, treated in a less delicate manner, would be too brutal to seem appropriate for discussion in literature, are *What Maisie Knew* and *The Wings of a Dove;* but the exposition of the rapid change in manners and customs in London is treated most comprehensively in *The Awkward Age* (1899). He visited the United States in 1905 and published his impressions in *The American Scene* (1906), in which book the author's later style, with what appears to be its perverse obscurity, its incredibly involved syntax, and its tortured diction, reach an amazing and fantastic climax.

Mr. James found his opportunity in the richer and more complex American society which developed after the Civil War; it was this phase of the expanding national life that became the material of much of his fiction, and he chose to present it against an English or continental background and with continual contrasts of American manners, ideals, and types of character with ideals and types that were foreign or cosmopolitan. He became, in fact, the greatest practitioner of the international novel, and as such performed an immense service in bringing the world at large to a better understanding of, and a fuller sympathy with, his compatriots. He performed no less a service in the introduction of his American readers to English aristocratic life, with its prejudices and conventions, and to many phases of continental life, both of which, in their outer aspects and inner spirit, are reflected in his stories with scrupulous fidelity to truth. In making such international studies, Henry James was doing in his day for his countrymen such work as Washington Irving did in a preceding generation with his English and other foreign sketches, or as Longfellow did with his *Outre Mer* and *Hyperion* and in a different way with a not inconsiderable portion of his poetry. In his practice of the realistic method James was strikingly original. It was under the shadow of the prestige of Thackeray, Dickens, and Trollope that he began his work, but he preserved free from outside influence the integrity of his art as he personally conceived it. So distinctive was he in method and manner, so far-reaching in his influence, that he may well be called the inventor of the artistic society novel, the novel that is characterized by minute and faithful observation, refinement and intellectual delicacy, elaborate analysis, subtlety of suggestion, and free form. To Henry James's novels America owes a great debt: they have quickened her vision for beauty in art and nature, they have broadened her social horizons, and they have done much to bring Americans to a better understanding of themselves and of Europe. Mr. James became a member of the American Academy of Arts and Letters. Among his works are: *Watch and Ward* (1871); *Roderick Hudson* (1876); *Transatlantic Sketches* (1875); *A Passionate Pilgrim* (1875); *The American* (1877); *Daisy Miller* (1879); *The Europeans* (1879); *French Poets and Novelists* (1878), a work in which the author's sure taste, subtle insight, and critical discrimination are in evidence; *An International Episode* (1879); *Life of Hawthorne* (1880); *A Bundle of Letters* (1879), in which will be found excellent examples of Mr. James's art in the short story; *Confidence* (1880); *Washington Square* (1881); *The Portrait of a Lady* (1881); *The Siege of London* (1883); *The Point of View* (1883); *Portraits of Places* (1884); *A Little Tour in France* (1885); *Tales of Three Cities* (1884); *The Author of Beltraffio* (1885); *The Bostonians* (1886); *The Princess Casamassima* (1886); *Partial Portraits* (1888); *The Aspern Papers* (1888); *The Reverberator* (1888); *A London Life* (1889); *The Tragic Muse* (1890);

The Pupil (1891); *Terminations* (1895); *The Other House* (1896); *Spoils of Poynton* (1897); *Embarrassments* (1896); *What Maisie Knew* (1897); *The Two Magics* (1898); *In the Cage* (1898); *The Awkward Age* (1899); *The Soft Side* (1900); *The Sacred Fount* (1901); *The Wings of a Dove* (1902); *The Better Sort* (1903); *The Golden Bowl* (1904); *English Hours* (1905); *The Question of our Speech; The Lesson of Balzac* (1905); *Julia Bride* (1909); *The Finer Grain* (1910); *The Outcry* (1911); *Notes on Novelists, with Some Other Notes* (1914); the two autobiographical volumes, *A Small Boy and Others* (1913); *Notes of a Son and Brother* (1914). In 1900 a new and revised edition of his novels was published in New York in 24 volumes. Consult E. L. Carey, *The Novels of Henry James* (New York, 1905); Le Roy Phillips, *Bibliography of the Writings of Henry James* (Boston, 1906); W. C. Brownell, *American Prose Masters* (New York, 1909); F. M. Hueffer, *Henry James: A Critical Study* (London, 1913).

JAMES, Henry James, first Baron (1828–1911). An English jurist, born at Hereford. He was educated at Cheltenham College, studied law, was called to the bar in 1852, and met with much success in the Mayor's Court of London and at Westminster. In 1867 he attained the coveted honor of post man in the Court of Exchequer, and two years afterward became queen's counsel and entered the House of Commons. In 1873 he was appointed Solicitor-General and then Attorney-General. The latter post he received again in 1880, when the Liberals were returned to power, and in it he distinguished himself by introducing and passing the reform bill known as the Corrupt Practices Act. Disagreeing with Gladstone's Irish policy, he refused the lord-chancellorship in 1886. He held the office of attorney-general to the Prince of Wales from 1892 to 1895, and in the latter year was created Baron James of Hereford and was appointed Chancellor of the Duchy of Lancaster.

JAMES, Jesse W. (1847–82). An American outlaw, born in Clay Co., Mo., where his father, Robert James, a Baptist preacher, owned a farm. The family were Southern in their sympathies during the Civil War, and as a consequence were persecuted by their Union neighbors. In order to get revenge, Jesse joined Quantrell's guerrillas and soon earned a name for reckless daring. At the conclusion of peace he surrendered, desperately wounded, and returned to his old home. In 1866, however, he was outlawed, and from that time until his death was constantly pursued by officers of the law. During these years he attained a world-wide notoriety by the crimes he committed or was charged with having committed, by his romantic adventures, and his almost invariable success. These exploits were generally bank or train robberies. Finally Governor Crittenden of Missouri offered a reward of $10,000 for his capture, dead or alive, and, tempted by this bribe, two members of his own band, Robert and Charles Ford, killed him in his home at St. Joseph, Mo. (April 3, 1882). The murderers then surrendered to the police, and presumably received the reward of their treachery. On the eighteenth of the same month both of the Fords pleaded guilty (at St. Joseph, Mo.) to the charge of having killed James (though it was generally believed that Robert fired the shot) and were sentenced to death, but were pardoned by Governor Crittenden. Frank James, Jesse's brother, surrendered in the following October; but although he was held in jail more than a year awaiting trial, he was never convicted on any charge. He spent the last 30 years of his life as a farmer and died near Excelsior Springs, Mo., Feb. 18, 1915, at the age of 74. Jesse James's son, in a biography of the outlaw, asserted that James was always anxious to surrender, provided the authorities would guarantee him protection and a fair trial. Consult: Jesse James, Jr., *Jesse James, my Father* (Independence, Mo., 1899); Edwards, *Noted Guerrillas, or the Warfare of the Border* (1877); *American Law Review*, vol. xvi (St. Louis, Mo.).

JAMES, John Angell (1785–1859). An English Congregational minister, born at Blandford Forum, Dorsetshire. From his thirteenth till his seventeenth year he was learning the trade of his father, a linen draper, but studied for the ministry too, and was called to Carr's Lane Chapel, Birmingham (1805), where he preached most acceptably to largely increased congregations for more than 50 years. He published a great number of sermons, pastoral letters, and the like; but his best-known books are *Christian Charity* (1829), *The Anxious Enquirer after Salvation* (1843), and *The Church in Earnest* (4th ed., 1851). Consult John Campbell, *John Angell James, his History, Character, and Literary Labours* (London, 1860), and Dale, *Life and Letters* (2d ed., ib., 1861).

JAMES, Louis (1842–1910). An American actor, born in Tremont, Ill., Oct. 3, 1842. He made his début at Louisville, in 1864. He was a member of Mrs. John Drew's company (1865–70); then of Daly's (1871–75); and subsequently appeared in support of various noted actors, including Lawrence Barrett and Joseph Jefferson, and as a star, notably with Frederick Warde, in a series of classic revivals (1892–95). Among his Shakespearean characters were Autolycus, Nick Bottom, and Cardinal Wolsey. Consult Clapp and Edgett, *Players of the Present* (Dunlap Society, New York, 1900).

JAMES, Ollie M. (1871–1918). An American legislator, born in Crittenden Co., Ky. He received an academic education, studied law under his father, and was admitted to the bar in 1891. He was one of the attorneys of Governor Goebel in his contest for the governorship of Kentucky. He served as chairman of the Kentucky delegation to the Democratic National Convention in 1896, 1904, and 1908, seconded Bryan's nomination for the presidency in 1908, and was chairman of the Democratic National Convention in 1912. He was a member of the Fifty-eighth to the Sixty-second Congresses (1903–13), and in 1912 was elected United States Senator for the term 1913–19.

JAMES, Prince, the Old Pretender. See Stuart, James Francis Edward.

JAMES, Protevangelium of. See Apocrypha.

JAMES, Robert (1705–76). An English physician, born in Kinvaston, Staffordshire. He graduated at St. John's College, Oxford, in 1726, was admitted an extralicentiate of the College of Physicians, London, in 1728, and in the same year was granted the degree of M.D. by Cambridge. He practiced successively in Sheffield, Lichfield, and Birmingham before establishing himself in London, where he made himself famous by the invention of a fever powder composed of lime phosphate and oxide of antimony. He was the friend of Dr. Johnson, who helped

him to publish his *Medical Dictionary* (3 vols., 1743–45). James translated the works of other physicians, and his *Vindication of the Fever Powder* was published posthumously in 1778.

JAMES, THOMAS (c.1593–c.1635). An English navigator and explorer. Being an experienced seaman and a scientific navigator versed in all kinds of observations, he was appointed in 1631 by the merchants of Bristol, with the approval of the King, to command an expedition for "the discovery of the North-West Passage to the South Sea, and to proceed to Japan round the world to the westward." Luke Fox sailed on a similar quest from London on May 3, 1631, the same day that James left the Severn, in a 70-ton ship manned by a crew of 22 seamen, and entered Hudson Bay in the latter part of June or the first part of July. Sailing over to the western shore, he turned southward, and on August 29 met Fox. Five days later he named Cape Henrietta Maria after his vessel and then sailed into the bay which is named after him. Wintering on Charlton Island, at the extreme south end of Hudson Bay, where he lost four men, he returned to England in 1632. From 1633 to 1635 he commanded the *Ninth Whelp*, an armed cruiser for the protection of commerce in the Bristol Channel and the Irish Sea, which waters at that period were seriously infested by pirates. Nothing definite is known of his later career. Consult *The Strange and Dangerous Voyage of Captain Thomas James* (London, 1633) and Rundall, *Voyages toward the North-West* (Hakluyt Society, London, 1849).

JAMES, THOMAS LEMUEL (1831–1916). An American banker and cabinet officer, born at Utica, N. Y. He learned the printer's trade and from 1851 to 1861 owned the leading Republican paper in Madison County, to 1856 called the *Madison County Journal* and afterward the *Democrat-Republican.* Between 1854 and 1873 he was collector of canal tolls at Hamilton, customs inspector at New York, weigher, and deputy collector in charge of bonded warehouses. From 1873 to 1881, as postmaster of New York, he introduced reforms in the local mail delivery and had an important influence on the development of this branch of the service throughout the country. He was Postmaster-General for 10 months in 1881–82, and during this short time accomplished various economies and set under way the investigation of the "star route" frauds. In 1882 he became president of the Lincoln National Bank in New York, and he served as president also of the Lincoln Safe Deposit Company and as a director of the Metropolitan Life Insurance Company. In 1896 he was mayor of Tenafly, N. J.

JAMES, THOMAS POTTS (1803–82). An American botanist. He was born at Radnor, Pa., but passed the greater part of his life in Philadelphia, where he was in the wholesale drug business. In 1867 he went to live in Cambridge, Mass., and there devoted himself to botanical research, which had hitherto been his recreation. He wrote several papers for the *Proceedings of the Philadelphia Academy of Natural Sciences* and for the *Proceedings of the American Academy of Arts and Sciences;* prepared the article on "Musci," in the volume on botany of King's *Exploration of the 40th Parallel*, and with Leo Lesquereux wrote *Manual of American Mosses* (1884).

JAMES, WILLIAM (died 1827). An English naval historian. The date and place of his birth are unknown. Between 1801 and 1813 he was an attorney of the Supreme Court of the island of Jamaica and a proctor in Admiralty. At the outbreak of the War of 1812 he was in the United States and was detained as a prisoner, but escaped to Halifax in 1813. He was much interested in naval affairs and over the signature of "Boxer" wrote a number of articles on the war for the British *Naval Chronicle.* In 1816 he published a bitterly anti-American pamphlet entitled *An Enquiry into the Merits of the Principal Naval Actions between Great Britain and the United States* (enlarged under changed title, 1817). In 1818 he published *A Full and Correct Account of the Military Occurrences of the Late War between Great Britain and the United States of America*, and in 1819 he began his most important work, *The Naval History of Great Britain from the Declaration of War by France in 1793 to the Accession of George IV* (1st ed., 5 vols., 1822–24; reprinted, 6 vols., 1826; ed. in 6 vols., 1837; ed. in 1886; epitomized ed., 1 vol., by Robert O'Beirne, 1888). Accounts of all operations in which the British navy was not victorious are omitted.

James was a fierce partisan. While he carefully sought and examined all British sources of information, he gave no weight to contradictory evidence on the other side, so that his conclusions are often erroneous and very unfair. His contention that the American ships were more powerfully armed and more heavily manned than British vessels of similar rating was in many cases true, but the discrepancy was not so great or so important as he strove to make it appear. J. Fenimore Cooper's *Naval History* (1st ed., 1839) was written in part to refute James's statements; but Cooper's resentment towards Britain and friendliness to his own service led him into erring almost as far on the opposite side, and it was not until the appearance of Theodore Roosevelt's *Naval War of 1812* (1882) that a fair statement of the facts was made.

JAMES, WILLIAM (1842–1910). A distinguished American psychologist and philosopher, son of Henry James, the theologian, and brother of Henry James, the novelist. He was born in New York City, Jan. 11, 1842, was educated in private schools and by tutors in New York and Europe, studied at the Lawrence Scientific School, and graduated from Harvard Medical School in 1870. He received the honorary degree of LL.D. from Princeton, Edinburgh, and Harvard, and that of Ph. et Litt.D. from Padua. Beginning to teach at Harvard in 1872, he was appointed professor in 1881. At first his subjects were anatomy and physiology, then philosophy, later psychology, and then again philosophy. He was Ingersoll lecturer on the immortality of man, at Harvard University (1898); Gifford lecturer on natural religion, at the University of Edinburgh (1899–1901); Lowell Institute lecturer (1906); and Hibbert lecturer on the present situation in philosophy, at Manchester College, Oxford (1909). In 1908 "his colleagues at Columbia University" published in his honor *Essays Philosophical and Psychological.* Besides numerous articles in medical and scientific journals, he published: *Principles of Psychology* (1890); *Psychology, Briefer Course* (1892); *The Will to Believe, and Other Essays in Popular Philosophy* (1897); *Human Immortality: Two Supposed Objections to the Doctrine* (1898); *Talks to Teachers on Psychol-*

ogy, and to Students on Some of Life's Ideals (1899); *The Varieties of Religious Experience* (1902); *Pragmatism* (1907); *A Pluralistic Universe* (1909); *The Meaning of Truth* (1909); *Memories and Studies* (1911); *Some Problems of Philosophy* (1911); *Essays in Radical Empiricism* (1912). He also edited the *Literary Remains of Henry James* (1885).

James's writings are characterized by a fresh and entertaining style and by lucid exposition of abstruse themes. From the publication of the *Principles* until the time of his death his reputation and influence, both in America and in Europe, were probably unequaled by any other American psychologist. His work is especially significant in the field of analytical psychology, in which James has had few equals; several important theories in this field pass under his name. In philosophy his work was notable for keenness and originality. He was perhaps the foremost American expositor, and in a large measure the originator, of the doctrines included under the term "radical empiricism" (q.v.) and "pragmatism" (q.v.; see also DEWEY, JOHN). He entered upon his philosophical studies fresh from his successful work in psychology and brought with him a keen desire to give up all unnecessary theorizing and to confine himself to correct and full description. His radical empiricism was in spirit nothing but an attempt to make experience self-supporting instead of having it depend on assumed extra-experiential factors. His pragmatism was in like measure a revolt against the logic of absolute idealism, developed by Royce and Bradley, and an attempt to make logic a description of our actual thinking processes. His influence was enormous even in remote philosophical circles. Psychical research interested him greatly.

Bibliography. *Essays Philosophical and Psychological in Honor of William James, by his Colleagues at Columbia University* (London, 1908); Flournoy, *La philosophie de William James* (Saint-Blaise, 1911); Josiah Royce, *William James, and Other Essays on the Philosophy of Life* (New York, 1911); Ménard, *Analyse et critique des principes de la psychologie de W. James* (Paris, 1911); K. A. Busch, *William James als Religionsphilosoph* (Göttingen, 1911); Boutroux, *William James* (New York, 1912); R. B. Perry, *Present Philosophical Tendencies* (ib., 1912); James Huneker, "A Philosophy for Philistines," in his *The Pathos of Distance* (ib., 1913); Werner Bloch, *Der Pragmatismus von James und Schiller nebst Exkursen über Weltanschauung und über die Hypothese* (Leipzig, 1913); H. V. Knox, *Philosophy of William James* (London, 1914). Henry James's *A Small Boy and Others* (1913) and *Notes of a Son and Brother* (1914) are full of interesting material.

JAMES BAY. The southern arm of Hudson Bay (q.v.) (Map: America, North, K 4). It is 300 miles long from north to south and 160 miles wide and contains a number of islands, the largest of which, Agomska, is 70 miles long. The bay is shallow except in a narrow channel leading to Moose Factory, at the extreme southwest, the most important station, next to York Factory, of the Hudson's Bay Company on the Canadian coast. James Bay received its name from Thomas James (q.v.), who explored it in 1631–32.

JAMES ISLAND. One of the Sea Islands chain famous for cotton. It constitutes a township in Charleston Co., S. C., south of the city of Charleston (Map: South Carolina, E 4). Pop., 1900, 2570; 1910, 3147.

JAMES MILLIKIN UNIVERSITY. A coeducational institution of learning, comprising Lincoln College at Lincoln, Ill., and Decatur College and Industrial School at Decatur, Ill. Lincoln University was founded in 1865 by the synods of Indiana, Illinois, and Iowa of the Cumberland Presbyterian church. In 1901 certain amendments were made to the charter of the university which provided that it should change its name to Lincoln College and along with the new Decatur College constitute the James Millikin University. The reorganization was made possible by the liberal contributions of the founder, James Millikin, the citizens of Decatur, and the synods of Indiana, Illinois, and Iowa of the Cumberland Presbyterian church. With the union of the Cumberland Presbyterian and the Presbyterian U. S. A. churches the institution passed under the control of the latter denomination, though it is nonsectarian. The college at Lincoln in 1913 had 279 students, a faculty of 18, an endowment of $120,000, buildings, grounds, and equipment valued at $100,000, and a library of 7000 volumes. In the same year the college at Decatur reported 1128 students, a faculty of 58, an endowment of $220,600 with an assured annual income from the trustees of the Millikin estate representing $600,000 additional, buildings, grounds, and equipment valued at $594,000, and a library of 7800 volumes. Each college maintains an academic and a collegiate department. Lincoln College offers courses in liberal arts, fine arts, elocution, domestic economy, and music, and Decatur College in liberal arts, domestic economy, fine and applied arts, library science, manual training, commerce and finance, engineering, and music. The president in 1914 was George Emory Fellows, LL.D.

JAMES OF VIRAGGIO, vē-räj'ō. See GOLDEN LEGEND.

JAMESON, jām'son, ANNA BROWNELL (MURPHY) (1794–1860). A British author, born in Dublin. She was the daughter of D. Brownell Murphy, the miniature painter, and married Robert Jameson, a barrister, from whom, however, she soon separated. Her first book, *The Diary of an Ennuyée* (1826), was followed by *Loves of the Poets* (1829) and *Characteristics of Women* (1832), a series of essays on Shakespeare's women, which is probably her best work and is still current in various editions. In 1836 she visited New England, where she remained two years. Her *Sacred and Legendary Art* is divided into four volumes: *Legends of the Saints* (1848), *Legends of the Monastic Orders* (1850), *Legends of the Madonna* (1850), and *The History of Our Lord* (1860), completed by Lady Eastlake and the most important of her art writings. Though Mrs. Jameson's work as a critic is of little value, her compilations contain much material not easily obtainable from other sources, and her style is pleasant and readable. Consult Macpherson, *Memoirs of the Life of Anna Jameson* (Boston, 1878), and biography by Richard Garnett in *Dictionary of National Biography*, vol. xxix (London, 1892).

JAMESON, JAMES SLIGO (1856–88). An English naturalist and African explorer, born at Alloa, Clackmannanshire. His early voyages were to Ceylon and Borneo. In 1878 he went to South Africa, succeeded in entering Mashonaland, and discovered the junction of the

Umniati and Umfuli rivers, besides bringing to England valuable ornithological specimens. After travels in the Rocky Mountains (1882), in Spain and Algiers (1884), Jameson joined Stanley's expedition for the relief of Emin Pasha early in 1887 and in June of the same year was left at Yambuya, where Tippu Tib was to reenforce him. These forces were slow to arrive and inadequate when they had come. Barttelot pressed on without Jameson in June of 1888 and was shot at Unaria. Jameson punished the assassin and did all in his power to induce Tippu Tib to accompany him in the search for Stanley, even offering £20,000 from his own funds. To communicate with England, he left Stanley Falls for Bangalas in August and there died of fever. He left a *Diary of the Emin Pasha Expedition* (1890). Stanley's account of Jameson's connection with a cannibal feast, which the latter sketched at Riba Riba, is probably exaggerated; but Jameson, by his own account, cannot be held blameless.

JAMESON, John Alexander (1824–90). An American jurist, born at Irasburg, Vt. He graduated at the State University (1846) and from 1867 to 1868 was professor of law in the University of Chicago. For many years he was assistant editor of the *American Law Register*. He wrote several legal works, including *The Constitutional Convention: Its History, Power, and Modes of Proceeding* (1867; 4th ed., 1887).

JAMESON, John Franklin (1859–). An American historian, born in Boston. He graduated from Amherst College in 1879 and in 1882 from Johns Hopkins University (Ph.D.), where he was an assistant and associate in history until 1888. From then until 1901 he was professor of history at Brown University and in 1901–05 served as professor and head of the department of history at the University of Chicago. In 1905 he became director of the department of historical research and editor of the historical publications of the Carnegie Institution. In 1906–07 Jameson was president of the American Historical Association. He was managing editor of the *American Historical Review* from 1895 to 1901 and again after 1905. He edited the *Correspondence of John C. Calhoun* (1900) and *Original Narratives of Early American History* after 1906 and published, further: *Willem Usselinx, Founder of the Dutch and Swedish West India Companies* (1887); *History of Historical Writing in America* (1891); *Dictionary of United States History* (1894, and published in 1904 in 3 vols. as the *Encyclopedic Dictionary of American History*).

JAMESON, Sir Leander Starr (1853–1917). A British physician, soldier, and administrator, who became prominent as leader of the raid into the Transvaal in December, 1895. A son of R. W. Jameson, writer to the signet, he was born in Edinburgh. He graduated from London University in 1875, received his M.D. in 1877, and in 1878, on account of ill health, went to Kimberley, Cape Colony, to practice his profession. Association with Cecil Rhodes led to his appointment as Administrator of Rhodesia in 1891, under the British South Africa Company. In that capacity he organized an expedition against the Matabele in 1893. In 1894 he was created a C.B. In the course of the discontent and political agitation among the Uitlander element in the Transvaal Republic, a body of troops commanded by Dr. Jameson was placed by Rhodes's orders on the borders of the Transvaal, prepared to act in case of disturbances. On receipt of a letter from Johannesburg, the seat of disaffection, Jameson, acting on his own judgment, invaded the Transvaal, with 600 men, on Dec. 29, 1895. On January 1, meeting with resistance at Krugersdorp, he shelled the town, but was unable to carry the position. The next day he moved towards Doornkoop, where, after 36 hours of almost continuous fighting, and the loss of 17 killed and 49 wounded, he was forced to surrender to the Boers. The raid was condemned throughout the civilized world. President Kruger handed Jameson and his officers over to the British government for punishment. They were taken to England and tried in London. In May, 1896, Jameson was sentenced to 10 months' imprisonment for an infringement of the Foreign Enlistment Act, but, owing to ill health, was released in December. He fought against the Boers in 1899–1900, was elected to the Cape Legislative Assembly for Kimberley in 1900, from 1904 to 1908 was Premier, and in 1910–12 was a member of the Cape Parliament. He was made first Baronet in 1911. A director after 1900 of the De Beers Consolidated Company, and after 1902 a director of the British South Africa Company, he also became president of the latter. Consult Garrett and Edwards, *The Story of an African Crisis* (Westminster, 1897), and "Cape of Good Hope, House of Assembly, 1897, Report of the Select Committee on the Jameson Raid into the Territory of the South African Republic," in *British Parliamentary Papers* (London, 1897).

JAMESON, Robert (1774–1854). A Scottish naturalist, born at Leith. He began the study of medicine, but, manifesting a fondness for natural history, went, in 1800, to Freiberg, Saxony, where he studied geology under Werner. In 1804 he returned to Edinburgh and was given the chair of natural history in the university there, which place he held until his death. The natural history museum of the university was largely indebted to Jameson's care and skill, for not only did he arrange its collections, but he also obtained a grant from the government for its maintenance. He founded the Wernerian Society in Edinburgh in 1808 and was a zealous advocate of the Neptunian theories of his master, which he subsequently abandoned, adopting Hutton's Plutonian or igneous theories of earth origin. With Sir David Brewster he founded, in 1819, the *Edinburgh Philosophical Journal*, and in 1826 the *Edinburgh New Philosophical Journal*, which he edited until his death. The geological articles of the fourth edition of the *Encyclopædia Britannica* were prepared under his supervision. His works include: *System of Mineralogy* (3 vols., 1804–08; 3d ed., 1820); *Elements of Geognosy* (1809); *Manual of Minerals and Mountain Rocks* (1821).

JAMESONE, or **JAMESON,** George (c.1587–1644). A Scottish portrait painter. He was born at Aberdeen, the son of an architect. After some practice as a portrait painter at Aberdeen, he went abroad and was a fellow pupil with Van Dyck under Rubens. He was employed by the city of Edinburgh, where he lived after 1630, to copy several portraits of the Scottish King's presentation to Charles I on the occasion of his first visit to Scotland in 1633, and was rewarded by the King with a diamond ring from his own finger. His reputation established, the most celebrated Scotchmen of the day sat to him. But the magistrate of Edinburgh refused to pay

him his price for his portrait of Charles I. His work lacks distinction. Consult Bullock, *George Jamesone* (London, 1885).

JAMESONITE, jām'sūn-īt. A lead sulphantimonite, named after Prof. Robert Jameson, of Edinburgh (1774–1854). It is an occasional ore of lead and is sometimes associated with more important lead ores. It is sometimes called feather ore in reference to its fibrous divergent structure.

JAMESON RAID. See JAMESON, SIR LEANDER STARR.

JAMES (or DAKOTA) RIVER. A navigable stream rising in Wells Co., N. Dak., about 60 miles northeast of Bismarck (Map: South Dakota, G 4). It flows southerly through a fertile country and joins the Missouri River about 9 miles east of Yankton, S. Dak. It is about 400 miles long in its general direction. It falls nearly 600 feet, but the fall is so uniform that the stream is incapable of much development as to water power. Only small tributaries flow into it.

JAMES RIVER. The largest river in Virginia. It is formed by the union of the Jackson and Cowpasture rivers, which rise in the Alleghanies (Map: Virginia, F 4). Its general direction is east-southeast, with many large bends and windings, and after widening into a broad and deep tidal estuary for the last 66 miles of its course, it flows into the lower part of Chesapeake Bay through Hampton Roads near Norfolk. The total length is about 335 miles, and its drainage basin is about 9700 square miles. The main stream and all of its confluents lie entirely within the State of Virginia. There is a nearly uninterrupted channel, about 100 feet wide and 18 feet deep, from Hampton Roads to Richmond Wharf. The western reach of the river opposite Richmond falls about 116 feet in 9 miles, thereby forming rapids which offer ample water power. The old James and Kanawha Canal, which followed the river from Richmond to Buchanan, is now abandoned. The chief tributaries of the James are the Appomattox from the right and the Chickahominy from the left, made famous by campaigns in the Civil War. It was on this river that Jamestown, the first permanent English settlement in America, was founded in 1607.

JAMES'TOWN. The first permanent English settlement within the limits of the United States, founded in May, 1607, by a small company under Captain Newport, in Virginia, on the banks of the James River, about 32 miles from its mouth. Here in 1619 the first legislative assembly in America was held, and here in the same year slavery was first introduced into the original thirteen Colonies. In September, 1676, the town was almost completely destroyed by Nathaniel Bacon. (See BACON'S REBELLION.) Up to 1698, when it was supplanted by Williamsburg, it was the capital of Virginia. The site of the settlement, which was originally a peninsula but is now an island, is owned by the Association for the Preservation of Virginia Antiquities. Ruins are left of a church, built probably between 1676 and 1684, of the fort, and of two or three houses. Near here is the site of the exposition held in 1907 to celebrate the tercentennial (see JAMESTOWN TERCENTENNIAL EXPOSITION) of the first permanent English settlement in the United States.

Bibliography. "Documents Illustrating the History of the Colony of Jamestown," in *Transactions of the American Antiquarian Society*, vol. iv (Worcester, Mass., 1860); M. L. D. Foster, *Colonial Capitals of the Dominion of Virginia* (Lynchburg, 1906); L. G. Tyler, *Cradle of the Republic; Jamestown and James River* (2d ed., Williamsburg, 1906); J. E. Davis, *Round about Jamestown* (Hampton, 1907); R. A. Pryor, *Birth of the Nation; Jamestown, 1607* (New York, 1907); S. H. Yonge, *Site of Old "James Towne," 1607–1698* (Richmond, 1907). For further details concerning the history of Jamestown, see VIRGINIA.

JAMESTOWN. The capital and seaport, on the north coast, of St. Helena (q.v.), a British Admiralty coaling station. It consists of a long street, situated in a deep valley on the northwest coast. Its chief building is the observatory. In its vicinity is situated the tomb and first burial place of Napoleon I. Pop., 1911, 1439.

JAMESTOWN. A city in Chautauqua Co., N. Y., 70 miles by rail south by west of Buffalo, on the outlet of Chautauqua Lake, and on the Erie, and the Jamestown, Chautauqua, and Lake Erie railroads (Map: New York, A 6). Jamestown is a popular summer resort. It is connected by boat and steam and electric railroads with other resorts on the lake. One of the leading attractions of the city is Celoron, on Chautauqua Lake, a popular place of amusement. Among its buildings are the James Prendergast Free Library, the Women's Christian Association Hospital, and the Agnes Home for working girls. Jamestown is the centre of a productive farming district and has large manufacturing interests, including several worsted mills, furniture and lounge factories, saw mills, a cotton mill, and manufactures of metallic goods, voting machines, pianos, towels, bank vaults, and photographic paper. The city government is administered, under the charter of 1886 as revised in 1900, by a mayor, elected every two years, a unicameral council, and subordinate officials. Jamestown was settled in 1810, laid out in 1815, incorporated as a village in 1827, and chartered as a city in 1886. Pop., 1900, 22,892; 1910, 31,297; 1914 (U. S. est.), 34,878; 1920, 38,917.

JAMESTOWN. A city and the county seat of Stutsman Co., N. Dak., 93 miles by rail west of Fargo, on the James River, and on the Northern Pacific and the Midland Continental railroads (Map: North Dakota, F 4). It has the State Hospital for the Insane, St. John's Academy, an Elks Home, Park View Hospital, Roman Catholic Cathedral, the Presbyterian College, a public library, and a fine courthouse. The city is a railroad centre and has farming, dairying, and stock-raising interests. There are grain elevators, flour mills, and other industrial establishments. The water works are owned by the city. Pop., 1900, 2853; 1910, 4358.

JAMESTOWN TERCENTENNIAL EXPOSITION was held on Hampton Roads, Va., from April 26 to Nov. 30, 1907, in commemoration of the three-hundredth anniversary of the first permanent settlement of Anglo-Saxon people in America. The site covered 350 acres at Sewall's Point, along the southern shore of Hampton Roads. The principal group of buildings, eight in number, were arranged around a square called Raleigh Court. Also there were two government buildings in which were shown the exhibits of the government departments. All these buildings were in the Georgian style of architecture. The smaller

buildings included a Porto-Rican, Pan-American, and Mexican building in the Spanish-American Renaissance style. Arranged in a row along the wide street fronting the shore of Hampton Roads were the State buildings, mostly in the Colonial style of architecture and many of them reproducing some historical building. Typical of these may be mentioned the Maryland building, which was a reproduction of the house of Charles Carroll of Carrollton; the Massachusetts building, which was a reproduction of the old State House in Boston; and the Pennsylvania building, which was a replica of Independence Hall. An architectural feature of interest was the government piers, which extended 1600 feet northward into the waters of Hampton Roads and were connected by an arch, 200 feet in width, and elevated in the centre so as to permit the entrance of small vessels. The amusement features were grouped in the western part of the grounds along a continuous street called the War Path. There were about 2500 exhibits, which were classified among the following groups: (1) Historic Art; (2) Education and Social Economy; (3) Manufactures and Liberal Arts (including Graphic Arts); (4) Machinery and Transportation (including Electricity); (5) Agriculture and Horticulture; (6) Food Products and Accessories; (7) Forestry, Fish, and Game; and (8) Mines and Metallurgy. These exhibits were considered by a jury of awards, which awarded 665 gold, 640 silver, and 635 bronze medals. The attendance was between 4000 and 5000 daily, or in all the total admissions were about 2,800,000, of which 1,500,000 were paid. On North Carolina day the attendance was 60,000. The financial results were bad, and at the close of the exposition a statement issued showed the liabilities to be $3,465,000 and the assets $710,000, indicating a deficit of $2,655,000, against which was the ownership of the site. Consult *Final Report of the Jamestown Ter-Centennial Commission* (Washington, 1909) and *The Official Blue Book of the Jamestown Ter-Centennial Exposition, A.D. 1907* (Norfolk, 1909).

JAMESTOWN WEED. A weed of the solanum family. See STRAMONIUM.

JĀMI, jä'mē, NUR-UDDIN 'ABD-URRAHMAN (1414–92). A Persian poet, renowned for his romantic, lyric, and mystic writings, and often spoken of as the last of the transcendental sufi poets. Jāmi was born at the small town of Jam, near Herat, in Khorassan; on this account he is known as Jāmi, although he also plays upon his name in its significant sense as denoting that he was a mystic wine cup (Pers. *jām*, cup) of the divine love of God. His education seems to have been excellent, and his guiding principle in life was the philosophy of Sufism (q.v.), with all its mysticism. His poetic activity must have begun early, if we may judge from the number of works that are his, besides others which are attributed to him. Foremost among his works is a collection of seven poems entitled *Haft Aurang* (Seven Stars of the Great Bear, or Seven Thrones). One of the poems in this series is the tender love story of *Lailā u Majnūn;* another, the *Salāmān u Absāl,* is allegorical and moral in its treatment, and is known in English through Edward FitzGerald's version; a third, *Yūsuf u Zulaikhā* (trans. by Griffith, 1901), in the same collection, is the romantic tale of the passion which Joseph's beauty inspired in Potiphar's wife. Jāmi is likewise the author of a well-known prose work, *Baharistān* (Garden of Spring), composed about 1487 to give instruction to a son born to him in his old age. He composed also three divans or collections of lyrical poems and odes, written between the years 1479 and 1491. His death occurred at Herat, Nov. 9, 1492.

As a poet, Jāmi's talent is unquestioned; his verse is so polished and his art so finished as to contain almost elements of weakness owing to their refinement and perfection. His works are held in high esteem among the Persians, and some of the manuscripts of his poems are splendid specimens of Oriental calligraphy and illumination. His life and personality, moreover, seem to have been such as to win the favor of princes as well as to endear himself to the people because of his reputation for spiritual exaltation.

Bibliography. Ouseley, *Biographical Notices of Persian Poets* (London, 1846); Robinson, *Persian Poets* (Glasgow, 1883); FitzGerald, *Salámán and Absál,* translated (Boston, 1887), which contains a sketch of Jāmi's life after Rosenweig; *The Baharistān Literally Translated* (Benares, 1887); the comprehensive references in Ethé, "Neupersische Literatur," in Geiger and Kuhn, *Grundriss der iranischen Philologie,* vol. ii (Strassburg, 1896–1904); Costello, *Rose Garden of Persia* (Boston, 1901); *Jāmi Lawā'ih: A Treatise on Sūfism* (London, 1906), containing a facsimile of an old manuscript with translation by Whinfield and Kazvīnī; Davis, *The Persian Mystics: Jámí* (New York, 1908).

JAMIESON, jā'mē-son, JOHN (1759–1838). A Scottish philologist and antiquary. He was born in Glasgow, studied for the ministry at the university there, and in 1781 was ordained pastor of a congregation at Forfar, in connection with the Antiburgher secession body. In 1797 he was called to Edinburgh. His fame rests chiefly upon his *Etymological Dictionary of the Scottish Language* (1808), a work which shows great learning and industry. In 1818 he published an abridgment, and in 1825 two supplementary volumes. The book, while exceedingly valuable in definition and illustration and in its exposition of Scottish customs, was originally weak in its philology. This defect was remedied, however, in a revised edition (1879–87), edited by Dr. Longmuir and Mr. Donaldson. Among his other publications are: *Ancient Culdees of Iona* (1811); *Hermes Scythicus, or the Radical Affinities of the Greek and Latin Languages to the Gothic* (1814); *An Historical Account of the Royal Palaces of Scotland; Remarks on Rowland Hill's Journal* (1799).

JAMIN, zhà'măN', JULES CÉLESTIN (1818–86). An eminent French physicist, born at Termes, Ardennes. He was educated at Rheims and at the Ecole Normale Supérieure; taught physics at Caen, at the Collége Bourbon (now Lycée Condorcet), and at the Louis le Grand; and in 1852, after publishing his valuable thesis on the reflection of light from metallic surfaces (1847), became professor at the Ecole Polytechnique, from which he resigned in 1881. On the death of Despretz (1863), Jamin succeeded him at the Sorbonne, where he was director of the physical laboratory until his death. He was elected to Pouillet's place in the Academy of Sciences (1868), of which he was secretary, 1884–86, and followed Milne-Edwards as dean of the faculty of science. An excellent botanist and geologist and a painter of some skill, Jamin was

also a versatile physicist. His contributions to the *Comptes Rendus* of the Academy, numbering more than 80, treat of the critical point of gases, capillarity, hygrometry, compressibility of liquids, and many other subjects. But his fame rests on special studies in optics, magnetism, and electricity. Many of his articles deal with polarization and refraction. As a result of his theory of magnetic distribution, Jamin devised (1873) a very powerful magnet, composed of many laminæ, which was adopted for use in Gramme's machine. The Jamin electric light (1879) has carbons side by side, with points down, one fixed and one rotary; in general it resembles those devised by Wilde and Jablochkov, relights automatically, and casts a disadvantageous shadow. *A Cours de physique* (with Boutmy, 4th ed., 1886–91) and a *Petit traité de physique* (1870) were translated into German by Müllner and Recknagel respectively. Jamin published, besides, *Quelques phénomènes atmosphériques* (1880) and wrote essays in the *Revue des Deux Mondes*.

JAMITZER, yä′mĭts-ēr, **GAMITZER,** gä′mĭts-ēr, or **JAMNITZER,** yäm′nĭt-sēr, Wenzel (1508–85). The greatest of the German Renaissance goldsmiths. He was born in Vienna, but during his boyhood his family moved to Nuremberg, where he became a master workman in 1534. He was court goldsmith successively to the Emperor Charles V, Ferdinand I, Maximilian II, and Rudolph II. His grave in St. John's Cemetery, Nuremberg, is marked with a bronze epitaph designed by his friend and pupil, Jost Amman. His most famous works are: the silver jewel box in the Green Vault of the Royal Palace of Dresden, 13 inches high by 11 wide; the table centrepiece of gilded silver, 39 inches high, now in the collection of Baron Henri de Rothschild of Paris, made in 1549 for the city of Nuremberg at the price of 1325 gulden, sold in 1880 for 800,000 marks; miniature statues of Flora, Ceres, Bacchus, and Venus, in the Imperial Treasury of Vienna (the surviving part of a centrepiece made for Rudolph II); a jewel box picturing the deeds of Hercules, in the Bavarian Treasury at Munich; a cup with the figure of Maximilian II, now in the possession of the German Emperor. Jamitzer's mark was a lion's head, sometimes accompanied by a W. He made many designs for ornamental gold and silver plate, some of which were reproduced as line engravings, etchings, and wood engravings. There are collections of his drawings in Basel, Coburg, Nuremberg, Erlangen, and Paris. Of the engravings, a number are illustrated by Bergau. Jamitzer was the first German master to break entirely with Gothic and adopt definitely and completely the forms of the Italian Renaissance. Being unable to study the originals, he made much use of Italian engravings, particularly those of Enea Vico and those of Lazarus de Baif. The latter's *De Vasculis*, published in Paris in 1536, was also a source of inspiration to Du Cerceau, which accounts for the similarity of many of his compositions to Jamitzer's.—Christopher (1563–1618), Wenzel's grandson, is known as a goldsmith by works now in Vienna, Berlin, and Moscow, and as an engraver by his *Groteskenbuch*. Consult Bergau, *Wenzel Jamitzers Entwürfe* (Berlin, 1879), and, for Nuremberg documents illustrating the history of the family, Frankenburger, *Wenzel Jamnitzer* (Strassburg, 1901).

JAMMU, jŭm′o͞o. A town and fort in the south of Kashmir, India, 25 miles north of Sialkot by rail (Map: India, C 2). It was the ancient capital of a Rajput kingdom, and it stands amid the Himalayas, on both banks of the Tavi, an affluent of the Chenab—the town on the right side and the fort on the left. Here are the palaces of the Maharajah and his kin, several temples, the Prince of Wales College, and the hospital. Jammu is the terminus of a branch railway, and the starting point of the busy trade route to Srinagar and the Kashmir valley. Jammu at the end of the eighteenth century was said to be a city of 150,000 inhabitants, but new trade routes have robbed it of its importance. Coal mines have been opened in the vicinity, and its prestige may return. Since 1889 a modern system yields a good water supply. Pop., 1901, 35,672; 1911, 31,726.

JAMNA, jŭm′nä. A river of India. See Jumna.

JAMNITZER. See Jamitzer.

JAMYN, zhä′măn′, Amadis (c.1530–c.1593). A French poet, born at Chaource (Aube). He was made secretary at the court of Charles IX through the influence of Ronsard, and Sainte-Beuve says his friendship with this poet is his principal claim on our interest. He translated the last 12 books of the *Iliad*, a continuation of the work begun by Hugues Salel, and the first three books of the *Odyssey* (1574), and brought out two volumes of poetry, *Œuvres poétiques* (1575 and 1584). His poems were edited by Brunet, with a life by Colletet (Paris, 1879).

JAN, yän, Karl von (1836–99). A German musical savant, born at Schweinfurt. Although his real profession was philology, he made a special study of the music of the ancient Greeks, and came to be one of the foremost scholars in this field. He began his career as a teacher at the Gymnasium in Berlin, but soon went to Landsberg, where he remained till 1875. From then until 1883 he was in Saargemünd. In that year he was appointed professor at the Lyceum of Strassburg, which position he retained till his death. The results of his researches he published in essays which appeared in various journals. Perhaps the most important of these is *Kitharodik*, giving entirely new and valuable information about the Greek kithara and lyre (1882). His principal work is *Musici Scriptores Græci* (1895), a critical text edition of all Greek writers on music, with an appendix, *Melodiarum Reliquiæ*, containing all known fragments of Greek music in notation (1899).

JANA. See Janus.

JANAUSCHEK, yä′nou-shĕk, Fanny, or Franziska (1830–1904). A well-known actress, born at Prague, Bohemia, July 20, 1830. From childhood she gave evidence of dramatic talent, and her first appearance was at her native place. After a successful experience at Cologne she became established as leading actress at Frankfort (1848), remaining till 1860, when she began a series of successful engagements in other German cities. In 1867 she came to America, playing in New York and elsewhere, in the German language. Resolved to play in English, she came again to America in 1873 and very effectively presented Medea, Lady Macbeth, Iphigenia, and other tragic parts. She extended her reputation by further tours in Europe and Australia, but finally settled in the United States, where she appeared in less classic representations, among them *Meg Merrilies* and *The Great Diamond Robbery* (1895–96). After

her retirement she took up her residence in Brooklyn, N. Y.

JANE EYRE, ār. A novel by Charlotte Brontë (Currer Bell) (1847). It is partly autobiographical, especially in the school life and early career of the heroine.

JANES, Edmund Storer (1807–76). An American Methodist Episcopal bishop, born at Sheffield, Mass. He read law while teaching school (1824–30), but instead of becoming a lawyer entered the ministry, joining the Philadelphia conference of his church in 1830. In 1838 he was appointed financial agent of Dickinson College and in 1840 financial secretary of the American Bible Society. He was elected Bishop of the Methodist Episcopal church in 1844, when 37 years old. No other Bishop of the church has ever been elected at so early an age. At the time of his death he was the senior Bishop of the church, and president of the Missionary Society, of the Board of Church Extension, and of the Sunday School Union and Tract Society of the church. He was also one of the managers of the American Bible Society, a director of the American Colonization Society, and trustee of several institutions. After the Civil War he labored in the reconstruction of the work of the church and nation in the South. He represented the American Methodist church abroad in 1865. He died in New York City. Consult H. B. Ridgaway, *The Life of Edmund S. Janes* (New York, 1882).

JANE SHORE. 1. A tragedy by Chettle and Day (1603), founded on the story of the beautiful and unfortunate mistress of Edward IV. 2. A tragedy by Nicholas Rowe (1714), which was popular for a long time and furnished one of Mrs. Siddons's leading rôles.

JANES'VILLE. A city and the county seat of Rock Co., Wis., 79 miles by rail west by south of Milwaukee, on the Rock River and on the Chicago and Northwestern and the Chicago, Milwaukee, and St. Paul railroads (Map: Wisconsin, E 6). It is built partly on level and partly on elevated ground and is the seat of the State School for the Blind. The public library, courthouse, city hall, high school, and Y. M. C. A. buildings are all worthy of mention. The city is the centre of a fertile agricultural region, has a considerable trade in tobacco, grain, and sugar beets, grown in the vicinity, and manufactures cotton and woolen goods, shoes, fountain pens, agricultural implements, furniture, barbed wire, carriages, and cement building products. Settled about 1837, Janesville was incorporated in 1853 and adopted the commission form of government in 1912. Pop., 1900, 13,185; 1910, 13,894; 1914 (U. S. est.), 14,195; 1920, 18,293.

JANET, zhȧ'nȧ', Paul (1823–99). A French philosophical writer, born in Paris and educated at the Ecole Normale. He was lecturer on philosophy at Bourges (1845–48), was then professor at the University of Strassburg until 1857, at the Lycée Louis le Grand in Paris, and in 1864–97 at the Sorbonne, succeeding Caro. He was elected a member of the Institute in 1864. In general he advocated the principles of Cousin. His peculiarity was a conciliatory method, seeing in various philosophic systems not oppositions, but mere developments of truth; but his eclecticism is very strongly affected by his spiritualistic bias. His numerous works include his *Histoire de la science politique dans ses rapports avec la morale* (1850, 1872); *La famille: Leçons de philosophie morale* (1855), crowned by the Academy; *Philosophie du bonheur* (1862, 1873); *Le matérialisme contemporain en Allemagne* (1864); *Les problèmes du XIXème siècle* (1872, 1873); *Saint-Simon* (1872); *Les causes finales* (French, 1874; Eng., 1883); *Philosophie de la Révolution française* (1875); *Les maîtres de la pensée moderne* (1883); *Les origines du socialisme contemporain* (1883); *Victor Cousin et son œuvre* (1885); *La philosophie de Lamennais* (1890); *Fénelon* (1892); *Principes de métaphysique et de psychologie* (1896).

JANE'WAY, Edward Gamaliel (1841–1911). A distinguished American physician, born near New Brunswick, N. J. He graduated from Rutgers College in 1860 and from the College of Physicians and Surgeons, New York, in 1864, having served as acting medical cadet in the United States Army Hospital at Newark, N. J., from 1862 to 1863. He was on the resident staff of Charity Hospital, Blackwell's Island, New York (1864), and of Bellevue Hospital (1864–66), and then, establishing himself in private practice, soon became a consultant of eminence, especially in the diseases of the organs of the chest and abdomen. For several years, beginning in 1867, he was curator and pathologist to Bellevue Hospital. Janeway's career as a teacher of medicine began in 1872, when he was elected instructor in pathological anatomy in the medical department of New York University. In Bellevue Hospital Medical College he was professor of materia medica and therapeutics from 1873 to 1876, professor of pathological anatomy from 1876 to 1881, associate professor of the principles and practice of medicine from 1881 to 1884, and professor from 1884 to 1891. Six years later he resumed his connection with the college upon the adoption of the plan to consolidate it with the medical department of New York University, as University and Bellevue Hospital Medical College, becoming professor of clinical medicine and president of the faculty; later (1898–1905) he was dean, and after 1898 professor of medicine. He rendered important professional services as visiting or consulting physician to a number of New York hospitals and was president of the Pathological Society, the New York Academy of Medicine, and the Association of American Physicians (1900). From 1875 to 1881 he was commissioner of health of New York City.

JA'NI. See Forum (at the beginning).

JANIC'ULUM, or Mons Janiculus. A long ridge or hill on the west bank of the Tiber at Rome, rising to a height of about 300 feet above the sea. The name is derived by tradition from Janus, King of the aborigines, who founded a city on the hill opposite to the Capitoline, then occupied by Saturn. From its argillaceous formation it shares with the Vatican Hill the name of *monti della creta*. It was anciently called Mons Aureus, from the golden color of its sands, whence the modern name Montorio. The commanding position of the hill led to its early fortification by the kings of Rome; but it was not included in the city until the time of Augustus, who made it the fourteenth quarter, under the name of Regio Transtiberina, now Trastevere. In early times it was connected with the east bank only by the Sublician Bridge, which was supplemented in 181 B.C. by the Æmilian Bridge, and in 366 A.D. by the Bridge of Valentinian, represented by the modern Ponte Sisto. The hill commands a magnificent panoramic view of

Rome. Consult Richter, *Topographie der Stadt Rom* (2d ed., Munich, 1901), and Baedeker, *Central Italy and Rome* (15th Eng. ed., Leipzig, 1909).

JANIN, zhȧ'năn', Jules (1804–74). A French critic, born at Saint-Etienne, Feb. 16, 1804. Besides his journalistic cleverness, Janin was skillful as a novelist in knowing what the public would like next. He is perhaps the best representative of the individualistic vagaries of romanticism, both in his style and thought. His earlier novels are ultraromantic and trivial; the later ones, such as *La religieuse de Toulouse* (1850) or *Gaietés champêtres* (1851), are never natural, but often charming. His best journalistic papers, written for the *Journal des Débats,* are collected in a *Histoire de la littérature dramatique.* In 1870 he was elected to the French Academy. His *Œuvres choisies* (12 vols., 1875–78) were edited by A. de la Fitzelière.

JANINA, yä'nê-ná, or **YANINA.** A town of northwestern Greece, situated near the Albanian frontier, on the Lake of Janina (Map: Balkan Peninsula, C 5). Although the splendid buildings of the old city are now in a state of decline, there are still a number of mosques, churches, synagogues, a Greek gymnasium, a library, and a hospital. The chief manufactures are gold ware and silk goods. Pop. (est.), 22,000, including about 15,000 Greeks and about 2500 Jews. Janina is mentioned as early as the ninth century, when it formed a part of the Byzantine Empire. During the eleventh and twelfth centuries it was destroyed by the Normans and fell into the hands of Turkey in 1430, in whose possession it long remained, constituting the capital of the Vilayet of Janina. From 1788 to 1822 it was the seat of the famous Ali Pasha, "the Lion of Janina." On March 6, 1913, after undergoing a protracted siege, Janina was captured by the Greeks, and by the territorial settlements of that year, following the Balkan War (q.v.), especially by the treaties of London and Bucharest, was formally ceded to Greece.

JAN'IS, Elsie (Elsie Janis Bierbower) (1889–). An American actress, born at Delaware, Franklin Co., Ohio. She first appeared on the stage at Columbus, Ohio, in 1897, and her first appearance in New York City was in 1900 on the vaudeville stage. She starred in *The Belle of New York* in 1904 and in *The Vanderbilt Cup* in 1906–07. Subsequently she played in *The Hoyden* (1907); *The Fair Co-ed* (1908–09); *The Slim Princess* (1910–11); a play written by herself, *A Star for a Night* (1911); *The Lady of the Slipper* (1913), in which she starred with Montgomery and Stone; *The Passing Show* (1914), in London.

JANITSCHEK, yä'nê-chĕk, Hubert (1846–93). An Austrian art historian, born at Troppau, Silesia. He studied at the university at Graz from 1868 to 1873, then pursued art historical studies in Italy until 1877, when he was appointed custodian of the Austrian Museum of Art and Industry in Vienna. Afterward he became professor, successively, at the universities of Prague (1879), Strassburg (1881), and Leipzig (1891). His sound and scholarly researches in the history of Italian and German art resulted in the publication, among other works, of *Die Gesellschaft der Renaissance in Italien und die Kunst* (1879); *Zwei Studien zur Geschichte der karolingischen Malerei* (1885); the important volume, *Geschichte der deutschen Malerei,* in Grote's *Geschichte der deutschen Kunst* (1890); *Dantes Kunstlehre und Giottos Kunst* (1892); and a number of biographies of Italian masters in Dohme's *Kunst und Künstler.*—His wife, Maria (1859–), a poet and novelist, was born in Vienna. After her husband's death she settled in Berlin and afterward at Rome and Munich. Among her principal works may be mentioned: *Im Kampf um die Zukunft* (1887), an epic poem; *Gesammelte Gedichte* (1892; new ed., 1910); *Aus alten Zeiten* (1900); and the novels and tales *Lichthungrige Leute* (1892), *Gott hat es gewollt* (1895), *Frauenkraft* (1900), *Harter Sieg* (1901), *Ein Stück modernen Lebens* (1903), *Irrende Liebe* (1909), and *Stille Güste* (1912). Although not always true to nature, her writings attract by reason of their temperamental qualities and their sincere treatment of the problems of modern life.

JANIUAY, hä'nê-wī'. A town of Panay, Philippines, in the Province of Iloilo, situated in a beautiful valley among the mountains in the interior of the island, about 18 miles north-northwest of Iloilo (Map: Philippine Islands, D 5). Oil has been found in the neighborhood. It produces textiles of piña, silk, and cotton. Pop., 1903, 20,738. It was founded in 1578, under the name of Matagub. In 1903, after the census, Lubano (pop., 6661) was annexed.

JANIZARIES, jăn'ĭ-zâ-rĭz, or **JAN'ISSARIES** (OF. *jannissaire,* Fr. *janissaire,* It. *gianizzero,* from Turk. *yeñicheri,* new troops, from *yeñi,* new + Ar. *askar,* army, soldier). A Turkish military force, first instituted by Orkhan (1326–59), the son and successor of Othman, the founder of the Ottoman Turkish Empire, who levied from the conquered Christian peoples a systematic tribute of young children. These tribute children, always the healthiest and strongest, were trained under Mohammedan tutelage, and, together with Christian captives taken in war and Turkish subjects attracted by the special privileges offered, constituted a special corps of picked troops, which was thus composed of many nationalities. In turn it became the bulwark of the Empire, and, like the Roman prætorians and Russian streltsi, assumed dictatorial power. The corps was more perfectly organized by Amurath I after 1360, when its strength was raised to about 12,000. After the sixteenth century the drafting of Christian children and captives ceased, and the corps was recruited by voluntary enlistment. There were two classes of janizaries—one a standing force, garrisoned in Constantinople and the chief towns and varying in number from 25,000 to 100,000; the other a trained militia known as jamaks, scattered throughout all the towns of the Empire and numbering from 300,000 to 400,000. The janizaries proper were divided into ortas, or regiments. At the head of the whole force was the aga, whose power extended to life and death, for the janizaries were always ready to break out into deeds of violence if their pay or perquisites were withheld. In times of peace they acted as a police force. They served on foot, generally formed the reserves of the Turkish army, and were noted for the wild impetuosity of their attack. The Sultan's bodyguard was formed of them. They became in the course of time very unruly, and their history abounds in conspiracies, assassinations of sultans, viziers, and agas, and

atrocities of every kind; so that by degrees they became more dangerous to the sultans than to foreign enemies. Attempts were made by several sultans to reform or dissolve the corps, but they were always unsuccessful. The reforms of Sultan Mahmud II (q.v.) were bitterly opposed by the janizaries, especially the reorganization of the army on the European model. This opposition broke forth in open revolt, and on June 15, 1825, Mahmud ordered the flag of the Prophet to be unrolled and the Faithful to be arrayed against the mutinous corps. The janizaries, deserted by their aga and other principal officers, were defeated, with the loss of 16,000 men; their barracks were burned and 6000 to 8000 of them were killed in the assault or perished in the flames. A proclamation of June 17, 1826, declared the janizary force dissolved. All opposition was drowned in bloodshed. Thousands were put to death, and more than 20,000 were banished. In the Imperial Museum at Constantinople are 150 life-size figures illustrating the appearance of these famous troops. Consult: M. d'Ohsson, *Tableaux de l'Empire Ottoman* (Paris, 1787–1820); Es'ad Effendi Essejjid Mehemed, *Précis historique de la destruction du corps des Janissaries par le Sultan Mahmoud en 1826* (ib., 1833); A. Djévad Bey, *Etat militaire Ottoman* (Constantinople, 1885); Heinrich Schwartz, "Die Janitscharen," in *Preussischen Jahrbuch*, vol. cxii (Berlin, 1903); Theodor Menzel, "Das Korps der Janitscharen," in *Beiträge Zur Kentniss der Orients*, vol. i (ib., 1904).

JANIZARY MUSIC. A term applied to music produced by a combination of shrill wood wind and brass instruments, various kinds of drums, and triangles.

JANK, yänk, ANGELO (1868–). A German painter and illustrator. He was born in Munich and studied under Höcker and Löfftz at the Munich Academy, where he was appointed professor in 1907. His best-known paintings are hunting scenes, distinguished by broad brushwork and rhythmic movement, such as "The Hunt" and "The Horsewoman," exhibited in the Metropolitan Museum, New York, in 1909. Other works are "Hurdle Race" (Elberfeld Museum); "Mailed Defense," in the possession of the King of Italy; an equestrian portrait of the Duke of Saxe-Coburg-Gotha; "The Princess and the Swineherd" (Society of Historical Art, Munich). Jank became a contributor to the Munich paper *Jugend*, and his chromolithographs are popular throughout Germany. He was commissioned by the government to paint a large historical composition in the German Reichstag, and in 1905 received the great gold medal at Munich.

JANKÓ, yŏn'kō, PAUL VON (1856–). An Hungarian pianist and inventor of the Jankó keyboard. He was born at Totis, Hungary, and studied music at the Vienna Conservatory, the piano with Ehrlich in Berlin, and mathematics at the University of Berlin. Owing to the smallness of his hands, he had great trouble in playing music which involved octaves, and he turned his attention to constructing a keyboard which would obviate the difficulty. From 1886 to 1890 he made extensive concert tours to demonstrate his new invention. In 1892 he settled in Constantinople. See JANKÓ KEYBOARD.

JANKÓ KEYBOARD. A keyboard for the pianoforte invented by Paul von Jankó (q.v.) in 1882. This was introduced to the English public in 1888 and in New York in October, 1890. The Jankó keyboard consists of six rows or banks of keys, placed in a semicircle and presenting a fanlike appearance. Each note has three different keys, one lower than the other and attached to a key lever, so that each key may be struck in three different rows. Six parallel rows of whole-tone intervals are thus produced. The keyboard slants, the keys are rounded on both sides, and the sharps and flats are distinguished by black bands. A freer use of the fingers is claimed than with the accepted keyboard. By reason of the many rows the hand can maintain its natural position with the long fingers on the upper notes and the shorter ones on the lower. All scales and chords have uniform fingering, the relative position being the same in all keys, and the only necessary change is to raise or lower the entire hand. The octave is brought within the stretch of the sixth on the ordinary keyboard, and half tones may be played legato with one finger. The new keyboard can be adapted to any pianoforte, grand, upright, or square, without harm to the instrument. Chromatic scales in thirds, sixths, and octaves can be executed with as much facility as the ordinary scale on the ordinary pianoforte, because one performer can produce effects that now are obtainable only in four-hand playing. Yet in spite of positive merits, the interest shown by some eminent pianists, and the foundation of a Jankó Society in Vienna in 1905, the new invention has not met with success.

JAN MAYEN (yän mī'en) **ISLAND.** A volcanic island in the Arctic Ocean, situated between lat. 70° 49′ and 71° 9′ N. and between long. 7° 53′ and 9° 5′ W., about 220 miles north-northeast of Iceland (Map: Arctic Regions, J 5). It is oblong in shape and has an area of about 160 square miles. The surface is generally mountainous and reaches in the extinct volcano, Beerenberg, in the north, an altitude of 6000 feet or more. There are some volcanoes on the island, Mount Beerenberg being the highest, and a number of glaciers. The mean annual temperature is somewhat less than 28° F. In the seventeenth century there were seven extensive summer colonies maintained on Jan Mayen for exploiting the valuable whaling fisheries around the island. At present it has no permanent population, but is occasionally visited by sealers and explorers. In 1882–83 Jan Mayen Island was the seat of the Austrian international polar station. Sighted by Hudson in 1607, the island was rediscovered in 1611 by Jan Mayen, after whom it is named. Consult: Wohlgemuth, *Osterreichische Polarstation Jan Mayen* (Vienna, 1886); Ernesto Lyders y Stamm, *Derrotero de Islandia é instrucción náutica para la Isla Juan de Mayen* (Madrid, 1895); J. B. A. E. Charcot, "Une excursion à Jan-Mayen," in *Géographie*, vol. vi (Paris, 1902).

JANNARIS, yän'nà-rēs, ANTHONY (1852–1909). A Cretan scholar and public official. He was head master of the public Gymnasium at Canea in 1883–85 and lectured at the University of Athens in 1889. For taking part in the Cretan insurrection in 1889 he was proscribed by the Sultan of Turkey and was obliged to flee to London, where he remained six years. When he returned to Crete, he was elected a member of the Assembly, was correspondent for the London

Times during the troubles of 1897, and in 1907 became inspector general of education. He compiled Greek grammars and dictionaries, wrote many books and reviews, and is author of Cretan folklore stories.

JANNES, jăn′ēz, AND **JAMBRES,** jăm′brēz, or, according to some authorities, MAMBRES. According to an apocryphal story, the names of two Egyptian magicians who withstood Moses (cf. Ex. vii. 11, etc.; 2 Tim. iii. 8). As the names seem to be Hebrew, the story was probably of Jewish origin. Its beginning was as early as the second century B.C., but it was constantly receiving additions until at last in both Jewish and Christian circles there was an extensive cycle of stories concerning these two men. In these Jannes and Jambres are represented as very skillful Egyptian magicians, who were able even to counteract the most severe of the plagues Moses brought upon Egypt. As demonic spirits, they continued their malignant activity against Israel during the wandering in the wilderness, but at last were destroyed through Phinehas' use of the Divine name. One story relates that Jannes died first and went to the deepest place of torment, whence his spirit addressed his brother Jambres, warning him to repent ere it was too late. According to Origen and the *Decretum Gelasii*, there was an apocryphal book of Jannes and Jambres. Origen supposed that Paul depended on this for the statement in 2 Timothy, though the Apostle may have alluded only to a well-known story for the sake of illustration without being acquainted with the book. Consult: Emile Schürer, *Geschichte des jüdischen Volkes*, vol. iii (4th ed., Leipzig, 1901–11); Kohler, in *The Jewish Encyclopœdia*, vol. vii (New York, 1901–06); Max Förster, "Das lateinisch-altenglische Fragment der Apokryphe von Jannes und Mambres," in *Archiv für die Studium der neueren Sprachen und Litteratur*, vol. cviii (Brunswick, 1902).

JANNET, zhȧ′nȧ′, CLAUDIO (1844–94). A French publicist, born in Paris. He studied for the bar and afterward became professor of political economy at the Catholic University of Paris. His works include: *De l'état présent et de l'avenir des associations coopératives* (1867); *L'Internationale et la question sociale* (1871); *Les institutions sociales et le droit civile à Sparte* (1874); *Les Etats-Unis contemporains* (1875; 4th ed., 1888), an important work; *Les sociétés secrètes* (1876); *Les précurseurs de la francmaçonnerie* (1887); *Le socialisme d'état et la réforme sociale* (1889); *Le capital, la spéculation et la finance au XIXème siècle* (1892). In theory Jannet was a disciple of Le Play.

JAN′NEY, SAMUEL MACPHERSON (1801–80). An American Quaker preacher, historical biographer, and poet, born in Loudoun Co., Va. He was a member of the Hicksite Society of Friends and served as a superintendent of Indian affairs in 1869. His publications in prose include: *Conversations on Religious Subjects* (1835); *Historical Sketch of the Christian Church* (1847); *Life of Penn* (1852); *Life of Fox* (1855); *History of the Religious Society of Friends from its Rise to 1828* (1867). His best-known writings in verse are *The Country School House* (1825) and *The Teacher's Gift* (1840).

JANOW, jä′nôv, MATTHIAS VON (?–1394). A Catholic prelate, often called a precursor of Huss. Of his early history little is known. He was educated at the University of Prague and the University of Paris. Visiting Rome, he was appointed in 1381 canon and confessor in the cathedral of Prague and continued to perform the duties of the office until his death. In his book, *Regula Veteris et Novi Testamenti*, he alleges the corruption of the Church in all its parts and explains the causes of it. He advocated the removal of images from the churches, but never revolted from ecclesiastical authority. He died in 1394 and 16 years later his works were burned with those of Wiclif. Consult Lützow, *Life of John Hus* (New York, 1909).

JANS, yäns, ANNEKE or ANNETJE (?–1663). An early Dutch colonist of New Netherland, famous because of lawsuits concerning her farm between her heirs and the corporation of Trinity Church, New York City. She emigrated from Holland to New Netherland with her husband, Roeloff Jansen, in 1630. In 1636 the latter obtained a grant of 62 acres of land on Manhattan Island, extending from the present Warren Street to the neighborhood of Desbrosses Street and lying between Broadway and the Hudson River. Soon afterward Jansen died, and she married the Dutch dominie Everardus Bogardus (q.v.). In 1654, after her husband's death, she secured a patent to the farm in her own name and later removed to Albany, where she died, leaving her property to be divided among her eight surviving children. After the English had taken possession, in 1664, all property holders were required to secure new titles for their lands. Accordingly the heirs secured a new patent for the farm from Governor Nicolls, on March 27, 1667. Four years later, March 9, 1671, the property was sold to Governor Lovelace, all of the heirs signing the deed of transfer except the wife and child of Cornelius Bogardus, a son of Anneke and her second husband, who had died in 1666. It is largely upon this omission that the subsequent suits have been based. Upon the recall of Governor Lovelace (q.v.) the government confiscated the Jans farm and subsequently granted it to Trinity Church by a patent sealed on Nov. 23, 1705. In 1749 Cornelius Brower, a descendant of the Cornelius Bogardus whose heirs had not signed, took forcible possession of a portion of the farm and on being evicted began an action against Trinity Church, which was decided against him. In 1757 he made another unsuccessful attempt. Another Cornelius Bogardus took possession of part of the estate in 1784 and held it until he was evicted by the courts in 1786. His son John brought suit in 1830 to secure one-thirtieth of the farm and a proportionate share of back rents. In order to secure the money necessary to carry on this suit, he sent circulars to all the descendants of Anneke Jans, asking them to contribute, which they did most liberally until 1847, when judgment was again given for the church. Since then several other suits have been brought by the heirs, but they have been uniformly decided in favor of the defendants. Consult: Nash, *Anneke Jans Bogardus: Her Farm, and how it Became the Property of Trinity Church, New York* (New York, 1896); *Sandford's Chancery Reports*, vol. iv, pp. 633–672; Schuyler's *Colonial New York*, vol. ii; *Harper's Monthly Magazine* for May, 1885.

JANS, JANSEN ENIKEL, or ENENKEL. An Austrian historian and poet of the thirteenth century. He wrote a rhymed *Weltchronik*, en-

tirely worthless as history, but containing many anecdotes and tales which give it a certain literary value (ed., by Strauch in *Monumenta Germaniæ Historica*, vol. ii, part i, 1891), and a *Fürstenbuch* (ed. by Rauch in *Scriptores Rerum Austriacarum*, vol. i, 1790), which, though equally unscientific, describes the reigns of the Austrian dukes Leopold VII and Frederick the Quarrelsome with a good deal of picturesqueness and vigor. Consult Scherer, *Litterarisches Centralblatt* (Leipzig, 1868).

JANSEN, yän'sen, Olaüs (1714–78). A Swedish naturalist, born at Christianstad. He went to Germany for his education and was appointed professor at Tübingen University. Thence he went to a similar position at Copenhagen, and in 1764 he was ordered by the Danish government to make a study of the natural resources of South America; but his travels extended north to Central America and Florida. In 1772 he visited New England. His published works include: *Aanden i Naturvidenskaben og Naturens almindelige Lære* (1773); *Neue Reisen durch Brasilien und Peru* (1775); *Neue Reisen durch Louisiana und Nueva España* (1776); *Anmärkningar till Historia Naturalis och Klimatet i Nye England och Nye Spanien* (1778).

JANSENISM, jăn'sen-iz'm. The name applied to the doctrines of a party in the Church of France which led to bitter controversies in the last half of the seventeenth and the beginning of the eighteenth century. It was a combination of three different tendencies. On the more abstruse theological side it derived from the doctrines of Jansenius, Bishop of Ypres, on the question of grace, and took its name from him; a second equally strong tendency carried the Jansenists into opposition to the current practice in regard to the sacraments and the spiritual life, as a consequence of the influence of the Abbé de Saint-Cyran; while a third characteristic was a spirit of opposition to the government which made them the legitimate heirs of the Fronde. The first two tendencies found determined opponents in the Jesuits, whose stand on the question of grace and whose practice in moral theology were attacked by them; and the third brought the leaders of the party into conflict with the absolute monarchy of Louis XIV.

The Reformation, with its special doctrines as to original sin and justification, had tended to recall attention to the difficult questions of grace and man's free will. Since the famous controversy in the fifth century between St. Augustine on one side and Pelagius and John Cassian on the other, the doctrines of the latter, who exaggerated the part played by the human will (see Free Will) at the expense of divine grace, had taken their place in the list of heresies, while that of St. Augustine had held the field. Adopted by St. Thomas Aquinas and the Dominicans in the thirteenth century, it was opposed to some extent by the Franciscan Duns Scotus and became a constant source of controversy between the two orders. In the sixteenth century the discussion became more violent, especially at the University of Louvain, where Michel de Bay, known as Bajus (q.v.), taught what professed to be the Augustinian doctrine, but was actually a violent exaggeration of it, not a little resembling that of Calvin. At the same time the University of Salamanca was agitated by cognate questions, and the theses of the Dominican Bañez and the Jesuit Molina arrayed the orders against each other. Clement VIII established a special congregation, called De Auxiliis Gratiæ, to consider these questions, but his successor, Paul V, finally, for the sake of peace, forbade the two parties to accuse each other of heresy, thus leaving the question, in a sense, open.

The publication, in 1640, of the *Augustinus* of Jansenius (q.v.) added new vigor to the controversy. Its theories about the relation of grace to human nature, singularly close to Calvin's views, were immediately attacked by the Jesuits. By the bull *In eminenti* of 1642, Urban VIII confirmed the prohibition of it by the Inquisition as contravening the decree of Paul V and as renewing some of the condemned propositions of Bajus. But this did not put an end to its influence. Jansenius' friend, Saint-Cyran, had succeeded in grouping around him at Port-Royal a community imbued with similar doctrines; it was small in numbers, but strong in personal character. Besides Antoine Arnauld, who became the leader of the party on Saint-Cyran's death in 1643, and others of his family, it included the learned Lemaître de Sacy, the moralist Nicole, the preacher Singlin, and Pascal. In 1643 Arnauld, in his book *De la fréquente communion*, attacked the practice of the Jesuits in regard to the sacraments; and later, Pascal, in his celebrated *Lettres à un provincial* (1656–57), with the most brilliant irony but with very little regard for the rules of fair controversy, made an onslaught on their moral theology. But the society pursued its end. It had a certain number of propositions from the *Augustinus* submitted to the theological faculty of Paris, and five of them were eventually presented to the holy see for judgment, by 88 bishops. By the bull *Cum occasione* of May 31, 1653, Innocent X declared these five heretical. They were as follows: 1. Certain commandments of God are impossible to just persons even desiring and endeavoring to keep them, according to the strength which they then possess; and such grace as would render them possible is lacking to them. 2. In the state of fallen nature internal grace is never resisted. 3. In order to merit and demerit in the state of fallen nature, freedom from necessity is not required of man, but it suffices that there be freedom from constraint. 4. The Semi-Pelagians admitted the necessity of internal prevenient grace for each separate act, and even for the beginning of faith; their heresy consisted in this, that they considered that grace to be such as the will of man might either resist or obey. 5. It is a Semi-Pelagian error to say that Christ died or shed His blood for all men absolutely.

The Jansenists attempted to evade the force of this bull by contending that the five propositions were not found in the *Augustinus*, or at least not in the sense in which they were condemned, and pointed out that papal infallibility (q.v.) did not extend to questions of fact; therefore, they maintained, the book was not really condemned. The propositions may not have been there—Louis XIV commissioned the Comte de Grammont to read the book and see if they were, and the witty courtier reported that, if they were, they were there incognito—but it was indisputable that they represented the very pith and marrow of the Jansenist position. Alexander VII renewed their condemnation, declaring expressly that they were found in the book, and condemned in the sense there

given to them. Later, he drew up a formulary to be signed by all the bishops and religious of France, in these terms: "I submit myself sincerely to the constitution of our holy Father Innocent X, and I condemn with heart and mouth the doctrine of the five propositions of Cornelius Jansenius, which the Pope and bishops have condemned—a doctrine which is not that of St. Augustine, whom Jansenius has ill explained, and is contrary to the true meaning of that great doctor." The community of Port-Royal refused to sign, in spite of Bossuet's persuasions and severe pressure from the government; and four bishops were willing to sign only with a reservation that they believed themselves to owe nothing more than "respectful silence" to a decision of the Church in matters of fact. They were about to be deposed, when Clement IX came to the pontifical throne in 1667. After complicated negotiations the new Pope managed to arrange a compromise (1668); and the cessation of hostilities, which lasted for 34 years, was known as the Clementine Peace.

During this period the Jansenists strengthened themselves in a number of dioceses and in some religious orders, insisting especially upon strictness in the administration of the sacraments. Their whole attitude, in fact, moral, dogmatic, and political, had many points of resemblance to that of the English Puritans of a generation earlier. On Arnauld's death, in 1694, the former Oratorian Quesnel (q.v.) succeeded to the leadership. The controversy once more revived in an acute form, with the celebrated "Case of Conscience," by which the Jansenists subtly endeavored to make their doctrines appear approved. Clement XI, however, reiterated the disapproval of his predecessors in 1703 and by the bull *Vineam Domini* of 1705. The French parlements, among the legal minds of which Jansenism found many supporters, refused to accept the brief *Universi Dominici* by which, in 1708, the Pope condemned Quesnel's *Réflexions morales;* and the weak character of Cardinal de Noailles, Archbishop of Paris, gave them courage. Louis, who persistently disliked them as preventing the realization of his ideal of perfect unity in church and state, asked the Pope definitely to put an end to these confusions. After two years' further investigation Clement XI issued the constitution *Unigenitus*, which condemned 101 propositions taken from Quesnel's works. Cardinal de Noailles and 15 other bishops made difficulties about its reception; the universities of Paris, Rheims, and Nantes declared against it; the parlements protected the Jansenists; and after the death of Louis XIV the Regent, the Duke of Orléans, took a dubious position. In 1717 Cardinal de Noailles appealed from the bull "to a better-advised Pope and a general council," and several bishops joined him, constituting the party of the Appellants. When he died, after making his submission, in 1729, they gradually lost strength, and not even the miracles supposed to have been wrought by the deacon Pâris (see CONVULSIONARIES) could restore them to their former position. Their spirit, however, remained active up to the Revolution and showed itself especially in the war against the Jesuits. It spread to some extent in Germany and Italy and had its influence on the ecclesiastical innovations proposed by the Emperor Joseph II.

As an organization, it was able to prolong its existence only in Holland, where, at the beginning of the eighteenth century, a formal schism arose. In 1723 the chapter of Utrecht undertook to restore the extinct archbishopric of that city, and they have maintained a succession ever since, claiming this to be the Church of Holland and creating also bishops of Haarlem and Deventer. After the Vatican Council of 1870 they entered into relations with the Old Catholics (q.v.) and consecrated the first bishop of the new sect.

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JANSENIST. See JANSENISM.

JANSE'NIUS (Latinized form of JANSEN, *Dutch pron.* yän'sen), CORNELIUS (1585–1638). A Dutch theologian, who gave his name to the Jansenist school. He was born near Leerdam in the Netherlands and made his studies at Utrecht and Louvain, partly under the guidance of the Jesuits, whose society he thought of entering, but was discouraged by them. During his theological studies in the college founded at Louvain by Adrian VI he came under the influence of Jacobus Jansonius, an ardent supporter of Bajus (q.v.), and became intimate with Duvergier de Hauranne (q.v.), better known as the Abbé de Saint-Cyran, whom he followed to Paris and to Bayonne. He came back to Louvain in 1617 as head of the new Dutch College of St. Pulcheria, and acquired much influence as a teacher. In concert with Saint-Cyran he agitated reforms in the Church, especially in the administration of the sacraments, and a discussion of the doctrine of grace which was to have far-reaching consequences. In 1636, on the nomination of Philip IV of Spain, he was made Bishop of Ypres and died there two years later, in good standing and apparently unconscious of the results which were to follow the publication two years later of his great work, *Augustinus, seu Doctrina Sancti Augustini.* Consult Van den Peerenboom, *Cornelius Jansenius septième évêque d'Ypres, sa mort, son testament, ses épitaphes* (Bruges, 1882), and Callawaert and Nols, *Jansenius* (Louvain, 1893). See JANSENISM.

JANSON, yän'son, KRISTOFER NAGEL (1841–). A Norwegian novelist, born at Bergen. He studied theology at the University of Chris-

tiania and afterward interested himself in the advancement of popular education, improving his own by sojourns in Italy. From 1882 till 1892 he was minister to a Unitarian congregation of his countrymen in Minneapolis, Minn., and became editor of the Norwegian periodical, *Saamanden*, published there. He returned to Norway in 1892. Besides poems, his publications include numerous novels, such as: *Fraa Bygdom* (1866); *Han og ho* (1872); *Marit Skjölte* (1868); *Torgrim* (1872); *Fraa Dansketidi* (1875); *Den Bergtekne* (1876), translated into English as *The Spell-Bound Fiddler; Gjorde hun ret?* (1910); the historical novels *Sara* (1891); *De Fredlöse* (1894); *Liv* (1897); *Ensom* (1903); *Alv Pave* (1904); *Bondefortællinger* (1908); and various dramas, among them *En Kvindeskjæbne* (1878). A collection of his *Digte* was published in 1911.

JANSON, zhän'sôn', Paul (1840–). A Belgian advocate and politician, born at Herstal. He first made himself conspicuous by his speeches on social reform topics delivered at the labor unions in Liége and elsewhere, and in 1877 he was sent to Parliament, where he went at once to the front as a debater, and the following year was made a member of the Liberal cabinet. Afterward he joined some deputies of the Extreme Left in the formation of a radical party, claiming an extension of the suffrage, thus making a split in the Liberals. They reunited in 1889, after M. Janson had been out of Parliament for five years, and he once more began to agitate for universal suffrage. His efforts were finally successful; in 1893 universal suffrage was established. In 1900, as member for Brussels, he reëntered the chamber, after an absence of six years, to take up the struggle for an equal suffrage, and he was active in the Congo debates in 1906. In August, 1912, he received the title of State Minister.

JANSSEN, jän'sen (or Jansen, or Johnson), Cornelius (1593–1664). An English portrait painter. He was probably born in London, and from 1618 was the fashionable portrait painter at court. His patronage declined after the arrival of Van Dyck, and during the Parliamentary wars he migrated to Holland. His portraits include those of Charles I, at Chatsworth; the Duke of Buckingham, at Welbeck Abbey; John Milton as a boy of 10, in private possession, London; "The Magistrates," Hague Museum. Other examples are in the museums of Dresden, Brunswick, Rotterdam, and Lille and in many English private collections. Janssen's portraits are distinguished by clear color, delicate touch, and careful finish, and by dark backgrounds that throw the flesh tints into high relief.

JANSSEN, yän'sen, Johannes (1829–91). A German historian. He was born at Xanten on the Rhine, was educated at the universities of Louvain, Bonn, and Berlin, and became a priest of the Roman Catholic church in 1860. He was also professor of history at the city Gymnasium in Frankfort-on-the-Main, and in 1880 became domestic prelate to the Pope. He was strongly ultramontane in his views. His historical works are as follows: *Frankreichs Rheingelüste* (1861; 2d ed., 1883); *Schiller als Historiker* (1863; 2d ed., 1879); *Zur Genesis der ersten Teilung Polens* (1865); *Gustav Adolph in Deutschland* (1865); *Frankfurts Reichskorrespondenz von 1376 bis 1519* (1863–66); *Zeit- und Lebensbilder* (1875; 3d ed., 1879); *Friedrich Leopold, Graf zu Stolberg* (1876–77; 2d ed., 1882). *Geschichte des deutschen Volkes seit dem Ausgang des Mittelalters* (1877–86), translated into English in 1905, is his principal work. Consult: Julius Köstlin, *Luther und Janssen* (Halle, 1883); Maximilian Lenz, *Janssens Geschichte des deutschen Volkes* (Munich, 1883); Ludwig Pastor, *J. Janssen* (5th ed., Freiburg, 1893); Mathieu Schwann, *Johannes Janssen und die Geschichte der deutschen Reformation* (Munich, 1892).

JANSSEN, Peter (1844–1908). A German historical painter. He was born at Düsseldorf, son of the engraver Theodor Janssen (1817–94), by whom he was first instructed before studying at the Academy under Karl Sohn and Bendemann. He is principally known through a series of decorative works whose monumental style and sound naturalism won him a reputation as one of the foremost historical painters of modern Germany. He became professor at the Düsseldorf Academy in 1877 and its director in 1895, and was elected a member of the Berlin Academy in 1885. His more important mural paintings include: "The Colonization of the Baltic Coast" (1872), in the Exchange at Bremen; "The Myth of Prometheus," in 12 compositions, in the second Cornelius Room of the National Gallery in Berlin; "Seven Momentous Episodes in the History of Erfurt" (1882), Town Hall, Erfurt; "Human Life," "Imagination," "Beauty," and "Nature," in the Aula of the Düsseldorf Academy. Of his oil paintings, the "Denial of Peter" is in the Academy at Philadelphia; the "Infancy of Bacchus" (1882) excited great admiration at the International Exhibition in Munich; and "Walther Dodde and the Peasants of Berg before the Battle of Worringen, 1288" (Düsseldorf Gallery), a composition of great dramatic power, containing many life-size figures, was awarded the great gold medal in Berlin in 1893.—His brother, Karl (1855–), a sculptor, born at Düsseldorf, was a pupil of the Academy in his native city, where, after studying at Rome, he was appointed professor in 1893. His chief works include the monument to the Kaiser at Düsseldorf, and "Woman Hewing Stone," in the National Gallery, Berlin.

JANSSEN, zhän'sän', Pierre Jules César (1824–1907). A French astronomer, born in Paris. Chosen to report upon natural phenomena in different parts of the globe, he went to Peru in 1857 to locate the magnetic equator, and to Italy (1861–64) to take observations of the solar spectrum. The thesis he wrote for his degree of doctor of science, *L'Absorption de la chaleur rayonnante obscure dans les milieux de l'œil*, made a sensation in 1860. For several years he made a specialty of sun eclipses, and in 1870 he escaped from besieged Paris in a balloon, so as not to miss the Algerian obscuration. As the result of his observations of the solar eclipse at Guntoor, India, in 1868, he announced, almost simultaneously with Lockyer and independently of him, that the solar prominences could be studied without a spectroscope, thus opening up a fruitful field of investigation. The year 1874 found him in Japan, watching the transit of Venus, and the following year he went as astronomer with the English expedition to Siam. In 1875 he was put in charge of the Meudon Observatory, which he had been instrumental in establishing and where he collected his solar photographs in his *Atlas de photographies solaires* (1904). In 1891 he began his

ascents of Mont Blanc, which resulted in the erection of the observatories there. He published volume i of the *Annales de l'observatoire de Meudon* (1896).

JANSSENS, Abraham, called Janssens van Nuyssen, yän'sĕns vän noi'sen (1575–1632). An eminent Flemish painter, born in Antwerp, where, at the age of 18, he became the pupil of Jan Snellinck. He was admitted as a master into the Guild of St. Luke in 1601, was its dean in 1606–07, and then visited Italy. A contemporary of Rubens, he ranks next to him among the Flemish masters of the seventeenth century, especially as a colorist, and occasionally surpasses him in the correct drawing of his figures. Torchlight and other artificial effects were treated by him with exceptional skill. Of his biblical, allegorical, and mythological subjects there are in the Antwerp Museum a "Madonna," an "Adoration of the Magi," and "Scaldis" (an allegorical representation of the river god of the Scheldt); in the Brussels Museum, "Old Age Resting on Faith and Hope"; in the Cassel Gallery, "Diana and Nymphs Watched by Satyrs"; in the Berlin Museum, "Vertumnus and Pomona" and "Meleager and Atalanta"; and in the Vienna Museum, "Venus and Adonis" and "Day and Night." His finest productions, however, are to be seen in the churches of Flanders, notably an "Entombment" and "Madonna with Saints," in the church of the Carmelites at Antwerp, and an "Ecce Homo" and "Descent from the Cross," in the cathedral of Saint-Bavon at Ghent.

JAN'UA'RIUS, Saint, or **SAN GENNARO.** A martyr of the Christian faith under Diocletian, and patron saint of Naples. He was Bishop of Benevento, and according to the legend suffered martyrdom by beheading at Puteoli. His day is September 19. His body is preserved at Naples in the crypt of the cathedral, and in a chapel of the same church are also preserved the head of the martyr and two phials (*ampullæ*) said to contain his blood. This blood is affirmed to possess the property of becoming liquid when brought near the head. Should it fail to do so, the event is considered a bad omen by the people. The alleged miracle has commanded much interest, though the phials have never been opened for scientific examination. Consult Cavenne, *Le célèbre miracle de S. Janvier* (Paris, 1909), which, although somewhat uncritical, is a good account.

JANUARY. See Month.

JA'NUS. An ancient and important Roman god, whose name was invoked at the beginning of all religious ceremonies. Regarding the etymology of the name and its original meaning, two theories are prominent. One considers it a formation from the root *dju, djav, djev,* by the addition of *-an, djav-an;* as we have Ζεύς and Ζάν in Greek, so, in this view, we have *Iovis* and *Ianus* in Latin; but while in Greek the differentiation in form was not sufficient to lead to the growth of two separate divinities, among the Romans the separation was complete. He is thus the god of the light and heaven, a masculine counterpart to Diana (q.v.), a sun god according to some. This theory of the origin of the name Janus certainly agrees well with the high place of this deity among the gods and with many features of his cult. The other view connects the name of the god with *ianua* (Lat., house door from the street) and considers him as the god of the entrance and the door, whether of city or house, as Vesta is the goddess of the hearth. This is in accordance with the nature of many Roman gods and explains the peculiar nature of the special shrine of Janus, the *ianus geminus* which formed an entrance to the Forum, at the northeast end. This shrine was simply two parallel arched gateways connected by side walls and furnished with gates. The tradition of later times declared that King Numa Pompilius had built the shrine and ordained that the gates should be closed only in time of peace, and that only once (in 235 B.C.) between Numa and Augustus, who closed them three times during his reign, had such a time been known. If the custom really existed from early times, its origin is probably to be sought in the belief that the Ianus Geminus was the entrance to the sacred hearth, the centre of the city, and that it would be a bad omen to close these gates upon the absent warriors. All doors and gateways were under Janus's protection. Janus is preëminently a god of the beginnings and was therefore invoked at the opening of each prayer. The beginning of the day was sacred to him. To him as well as to Juno offerings seem to have been made on the first day of each month, and his festival, the Agonium, on January 9, was the first of the Roman religious year. The *rex sacrorum* was the special priest of Janus and therefore stood at the head of the Roman priests. (For a different view of the *rex sacrorum,* consult Bessie R. Burchelt, "The Divine Character of the *Rex Sacrorum,*" in the *Classical Weekly,* viii, 33–37.) The double-faced head of the god appears on the Roman *as* (q.v.) of the early coinage, and it is possible that this is the earliest representation of the god. In later times his image, with the double face, was set up under the arch in the Forum. Janus, though so ancient and important in the ritual, seems to have played but a small part in the popular religion; his cult is not proved to have existed in early times outside of Rome, and votive inscriptions in his honor are very rare. There are traces of a goddess Jana, the feminine parallel to Janus, but she never became prominent in the state religion. Some ancient authorities apply the name Janus to a King Janus who had a citadel on the Janiculum (q.v.). Consult: Linde, *De Jano Summo Romanorum Deo* (Lund, 1891); Fowler, *The Roman Festivals* (London, 1899); Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912).

JANUS GEM'INUS. See Janus.

JANUS QUAD'RIFRONS, Arch of. An arched passage in the Forum Boarium (q.v.) at Rome. It has four façades and was surmounted by a second story, now destroyed. It is about 40 feet square and 50 feet high; the arches are 33 feet high and 17 wide. Its erection is assigned to the time of Constantine, and it appears to have served as a sort of exchange.

JANVIER, jăn'vī-ā, Margaret Thomson. See Janvier, Thomas Allibone.

JANVIER, Thomas Allibone (1849–1913). An American story-writer and historian, born in Philadelphia, of Provençal descent. With a public-school education he began newspaper work in his native city in 1870 and continued it till 1881. In 1878 he married Catharine Ann Drinker, a lady of literary interests and ability. He spent several years in Colorado and in New and old Mexico, sojourns which provided inspiration and material for much of his literary work. From 1884 to 1894 he lived in the Wash-

ington Square district of New York, for three years was in Provence, and for another three in England. The fruit of his residence in New York was his *Color Studies* (1885), skillfully and charmingly written tales of artist life, originally published in magazines as the "Ivory Black Stories." In France, Janvier became a warm friend of Mistral and was made an honorary member of the Félibrige society. Besides *Color Studies* he wrote: *The Mexican Guide* (1886); *The Aztec Treasure House* (1890); *Stories of Old New Spain* (1891); *The Uncle of an Angel, and Other Stories* (1891); *An Embassy to Provence* (1893); *In Old New York* (1894); *The Women's Conquest of New York* (1894), in which the suffrage movement is fictitiously presented; *In the Sargasso Sea* (1898); *The Passing of Thomas, and Other Stories* (1900); *In Great Waters* (1901); *The Christmas Kalends of Provence* (1902); *The Dutch Founding of New York* (1903); *Legends of the City of Mexico* (1910); *From the South of France* (1912), short stories; *At the Casa Napoleon* (1914), which contains a memoir by Ripley Hitchcock.

Janvier's sister, MARGARET THOMSON JANVIER (1844–1913), was born in New Orleans. Under the pen name Margaret Vandergrift she wrote many juveniles, among which are to be noted: *The Absent-Minded Fairy, and Other Verses* (1884); *The Dead Doll, and Other Verses* (1900); *Under the Dog-Star* (1900); *Umbrellas to Mend* (1905).

JA'OK (name among the Kamchadales). A large, edible sculpin (*Myoxocephalus jaok*), which is one of the most characteristic and useful fishes of both shores of Bering Sea. It is about 2 feet long, reddish above and white beneath. It is very active, has extraordinary tenacity of life, and is extensively caught and smoke cured by the Kamchadales, who call it jaok, and Koriaks, whose name for it is i laal, while the coast Russians call it ramsha.

JAPAN', in Japanese **NIPPON'**, or **NIHON'**. An empire consisting of a chain of islands lying along the east coast of Asia and extending from lat. 21° 45′ N. to 50° 56′ N. and from long. 119° 18′ to 156° 32′ E. It is separated from the Philippines by Bashi Channel; from China by Formosa Channel, 70 to 100 miles wide; from Korea by Broughton Channel, less than 25 miles in width; from the Russian portion of the island of Sakhalin by the fiftieth parallel, N. lat.; and from Kamchatka by the Kurile Strait; while the wide, somewhat secluded Sea of Japan lies in the embrace of the main island and Yezo, on the south and east, and of the east coast of Korea and the maritime province of Siberian Manchuria on the west and north.

Japan is the name by which the country is known to foreigners, but in Japan itself Nippon or Nihon is used, sometimes with the syllable Dai (great) prefixed and occasionally Te Kokŭ (empire, or imperial) suffixed to it, so that in its most expanded form the name is Dai Nippon (or Nihon) Te Kokŭ (i.e., the empire of great Japan). The name Nihon seems to have been adopted about the year 670. Down to that time Yamato was the name, from the province adjoining Kyoto, in which Jimmu Tenno (660 B.C.) and the early mikados ruled. The Chinese have long known the country as Jih-pun-Kwoh, (sun-origin kingdom).

The islands of which the Empire is composed are said to number nearly 4000, but of these only about 500 are inhabited or have a coast line of over one *ri*, or about 2.44 miles. The remaining islands are mere rocks, sometimes covered with vegetation, as, e.g., the 808 tiny islets of the Bay of Sendai, collectively known as Matsushima, or Pine Islands. The chief islands are five in number: 1. The Hondo, or Main Island, sometimes also designated as Honshu, or the Mainland, and formerly but incorrectly named Nippon, a name which can be applied only to the whole country. With its adjacent small islands, it has an area of 87,426 square miles. In shape it is an irregular crescent, its concave side forming the southeast boundary of the Sea of Japan. Its greatest breadth is less than 200 miles. It is separated from Yezo, on the north, by Tsugaru Strait, 10 miles in width (through which runs a strong current from the Sea of Japan), and from the eastern part of Shikoku, on the southwest, by Kii Channel. 2. Shikoku, with an area of 7083 square miles, lying south of the western part of Hondo, and separated from it by the beautiful landlocked but shallow channel, studded with islets, known to foreigners as the Inland Sea, but to the Japanese by different names in different parts of the length. 3. Kiushu, with an area of 15,703 square miles, separated by the narrow Strait of Shimonoseki from the western point of Hondo, and lying to the west of Shikoku, from which it is divided by Bungo Channel. 4. Yezo, an irregular four-cornered island, with an area of 36,570 square miles, including the Kurile Islands, lying north of the main island, with one long arm or corner stretching north to Siberia and one reaching northeast to the Kurile Islands. 5. Formosa (q.v.), with an area of 13,944 square miles, lying off the coast of China. The other considerable islands or groups of islands are Sado and Oki, in the Sea of Japan, with a combined area of 468 square miles; the island of Awaji, lying off the mouth of Osaka Bay and between the main island and Shikoku, area 220 square miles; and Iki and Tsushima, lying between Kiushu and Korea, and having an area of 318 square miles; lastly, the Seven Islands, which are found off the promontory of Idzu. Korea, which was annexed to Japan in August, 1910, is separately treated.

CHIEF ISLANDS	Adjacent islands	Coast line in miles	Area in sq. miles
Hondo	167	5,930.12	87,426.00
Shikoku	74	1,628.29	7,083.00
Kiushu	150	4,506.33	15,703.00
Sado	....	130.05	336.44
Oki	1	185.36	130.35
Awaji	1	89.76	220.00
Iki	1	90.89	51.39
Tsushima	5	503.17	266.30
Total, Old Japan	....	13,063.97	110,748.09
Loo-choo group, 55 isl'ds	....	768.84	834.40
Bonin group, 20 islands	....	174.65	26.79
Total, Japan proper	....	14,007.46	111,607.28
Yezo	13	1,533.56	30,502.00
Kurile group, 32 islands	....	1,496.23	6,153.25
Formosa	29	859.63	13,944.00
Pescadores	47	98.67	85.33
Southern Sakhalin	....	....	13,253.00
Korea	....	....	84,738.00
Total, Japanese Empire	488	17,995.45	259,671.47

TOKIO BAY
SCALE OF STATUTE MILES
0 5 10
KURIL ISLANDS
(CHISHIMA)
Same Scale as Main Map
LOWER PORTION OF SAKHALIN
SCALE OF MILES
0 50 100
JAPAN
HOKUSHU
KAMCHATKA
PARAMUSHIR
SHUMSHIR
ITURUP
URUP
SEA OF OKHOTSK
PACIFIC OCEAN
Tokio
Yokohama
Yokosuka
Hakodate
Sapporo
Otaru
Aomori
Hirosaki
Akita
Morioka
Sendai
Yamagata
Niigata
Fusiyama
Nojimazaki
Esanzaki
Shiriyuzaki
Erimozaki
Kunashiri
Shikotan
Rewausi C.
Moimoto C.
Chachunobori
Nemuro
Kushiro
Otchishi
Shiretoko
Notoro
La Perouse Strait
Aniwa Bay
Patience Bay
Bellinghausen
Lopatka Str.
Kuril Str.
Alaid
Amphitrite Str.
Asirmintar Vol.
ONEKOTAN
Toorussyr
KHARIMKOTAN
SHIASHKOTAN
Mushir Str.
RASHAU
Ketoi Str.
KETOI I.
Bonassole Str.
Itarkiol
SHIMOSHIRI
Iturup Str.
Nabo Har.
Hitokapu B.
Bettobu
Sandai or Furubetsu
Nobunotsu
Matsunobori
Itolentomo
Okubetou
Tsugarugaki Str.
Uruga Channel
Kanozan
Nokogiriyama
Kiyodzumiyama
Fudoyama
Tateyama-wan
Sunozaki
Inubo Saki
Ogusu
Ashina B.
SAGAMI
Misaki
JOGASHIMA
Oshima
Toshima
Mashikeyama
Nutapkawshipe
Optateshipe
Meakantake
Yubaritake
Kamuizaki
Ishikari Bay
Iwaonobori
Tsugaru Str.
Tsugaru Bay
Aomori
Hachinohe
Miyako
Kamaishi
Ofunato
Yamada Bay
Kesennuma
Onahama
Mogamigawa
Fujishima
Tsuruoka
Sakata
Gwasan
Asamtake
Yazaki
Sado
Aikawa
Murakami
Komatsu
Tsuruga
Yonezawa
Shirakawa
Yokoseki
Kuroshima
Kinkasan
Ishinomaki
Shiogama
Sendai Bay
Yezo Str.
Shari Bay
Kushiro
Akkeshi
Nemuro
Shikotan Channel
TARAKU
SHIBOTSU
Nosshapzaki

Important towns are shown in heavy face type
Railways shown thus
Saki, Zaki or Misaki = Cape or Point
Shima = Island; Ko = Lake
JAPAN SEA
PACIFIC OCEAN
PHILIPPINE SEA
KOREA STRAIT
Tsushima
HONSHIU
SHIKOKU
KIUSHIU
Tokyo
Yokohama
Kobe
Osaka
Kyoto
Nagoya
Hiroshima
Nagasaki
Kagoshima
Miyazaki
Kumamoto
Fukuoka
Yamaguchi
Shizuoka
Sendai
Aomori
Hakodate
Niigata
Kanazawa
Toyama
Nagano
Fukui
Tottori
Matsue
Okayama
Kochi
Tokushima
Takamatsu
Matsuyama
Oita
Saga
Kurume
Sasebo
Beppu
Kagoshima
Miyazaki
Kirishima
Aso-san
Fujiyama
Hakuzan
Ontake
Yatsugatake
Shirane-zan
Nantaizan
Kirishima
Daisen
Hiko-san
Ibuki-yama
Kii Channel
Bungo Suido
Van Diemen Str.
Colnett Str.
Tsugaru Kaikyo
Kii-suido
Shionomizaki
Murotozaki
Sadazaki
Asotake
Hukuzan
Ichibusayama
Sobo-ka
Aso-san
Kirishima
Takachiho
Tanegashima
Yakushima
Kuchinoshima
Tokara I.
Shobotsu I.
Hasamaka
Wakasa
Kyogamizaki
Wakasa-wan
Tsuruga
Biwa
Ise-wan
Owase
Kumano
Shionomizaki
Kii Channel
Kii-suido
Awa
Tosa
Tosa-wan
Bungo Suido
Hyuga-nada
Osumi-kaikyo
Kagoshima-wan
Sumbe-yama
Hinomizaki
Matsue
Shimonoseki
Moji
Yawata
Kokura
Nakatsu
Usa
Saeki
Kitsuki
Oita
Beppu
Takada
Kuji
Kamaishi
Ofunato
Sendai
Ishinomaki
Shiogama
Soma
Onahama
Iwaki
Mito
Choshi
Inuboesaki
Tateyama
Kisarazu
Yokosuka
Kamakura
Odawara
Hakone
Atami
Numazu
Yoshiwara
Shimoda
Irozaki
Nushima
Kodzushima
Miyakeshima
Oshima
Mikura-shima
Hachijo
Sagami-nada
Tokyo-wan
Kii-suido
Shichi-to
Daiozaki
Wakayama
Shingu
Kushimoto
Kinomoto
Tanabe
Hongu
Yunoki
Kawanoshima
Saijo
Matsuyama
Imabari
Takamatsu
Sakaide
Marugame
Kotohira
Tadotsu
Uwajima
Yawatahama
Ozu
Iyo
Niihama
Shikoku-Sanchi
Kurosaki
Kubokawa
Makamura
Suiki
Kumamoto
Yatsushiro
Kumamoto
Hitoyoshi
Sadowara
Takanabe
Miyakonojo
Obi
Kanoya
Ibusuki
Kagoshima
Kushikino
Izumi
Sendai
Toizaki
Akune
Kirishima
Miyanoura
Yakushima
Tanegashima
Mush

The first three of the large islands, viz., Hondo, Shikoku, and Kiushu, with their adjacent islands, together with Sado, Oki, Awaji, Iki, and Tsushima, with their adjacent islands, constitute Oyashima, or Old Japan. With the 55 islands of the Loo-choo group and the 20 of the Bonin group added, there is formed Japan proper—Yezo, with its 12 adjacent islands, the 32 islands of the Kurile group, Formosa, the Pescadores, and Korea, with their numerous adjacent islands, being regarded merely as colonial possessions.

The preceding table shows the different constituent members of the Empire—the chief islands with the number of adjacent islands, the length of coast line of the various groups, and their area in square miles.

Topography. Japan is a land of high mountains and deep valleys, with many small plains. Its scenery is, in the main, pleasing rather than grand or sublime, rounded heights clad with forests, or with the verdure of a remarkably luxuriant vegetation predominating, though a large number of lofty, more or less shattered and craggy volcanic peaks are found.

The level land lies chiefly along the lower courses of the principal rivers, or consists of small extents of coast lowlands or coastal plains, or of plateaus and gentle slopes along the feet of the mountain ranges. The most extensive plains are those which border the Ishikari and Tokachi rivers in Yezo or stretch along the seashore at Kushiro and Nemuro. In the northeast section of Hondo is the Oshu plateau, watered by the swift-flowing Kitakami and extending over portions of four provinces. In the central region is that of the Tonegawa, or plain of the Kwanto, which spreads into the provinces of Musashi, Kodzuke, Hitachi, and Shimosa. Next comes the Kisogawa, which forms part of Mino and Owari. The most extensive of the littoral plains is found in Echigo, along the lower waters of the Shinano River. In the Five Home Provinces are several comparatively wide plains along the Yodo and Yamato rivers and their feeders, while in Shikoku flat lands lie along the Yoshino River and in Kiushu along the Chikugo. In Formosa a plain 20 miles wide, expanding towards the south, lies between the mountains and the western coast.

In general, the mountains follow the trend of the land itself, and the main chains send off various smaller ranges which run parallel or branch out from them, often descending to the sea and forming bays and harbors capable of sheltering large ships. It is at these points that the greatest mountain masses and the most imposing scenery are found. In Formosa, also, the great backbone of the island extends from north to south, several of its peaks exceeding in height those of Japan proper. Beginning with the volcanic elevations of the Kurile group, which form a line of 32 stepping stones from Kamchatka to the island of Yezo, a range of trachytic and basaltic rocks is intersected near the centre of Yezo by a loftier and more massive chain composed of granite and old schists, from Cape Soya on the north (a continuation of the Sakhalin system), the highest peak of which is the Tokachi, with an elevation of 8200 feet. Farther on towards the southwest this volcanic Kurilian Range merges into the west coast range from Cape Soya and is marked by some remarkable volcanoes, the most noted though not the highest of which is Koma-ga-take, or Foal Mountain (a name of common occurrence in Japan), with a height of nearly 4000 feet. Branching into two lines after the long western arm of the island rounds Volcano Bay, these mountains reappear on the main island in two parallel chains. One, the northern schist range, separates the valley of the Kitakami River from the Pacific; the other, the main chain, continues towards the southwest, forms the backbone of the island until it meets the great complex of massive intersecting ridges which inclose the plateau of Shinano (2550 feet above the sea), and occupies the central portion of the main island where it is widest. It sends out important branches and continuations southeast through the Hakone Range into Idzu; southwest through Yamato and Shikoku to Kiushu; and westerly through the centre of Chugoku to Shimonoseki, forming in its course the dividing line between the group of provinces known as San-yo-do and that called San-in-do.

In this central mountain mass, which covers the provinces of Kaga, Ecchu, Hida, Shinshu, Koshu, and part of Kodzuke, are found the loftiest peaks of Japan proper. They also offer the grandest scenery and hence are frequently called the Japanese Alps. The principal summits are Haku-san in Kaga, an extinct volcano, with a height of 8920 feet; Yari-ga-take, 10,000 feet, in Hida; Gohonsha, the highest peak of the Tate-yama Range, 9500 feet; Koma-ga-take, 10,384 feet; and scores of others. Farther north in the Nikko Range of Shimotsuke is Shirane-san, 8580 feet; Nantai-san, 8150 feet; and others, each as a rule sacred to some deity and consequently much visited by pilgrims. Snow covers most of them in winter, but, except in a few cases, as, e.g., Haku-san and the peaks of the great mountain masses of Shinano and Hida, it disappears before the end of summer. The Fuji Range is the most noted of the Japanese mountains, and Fujiyama, "the Peerless," 12,395 feet, the highest peak on the islands, is not far from Tokyo. The remarkable grace of the mountain has given it an eminent place in Japanese decorative art. About its base the land is cultivated up to 1500 feet, from this point a grassy moorland extends to 4000 feet, then forests to 8000 feet, and above this is a wide stretch of old ejected lava and ash. Even on Fujiyama only patches of snow remain from year to year. The *toge*, or passes, by which these mountains are crossed are comparatively low, owing to the fact, as Rein points out, that (1) the mountain masses of primitive crystalline rocks and schists do not rise very high, and that (2) the volcanic formations, which have in so many places burst through and overlain them, seldom form long or very high ridges.

It is said that there are in Japan, which is of volcanic origin, 170 volcanoes, most of them, however, regarded as extinct, some merely quiescent, but scores still active, sending forth smoke and steam, or serving as landmarks at night by their fiery glow. Among the more famous volcanoes still reckoned as active are Asama-yama, in Shinano; Koma-ga-take and several others, in Yezo; Chacha-take, in one of the Kuriles; Shirane-yama, in the Nikko Range; Mihara-yama, on Oshima or Vries Island, one of the Seven Islands, lying off the promontory of Idzu; and Suwa-shima in Loo-choo. As late as 1888 Bandai-san (q.v.) was in a state of violent eruption. On Jan. 11, 1914, the volcano

of Sakur-shima on the island of Kiushu after a quiescent period of 130 years broke out violently and thousands of lives were lost. Earthquakes are of frequent occurrence, and even in comparatively recent times some have been very disastrous. The line of greatest seismic disturbance extends from Loo-choo through Kiushu to the northeast. On Oct. 28, 1891, occurred an earthquake, felt in six provinces; 7279 persons lost their lives, 17,393 were injured, and over 200,000 buildings were utterly destroyed.

Thermal springs and solfataras, some of them with curative properties, are exceedingly numerous. In Japan proper, the former, chiefly sulphur, are said to occur in 388 different localities, and almost all are much patronized by the natives. The chief are Kusatsu and Ikao, in Kodzuke; Yumoto, at the foot of Shirane-yama, in the Nikko Range; and Enoyu, on Kirishima-yama, in Kiushu. Chalybeate springs, both hot and cold, are also found. The solfataras are well exemplified by the O-jigoku and Ko-jigoku, or Great and Little Hells, of the Hakone Range.

Hydrography. Owing to the mountainous character of the country and the narrowness of the islands, Japan cannot boast of long rivers, no part being farther distant from the sea than about 100 miles. Yet the country is abundantly watered. Every valley has its stream or its streamlet, and one of the chief charms of the scenery is the rush of the numerous waters, and the beauty of its waterfalls, while the swiftness and torrential character of many of the streams cutting their way through deep rocky gorges, present grave problems to the engineer engaged in railway construction or bridge building. The largest river in the Empire is the Ishikari, in Yezo, which flows into the Sea of Japan, after a course of 275 miles. On the main island the three great *kawa*, or rivers, are the Shinano-gawa, the Tonegawa, and the Kisogawa. The Shinano rises in the province of that name, has a course of 215 miles, and flows northwest into the Sea of Japan. The Kitakami, in the northeast, has a course of 146 miles and flows southeast into the Bay of Sendai. The Tonegawa rises in Kodzuke, traverses the plain of Kwanto, and enters the Pacific near Tokyo, after a course of 177 miles. The third great river is the Kisogawa, which pursues a devious course from Shinano and falls into the Pacific. Another important river is the Ten-riu, which rises in Lake Suwa and flows south for 135 miles to the Pacific. Other rivers are the Sumida, flowing through Tokyo into the Gulf of Tokyo, and the Yodogawa, the outlet of Lake Biwa, which enters Osaka Bay. They are all swift, and spread out greatly when they leave the mountains. The streams are rarely navigable for any but the smallest vessels, being very shallow for most of the year; in late summer the torrential rains cause them to rise 15 feet or more, and they become impetuous.

Japan has many lakes, more remarkable for their beauty than their size. Several shallow sheets of water are found in Yezo, and along both the east and the west sides of Hondo or Main Island, but they are of little consequence as lakes and have little beauty. The largest and most noted is Lake Omi, better known as Biwa-ko (ko = lake) from a fancied resemblance in shape to the Chinese guitar (*p'i-pa*). It lies in the centre of the Province of Omi, at no great distance from Kyoto (q.v.), and is much visited by tourists on account of its "Eight Beauties." It is 37 miles long and 12 miles wide at the widest part and has an area nearly equal to that of Lake Geneva in Switzerland. Northeast of this, in the Province of Shinano, is Suwa Lake, the source of the Ten-riu-gawa, 2600 feet above the level of the sea. In winter it is covered with ice more than a foot thick. Farther north, in the Nikko Mountains, is the beautiful Chuzenji, at the foot of Nantai-san, with an area of nearly 18 square miles, being the highest lake in Japan, 4375 feet above sea level. It is of great depth and contains no fish. Farther north still is Inawashiro, near Bandai-san, with an area of perhaps 90 square miles, and situated about 1840 feet above sea level. It abounds in fish and is said never to be frozen over. Its outlet is the Ikano-gawa, which falls into the Sea of Japan near Niigata. Another well-known lake is that of Hakone, about 50 miles west of Yokohama. It is said to fill the crater of an ancient volcano, at an elevation of 2300 feet above sea level. It is about 10 miles long and is of unknown depth. Its outlet is the Haya-gawa, and by a tunnel at one end it supplies water for irrigating the rice fields of 17 villages on the plain to the west.

Climate. Stretching as the Empire does through nearly 30 degrees of latitude, climatic conditions vary widely in different parts. In the Loo-choo group subtropical conditions prevail; the heat is great, and snow and ice are never seen. In the Kurile Islands, on the other hand, snow and ice never entirely disappear, the sea freezes over in winter, and it is sometimes possible to pass from one island to another on the ice. Omitting Loo-choo, the Bonin Islands, and Formosa, there is scarcely a part of the country that is entirely free from snow in winter. It is heaviest in Yezo and along that part of the main island which lies between the great mountains (which form its backbone) and the Sea of Japan; and so deeply does it cover the country that in many places, especially north of the Shinano, Hida Range, the inhabitants have recourse to continuous porticoes or snow sheds along the streets to afford passageway. To the south and east of this region the snow is somewhat less heavy, and the winter is milder, owing to the influence of the warm current known as the Kuro Shiwo (q.v.). Seldom does more than a few inches of snow fall in Tokyo and Yokohama, though Fujiyama, only 60 miles distant, is covered to its base. The winter temperature hardly ever goes below 22° F., and there are not more than three or four frosty days during the whole winter. Kiushu, Shikoku, San-yo-do, and Tokaido are warm, and snow seldom lies except on the higher mountains. The wind is northerly and dry and the air bracing. The exceptional conditions which prevail in Yezo are due largely to the cold current —the Oyashiwo—and to the strong northeast winds which sweep down upon it from the ice fields of Siberia.

The southwest monsoon brings with it a hot, moist summer. The rainfall is great, and the heat is considerable, much greater than in corresponding latitudes in Europe and America. The rainfall is heaviest in June and September. During September, at the end of the summer heat, tropical cyclones, called typhoons, occur and cause great damage to property, especially to shipping. The annual fall in Yokohama is

about 70 inches; in Nagasaki, 71½; in Tokyo, 65.4; in Hakodate it is only 57.2. It is the great humidity which some of these figures imply, coupled with a temperature which may rise, though rarely, in summer to 95° F. as in Tokyo and Yokohama, that causes so much discomfort and sends to the mountain all who can get away. Yet, as compared with many places on the mainland of China, Japan is a very pleasant summering place. There is a well-equipped and well-managed weather bureau, with many meteorological stations.

Flora. The flora of Japan is exceedingly rich in variety, and its luxuriance is in keeping with the warmth and the moisture of the Japanese summer. In 1876 Franchet and Savatier enumerated no fewer than 2743 species of phanerogamous and the higher cryptogamous plants, distributed among 1035 genera. Since then the number has been increased to over 3000. The ferns are represented by 43 species, the sedge family by 168, and the Ericaceæ by 76. In the plains one meets with pimpernel, the lily of the valley, bluebells, eyebright, various kinds of violets, the gladiolus, or sword lily, and many species of iris, hemerocallis, etc., as well as the characteristically Japanese *Lespedeza striata*, or Japan clover, with its minute purple flower, now well known throughout the southern part of the United States, having been introduced accidentally about 1840, perhaps in tea chests. In April the hillsides of Japan are ablaze with azaleas.

Among trees, evergreens, of which there are said to be 150 varieties, predominate. Savatier enumerates 41 species of Coniferæ alone. One of the most characteristic of Japanese trees is the sugi, or Japanese cedar (*Cryptomeria japonica*), which sometimes attains a height of 150 feet. It is a favorite in temple grounds and is frequently seen lining the highways, but more particularly the approaches to some sacred place, as along the great avenue (nearly 50 miles in length) leading to the tomb of Iyeyasu at Nikko (q.v.). Another beautiful temple tree is the icho (*Salisburia adiantifolia*), or maidenhair tree. A fine specimen, said to be 1000 years old, stands near the entrance to the temple of Hachiman at Kamakura.

The cypress and the yew, firs of different kinds, the box, the holly, and the myrtle abound. The mulberry tree, the tea plant, the lacquer tree (*Rhus vernicifera*), the camphor tree, and many species of bamboo not only add to the beauty of the landscape, but are of great economic value. Among deciduous trees are the oak (20 species), the maple (24 species), beeches, alders, the ash, the horsechestnut, the birch, and 17 species of willow. The hinoki, or fire cypress, is much prized in the making of lacquer ware; the keyaki, or Japanese elm (*Planera japonica*), in cabinetwork; and the box for combs. The hajimo-ki, or wax tree, grows profusely on the hillsides and round the edges of the cultivated fields in Kiushu, and the coco tree, the banyan tree, and the banana flourish in Loo-choo and the Bonins. The bud and leaves of the ornamental kiri, or *Paulownia imperialis*, form the badge of the Mikado. Among the climbing and twining plants are the *Hydrangea cordifolia*, several species of climbing magnolia, whose coils run from right to left, the *Akebia quinata*, the *Clematis japonica*, and the wistaria, which blossom in June. The plum blossoms in February; the cherry in April. The tree peony flowers about the first of May, lotuses fill the castle moats and canals in August, and in November the chrysanthemum is the occasion of perhaps the greatest of the Japanese flower festivals. Of the fruits the grape is the best, and those from the Province of Kai are most esteemed. (See Kofu.) The kaki, or persimmon, is a very luscious fruit, and the oranges are the most characteristic of Japanese fruits. The pear, apple, peach, and fig are mostly of inferior value. All attempts at introducing English and other pears have invariably proved unsuccessful; but the apple is now cultivated with good results in Yezo. The strawberry has been successfully introduced. The loquat comes in April.

Fauna. This is not so rich as the flora, yet the country can boast of at least 150 species of mammals, 359 of birds, 300 of reptiles and batrachians, a great number of kinds of fishes, of which 358 species were described by Siebold. Also over 1200 species of mollusca are mentioned in the books; and, according to the best authorities, 26 kinds of sea urchins and 12 species of starfishes are found. At the head of the mammals stands the red-cheeked saru, or monkey (*Inuus speciosus*), which lends its name as a qualifier to the name of many a place and plant, and whose flesh is esteemed a delicacy. The saru is sometimes found as far north as the forty-first parallel of latitude, where in winter snow often lies 15 to 20 feet deep, and the thermometer registers many degrees below zero. Among the 10 species of cheiroptera peculiar to the country are several bats, and of the insect eaters are the mogura, or Japanese mole, and several kinds of shrew mouse. The hedgehog is unknown. The carnivora include three species of bear—the common black bear (*Ursus japonicus*), the red bear, also called the great bear (*Ursus ferox*), much reverenced by the Ainos, and the ice bear (*Ursus maritimus*), an involuntary visitor brought to Yezo and the Kuriles by the Arctic current. The tanuki, or badger, sometimes called the bamboo bear, whose flesh is eaten, occurs everywhere. The tiger is known only from Chinese literature and art, while the wolf of the country, known as yamainu, or mountain dog, is not numerous. The fox is found everywhere and, like the monkey and the badger, plays a very important part in folklore and the superstitions of the country. (See Fox.) Among the fur-bearing animals are the marten, the fish otter, the sea otter, and the itachi, or weasel. Rodents are numerous and include two species of ki-nedzumi (tree rats) or squirrels, two flying squirrels, and rats, which are so numerous and so much of a pest that the Japanese government has offered rewards for their extermination. The common house mouse is unknown. Hares exist everywhere. Two species of deer are found.

The avifauna includes many species which are familiar in the Old World, showing very slight differences in color and size, as, e.g., the robin, the cuckoo, the woodpecker, the ice bird, the hoopoe, and the jay. The cuckoo, however, is not very common. The sparrow, the house swallow, and the thrush are the commonest and most numerous. Eagles, falcons, and kites are seen, as well as the woodchat, the magpie, and the Korean raven. There are several species of singing birds, but the uguisu, or Japanese nightingale, and the lark are the most conspicuous. Blackbirds and the singing thrushes are

absent. There are two species of kiji, or pheasant: the *Phasianus versicolor*, called yama dori, or mountain bird, by the Japanese, and the copper pheasant, or *Phasianus sæmmerringi*. Wild pigeons abound, and quail and snipe are fairly abundant. The wild duck and geese also furnish many a shot for the sportsman. The crane and the silver heron are the most popular of the waders. The former, the symbol of longevity, has a prominent place in Japanese art. The latter faithfully keeps company with the peasant in the rice fields all summer.

The mamushi (*Trigonocephalus blomhoffi*) is the only poisonous snake of the eight species found in Japan proper. Another, called the habu, exists in Loo-choo. The mamushi, skinned and cooked, is used as a nerve-strengthening food. Four sea snakes make their way to the southern islands in summer. Of the three species of lizard, one, the ya-mori, or house warden, frequents dwellings and is an expert flycatcher. Marine turtles, of which there are three species, are most numerous in the Bonin Islands. The kame, a river tortoise, another symbol of longevity, is one of the four supernatural creatures of Chinese and Japanese mythology. It is found as far north as Yezo, but is not common. There are several species of frogs and toads, but they differ little from those found in Europe and America. The mountain newt (*Lacerta japonica*), when boiled and dried, enriches the Japanese pharmacopœia as a vermifuge. The most remarkable of this class is the giant salamander, extinct elsewhere, but still found in the rivers. It is sometimes captured for the sake of its flesh.

Insects are exceedingly numerous, both in species and individuals, and include many beautiful beetles, 137 species of butterflies, and over 100 species of moths. There are several large silk moths, but only two are used in the silk industry. Except in the mountains, the mosquito is very troublesome and rivals the flea in persistency, but not in numbers. Flies are found everywhere, but are most numerous in the silkworm-breeding localities. Ants are numerous and troublesome, and crickets, grasshoppers, and cicadas abound. Scorpions exist, but are said to be nonpoisonous. The seas teem with fish, the tai and the maguro being highly esteemed for food. Salmon and trout are found in the northern rivers.

Geology and Mineral Resources. Soon after the opening of the country the government seems to have realized the desirability of exploiting its mineral resources, which were supposed to be very extensive and of great value. To this end geologists and mining engineers were engaged abroad, and to them—Pumpelly, Lyman, and others—as well as to the explorations and observations of later geologists and travelers—Richthofen, Milne, Naumann, Rein, and Wada—the world is indebted for its still very imperfect knowledge of the geology of Japan.

The backbone of the country consists of metamorphic rocks—gneiss, crystalline schists, serpentine, and marble—which are discovered everywhere in great masses, but are best studied in Shikoku. Overlying these are thick Paleozoic strata—probably of the Silurian or Devonian formation—consisting of clay slate, graywacke, quartzite, and limestone. The Carboniferous formation is represented by limestone and by the coal measures of Yezo. The Permian seems to be entirely unrepresented in Yezo, but Rein seems to have found indications of the occurrence of the lower New Red Sandstones on the main island. Mesozoic strata of the Jurassic formation exist in Kaga, while the Cretaceous formation is exemplified by the coal measures of Takashima, by the gray-white granular and micaceous sandstones of that vicinity, and in Yezo by certain Cretaceous clays. Tertiary and Post-Tertiary conglomerates, sandstone, clay slate, peat, stratified volcanic tuffs rich in coal, lignite, and fossil plants, fringe the country in many places. The oldest eruptions were of granite, which is very widespread.

Japan is not specially rich in minerals, contrary to the views expressed by early geologists. Iron and coal are the most plentiful; next come copper and antimony, gold, silver, lead, sulphur, and petroleum. During 1911 the production was: gold, 10,000 pounds; silver, 300,000 pounds; copper, 580,000 tons; lead, 4500 tons; iron, 60,000 tons; coal, 17,632,000 tons; sulphur, 57,000 tons. The Japanese seem to have been entirely unacquainted with the useful or even the precious metals until after contact with the Chinese and the incoming of the arts, sciences, letters, and religion from China. Silver was first discovered and worked in the year 674, copper in 698, and 10 years later, in imitation of the Chinese cash, a copper coinage was introduced, a fact commemorated in the name of the reign in which this occurred—*Wa-dō* (Japanese copper) (708–714). Gold was discovered in 749. The lodestone had become known somewhat earlier—in 713.

Coal is found in many places, from Formosa to Yezo. The best is that of Takashima (where the seams are 14 feet thick and extend under the sea), Karatsu, Miike, and other places in the island of Kiushu; at Kelung (q.v.) in Formosa; and at Horonai in Yezo. In 1912 the output (exclusive of that of Formosa) was 19,639,000 tons against 3,200,000 tons in 1891. As already indicated, most of it belongs to the Tertiary formations. The coal is of good quality, is much used by the steamships in the Pacific trade, and is also sold at the coaling stations as far south as Hongkong, where it begins to meet the competition of Australian and East Indian coals. Its steaming value is about 75 per cent that of the Welsh coals, which are the standard for steaming purposes on the ocean. Iron is found chiefly as magnetic iron ore, and as iron sand exists in nearly all the provinces. In 1912 the production amounted to approximately 60,000 tons. Copper seems to have been plentiful from the very first. It is said that from 1609 to 1858 no less than 533,332,000 pounds were exported by the Dutch. The product in 1912 amounted to about 140,000,000 pounds. Three silver ores are found, besides galena. The first discovery of silver was on the island of Tsushima, halfway between Kiushu and Korea. It is now worked in many places in Shikoku, and in Hondo from Settsu to Mutsu in the north. In 1912 the product amounted to 39,996,000 mommé (120 mommé = 1 pound).

Gold exists chiefly (1) in the alluvial sands and gravels of Osumi, in Kiushu, and at several places in Yezo; and (2) in auriferous quartz in Satsuma, Koshin, Rikuchiu in Hondo, and at Aikawa, on the island of Sado, in the Sea of Japan. In 1912 the total product was 1,373,000 mommé. Several gold mines are also

worked near Kelung in Formosa. The other mineral products in 1912 were: lead, 11,010,000 pounds; antimony, 176,000 pounds; sulphur, 121,000,000 pounds; iron pyrites, 167,000,000 pounds. The sulphur supply is practically inexhaustible. Petroleum is obtained at Nagaoka and many other places, but the output is far from being enough to supply the needs of the country. In 1912 it amounted to 58,100,000 gallons. The total mineral production of Japan amounted in 1912 to $65,000,000. It is interesting to note that petroleum was discovered by the Japanese in the Province of Echigo as early as 668. Marble, granite, and other building stones exist in different parts of the country, but are at present little used in building. The number of persons engaged in mining in 1911 was 226,308, of whom 145,412 were engaged in the coal mines, 72,614 in metalliferous mines, and 8282 in nonmetalliferous mines.

Fisheries. The Japanese depend on the farmer and the fisherman for their food supplies. The former provides them with the indispensable rice, and the latter with the fish which invariably goes with it. In 1911 about 1,500,000 persons were engaged in fishing and the industries allied to it. The waters, both fresh and salt, teem with fish of every kind, from the whitebait to the bonito and the sturgeon. There is probably no country in the world where the markets are supplied with a greater abundance or variety. The mackerel family is perhaps the largest, both in species and catch; the tai, or golden bream, is perhaps the most prized. The salmon abounds, especially in Yezo, where there are many salmon-curing establishments. The flounder, sole, turbot, trout, haddock, perch, pike, shad, and halibut are all plentiful. In 1912 the value of the take of fresh fish for the entire Empire was over $51,700,000, and of all fish and fish products $78,100,000 against $39,890,000 in 1900. There are a great number of establishments in different parts of the country for the hatching and rearing of fish, and in 1911 there were 71,369 culture beds, aggregating about 475,000,000 square yards. Various kinds of fish oil are made. On the coasts of Yezo immense numbers of a kind of herring or sardine are caught, and the residue, after expressing the oil, is packed and shipped south to the other islands as manure. The value of the dried fish and fish oil, fish guano, and other manufactured products in 1912 was $48,250,000. The salt used in fish curing and in Japan generally is made by evaporating sea water and then leaching and boiling. The area of beds in 1912 was 14,586 acres, and the value of the salt produced was $5,840,000.

Agriculture. In Japan, as in China, the farming class has always held an honorable position in the community, ranking next after the barons and their military retainers, who were the scholars of the country, and taking precedence of the mechanic and the merchant. Sixty per cent of the population is directly engaged in agriculture.

The soil is largely the product of old shales, granite and trachytic eruptions decomposed by the action of the weather, and is not naturally fertile. It is only by the most careful manuring that it can be made productive, a result to which also the warmth and moisture of the climate contribute largely. As already indicated, the greater portion of the country is occupied by mountains, largely covered with forests or tall, rank grass, leaving only certain narrow river stretches and plateaus and more or less circumscribed plains for cultivation. It is therefore not surprising that the portion devoted to agriculture is only 17 per cent of the total area. The forests covered 46,300,000 acres in 1913, 42.1 per cent being owned by the state. Rice (of which there are 217 varieties) is the staple food and the most important crop, and rice or "wet" land is worth about three times as much as other arable land. For its cultivation, irrigation is needed, and even the hillsides and gullies are terraced, the water being ingeniously conducted from one terraced plat to another. In 1913, 7,411,000 acres of rice land were under cultivation and yielded 248,463,000 bushels. Much of this is consumed in the manufacture of sake, the beverage of the country, the excise duty on which returns a large revenue to the government. In 1912 over 212,850,000 gallons were produced. The crops next in importance are barley and wheat, the area and the product of which in 1912 were as follows: barley, 1,465,000 acres, yielding 48,012,000 bushels; wheat, 1,216,013 acres, yielding 25,688,000 bushels. The other products are pulse, millet, corn, buckwheat, potatoes of various kinds, all sorts of vegetables, and the soy bean, which is said to approach more nearly in its chemical composition to animal food than any other known vegetable; one-fifth of its weight is fat and nearly two-fifths nitrogenous matter. In 1912, 17,900,000 bushels of this bean were produced. Tobacco (introduced by the Portuguese before 1612, for in that year its production and use were forbidden), cotton (known to the Japanese 150 years before the Chinese), sugar, hemp, and indigo are grown, and great attention is given to silk and tea. The tea plantations in 1913 covered 73,500 acres and produced 71,013,000 pounds of tea.

Since the abolition of the feudal system, the soil has been mostly held by those who work it, the average holding being about one acre. The land tax was transformed in 1873 from a tax in kind (grain), proportioned to area, into a money tax proportioned to the value of the land. It was 2½ per cent of the assessed value until 1899, varied between 3.3 and 5 per cent—according to the class of land—during 1899–1903, and was raised to 5.5 per cent since the war with Russia. In the budget for 1913–14 it was estimated at $37,501,000, or about 35 per cent more than the estimate from customs.

Until comparatively recent years flocks and herds were not reared, such cattle as were found being used merely as beasts of burden. Milk, butter, and cheese were unknown, and beef was never eaten. This was due partly to the influence of Buddhist teaching and partly to the fact that the grasses of Japan, except perhaps in Yezo, are not adapted for grazing. Since the Restoration (see paragraph on *History*) the government has established numerous experimental farms, under skilled foreign superintendence, including the breeding of horses and cattle and the rearing of sheep. These efforts have been only partially successful. The use of animal food is, however, extending, and dairying has been introduced. In 1912 there were 1,399,498 cattle, 1,581,000 horses, 308,970 hogs, 101,475 goats, and 3308 sheep.

Manufactures. China is the original home of the highly perfected arts of lacquer work,

fine ceramics, chasing and inlaid work, ivory, bone, stone, and wood carving, in most of which Japan now excels its ancient tutor. The most authoritative writers on the industries of Japan agree that the Japanese have regarded China as their model in all these departments for many centuries. They have developed great aptitude for imitating these art products and but very little independent creative power. The fact that Japan now far surpasses its old master in the most extended branches of art handicraft is to be attributed to this very gift of imitation, and most of all to the awakened sense of beauty in nature and art that has been applied to worthy and useful ideas as models which originated on foreign soil.

In the latest development of the industries of Japan the same limitations are observed. It has been shown thus far that while the Japanese artisan has great manipulative skill and can turn out indifferent sewing machines, typewriters, and many other foreign mechanisms with an imitative art in superficialities that amounts almost to genius, still for the fundamental elements of his industry he must yet depend on the assistance of foreigners. The national character in its recent approximation to Western civilization is what it always has been, imitative, not originative; and is almost wholly devoid of that rude energy of initiative which constitutes such a marked difference between the inhabitants of the East and the West. This detracts nothing from the merit and value of the industries for which the Japanese are famous. In woodwork their buildings lack much in solidity, adaptation, and elegance. It is not as carpenters and architects that they are distinguished, but as joiners, turners, and wood carvers. The frames of their window panes, the wainscoting of the walls of many of their temples, and numerous other works are samples of fine and careful joinery. They make many small wooden wares, excellent in design and utility. Comb cutting is a large house industry, small-toothed combs of the wood of several evergreen trees being used in the native toilet.

Lacquer work takes the first place among the Japanese art industries. In no other branch of art have the Japanese so completely disengaged themselves from their Chinese masters, displayed so much fancy and taste, and won such eminence among all civilized peoples. The lacquer tree is grown chiefly in Hondo or the main island, between the parallels of latitude 35° and 40° north. Its sap is distinguished from all other varnishes by its greater hardness, its high lustre preserved for centuries, and its resistance to agencies that destroy other resinous varnishes. The lacquer varnish is applied to wooden or metal articles. Every layer must be thoroughly dried and polished before another is placed. A fine piece of work, with 20 to 30 coats of lacquer, may be many months in making. The antiquity of the industry is attested by some lacquer boxes in one of the temples where they have been kept, it is said, in a state of perfect preservation for 17 centuries. Among the choicest exhibits of the museums in the Occident are Japanese lacquers fixed on copper, or more frequently on the wood of the *Pinus retinospora*, and ornamented with gold, silver, or mother-of-pearl. The best specimens have a metallic lustre, can scarcely be scratched, and are almost indestructible. In 1912, 17,813 persons in 6234 families were engaged in the manufacture of lacquered ware. The value of their output was $4,520,000.

Much broken pottery has been discovered in mounds in Japan dating from prehistoric times, but it was only after contact with China through Korea, and the introduction of Korean potters, that Japan began to progress in an art which has made it renowned. The most famous of the pottery wares are the choice imitation porcelains known as Old Satsuma, which have become extremely rare. All Japanese pottery, however, is traced back to Sedo in Owari, and from this circumstance Sedomono has become the general name for all Japanese ceramic ware. The number of ceramic works was never greater than at present, the art having spread into many new districts. Wares serving the humblest utilities or expensive products for the collections of connoisseurs are produced, many of them being remarkable for richness of color and originality of floral and animal designs. Many of the potters' villages are famous, though they do not differ in appearance from ordinary hamlets. Each workshop comprises the members of a single family, every member watching in his turn over the baking of the materials in the public oven of the commune. The chief manufactories for the finest porcelain ware are at Arita in the Province of Hizen, in Kiushu, where the best clays are found in abundance. It was here that Gorodayu Shonsui set up his first kiln on his return in 1520 from China, where he had learned the art of porcelain making. In 1899 the number of factories engaged in pottery and porcelain making was 4604, the number of persons employed 19,454, and the value of the product $2,934,000; in 1912 the number of factories was 5657, of persons 34,654, and the value of the product $8,272,000.

In the making of works of art in bronze, a single artist casts the metal, does the chasing, colors with oxides, incrusts the bronze with precious metals, coral, or pearls, and produces the work from start to finish. The Japanese do not share the predilection of the Indian people for brass utensils, though the few they make are ornamented with great skill and care, but they excel in bronze manufactures.

The Japanese excel in the manufacture of some kinds of paper, of which they use a larger quantity in proportion to population than most other nations. It is made from various species of plants, including the pulp of the paper mulberry, and is used not only for printing and painting, but for many other purposes. Their handkerchiefs, table napkins, windowpanes, the panels forming the movable partitions of their houses, are made of paper. They cover with paper the cushioned stools used as pillows, and paper garments coated with vegetable wax are worn in rainy weather. The papers of Japan always show a yellowish tint when made of the purely native materials and in the purely native way, and in this respect are inferior to the pure white products of the West; but printing paper as white as any made in the United States or Europe is produced in quantity. All attempts to imitate certain of the Japanese native papers have failed. In 1899 Japanese paper was manufactured in 65,514 families, yielding an output valued at $8,272,754; in 1912, in 53,474 families, the value of the product was $10,130,000. In addition to this there was produced in 33 factories 324,072,000 pounds of "European" paper valued at $10,020,000.

The Japanese also excel in wickerwork and in a great variety of straw objects, such as straw toys and mosaics. Ivory is fashioned into curious boxes and cabinets and embellished with carved reliefs involving miscroscopic work. Ivory carvings, large and small, distinguished for technical skill and inspiration, are sold in all Western countries. The artistic skill of many of the natives, however, has been impaired by the production of great quantities of cheap articles to meet the foreign demand for the artistically worthless articles sold under the name of Japanese china and other cheap products.

Spinning and weaving have for centuries been the most important native industries. The art of weaving heavy linens and silken fabrics and their brocades, interwoven with gold and silver thread, was long ago developed to a high degree; their products still form admirable hangings and festive robes. But the modern brocades are often colored with imported aniline dyes and have neither the brilliancy nor the quality of the old fabrics. Spinning and weaving for everyday utility have always employed most of the textile workers. The returns for 1895 showed that there were then over 1,000,000 weavers, and in nearly every house in rural Japan the spinning wheel and loom were kept going from morning till night. A great revolution, however, was already far advanced. About 1880 an enormous impetus was given to the erection of cotton spinneries, with all modern appliances, and to-day homespun yarn is almost unknown in the Japanese markets. Not only is the domestic market fully supplied by the great spinning mills but large quantities of yarn are produced for exportation. The value of cotton yarn exported in 1913 was $35,493,000, of which a large proportion went to China for use in the hand industry of weaving cotton cloths. Osaka is the great centre of manufacture both of yarns and cotton goods. It has been compared to Manchester on account of the many spinning mills and other large textile interests centred there. In 1890 the value of raw cotton imported into Japan was $2,672,000; in 1913 it was $116,755,000. In 1894 the number of cotton spinning mills was 45, representing a capital investment of $6,627,000, with 476,000 spindles, producing 121,054,000 pounds of yarn, and employing 8229 male and 26,923 female workers. In 1904 the number of cotton spinning mills was 74, the invested capital was $17,280,000, the number of spindles was 1,306,000, the yarn produced was 286,235,000 pounds, and the number of employees was 10,967 males and 52,115 females. In 1911 the number of mills was 90, the employees 41,531 men and 707,350 women, machine looms 89,003, hand looms 638,412, value of output $69,875,000 cotton goods and $15,091,000 mixed silk and cotton. The exportation of cotton goods has become an important feature of the trade of Japan, the value of cotton shirtings amounting to $16,645,000 in 1913, and of miscellaneous cotton goods the exports are steadily increasing, especially to China, where cloths from Japan have to a considerable extent displaced those formerly drawn from the United States. Japan draws from the United States a large proportion of the raw cotton used in her mills, though in years of high prices of the raw material a larger share is drawn from India, whose short-staple cotton sells at a less price than the United States product. The following table, giving the value for a series of years of the silk, cotton, and other textile manufactures, shows the progress of these industries:

1886	1896	1903	1911
$14,240,000	$55,492,100	$68,867,000	$136,900,000

Silk is also manufactured to a great extent by modern machinery. About half the raw silk is retained at home for the manufacture of the characteristic silk fabrics worn in the country. Large quantities of the exported silk fabrics are now dyed in France and the United States before being placed on the market. Reeled silk, however, is the chief silk export. Silkworm eggs on cards are also exported to Italy.

The policy of Japan has long been to build up a strong navy and a large merchant marine without dependence on foreign yards. Shipbuilding is therefore a large industry, especially at Nagasaki, the open port of Kiushu, where vessels of from 1000 to 8000 tons' burden are turned out. There are also large yards at Kawasaki, Osaka, Ishikawa-jima, and Uraga. They are all equipped with the best appliances for the building of steel and iron ships and have fully demonstrated their ability to turn out ocean-going craft and river steamers of the highest standard. A number of steamers on the Yang-tse River were built in Japan. The merchant marine of Japan on Jan. 1, 1913, was 1981 steamers above 20 tons with a tonnage of 1,430,629; sailing vessels 6443, tonnage 447,307. In many directions Japan is striving to increase her manufactures of iron and steel goods. This necessitates considerable imports of metal, as the local iron-mining industry is not yet adequately developed.

For some years the Japanese have been carrying on the manufacture of many European and American articles that were not even known in their country when it was opened to foreigners. They manufacture enormous quantities of matches, which they sell in China, Hongkong, India, Singapore, Siam, Australia, and other markets. The value exported averages about $6,000,000 per annum. About 30,000 clocks are made in Kyoto, Osaka, and Nagoya every month and sold at very low prices. Saddlery, glassware, umbrellas, brushes, boots and shoes, rugs, mathematical and surgical instruments, patent medicines, watches, canned fruits, vegetables, and condensed milk are among the articles they are producing with the aid of Western patterns and processes. The wages of the labor employed in these numerous industries are advancing and, while at much lower rates per hour than in Europe or America, are, when judged by the quantity and quality of the product, about as high as those paid in the Western world.

The following tables illustrate the growth of Japanese industry:

1. NUMBER AND KIND OF FACTORIES AND EMPLOYEES

	1904	1912
Factories run by motors	4,000	8,710
Total horse power	223,930	1,102,782
Factories not run by motors	5,234	6,409
Total number of factories	9,234	15,119
Operatives employed, male	207,951	348,230
" " female	318,264	515,217
Total number of operatives	526,215	863,447

2. PRINCIPAL BRANCHES OF FACTORY INDUSTRY IN 1912

	Total number	Nonmotor factories	Total number of employees	Female employees
Textile factories	8,119	3,003	513,187	446,283
Raw silk (included in above)	3,056	471	216,833	205,154
Machine and iron	1,260	312	89,651	4,655
Chemical	1,537	929	75,304	24,992
Ceramic (included in above)	588	761	28,233	4,294
Food and drink	1,849	1,111	43,960	7,929
Brewing (included in above)	1,020	744	22,283	723
Metal refining	41	1	17,128	1,251
Printing and publishing	545	123	20,981	3,331
Wood and bamboo work	589	218	15,157	3,611

3. THE WEAVING INDUSTRY

	1894	1904	1912
Weaving houses	660,444	397,912	427,636
Machine looms	.....	15,636	111,656
Hand looms	.....	605,209	621,383
Looms, total number	820,585	620,845	733,039
Operatives, male	48,175	23,671	36,742
" female	895,416	598,052	660,956
" total no	943,591	621,723	697,698
Val. of total production	$35,555,000	$64,389,000	$152,562,000

4. QUANTITY AND VALUE OF PRINCIPAL MANUFACTURES. (000 omitted)

	1894	1904	1912
Raw silk (lbs.)	10,731	22,000	21,400
Cotton yarn (lbs.)	121,054	286,235	561,000
Matting	$1,806	$3,458	$5,345
Porcelain and earthenware	$1,595	$3,619	$8,250
Lacquered ware	$1,292	$2,229	$4,500
Matches	$2,231	$5,848	$7,060
Straw plait	.....	$2,394	$3,987
Japanese paper	$4,014	$6,745	$10,130
European paper	$1,139	$4,882	$10,020
Sake (gals.)	157,609	143,497	212,000
Beer (gals.)	556	5,296 (1905)	9,345
Soy (gals.)	52,761	73,809 (1905)	111,800

Government Industrial Activity. The government of Japan has not only promoted the development of national industry by the establishment of special commissions of scientists and experts, the payment of shipping subsidies, the advancement of capital obtained through foreign loans at a lower rate of interest than can be obtained at home, and in many other ways, but it is also the greatest employer of labor in the country. It owns shipbuilding yards, factories for the manufacture of arms, railway and telegraph material, clothing, etc. On Dec. 31, 1912, the total number of government factories employed 141,500 operatives and laborers. The Tokyo military arsenal gave employment on the above date to 17,856 persons. Other important establishments are: the Osaka military arsenal, employing 10,900 persons; the Kure naval arsenal, with 22,276 employees; the Yokosuka naval arsenal, with 9924 employees; and the Sasebo naval arsenal, with 5340 employees. The three factories belonging to the government railway works bureau, situated at Shimbashi, Kobe, and Nagano, employed 4935 persons, and the tobacco factories belonging to the Bureau of Monopolies, 28,664. And while the government's industrial activity during 1904–05 was excessively large, owing to the necessities of war, it should be borne in mind that its taking over of the chief railway lines of the country (see below, *Nationalization of Railways*) still further extended the scope of its industrial activities.

Commerce. The domestic trade has been greatly stimulated by the rapid growth of railways, which render it easy and cheap to distribute the products of the factories throughout the country and particularly in the main island. This fact is causing some decline in the household industries, which, however, still supply a part of the common needs of the people. In the foreign trade the imports have exceeded the exports since 1895, owing to the large railway equipment and other material which Japan has purchased abroad in the development of its many enterprises. About one-third of the imports come from other parts of Asia and two-thirds from Occidental lands. Asiatic countries buy from Japan about one-third of her exports, the remainder being sent to Western countries. The accompanying table showing the total foreign trade (excluding the precious metals) for a series of years will give an idea of the rapid development of foreign commerce (one yen equals $0.498).

The rapid industrialization of Japan is reflected in the increase, both absolute and relative, of the export of manufactured commodities.

Trade between the United States and Japan has grown rapidly in recent years. The imports into the United States from Japan were, in 1901, $29,229,443 and, in 1914, $107,355,847. The exports from the United States to Japan were, in 1901, $19,000,640 and, in 1914, $51,205,520. The principal imports into Japan from the United States are flour and wheat, raw ginned cotton and kerosene oil; also engines, locomotives, electrical apparatus, and other kinds of machinery, and leather goods. Nearly all the kerosene oil and most of the lubricating oil and paraffin wax come from the United States. A part of the raw cotton is obtained from British India, the price of whose short staple is usually about 10 per cent lower than that of American cotton. Raw cotton, however, is largely imported from the United States, especially in years of low prices, and the shipments of 1913 were 375,000 bales valued at $25,022,000 against 92,556 bales in 1910 valued at $6,583,000. The United States supplies nearly all the flour, but Australia competes in supplying wheat. The United States leads in shipments of alcohol, leather, telephones, lumber, and steel and iron materials for bridges

	1909	1910	1911	1912	1913
	Yen	Yen	Yen	Yen	Yen
Imports	394,198,840	464,233,800	513,805,700	618,992,270	729,431,644
Exports	413,112,510	458,428,990	447,433,388	526,981,840	632,460,213

and buildings. Hongkong, Germany, and the Philippine Islands supply nearly half the sugar imported, the remainder coming chiefly from other Asiatic countries, especially Java. The United States buys more than three-fourths of the tea exports and is the heaviest purchaser of raw silk, which constitutes more than one-half of the entire imports from Japan. Japan's cotton yarn and tissues are sold in neighboring countries of Asia. The exports of coal, principally to China and Hongkong, are important, and large quantities of coal are supplied to ocean steamers for bunker use.

The value of the imports from and exports to the leading countries in 1912 and 1913 was as follows:

FOREIGN TRADE BY COUNTRIES

COUNTRIES	Imports		Exports	
	1912	1913	1912	1913
	Yen	Yen	Yen	Yen
Australia	12,791,985	14,943,145	8,628,934	8,637,974
Belgium	9,087,488	9,448,023	3,080,150	3,705,592
British India	134,741,613	173,173,831	23,648,074	29,873,414
China	54,807,116	61,023,038	114,823,727	154,660,128
France	5,421,103	5,828,992	43,871,410	60,229,619
Germany	61,075,924	68,394,798	13,487,589	13,131,709
Great Britain	116,146,973	122,736,970	29,791,898	32,869,675
Dutch India	19,063,191	37,389,257	4,343,389	5,148,686
Hongkong	881,550	1,294,749	28,712,905	33,621,978
Philippine Islands	5,276,234	7,647,833	5,535,497	6,283,556
European Russia	73,619	40,943	2,540,737	4,897,420
Asiatic Russia	669,098	750,846	3,542,176	4,271,413
United States of America	127,015,757	122,408,361	168,708,896	184,473,182

The value of the chief articles of Japan's special import and export trade in 1912 and 1913 was as follows:

FOREIGN TRADE BY ARTICLES

IMPORTS	1912	1913	EXPORTS	1912	1913
	Yen	Yen		Yen	Yen
Rice	30,192,437	48,472,446	Cotton yarn	53,680,797	70,997,538
Wheat	4,409,938	12,351,029	Cotton shirtings	25,759,635	33,557,999
Wheat flour	1,722,140	1,781,660	Raw silk	150,324,733	188,884,182
Soy beans	10,222,235	10,388,487	Silk waste	10,546,185	10,465,427
Sugar	16,046,903	36,762,302	Silk manufactures	26,882,129	34,882,279
Raw cotton	200,824,203	233,599,185	Coal	20,323,831	23,670,886
Wool	16,333,968	15,998,149	Matches	12,043,538	11,864,514
Woolen yarn	8,225,051	10,091,604	Copper	24,920,637	28,183,904
Oil cake	27,479,953	39,418,165	Camphor	2,826,754	2,235,784
Petroleum	12,433,180	11,053,807	Tea	13,466,552	10,077,421
Iron	35,600,242	33,288,861	Rice	4,382,677	4,372,113
Machinery	28,289,431	34,358,844	Earthenware	5,451,890	6,038,994
Engines and rolling stock	2,562,831	3,668,435	Straw plait	17,337,999	15,692,054
			Toys	1,898,345	2,489,843

Communications. Japan has exerted every energy for many years to improve transportation facilities throughout the country and to foreign lands. The government is not unmindful of the necessity of supplying good harbors. Yokohama, the most northerly port of first-class importance, has a naturally fine harbor that has been greatly improved by dredging. There are large dock facilities and a substantial breakwater. Yokohama transacts a very large part of the foreign business of the country. It is the centre of the silk trade. The second port in importance is Kobe, one of the centres of the tea trade and other commerce of central Japan. The principal ports utilized in the foreign trade are Yokohama, Kobe, Osaka, Nagasaki, Hakodate, Niigata, and a few minor ones. In January, 1913, Japan had in its merchant marine 1981 steamers above 20 tons and 6443 sailing vessels of the Western type (1,877,936 tons), besides 20,635 sailing vessels of the native type. There are regular lines of Japanese steamers to Europe, America, Australia, British India, China, and Korea. More than 50 steamships, including those of the United States and Canada, ply regularly between the Pacific coast ports of America and the seaports of Japan, some of them going on to Hongkong and Shanghai. Nine steamship companies have vessels in this trade, and they ply between Yokohama, San Francisco, Puget Sound ports, and Vancouver. The government grants liberal subsidies to vessels in the foreign trade. The steamship lines to the United States were greatly strengthened on the opening of the Panama Canal, and a line to the eastern coast of South America was established.

The total mileage of railway in operation in Japan in the fiscal year ended June 30, 1912, was 7067. Of this 6008 miles were operated by the government and 1059 miles by private companies. The first railway, 18 miles in length, between Tokyo and Yokohama, was opened in 1872, and now there is direct communication by rail from Awomori at one end of the main island to Shimonoseki at the other, a distance of 1132 miles, and from Moji in Kiushu, less than a mile distant, the lines run south to Kumamoto, 121 miles, and beyond. There are many branch lines, and there is a line of some length in Yezo. There were 844 miles of elec-

tric tramways in operation in Japan in 1912, with 306 miles additional under contract to be built. The post-office system is extended all over the Empire, and the telegraph and telephone have been very widely introduced, their length in 1905 being 16,468 and 3374 miles respectively.

Nationalization of Railways. In 1907 the Japanese government owned and operated about one-third of the total mileage in Japan, and the remainder was operated by private companies. The government then decided to take over the private lines with their subsidiary businesses, paying approximately $237,100,000 for these lines. In 1910 the mileage owned and operated by the government in Japan proper was 4879 miles, which had cost $303,978,000, or about $62,300 per mile. There were at that time 506 miles of privately owned road, capitalized at about $44,900 per mile. There was considerable opposition in the minority political party in Japan to the acquisition of the privately owned mileage, but this acquisition was hardly as much of a revolutionary change of policy as it was the addition of privately owned lines to already existing state lines.

The average rate of dividends of private railways in 1904—before the large government acquisition—was 8.2 per cent, and of the state railways at that time 9.4 per cent. Lines may be bought at the discretion of the government within 10 years, and the price in each case is to be a sum equal to the capitalized average net profits for the three years 1902–05. New lines and lines which have not paid dividends will be valued by a special commission, from the decisions of which appeal may be made to the Minister of Communications. Payment for cost of construction and equipment is to be made with 5 per cent 30-year bonds at face value, the bonds to be delivered to shareholders at the option of the government within five years from the date of purchase. Payment for supplies on hand is to be made, at their market value, with similar bonds. During the interval between the date of purchase and the delivery of the bonds, shareholders receive the 5 per cent interest on the bonds due to them. The relation of the actual cost of construction and equipment to the face value of the bonds varies greatly in the case of the different lines, the extremes being 34 per cent and 347 per cent. For the six largest companies the ratio of cost to face value of bonds is 40.1 per cent, 41.7 per cent, 49.6 per cent, 52.6 per cent, 87.7 per cent, and 100 per cent respectively. Eight companies will receive bonds, the face value of which is less than cost of construction and equipment; but these are very unimportant companies, only two of them having more than 50 miles of line each. The average of cost to face value of bonds for the 17 lines is 55 per cent. A separate law, similar in its provisions, empowers the government to purchase the railways in Korea, the estimated cost being about 34,000,000 yen.

In 1921–22 the state railways carried 57,394,000 tons of freight and 447,183,000 passengers, and the privately owned roads 11,516,000 tons of freight and 119,229,000 passengers.

The Japanese railways in 1921 operated at a 69.1 per cent ratio of expenses to revenues. In 1918 and 1920 passenger rates were increased to about 50 per cent over pre-war tariffs. There are three classes, with express rates and increased fares for limited trains.

Banks. The banking business of the country is carried on (1913) by six great banks (one of them with 16 branch establishments), 46 industrial and agricultural banks, and 1620 ordinary banks, not including the foreign banks at the open ports. The paid-up capital of all banks was, in 1913, 592,031,296 yen, the reserve fund 211,707,667 yen, and the deposits 22,261,751,004 yen. The Bank of Japan is a government institution founded in 1882 and authorized to issue convertible notes, the paper currency of the country down to that time having been "fiat" money. There were also 480 savings banks with deposits in 1913 of 1,047,147,527 yen. Japan adopted a gold standard in 1897, and the yen, in which accounts are kept, is equal to 49.8 cents.

Money, Weights, and Measures. The yen is divided into 100 sen. The subsidiary silver coins are 5, 10, 20, and 50-sen pieces, and there are 5-sen nickel pieces, and 2 sen, 1 sen, and ½ sen of copper. The unit of weight is the kin, equal to 1⅓ English pounds, or more exactly 1.32277 pounds avoirdupois. Above that is the kwan (or kwamme), equal to 8.267 pounds avoirdupois, or 16 kwan to 100 kin. The lineal foot is divided into 10 inches and is equal to 0.9942119 English foot. For distances, 36 chō equal 1 ri, which equals 2.44034 English miles. For land measures the square chō equals 2.45 acres, and the square ri equals 5.955 square miles. For measures of capacity 1 to = 3.97 English gallons or in dry measure 1.985 pecks. The kokŭ is equivalent to 39.7033 English gallons, or 4.9629141 English bushels. The English pound and the ton of 2240 pounds are also coming into commercial use. The picul —100 kin, or 132½ pounds avoirdupois—has long been in use in the foreign trade.

Government. The government may be described as a constitutional monarchy with representative institutions based largely on German rather than on British or American models. The constitution on which it rests was promulgated by the Mikado in 1889 in accordance with his oath in 1868 to give the people representative government. In that year the dual government which had existed for centuries reached its end, and the Mikado became the de facto as well as the de jure ruler. The instrument consists of 76 articles, 17 devoted to the Emperor, 15 to the rights and duties of subjects, 22 to the Imperial Diet, 2 to the ministers of state and the Privy Council, 5 to the judiciary, 12 to finance, and 4 to supplementary rules. The Premier, or Minister President of State, presides over the Imperial cabinet. The central government consists of the Imperial cabinet, Privy Council, and the nine ministries—Foreign, Home, Finance, War, Navy, Justice, Education, Agriculture and Commerce, and Communications. There are also a court of accounts, a tribunal of administration, and the administrative bureaus for the Upper and Lower Houses. In the provincial governments division there are the prefecture of the police of Tokyo, the Department of Colonization of Yezo, the fu and ken (the three cities and 43 prefectures into which Japan proper is divided), and the Government of Formosa. Functionaries are in three grades (choku, so, and han), besides many salaried agents.

The Parliament or Diet meets annually and has control over the policy and expenditures not fixed by the constitution. It consists of an Upper and a Lower House. The composition of the Upper House is peculiar, its membership

being made up of five classes: (1) princes of the Imperial family who are 25 years of age or over—they become members for life; (2) princes and marquises of 25 years of age and over—also members for life; (3) a certain number of each of the other classes of peers—counts, viscounts, and barons—over 25 years of age, elected by their own order to serve for seven years; (4) persons who are not peers, nominated by the Emperor for meritorious services to the state, or noted for scholarship—they are members for life; (5) persons over 30 years of age in each fu and ken who are among the 15 largest taxpayers, elected by the 15, and appointed by the Emperor for life. The Upper House contained 369 members in 1914. The Lower House, according to the Election Law of 1900, is composed of 379 members, or one for every 136,522 of the population in 1914.

The Emperor in reality is a mere screen behind which are a powerful group of aristocrats known as the "elder statesmen" who really control the government. It is they who advise the monarch whom to appoint to the cabinet and what policies to recommend. In the fu (first-class cities), Tokyo, Osaka, and Kyoto, and the ken, or prefectures, there are local legislatures, which have general supervision over local affairs, besides paying their own officers. Male subjects who are 25 years old, have lived a year in the voting district, and pay $5 of direct taxes are allowed to vote for members of the Lower House. The inhabitants of the Colony of Yezo and the inhabitants of the Loo-choo Islands have as yet no part in the parliamentary representation. The franchise is also withheld from functionaries of the Imperial household, ecclesiastics, police, soldiers, sailors, bankrupts, and outlaws. Deputies must be at least 30 years of age and Japanese subjects. The national trend is towards democracy, and the struggle is to secure party government and to make the ministers responsible to the Diet and not, as now, to the Emperor.

Administration of Justice. In preparation for the abolition of the extraterritoriality clause in all the treaties, a new criminal code, based on the Code Napoléon, was put in operation in 1882, with modifications suggested by the old criminal law of Japan. The code of criminal procedure was in 1890 made uniform with the code of civil procedure, according to the provisions of the law of the organization of judicial courts. The civil code, code of civil procedure, and commercial code, published in 1890, went into effect after 1893. The law of the Imperial house, Diet, and finance, laws for the exercise of local self-government, and various miscellaneous subjects, such as the statutes relating to banking and the mechanism of exchange, may also be called codes. Three kinds of crime are classified: (1) crimes against the state or to public detriment; (2) crimes against personal property; and (3) police offenses. Punishments for major crimes are death by hanging; deportation, with or without hard labor, for life or a term of years; imprisonment, with or without hard labor, for life or a term of years. Instead of the 250 crimes calling for the death penalty under the old system, there are but few mentioned which are punishable with death. The principal courts are the high court of cassation (1), courts of appeal (7), and tribunals of the first instance (49).

Finance. The revenue of the Imperial government is derived from many sources. The land tax, which from 1873 until 1899–1903 was 2½ per cent of the market value of the land, was raised after the war with Russia. It produced, in 1913–14, 75,350,000 yen; the taxes on sake and other liquors, about 89,000,000 yen; customs dues, 55,906,000 yen; income tax, 35,471,000 yen; and the receipts from government enterprises—railways, mining, postal and telegraph services, etc.—140,000,000 yen. The chief items of expenditure are (1913–14): army, 78,000,000 yen; navy, 42,000,000 yen; administration of justice, 12,300,000 yen; education, 9,500,000 yen. In 1913–14 the total revenue and expenditure—ordinary and extraordinary—was estimated at 586,807,000 yen each. The public debt stood in 1913 at 2,494,000,000 yen.

In local matters the revenue in 1913–14 was 80,613,558 yen. The revenue of the cities amounted in 1913 to 127,213,000 yen, and the expenditure to 111,970,000 yen.

Prior to 1884 the country was flooded with "fiat" paper money, which had greatly depreciated. In that year the Bank of Japan, a government institution, issued convertible notes in exchange for this depreciated currency, and by 1885 the difference in value between silver and paper had almost disappeared. The following year specie payments were resumed. In 1897 the gold standard was adopted, 74,455,735 yen in gold were coined, and the silver dollars were redeemed as far as received. The currency is now on a gold basis. From the foundation of the mint in 1870 up to 1914 the total coinage issued amounted to about 750,000,000 yen. The coins in circulation Jan. 1, 1913, were 175,090,000 yen. The note issues of the Bank of Japan amounted in 1913 to 408,376,000 yen.

Russo-Japanese War Finance. The methods resorted to by the Japanese government to raise funds for the prosecution of the war against Russia were the usual ones of imposing new taxes or increasing existing ones, diverting funds from the ordinary expenditures to war purposes, and contracting loans at home and abroad. In addition a monopoly was assumed over the salt and tobacco industries. On Dec. 28, 1903, an ordinance was published authorizing the diverting of funds under special accounts, the issuing of Treasury bonds, and the raising of temporary loans for military expenditure. The sums thus obtained amounted to 156,000,000 yen up to March 30, 1904. For the fiscal year 1904–05 the Diet voted 576,201,000 yen for war purposes, and for 1905–06 it voted 780,000,000 yen, including loans of 411,000,000 yen and 571,000,000 yen respectively. The most important special taxes imposed were those on land, sugar, income, and business, and the tobacco and salt monopolies. By the end of March, 1906, by which time all the troops had been repatriated, with the exception of two divisions in Manchuria and two in Korea, the actual outlays for the war amounted to 1,261,161,877 yen, of which sum 1,070,140,000 yen were for the army and 191,021,868 yen were for the navy. The sources of revenue to meet this expenditure were as follows:

Loans and treasury bills	yen 1,127,634,199
War taxes	82,430,129
Capital funds (navy, education, and famine relief)	69,311,977
Voluntary contributions	2,279,899
Sale of state property	5,126,436
Other revenue	5,472,912
Total	yen 1,292,255,552

The loans contracted at home and abroad for war purposes were as follows:

FOREIGN LOANS

AMOUNT OF ISSUE	Rate of interest	Issue price per 100 face value	Period of redemption	Date of issue
£10,000,000	6%	93½	7 years	May, 1904
12,000,000	6	90½	7 "	Nov., 1904
30,000,000	4½	90	20 "	Mar., 1905
30,000,000	4½	90	20 "	July, 1905

DOMESTIC LOANS

AMOUNT OF ISSUE	Rate of interest	Issue price per 100 face value	Period of redemption	Date of issue
yen 100,000,000	5%	95	5 years	Feb., 1904
100,000,000	5	92	7 "	May, 1904
80,000,000	5	92	7 "	Nov., 1904
100,000,000	6	90	7 "	Mar., 1905
100,000,000	6	90	7 "	Apr., 1905

Army. The rapid and progressive development of the military resources of Japan due to her war with China (1894–95), with Russia (1904–05), and to her alliance with Great Britain, signed in 1905 and renewed for 10 years in 1911, combined with her policy of secretiveness in connection with all military affairs, renders it difficult to arrive at an accurate estimate of the ultimate military resources of the nation. It is known, however, that between 1894 and 1904 Japan's fully trained force about doubled, and that this force has again doubled since 1904. At the present time (1914) she has fully realized her national ideal of the "nation in arms," adopted from the continental European countries, and no doubt could rapidly mobilize at least 1,000,000 fully trained men in addition to her regular army, and ultimately put into the field a force of between 3,000,000 and 3,250,000 men, or about 6 per cent of her total population. Her tactical organization, equipment, and methods closely follow European models, particularly that of Germany.

Administration.—The Emperor is supreme commander of the army and navy. He selects his War Minister (a general officer of the army), the chief of staff, the director of military schools, and the members of his military council. The 19 divisions are organized in and recruited from definite territorial districts, which constitute the administrative and command units. In addition to the line troops there are a number of special organizations, military schools, gendarmes, etc., used for educational and administrative purposes. The number of officers performing the semimilitary functions of intendants is estimated at about 1000. The cost of the army amounts to from $40,000,000 to $50,000,000 yearly. The military budget for 1913–14, including extraordinary expenditures, was $49,983,035. Late in 1914 the Premier, on account of Japan's participation in the European War as England's ally, asked for an increased army and larger military appropriations for the fiscal year 1914-15.

Arms.—The Japanese infantry uses the improved Arisaka (modified Mauser) rifle, calibre 0.256 inch; the cavalry, a similar carbine; the field artillery, a rapid-fire shielded Krupp gun, calibre 2.95 inches, projectile 14.3 pounds; the mountain artillery, a gun of same calibre with lighter projectile. The light and heavy field howitzer batteries use a 4.6-inch and 5.9-inch piece, firing projectiles of about 44 and 80 pounds respectively. A 4-inch gun is also under construction for issue to the heavy artillery.

Service is universal and compulsory, with liability from 17 to 40, actual service beginning at 20. The first line is made up of two classes: the Geneki, or active service with the colors for 2 years in the infantry, 3 in other arms; the Yobi, or reserves for the active army, with service of 5 (or 4) years and 4 months, making a total of 7 years and 4 months in the first line. In the Yobi training of 60 days each is given on two occasions. The reservists then pass to the Kobi, or second line, for 10 years, where they have two periods of 60 days each with the colors; then to the Kokumin, or third line, home-defense army, for 2 years and 8 months, which completes the liability of 20 years' service. The classes just mentioned are filled by the men of highest physical standard. The excess of these, plus the men capable of bearing arms but of a lower physical standard, up to a certain number, are assigned to a category called Hoju, which is a supplementary reserve to replace losses in war. They do not serve continuously with the colors, but are given a first training of 3 months and report for two subsequent trainings of 2 months each during the Hoju period of 7 years and 4 months. They then pass to the Kobi and Kokumin category in the same way and for the same periods as the first-line men. The men composing the Kokumin, or third line, are thus seen to be made up of men of different degrees of military training. It is divided into two classes, or bans: first, the fully trained men of the first line and the partially trained men of the Hoju; second, the untrained men, made up of the excess not required for the Hoju, the men exempted from military service, and the boys between 17 and 20 years. It should be noted that only fully trained men are assigned to the fighting units of the Kobi, or second line, the partially trained being assigned to the transport, supply, and administrative corps on mobilization for war.

Higher Organization.—The division is the highest permanent organization in peace. There are provided in peace, however, the generals and lieutenant generals and staff officers required for the organization and command of field armies composed of from 3 to 5 divisions each in war. In peace there are in Japan proper 19 divisions, 4 independent cavalry brigades, 3 independent brigades of field artillery (each of 12 batteries of 6 guns each), 3 independent battalions of mountain artillery, and 6 regiments of heavy field artillery, each of 24 guns. The normal division consists of 2 brigades of infantry, a regiment of cavalry of 3 squadrons and 4 machine guns, a regiment of light field artillery (6 batteries of 6 guns each), with such heavy and mountain batteries as may be required, with, possibly, 3 Kobi batteries; 1 battalion of engineers, and the necessary communication, supply, and sanitary troops. The total war strength of a normal division is about 19,000 men, 5000 horses, 36 guns, and 1700 vehicles. The field army, of from 3 to 5 divisions, varies in strength from 80,000 to 130,000 men. Total peace strength of the regular army, according to latest information (1914), is estimated at 250,000 men. Upon initial mobilization this regular or standing peace army could at once be expanded to 600,000 fully trained men. In addition there

would still be available about 650,000 fully trained reservists, giving a total trained force of 1,250,000 at the outbreak of war. Adding to these the partially trained and untrained men of the Kokumin, Japan could ultimately mobilize about 3,250,000 men.

Infantry Organization.—Four companies to the battalion of 1000 rifles (war), 3 battalions to the regiment, 2 regiments to the brigade. In 1914 the standing army consisted of 76 regiments (228 battalions), the Kobi of 228 battalions.

Cavalry Organization.—The scarcity of horses in Japan, the demands on the supply, and the expense of maintenance have retarded the development of this arm. There are in the standing army 27 regiments (89 squadrons), in the Kobi 57 squadrons. Peace footing, about 5 officers and 136 men per squadron; war strength but slightly greater. See CAVALRY.

Artillery Organization.—Field artillery, the German system of 6 guns to the battery, 3 batteries to the battalion, 2 battalions to the regiment; in the standing army, 150 field batteries, 9 mountain batteries, 19 battalions of garrison artillery; in the Kobi, 114 field batteries, 12 battalions of garrison artillery. Peace strength, about 5 officers and 120 men; war strength, 5 officers and 154 men.

Technical Troops.—Active army, 19 battalions of engineers, each of 3 companies. Peace strength of a battalion, 21 officers and 374 men; war, 660 men. Kobi, 19 battalions. There is in addition a "communication corps," consisting of railway, telegraph, and aëronautical troops. The strength and equipment of the latter is not definitely known.

Supply Trains.—The train troops are organized into battalions of 2 companies each, to which is added a third company in war. One battalion is assigned to each of the 19 divisions. Peace footing of battalions, 17 officers and 596 men; war footing of a company, 10 officers and 880 men. The total war strength of the train of the 19 divisions is about 51,000 officers and men.

Sanitary Troops.—Six field hospitals accompany each division in war. Peace strength of the medical department is estimated at 1250 officers and 2200 men; the war strength is not known.

Colonial Troops.—In addition to the troops mentioned a division is maintained in Formosa, about 30,000 men in Korea and Manchuria, and small garrisons in Sakhalin and Tsushima.

Navy. The Japanese have always been a seagoing people, and they have had a naval force for many centuries, chiefly as a weapon of defense and offense against the hereditary enemy, China. An old Japanese painting (its date said to be about 1300 A.D.) shows a naval fight with the Chinese in which the ships are wreathed with the smoke of their guns. If the date is correct, this is the first-known naval battle in which guns were used.

The modern Japanese navy may be said to have commenced with the purchase of the armored ram *Stonewall* (renamed Adzuma), which was built for the Confederate navy and sold to Japan at the close of the Civil War. From that time the navy increased slowly until 1894, when the war broke out with China. The resistance of the heavy Chinese armor-clads, notwithstanding their defeat, showed the value of such vessels. Japan ordered 2 first-class battleships in England at this time; and during the next 10 years 4 more battleships and 8 armored cruisers were built or purchased, as were also a number of smaller cruisers and torpedo craft. In the meantime the Japanese navy yards were greatly improved and excellently equipped for building and repair of vessels of all kinds. In 1904 the Japanese navy was in a condition to cope successfully with that of Russia, and the resulting victories not only humbled her antagonist, but added to her fleet 6 battleships, 1 armored cruiser, and 2 coast-defense vessels. Two of her own most powerful battleships were sunk.

The value of a strong navy to an island empire was now fully realized, if it had not been before, and Japan made extensive plans to build one of the great navies of the world. But the cost of the war with Russia and the developing of the conquered territory made such a severe strain upon Japanese finances that the naval construction proceeded much less rapidly than

TYPE	Displ.	Guns	Speed
2 battleships	20,760	12 12-in.	20k.
2 "	19,500	4 12-in. + 12 10-in.	20k.
2 "	16,500	4 12-in. + 4 10-in.	20k.
4 "	16,500	4 12-in.	18k.
5 "	11,200 to 15,800	4 12-in.	18k.
7 coast-defense vessels	2,000 to 5,000	4 12-in.	18k.
2 battle cruisers	27,500	8 14-in.	28k.
2 heavy armored cruisers	14,600	4 12-in.	22k.
2 heavy armored cruisers	15,150	4 12-in.	21k.
6 armored cruisers	9,700	4 8-in.	21k.
2 " "	7,700	4 8-in.	20k.
1 " cruiser	7,700	2 8-in.	21k.
16 small cruisers	1,250 to 7,000	various	19k. to 26k.
2 destroyers	1,150	2 4-in.	35k.
2 "	790	2 4-in.	33k.
35 "	380	6 3-in.	29k.
16 "	240 to 370	1 3-in.	26k. to 31k.
48 torpedo boats	50 to 150	various	20k. to 29k.
13 submarines	106 to 320	.....	7k. to 13k.
Vessels building:			
4 battleships	31,500	12 14-in.	22k.
2 battle cruisers	27,500	8 14-in.	28k.
2 destroyers	.....	.....	...
2 submarines	.....	.....	...

was desired. Nevertheless 7 battleships were completed or placed under construction between 1904 and 1914, also 4 battle cruisers and 5 large armored cruisers carrying heavy guns. A scandal in the Navy Department in connection with foreign contracts was made a pretext by the Japanese Parliament to cut down the naval appropriations to such an extent that the work on shipbuilding was greatly retarded, and no new keels were to be laid during 1914–15. The lack of money for the navy is likely to be felt until Korea and the other additions to the Empire cease to be a source of expense and afford a revenue.

In 1914 the strength of her fleet placed Japan fifth among naval powers. The numbers of the *personnel* were doubtful, as a considerable portion of the enlisted force had been released

owing to the lack of money. The latest official reports (1913) give 4035 commissioned officers, 1553 warrant officers, and 43,847 enlisted men. The fleet consisted of the ships enumerated in the preceding table, which gives the displacement in tons, number and calibre of principal guns, and maximum speed.

The principal dockyards are at Yokosuka, Kure, Sasebo, Onohama, and Nagasaki. These are well equipped, and most of the vessels of the navy are built in them. The Navy Department is one of the principal departments of the government and is presided over by the Minister of Marine. See NAVIES.

Political Divisions. Omitting Formosa (q.v.) and Korea (q.v.), it may be stated that

SECTION	Pop. 1908	Prefectures	Rural districts	Cities	Towns	Villages
Mainland:						
Central	19,004,481	17	202	23	544	4,148
Northern	7,480,432	7	90	12	217	1,698
Western	10,929,374	10	137	14	215	2,769
Shikoku	3,288,310	4	36	5	69	742
Kiushu	7,246,934	7	80	10	126	1,407
Okinawa	501,818	1	5	2	1	48
Hokkaido	1,137,455	1	87	3	22	313
Total	49,588,804	47	637	69	1,194	11,125
Korea (Chosen)	13,071,177	..	..	..	4,351	....
Formosa (Taiwan)	3,252,589	..	..	..	3,017	....
Japanese Sakhalin (Karafuto)	26,393	..	..	..	....	....
Grand total	65,938,963					

Japan is divided (1) into 84 provinces, separated the one from the other by natural boundaries; and (2) for administrative purposes into *fu* and *ken*, or prefectures. The former is the older division and dates back many centuries, though the number has not always been the same. Their names are in more general everyday use than those of the newer divisions. With only one or two exceptions each has both a Japanese and a Chinese name; thus, Yamashiro is also called Joshu, and so on, those ending in *-shu* (which may be translated 'province') being of Chinese origin. Of these 84 provinces two are separate islands (Iki and Tsushima, which lie between the island of Kiushu and Korea). The others are grouped into nine regions, of which eight are named *do*, or circuits. The other is the *Go-kinai*, or Five Home Provinces, which surround the old capital, Kyoto (q.v.). Taken in order from east to west, the eight circuits are as follows: (1) Hokkaido, or North Sea Circuit, comprising the 10 provinces of Yezo (q.v.), and an eleventh added in 1875, made up of the Kurile Islands; (2) Tosando, or Eastern Mountain Circuit, comprising 13 provinces, the most easterly of which lie towards Yezo; (3) Tokaido, or Eastern Sea Circuit, comprising 15 provinces, and stretching along the Pacific from Sendai Bay towards the Five Home Provinces (Fujisan, Tokyo, Yokohama, and other important or well-known places are in this do); (4) Hokuroku-do (or riku-do), the Northern Land Circuit, lies along the Sea of Japan and comprises seven provinces; (5) San-in-do, or Mountain Shade Circuit, comprises eight provinces which border the Sea of Japan; (6) San-yo-do, or Mountain Sun Circuit, lying along the south or "sunny" side of the mountains (the last two circuits are frequently spoken of as Chugoku, or the Central Provinces); (7) Nan-kai-do, or the South Sea Circuit, comprising the four provinces of Shikoku, the island of Awaji, and Kiushu on the main island, six in all; (8) Saikai-do, or the West Sea Circuit, comprising the nine provinces of Kiushu. The subdivisions of the provinces are called *kori*.

For administrative purposes the Empire is divided into *fu*, or municipal prefectures, and *ken*, or rural prefectures. These prefectures are further divided into *gun kori*, or districts, *shi*, or cities, and rural towns, and villages ranked as *cho* and *son*. The preceding table shows the population of the sections of the Empire, with the population according to the census of 1908, and the number of prefectures, rural districts, cities, towns, and villages in 1911.

The capital of the country is Tokyo (q.v.). The pre-Restoration capital was Kyoto.

Population. The first really reliable census of the whole country was taken in 1872. This showed 7,107,841 houses and a total population of 33,110,825—less than that of the main island at the present time. At the end of 1898 the number of houses had increased to 8,281,708, and the population to 43,763,153. Of this total number the nobility claimed 4551, the gentry 2,105,696, and the common people 41,050,568. On Jan. 1, 1909, the number of Japanese proper (i.e., exclusive of the natives of Formosa, the Pescadores, and other dependencies), at home and abroad, divided according to the six statistical divisions, was as follows:

	Population	Pop. per square kilometer
Hondo, central	19,004,481	214
Hondo, northern	7,480,434	93
Hondo, western	10,929,374	217
Total Hondo	37,414,889	
Shikoku	3,288,310	175
Kiushu	7,246,937	181
Hokkaido	1,137,455	16
Grand total	49,588,804	135

Of this total, 25,046,380 were males and 24,542,424 females. The numerical strength of the various classes was as follows: nobles, 5642; knights or gentry, 2,218,623; common people, 47,382,262, including 18,017 Ainos in Hokkaido. Estimated population at end of 1913, 52,985,423; 1920, 55,961,140. The percentage of increase has been as follows: 1872, 0.57; 1881, 0.94; 1886, 0.84; 1891, 0.66; 1896, 1.04; 1900, 1.25; 1901, 1.39; 1902, 1.29; 1903, 1.54; 1904, 1.32; 1905, 1.32; 1906, 1.32; 1910, 1.46; 1911, 1.30; 1912, 1.29; 1913, 1.29.

Since the centralization of modern industries there has been a large concentration of population in the cities and towns. The following table shows the number of communes of each

COMMUNES	1898		1908	
	No. of communes	Population	No. of communes	Population
Under 500 population	750	199,712	229	59,950
500 and under 2,000	4,250	5,991,450	2,551	3,778,108
2,000 and under 5,000	8,008	24,427,130	7,649	24,269,615
5,000 and under 10,000	1,069	6,775,503	1,654	10,736,232
10,000 and under 20,000	150	1,991,185	268	3,586,200
20,000 and under 50,000	60	1,747,670	76	2,422,981
50,000 and under 100,000	12	772,481	19	1,352,565
100,000 and under 200,000	3	423,490	4	530,916
200,000 and under 300,000	2	459,925	..	....
300,000 and under 400,000	1	353,139	3	1,150,731
400,000 and under 500,000	....	.....	1	442,462
500,000 and over	2	2,261,356	2	3,412,726
Total	14,262	45,403,041	12,456	51,742,486

class, and the aggregate population in each class of communes, according to the censuses of 1898 and 1908.

Education. Since Japan was opened to foreigners much attention has been given to education, and for a time foreign teachers and advisers were in demand, both by the government and by private persons. The present Department of Education was established in 1871, but much organizing had been done before that time. The advisers were mostly from the United States, and as regards the public-school system which the government had determined to establish, United States models were largely followed. Later German influences prevailed, and the system now in vogue is largely patterned after German models. It includes the following grades:

1. Kindergarten work or infant schools, which originated first in 1876 in connection with the normal school, but have since been extended. The age is from three to six. In 1911 there were 475 such schools, employing 1312 women, with 38,125 infants in attendance.

2. Elementary schools, attendance at which is compulsory, as far as the lower division, called "ordinary schools," is concerned. It is for children from 6 years to 10; the school year is 32 weeks long, and the children are taught morals, reading, writing, composition, and arithmetic, and sometimes gymnastics, drawing, and music are provided. The higher grade is optional for children between 10 and 14. The course of instruction includes geography, history, English, agriculture, and commerce.

3. Middle schools, in two grades, ordinary and higher. The ordinary covers a course of five years and includes ethics, Japanese language, English (then French or German), agriculture, geography, history, mathematics, natural history, physics, chemistry, etc. In the higher grade the course covers two years of Latin, zoölogy, botany, geology, mineralogy, dynamics, surveying, philosophy, etc.

4. The university crowns the whole. There are also normal schools and special schools.

Instruction is not gratuitous, and the local school boards, which are elected by the people, have to provide for those too poor to pay. The school age is from 6 to 14. In 1911 the number of children of school age was 8,604,787, of which 4,482,609 were boys and 4,122,178 were girls. In 1911–12 the public and private primary schools numbered 25,750, with 157,536 teachers and 7,021,661 pupils in attendance. In 1880 the rate of attendance per 100 children of school age was 41.06; in 1903 it was 92.23; in 1910–11 it was 98.14, an increase of 0.04 over the previous year. A notable fact is the spread of female education. In 1880 the rate of attendance per 100 children of school age was 57.60 for boys and 23.51 for girls; in 1903 the rate for boys was 96.59 and for girls 89.58; in 1910–11 the rate was 98.83 for boys and 97.38 for girls.

In 1911–12 there were 314 middle schools, with 6092 instructors and 125,304 pupils; 83 normal schools, with 1571 instructors and 27,076 students; 7298 special and technical schools, with 8247 instructors and 394,586 students; 250 superior (or high) schools for girls, with 3300 instructors and 64,809 students; 2266 miscellaneous schools (1910–11), with 7346 instructors and 144,089 pupils.

There were 9 special schools of medicine and pharmacy, with 3389 students; 10 schools of law and politics, with 14,267 students; 241 agricultural schools, with 26,945 students; 108 apprentices' schools, with 10,018 students; 97 commercial schools, with 24,642 students; 12 nautical schools, with 1973 students; 15 fishery schools, with 912 students; 34 schools for the fine arts, languages, etc., embracing 5595. There are numerous preparatory schools for each of the above divisions. The 445 libraries had a total of 2,750,205 volumes in 1911–12, of which 2,600,278 were Japanese and Chinese works and 149,927 European. The Imperial University at Tokyo was founded in 1869 by the consolidation of two schools, the Kai-sei-gakko and the Shoheiko, and later other colleges were added. In 1911–12 it had 372 professors and instructors (including 15 foreign) and 4984 students. The University of Kyoto was opened in 1889, with one foreign and 69 native professors and 360 students; in 1911–12 it had 158 professors and 1226 students. There are, besides, two universities maintained from private funds, the Keiogijuku University, founded in 1865, and the Waseda University, founded in 1882 and converted into a university institution in 1902. In 1911–12 there were published 43,153 books, most of them on politics, industry, law, and religion. There were 1793 periodicals in that year.

Religion. Japan has really three religions—Shinto, Buddhism, and Christianity. Under the new constitution of 1889 absolute freedom of speech and freedom of religious opinion and belief are guaranteed. Shinto (the way of the gods) is a purely native cult. It has no creed, no doctrinal system, no moral code, no priests, and no images in its 130,258 (in 1908) temples and shrines, though it has nearly 14,000 gods, before whom, or some of whom, certain offerings are made from time to time; to whom certain prayers are addressed on such occasions, and before whom certain ceremonious dances are performed in a very punctilious and decorous way. It appears to be a mild kind of ancestor and hero worship which has come down from primitive times. The chief deity is Amaterasu (the sun goddess), from whom the mikados are descended. It exerts no particular influence for good on the people, though it does them no harm. From the ninth century onward it became much tinged and corrupted with Buddhism, indeed was practically absorbed by it, Kobo Daishi (q.v.) having apparently convinced everybody that the Shinto gods were merely manifestations or transmigrations of Buddhist deities. It is stated that 13 sects of Shinto now exist.

Buddhism entered Japan by way of Korea in 552 along with the arts, sciences, and letters of China. Its gilded images and its gorgeous temples and ritual appealed to the Japanese mind, and the new religion became popular. It gained both the favor and the patronage of the Imperial court, and in 621 it was by edict proclaimed to be the established religion. Priests went to China, or were sent there by the government to study, and these on their return brought with them new scriptures, new sects, and new ideas which soon began to blossom out into other new sects in Japan. Kobo Daishi in 816 founded the Shingon (q.v.), or the sect with the form of "true words"; the Zen, or "contemplative" sect, was introduced in 1202; the Jodo, or "pure-land" sect (see TS'ING-TU and SUKHAVATI), in 1211; the Shinshu, or "true sect," an offshoot of the preceding, in 1262; the Nichiren in 1282; and many others. Now there are 70 sects and subsects, all based on or developments of the

Mahayana, or Northern School of Buddhism, in which Sakyamuni, the historical Buddha, has little or no place. The most important of these as far as influencing the people is concerned are the Jodo, which finds Nirvana too hard to attain to and provides instead a "Paradise in the West," presided over by Amida Buddha, where the faithful may enjoy a blissful existence through untold ages, and whence, if they have to be reborn, it will be easy to reach the Nirvana state. The Shinshu, an offshoot from Jodo, has been called the "Protestantism of Japan." It teaches that salvation may be obtained merely by faith in the mercy of Amida—the chief of the Buddhas—and his ability to save, without works of any kind. No change of heart or conduct is necessary, and nothing is required beyond loving one another, keeping orderly, and observing the laws of the government. Its priests may marry, and they are free to eat both flesh and fish. This is the most powerful of the Japanese sects; its temples are large and magnificent, are found in the most crowded parts of the cities, and are thronged day and night with silent worshipers. In 1899 its temples numbered 19,213. Buddhism was disestablished in 1871 and disendowed in 1874, and there is now no state religion. The great majority of the people are Buddhists, but there are no organized bodies of church members as there are in Christendom. Among the upper classes agnosticism prevails.

If Shinto can be called a religion, then Christianity comes third. All its churches are enrolled by the government and are protected by law. In 1914 there were in Japan 962 Protestant missionaries, 1785 native clergy and other workers, and 90,469 church members. These totals include all of the various Protestant churches. The Roman Catholic church, which in 1891 established an episcopate of one archbishop and three suffragan bishops, had 371 European missionaries, 170 native clergy, and a total church membership of 66,689. The Greek church had 1 missionary, 156 native clergy and a church membership of 32,246. Little has been written about the work of the Russians in Japan; even in Russia almost nothing was ever published.

In 1920 there were in Japan excluding Formosa, 71,689 Buddhist temples, exclusive of 26,051 minor temples, with 53,203 high priests and priestesses. The Shinto shrines in 1921 numbered 49,416, besides 65,132 minor shrines, and in 1919 14,742 priests. The Roman Catholic, Greek, Anglican and Protestant churches embraced 2595 licensed preachers and 1492 churches and preaching stations.

Ethnology. The modern Japanese are a very mixed people. The largest factor in the production of the Japanese is to be traced back to the Mongolian race of the adjacent continent, a view confirmed by the physical characteristics of a considerable portion of the population at the present time. Some, indeed, group Japanese and Koreans together as being ancestrally very closely akin, by physical characters as well as by speech. But among the Japanese, as among the Koreans, and in certain parts of China, there are recognizable three physical types—an Ainu type, chiefly characteristic of north Japan; a Manchu-Korean, in the regions nearest Korea; and a Malayo-Mongolic, in the centre and east. The Korean-Manchu type seems to go back, like the primitive Chinese, to a Mongolian ancestry with a strain of proto-Caucasian blood, while the Ainus (see AINO) are perhaps allied to the most primitive Caucasians; but such opinions must be accepted with caution. The best authorities agree in distinguishing a "fine" and a "coarse" type among the modern Japanese. The former is taller, more slenderly and gracefully built, longer-faced and longer-headed, with better-shaped nose, and, generally, less distinctively Mongolic in form and features, with lighter skin, etc. The "finer" type may be considered to be the descendants of the Japanese immigrants from the continent, who conquered and intermingled with the original inhabitants, or Ainus. This "fine" type has now become the Japanese ideal. The "coarse" type is characterized by shorter stature and thickset body, broader skull and face, more prominent cheek bones, somewhat oblique eyes, large lips, wide mouth, more powerful jaw, flattish nose and wide nostrils, darker skin, and generally more of the Mongolian in form and feature.

The population of Japan may thus be considered to consist of a prehistoric proto-Ainu and later historic Ainu element, upon which the Sibiric ancestors of the Japanese proper imposed themselves by slow degrees until they ultimately became the dominant factor. There has been added, perhaps at several different periods, a Malay or Polynesian element, which is noticeable in central and east Japan, where it is thought to have modified considerably both physical and social characters. Traces of ancient Negrito influence have been seen in Japan by some authorities, but others attach no importance to these alleged proofs of the former existence of a black race in Japan.

Physically the Japanese are not a strongly developed people, but they are capable of great exertion and endurance. A number of somatic peculiarities have been noted in the Japanese, such as the divided molar bone (*os japonicum*), the low, broad upper jaw, without canine fossa, and the so-called "Japanese knee" (due to the practice of sitting so much). In their general physical conformation many of the Japanese males of the better classes have a decidedly feminine or even childlike cast—a character thought by some authorities to belong more or less to the Mongolian race in general.

Intellectually the Japanese have shown a capacity equal to that of any other known people, and their native power is revealed by the fact that while their manners, customs, and certain institutions were modified in ancient times by Chinese culture, and in recent times by European and American civilization, the fundamental traits of their character have not been altered. The mental and moral characters of the Japanese may be summed up as patience and persistence, combined with cheerfulness, a certain versatility and quick-wittedness, enterprise and originality, together with unexcelled powers of imitation, as well as progressiveness, industry, artistic sense, humor, cleanliness, politeness, honor, bravery, kindness, calmness, and ability to conceal the emotions. From the Chinese and some other Mongolian peoples the Japanese differ in the freedom accorded to women from the remotest times down to the present day, their less altruistic ethical system, their high estimation of the warrior and their appreciation of war as a means of national advancement, their national virility, and their power to respond to and accept facts of modern social and historical evolution. The social and moral life of the Japanese offers much that is

interesting in the way of evolution. In sexual relations they are now monogamous, though polygamy was formerly permissible.

As compared with China, and perhaps with Korea, the civilization of Japan is comparatively modern, for the coming of the continental Mongoloid ancestors of the Japanese to the island may be fixed at 2000–1500 B.C. Their conquest of the various islands of the great archipelago was slow and apparently difficult, as the Japanese annals themselves record, for the Ainu and proto-Ainu population was well distributed throughout the group. Relics of Ainu origin are found almost everywhere, but naturally in more abundance towards the north. The amount of Ainu blood in the modern Japanese is considerably more than hitherto supposed, and the liberal policy of the present authorities towards the Ainus of the extreme north is leading to a recognition of the abilities and intellectuality of this ancient and primitive people, pointing to their ultimate disappearance, not by dying out or extermination, but by absorption into the general population. The question of the Malayan or Polynesian element in Japan is more difficult to elucidate. Twice at least in Japanese annals there is mention of swarthy foreigners from the south who made irruptions into east and central Japan. These, according to several authorities, were Malayan or Malayoid tribes, who came by way of Formosa and the Loo-choo Islands, and the physical characteristics of this section of Japan bear testimony to their presence and their numbers. Other evidence of a Malayan influence exists, according to some ethnologists, in the structure of the house, the practice of massage, certain dances, luxury, and love of weapons. Some of these resemblances are too general, however, and others too clearly the product of the Japanese environment, to be conclusive evidence. The introduction of Chinese and Korean civilization into Japan dates back for its beginnings to about the first Christian century, and this influence was strengthened after the transference of Buddhism in the sixth century.

Manners, Customs, etc. The Japanese are a cheerful, contented people, lovers of nature, and always ready for a holiday. Opium growing and the importation of it are forbidden, and government supplies the needs of the medical profession. Courteousness is a distinguishing trait, and their ceremonious politeness is oftentimes most embarrassing to the foreigner, who is not usually given to self-depreciatory remarks, and whose stock of honorifics is small and not always instantly at command. Hand-shaking is not a Japanese custom, and the lowness of the obeisance varies with the rank of the individual, women and the lower classes usually getting down on their knees. Children dress like their elders, and though their footgear is clogs held on by a band passing between the big toe and the next one, they romp and run as much and as fast as European or American children. Their socks—when they wear them—have a separate compartment for the big toe. Their toys and indoor amusements are innumerable. In dress the Japanese are not burdened with much underclothing. Their chief outer garment is the loose-sleeved gown known as the kimono, open in front but bound round the waist with a sash. That of the women is a little longer, differs somewhat in the sleeves, and the sash, or *obi*, is wide and formed into a bow at the back which varies in style according to age, etc. Married women used to shave off their eyebrows and blacken their teeth with the juice of the persimmon tree. The coiffure is an elaborate construction, with "waterfalls," plastered down with bandoline and decked with stickpins.

Japanese houses are usually of one story. There are no cellars. The floor is about 2½ or 3 feet from the ground and is formed of soft, thickly padded mats measuring 6 feet by 3, and on these the family sit (or rather squat on their heels), eat, and sleep. There are no tables, chairs, or bedsteads, thick wadded quilts serving as mattress and blankets. Heat when wanted is provided by a *hibachi*, or brazier filled with burning charcoal. The pillow was formerly a little paper-covered cylindrical cushion strapped on a narrow stool, and placed under the neck so as not to disturb the hair, but the European pillow is now in general use. Footgear is left in the porch before stepping on the veranda. A single picture, changed with the season, and a small wall vase containing a single sprig, form the only decoration, apart from that of the *shōji*, or sliding paper screens which serve as partitions. Passers-by may get a glimpse through the open screens of a tiny garden at the back, with a miniature rivulet, a stone thrown across it as a bridge, a miniature hillock crowned with a dwarfed pine, and a flowering shrub or two, and perhaps a stone-pillar lantern. A necessary feature of every house is the "god shelf," or family altar, where is the little shrine—Shinto or Buddhist—before which the offerings are placed. Cleanliness is next to godliness, and the bathtub at the back, with its little furnace in one end for boiling the water, is patronized by every member of the family in succession, the water being invariably hot (100° to 115° F.).

Food is served on little lacquered stands about a foot high and is eaten with chopsticks (both of the same material). Rice, with soup of seaweed, beans, vegetables, or hard-boiled egg cut up into pieces, with a little fish with soy, and the like, daintily served, make the meal, sake (their fermented beverage) when used being heated and served in the tiniest of porcelain cups. Tea is the usual beverage. But there is no meal called "tea." Pickled daikon (or radish) is their chief relish.

Married life is usually happy. Cremation was introduced by the Buddhists about 700 A.D. After the Restoration it was forbidden, but a custom of such long standing could not be wiped out with the stroke of a pen. Those who favor the Shinto cult bury their dead in coffins.

History. Japan begins its history with a year corresponding to 660 B.C., when Jimmu Tenno (q.v.), the leader of a band of invaders, settled in Yamato after having conquered several of the tribes who opposed him. Our only source of information in regard to the early history of the dynasty which was founded by him, and which exists to the present day, is found in the *Kojiki*, the oldest extant book of Japan, in which are found the myths and legends written down in Chinese characters in the years 711–712 by one Yasumaro, from the lips of a person named Hiyeda-no-Are, who possessed a most wonderful memory. These myths and legends, under close analysis, show three streams of legends: the Tsukushi or Kiushu cycle; the Idzumo legendary cycle, which covers central and west Japan; and the Yamato cycle,

which covers the central and eastern parts of the main island. The north and east parts of the main island were inhabited by the Emishi savages, or Ainus, who had retired thither before the advancing invaders, leaving their names on rivers, mountains, streams, and other natural landmarks. In the south dwelt aboriginal people, perhaps from the Malay regions. The invaders of the archipelago, whether coming from Tartary or Korea, were without letters or writings, but possessed superior arms, valor, and discipline. They came as immigrants, at various times and to various places, finding people already on the soil, whom they proceeded to put under their control.

There are thus early discerned with clearness, in the morning of the history of Japan, race struggles among various tribes of differing customs and languages, and two types of men, whom we now call Japanese and Ainus, the former living south, the latter north of the thirty-eighth parallel. Gradually the Tsukushi and the Idzumo people became subordinate to the Yamato house or tribe. The conquerors intermarried with the subjugated, and the pacified chiefs were awarded rank and honor, while the power of the Mikado or Yamato chief was consolidated by making the primitive cult, now called Shinto, or Kami-no-michi, a political engine. The whole country was put under a rude feudal system, the conquered or subordinated holding their lands in loyalty to the Yamato chieftain or Mikado. Civilization gradually drifted in from Korea, through teachers, artificers, and men of learning. There are indications that a century or two before the great flood of civilizing influences was borne on the waves of Buddhism, considerable knowledge of Chinese letters, writing, and ethical notions had penetrated to the Yamato court and among some of the chiefs of the southwest. The *Nihongi* (another historical work, compiled in 720 A.D.) states that in the year 405 a Korean scholar was appointed tutor in Chinese classics to one of the Imperial princes, and that about the year 430 "historiographers were appointed." As yet, however, there was no such thing as a settled capital, the Mikado and his household moving from place to place in central Japan. After the death of the Mikado chief, his successor, with a horror of the place of the dead, moved on and built a new palace. There have been thus no fewer than 60 capitals. To-day the provinces of Yamato, Yamashiro, Kawachi, and Settsu "are dotted with places, now mere villages, sometimes indeed empty names, but once in the proud position of capitals of the Empire."

The line between legend and true history is made clear upon the arrival in 552 A.D. of Buddhist missionaries from Korea, who brought with them not only the sutras and images of their cult—the Mahayana northern form of Buddhism—but also letters, writing, calendars, and methods of keeping time. Buddhism took root and became so popular with both court and people that in 621 it was proclaimed by edict to be the established religion of the land. From this time forth we have something like a coherent account of things and can trace with some clearness, through many rebellions and oppositions, the rise to paramountcy of the Yamato house. Nara in Yamato became the fixed capital and remained so for seven reigns between the years 709 and 784. One decade later Kyoto was made the Imperial residence and, with few interruptions, continued to be so until 1868. At the opening of the seventh century Chinese civilization had so far been accepted that in 603 the form of government was changed from feudalism to monarchy; eight boards or departments of state were established, in imitation of the Chinese system; and a new order of nobility, in nine ranks, was created. A great council, called the Dajo-Kwan, which had also been established, superintended the eight boards and ruled the Empire by means of local governors appointed and sent out from the capital.

The practical enforcement of this new centralized system of rule from Kyoto was not acceptable and was in many places long and stoutly resisted. Gradually a military class was formed, which became separate from the agricultural, the latter comprising the farmers and those who permanently tilled the soil. By parallel development the men at arms became professional soldiers. Other great lines of movement may be summarized in the increasing centralization of government and the withdrawal of the Mikado from active service in the field or even in the affairs of government and his comparative seclusion. Under the pretext of religion or a desire to lay aside the cares of government, committing the actual work of administration to his subordinates in order to seek retirement, he became in the national life rather an abstraction than a person.

By means of the superior valor, force, and skill of its soldiers the Empire was extended north, south, east, and west until all Kiushu and Shikoku were subdued and the arms of Japan extended to the far east and north. Meantime in the capital and palace the Fujiwara family, who had come into position and power about the year 670, had developed a bureaucracy, so that they gradually monopolized most of the offices in and about the court and the administrative boards. In other civilian families the particular administration of sacred rites or the cultivation of learning became the specialty or monopoly. The military commands were always given to the rival clans of the Taira and Minamoto. The Taira warriors, fighting under the white crest or banner, gained renown and power in the southwest. The Minamoto, under the red banner or crest, won victory and held power in the east and north; but when once the activities of the field were comparatively things of the past, both clans lusted for power nearer the throne. Then began a struggle in the capital. The Fujiwara, who had formed a ring around the Emperor and by their own henchmen blocked most of the ways of approach by nepotism, were ousted by the Taira, whose star was now in the ascendant. This naturally excited the jealousy of the Minamoto, and in the year 1159 the two rival military clans came to blows. Then began that famous period of the wars of Genji and Heiké, which have since colored all Japanese history, literature, and art, and which in later times, even to this day, have given the standard and motives for games of skill and chance. Kiyomori, the Taira chief, became Premier in 1167. He not only redistributed the offices, civil and military, among his own clansmen, but by marrying his daughter to the Emperor controlled the throne itself. The Minamoto men, their leaders beheaded or banished, were scattered, one line becoming rulers of far-off Loo-choo. In 1181, after Kiyomori's death, Yoritomo led the Minamoto in an

uprising, and under the generalship of Yoshitsuné, his brother, the Taira men were driven out of the capital and from their palaces. After several land battles and a great naval conflict near Shimonoseki (1185) the Taira were annihilated. The divisive evolution between military and civil power had so far proceeded that, leaving Kyoto to be the centre of honor and tradition and of that outward form which in Japan, as in China, saves the "face" of a thing, Yoritomo fixed his seat of authority, in the name of the Emperor, at Kamakura, in the Far East, on the bay of Tokyo. He had himself appointed Shogun, or general (1192), and was hailed as the great peace bringer. Although his line came to an end in 1219, yet the system which he inaugurated was carried out by the Hojo family of regents, who held power until 1333. Obtaining from Kyoto, in the name of the Emperor, nobles who were mere children and puppets, to whom the title of Shogun was given, while they held the power themselves, the Hojo ruled the Empire. It was during their rule at Kamakura that the armada of the Mongol Tatars was destroyed by storms and the valor of the Japanese. Several of the Hojo regents were men of great ability and ruled with justice and vigor.

From the moment of Yoritomo's success feudalism entered upon a new stage of development. Under the Imperial system, from 603 to 1182, the governors sent out from Kyoto to the different provinces under a four years' tenure of office had charge both of the collection of revenue and the repression of crime. Yoritomo had no sooner got control of the east than he obtained from the Emperor a civil title equivalent to that of "high constable of the realm," by which means he had the two departments of revenue and the maintenance of order divided, leaving the Emperor's officers to collect the revenue, while he repressed crime and maintained order. This system of appointing military magistrates seemed to be so excellent that it was gradually extended all over the country. Yet all the time Yoritomo cloaked his military ambition under the guise of his civil title, so that when, in 1192, he was made Shogun, and was thus military commander in chief, he was already the virtual ruler of the country. Seeing this, the Imperial officers in charge of the revenue left Kyoto for Kamakura, and the Shogun thus possessed both purse and sword, leaving Emperor and court, in honor and poverty, dependent on him. Henceforth the functions of government were separated into those of throne and camp—the former the centre of mystery and the fountain of honor, the latter being the actual government. The Hojo were overthrown by the brave warrior Nitta in 1333. Then followed for a while, but for two years only, what may be called the temporary mikadoate, when there was no Shogun and theoretically no feudalism.

That the mikados had not yet, however, vigor enough to enter upon personal rule was shown in the fact that when the adherents of rival nominees to the throne went to war over the division of spoils, the Mikado could not restrain them. Civil war broke out, lasting 56 years, when two rival lines of mikados held the shadow of power, in the period 1336–92, and there were two capitals, though the real rulers were the shoguns of the Ashikaga family. In 1392 one of their envoys persuaded the Mikado, who had the three Imperial regalia—mirror, crystal ball, and sword—to come to Kyoto and hand over the sacred emblems, and the feud was healed. Now that the Ashikagas had their nominee on the Imperial throne, the second great step in feudalism was taken by them, when they made the military magistracies, established by Yoritomo, hereditary in the families of their own nominees. Thus arose the class of daimyos. (See Daimyo.) The Ashikaga power lasted until 1573, during which time the Portuguese came to Japan, Mendez Pinto (q.v.) landing in 1542 and Xavier in 1549, beginning a period of intercourse with Europeans which continued until about 1620, during which Christianity and firearms were introduced. In general the period of the Ashikaga rule was one of great refinement of manners, of high art and literary culture, along with the missionary expansion of Buddhism and a remarkable phase of doctrinal evolution. On its political side Buddhism reached a point of wealth, luxury, and menacing military power which made it one of the great forces in the state, calling for some powerful hand to put it down. As the Ashikaga became weaker in their later years, anarchy grew to be more general. The Buddhist abbots and their monks, in arms and armor, possessing closer organization and with fortified monasteries, often turned the scale of power. From 1573 to 1604 was the period of the three famous men Nobunaga (q.v.) (1533–82), Hideyoshi (q.v.) (1536–98), and Iyeyasu (q.v.) (1542–1616). The first humbled the Buddhists, the second reduced the daimyos to submission, and the third consolidated results. The third decisive step in the development of feudalism was taken by Hideyoshi when he rearranged the feudal map of the Empire, marking out the boundaries of the fiefs and appointing to them the daimyos as his own nominees, giving them titles in his own name without reference to the Emperor. During Hideyoshi's time Korea was invaded (1592–98) by his hosts of warriors, who on the return of peace in Japan had been left without occupation. Iyeyasu, his successor, making Yeddo his capital, carried out Hideyoshi's plans, so enlarging them that he and his grandson, Iyemitsu, gave the final form to Japanese feudalism, which early in the middle of the seventeenth century had become settled in routine. It is noteworthy that alongside of elaborate feudal institutions grew up a commercial and industrial system like that contemporaneous with late feudalism in Europe. Yeddo, from a village, became the greatest city in the Empire. The Tokugawa family furnished, from 1603 to 1868, 15 shoguns. Christianity was, as was thought, rooted out. Then began a great development in art, literature, the study of ancient history and the native language, and the revival of pure Shinto (q.v.). The policy followed was that of the exclusion of foreigners and the inclusion of the people of Japan within their island walls, while their intellect was kept within fixed bounds.

Shipwrecks and the casting away of seamen gave the United States government its opportunity to seek a treaty of friendship and, if possible, of commerce. In 1854 Commodore Perry, to whom the task was intrusted, succeeded in establishing treaty relations between Japan and the United States. Four years later other treaties opened several ports to foreign residence and trade. In 1860 a Japanese embassy visited the United States, and in the fol-

lowing year ambassadors were sent to the European courts. Narrow-minded patriots protested, but the great clans of the southwest, always detesting the northern rule of Yeddo, gradually gathered around the court. In 1867 the Shogun was compelled to resign, and when in 1868 he sought to regain power by force of arms, he was driven from the field. Men with new ideas and determined purpose obtained control of the Emperor and the government, moved the capital to Yeddo, had the sovereign swear to rule according to "the right way between heaven and earth" (in deference to public opinion), and began the abolition of feudalism. It was virtually a committee of four men, Iwakura, Okubo, Kido, and Saigo, with their farseeing fellows and helpers, that led the samurai to swing the nation out of ancient routine in order to create the new Japan. They invited educators from the United States to reorganize their educational system, French officers to remodel their army, British seamen to reorganize their navy, and Dutch and other engineers to make internal improvements. These tremendous changes were not accomplished without protest. In 1887 Saigo quarreled with his old friends, led an army "against the Emperor's evil advisers," and the Satsuma Rebellion cost Japan 20,000 lives and $50,000,000. In 1879 Loo-choo was made an integral part of the Empire, and Sho Tai, the King, brought to Tokyo and made Marquis. Western laws were introduced and codified. In pursuance of the Imperial oath, a Parliament was promised. In 1884 the nobility was organized on the European idea, and many new men were honored with titles. In 1889 the constitution was proclaimed, and the Diet met in 1891. With many an ebb and flow the great tide of progress has kept on. In 1894 war with China broke out in regard to Korea; this resulted in the utter defeat of China, the cession in 1895 of Formosa to Japan, the payment of a large indemnity, and the independence of Korea. The decisive triumph of Japan was notice to the world of the advent of a new power in the East whose voice would be heard in future political arrangements. Even before the outbreak of the war the nation had entered on a series of treaty negotiations which was to admit it to full equality with the Powers through the abolition of the obnoxious consular courts. As a preliminary step a thorough revision was effected of the different legal codes, criminal, penal, judicial, civil, and commercial. Great Britain and the United States were the first to abandon the principle of extraterritoriality (1894), receiving in return the freedom of the entire Empire for their trade. Similar treaties were concluded in 1895–96 with all the European nations of consequence, all the treaties to go into effect in 1899. The sphere of national interest had broadened as a result of the war. The pacification of Formosa, which was made difficult by the activity of Chinese irregular bands or "black flags," was actively carried on. In Korea Japanese influence had to contend with the aspirations of Russia, against whom, naturally, bitter resentment was cherished as the leader in the Triple Alliance of the European Powers which in 1895 had deprived the nation of the greater share of the fruits of victory. In 1898 the two Powers by treaty made formal recognition of the independence of Korea and pledged themselves to abstain from all interference with the internal affairs of that Empire.

During the Boxer uprising the Japanese troops more than held their own among the international forces which marched on Peking. In the diplomatic struggles which followed the occupation of Manchuria by Russia, an act which Japan regarded as portending peculiar danger to its interests, the latter nation found itself again confronted by the 1895 alliance of Russia, Germany, and France. The result was the Anglo-Japanese alliance concluded Jan. 30, 1902, for a period of five years. The two governments, declaring themselves specially interested in maintaining the independence and territorial integrity of the empires of China and Korea, guaranteed to each other the right to take all needful measures for the protection of those interests if threatened by the aggressive action of any power or by disturbances arising within China and Korea. If war was entered into by either of the contracting parties and any other Power, the second party to the agreement pledged itself to maintain an attitude of strict neutrality. In case, however, its ally was involved in hostilities with more than one Power, the other party would come to its aid and wage war and make peace in common. By linking itself with the leading power in the East and the greatest naval power of the world, Japan found its position immeasurably improved. From that time war with Russia was deemed by competent observers to be inevitable, though there was division of opinion as to whether the alliance with Great Britain was only a justifiable measure of self-defense taken in preparation for the conflict which Russian fatuity in Manchuria was bound to evoke, or whether it constituted a challenge and an irritation to Russia and a cause of war in itself.

The developments of the two years preceding the outbreak of hostilities in February, 1904, will be found under CHINA, KOREA, MANCHURIA, and especially RUSSO-JAPANESE WAR. Internal affairs after 1900 were largely concerned with party struggles (see POLITICAL PARTIES) and unsuccessful attempts on the part of the government to cope with the unhappy economic conditions that had followed the war with China. The Katsura ministry, which came to power in June, 1901, found itself confronted by the necessity of satisfying the general demand for the abolition of the onerous land tax instituted in 1898, and at the same time of providing means for the execution of a programme of naval expansion made necessary by the anticipation of war with Russia. A hostile Diet was dissolved in December, 1902, but the House which met in March of the following year was equally recusant. Through the intercession of Marquis Ito a compromise was finally concluded whereby in return for a reduction of the land tax the desired naval credits were voted. In the course of the year relations with Russia over Korea arrived at a critical stage. The Diet which met in December, 1903, expressed its disapproval of the government's conduct of the negotiations and was promptly dissolved. The new House met in March, 1904, after the outbreak of hostilities with Russia (February 8). See RUSSO-JAPANESE WAR.

The history of Japan since the Russo-Japanese War is largely concerned with two great problems, internal reorganization and immigration to the United States. The enormous cost of the war produced a financial stringency which had to be tided over, and the heavy

taxes laid on industry aroused general discontent. Machine production has made rapid strides in Japan, which is now almost as highly industrialized as some of the European countries. The historic friendship between Japan and the United States has several times been strained on account of the question of Japanese immigration. Many Japanese laborers have come to the western part of America, mainly to the States of California, Washington, and Oregon. The white population of these States, particularly the labor unions, were bitterly opposed to the Japanese immigrants and demanded their exclusion by law, as in the case of the Chinese. In 1906 the school board of San Francisco ordered the segregation of Japanese children. This action was regarded by the Japanese as an insult to their race, and a note of protest was sent to the United States government. The sensational press of both countries began an agitation which threatened to rouse the war spirit of both peoples. Moreover, the American government was in a quandary, as it had no power to interfere with the regulations of the local authorities. Mayor Schmitz of San Francisco was called to a conference on the subject by President Roosevelt, and the latter was informed of the intense sentiment against the Japanese on the Pacific coast. A partial settlement was effected by the Japanese government giving an oral assurance that it of itself would restrict the emigration of Japanese laborers to the United States; the objectionable school ordinance was then withdrawn by the authorities of San Francisco.

Japan's emergence as a great Power made her a desirable ally. On Aug. 12, 1905, was signed the famous Anglo-Japanese alliance. Its object was (*a*) the preservation of peace in eastern Asia and in India, (*b*) the maintenance of the integrity of China and equal opportunities for trade among all nations, (*c*) the defense of the territorial rights of each in the regions of eastern Asia and of India; both were to act in common in case of an unprovoked attack or aggressive action. This treaty was renewed for 10 years on July 13, 1911, and a new clause was inserted that "should either High Contracting Party conclude a treaty of general arbitration with a third Power, it is agreed that nothing in this Agreement shall entail upon such Contracting Party an obligation to go to war with the Power with whom such treaty is in force." This clause was put in at the behest of the British government, which became alarmed at the possibility of being forced into a war with the United States on account of Japan. An oral assurance was also given by Japan that she would regulate the emigration of her laborers to Canada.

As a result of the Russo-Japanese War, the paramount interest of Japan in Korea was acknowledged. Great indignation was felt among the Koreans, for it foreshadowed their loss of independence. In 1909 Prince Ito, the famous Japanese statesman, was assassinated at Harbin by a Korean patriot who wished to avenge the wrongs inflicted upon his countrymen by the Japanese. In 1910 Korea was formally annexed to Japan and renamed Chosen, but the commercial rights of foreigners resident there were guaranteed for 10 years. An extensive conspiracy by Koreans against the Japanese government was laid bare in 1912, and many arrests were made. Of the 123 prisoners held for trial, 106 were sentenced to terms of imprisonment.

The heavy taxation necessary to maintain the army and navy and to pay for the war against Russia resulted in widespread discontent, particularly among the commercial classes, who continually protested against the ever-increasing drain upon industry. In the election of 1908 the Seiyu-kai (Liberal) party obtained an absolute majority in Parliament. As in Germany, the cabinet is responsible to the Emperor, not to Parliament. This was the first time that one party had a majority over all the others, and it was feared by the Conservatives that the principle of ministerial responsibility would be established. In order to prevent this, the Elder Statesmen interfered and ordered the appointment of Prince Katsura as Prime Minister, although he was a member of a small faction known as the Daido Club. The Katsura cabinet took office, promising fiscal reform in harmony with the desires of the commercial classes.

Japan's rapid transformation into a modern nation both politically and industrially brought into existence those revolutionary elements long familiar in Europe, Socialists and even anarchists. For the first time a conspiracy was formed against the life of the Emperor. A Dr. Kotoku and his wife with 12 others were secretly tried and executed in 1911. Twelve others were imprisoned for life. There was much criticism of the government because of the secrecy of the trial. On July 29, 1912, the Emperor Mutsuhito died and was succeeded by the Crown Prince Yoshihito, aged 33. The death of the much beloved Emperor produced great grief among all classes of the population.

The Japanese people have been trying fitfully to shake off the powerful grip that the Elder Statesmen have on the government. In 1913 there occurred a grave constitutional crisis. The Seiyu-kai party, having a majority in Parliament, introduced a resolution of "no confidence" in the Katsura ministry. Urged on by the Elder Statesmen, the Emperor asked that the resolution be withdrawn, but his request was refused. He then prorogued Parliament. A great popular demonstration was the result. Vast mobs collected in the streets, the police were attacked, and the offices of reactionary journals burned. Prince Katsura then resigned and was succeeded by Admiral Yamamoto, a popular naval officer, who promised economy and reform.

The Yamamoto ministry, although it came in on a wave of popularity, was not destined to live long. His naval estimate of February, 1914, was the highest of any year, and it was reduced considerably by both Houses of Parliament. A great naval scandal came to light, which showed widespread corruption among the naval officials in the purchase of supplies, particularly from the armament firms of Germany. Vice Admiral Koichi Fujii was found guilty of bribery and sentenced to one year's penal servitude. But more than all else, there was great dissatisfaction with the ministry because it had not sufficiently protected the rights of the Japanese in the United States. Count Okuma, an old Liberal statesman, succeeded Admiral Yamamoto as Prime Minister. It is significant that Count Okuma is a member of neither the Satsuma nor the Chosu clan, the aristocratic governing elements in Japan.

The relations between the United States and

Japan again became strained in 1913. In that year the State of California passed the alien land ownership law, which excluded from the right to own land all aliens who were not eligible to American citizenship. It was directly aimed at the Japanese, as they are prohibited from becoming naturalized citizens in America. The government of Japan protested vigorously against this discrimination, declaring that the law violated the Treaty of 1911, which guaranteed equal treatment to the citizens of each country. President Wilson, aided by Secretary of State Bryan, made every effort to prevent the law from being passed, but was unsuccessful. See CALIFORNIA.

During the next few years the affairs of Japan were taken up almost entirely by the Great World War. For a complete discussion of Japan's part in the war and her relations with China, see SUPPLEMENT. The Okuma cabinet was severely attacked after the outbreak of the war. Charges of bribery were brought against the legislative body and it was forced to resign in October, 1916. Count Terauchi organized a new ministry. He was succeeded by Mr. Kei Hara on Sept. 29, 1918. Mr. Hara was the leader of the Seiyukai (see above). Hara's ministry was a stormy one. It was marked from time to time by bitter attacks on the anti-Japanese attitude of several of the American States. These attacks were so bitter during 1920 that many predictions of an American Japanese war were made. The same year was marked by a series of riots in the principal cities caused by the failure of the government to extend the suffrage. Premier Hara was assassinated on Nov. 4, 1921. Baron Takahashi became prime minister on November 13. On November 24, the Japanese Crown Prince, Hirohito, was appointed regent, his father, Emperor Yoshihito, having long been incapacitated by illness.

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For the Ainus, see AINO.

JAPANESE ART. The history of Japanese art, as distinguished from Japanese archæology, begins with the introduction of Buddhism in the sixth century A.D. Along with the new religion came the knowledge of Chinese ideographs (word characters) and the art of the calligraphist that creates them. In Japan, as well as in China, the manual dexterity attained early in life by the use of the brush influences profoundly the manner and method of expression of artists. In both countries painting is often regarded as a mere branch of calligraphy, and both arts are similarly classified according to the nature of the brush strokes. Indispensable to the painter who would acquire a high position in the world of art are complete mastery and consistent use of a definite style of brushwork. In every painting, print, sculpture, or chased bronze, the Japanese connoisseur looks first of all for individuality of expression, the trace of the living hand of the master. While Japanese art inherits from Chinese, just as Renaissance inherits from Roman, it is interesting to note that all inherit from Greek. The Buddhist art that Chinese pilgrims carried back with them from India to the Far East was still in a measure under the influence of the Greek civilization introduced centuries before by the successors of Alexander the Great. In many an ancient Japanese idol may be found a faint echo of Hellenistic art of the third century B.C.

Painting. Japanese paintings are of three different forms—the *kakemono*, the *makimono*, the *gaku*. The kakemono is a tall hanging picture for display on the wall, either singly or in sets of two or three. It is mounted on brocade or paper, at the lower end of which is an ivory-tipped stick around which it is rolled when not on exhibition. The makimono is a specially long roll for the presentation of processions, combats, and serial pictures. The gaku is a picture framed flat but not glazed. Of Japanese kakemonos there exist records and specimens in almost unbroken continuity from the ninth century on. Even of seventh-century paintings there still exist examples, notably the one on the wall of the Kondo in the Horiuji Temple at Nara. With Japanese painters it has always been an axiom to keep materials as much in the background as possible. They work on a surface of ribbed silk or of flat paper, with a brush full of color that does not admit timidity or error. The effect in each picture is confined to narrow limits (usually to a single expression) and is produced with a minimum of manual labor and extreme economy both of line and surface. The principal schools of Japanese painting are:

1. *Chinese* and *Buddhist*, dating from the sixth century—the former relying on feats of calligraphy, in black and white or dull tones, and intended for the highly cultivated classes; the latter gorgeous in gold, polychrome, and mounting, to attract the masses. The Buddhist subjects were almost entirely religious; the Chinese included history, legend, mythical zoology, landscapes, animals, birds, and flowers, all fashioned after Chinese models.

2. *Yamato* and *Toza*, dating from the eleventh century—Chinese in basis, but executed with a lighter touch and with decorative coloring, and having subjects commonly connected with Japanese history and legends and court ceremonials.

3. *Kano*, founded by Kano Monotobu (1476–1559), who was contemporary with Raphael and was skillful equally at figures, landscapes, birds, and flowers. His grandson Eitoku was distinguished for boldness of design and brilliancy of coloring. Among the most original of his successors was Tanyu.

4. *Ukiyoye*, founded by Iwasa Matahei (1577–1650), who deserted mediæval and aristocratic subjects for contemporary scenes and figures, corresponding to our genre paintings. Among his numerous successors were Moronobu (1624–95), Chosun (1682–1752), Harunobu (1718–70), Shunso (1726–92), Kiyonaga (1742–1815), Utamaro (1754–1806), Toyokuni (1769–1825), Hokusai (1760–1849), Hiroshige (1797–1858).

5. *Korin*, named after the great artist—a style that originated with Koyetsu (1552–1637),

aimed at an imaginative treatment of nature unfettered by the formalities of the Kano school, and achieved extraordinary decorative values.

6. *Shijo*, a naturalistic school dating from the eighteenth century, named from the street where stood the studio of the founder, Okyo (1733–95), who revolutionized the laws of painting in Kyoto, working closely from nature and preferring washes and quiet tones to sharp lines and strong body colors. Noted masters of the school are Goshun, Sosen (famous for his monkeys), Hoyen, Ganku, Ippo, Gosai, Kuburo, Zeshin.

Color Prints. Printing from wooden blocks was practiced by the Chinese centuries before it was known in Europe, and Japanese prints are extant dating from the thirteenth century. But Japanese color prints of the kind now familiar to Europeans and Americans were originated in the middle of the seventeenth century by Hishigawa Moronobu and used for the multiplication of Ukiyoye pictures. Moronobu was the son of an embroiderer and began life as a pattern designer. There had been woodcut illustrations to books before, but Moronobu was the first to publish picture books and single prints,

FROM THE KWA-CHO GWA-JO (FLOWERS AND BIRDS ILLUSTRATED).

in which the text was quite subsidiary. On Moronobu's prints the outline alone was stamped, the color being applied afterward with the brush. His pupil Kiyonobu (1663–1729) began to apply the color also from blocks, at first rose and green only. Harunobu increased the number of blocks to complete the design with background and atmosphere. He is one of the most seductive artists of Japan, presenting delightfully and delicately the maidens and matrons of his native land. His color is distinguished for force and variety—tender tones of gray, rose, and soft yellow; but also rich apple green, crimson, and chocolate red. Koriusai continued Harunobu's work so closely that their work is often hardly to be distinguished. Shunso produced an infinite array of actors in character. Kiyonaga pictured wonderfully the out-of-door life of Yeddo, its processions and festivals, the countless ceremonies of the New Year, music parties in house boats on the river, and wonderful night scenes. Utamaro is distinguished for strength in figure drawing and versatility of invention. His famous triptych of "Awabi Fishers" is one of the great classics of color printing, and his sets of prints illustrating the life of the strong boy Kintoki have few equals. Kuniyoshi preferred heroic subjects, the feats of old Chinese warriors, the deeds of the Forty-seven Ronins, the civil wars of the Middle Ages. The most various and most puissant spirit of all was Shunso's pupil, Hokusai, who produced a wealth of masterpieces in landscape, and a few great figure subjects in which were concentrated wide knowledge of humanity, mastery of the human form, and extraordinary resource in composition. Under the name of Shunro, Hokusai produced graceful prints in his master's style. Then, quarreling with his master and being expelled from the studio, he lived for a time from hand to mouth, designing New Year's cards or even peddling small objects through the streets. He was marvelously industrious but equally improvident. During the 90 years of his life he changed his residence 93 times, finding it easier to move, it is said, than to clean house. At the age of 75 he signed himself "The Old Man with a Mania for Drawing," but his thoughts were all of the future. "When I am 80," he wrote, "I shall know more; at 90 I shall have got to the heart of things; at 100 I shall be a marvel; at 110 every line, every blot, of my brush will be alive." On his deathbed he sighed, "Five more years and I should indeed have become a painter." The prints made from his paintings, published in 15 volumes, display a vast range of observation. Mountains, rivers, trees, birds, fishes, animals, insects, breaking waves, flowers, rocks, ships, buildings, utensils, men and women at all kinds of occupations, comic and fantastic figures; even gods, saints, heroes, warriors, dragons, and fabulous beasts, all take life under his restless brush. The sets of prints on which his fame chiefly rests are the "Thirty-six Views of Fuji," the "Bridges," the "Waterfalls," the "Hundred Poems Explained by the Nurse," the "Ten Poets of China and Japan." The landscape work of Hokusai, forming almost an illustrated guidebook to the famous views and favorite resorts of Japan, was continued by Hiroshige, who is less elemental but more full of charm, and whose influence on European painting has been wider than that of any other Japanese painter. Hiroshige gives us exquisite impressions of twilight, mist, moonrise, snow, and fireworks. It is a Hiroshige motive that Whistler presents in "Battersea Bridge."

Sculpture. Beginning with the sixth century,

1. TERRA COTTA STATUE, polychromatic, at Todeiji, near Nara. VIII Century
2. WOODEN STATUE, polychromatic, half life size. XII Century
3. THE HONDO (Chief Temple) of Horiuji, Yamato. VII Century

Japanese sculptors expressed themselves in wood and metal, but seldom used stone. Noteworthy are the wooden statues dating from the eighth century, preserved at Nara, portraying the Indian Buddhists, Asangha and Vasabandhu, in dignified pose and with stately lines; and the eleventh-century colossal temple guardians of the great gate of Todaiji. The most perfect of the ancient bronzes is the great image of Bhaicha-djyaguru in the temple of Yakushiji at Nara, attributed to a Korean monk of the seventh century. From an early period the ornamentation of arms and armor was elaborate, reaching its height in the twelfth century in the armor of the Japanese Bayard, Yoshitsune, that is still preserved at Nara. In the latter half of the fifteenth century began the elaborate decoration of swords with engraved metal guards (tsubas) often inlaid with gold and silver. During the seventeenth century the use of tobacco became common, and a kind of button or toggle (*netsuke*) was employed to fasten the pouch to the girdle. The love and expense that the gentry bestowed upon sword hilt and guard were devoted by commoners to pipe and netsuke. The name *okimono* is applied to carved animals and decorative objects in metal, wood, and ivory, not having any special use or value.

The Japanese name for bronze, *kara-kane* (Chinese metal), shows whence came knowledge of the alloy. From an early period the Japanese bronze casters have understood how to model in wax and how to employ a hollow removable core, although making colossal statues like that of Lochana Buddha at Nara, 138 feet high and weighing 550 tons, in sections in situ. In the production of rare and exquisitely beautiful patinas the Japanese are unexcelled.

PAGE FROM THE GWA-FU (COLLECTION OF STUDIES) BY HOKUSAI.

Textiles. Japanese textiles are by no means equal to those of the Chinese. No pile rugs or tapestries of great merit have come down from antiquity. Some of the modern brocades and velvets and embroideries are masterpieces of ingenuity and patience, but by no means to be classed decoratively with the great Chinese and European classic examples. The modern Japanese imitations of Gobelin tapestries made at Kyoto, though praised without reservation by some critics, are unworthy to be named in the same breath with the great products of French-Flemish looms. For Japanese lacquer and ceramics, see LACQUER WORK; POTTERY; PORCELAIN.

Architecture. As compared with that of China, the architecture of Japan is less massive, the great overhanging curved roof forming the chief motive of the design, which, even more than the rounded and swelling cupola in a domed church of Europe, gives character to the whole. The common use of timber even for buildings meant to be, and sufficiently proved to be, very lasting has deprived Japanese architecture of the monumental possibilities of wall, colonnade, and arch. The building of the country is therefore timber construction very like in principle to that of mediæval Europe, but more dignified than that, because there was in the Eastern land no overmastering style of masonry architecture, like that of the vaulted buildings of Gothic or of neoclassic type, to restrain its development. Whatever was to be done, architecturally speaking, in Japan was perforce done with the trees of the mountain forests; whereas in Europe wood was in general employed only for the less important and less monumental structures. The result of this is that the architecture of Japan seems to a European rather uniform in character, but a profounder examination shows divergences as great in the different forms and characteristics of Japanese buildings as we find in the buildings of any European land. The difference from century to century is less, however; and this because of the admitted slowness of all change among Asiatics, and also because of the deliberate action of so many rulers of Japan in keeping new foreign influences away from the land. In detail there are one or two exceptional

characteristics which result from the custom of building in wood and framework. This framework has its own necessary characteristics; and these are heightened and emphasized by the use the Japanese have made of them. Next to the broad eaves and the exquisitely subtle concave curves of the roofs, one notices the effective use of multiple bracketing of great ingenuity. Very effective also is the decorative treatment of metal holders for the points of support and the points where one timber is secured to another. Just as the floor beams in European buildings are often hung in "stirrups" of wrought iron, so in Japan a metal mount especially affected to the purpose will mark the insertion of one timber into another, the crossing of two timbers of equal size, and also the base and top of a pillar, whether of wood or, as sometimes happens, of stone. The interior of the often represented Phœnix Hall of the Shoguns of the Fujiwara race reigning in the eleventh century of the Christian era has retained almost unchanged the beautiful interior effect produced by this system of construction in wood and metal. These metal mounts are often exquisitely ornamented and gilded in different hues of gold. The wooden members which they strengthen and adorn are lacquered in rich and deep colors, superbly finished. All the framing is executed with extraordinary precision and elegance both of design and fitting.

The chief monuments of Japanese architecture are temple groups, consisting in many cases of a pagoda, temples, halls, and gates; but in others the pagoda is wanting. These groups are built on terraces approached by stairways and planted or surrounded with flowers, trees, and shrubbery. Probably the oldest is the group of Horiuji, near Nara (593 A.D.); that of Yakushiji (680) is even more celebrated. At Kyoto, another important monastic temple centre, are examples of a later and more magnificent style, lacking the charm of the early simplicity. The great monastery of Obaku-san is the finest example of the Zen temple architecture of the Kamakura period, during which loftiness came to be sought after in the interior design; while the Iyeyasu shrine and the temple groups at Nikko display the final flamboyant gorgeousness of the style in its early decline, which began under the Tokugawa dynasty, after 1603. The modern architecture of Japan in part retains the old traditions, but these tend to decay before the persuasive and destructive influence of Western models.

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JAPANESE BEAR. See BEAR.

JAPANESE DEER. The name in England, where this deer has been introduced into parks, of the sika (*Cervus sika*). See SIKA.

JAPANESE LANGUAGE. The most important member of a very small family of languages. Its nearest relatives are Luchuan and the languages spoken in the little islands which lie between Japan and Loo-choo. On the Asiatic continent Korean resembles it in grammatical structure and more remotely in etymology. It is not related to Ainu or to Chinese. Efforts to find other members of the family and to establish more distant relationships have been made in various directions, but with little success. It is called, somewhat vaguely, Altaic; but the identifications are not very convincing, and the results thus far cannot be regarded as scientifically established.

Characteristics. Words and inflections are often formed by loosely joining words and parts of words to other words, and so the language is described as agglutinative. Native grammarians divide its words into two classes, uninflected and inflected. The former includes nouns, pronouns, numerals, postpositions, and some adjectives which are really nouns. The inflected words are most of the adjectives and verbs. Nouns do not distinguish gender, number, or case. The apparent exceptions really conform to the rule, for when the distinction of sex is imperative it is formed by using a special word, and when number must be indicated there is reduplication or the use of words signifying number. There are no personal pronouns; but when, in exceptional cases, a pronoun is required, certain nouns are used which retain in common conversation their ordinary meanings. Relative pronouns are wholly wanting, the relative word or clause being placed before the word qualified, as we may say "the murdered man" for "the man who was murdered." There is no article, and our prepositions are represented by postpositions, the latter having certain uses which have no equivalent in European prepositions. The verb also, in some of its aspects, differs widely from the verb in

languages more familiar to ourselves. It is conjugated in three tenses, past, present, and future, but in a wide range of moods—probable, conditional, concessive, frequentative, imperative. It has, however, neither number nor person, and, one might also add, it has only the present tense; for its past tense denotes primarily certainty and is used, therefore, sometimes of the present and even of the future. The future denotes uncertainty and is used therefore sometimes of the present and even of the past. The past tense is used in its ordinary sense of past time when the emphasis is upon the tense, but often a second verb is introduced in the present showing that it is the dominant point of view, as if one should say "Is it that you have been in Russia?" The moods differ from our own. There is no infinitive, and there are forms not found in our ordinary conjugations—concessive, desiderative, hypothetical, and the like, with negative forms corresponding throughout. The terminations are other verbs, fragments of verbs, or postpositions. Most adjectives are conjugated like verbs, and the adverbs are adjectives with a certain termination. Adjectives are in the positive degree only, though sometimes comparison is indicated by a word corresponding to "than," and the superlative by various words signifying "most." The lack of distinctions of persons is made good in part by the use of honorific prefixes, suffixes, and words which themselves convey differences in the degree of estimation in which persons and things are held. Conjunctions are in part postpositions, and in part they are supplied through inflections of the verb. Two sets of numerals are employed, the Chinese and the native Japanese, but the latter extend only to 10. Auxiliary numbers are common. Similar numerals are used sparingly in English, as sheets of paper, blades of grass, head of cattle, and the like; but the Japanese use such expressions lavishly, certain ones applying to whole classes of objects, so many long, round ones, so many flat ones, and as the usage is fixed a mistake in a numeral produces, as indeed in English, a ludicrous effect. In pronunciation the vowel sounds closely resemble the Italian, and the consonants can be represented by the English letters, *l*, *q*, *v*, and *x* being wanting. In diphthongs each vowel retains its separate value. In many instances "clear" consonants, i.e., surds, are changed to "muddled," i.e., sonants. Syllables are open, and accent is so slight that it may be disregarded. The chief rule of syntax is that the qualifying word or clause precedes the word or clause qualified. The verb is last in the sentence, and as a sentence is supposed to contain a complete statement, however complicated, the mind is often held long in suspense. Most affirmations are without true subjects, active verbs being employed often without a subject, the tendency being to remark "with reference to" somebody or something. It follows that the distinction between active and passive voices and verbs is not precisely the same as in other languages.

The Spoken and Written Forms. The language differs in grammatical forms and in vocabulary in its spoken and written forms, making a twofold series of grammars and dictionaries necessary. In the written language there are also marked distinctions—the archaic, classical, Sinico-Japanese, epistolary, etc. The oldest specimens we have go back to the eighth century A.D., but they are unintelligible to all but special students. At a still earlier period the Chinese language had already influenced the Japanese, and many Chinese words are embedded in the Japanese, disguised and naturalized. But from the ninth century onward Chinese has been the language of the learned, taking the place of Latin in Europe. The talk of educated men is unintelligible to the common people, so full is it of Chinese words and phrases. In our day the use of Chinese has increased, since its monosyllables offer unequaled facilities for the coinage of scientific terms, and the whole terminology of modern science has been translated into Chinese compounds by the Japanese. The result is mystifying to a Chinaman, because of the unfamiliar use and collocation of the ideographs, as well as from the retention of the order of the Japanese sentence and its grammatical structure in the ordinary written styles. The pronunciation, too, of Chinese in Japan is traditional, derived from teachers who spoke dialects which have ceased to exist in China. Unfortunately there are two traditions and both in use, complicating a situation which has inherent difficulties enough.

As the Japanese had no writing previous to the introduction of Chinese, the Chinese ideographs are used phonetically, as well as for the expression of ideas. Thus, in Japan names are written with the ideographs without regard to the meaning implied, and originally pure Japanese literature was thus written, certain ideographs being associated with definite sounds. But the result was cumbersome in the extreme, the long, polysyllabic Japanese words not lending themselves to this treatment. In course of time the ideographs were abbreviated and finally took on the form of the *kana*, the syllabary. It is in two forms—the *katakana* and the *hiragana*, the former used chiefly for names. The katakana are fashioned out of the square or book form of Chinese characters, the hiragana from the cursive. The kana, for mnemonic purposes, is arranged in two orders—one composing a verse of Buddhist poetry written by Kōbō Daishi (q.v.) which sets forth the vanity and brevity of life, and the other the table of "50 sounds," though there are really but 47. For convenience in transliterating Chinese, however, a letter representing *n* has been added. All purely Japanese words and syllables end with a vowel sound. The kana is thus used as an alphabet, representing syllables instead of consonants and vowels. By the change of surds to sonants in certain instances, and by the distinction of long and short vowels, the number of syllables is considerably increased.

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JAPANESE LITERATURE. The literature of Japan falls into three groups corresponding to three periods in the nation's history.

The first represents primitive Japan still feeling foreign influence but slightly. The literature is in archaic Japanese, though already Chinese words and marks of Chinese civilization may be detected. The traditions, hymns, and prayers of Shinto (the way of the gods) came from immemorial antiquity by oral tradition and were reduced to written form in the beginning of the eighth century A.D. The *Ko-ji-ki* (Record of Ancient Matters) is the most important member of this group and perhaps the most important work produced in Japan. It has been called the Bible of the Japanese, although it contains neither doctrine nor ethics. It is a mass of loosely connected and fragmentary legends and annals, setting forth the history of the world, i.e., Japan, from the Divine Age, the beginning. Its first trustworthy date is in the middle of the fifth century A.D., but its materials become scanty in proportion to their historic trustworthiness. The book, however, contains most valuable matter for the critical scholar, being his most important source for the reconstruction of ancient Japan. Even in the eighth century Japan was feeling the mighty influence of the Chinese civilization, and thenceforth scholars studied its language and literature, while they left pure Japanese to romance and poetry and trifles, the amusement of women, and of men in their lighter moods. Archaic Japanese, already unintelligible, gave way to classical forms, and women furnished the models of literary style. This literature reached its culmination in the capital, Kyoto, in the ninth and tenth centuries. It reflects the elegant, trifling, and immoral life of the court in romances which show the customs and manners of the period accurately and tediously. The novels are strings of incidents without unity or attention to the relation of character to event, with supernatural marvels interspersed, and palace intrigue as the chief interest. The poetry is more attractive from its curious unlikeness to other verse. It has neither rhyme nor quantity nor parallelism, but consists simply of alternate lines of five and seven syllables, the usual "poem" containing 31 syllables in all, two pairs of five and seven, with a final seven added. A few poems are longer, and a later form restricts the syllables still more severely to 17. But even within these narrow limits room is found for "pillow words," mere ornaments without significance used as "rests" for other words. The subjects are as few as the syllables —birds, flowers, mountains, the moon, the rain, and snow, the autumn leaves, the wind, and other themes associated with them. Often the verse merely hints a picture which the reader's imagination must complete. There are travels, too, and diaries, and miscellanies filled with reflections and fancies. After the tenth century few additions of value were made to this literature. It continued to be cultivated, but it revolved around the same trite subjects, imitated the same models, and was capable of no further development. In the seventeenth and eighteenth centuries a group of scholars attempted to revive the ancient faith, Shinto, in its pure form. As a part of their endeavor, they wrote in pure Japanese, attempting to exclude all Chinese elements; but the literary fashion never extended very far, nor did it produce important results. In modern times a vast formless literature has been created for the masses, for the greater part novels, in the colloquial or in a simple written style paying little attention to the canons of classical Japanese literature. Naturally it is ignored by educated men.

Doubtless even the first collections of traditions and rituals were made because Chinese influence was already powerful, and they were put in written form only by the aid of Chinese ideographs. Buddhism won Japan in the sixth and seventh centuries A.D. and brought with it Chinese civilization. Henceforth Chinese literature in form and matter was supreme. The *Ko-ji-ki* was given its written form in archaic Japanese in the year 712 A.D., and it was followed in the year 720 by the *Nihongi*, which covered much the same ground, but was written in Chinese. As Rome in language, ideals, philosophy, law, and literature ruled Europe in the Middle Ages, so did China influence Japan. The Chinese classics were the models of style, as they were the unquestioned authority in religion and morals. Buddhism brought its voluminous works, historical, doctrinal, sectarian, polemic, exegetical, philosophical, with it, and the Japanese set themselves to master and appropriate these riches. Nothing new of importance was produced, if we except possibly the canonical writings of the Shin sect, which is accounted heretical by all the rest and as a matter of fact denies what Buddha affirmed and for the most part affirms what he denied. From the twelfth century until nearly the end of the sixteenth century Japan was tormented by feudal strife. Letters were cultivated by monks, and even in the seventeenth century it required an argument to persuade the higher classes that letters were for others besides priests. With the final restoration of peace under the Tokugawa family (1603–1868) there was a revival of learning. China again gave the impulse, but it was no longer the Buddhistic China of the sixth century, for the literati had by this time rejected the Indian faith and had set forth Confucianism as a fully developed philosophy and cosmogony. Introduced into Japan in the beginning of the seventeenth century, this was thenceforth the religion of the higher classes, and Buddhism was left to priests, women, and the ignorant masses. But, as before, Japan added little to the controlling ideas of the new learning. It imported the varying schools of Chinese thought, fought over anew the same battles with the same arguments and illustrations, but there was no native development. Chinese language, history, literature, and poetry furnished models which satisfied all literary needs. Yet it was not mere copying, nor was the change wholly superficial, for the two empires are animated by different spirits, and these are shown in their respective literatures, so that Sinico-Japanese is entitled to a place by itself and is something more than a mere branch of the greater literature of its more original neighbor.

Again in the present age Japanese literature has undergone a transformation. The style itself has changed, though still held in the bondage of the Sinico-Japanese; but newspapers and reviews with the popularization of knowledge no longer permit the maintenance of the rigid standards of the past. Besides, the acquaintance with the whole range of Chinese literature which the older forms presupposed no longer exists except for specialists. As in the seventeenth century the orthodox Confucian philosophy supplanted the earlier Buddhist teaching, so now have Chinese literature and history given way before the history, philosophy, ethics, theology,

romance, poetry, and, above all, science of the Occident. Judging from the past, we may expect vigorous assimilation of Western literature, and its transformation into forms congenial to this people, who, hospitable to ideas from foreign lands, know how to impress themselves upon the importations and amid all changes to preserve the spirit of Old Japan. See ANTHOLOGY.

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JAPANESE MUSIC. The music of Japan is almost identical in form with that of China. From the fifth century, when Korean musicians introduced the stronger, more elaborate type, Chinese music has dominated, except in the temples where the priests still preserve the older forms. The only instruments indigenous to the island are the "Yamato" koto, a stringed instrument of 13 strings with a compass of two and a half octaves (pentatonic), and the "Yamato" flute. The few others employed are merely softened modifications of Chinese instruments. From time immemorial the national music has been handed down by certain chosen families, and it is this spirit of conservatism as much as the poverty of their musical instruments which has prevented any original development in Japanese music. In addition they are hampered by a lack of systematized notation, a scale derived from the Chinese, and the unvaried use of common time. The most noticeable characteristics are an extensive use of chromatics, the monotony of their melodies, and the prevalence of the minor key. It is of interest to note that the national hymn was composed by an emperor and written by an empress in the seventh century. Consult: P. T. Piggott, *The Music and Musical Instruments of Japan* (London, 1893); C. Leroux, *La musique classique japonaise* (Paris, 1910); A. Westarp, *Japan Ahead in Music* (London, 1912). A collection of music for koto, both in Japanese and European notation, was published by S. Isawa, at Tokyo in 1888. See also CHINESE MUSIC; KOTO.

JAPANESE PERSIMMON. See PERSIMMON.

JAPANESE POLITICAL PARTIES. See POLITICAL PARTIES, *Japan*.

JAPANESE ROBIN. A dealer's name for one of the East Indian hill tits (q.v.), frequently kept as a cage bird.

JAPANESE SPANIEL. See SPANIEL.

JAPAN'NING. The art of giving a coating of varnish and other materials to certain manufactures, by which a glossy surface is produced. The varnished articles are usually submitted to a high temperature in an oven in order to harden the coating.

JAPAN SEA, BATTLE OF THE. See RUSSO-JAPANESE WAR.

JAPAN VARNISH TREE. A Japanese tree which furnishes a varnish. See SUMACH.

JA'PHETH. According to Gen. x. 2–5, the youngest son of Noah, the brother of Shem and Ham, the father of Gomer, Magog, Madai, Javan, and Tiras. These are clearly the eponymous ancestors of ancient peoples; and three of them —Gomer, Madai, and Javan—unquestionably represent the Cimmerians, the Medes, and the Greeks. Magog (q.v.), or perhaps originally Gog, seems to have been the name of some Scythian people in the wider sense of the term, and Tiras probably refers to the Tyrrhenians, or Etruscans. Gomer's sons are said to be Ashkenaz, Riphat, and Togarmah. Ashkenaz (see ASHKENAZIM) is the Hebrew form of the Assyrian Ashkuza, the Scolotian Scythians; Riphat is supposed to be the Phrygians, but that is doubtful, as is also the identification of Togarmah as Armenians, or Tilgarumu. The sons of Javan are Elisha, Kittim, Tarshish, and Rodanim. Elisha may be Alashia and represent the Greeks on Cyprus; Kittim may be the Macedonians; Tarshish the Tartessians in Spain or the Dorians around the Etrurian Sea, and Rodanim, which is the probable reading, the Rhodians. The grouping of these peoples together as descendants of Japheth is evidently later than the oracles of Noah in Gen. ix. 25–27, in which the three brothers are Shem, Japheth, and Canaan, who appears as the youngest. Shem here seems to represent a congeries of Hebrew tribes, such as Israel, Judah, and probably Moab, Ammon, Edom, Jerahmeel, Kenaz, Cain, and others. Canaan clearly included a group of kindred Syrian peoples; and Japheth is likely to be the name of the Philistines, the Cherethites, the Pelethites, the Zakkalians, and others. These Japhethites probably came for the most part, as is certainly the case with the Philistines and the Cherethites, from Crete.

Canaan is cursed—let him become a slave of his brothers; Shem is blessed; Japheth also receives a blessing—let the Canaanites be enslaved by Japheth as well as by Shem. The present text reads: "let Japheth dwell in the tents of Shem." That could scarcely mean anything else than a wish that the Japhethites might drive the Shemites out of their dwelling places and occupy them. Such a wish is inconceivable; and it is therefore probable that the original text read: "let Japheth dwell in the tents of Canaan." Such an oracle must be earlier than the invasions by the Philistines of the territory occupied by Israel and Judah. Since the Philistines are first mentioned as falling upon Egypt c.1200 B.C., and they appear to have settled upon the coast of Syria after their defeat by Rameses III (1200–1169), the song is likely to have originated in the twelfth century B.C.

Later some of these terms took on a wider significance. Canaan did not lend itself to expansion; it was naturally limited to Syria. Ham took the place of Canaan as the son of Noah. Shem came to include a number of peoples rightly or wrongly supposed to be akin. Japheth was made the ancestor not only of the nations who had invaded Syria from Crete, but of their assumed kindred. The real kinship of Cimmerians, Scythians, Medes, and Greeks cannot be questioned. As for the Etruscans, if they are indicated by Tiras, their genetic relations have not yet been definitely determined. Japheth is no doubt identical with Iapetos, the father of Prometheus; and there is probably also a connection between Kaphti (Cretan) and Japhti (Japhethite) as well as between Japheth and Joppa. Consult Görres, *Die Japhetiden* (Regensburg, 1845); Knobel, *Die Völkertafel der Genesis* (Giessen, 1850); Eduard Meyer, *Die Israeliten und ihre Nachbarstämme* (Halle,

1906); Nathaniel Schmidt, "The Blessing of Japheth," in *Journal of Biblical Literature*, vol. xxxv (Boston, 1915); and the commentaries on Genesis by Dillmann, Gunkel, Driver, and Skinner.

JA'PHET IN SEARCH OF A FATHER. A novel by Captain Marryat (1836).

JAPIKS, jä'piks, GIJSBERT (1603–66). A Frisian poet, born at Bolsward. His father was a burgomaster, and the son after an excellent education became schoolmaster at Bolsward (1634). In his hands the West Frisian dialect again became a literary tongue. From the French he translated in prose several poems, and he also published versions of the Psalms. His own writing was marked by originality, feeling, and lyric beauty. The *Friesche Rymlerye* was first published in 1668; the edition of Epkema (Leeuwarden, 1821) is supplemented by a grammar and vocabulary (ib., 1825). Consult Halbertsma, *Hulde aan Gijsbert Japiks* (Bolsward, 1824–27).

JAPURÁ, zhä'pōō-rä'. A river in Colombia and Brazil. See YAPURÁ.

JAQUES, jāks *or* jäks, on the stage often pronounced jā'kwēz, *Fr. pron.* zhāk. 1. A contemplative character in Shakespeare's *As You Like It* ("the melancholy Jaques"). 2. A son of Sir Rowland de Bois in *As You Like It.* 3. A miser in Ben Jonson's *The Case is Altered.*

JARARACA, zhä'rä-rä'kä (Portug., from the native name). A venomous crotaline serpent (*Lachesis jararaca*), widely distributed over tropical South America and closely related to, if not identical with, the bushmaster (q.v.) or labaria, which it resembles in colors and manner of life.

JARCKE, yär'ke, KARL ERNST (1801–52). A German jurist and conservative publicist. He was born at Danzig and studied at Bonn and Göttingen. In 1824 in Cologne he became a member of the Roman Catholic church after having been professor at Bonn. At Berlin in 1825 he became connected with the university as lecturer and founded the *Politisches Wochenblatt* (in 1831). In 1832 he went to Vienna as Court and State Councilor and as instructor of the Princes of Nassau. Among Jarcke's works are: *Handbuch des gemeinen deutschen Strafrechts* (1827–30); *Die französische Revolution von 1830* (1831, anonymously); *K. L. Sand und sein an Kotzebue verübter Mord* (1831); *Die ständische Verfassung und die deutschen Konstitutionen* (1834); *Vermischte Schriften* (1839–54). With Phillips and Görres he founded in 1839 *Historisch-politische Blätter.*

JARDIN D'ACCLIMATATION, zhär'dăN' dà'klē'mà'tà'syôN' (Fr., garden of acclimatization). A garden of 50 acres forming part of the Bois de Boulogne in Paris, designed to acclimatize foreign plants and animals suitable for domestic or ornamental purposes. It contains, besides buildings for the various animals, a permanent exhibition of articles connected with gardening, a dairy, an aquarium, greenhouses, an aviary, a winter garden, establishments for fattening poultry and rearing carrier pigeons, and several cafés. The garden, which was greatly damaged in 1871 during the siege of Paris, is a favorite resort.

JARDIN DES PLANTES, dà plänt (Fr., garden of plants). A botanical and zoölogical garden in Paris, founded at the beginning of the seventeenth century. It was at first called Jardin du Roi.

JARDINE, jär'dĭn, SIR WILLIAM (1800–74). A Scottish naturalist, born in Edinburgh and educated at its university. He succeeded his father in the baronetcy at the age of 20. Ornithology was the first of the natural sciences to claim his attention, but he went on to the study of fishes, monkeys, felidæ, pachyderms, and ruminants, writing himself 14 volumes on these subjects and on birds in a series of books which he edited called *The Naturalist's Library* (40 vols., 1833–45). Sir William made a collection representing 6000 species of birds, was a commissioner on the salmon fisheries, member of the British Association, and author of a *Calendar of Ornithology* (1849); *The Ichnology of Annandale* (1853); *British Salmonidæ* (1861); *The Birds of Great Britain and Ireland* (4 vols., 1876).

JARDIN MABILLE, zhär'dăN' mà'bēl'. A former very popular resort in Paris, founded in 1840 by a dancer, Mabille. It was a favorite gathering place of the demimonde, and with its brilliant illuminations, fountains, flower beds, and other attractions, became one of the celebrated sights of Paris. The Mabille introduced many novelties in dances, among them the cancan, brought in by Chicard. The place was closed in 1875, and its clientage was absorbed by other similar resorts.

JARGON, jär'gŏn, or **JARGOON,** jär-gōōn'. See ZIRCON.

JAR'LEY, MRS. A character in Dickens's *Old Curiosity Shop,* proprietor of a waxworks show, who befriends Little Nell.

JARNAC, zhär'nàk'. A town in the Department of Charente, France, known as the scene of a battle fought on March 13, 1569, between 26,000 Catholics under the Duke of Anjou, afterward Henry III, and 15,000 Huguenots under Louis, Prince of Condé. The latter were completely routed, and their leader was killed. See HUGUENOTS.

JARNDYCE, järn'dīs, JOHN. A kind-hearted character in Dickens's *Bleak House,* a principal in the famous Chancery suit of Jarndyce *v.* Jarndyce.

JÄRNEFELT, yĕr'ne-fĕlt, ARMAS (1869–). A Finnish composer, born at Wiborg. At the Conservatory of Helsingfors he studied piano with Busoni and composition with Wegelius. Later he continued his studies with Massenet in Paris and Becker in Berlin. He began his career as conductor in Magdeburg, then went to Düsseldorf, and from there as principal conductor to the Royal Opera of Stockholm. In 1906 he succeeded Wegelius as director of the Conservatory in Helsingfors. Next to Sibelius (q.v.), he is the most notable among early twentieth-century Finnish composers. His works include a symphonic poem *Korsholm,* two concert overtures, a serenade, a phantasy, and suites for orchestra; choral works with orchestra; male choruses; piano pieces and songs.

JARO, hä'rō. A town of Leyte, Philippines, situated in the north part of the island, 15 miles west-southwest of Tacloban (Map: Philippine Islands, E 5). Pop., 1903, 11,066.

JAROCHOWSKI, yä'rō-kôv'skē, KAZIMIR (1829–88). A Polish historian, born at Sokolniki and educated at Posen and Berlin. He took part in the Polish uprising of 1848, but in 1862 entered the Prussian magistracy and resigned in 1882. He died soon after his election to the Prussian Diet. His historical studies deal especially with Poland under the Saxon kings.

Among them the more important are: *Teka Podoskiego* (1854–61); *Wielkopolska w czasie pierwszej wojny szwedzkiej* (1864), dealing with the first Swedish war; *Dzieje panowania Augusta II* (1856–74); *Opowiadania i studia* (1860–84); *Literatura posnańska* (1880).

JAROSLAU, yä'rô-slou'. A town of Galicia, Austria, and an important garrison, on the San (an affluent of the Vistula), 130 miles east of Cracow by rail (Map: Austria, H 1). It has evangelical, Roman Catholic, and Greek churches, and is an industrial centre, with manufactures of textiles, pottery, bricks, tutty, pastry, smoked meats, and spirituous liquors. There is also a considerable trade in agricultural produce, hides, and lumber. Pop., 1900, 22,660; 1910, 23,965, mostly Poles. In the European War, which broke out in 1914, Jaroslau was captured by the Russians, but was later retaken by the Austro-German army. In the second Russian invasion of Galicia it was reoccupied after severe fighting, and the way to Przemysl (captured in March, 1915) and Cracow opened up. See WAR IN EUROPE.

JAROSLAV, yä-rôs'läf. A Russian government and its capital. See YAROSLAV.

JARRAH WOOD. See EUCALYPTUS.

JARRIC, zhä'rêk', LOUIS ETIENNE, CHEVALIER DE (1757–91). A West Indian revolutionist, born at Aux Cayes, Haiti. He had no legitimate claim to the name he bore; but his father had him well educated, and he was in France at the time of the Revolution, serving as a captain. A mulatto himself, he started a society in Paris called Friends of the Blacks, but it did not flourish; so he sailed for Haiti in 1790 with a supply of arms. These he distributed among the disaffected negroes, and he headed a band of 700, which, through a victory over the regulars, was increased to 2500; but they were defeated near the river St. Vincent, and Jarric was tortured to death.

JAR'ROW-ON-TYNE. A municipal borough and seaport in Durham, England, on the estuary of the Tyne, 6 miles east of Newcastle (Map: England, E 2). Formerly a small colliery village, it was made a municipality in 1875. Its growth was due to the establishment of large iron shipbuilding and marine-engine works, blast furnaces, iron foundries, gun, paper, and chemical factories. It makes extensive shipments of coal. On the banks of Jarrow Lake are the Tyne docks, with quays, etc., covering about 300 acres. The town maintains quays, an infectious-diseases hospital, and recreation grounds. The Venerable Bede was born in Jarrow and lived and wrote and died in the Benedictine monastery built there in 682, of which there are remains. Pop., 1901, 34,295; 1911, 33,726.

JARVES, jär'vĕs, JAMES JACKSON (1820–88). An American author and art collector, born in Boston. In 1851 he went to Europe and settled in Florence, where from 1879 until 1882 he was Vice Consul and acting Consul. He made an important collection of Venetian glass and gave it to the Metropolitan Museum in 1881. But his great collection was of early Italian paintings, and he was the only American of his day (except Thomas J. Bryan, who gave his collection to the New York Historical Society in 1867) who collected primitives. Jarves hoped that his collection might become the nucleus of an American museum for the study of Italian art, but his attempts to interest the American public were unsuccessful. He was finally compelled in 1867 to deposit a large part of his collection with the trustees of Yale College as security for a loan, and, being unable to repay it in the agreed period, the pictures became the property of the college. They form the largest and most important collection of *trecento* pictures in the United States. The balance of Jarves's collection was purchased by L. E. Holden, whose widow in 1912 lent 27 of the pictures to the Metropolitan Museum. Jarves wrote a number of books on art, among them: *Art Hints, Architecture, Sculpture, and Painting* (New York, 1855); *The Art Idea, Sculpture, Painting, and Architecture in America* (Boston, 1864); *Art Thoughts: The Experience and Observations of an American Amateur in Europe* (ib., 1869) —all of which were often reprinted and had an important influence in the right direction, though of course now entirely superseded. His most important work was *Art Studies, the "Old Masters" of Italy, Painting* (New York, 1861), dedicated to his friend Charles Eliot Norton (q.v.), with 43 copperplate illustrations from the pictures of his own collection. The same year Jarves published a *Descriptive Catalogue* of his collection, with explanatory documents. A catalogue of the paintings at New Haven, by Russell Sturgis, Jr., was published in 1868. It was critically treated by Sirén, *Burlington Magazine*, xiv–xv (1908–09), as was the Holden collection by Mrs. Berenson, *Rassegna d' Arte* (January, 1907). The *Bulletin of the Metropolitan Museum* (1911–12) discusses the Holden collection and the Jarves collection of glass.

JAR'VIS, ABRAHAM (1739–1813). A Protestant Episcopal bishop of Connecticut. He was born at Norwalk, graduated at Yale in 1761, and was ordained in England three years afterward. He became rector of Christ Church, Middletown, in 1765, and was regarded as a Tory sympathizer because of his opposition to the independence of the American church during the Revolution. In 1797 he was chosen second Bishop of Connecticut.

JARVIS, EDWARD (1803–84). An American physician, born at Concord, Mass. He graduated at Harvard in 1826 and at the Harvard Medical School in 1830 and subsequently practiced as a physician successively in Concord, Mass., Louisville, Ky., and Dorchester, Mass. He interested himself in the collection of vital statistics and published reports and monographs on this subject, among which are: *Physiology and Health; Elementary Physiology; Reports on the Number and Condition of the Insane and Idiots in Massachusetts.* He was for many years after 1852 president of the American Statistical Association.

JARVIS, JOHN WESLEY (1780–1834). An American portrait painter, born in South Shields, England. He was a nephew and namesake of the famous divine, who kept him till he was five years old and then sent him to join his seafaring father in Philadelphia. As a boy, he made the acquaintance of Stuart and of the aged Matthew Pratt, who greatly encouraged his aspirations to become a painter. Leaving school, he was apprenticed to an engraver named Savage and learned to draw and engrave from an Englishman in Savage's employ, Edwin by name, with whom Jarvis moved to New York. After engraving for a while on his own account, he began to paint portraits, practicing chiefly in New York. He also visited other cities, particularly Baltimore, Charleston, and New Or-

leans, where he painted full-length portraits of Andrew Jackson and other military and naval heroes, earning $6000 in six months. His principal portraits—of statesmen, churchmen, and naval heroes (1812–15)—are in the City Hall, New York, and in the collection of the New York Historical Society. There are two of his portraits in the Metropolitan Museum, New York. Jarvis was a conspicuous example of the artistic temperament—convivial, improvident, witty, eccentric, vain, observant, a noted story-teller, and practical joker. His work suffered from his manner of life, not so much in lack of finish as in lack of inspiration, and this despite his brilliant talents and the fact that he worked hard to acquire technique, studied anatomy seriously, and became an enthusiast in phrenology, then a novelty. He usually got the character of sitters, but his best work is decidedly inferior to that of Sully.

JARVIS, Samuel Farmer (1786–1851). An American Protestant Episcopal clergyman, the son of Abraham Jarvis. He was born at Middletown, Conn., graduated at Yale in 1805, was ordained in 1810, and three years afterward became rector of St. James's, New York. After a year in the chair of biblical criticism in the General Theological Seminary, he was rector of St. Paul's, Boston (1820–26), then traveled and studied in Europe, and lived in Italy until 1835, when he was appointed professor of Oriental literature at Trinity (then Washington) College. He edited the *Gospel Advocate* in 1821–26. As historiographer of the Episcopal church in America, Jarvis wrote *A Chronological Introduction to the History of the Church* (1844). He published, besides: *The Religion of the Indian Tribes of North America* (1820); *No Union with Rome* (1843); *The Church of the Redeemed* (1850).

JASHER, jā′shẽr *or* jăsh′ẽr, Book of (Heb. *sepher ha-yashar*). One of the lost books of Hebrew literature. It is quoted twice in the Old Testament (Josh. x. 13; 2 Sam. i. 18). In the first passage the reference to it is lacking in the majority of manuscripts of the Greek version, and the Syriac has *sifra de teshkeḥata*, 'book of praise songs'; while in the second the Greek has *βιβλιον τοῦ εὐθοῦς, biblion tou euthous*, and the Syriac *sephar ashir*, 'book of Ashir,' or 'book of songs,' Jerome translating in both instances *liber justorum*. It has been maintained by some scholars that the words attributed to Solomon in 1 Kings viii 12, 13, came from this collection. The Greek version states that they were taken from the Book of Songs. It has been conjectured that the translator was misled by a transposition of letters in his text, the Book of Jasher being originally meant. But there is no evidence of this, and the nature of the poetic fragment is such that it is more likely to have come from a book containing songs connected with the temple service. Rather may it be questioned, in view of the textual condition, whether *shir*, 'song' or 'songs,' was not the original reading in the other passages. Both have the appearance of being later interpolations, but there is no reason on this account to doubt their accuracy. As to the meaning of Jasher, many suggestions have been made, chief among them that it signifies 'upright' or 'brave,' and that it refers to Israel, which is also called Jeshurun. The command of Joshua to the sun and the moon to stand still, and the lament over Saul and Jonathan by David, breathe a spirit that accords with other specimens of early Hebrew poetry. The "lost book" naturally attracted forgers, and in the thirteenth and fourteenth centuries no less than three different works purporting to be the lost book of Jasher seem to have been produced. The most famous of these was published in Naples, 1552, and has passed through many editions. An English translation was printed in London in the year 1750, and a new translation was made by Noch (New York, 1840). The *Book of Jasher* is also the title of a ritualistic treatise by Jacob ben Meir (died 1171) and of several other works of an ethical or legal character written by Jewish scholars.

JASMIN, zhȧs′măn′, Jacques (1799–1864). A Provençal poet, born at Agen. His real name was Jacques Boé. He was apprenticed to a hairdresser, who had been a soldier of Napoleon. At 18 Jasmin was writing verses and dressing hair. Hence his name "The Barber Poet." His four collections of *Papillotos* or *Curl-Papers* (1825, 1843, 1851, 1853) were naïve little occasional verses, revealing much native power. The *Souvenirs* (1830) are a winning mixture of humor and pathos in their tale of his early struggles for literary recognition. *The Blind Girl of Castel-Cuillé* (1835) is accessible in a good translation by Longfellow. *Françounetto* (1840), a narrative poem, is Jasmin's most sustained work and won general recognition. Jasmin was received into the Legion of Honor in 1846. In 1852 his works were crowned by the Academy. He is the poetic father of Mistral (q.v.) and the Félibres. There is an edition of his *Works*, with a French translation (1860). Consult: Rabain, *Jasmin, sa vie et ses œuvres* (Limoges, 1867); Moutrond, *Jasmin, poète d'Agen* (Lille, 1875); Sainte-Beuve, *Portraits contemporains*, vol. iii (Paris, 1881–82); Andrien, *Vie de Jasmin* (Agen, 1882); Smiles, *Barber, Poet, Philanthropist* (New York, 1892).

JASMINE, jăs′mĭn, or **JESSAMINE,** jĕs′ȧ-mĭn (OF., Fr. *jasmin*, from Ar. *yasmin*, from Pers. *yasmin*, jasmine), *Jasminum*. A genus of plants, chiefly natives of the warm parts of Asia, which belong to the family Oleaceæ, containing about 100 species of shrubs, some of them climbing and many of them having exquisitely fragrant flowers. This genus has the calyx and corolla each five or eight cleft, two sta-

JASMINUM GRANDIFLORUM.

mens attached to and included within the tube of the white or yellow corolla, and a two-lobed berry, one of the lobes generally abortive. The common jasmine (*Jasminum officinale*) is a native of the south of Asia, naturalized in the south of Europe as far north as Tirol and Swit-

zerland. In more northern regions it is much cultivated in gardens, but does not easily endure very severe winters. It is a shrub from 6 to 10 feet high, with pinnate leaves, the terminal leaflet the largest, and very fragrant white flowers. Its slender, deep-green branches

CAPE JASMINE.

give it the appearance of an evergreen. The flowers are used for preparing oil of jasmine, a delicate perfume. It blooms from June to October and requires a light, moist soil to induce free flowering. *Jasminum grandiflorum*, Spanish or Catalonian jasmine, a native of the East Indies, has flowers still more fragrant, from which, and from those of *Jasminum sambac*, oil of jasmine is also made. *Jasminum humile*, a

A PENDENT SPRAY OF YELLOW JASMINE.

very common greenhouse variety, is hardy in the open air as far north as Maryland. The varieties of jasmine are propagated by seeds and layers, but the usual method is starting cuttings of the nearly ripened wood under glass.

Cape Jasmine is a name popularly applied to plants belonging to the genus *Gardenia*, not related to the true jasmines. They belong to the madder family (*Rubiaceæ*) and are tropical and subtropical shrubs. The genus was named for Dr. Garden, of Charleston, S. C., who was a correspondent of Linnæus. The best-known species is *Gardenia jasminoides*, popularly known as *Gardenia florida*, brought to England from China (not from the Cape) in 1754. A double variety is a very popular greenhouse plant and is common in the Southern States as a hardy outdoor plant. It bears a large, oblong, orange-yellow berry, which is said to be used in China as a dye.

JASMINE, or JESSAMINE, CAROLINA, or YELLOW. A North American climbing plant, *Gelsemium sempervirens*, of the family Loganiaceæ, which grows in Virginia and southward upon trees and fences and bears a profusion of yellow, funnel-shaped flowers an inch in diameter, with a fragrance similar to that of the true jasmine, the odor on a damp evening or morning being almost overpowering. It has been recently used in medicine as a sedative, antispasmodic, and nervine.

JA'SON. The leader of the Argonauts (q.v.). See also MEDEA; PELIAS.

JASON (Gk. Ἰάσων). A tyrant of Pheræ in Thessaly, the successor and the reputed son of Lycophron. He came into prominence early in the fourth century B.C. and undertook to reduce all Thessaly under his dominion. By 374 B.C. he had conquered the chief cities of Thessaly and was recognized as Tagos. He then collected a large army with the object of making himself master of all Greece, but was assassinated in the midst of his preparations (370 B.C.). Consult Kent, *History of Thessaly from the Earliest Historical Times to the Accession of Philip of Macedon* (Lancaster, Pa., 1904).

JASON. A Jewish high priest, son of Simon II, and leader of the Hellenizing party. His real name was Jesus, according to Josephus (*Ant.* xxii, 5, 1). In 174 B.C. he was appointed high priest in place of his brother by Antiochus IV. For this office he is said to have paid a large sum; but he also secured for the citizens of Jerusalem the rights and privileges of Antiochians and was allowed to build a gymnasium and an ephebeum below the acropolis, near Mount Zion. Greek games, Greek caps, and Greek customs were speedily adopted. Even the priests left the altar to take part in the games in the palæstra and artificially concealed their circumcision. Jason sent a large contribution to Tyre for the festival of Hercules. In 171 B.C. he was deposed, and Menelaus raised to the pontificate. But when Antiochus marched against Egypt, in 170 B.C., Jason seized the opportunity of reinstating himself and drove Menelaus away. The King, however, upon his return from Egypt punished the city severely for what he deemed rebellious conduct. Jason was obliged to flee, first to Egypt, then to the Lacedæmonians. Our knowledge of his career depends upon 2 Maccabees and Josephus. The accounts differ in many respects, and neither can be used without great caution. Consult: Willrich, *Juden und Griechen vor der makkabäischen Erhebung* (Göttingen, 1895); Büchler, *Tobiaden und Oniaden* (Vienna, 1899); Willrich, *Judaica* (Göttingen, 1900); Schürer, *Geschichte des jüdischen Volkes* (4th ed., Leipzig, 1901); Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

JASON OF CYRENE, sī-rē′nē. An author whose history in five books is mentioned in 2 Macc. ii. 23. The original work is lost, and known to us only in the epitome made by the author of 2 Maccabees. (See MACCABEES, BOOKS OF THE.) There is some evidence that it was used by Gorionides. It was unquestionably written in Greek. Whether Jason was a Greek or a Hellenistic Jew is not altogether known. Büchler defends the former opinion and ascribes to him those parts of 2 Maccabees dealing with the Syrian wars under Antiochus IV, Antiochus V, and Demetrius I (qq.v.). But there is reason to believe, as Willrich has shown, that the work comprised the whole history of the Hasmonæan dynasty, and that only the part of it dealing with events that occurred between 175 and 161 B.C. was epitomized. In that case it is more natural to suppose that he was a Jew. He may, however, have had access to written sources not of Jewish origin. This would account for some facts that led Niese to ascribe to 2 Maccabees, and consequently to Jason, a higher age and a greater credibility than to 1 Maccabees. It is not likely that this view will prevail. But even if preference is given to 1 Maccabees, this may not affect Jason so much as the author of 2 Maccabees. The latter has confessedly exercised much freedom. Not only has he abridged, but also added to and probably altered Jason's work. Kosters and Kamphausen have gone so far as to declare Jason a fictitious personage behind whose name the author indulged in polemics against 1 Maccabees. There is no convincing evidence, however, of acquaintance with 1 Maccabees, and such a fiction seems to most scholars wholly improbable. If Jason's work included the whole dynasty, he must have written after 63 B.C. But this is not certain. The allusion to Esther ix. 21 in 2 Macc. xv. 36 points to a time later than 114 B.C., the anti-Hasmonæan bias to a time later than 106 B.C.; but these indications only apply to the epitomizer. The Ἰάσων κυρήναιος discovered on a temple wall in Egypt (*Revue des Etudes Grecques*, 1894, p. 297) seems to belong to the third century B.C., but there is no evidence of any connection between this man and the author. Jason may be tentatively considered as having produced his work at Alexandria in the first half of the first century B.C., as 2 Maccabees seems to have been used already by Philo.

Bibliography. Geiger, *Urschrift und Uebersetzungen der Bibel* (Breslau, 1857); Wellhausen, *Pharisäer und Sadducäer* (Greifswald, 1874); Kosters, in *Theologisch Tijdschrift* (Leyden, 1878); Trieber, *Zur Kritik des Gorionides* (Göttingen, 1895); Buchler, *Tobiaden und Oniaden* (Vienna, 1899); Kamphausen, in Kautzsch's *Apokryphen* (Tübingen, 1900); Willrich, *Judaica* (Göttingen, 1900); Schürer, *Geschichte des jüdischen Volkes* (4th ed., Leipzig, 1901); Niese, *Kritik der beiden Makkabäerbücher* (Berlin, 1900); Torrey, article "Maccabees," in *Encyclopædia Biblica* (London, 1902); Laqueur, *Kritische Untersuchungen zum zweiten Makkabäerbuch* (Berlin, 1904); Moffatt, in Charles, *Apocrypha and Pseudepigrapha of the Old Testament* (Oxford, 1913).

JA′SONVILLE. A city in Greene Co., Ind., 25 miles south of Terre Haute, on the Chicago, Terre Haute, and Southeastern Railroad (Map: Indiana, C 6). It is in a farming and productive coal-mining region, and there are brickyards. Pop., 1910, 3295.

JAS′PER (OF. *jaspre, jaspe*, Fr. *jaspe*, It. *jaspide*, from Lat. *jaspis*, Gk. ἴασπις; probably of Semitic origin, cf. Heb. *yāshpheh*, Ar. *yasb, yashb, yasf*, jasper). A cryptocrystalline variety of quartz distinguished by its opacity, which is due to the presence of clay and other substances. Jasper was known to the ancients, by whom it was called *iaspis*, and by whom it was used for ornamental purposes, owing to the high polish which it is capable of taking. It is still used for rings and seals and to a certain extent for pillars, mantels, and table tops. The colors of the different varieties of jasper are reddish brown, dark green, grayish blue, and brownish black, according to the impurities present. When the colors appear in layers, the mineral is known as striped or ribbon jasper; the brown and yellow varieties are known as Egyptian jasper. See GEMS.

JASPER. A city and the county seat of Walker Co., Ala., 35 miles northwest of Birmingham, on the Alabama Central, the St. Louis and San Francisco, the Illinois Central, and the Northern Alabama railroads (Map: Alabama, B 2). It is the centre of a rich coal field and farming and cotton district and has large saw mills, coke ovens, and some manufactures. Pop., 1900, 1661; 1910, 2509.

JASPER, WILLIAM (c.1750–79). An American soldier, born in South Carolina. He enlisted as a sergeant in the Second South Carolina Regiment in 1775 and at Fort Moultrie, on June 28, 1776, distinguished himself by recovering, through an act of personal bravery, the American colors which had fallen outside the walls. For this Governor Rutledge offered him a commission as lieutenant, but Jasper modestly refused because of his lack of education. He was commissioned by General Moultrie, however, to scour the country and harass the British outposts, and he became the hero of numerous adventures. At last, during the assault on Savannah, Oct. 9, 1779, he fell mortally wounded, while trying to fasten his regimental colors on the parapet. Consult McCrady, *South Carolina in the Revolution* (New York, 1901), and C. C. Jones, "Sergeant William Jasper," in *Magazine of History with Notes and Queries*, vols. viii, ix (ib., 1908–09).

JASPER WARE. A form of porcelain, the invention of Josiah Wedgwood. After a long series of experiments carried on at his manufactory in Burslem, England, he succeeded in 1773 in producing a compact, hard paste, susceptible of taking a very high polish. This he used in producing articles ornamented with cameo-work reliefs, etc. Barium sulphate was employed as a fluxing agent. See POTTERY.

JAS′PILITE. A banded metamorphic sedimentary rock (q.v.), made up of alternate layers of iron-stained quartz particles (jasper) and iron oxide (hematite). The bright red of the jasper and the dark brown or black of the oxide of iron give the outcroppings of this rock a brilliant appearance. In the Lake Superior region this rock has considerable economic significance, for the reason that it has a constant geological position at the top of the ore-bearing formation. This upper contact of the formation having been one of accommodation, the jaspilite has been much plicated and fractured. It is capped by a bed of quartzite called the Goodrich quartzite.

JASSY, yäs′sĕ (Rum. **IAŞI,** yä′shĕ). The former capital of Moldavia, the northern division of Rumania, on the Bachlui, a tributary

of the Pruth, a few miles from the Russian frontier, in about lat. 47° 25′ N. (Map: Balkan Peninsula, F 1). It is irregularly built over a large area. Among its numerous churches the most noteworthy are the newly restored cathedral, the fifteenth-century church of St. Nicholas, and the church of the Three Saints. There are also a number of interesting residences of the boyar families. Jassy is the seat of a Greek Orthodox metropolitan and of a Roman Catholic archbishop. The educational institutions of the city include a university, with 900 students in 1913, a theological seminary, a military school, a school of art, a school of music, and a literary and scientific society. The industries are insignificant, but the commerce is important. The exports consist chiefly of agricultural and animal products, petroleum and salt, while the chief imports are foreign manufactures and coal. Pop., in 1912, 75,882, over a third of whom were Jews. Jassy was created a town in the fourteenth century and became the residence of the Moldavian princes in 1565. A treaty of peace was concluded here between Russia and Turkey on Jan. 9, 1792, by which Russia acquired Otchakov and extended her frontiers to the Dniester. The struggle for Greek independence was inaugurated at Jassy by Alexander Ypsilanti in 1821. The seat of the Rumanian government was transferred to Bucharest in 1861.

JASTROW, yäs′trō, Ignaz (1856–). A German economist and historian, born in Nakel and educated at Breslau, Berlin, and Göttingen. He became docent at Berlin in 1885 and was Von Ranke's assistant in historical work. He edited the *Jahresberichte der Geschichtswissenschaft* (1881–94); *Sociale Praxis* (1895–97); *Das Gewerbegericht* (1896 et seq.); *Der Arbeitsmarkt* (1897 et seq.); and wrote: *Geschichte des deutschen Einheitstraumes und seiner Erfüllung* (1884; 4th ed., 1891); *Socialliberal* (1893; 2d ed., 1894); *Die Einrichtung von Arbeitsnachweisen und Arbeitsnachweisverbänden* (2d ed., 1900); *Deutsche Geschichte im Zeitalter der Hohenstaufen* (1879–1901), with George Winter; *Kaufmannsbildung und Hochschulbildung* (1907); *Bürgertum und Staatsverwaltung* (1907); *Handelshochschulen* (1909); *Gedächtnisrede auf Dunker* (1911); and many other works. In 1904 he pursued industrial investigations in the United States, and in 1905 became professor of administrative science at Berlin.

JASTROW, jăs′trō, Joseph (1863–). An American psychologist, son of Marcus Jastrow. He was born in Warsaw, Poland, but came to Philadelphia in 1866. After graduating at the University of Pennsylvania in 1882 and devoting some time to graduate study there, he was fellow in psychology at Johns Hopkins University (1885–86) and was professor of experimental and comparative psychology at the University of Wisconsin from 1888 to 1903, thereafter being known as professor of psychology. In 1893 he was head of the psychological section at the World's Columbian Exposition and in 1900 he was president of the American Psychological Association. Jastrow contributed to the *Psychological Review*, of which he was associate editor, and to other periodicals. He published: *Time Relations of Mental Phenomena* (1890); *Epitomes of Three Sciences* (1890), with others; *Fact and Fable in Psychology* (1900); *The Subconscious* (1906); *The Qualities of Men* (1910); *Character and Temperament* (1914).

JASTROW, Marcus (or Morris) (1829–1903). An American rabbi and Hebrew scholar. He was born at Rogasen, in Prussian Poland, studied at the Gymnasium there and at the universities of Berlin and Halle, and in 1857 became assistant rabbi in Warsaw. His radical politics forced him from Russia in 1861. He was rabbi in Baden until 1863, at Worms until 1866, and, then coming to America, in Philadelphia until 1892, when he was named pastor emeritus. Prominent in Jewish education and charities, he is best known for his Talmudic learning and as author of *A Dictionary of the Targumim, the Talmud Babli and Yerushalmi, and the Midrashic Literature*, in 16 parts (1904), and as editor of the department of Talmud in the *Jewish Encyclopædia*.

JASTROW, Morris, Jr. (1861–1921). An American Orientalist, son of Marcus Jastrow. He was born in Warsaw, Poland, came to Philadelphia in 1866, and, after graduation in 1881 at the University of Pennsylvania, studied Semitic languages and religions in Leipzig and in Paris. Returning to Philadelphia, Dr. Jastrow became professor of Semitic languages and librarian in the University of Pennsylvania. Besides papers for the *Zeitschrift für Assyriologie*, the *American Journal of Semitic Languages*, and the publications of the American Oriental Society, of which he became president in 1915, and the Society of Biblical Literature, he wrote: *The Religion of the Babylonians and Assyrians* (1898; Ger. trans., 1902; new ed., vol. i, 1905, vol. ii, 1912); *The Study of Religion* (1902); *Aspects of Religious Belief and Practice in Babylonia and Assyria* (1911); *Hebrew and Babylonian Traditions*, Haskell Lectures at Oberlin (1913; rev., 1914). He edited the Arabic text of the grammatical treatises of Abu Zakariyya Hayyug (1897); *Selected Essays of James Darmesteter* (with a memoir; translation of the essays by Mrs. Morris Jastrow, Jr., 1895); a series of *Handbooks on the History of Religion*. He contributed articles on Semitic archæology to the New International Encyclopædia, to the *Britannica*, to the *Jewish Encyclopædia*, and to *Hastings' Dictionary of the Bible* and *Hastings' Encyclopædia of Religion and Ethics*.

JÁSZBERÉNY, yäs′bĕ-rān-y′. A town of the County of Jász-Nagykun Szolnok, Hungary, on the Zagyva, 40 miles east of Budapest (Map: Austria-Hungary, F 3). It has a city hall with archives, a Franciscan cloister, and several imposing monuments, also an agricultural school. Pop., 1900, 26,791; 1910, 29,675, Magyars and mostly Roman Catholics, employed in agriculture and in trade in corn, cattle, and horses.

JATAKA, jä′tă-kă (Skt. *jātaka*, relating to birth, from *jan*, to beget). The name of a Book of Birth Stories, a Buddhist work written in the Pali language and containing 550 stories of incidents in the previous births of Sakyamuni, the Buddha, and to each of these tales is given a religious coloring at the close. This large collection forms a part of that division of Buddhist sacred canon known as the *Sutta-piṭaka*, or Basket of Discourses (see Piṭaka), and it is divided into 22 books, roughly classified according to the number of short rhythmical stanzas that are introduced into each narrative regarding some episode in an anterior birth. The Jatakas are of great importance in the study

of folklore. The Pali text of the stories has been edited by Fausbøll, *Jātaka, Together with its Commentary* (7 vols., London, 1879–97); the Pali introduction, sketching Buddhist life, has been translated into English by Rhys Davids (London, 1880), and a valuable translation of the whole is being made by Chalmers, Rouse, Francis, and Neil, under the editorship of Cowell, *The Jātakas, or Stories of the Buddha's Former Births* (7 vols., Cambridge, 1895–1913); Lévi, "Les Jātakas, étapes du Bouddha sur la voie des transmigrations," in the *Annales du Musée Guimet*, vol. xix (Paris, 1906); Foucher, "Les représentations de 'Jatakas' sur les bas-reliefs de Barhut," in the *Annales du Musée Guimet* (ib., 1908); Dutoit, *Jātakam, das Buch der Erzählung aus früheren Existenzen Buddhas*, translated from Pali into German (4 vols., Leipzig, 1908–12); Macdonell, *History of Sanskrit Literature* (London, 1913).

JATHRIP'PA. See MEDINA.

JÁTIVA, hä'tê-vȧ, or **XÁTIVA**, formerly SAN FELIPE DE JÁTIVA. A city in the Province of Valencia, Spain, 33 miles south of Valencia, on the railroad between that city and Madrid, in the midst of gardens, vineyards, and olive orchards (Map: Spain, E 3). It was formerly strongly fortified and is still commanded by a castle situated on the brow of a hill. It has several fine promenades, and among its prominent buildings are an old collegiate church, formerly a cathedral, a silk exchange, a theatre, and a bull ring. Its water supply, brought through an aqueduct, is excellent and is utilized in numerous fountains and several public laundries. Játiva was a flourishing town in Roman and Moorish times and famous for its linens. It is the birthplace of Roderigo Borgia (Pope Alexander VI). Pop., 1887, 14,099; 1900, 12,602; 1910, 12,737.

JATS, jȧts. A people of the Punjab, numbering some 5,000,000, representing the population subjected in the fourth and fifth centuries by the Rajputs, high-caste Hindus. Together with the Rajputs they constitute a definite physical type —dolichocephalic head; straight, finely cut, leptorrhine nose; long, narrow face; well-developed forehead, regular features, tall stature, and light transparent brown skin. They are sturdy, independent farmers and herdsmen, Mohammedan in religion. Consult Sir Herbert Risley, *The People of India* (Calcutta, 1908).

JAUCOURT, zhō'kōōr', ARNAIL FRANÇOIS DE (1757–1852). A French politician, born at Tournon, of a Protestant family. He played some part in the early days of the Revolution, narrowly escaped the massacres of September, and was obliged to leave France because of his moderate views. After his final return he was elected to the Tribunate (1799), became its president (1802), and in 1803 was elected to the Senate. After the departure of Maria Louisa, Jaucourt became a member of the provisional government and at the First Restoration was made a peer, and, while Talleyrand was at Vienna, held the Foreign portfolio. For a short time after the Hundred Days Jaucourt was Minister of Marine and then became Privy Councilor. He voted for Louis Napoleon in 1851 and approved the Coup d'Etat, although he had been a member of the Upper House under Louis Philippe. He was descended from Duplessis Mornay and took much interest in the welfare of Protestant France.

JAUER, you'ĕr. An old town in the Prussian Province of Silesia, on the Neisse, 38 miles west of Breslau (Map: Prussia, G 3). It has ancient churches, the palace of the former princes of Jauer, a school of commerce, and a Gymnasium. The chief manufactures of the town are machinery, leather, carpets, pens, cloth, cigars, wagons, and gloves. Jauer has a large trade in grain and a reputation for sausages. It was the capital of the Principality of Jauer, which was founded in 1303 and annexed at first to Bohemia (1392) and later to Prussia. Pop., 1900, 13,024; 1910, 13,549, mostly Roman Catholics.

JAUN'DICE (ME. *jaundys, jaunes*, from OF. *jaunisse, jaulnisse*, Fr. *jaunisse*, yellowness, from OF. *jaune, jaulne*, yellow, from Lat. *galbinus*, from *galbus*, yellow), or ICTERUS. The yellow color of the skin, conjunctiva, etc., arising from the presence in the blood and tissues of the coloring matter of the bile. Jaundice is a symptom of disease, not a disease itself. The fæces, from the absence of bile, are of a clay color or light-gray tint; the urine is deep saffron color, and all the other secretions are tinted with bile. The tissues are also stained, as shown at autopsies, the cut surface of the kidneys being especially yellow. The coloring matter of the bile comes from the hæmoglobin of the blood, which is transformed into bilirubin. The transformation takes place in the hepatic cells.

Icterus is due to one of two causes: (1) mechanical obstruction of the flow of bile into the duodenum (see LIVER, DISEASES OF), or *stasis icterus;* and (2) functional alteration of the hepatic cell, resulting in the production of pigmentary polycholia. *Stasis icterus* results from pressure on the gall duct or common bile duct of a tumor or new growth, such as cancer of stomach, of duodenum, of liver, or of pancreas; or fæces in the intestine; or blocking of the gall duct by a gallstone, or blocking of the common bile duct by swelling of the mucous lining and an accumulation of mucus. A gallstone or biliary calculus (see CALCULUS) causes exquisite pain when lodged in or passing through the gall duct. After the endobiliary tension has reached a certain limit the lymphatics begin to absorb the bile and carry it to the thoracic duct, which in turn empties it into the veins. The reabsorption of the bile depends on the bile pressure's being relatively greater than the blood pressure in the portal vein. Jaundice therefore occurs in the newborn babe, in some cases, because ligature of the umbilical cord prevents the blood from flowing from the umbilical to the portal vein. The jaundice of fasting is accounted for by the diminution of pressure in the portal system, owing to insufficient intestinal absorption. Functional alteration of the hepatic cell occurs in phosphorus poisoning and in grave infective conditions, such as yellow fever. In yellow fever there is enormous destruction of the red cells of the blood, but there is also altered biliary function of the liver cells, with a consequent inspissation of the bile. Semmola and Gioffredi classify icterus, according to clinical types, into primary or secondary forms, as follows, without regard to our pathological knowledge of the subject:

Primary	1. Catarrhal (acute or chronic). 2. Febrile. 3. Grave (acute yellow atrophy). 4. Emotional. 5. Of the newborn.
Secondary	1. To infections. 2. To hepatic disease. 3. To intrinsic or extrinsic stenosis of the bile ducts.

Two types of jaundice deserve special mention. *Icterus neonatorum* (jaundice of the newborn) results physiologically from the destruction of large numbers of red blood cells during the first few days of life or from interruption of the placental circulation, permitting absorption from the bile capillaries. Pathologically it may arise from septic poisoning through an infected umbilical stump, from syphilis, or rarely from congenital absence of biliary passages. Usually the condition is evanescent and requires no treatment beyond mild purgation.

Weil's Disease (acute febrile jaundice) is most common in the summer and occurs chiefly among laborers, brewers, and butchers. Cold is an exciting cause, but the active agent is believed to be one or more microörganisms. The disease comes on suddenly, with a chill, followed by fever, headache, nausea, and epigastric pain. The liver and spleen are enlarged and tender. The treatment is the same as that for ordinary jaundice, and recovery is the rule. See CHILDREN, DISEASES OF.

During the existence of jaundice changes in the diet should be made, fats being avoided and constipation relieved. Mercury, chloride of ammonium, phosphate of sodium, and hyposulphites are useful drugs.

JAUNPUR, joun-pōōr′. The headquarters of a district of the same name in the United Provinces, British India (Map: India, E 4). It is on the river Gumti, 34 miles northwest of Benares. It has manufactures of perfumes and papier-mâché and a fair trade, but its chief interest is archæological. It was in ancient times the capital of a Mohammedan kingdom. Sultan Feroz III, of Delhi, having ordered a Hindu temple to be demolished, erected in 1370, around its ruins, a fort of solid stone. He sent numerous artificers and others to inhabit the new city, which was completed in 12 years. Pop., 1901, 42,771; 1911, 30,473.

JAUNTING CAR, or JAUNTY CAR. A two-wheeled carriage, very common in Ireland. The seats are extended back to back over low wheels, and at right angles to the wheels, the passengers riding sidewise.

JAURÉGUIBERRY, zhō′rā′gē′bĕ′rē′, JEAN BERNARD (1815–87). A French naval officer. Born at Bayonne, he entered the navy in 1831, was made lieutenant in 1845, commander in 1856, captain in 1860, rear admiral in 1869, and vice admiral in 1870. He served in the Crimean War, in active operations in China, and as Governor of Senegal (1869). Finding no opportunity for service afloat in the Franco-Prussian War, he applied for a command in the army, and his request was granted. He was in command of a division at Coulmiers, Villepion, and Loigny-Poupry, while in the retreat upon Le Mans and in the battle at that place he commanded a corps. In 1871 he became commander in chief of the Toulon fleet and in 1876 was given the command of the Mediterranean evolutionary squadron. He served in many other important naval capacities, including Minister of Marine (1879–80, 1882–83), and in May, 1879, he was elected a senator for life.

JÁUREGUI Y AGUILAR, hou′râ-gē ē ä′gē-lär′, JUAN MARTÍNEZ DE (1583–1641). A Spanish poet, born at Seville. He seems to have begun his career as a painter and to have gone to Rome to study art. Some have identified him with the Jáuregui who painted a picture of Cervantes, and whom the latter mentions in the prologue to his *Novelas.* (A portrait, recently discovered and now in the possession of the Real Academia Española, and purporting to be of Cervantes and by Jáuregui, is considered by many critics to be authentic and the very portrait mentioned by Cervantes. See the reproduction thereof in the article CERVANTES SAAVEDRA, MIGUEL DE.) While in Italy he studied Italian literature, and by the publication at Rome, in 1607, of his verse translation of Tasso's *Aminta,* he firmly established his literary reputation. He seems to have returned to Spain late in 1609. In 1618 he published an edition of his verse (*Rimas de Juan de Jáuregui*) at Seville. In the preface to this volume he protested against the baneful mannerisms that Góngora had introduced into Spanish poetry, and his *Discurso poético contra el hablar culto y oscuro* (1624; cf. the reprint of this in Menéndez y Pelayo's *Historia de las ideas estéticas en España,* Madrid, 1884–89) contains so skillful an attack on these same mannerisms that it won him knighthood in the Order of Calatrava. Yet his own *Orfeo,* a poem in five cantos on the well-known classic legend, has some of the stylistic aberrations of Gongorism, and it was published at Madrid the same year. Jáuregui yields entirely to the Gongoristic current in the *Farsalia* (a version of Lucan's Latin poem), published posthumously in 1684. His permanent title to fame must rest upon the translation of the *Aminta* and on one or two of the lyrics contained in the *Rimas,* especially the graceful *silva* on his lady-love bathing. Consult the edition of the *Aminta* in López de Sedano, *Parnaso español,* vol. i (Madrid, 1768–78), and the edition of Jáuregui's poems in *Biblioteca de autores españoles,* in vol. xlii (ib., 1857).

JAURÈS, zhō′rĕs′, JEAN LÉON (1859–1914). A distinguished French Socialist and writer, born at Castres (Tarn) of well-to-do middle-class parents. He was given an excellent education at the Lycée Louis le Grand and at the Ecole Normale Supérieure. For some years he was a professor of philosophy at the University of Toulouse. In 1885 he was elected to the Chamber of Deputies as a radical Republican, but was defeated four years later by a Monarchist. In 1893 he was returned as a Socialist Deputy, and his great oratorical powers quickly made him one of the leading figures in the Chamber. From that time on he was almost continuously in public life and was regarded as the leading Socialist of France, sharing with August Bebel (q.v.) the leadership of international Socialism. The moderation of Jaurès's Socialism brought upon him the bitter hostility of the revolutionary Marxians led by Jules Guesde (q.v.). The Marxians saw in the Dreyfus affair merely a "bourgeois quarrel" which was of no concern to the worker. To Jaurès it was a great human issue which involved not only the fate of an innocent man but that of the Republic as well. He threw himself into the fray with all his ardor and became one of the stoutest defenders of Captain Dreyfus. When the radical Republican *bloc* was formed in 1899 under Waldeck-Rousseau, he consented to the inclusion of the Socialist Deputy Millerand (q.v.) as a member of the cabinet. Jaurès's support of the *bloc* was the decisive element in the struggle which followed to disestablish the church and to republicanize the army. The followers of Guesde, having denounced Jaurès as a traitor

to Socialist ideals for having compromised with the "bourgeois state," saw to it that the matter was taken up by the International Socialist Congress which met at Amsterdam in 1904. A resolution that no bona fide Socialist should be allowed to hold office in a bourgeois cabinet gave rise to a great debate in which Bebel and Jaurès took the leading parts. In spite of the latter's eloquence the resolution passed the congress, and all Socialist factions in France were ordered to unite. Jaurès, accepting his defeat with good grace, became the leader of a unified Socialist party, which in the election of 1914 returned more than 90 deputies.

Jaurès, although opposed to the main theories of Syndicalism, nevertheless warmly championed the cause of the workers in the great railway strike of 1910. He strongly denounced the Briand ministry for having resorted to mobilization orders to break the general strike. Jaurès favored an agreement with Germany which would do away with militarism by calling a halt on further armament. Socialists, he held, should urge all possible methods of arbitration, but if these failed they should fight willingly the *aggressor*. He even favored a general strike to stop war, but on condition that it be under *international* direction and not confined to one country. He was the chief opponent of the three years' military law passed by the Chamber in 1913. Just before the Great European War broke out, in 1914 (see WAR IN EUROPE), a meeting of Socialists took place in Brussels, at which Jaurès made a notable attack on militarism. His speech aroused great antagonism, and it was only a few weeks later (July 31) that a semidemented youth, incited by recent attacks on the Socialist leader, assassinated him in front of a café in Paris.

Jaurès was a voluminous writer. For the *Histoire socialiste* (12 vols., 1901–08), to which he was the chief contributor, he wrote vol. i, *La constituante* (1901), vol. ii, *La législative* (1902), vols. iii and iv, *La convention* (1903), vol. x, *Le second empire* (1907), and part of vol. xi, *La guerre franco-allemande* (1908). He also published *Discours parlementaires* (1904); *Etudes socialistes* (1902), translated by Mildred Minturn (1906); and *L'Armée nouvelle* (1911). Jaurès was editor of the Parisian journal *L'Humanité*, which he founded in 1904 and to which he contributed regularly. For description of the personality and ideas of Jaurès, consult S. P. Orth, *Socialism and Democracy in Europe* (New York, 1913); J. S. Schapiro, "The Drift in French Politics," in the *American Political Science Review* (Baltimore, 1913); and the anonymous article in *Current Literature*, February, 1914 (New York). See SOCIALISM.

JAVA, jä'vȧ (commonly derived from Skt. *yāva*, rich in millet, from *yava*, millet; but it is worthy of note that *Java*, or in the more ancient form *Java-dvipa*, is associable with the proto-Polynesian *Sava* or *Hava*, which, in composition with *Iki*, appears in Polynesian in such widely different names of major geography as Havaiki, Hawaii, Savaii). The most important island of the Dutch East Indies, lying south of the equator, between the parallels of 5° 52′ and 8° 59′ and between the meridians of 105° 13′ and 114° 39′ E. (Map: East India Islands, C and D 7). It is bounded on the north by the clear, shallow waters of the Java Sea; on the south by the Indian Ocean; on the west by the Strait of Sunda, which separates it from Sumatra (also a Dutch possession); and on the east by the Strait of Bali (11 miles wide), separating it from the island of Bali. The south coast is steep and precipitous, with cliffs rising almost perpendicularly to a considerable height, and is bordered by a long line of breakers. The north coast is low and swampy in many places and overgrown with mangrove trees and bushes, particularly towards the west. The island is long and narrow, its greatest length, from west-northwest to east-southeast, being 666 miles, and its breadth from 46 to 121 miles. Area, 48,503 square miles. With Madura and several smaller adjacent islands administratively belonging to it, it is known officially as "Java and Madura." The area of the whole is 50,554 square miles. Java is one of the richest and most populous islands in the world. It is unsurpassed in fertility and in the beauty of its scenery. It has passed through many historical changes and is intensely interesting archæologically.

Topography. Java is very mountainous and is remarkable for the number of its volcanic peaks, 45 in all—ranging in height from 2000 to 12,040 feet above the level of the sea, clad with verdure to their summits and having slopes fertile in nearly all their climatic zones. The general trend is from west to east. A striking difference is noted between the western and eastern halves of the island. In the former the volcanoes are bunched together, forming great masses, without intervals or plateaus. Towards the east the volcanic peaks are for the most part isolated one from the other, with a large number of valleys and plains, deep gorges and rushing streams. Most of the active volcanoes are found in the western end, and of these 14 are found in an area of 20 by 35 miles. During historic ages these volcanoes are known to have destroyed many tens of thousands of human lives, and within recent times several have exploded, spreading devastation on all sides. The peak of Ringghit, once one of the highest, lost much of its form by internal explosions in 1686, destroying, it is estimated, approximately 10,000 lives. In May, 1901, the Kloet, one of the smaller volcanoes, broke into eruption after many years' quiet, enveloping towns 150 to 250 miles distant in thick darkness, destroying the sugar crop and killing several Europeans and about 100 natives. Among the best-known mountains are: Salak, 7000 feet, south of Batavia; Géde, 9718; Tjirmaj, 10,070; Slamat, 11,247; Marbabu, 10,673; Raun, 10,822; and Semeru, 12,040 feet high. The list of eruptions in historic times is a formidable one, that best known in the Western world being that of Krakatoa (q.v.) in the Strait of Sunda. Earthquakes are of common occurrence, though not usually very destructive.

Java abounds in plains, valleys, and forests, the richest alluvial coast land being in the northwest, in the provinces of Bantam, Batavia, Krawang, and Cheribon; yet all through the eastern half are many beautiful and fertile plains, and no part of the island, unless it be the Preanger Residency, which occupies the south half of the western part, and a few provinces in the east half, lacks rivers. As the south coast is relatively high and mountainous, with a long north slope, most of the streams flow into the Java Sea. In the rainy season at least 50 streams can be used for floating rafts to the sea, and five or six are always navigable for some distance

from their mouth. The longest is the Solo, about 300 miles long, on which is situated the city of Surakarta. For most of the year it is navigable for boats and river steamers. The Surabaya River, or Brantes, the next in importance, rising on the west slope of Semeru, forms, with its tributary, a curve with three sides and enters the sea near the Solo, one of its mouths being near the city of Surabaya, where is found the best harbor in Java. The third important river is the Tji Manuk, which nearly traverses the island, and the fourth is the Tji Tarun.

Climate. Though so near the equator, Java is, to those who avoid excess in eating and drinking and avoid exposure to the insect life of the lowland marshes, quite healthful. From April to October there is perpetual sunshine, with only occasional light showers, and the Western white man must avoid the direct rays of the sun during the heat of the day. From October to April there is almost a steady rainfall, except that the sun shines for a while daily, generally during the morning. In the west, however, no part of the year is free from rain. Land and sea breezes render life comfortable all the year round. Violent storms, winds, or hurricanes are unknown, though near the high peaks rains, with terrific lightning and thunder, are frequent. The annual rainfall is about 80 inches, the heaviest rainfall occurring in December, January, and February. The average temperature at Batavia is 78.69° F. (the average of 12 years), and the extreme range on the lowest levels is 26 degrees.

Flora. Java has many botanical zones. The deep black soil produces a richness and an abundance of products in the vegetable kingdom that is without parallel in any other part of the world within an area so limited. Almost all the plants are evergreen, and most of the villages are concealed by the perpetual verdure. The lowest zone, from sea level to 2000 feet, has the most extensive area. Here the heat is tropical, and here we find rice, sugar, cotton, indigo, mangoes, and palm trees. The swamps and plains are covered by cultivated areas, thickets of bamboo, patches of tall grass, and a profusion of flowers. The second level, which extends from 2000 to 4500 feet (the heat is moderate), produces coffee, tea, cinchona, dozens of varieties of palms, fruits, vegetables, teak, mahogany, sandalwood, rubber and camphor trees, rattan, bamboo, many fancy and rare woods, and thousands of vines and flowering shrubs. The third zone, from 4500 to 7500 feet, is moderately cool, and produces maize, tobacco, cabbages, potatoes, etc.; and in the fourth zone (7500 to 12,000 feet) the flora exhibits many genera found in temperate Europe. The fruits are abundant and include oranges, limes, pomelos, the coconut, banana, mango, mangosteen, the duku, the rambutan, and the durian. In the gardens near their houses the natives cultivate fragrant and ornamental flowers. About one-fourth of the area of Java is reckoned as forest, and only in comparatively recent years has this source of wealth been taken advantage of. Teak is the chief wood exported.

Fauna. Fifty species of mammalia are found in Java. Of the larger animals the tiger, leopard, rhinoceros, wild sheep and deer, two species of wild boar, the jackal, wild cat, and many species of monkey are found in the forests. Bats are plentiful, the kalong or "flying fox," a fruit-eating bat, doing much damage to sugar palms, maize, and young coconut trees. The buffalo, next to the native pony, is the most valuable animal, being used both for draft and for food. Domestic animals, such as sheep, goats, cows, and swine, though below the ordinary size, are not scarce. Horses from Arabia and pigs from China have been introduced and thrive. The smaller game in forest and marsh is numerous. In the watercourses are the crocodiles, from 20 to 30 feet in length, and always ravenous and dangerous. Large troops of wild dogs are found in the jungles. Among birds, the peafowl and pelican are the largest, the former being found in flocks. There are nearly 300 species of land birds, including jungle fowl, various species of woodpeckers and kingfishers, the hornbill, the black and crimson oriole, the minaret flycatcher, the yellow and yellow-green trogon, etc., and the swift (*Collocalia fuciphaga*), which inhabits deep caverns near the sea and cliffs and furnishes the edible birds' nests (see SALANGANE) so much prized by the Chinese for soup. Land and water turtles abound. The varieties of snakes are almost countless. The python is quite common. The insects are without number, but not many of them overtroublesome or venomous. Many rare and beautiful butterflies are found, including the calliper butterfly. The sea abounds in fish, and 600 species are known, besides 34 species of river fish.

Geology and Mineral Resources. Java has been for so many ages under a stress of volcanic action that the strata anciently deposited have been again and again disturbed; yet it appears that the underlying rocks are for the most part granite and syenite, and on these rest sedimentary rocks of the Tertiary period. Though the absence of the fossils of vertebrates is noticeable, the rocks containing the invertebrates are very abundant; but the volcanic deposits have covered up or distorted the older formations in every part of the island. Coal is found in many places, but in thin strata. The best mineral fuel, lignite, is found in Bantam. Asphalt, clay (excellent for bricks and earthenware), limestone, marble, manganese, sulphur, salt, and saltpetre are obtained. The production of petroleum has become important, the quantity produced in 1911 being 425,000,000 gallons. Java is the poorest of the East Indian islands in minerals.

Agriculture. The great majority of the natives are farmers or agricultural laborers. Rice is the chief article of food, and its production the chief industry. By gift from the last Mohammedan Emperor, who abdicated in 1749 in favor of the Dutch, and by purchase from the native princes since then, the Dutch government now owns almost all the land. Along with the Mohammedan gift they secured the right to receive one-fifth of the produce and of the labor of the peasant. This made easy the introduction in 1832 of the "culture system," which has since prevailed. This consists in obligatory service on the part of the peasant, under official superintendence, in the cultivation of tobacco, coffee, sugar, indigo, tea, pepper, etc. Now coffee only is produced by enforced labor. About 8,638,600 acres are under native cultivation. The lands now the property of Europeans cover 1,969,544 acres; of Chinese, 316,209 acres; and of other foreign Orientals, 22,923 acres, and in addition to this there were leases of over 1,000,000 acres to Europeans. The chief products are as follows: sugar (1912), 1,443,584 tons (including the whole of

Dutch India, mostly, however, grown in Java); coffee, including Sumatra (1912), 34,280 tons; cinchona (1911), 21,412,417 pounds; tobacco, including Sumatra (1911), 189,771,968 pounds; tea (1911), 55,697,639 pounds; indigo (1912), 175,504 pounds; cocoa (1911), 3,912,328 pounds; and pepper (1912) 24,071 tons. The tin mines of Banca and Billiton yielded, in 1913, 15,346 tons; the coal mines of Java, Sumatra, and Borneo, 411,000 tons. Java holds third rank among the cane-sugar producers of the world, and second as an exporter of that product. The production of 1912–13 was 1,458,000 tons against 2,492,000 in Cuba and 2,552,000 in India, which latter country, however, produces practically none for the export trade.

Communication. Java is well supplied with good roads. Railway construction began in 1875, and now railways extend across and from end to end of the island. The total length of the railways, state and private, in 1911 was 1393 miles, and of telegraph lines, 10,000 miles. Batavia, Samarang, and Surabaya have been connected by telephone since 1896. The gross receipts of the railways in 1911 were 29,722,000 guilders; passengers carried, 36,867,000.

Commerce. In 1911 the total value of the imports of Java was 373,289,000 guilders (guilder = 40.2 cents); of the exports, 510,612,000 guilders. The chief imports are piece goods, fertilizers, and coal from Wales, Australia, and Japan. Much petroleum from Sumatra and tin from Banca are entered for reëxport. The chief exports are sugar, coffee, tobacco, rice, cinchona bark, quinine, which goes mostly to the United States and London, tea (almost entirely to Holland), copra, indigo, kapok (mostly to Australia), hides, timber, rubber, gutta percha, cocoa, tapioca, and spices. With the exception of rice, about one-half of which goes to Borneo and China, nearly four-fifths of the exports go to the Netherlands. There is considerable trade with Penang and Singapore. The only legal coins are those of Holland.

Intercourse with the Outer World. Intercourse with Java, and indeed with the Dutch East Indies generally, is hedged about with many irksome restrictions and regulations. One may land at any of the ports, but cannot stay on shore for more than 24 hours without registering, giving name, age, religion, nationality, place of birth, occupation, name of the ship on which one arrived, the captain's name, etc., and receiving a permit. If travel in the interior is desired, another permit is necessary; sureties have to be provided, the intended route indicated, fees have to be paid, and time is consumed, as every step is taken with true Dutch deliberateness. This pass is not good for more than six months. Should one wish to enjoy sport, however, still another document is needed, entitling the holder to import his gun and ammunition, and more fees, chiefly stamp dues, are demanded. Should one wish to settle in the country, the conditions are still more formidable, the time consumed much greater, and the fees quite considerable. Two sureties, each in a large sum, are needed, and the strictest inquiries are made, and should any inadvertence occur, or any slight discrepancy be found in the initials, the spelling of the name, or the like, it may vitiate the whole proceeding and lead to the rejection of the application; and lastly, when one wishes to leave the island, still another permit is necessary, and it cannot be obtained in a hurry, as wide inquiries have to be made as to whether all one's debts have been paid, and the like.

Government. "Java and Madura," with the surrounding islets included in the same administration, is divided into 17 residencies, under the control of a Governor-General, who has great executive and even a certain amount of legislative power. He is assisted by a council of five, whose functions are legislative and advisory. In each province there is also a resident, assisted by assistant residents and subordinate officers called controllers. Nevertheless the administration, so far as the Javanese see it, is carried on through a network of native officials, to whom the foreign rulers are "elder brothers." There is daily conference between the Dutch and native chiefs, and in all matters between them the Javanese language is used, Dutch not being allowed to be spoken. Each resident exercises judicial, financial, and administrative functions, dealing with civil and criminal cases. To each assistant resident there is an *afdeeling*, or department. The controller is really the link between the natives and foreign officers. He makes a personal inspection of his district every month, having supervision of everything—observing, advising, and reporting—but with little executive authority. Out of the ancient noble families a native regent is appointed, whose rank and right of precedence are superior even to those of all other European officers except the resident. He is the head of the native officials in his province and receives a salary of 2000 to 3000 florins; but in one or two cases—e.g., the Sultan of Jokja Karta and the Regent of Bandong—the allowance is 84,000 florins. The residents number 17, the assistant residents about three times as many, and the controllers a slightly larger number. The residents and controllers are appointed only after a searching examination in the Javanese language, customs, and conditions. The Governor-General resides in Batavia, the capital. In the administration of justice there is a distinction made between Europeans and natives and Orientals. The former are subject to laws based on those of the Netherlands, while in the regulation and trial of the Javanese and those classed with them, their own traditions, customs, and law, under the direction of the native chiefs, decide questions of equity and law. The High Court of Justice is at Batavia, with lower courts in the five large cities, besides a number of circuit, district, and in some places priestly, courts. For the defense of the colony there is an army of about 35,000 (about two-thirds being natives), with headquarters at Batavia, and a navy, with headquarters at Surabaya. The expenditure for defense was in 1914 about $19,000,000, of which about one-fourth was disbursed in Netherlands.

Finance. The revenue is derived from land and the usual taxes, licenses, customs dues, the government monopolies of salt, opium, and railways; but the largest item is from the sale of coffee grown under the "culture system" and sold by the government, as well as the sale of quinine and tin. The budget of Java forms a part of that for the Dutch East Indies. The local revenue is derived from land taxes and licenses, customs duties and certain indirect taxes. The revenue of 1914 was 256,957,000 guilders, and the expenditures 335,050,000 guilders.

Population. In 1800 Java, according to a rude census, had 3,000,000, and, in 1813, 6,000,000

inhabitants. In 1896 Java and Madura had 26,125,053 inhabitants, including 51,737 Europeans, 261,080 Chinese, 17,045 Arabs, 3238 other non-indigenous Orientals, and 25,791,953 natives. In 1900 Java and Madura had 28,746,688 inhabitants. In 1905 the population was estimated at 30,098,000, including 75,833 Europeans and Eurasians, 537,316 Chinese, and 27,400 Arabs.

Ethnology. The native inhabitants of Java belong to the Malay race, the alleged Negrito peoples of the interior having no real existence. The Javanese proper dwell in the central portions of the island and towards the east, the Sundanese in the west, and the Madurese in the east and on the adjacent islands of Madura, Bavian, etc. In the mountains of Bantam, in the extreme west, live the Baduwis, and in the mountains of the extreme east the Tenggerese, both of whom are very primitive peoples of the sort sometimes styled Indonesian, or proto-Malay, who, in spite of the influence of their Islamic neighbors, have preserved much of their old "heathen" religion. The much-discussed Kalangs, if at all a separate people, which is improbable, are on present evidence part of the aboriginal Malayan or proto-Malayan stock. Slavery and colonization have added at various periods minor elements to the Javanese population. Thus, there still exists in Batavia a "Bali village," testifying to the fact of deportation from that adjacent island in times past. The Baduwis and Tenggerese are less brachycephalic than the Javanese proper, the Sundanese, and the Madurese, and they are probably of somewhat greater average height, with a rather lighter skin. Outside of the "heathen" tribes of the interior, the Madurese seem to have accepted least the conditions of civilization. The Javanese proper are yielding somewhat to the Madurese on the east, but the Sundanese in the west seem to be becoming more Javanized, and the Javanese may still be looked upon as the average of the island population. The three principal peoples of Java have each their own language, a Malayan dialect with more or less individuality. The marked aristocratic tendencies of the Javanese, which find expression in social and governmental institutions, are reflected also in their language, with its "noble" and "common" forms of speech. The old Javanese of the monuments, inscriptions, etc.—the ancient literary language—is called Kavi (q.v.). Sundanese, though not at all neglected, has received less attention. The puppet plays, or *Wajang*, of Java, to which some authorities have too hastily attributed an entirely Indian origin, and the mask plays, or *topeng*, of which both popular and classical varieties exist, have been recently much studied. The *babads*, or chronicles, are another feature of Javanese folk literature. The Javanese represent perhaps the highest point of Malay culture, and show at the same time its limitations when controlled by Europeans. Not all of Javanese culture was created or suggested by India, probably less than is generally believed. Hindu influence in Java began before the beginning of the fifth century A.D. and had its greatest effects upon the religion, political divisions, language, and literature of the island. The advent of the religion of Islam in the fifteenth century was at first much more rapid and revolutionary in its effects. To-day the great majority of the nearly 30,000,000 Malays of Java are professors in some way or other of Islam, their creed being mixed here with relics of primitive Shamanism and there with echoes of Hinduism, Buddhism, etc. Besides the loan words in the language, the alphabet in which it is written, and the general influence upon arts of all kinds, Hindu contact has its monument in the great temples to Buddha erected in Java (700–1450 A.D.). One of these, the Great Buddha, or Boro Buddor (q.v.), is by some esteemed the greatest example of Buddhistic architecture in existence. The foundation, under Hindu influence, of kingdoms such as those of Madjapahit, led to the extension of Javanese culture into Sumatra, Borneo, and several of the smaller islands of the Malaysian Archipelago, and some have traced it even to Papua and Australia. The great numbers of the Javanese Malays, and the fact that they are not at all moribund, but a rapidly increasing people, make them one of the most important groups of mankind for the historian of human culture. The discovery by Dr. Eugene Dubois (1891–94) of the upper part of a skull, two molars, and a femur, in what is said to be a Pleistocene deposit at Trinil, on the river Bengâwan, has given rise to a voluminous literature of study and discussion. See MAN, SCIENCE OF, *Ancient Types*.

Education. Separate school organizations are maintained for natives and Europeans and those assimilated with them. In 1911 there were 706 primary schools for the natives maintained by the state and 507 private schools; the pupils in the two classes were 145,709 and 52,551 respectively. Besides these, there are several middle schools, and normal schools for training native teachers. For the Europeans there were a number of separate schools, both public and private (including several for girls only), besides normal schools at Batavia and Surabaya. There is a gymnasium at Batavia, and there are an agricultural college, a museum, and a botanical garden (one of the finest in the world) at Buitenzorg, the residence of the Governor-General, on the slope of Mount Salak near Batavia.

Religion. Perfect liberty is allowed to all forms of faith. Buddhism was early introduced; but by 414, when Fa Hein, the Chinese Buddhist, visited Java, he wrote that little Buddhism could be found. This was succeeded by Brahmanism, which continued until the Mohammedan conquest in 1475–79 and now lingers only in Bali. Nominally the Javanese are now Mohammedans, and great respect is paid to a returned pilgrim from Mecca, nearly 10,000 pilgrims leaving Java under this pretext of holy visitation annually. The mass of the natives, however, follow the primitive animism of their ancestors and are very religious, in the sense of being under the influence of unseen and mysterious spirits of local importance. About 150 Christian missionaries of various societies, chiefly Netherlandish, labor among them, about 400,000 natives being enrolled in the Roman or Reformed churches.

History. The history of Java, shorn of legend, fable, and mythology, is very simple. Civilization came to the aborigines from India, Buddhism at first being paramount. The Sivaism of the Hindus followed and prevailed for centuries, during which time many Hindu states were set up, that of Madjapahit being chief, with vast power and influence. The struggle between the two faiths introduced from India culminated in a compromise, which is very

marked and easily discernible in their art, antiquities, and ruins, of which the great mass called Boro Buddor (q.v.) furnishes a conspicuous example, superb copies of the sculptures from which were exhibited at the Paris Exposition of 1900. The chief towns containing Hindu remains are Surabaya, Samarang, Solo, Jokjakarta, and Magalang, in the centre and east of the island. The third great epoch was introduced by contact with the Europeans, when the Dutch navigators and their East India Company had trading stations along the coast. The Portuguese made their way to Java early in the sixteenth century, but about the close of the century they were supplanted by the Dutch. The paramount native state at this time was Mataram, and in the early Dutch records its princes are called emperors. The gradual extension of Dutch rule was effected in much the same manner as that of the conquest of India by the British. Their authority was extended over the Preanger Residency in 1705, over the whole northwest coast in 1745, over Surakarta and Jokjakarta by 1755, Bantam coming under their control in 1808. The British held the island from 1811 to 1816, still further asserting and extending European control, and introducing great reforms in the administration under the vigorous government of Sir Stamford Raffles; but on regaining the island the Dutch pressed their claims with increased vigor. Their chief idea seemed to be to use Java simply as an appendage to the Netherlands, to secure revenue and pay off the debts of the "mother country"; but since 1870 the general policy has been to hold the colonies for at least mutual benefit, with increasing purpose to benefit the Javanese in every way as far as possible. The three European names most closely associated with the development of Java are Daendels, Raffles, and Van den Bosch (q.v.). When in 1825 the native chief, Dipa Negara, struggled to regain ascendancy, a war broke out which lasted five years and ended in undisputed control by the Dutch.

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JAVA FOWL. An old-fashioned breed of domestic fowls, white, black, or mottled, with a small, single, upright comb in both cocks and hens. The shanks and toes are yellow and free from feathers. The cocks weigh from 9 to 10 pounds, and the hens about 7½ pounds. They are good, useful fowls and easily kept.

JAV'ANESE LANGUAGE. A language of the Malayo-Polynesian group, which is the vernacular of Java. Largely through Indian influence Javanese became the medium of an important literature as early as the ninth century A.D. In this ancient form Javanese was modified in its vocabulary to a large extent by Sanskrit, and it was accordingly termed Kavi (q.v.) as being preëminently the language of poetry. The direct derivative of Kavi is modern Javanese, which is divided into the courtly or Krama and into the vernacular or Ngoko. Ngoko is used in speaking to an inferior, while Krama is used in addressing a person of superior social station. These two forms of speech differ rather in vocabulary than in morphology. A third language, called Madhya or middle, partakes of the characteristics of both the others, although more closely resembling on the whole the Ngoko. The Javanese are thus bilinguists or even trilinguists, the use of one language in preference to the other being dictated by certain rules of social etiquette. This phenomenon may have its origin in word taboo. Javanese literature consists in great part of translations from the Kavi, and thus ultimately from the Sanskrit. Here belong such works as the *Brata-yuda*, the *Arjuna-sahasrabahu*, and the *Arjuna-vivahana*, all based on the Mahabharata (q.v.), as well as the *Rama*, derived from the Ramayana (q.v.). The *Manik-Maya* is important as a source of Javanese cosmogony and mythology, and the *Babads*, or prose chronicles, are of interest both linguistically and historically. Akin to the Babads are a number of historical romances, such as the Damar Wulan and the Raja Pirangon. In drama Javanese is rich in shadow plays (*wayang*), mainly based on old legends, and the beast fable is highly developed. There are also translations and imitations of Arabic religious literature.

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JAVARY, zhä'vȧ-rē'. A right tributary of the upper Amazon. It rises at the extreme western angle of the boundary of Brazil with Peru and flows north and northeast through the immense and unexplored forests of La Montaña, joining the Amazon in long. 70° W. (Map: Brazil, C 5). It forms nearly half the boundary line between Brazil and Peru and is navigable nearly to its source, a distance of over 300 miles.

JAVA SPARROW. A well-known cage bird (*Munia oryzivora*), known in the East as ricebird, paddy bird, and by other names. It is one of the weaver birds (Ploceidæ) and has many Oriental and African congeners. This species seems to be indigenous to Java, but was long ago carried abroad and has become naturalized and to some extent a pest in various rice-growing parts of China, Malaya, India, and Africa, where it is often very injurious to grain crops, after the manner of the bobolink. It is about 5 inches in length, plus a tail 2 inches long, of which the central feathers are longest. The beak is conical and swollen, and rosy in hue, as also are the feet. A narrow edging of red surrounds the eye. The body is slate-colored, rump, tail, and crown black, and there is usually a white patch on the cheek, but these white patches may change to black, regardless of sex or age. The lower parts are purplish gray, becoming white towards the vent. The females are rather lighter and the young somewhat mottled. A snow-white breed has been developed in confinement. These birds are sold everywhere as cage birds, their attraction being mainly their beauty, for the song is brief and of little account. See Plate of CAGE BIRDS.

JAVELIN, jăv'lĭn (OF. *javelin, javeline*, Fr. *javeline*, from Bret. *gavlin, gavlod*, javelin, *gavl, gaol*, fork of a tree, Welsh *gafl*, fork of the thighs, Ir. *gabul, gabel*, gable; connected with OHG. *gabala*, Ger. *Gabel*, AS. *geaful*, Eng. *gable*, Skt. *gabhasti*, gable). A long heavy spear, used by ancients for hurling or thrusting. In the Roman legion the first and second lines (the *hastati* and the *principes*) were both armed with two javelins to each man. Each javelin (Lat. *pilum*) was in all about 6¾ feet in length. The shaft was 4½ feet long, of tough wood, an inch in diameter; the remainder was given to the barbed pyramidal head. In action the legionary hurled one javelin on the enemy at the first onset; the second he retained as a defense against cavalry. The Goths and other barbarians used a javelin.

JAVELLE (zhȧ-vĕl') **WATER.** See HYPOCHLOROUS ACID.

JAWOROW, yȧ-vō'rôv. A town in the Austrian Crownland of Galicia, 29 miles northwest of Lemberg (Map: Austria, H 2). It makes pottery, beer, and liquors and has a large farming industry. The castle with its famous Italian gardens was the favorite resort of the Polish King John Sobieski, and here Peter the Great and Catharine were married. At a short distance is the sulphur spring and bath, Szklo. Pop., 1900, 10,090; 1910, 13,160, mostly Ruthenians, Poles, and Jews.

JAWS. The upper jaw is formed by the union of the two superior maxillary bones. The lower jaw or mandible consists of one bone, the inferior maxillary. The superior maxilla is described as consisting of a body, which is roughly cuboidal in shape, and four processes, viz., the malar, which articulates with the cheek bone; the nasal, into which the thin nasal bones fit; the alveolar, which gives lodgment to the teeth; and the palate, which forms the bony roof of the mouth. The body of the maxilla is hollow and contains the antrum of Highmore; its superior surface takes part in the formation of the orbit, and its internal surface forms the wall of the nostril.

The inferior maxillary bone consists of the body, curved somewhat like a horseshoe, and two perpendicular portions called rami, which join the body nearly at a right angle. Springing upward from the junction of the body and rami are the coronoid processes, which give attachment to the powerful temporal muscles. The upper border of the body presents hollows for the lower teeth, and the outer angle of the jaw gives attachment to the powerful muscle of mastication, the masseter. The upper jaw is fixed, the mandible moving only in chewing.

The joint of the jaw is a condyloid articulation and is formed by the reception of the condyle of the inferior maxilla into the glenoid fossa of the temporal bone. Although firmly bound by five ligaments, dislocation forward often occurs from opening the mouth too widely, as in yawning, as well as by violence. The dislocation is easily reduced by grasping the lower jaw with both hands, the thumbs resting on the lower teeth, pressure being made steadily downward and then backward. The jaw may become fixed as the result of ankylosis of the joint, from injury, syphilis, or chronic arthritis, or as the result of muscular spasm, as in tetanus (lockjaw), or the irritation of an erupting wisdom tooth, or, occasionally, in hysteria. The spongy alveolar processes of the jaws are liable to infection from the teeth or gums, giving rise to necrosis, or more often to alveolar abscess. Necrosis of the jaws was common among workers in match factories under the old process of manufacture, which has generally been discontinued (see OCCUPATIONAL DISEASES), this necrosis being due to phosphorus poisoning. Fracture of the lower jaw is a common injury, resulting nearly always from violence. It is treated by reducing the fragments into their normal position, closing the mouth so that the upper teeth act as a splint, placing a pad of gauze over the point of fracture, and applying a four-tailed bandage. (See BANDAGE.) In many cases it is possible, after a few days, to hold the parts in place by wiring the teeth. Diet must be liquid, and the food introduced through an opening in the teeth.

JAXARTES, jăk-sär'tēz. The ancient name of the Syr Darya (q.v.).

JAY (OF. *jai, gai, gay*, Fr. *geai*, from OF. *gai*, gay, from OHG. *gāhi*, Ger. *gähe, jähe*, quick). A popular English name for a considerable number of birds of the family Corvidæ. They are sometimes separated from the crows as a special subfamily, the Garrulinæ, but it is difficult to define the group satisfactorily. The jays have the wings shorter than the tail, which is long and rounded, or even graduated, and they are generally, but not always, brightly colored, some shade of blue being very characteristic. But these characters will not serve to distinguish them from the magpies, which are very near allies, the so-called blue magpies of the Old World forming an evident connecting link. Jays are smaller than crows and are more distinctly arboreal; when on the ground, they hop. The jays of the Old World belong to genera distinct from those of America, with the single exception of *Perisoreus*, which is circumpolar.

The bird to which the name "jay" was originally given is the common jay of Europe (*Garrulus glandarius*), which is somewhat over a foot in length and beautifully colored, being vinaceous gray varied with black and white, with exquisite black, white, and blue markings on the wings; the head is provided with a conspicuous black-marked crest. It is a common British bird, although its numbers have diminished under the persistent attacks of gamekeepers.

Blue Jay. The best-known American bird of this subfamily is the blue jay (*Cyanocitta cristata*), which is somewhat smaller than its European cousin and is provided with equally beautiful plumage. The general color above is purplish blue and beneath dusky white; forehead, and a yoke-shaped band on the sides of the neck and across the upper breast, black; wings and tail blue, beautifully variegated with black and white. The blue jay is found throughout eastern North America, from Newfoundland and Hudson Bay, south to Florida and the Gulf, and west to the Plains. It breeds throughout its range and is only partially migratory. As spring approaches, the blue jay becomes a quieter, more domestic and retiring bird, and prepares for the breeding season. The nest is well built of twigs and roots, lined with rootlets, and usually placed in a tree in the woods or an old orchard, at some distance from a house. The eggs are four or five in number, brownish olive or ashy green, thickly marked with rather indistinct spots of a darker shade. It is during and after the breeding season that the blue jay's worst traits come to light, for then he becomes an inveterate robber of birds' nests and devours both eggs and young with avidity. At such times he is quiet, sly, and cowardly. Later in the summer insects, nuts, fruits, and seeds form the staples of his diet, and in the winter he will eat almost anything. The notes of the blue jay are numerous and variable; he is a mimic and somewhat of a ventriloquist, but he is not a singer, and most of his cries are harsh and discordant. The blue jay delights in attacking owls and squirrels. While not truly gregarious, blue jays often travel about in small companies, especially during the winter.

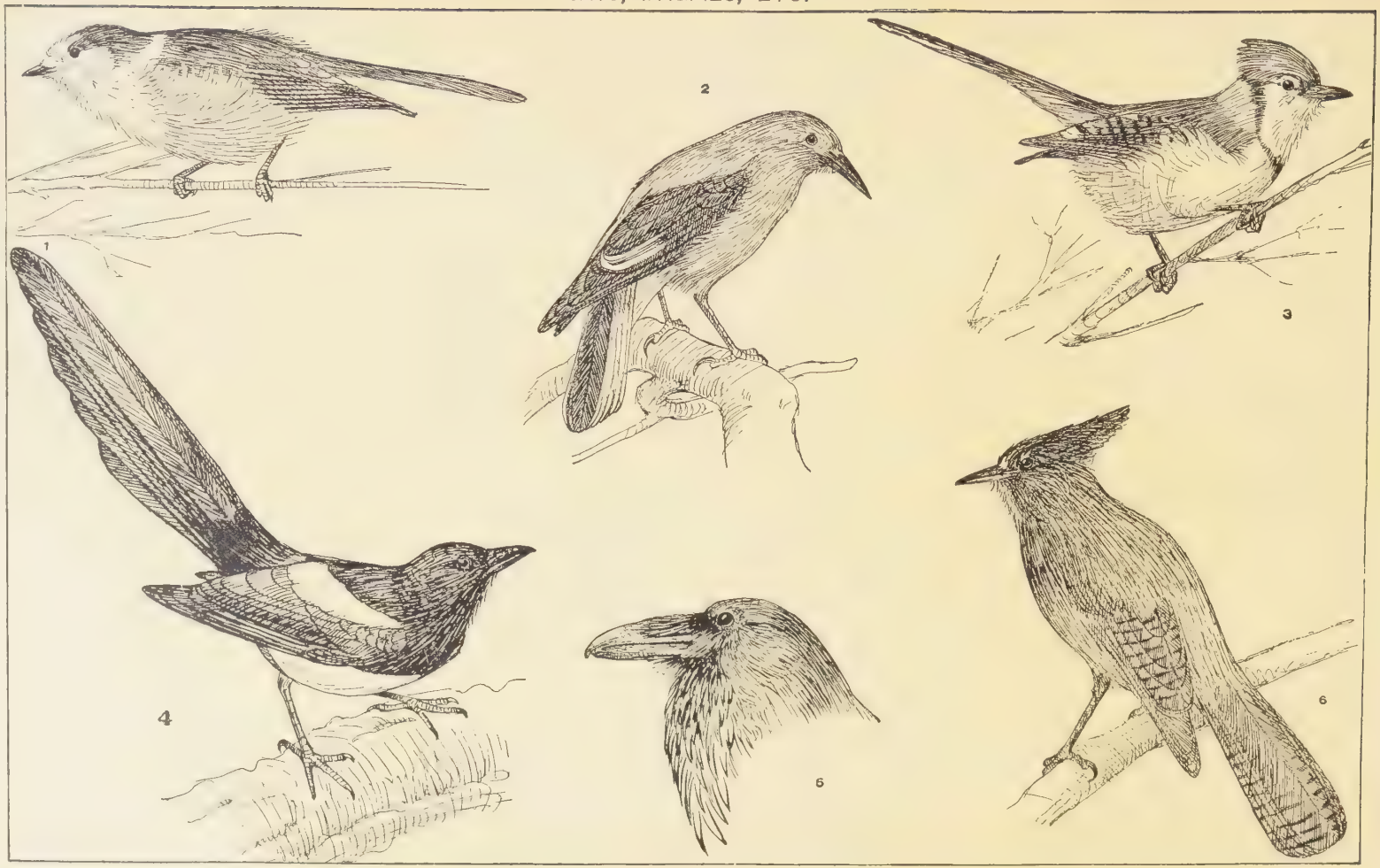
Other American Jays. Several other species of jay occur in North America, variously subdivided by ornithologists into a dozen or more subspecies. One of the most distinct and easily recognized species is the Canada jay, whisky jack, or moose bird (*Perisoreus canadensis*), one of the best-known birds of Canada and the North. Utterly unlike the blue jay in appearance (it lacks a crest), its manners and habits are very similar. The plumage is ashy gray, and only the forehead and throat are white. It becomes very tame about the camps of loggers and trappers in the northern woods and is famous for the great variety of its notes. It breeds very early in the spring, while there is still much snow on the ground and the weather is very cold. The nest is not unlike that of the blue jay, but the eggs are white, spotted with olive brown. This species, in one form or another, ranges throughout North America from Labrador to Alaska, south to the northern tier of States, in the Rocky Mountains to New Mexico and Arizona, and on the Pacific coast to Oregon. The Florida jay (*Aphelocoma floridana*, or *cyanea*) is another crestless jay, but the general color is blue, with more or less white and ashy. It is abundant in Florida, but is wholly confined to that State, although closely allied species occur in the Rocky Mountain region and in California. A well-known and widely distributed Western jay is Steller's jay (*Cyanocitta stelleri*), varieties of which are known as the black-headed jay, blue-fronted jay, and long-crested jay. These birds are especially characteristic of the Rocky Mountain and Sierra Nevada regions, while the typical form is seen from Oregon to Alaska, replacing the blue jay of the East. These jays have the whole head, neck, and back sooty blackish or brownish, the remainder of the plumage blue of some shade, with black markings on the wings. Their habits are similar to those of the Eastern bird. One other North American jay deserves mention, not only because of its beauty, but because it represents a group of jays characteristic of the warmer parts of America, notable for brilliancy of plumage. This is the Rio Grande, or green, jay (*Xanthoura luxuosa*), abundant in some parts of the lower Rio Grande valley. It is about the size of the blue jay, but has no crest, and the prevailing colors are green above and greenish yellow below; but the sides of the head, the chin, throat, and breast, and markings on the wings are black, while the top of the head is rich blue and the forehead is white. The nest and eggs are similar to those of the less gorgeous jays.

Consult: Elliott Coues, *Birds of the Northwest* (Washington, 1874); Dresser, *Birds of Europe* (London, 1879); William Newton, *Dictionary of Birds* (London and New York, 1893–96); L. S. Keyser, *Birds of the Rockies* (Chicago, 1902); Dawson and Bowles, *The Birds of Washington* (Seattle, 1909).

JAY. A town, including several villages, in Franklin Co., Me., about 38 miles northwest of Augusta, on the Androscoggin River and on the Maine Central Railroad (Map: Maine, B 4). There are pulp and paper mills, large granite quarries, novelty works, a corn-canning factory, and a large electric-power plant. Pop., 1900, 2758; 1910, 2987.

JAY, Sir James (1732–1815). An American physician, brother of John Jay. He was born in New York City, studied medicine, and became a practicing physician. He was instrumental in obtaining the endowments for King's (now Columbia) College, New York, and Benjamin Franklin's projected college (now the University of Pennsylvania) in Philadelphia. For the purpose of soliciting contributions for these colleges, he visited England in 1762, where he was knighted by the King, George III. His writings

JAYS, MAGPIES, ETC.



1. CANADA JAY (Perisoreus canadensis).
2. CLARK'S NUTCRACKER (Nucifraga columbiana).
3. BLUE JAY (Cyanocitta cristata).
4. MAGPIE (Pica pica hudsonia).
5. AMERICAN RAVEN (Corvus corax sinuatus).
6. LONG-CRESTED JAY (Cyanocitta stelleri diademata).

include two pamphlets relating to the collections made for the colleges in America (1771 and 1774) and *Reflections and Observations on the Gout* (1772).

JAY, JOHN (1745–1829). An eminent American statesman and jurist. He was born in New York City, Dec. 12, 1745, of French-Huguenot descent, and was the son of Peter Jay, a wealthy merchant. He passed his childhood at Rye, N. Y.; was educated in New Rochelle, N. Y., and at King's (now Columbia) College, where he graduated in 1764; studied law in the office of Benjamin Kissam in New York City; was admitted to the bar in 1768 and soon attained eminence in his profession. In 1770 he was one of the group of lawyers, several of whom later became famous, who formed the professional club known as The Moot. He was made secretary of the commission appointed to determine the disputed boundary between New York and Connecticut in February, 1773, and in April of the following year married, at Elizabeth, N. J., Sarah Livingston, the daughter of William Livingston (q.v.), thus allying himself with one of the most influential Whig families in the Middle Colonies. In the pre-Revolutionary disturbances, though insistent for what he considered to be the rights of the colonists, he allied himself with the conservative element in New York and deprecated the radicalism of such men as Isaac Sears and John Lamb, the leaders of the Sons of Liberty. In May, 1774, he was made a member of the important Committee of Fifty-One in New York, appointed "to correspond with our sister Colonies on all matters of moment," which was controlled by the conservative element and opposed all acts of violence. The answer sent by it to the communication of May 13 from Boston urging New York to concur in a policy of nonimportation and of a discontinuance of trade with the West Indian Islands is attributed to Jay. Jay was a delegate to the First Continental Congress in 1774, was a member of the committee appointed "to state the rights of the Colonies in general," supported Galloway's celebrated plan for an accommodation with the mother country (see GALLOWAY, JOSEPH), and drafted the address to the people of Great Britain. After his return to New York he was an influential member of the dominating Committee of Inspection and of the Committee of Observation, which succeeded it; was a member of the committee for the relief of Boston, and was also a member of the so-called Provincial Convention, an electoral body, by which he was chosen one of the delegates of New York to the Second Continental Congress. He became a colonel of New York City militia, and in 1776 was chosen a member of the Provincial Congress of New York, by which body he was called away in May from the Continental Congress at Philadelphia, thus failing to become a signer of the Declaration of Independence. Of the Provincial Congress, later called the Convention of the Representatives of the State of New York, which assembled in July, 1776, he was also a member. He drafted the resolution which was passed authorizing the New York delegates in the Continental Congress to sign the Declaration; was chairman of a secret military committee vested with extraordinary powers, which was appointed at the time of Lord Howe's expected passage up the Hudson River; was a member of other important committees; and in December, 1776, was the author of an address issued by the Convention to the people of the Colony. Early in the following year he had an important share in the drafting of the Constitution and Bill of Rights for the State of New York. Upon the adoption of that instrument he was made a member of a Council of Safety and was appointed Chief Justice pro tempore, being regularly confirmed early in September. Late in 1778 he again became a member of Congress, without vacating his seat on the bench, and on December 10 he was elected President of that body to succeed Henry Laurens, in which position he remained until Sept. 28, 1779, when he was succeeded by Samuel Huntington, having previously, on August 10, resigned the chief-justiceship. In September, 1779, he was appointed United States Minister to Spain, and on October 20 started on his mission. He was never officially received by the Spanish government, which, though allied with France and at war with Great Britain, steadily refused to recognize the independence of the United States. Aside from securing a few small loans, he was able to accomplish nothing, and after an unsatisfactory and in many respects a humiliating sojourn of two years he proceeded to Paris in the early summer of 1782 to join Franklin in negotiating the treaty of peace with Great Britain. The two were later joined by John Adams. In this capacity Jay, along with his fellow commissioners, rendered an invaluable service to his country, and he himself is considered to have had perhaps a predominant share, on the American side, in the delicate negotiations which resulted in the signing of the Treaty of 1783. Jay returned to New York in 1784, refusing appointments both to the English and the French court, and from that time to 1789 was Secretary for Foreign Affairs under the Confederation. He strongly approved of the Federal Constitution drawn up by the Philadelphia Convention of 1787 and coöperated with Alexander Hamilton to secure its ratification by New York, writing some of the papers known collectively as the *Federalist* (q.v.), and taking an active part in the debates in the State Convention at Poughkeepsie. He also published anonymously *An Address to the People of New York in Vindication of the Constitution.* Upon the organization of the Federal government Jay was allowed by Washington his choice of all the public offices to be filled by the President's appointment, and chose that of Chief Justice of the Supreme Court, which position he filled with marked dignity and ability until 1795. In 1794 he was sent to England to negotiate with regard to various matters then in dispute between the two countries and concluded with Lord Grenville what is known in American history as the Jay Treaty (q.v.). From 1795 to 1801, for two terms, he was Governor of the State of New York, and thereafter, refusing an appointment to his old position as Chief Justice, he lived in retirement on his estates at Bedford in Westchester Co., N. Y., until his death, on May 17, 1829. Politically Jay was ranked with Hamilton as one of the ablest and most influential leaders of the Federalist party. Consult: William Jay, *Life of John Jay, with Selections from his Correspondence and Miscellaneous Papers* (2 vols., New York, 1833); Whitelocke, *Life and Times of John Jay* (ib., 1887); H. P. Johnston (ed.), *Correspondence and Public Papers of John Jay* (4 vols., ib., 1890–93); Pellew, *John Jay,* in the "American Statesmen Series" (Boston, 1890).

JAY, JOHN (1817–94). An American lawyer and diplomat, son of William Jay (q.v.) and a grandson of Chief Justice John Jay (q.v.). He was born in New York City, graduated at Columbia College in 1836, and was admitted to the bar three years later. He early became intensely interested in the antislavery movement, and while still in college (1834) was president of the New York Young Men's Antislavery Society. He was active in the Free Soil Party movement, presided at several of its conventions, and was once its candidate for Attorney-General of New York. In 1854 he organized the series of popular meetings in the Broadway Tabernacle and the next year was prominently identified with the founding of the Republican party. From 1869 to 1875 he was United States Minister to Austria-Hungary. In 1877 Secretary Sherman appointed him chairman of the special commission to investigate Chester A. Arthur's administration of the New York Custom House. In 1883 Gov. Grover Cleveland appointed him the Republican member of the New York Civil Service Commission, of which he later became president. He published many books and pamphlets on slavery and other questions and in 1889 was president of the American Historical Association.

JAY, WILLIAM (1769–1853). An English Nonconformist minister, born at Tisbury, Wiltshire. He was apprenticed to his father, a stonecutter and mason; but in 1785 he was sent to school under Cornelius Winter, a dissenting clergyman. He preached at Christian Malford near Chippenham for two years; at Hope Chapel, Clifton, for one year; and in 1791 was ordained pastor of the Argyle Independent Chapel at Bath. He acquired a wide reputation as an eloquent pulpit orator. He published: *The Mutual Duties of Husbands and Wives* (1801; 6 editions); *Sermons* (2 vols., 1802–03); *Short Discourses* (2 vols., 1805); *Morning Exercises in the Closet* (1829; 10 editions); *Evening Exercises* (1831); *Sermons Preached at Cambridge* (5 parts, 1837); a collected edition of his *Works* (12 vols., 1842–48; new ed., 8 vols., 1876); *Autobiography* (1854).

JAY, WILLIAM (1789–1858). An American reformer and jurist, the son of John Jay (1745–1829). He was born in New York City, graduated at Yale in 1808, and then studied law at Albany, though poor eyesight soon compelled him to give up the profession. He early became interested in various philanthropic enterprises and reforms and identified himself especially with the temperance, antislavery, and antiwar movements. He was one of the founders (in 1816) of the American Bible Society, which he defended against the vigorous attacks of the High Church party; was judge of common pleas in New York from 1818 to 1820; and was first judge of Westchester County from 1820 to 1842, when he was removed on account of his antislavery views. An enthusiastic member of the American Antislavery Society, whose constitution he drafted, he stood with Birney at the head of the conservative Abolitionists, and by his calm, logical, and judicial writings exerted for many years a powerful influence. From 1835 to 1837 he was the society's corresponding foreign secretary. As a protagonist of the antiwar theories, he was also conspicuous, and was for many years president of the Peace Society. His most valuable publication was the *Life and Writings of John Jay* (1833), in which the part played by his father in the diplomacy of the Revolution was first adequately pointed out.

JAYADÉVA, jā'yā-dā'vā (c.1200 A.D.). A Hindu poet, probably a native of Bengal. His only extant Sanskrit work, a lyric drama called *Gītagōvinda* (Song of the Cowherd), treats of the love, estrangement, and reconciliation of Krishna and the milkmaid Rādhā. Though dating from the twelfth century, it is the earliest literary example of a primitive type of play that still survives in Bengal and must have preceded the regular dramas. The poem, which is in 12 cantos of artistically varied metrical structure, was presumably based on Prakrit originals and is notable for its vivid portrayal of the emotions. At a later time it was interpreted as a religious allegory. Lassen (Bonn, 1836) published the text, with Latin translation and notes, and native editions are numerous, as those by Vidyasagara (Calcutta, 1882) and by Telang and Pansikar (Bombay, 1899). Sir William Jones (London, 1799; new ed., Calcutta, 1894) and Sir Edwin Arnold (*The Indian Song of Songs*, London, 1875) have translated the poem into English, the latter from the allegorical point of view. There is also a German version of part of the drama by Rückert (Göttingen, 1837), which approaches as near to the highly artificial beauty of the original as is possible in a translation. Jayadéva likewise wrote a poem in Hindi, which was published, with a translation by Trumpp, in the *Sitzungsberichte der bairischen Akademie der Wissenschaften* (Munich, 1879). His *Chandraloka*, a treatise on rhetoric, has been edited by Vidyasagara (2d ed., Calcutta, 1906). Consult Macdonell, *History of Sanskrit Literature* (London, 1913).

JAY'HAWKER. A name applied in the Southern and Western States of the American Union to an irregular, lawless, freebooting soldier not enlisted or in uniform—a guerrilla or bushranger. The term originated in Kansas during the bloody strife between the slavery and antislavery parties and is said to have been first applied to a few isolated "Free State" men in the southeastern part of the Territory, who organized a system of retaliation against proslavery outrages, but who ultimately became robbers and assassins. The term appeared in a proclamation of Gen. James Lane in October, 1861, in which he declared that the people of Kansas were neither thieves, plunderers, nor jayhawkers. The term was also applied by General Sheridan during the Reconstruction period to certain lawless persons in Louisiana. Its origin is not certainly known. According to one theory, it was first applied to Colonel Jennison, of New York, who was known among his comrades as the "Gay Yorker," a phrase from which "jayhawker" was corrupted. A more probable theory is that the term was derived from "jay" and "hawk" in allusion to the predatory nature of these birds.

JAYME, HĪ'MĂ, I AND II. Kings of Aragon. See JAMES.

JAYNE, HORACE (1859–1913). An American zoölogist and educator. He was born in Philadelphia, was educated at the University of Pennsylvania (A.B., 1879; M.D., 1882), and studied biology at the universities of Leipzig and Jena in 1882–83 and at Johns Hopkins for a year. In 1884 he was appointed professor of vertebrate morphology at the Wistar Institute of Anatomy, University of Pennsylvania, and from 1894 to 1905 was professor of zoölogy and

director of the institution; in the university he was secretary of the biological faculty (1884–89) and dean of the college faculty (1889–94). He became a trustee of Drexel Institute and served as coeditor of several scientific journals. His writings include: *Abnormalities Observed in the North American Coleoptera* (1880); *Revision of the Dermestidæ of North America* (1882); *Mammalion Anatomy* (1898).

JAY TREATY. In American history, the name applied to a treaty negotiated in 1794 by John Jay on the part of the United States and Lord Grenville on the part of Great Britain. The refusal of Great Britain to observe several of the obligations imposed by the definitive treaty of peace signed in Paris in 1783, among them the compensation for negroes carried away by the retiring British army and the continuation of garrisons in the forts on the northwestern frontier, had produced a hostile feeling in America that was increased by Great Britain's restrictions on American commerce, her refusal to enter into any commercial treaty with the United States and, beginning in 1793, her insistence on the right of search and impressment. In the winter of 1793–94 war actually threatened. On April 7, 1794, a proposal was made in Congress, in accordance with a recommendation for retaliatory legislation made by the Secretary of State, Jefferson, to prohibit all commercial intercourse with England after Nov. 1, 1794, unless before that date the northwestern forts should be evacuated, and pledges given of a cessation of search and impressment. Before this resolution passed, however, Washington, who feared the result of such an enactment, intervened, and on April 16 sent to the Senate the nomination of Chief Justice John Jay as a special Ambassador to negotiate a treaty adjusting the difficulties. The nomination was immediately confirmed by a vote of 18 to 8, and the House nonintercourse resolution was defeated in the Senate by the casting vote of Vice President Adams. Jay reached London June 15, and on November 19 signed with Lord Grenville a treaty of 28 articles. The evacuation of the forts was the only one of the American claims definitely decided. Nothing whatever was said about either the right of search or impressment, or the question of compensation for the negroes. The settlement of the boundaries on the northeastern and northwestern frontiers was to be decided by a joint commission, as was the question of the collection of British debts. The last 18 articles constituted a treaty of commerce, by the provisions of which, with certain qualifications, trade was to be allowed with Great Britain and the East and West Indies. Further provisions related to the fitting out of privateers, defined contraband goods, and contained a renunciation of all American-European trade in West Indian products, such as sugar, molasses, cocoa, and cotton. One clause, the operation of which was limited to two years from the close of the existing war, provided that American vessels not exceeding 70 tons' burden might trade with the West Indies under certain restrictions. On June 8, 1795, the treaty was laid before the Senate in executive session, and it was ratified June 24 by a vote of 20 to 10, with the exception of the clause relating to trade with the West Indies. On July 2, before the terms of the treaty had been officially made public, its text was published in the *Aurora*, the Anti-Federalist organ in Philadelphia. An outbreak of public wrath and denunciation followed, such as has seldom occurred in the history of the Republic. Jay was burned in effigy from New England to Georgia, and both he and Washington were declared to have been bought with British gold. Even Washington's impeachment was suggested, and the attacks were of such a character as to draw from him the protest that they were "so exaggerated and indecent as could scarcely be applied to a Nero, a defaulter, or even to a common pickpocket." But the outbreak subsided almost as quickly as it had begun, the defenses and explanations of the treaty in the press, particularly in the famous "Camillus" letters of Hamilton and King, brought about a saner state of public opinion, and on April 30, 1796, the House, after debating the question for several months and listening to the able speeches of Fisher Ames and others in its defense, resolved by a vote of 51 to 48 that the terms of the treaty ought to be carried into effect.

Bibliography. Alexander Hamilton, *A Defense of the Treaty of Amity and Navigation Entered into between the United States and Great Britain as it has Appeared under the Signature of Camillus* (New York, 1795); James Monroe, *Views of the Conduct of the Executive in Foreign Affairs of the United States* (Philadelphia, 1797); United States House of Representatives, *Debates in the House of Representatives during the First Session, Fourth Congress, upon Questions Involved in the British Treaty of 1794* (2d ed., ib., 1808); Theodore Lyman, *Diplomacy of the United States* (2d ed., 2 vols., Boston, 1828); John Jay, *Life of John Jay* (2 vols., New York, 1833); Trescott, *Diplomatic History of the Administrations of Washington and Adams, 1789–1801* (Boston, 1857); Hildreth, *History of the United States of America* (rev. ed., 6 vols., New York, 1877–80); Lalor, *Cyclopedia of Political Science* (3 vols., ib., 1893); Thomas Jefferson, *Writings*, ed. by P. L. Ford, vol. vii (ib., 1896); H. C. Lodge, *George Washington*, in "American Statesmen Series" (2 vols., Boston, 1899); G. Pellew, *John Jay*, in "American Statesmen Series" (ib., 1899); E. Smith, *England and America after Independence* (Westminster, 1900); Alexander Johnston, *American Political History, 1763–1876* (2 vols., New York, 1905); J. S. Bassett, *Federalist System*, in "American Nation Series" (ib., 1906); A. B. Hart, *Manual of American History, Diplomacy, and Government* (Cambridge, Mass., 1908), contains a bibliography; McLaughlin and Hart (eds.), *Cyclopedia of American Government* (3 vols., New York, 1914). For the text of the treaty, consult *Treaties and Conventions* (Washington, 1889).

JAZYGES, jăz'ĭ-jēz (Lat., from Gk. 'Ιαξύγες). One of the numerous tribes which by the ancients were comprehensively named Sarmatians (q.v.). They originally occupied the shores of the Black Sea and the Sea of Azov. Later, part of them moved westward, and a detached body of them even settled as far west as the region between the Theiss and the Danube in the centre of modern Hungary. At first friendly to Rome, they later opposed the Romans, under Domitian, and were subdued by Marcus Aurelius during his war with the Marcomanni. Under the Hungarian kings the inhabitants of a part of this region, who had a special military organization, came to be known as Jászok (bowmen), and the district in which they lived re-

ceived the name of Jászság, which was Latinized into Jazygia. These names have been perpetuated to our times, and at the present day a body of Magyars numbering about 70,000 still figure as Jazygians. See HUNGARY. Consult "Sarmatia," in Lübker, *Reallexikon der klassischen Altertums* (8th ed., Leipzig, 1914).

JEAFFRESON, jĕf'ēr-son, JOHN CORDY (1831–1901). An English author. He was born Jan. 14, 1831, at Framlingham, Suffolk, England, where his father was a surgeon. He began the study of medicine, but, changing his intentions, he went to Oxford and from there to Lincoln's Inn, where he was admitted to the bar in 1859. In 1854 he published his first novel, *Crewe Rise,* which was followed by *Live it Down* (1863), *Not Dead Yet* (1864), *A Woman in Spite of Herself* (1872), and several others. In 1858 appeared *Novels and Novelists from Elizabeth to Victoria.* But his most important works are his three books on the three learned professions, *A Book about Doctors* (1860; an Amer. ed., Akron, Ohio, 1904); *A Book about Lawyers* (1866); *A Book about the Clergy* (1869). Other works are the *Annals of Oxford* (1871); *Brides and Bridals* (1872), a history of marriage in England; *A Book about the Table* (1875); *The Real Lord Byron* (1883); *The Real Shelley* (1885); *Lady Hamilton and Lord Nelson* (1888; revised in 1897); *A Book of Recollections* (1894). He was also a frequent contributor to the *Athenæum, Fraser's Magazine,* the *Dublin University Magazine,* and to other periodicals as well as to the London daily press.

JEALOUS WIFE, THE. A comedy by George Colman the Elder (1761). The plot is said to have been partly taken from Fielding's *Tom Jones.*

JEAMES, jēmz. A pseudonym used by Thackeray in his *Jeames's Diary,* contributed to *Punch.* From this diary of a footman the name has become a popular term for a flunkey.

JEAN CRAPAUD, zhăn krà'pō'. A Frenchman. See NATIONAL NICKNAMES.

JEAN DE PARIS, zhăn de pà'rē'. An opera by Boieldieu (q.v.), first produced in Paris, April 4, 1812; in the United States, Sept. 28, 1827 (New York).

JEANES, jēnz, ANNA T. (1822–1907). An American Quaker philanthropist, born in Philadelphia. Her benefactions included $200,000 to Spring Garden Institute, Philadelphia, a technical school; $100,000 to the Hicksite Friends; $200,000 to the Quaker schools of Philadelphia; and $200,000 to the Home for Aged Friends, an institution where she spent the closing years of her own life. In 1907 she transferred to the trusteeship of Booker T. Washington and Hollis B. Frissell the sum of $1,000,000 to be known as "The Fund for Rudimentary Schools for Southern Negroes" and to be used exclusively for the benefit of elementary negro schools in the South. Her $45,000 bequest to Swarthmore College was refused because of the condition that the college give up intercollegiate sports. See JEANES FOUNDATION.

JEANES (ANNA T.) **FOUNDATION.** In 1907 Miss Anna T. Jeanes, of Philadelphia, left a sum of $1,000,000 for the purpose of fostering negro education. The board administering the fund aims to secure the coöperation of existing educational authorities to develop improved means of education for the negroes. Its activities, which are confined to the Southern States, are exercised in three directions: (1) securing the appointment of teachers to direct and supervise industrial education; (2) encouraging through the appointment of teachers the development and supervision of extension work; and (3) appointing county agents to supervise the schools, stimulate public interest in the schools, and to improve home conditions. The board does not seek to assume the burden of expense on this work, but rather to point the way for new educational endeavor. The work is constructed in close coöperation with the General Education Board (q.v.).

JEAN JACQUES (zhăn zhàk) **I.** The title given to the negro military leader Jean Jacques Dessalines (q.v.).

JEANNE D'ALBRET, zhän dàl'brâ'. See ALBRET, JEANNE D'.

JEANNE D'ARC, därk. See JOAN OF ARC.

JEANNE D'ARC. An opera by Gounod (1873).

JEANNETTE, jĕn-nĕt'. A borough in Westmoreland Co., Pa., 27 miles east by south of Pittsburgh, on the Pennsylvania Railroad (Map: Pennsylvania, B 6). It is supplied with natural gas and has important manufactures of window glass, flint glass, tableware, lamps and shades, mine fans, rubber goods, bottles, etc. Oakford is the principal park. Jeannette was settled in 1888 and incorporated in the following year. The government is administered by a burgess, chosen every four years, and a borough council, elected on a general ticket. Pop., 1900, 5865; 1910, 8077; 1914 (U. S. est.), 9020; 1920, 10,627.

JEANNETTE EXPEDITION. See POLAR RESEARCH; DE LONG.

JEANNIN, zhà'năn', PIERRE (1540–1622). A French statesman, born at Autun. He was educated under Cujas, was an advocate at the Parlement of Dijon in 1569, and councilor in 1572, and as advocate of the State of Burgundy (1579) he was unable to prevent the St. Bartholomew Massacre from extending to his district. When councilor to the Duke of Mayenne, he strove to bring about a reconciliation between him and Henry IV, who took him into his own service in 1595, and he was made Intendant of Finances in 1602 and General Comptroller in 1610. A commissioner for the Treaty of Lyons with the Duke of Savoy, he was afterward instrumental in forming the important alliance between France and Holland in 1608, whereby Spain was obliged to acknowledge Dutch independence. Always on the side of conciliation, he tried to make peace between Louis XIII and Maria de' Medici. His *Négociations* were published posthumously in 1656 (2 vols.), in 1659 (3 vols.), in 1819, and in 1837, while they are to be found also in *Nouvelles collections des mémoires pour servir à l'histoire de France,* vol. iv (2d ser., 1887).

JEAN PAUL, zhăn pôl. See RICHTER, JOHANN PAUL.

JEAN POTAGE, pô'tàzh' (Fr., John Pottage). A nickname of the French, based on their fondness for soups and sauces.

JEANRON, zhăn'rôn', PHILIPPE AUGUSTE (1807–77). A French painter, born at Boulogne-sur-Mer. He was a pupil of Sigalon and Souchon and exhibited genre painting from 1831 to 1838, when he took up landscape. Without ceasing to paint he began to write criticisms for the magazines and newspapers and founded a Free Society of Painting. After the events of June 13, 1848, he saved the life of Ledru-Rollin by hiding him in the Louvre for 12 days

and in the same year, on the success of the Revolution, was appointed by Ledru-Rollin director of the national museums, holding office until 1850. He greatly improved the arrangement and classification of the various collections of the Louvre, founded the Luxembourg Museum, and gave many commissions to painters of the modern school, now held in high favor but then despised. Among his best paintings are: "The Isle of Calypso," at Bayeux; "Limoges Peasants," at Lille; "Beheading of John the Baptist," at Rouen; "Mirabeau," at Versailles. He is to be classed with the Barbizon school (see BARBIZON, THE PAINTERS OF), in which he was a painter of some distinction.

JEBAIL. See JEBEIL.

JEBB, JOHN (1775–1833). An Irish theologian, Bishop of Limerick. He was born at Drogheda, graduated M.A. at Trinity College, Dublin, in 1801, and in 1810 became curate at Mogorbane, Tipperary. Twelve years afterward Jebb was made Bishop of Limerick, Ardfert, and Agadhoe as a recognition of his services in the distress and disquiet following the famine of 1822. Jebb's great work in the Church was the reform of theological examinations. He favored High Church ritual, many services and communions, and has been reckoned a forerunner, with his friend Alexander Knox, of the Oxford movement. Jebb wrote several volumes of sermons, and his correspondence with Knox was published in 1836. Consult Charles Foster (ed.), *Thirty Years' Correspondence between John Jebb and Alexander Knox* (2d ed., 2 vols., London, 1836); James Wills, *Lives of Illustrious Irishmen,* vol. vi (Dublin, 1847).

JEBB, SIR RICHARD CLAVERHOUSE (1841–1905). An eminent Scottish classical scholar. He was born at Dundee, Scotland, and was educated at St. Columba's College, Dublin, the Charterhouse School, London, and Trinity College, Cambridge, where he graduated with the highest honors in 1862. In 1871 he became governor of Charterhouse School and in 1872 was appointed classical examiner in the University of London and tutor of Trinity College. Three years later he was called to the chair of Greek in the University of Glasgow and in 1889 was made regius professor of Greek in the University of Cambridge. Jebb was instrumental in establishing in 1886 the British School of Classical Studies at Athens. He was president of the Society for the Promotion of Hellenic Studies from 1891 to 1905; from 1891 also he was member of Parliament from the University of Cambridge. In 1900 he was knighted. He received honorary degrees from the universities of Edinburgh, Cambridge, Bologna, and Harvard; in 1878, in recognition of his high attainments and his earnest advocacy of the teaching of modern Greek, he was presented with the gold cross of the Order of the Saviour by the King of Greece. His numerous works are all distinguished by great scholarship and brilliant style. Among them the most important are: *The Characters of Theophrastus* (1870; 2d ed. by Sandys, 1909); *Attic Orators* (2 vols., 2d ed., 1893); *Richard Bentley* (English Men of Letters Series, 1882); *Homer* (1887); *A Complete Edition of Sophocles,* with critical notes, commentary, and translation (8 vols., Cambridge, 1883–1903; some plays reached a third edition); an edition of Bacchylides, with text, translation, and notes (ib., 1905); a translation of the *Rhetoric* of Aristotle, published after his death by Sandys (1909); *Essays and Addresses,* also collected and published after his death (Cambridge, 1907); and many monographs on philological subjects. In 1892 he was Turnbull lecturer at Johns Hopkins University. The lectures there delivered were published under the title *The Growth and Influence of Classical Greek Poetry* (1893). Consult Caroline Jebb, *Life and Letters of Sir Richard Claverhouse Jebb* (Cambridge, 1907), and Sandys, *A History of Classical Scholarship,* vol. iii (ib., 1908).

JEBEIL, je-bīl′, or **JEBAIL.** A town in Syria, Asiatic Turkey, situated near Mount Lebanon, 18 miles from Beirut. It is believed to occupy the site of the ancient city of Byblos (q.v.). Pop., about 2500.

JE'BEL BARKAL. See BARKAL.

JEBEL ESH SHEIK. See HERMON, MOUNT.

JECKER, zhe-kâr′, JEAN BAPTISTE (c.1810–71). A Swiss banker, whose difficulties with the Mexican government are said to have been one of the causes which led to the French intervention. He was born at Porrentruy in the Canton of Bern. About 1836 he went to Paris, where he entered the banking house of Hottinguer. His brother, who had achieved considerable fame as a physician in Mexico, persuaded him to emigrate to that country, and there he founded a bank which soon grew to be of the first importance. In 1859 President Miramón confided to it the conversion of the domestic debt, for which Jecker charged an enormous commission; but President Juárez refused to recognize the agreement which had been made by his predecessor. Jecker had further obtained from the government authority to explore Sonora and Lower California; but in spite of this the members of his surveying parties were expelled from the territories. When Napoleon III decided to intervene in Mexican affairs, Jecker ceded to the French government for 10,000,000 francs all his rights in Sonora. In 1861 the Mexican government acknowledged its indebtedness to Jecker, which was fixed at 27,703,770 francs. In order to secure prompter payment he consented that this sum should be reduced to 22,660,000 francs and should be paid in three installments—the first, of 7,660,000 francs, on Oct. 15, 1865; the second, of 5,000,000 francs, on December 15; and the third, of 10,000,000 francs, on Feb. 15, 1866. The first two installments were paid; but Maximilian refused to authorize the third, for this arrangement, besides being disastrous to the Mexican Treasury, was a drain on that of France. Jecker returned to France, was arrested by the Commune in 1871, and shot on May 26.

JEDBURGH, jĕd′bûr-ŭ. A royal and police borough, the capital of Roxburghshire, Scotland, on the Jed, 56 miles southeast of Edinburgh (Map: Scotland, F 4). It has the interesting remains of the magnificent abbey of Austin Canons, founded by King David I in 1118, and of a castle where William the Lion, Alexander II, and other Scottish kings frequently resided. It has also a fine modern grammar school, county buildings, and town hall. Industry includes the manufacture of blankets, beer, leather, and ironwork. Pop. (police borough), 1901, 3136; 1911, 2752. Consult Watson, *Jedburgh Abbey* (Edinburgh, 1877).

JED'DAH. A city of Arabia. See JIDDAH.

JEEJEEBHOY, jē′jēb-hoi′, SIR JAMSETJEE (1783–1859). A Parsi merchant prince and philanthropist, born in Bombay. At an early period he showed a great aptitude for mercan-

tile pursuits, and in consequence his father-in-law, Framjee Pestonjee, a Bombay merchant, took him into partnership. While still young, he visited most of the maritime countries of Asia, besides Egypt, Syria, and England. By the year 1820, when he had completed his twentieth year of business, he had amassed an immense fortune and was universally acknowledged to be the first merchant in the East. He now began to manifest on a magnificent scale his benevolence and between 1822 and 1858 gave upward of $1,000,000. Parsi and Christian, Hindu and Mussulman, were alike the objects of his beneficence. Queen Victoria conferred on him the honor of knighthood. Other honors followed, and in 1857 he was made a baronet of the United Kingdom. He was succeeded in the baronetcy by his eldest son, Cursetjee Jamsetjee Jeejeebhoy, who, in accordance with his father's will, took his father's name.

JEFFERIES, jĕf'rĭz, Richard (1848–87). An English author, born near Swindon, Wiltshire, Nov. 6, 1848. Being wild and restless, he attempted to run away to America when only 16 years old. Later he began to write for the papers and published novels of no moment. He went to London in 1876 and was soon known by his *Gamekeeper at Home* (1877), a remarkable series of nature studies originally contributed to the *Pall Mall Gazette*. This book was followed by *Wild Life in a Southern County* (1879) and other similar but less artistic books on nature. He now took up the novel again, enduing it with perhaps the most subtle appreciation of nature to be found in the entire range of English fiction. His finest work is represented in *Wood Magic* (1881), depicting the life of animals, *Bevis* (1882), and in *The Story of my Heart* (1883) and *Life of the Fields* (1884), the two last-named works, together with the *Gamekeeper at Home*, being his most popular books. In a different vein is the powerfully conceived *After London*, a romance of England after she shall have lapsed into a wilderness (1885). Jefferies died in poverty at Goring, Essex, Aug. 14, 1887. Consult Besant, *Eulogy of Richard Jefferies* (New York, 1888); A. Rickett, *A Vagabond in Literature* (ib., 1906); E. Thomas, *Richard Jefferies: Life and Work* (Boston, 1909).

JEFFERS, jĕf'ẽrz, Wellington (1814–96). A Canadian Methodist clergyman and journalist. He was born in Cork, Ireland, and in early youth was brought by his parents to Kingston, Ontario. He studied for the ministry of the Wesleyan Methodist church and was ordained in 1841. During the greater part of his ministerial career (1841–84) he filled prominent pastorates in Ontario. He was for several years chairman of the district, became secretary of the conference (1853), codelegate (1866), and president of the conference (1879). In 1884 he retired from active work. He was editor of the *Christian Guardian*, the official organ of Canadian Methodism, in 1860–69. He was known throughout English-speaking Canada as a pulpit orator, the vigor and effect of his sermons and addresses being due to his command of extempore speech. He was conservative in his theological outlook and in that behalf wielded a strong influence in the councils of his church. In 1863 the degree of D.D. was conferred upon him by Victoria University.

JEF'FERSON. A city and the county seat of Marion Co., Tex., 48 miles by rail northwest of Shreveport, La., on the navigable Cypress Bayou, and on the Missouri, Kansas, and Texas, the Jefferson and Northwestern, and the Texas and Pacific railroads (Map: Texas, E 3). It is in a region rich in iron ore; has extensive foundries, machine shops, and iron furnaces, cotton-seed-oil mills, and several saw mills; and is an important shipping point for cotton, produce, live stock, etc. The cultivation of vegetables and fruits is extensively carried on in the vicinity. The county courthouse, Carnegie library, high school, United States government building, and an iron bridge across the Bayou are the leading architectural features of the city. Jefferson was settled in 1850 and first incorporated in 1866. It is governed under a general law of 1875 which provides for a mayor, elected biennially, and a council. The water works are owned by the city. Pop., 1900, 2850; 1910, 2515.

JEFFERSON. A city and the county seat of Jefferson Co., Wis., 49 miles by rail west of Milwaukee, at the junction of the Rock and Crawfish rivers and on the Chicago and Northwestern Railroad (Map: Wisconsin, E 5). It has the county asylum for the insane, St. Colletta Institute for Defective Children, and a Carnegie library. There are breweries, a pork-packing plant, creameries, and manufactures of boots and shoes, furniture, motor cycles, cigars, yarn, condensed milk, agricultural implements, wagons and carriages, brick and tile, sash, doors, blinds, etc. Jefferson, settled in 1837, is governed, under a general State charter, by a mayor, chosen every two years, and a council. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 2584; 1910, 2582.

JEFFERSON, Charles Edward (1860–). An American Congregational clergyman, born at Cambridge, Ohio. He graduated from Ohio Wesleyan University in 1882 and from the theological department of Boston University in 1887. In 1882–84 he was superintendent of public schools at Worthington, Ohio. Ordained to the Congregational ministry in 1887, he was pastor at Chelsea, Mass., until 1898, and thereafter occupied the pulpit of the Broadway Tabernacle, New York City. In 1914 he became chairman of the executive committee of the Church Peace Union, endowed by Andrew Carnegie. He is author of *Quiet Hints to Growing Preachers in my Study* (1891); *Quiet Talks with Earnest People in my Study* (1898); *Doctrine and Deed* (1902); *Things Fundamental* (1903); *The Minister as Prophet* (1905); *Faith and Life* (1905); *The New Crusade* (1907); *The Character of Jesus* (1908); *My Father's Business* (1909); *The Christmas Builders* (1909); *The Building of the Church* (1910, 1913); *Why we may Believe in Life after Death* (1911); *The Minister as Shepherd* (1912).

JEFFERSON, Joseph (1829–1905). A distinguished American actor, the fourth of a line of actors, of whom his father and grandfather bore the same name. His mother had been Mrs. Burke, a singer of distinction. He was born in Philadelphia, Feb. 20, 1829, and from infancy was upon the stage, appearing as Cora's child in Kotzebue's *Pizarro* when only three years old, and with Rice as a miniature "Jim Crow" when four years old. In 1838 his father removed to the West, playing in Western and Southern cities. They went in 1842 to Mobile, where his father died of yellow fever, and for

several years after this Joseph went through the hard training of a strolling actor, playing minor parts in many cities of the United States and in Mexico. After his return to the East, in 1849, his circumstances improved, and the next few years were largely spent in various cities of the South. In 1856 he made his first visit to Europe. Returning again to New York, he became a member of Laura Keene's company, and in her newly opened theatre in 1857 appeared as Dr. Pangloss in *The Heir-at-Law*, Caleb Plummer in *The Cricket on the Hearth*, and in several less important rôles. In 1858 he played with E. A. Sothern in Miss Keene's production of *Our American Cousin*, really creating the part of Asa Trenchard. It was while acting in *Our American Cousin* that he began his search in literature for a character combining both humor and pathos, which he finally found in Irving's *Rip Van Winkle;* but his dramatization of the sketch was so unsatisfactory to himself that it was afterward altered and amplified by Boucicault. In its new form it became Jefferson's most famous rôle. He played it for the first time in London, in 1865, and afterward this character, Dr. Pangloss, Caleb Plummer, and Bob Acres in *The Rivals* (which he revived in Philadelphia in 1880) were the principal ones in his repertory. He also acquired a considerable reputation as a landscape painter in oils. Mr. Jefferson was twice married—to Miss Margaret Lockyer in 1850 and, after her death, to Miss Sarah Warren in 1867. He owned a fine plantation in Louisiana, and when not on the stage spent his winters there. He was a member of the American Academy of Arts and Letters. His *Autobiography* (New York, 1890) is full of interesting allusions to many contemporaneous actors and actresses.

Bibliography. William Winter, *The Jeffersons* (Boston, 1881); Carroll, *Twelve Americans: Their Lives and Times* (New York, 1883); Matthews and Hutton, *Actors and Actresses of Great Britain and the United States* (ib., 1886); N. H. Dole, *Joseph Jefferson at Home* (Boston, 1898); Francis Wilson, *Joseph Jefferson* (New York, 1906); M. J. Moses, *Famous Actor-Families in America* (ib., 1906); Francis Wilson, *Reminiscences of a Fellow Player* (ib., 1906); William Winter, *Other Days* (ib., 1908); E. P. Jefferson, *Intimate Recollections of Joseph Jefferson* (ib., 1909).

JEFFERSON, Thomas (1743–1826). Author of the Declaration of Independence, and third President of the United States, born at Shadwell in Albemarle Co., Va., April 2, O. S. (April 13, N. S.), 1743. His father was Peter Jefferson, a man of some prominence in his community; his mother was Jane Randolph, a sister of William Randolph, of Tuckahoe. Thomas was educated first in a common school, in the ordinary studies for a boy of seven, and when nine years old the Rev. Mr. Douglas gave him instruction in French and in the classical languages. He prepared for college under the tuition of the Rev. Mr. Maury and at the age of 17 became a student in William and Mary's College. Jefferson did well in the classics, in French, Italian, and Spanish, and acquired an equipment in mathematics and science such as was rarely had save by special students. On leaving college he turned his attention to law and studied for about five years under George Wythe, the head of his profession in Virginia. In 1767, at the age of 24, he was admitted to the bar; but, although successful, he never took the interest in the practice of his profession that he took in scientific farming and gardening, and he continued it only seven years.

In 1769 Jefferson took his seat in the House of Burgesses, elected on the arrival of the new Governor, Lord Botetourt. A set of too independent resolutions brought about the dissolution of the assembly; but before returning home the Burgesses met at the Raleigh Tavern and adopted a nonimportation agreement, of which Jefferson was one of the signers. The question of emancipating slaves was then being agitated in England, but little had been heard on the subject in the Colonies. Jefferson proposed an act which would give masters the right to free their slaves whenever they thought proper; but the bill failed to pass, and the principle was not established until 17 years later.

His term over, he removed to an unfinished house (subsequently famous as Monticello), and on New Year's Day, 1772, married Martha Skelton, daughter of John Wayles, and widow of Bathurst Skelton.

In March, 1773, when the House of Burgesses came together again, Jefferson, Henry, and others of advanced opinions undertook to form a committee of correspondence for the spread of political intelligence in the Colonies. This scheme had scarcely been adopted and the committee selected when the Governor dissolved the House. In the spring of 1774, however, all of the old members reappeared in their seats, and while this session was in progress news came of the Boston Port Bill. Jefferson, with some of the other leaders, succeeded in having a resolution passed to observe a day of prayer and fasting, and again the Governor resorted to dissolution. The Burgesses in a secret meeting requested the Committee of Correspondence to consult with the other Colonies as to the expediency of a general congress, and then resolved in favor of a meeting of representatives from the counties of Virginia, to be held at Williamsburg on August 1. Jefferson was chosen a representative, but was prevented by illness from attending. He forwarded, however, to Peyton Randolph, the president of the convention, a draft which he hoped to see adopted as instructions to the delegates to be selected for the Colonial Congress. When presented, copies of this document were ordered to be printed, and this first of Jefferson's political writings appeared in pamphlet form as *A Summary View of the Rights of British America.* It spelled virtual independence and was sent to England, where, after receiving some interpolations from the pen of Edmund Burke, it was published and widely circulated—a circumstance which Jefferson regarded as the reason for including his name with others in a bill to punish sedition. In the session of the convention held in the spring of 1775 Jefferson was on the committee to see to the defense of Virginia, and in the expectation that Peyton Randolph might be called home he was elected to the Continental Congress. This vacancy did occur soon; but before he left for Philadelphia he drew up for the Burgesses an answer to the "conciliatory propositions" which the English government had made to the Colonies. This reply, the earliest made by any of the Colonies, was anxiously expected in Congress, and when it was brought by the author it was vigorously indorsed. Jefferson was no debater, for, besides having a

poor voice, he hated contest; but his courtesy, his intellectual keenness, his wide political knowledge, and his power of expression gained him hearty respect, and he soon became the recognized document writer to the assembly. The answer of Congress to Lord North's "conciliatory proposition" was intrusted to Jefferson, who based his paper on the reply he had previously written for Virginia. In the winter of 1775–76 it became so plain that there was no possibility of a reconciliation that Virginia in the following spring instructed her delegates to urge on the final breach. On June 7 Richard Henry Lee presented resolutions to this effect, and before the month was out Jefferson, who was placed first on the drafting committee, presented his report. On July 2 Lee's resolution was passed, and on the same day Jefferson's draft was taken up. The author took no part in the warm discussion over the document, for which, with the exception of a few verbal changes by Franklin and Adams, he was solely responsible. Late in the day of July 4 the Declaration was adopted.

Jefferson did not take his seat at the next session of Congress, because he thought he could best serve his country by preparing the laws of his State for the changed conditions the new government would bring with it. In this task he was not working single-handed, but the initiative was almost entirely his own. In October, 1776, Jefferson took his seat in the Virginia House of Delegates, where for two years he labored incessantly at revising the whole Virginia code, reforming old and proposing new laws. In spite of the opposition of the privileged classes, the old aristocratic framework of Virginia society was in a brief time replaced by a democratic one. In June, 1779, a time when the Revolution looked most hopeless for the Americans, Jefferson was elected Governor of the State where the struggle was to be ended. Virginia had supplied to the Revolution 10,000 men, besides all the horses and arms possible, and Jefferson's first duty was to keep up as well as he could this support. Soon, however, the British pushed the war in the South. In April Cornwallis sent Tarleton to capture the Virginia Legislature, then at Charlottesville, but he succeeded only in dispersing it. Jefferson himself narrowly missed capture at Monticello by a party sent after him. His conduct during this period has been the subject of much thoughtless censure. He was not, indeed, fitted to be a "war Governor," but his course had Washington's substantial approval, for the commander in chief recognized that Virginia was without means of defense and that it was impossible for any one to defend it, and in December, 1781, the Virginia House of Delegates were unanimous in a resolution exonerating him from all censure. Jefferson's wife, to whom he had been singularly devoted, died at this time, and he retired from the Governor's chair to his home, where he remained until called by Congress to be one of the commissioners to arrange the treaty of peace. He left home, but found that matters had gone so far that he could be of no practical service, and he did not sail. In 1783 he took his seat in Congress and did much to strengthen a body fallen into something like contempt for its incompetence. His most important service here was his successful advocacy of the decimal system of coinage, which had been devised by Gouverneur Morris, and the drawing up a plan for the government of the territory to the northwest of the Ohio River. In the latter plan there was the provision for the prohibition of slavery, which, though rejected at first, finally secured all of the vast domain to freedom.

In May, 1784, Jefferson, Franklin, and Adams were sent to Europe under a general power to make commercial treaties. In 1785 Jefferson succeeded Franklin as American representative to France. The diplomatic fruits of this stay are not specially remarkable, because Europe was much concerned with internal troubles and little interested in the affairs of the new nation across the Atlantic. By his personal charm, however, by his sympathy with French ideas, and by the influence of his *Notes on Virginia*, now published with his consent, Jefferson did much to set the United States in a favorable light in Europe. Having as his official duty to attend to the ignoble tribute by which the commercial nations of the time warded off the Algerian pirates, he protested vigorously that a war would be not only more honorable, but much cheaper. On a brief and unsatisfactory mission to England he got a first-hand confirmation of the insolence with which the Americans were there treated. He traveled in Italy and Germany and in Paris became intimate with D'Alembert, Condorcet, and other extreme liberals, with whom his intellectual affinity was marked. In 1789 he returned to America and under Washington became first Secretary of State. The organization of the government had defined political parties, and hardly was Jefferson in office before he was recognized as the leader of the Democratic Republicans (afterward known first as the Republicans and then as the Democrats), while Alexander Hamilton was the leader of the Federalists. Hamilton favored a strong Federal government and distrusted the people; Jefferson insisted on State sovereignty and regarded the people with the most optimistic faith; Washington held views more moderate than either. Most of Hamilton's definite propositions have been adopted by the government, but Jefferson's spirit has given them life. The two new parties came into sharp contention over the question of neutrality when in 1793 France declared war against England. The followers of Jefferson held that the United States was bound by gratitude and treaty to aid the French Republic; those of Hamilton argued that the treaty was not now in force, and that motives of self-preservation were stronger than the obligation owed for help during the Revolution. Washington finally issued a neutrality proclamation, but at the same time declared that he would receive the Minister of the Republic, Genet. "Citizen Genet," as he was called, acted with what was considered to be outrageous disregard for international etiquette and was recalled, but the bitterness between Hamilton and Jefferson was never removed.

Jefferson's secretaryship had not been congenial to him, and at the call of some private business he retired Dec. 31, 1793. Washington's announcement in September, 1796, that he would not be a candidate for a third term, led to the nomination of Adams, then Vice President, and Jefferson by the Federalists and the Democratic Republicans respectively. Adams, having received the highest vote, was chosen President, and Jefferson, having the next highest, was,

under the law of the time, chosen Vice President. As the duties which Jefferson had now to perform were chiefly secondary, he was able to spend most of his time at home, where, nevertheless, he continued to direct the party of which he was the head. The excesses of the French in the Reign of Terror caused a great reaction in America against Republican doctrines, and the Directory now in control in France seemed bent on having war with the United States. The American envoys were treated with insolence, and later the shameful incident of the "X. Y. Z." letters brought not only the quick-tempered Adams but also all but the most devoted followers of Jefferson to a strong desire for war. This calamity was avoided because the French Minister, Talleyrand, seeing that he had overstepped himself in his knavery, now proclaimed the whole thing a mistake. The war feeling had, however, carried the President and his supporters so far that they felt justified in having the Alien and Sedition Laws passed for the protection of the government—the former making it possible to expel from the country any alien suspected of treason, and the latter making defamation of the government a crime punishable by a heavy fine. Jefferson on this provocation drew up the Kentucky Resolutions, which seemed strongly to manifest his belief in the right of a State to secede, although this is not absolutely implied and at least does not seem to have remained his fixed opinion.

The election of 1800 resulted, after a campaign marked by great bitterness, in the election of the Republican candidates, Jefferson and Burr receiving the same number of votes. The decision fell to Congress, where Jefferson was chosen, chiefly through the influence of his opponent, Hamilton, who was too much of a patriot to desire the success of Burr. Although the Federalists, especially of New England, predicted a revolution, Jefferson made astonishingly few removals from office for purely political reasons, was painstaking in his selections for vacancies, and by his popularity drew from the Federalist party much of its vital energy. The stately formalities that had marked the inauguration of the preceding Presidents were omitted. Jefferson rode horseback, without attendants, tied his horse to the fence, and walked unceremoniously into the Senate chamber. He also sent written messages to Congress, and the practice of the President in addressing Congress in person was not revived until 1913. These changes in official etiquette were paralleled in manners and dress; knee breeches gave way to trousers, and simplicity, for which the President set an unostentatious example, became the order of the day.

The most important event of Jefferson's quiet first term was the purchase of Louisiana from the French. This step was deemed unconstitutional by him, but the necessity of controlling the Mississippi and the obvious need of haste abundantly justified the action. A little war with Tripoli, the first opposition that the Algerine pirates had received, led to the extinction of the tribute paying to which Jefferson had so objected. The exploration of the Far West was undertaken, and settlements across the Mississippi were generously assisted. Four years of prosperity and the almost complete disintegration of the Federalist party led to Jefferson's reëlection in 1804 by 162 votes out of 176. Burr's scheme to invade Mexico to set up an empire brought about his trial for treason, and the prosecution gave Jefferson's enemies the opportunity to accuse him of gross partisanship. Jefferson's second term is remarkable for his consistent and on the whole unsuccessful attempt to apply to foreign affairs principles of action so far in advance of his time that we have not yet arrived at them to-day. The long wars between France and England had made these two nations utterly careless of the rights of neutrals. The United States, as the principal carrier of neutral goods, suffered most, her ships being attacked by both nations and her crews being impressed into British service. This impressment by the British went on in spite of protest until a crisis was reached in June, 1807, when the British ship *Leopard* fired into the American frigate *Chesapeake* (q.v.). Redress was demanded, but the British government refused to touch the fundamental cause of the trouble, impressment. The measures that Jefferson recommended in retaliation were those of commercial restriction such as had been not without effect in the eighteenth century. The Embargo of 1807 forbade American vessels to leave for foreign ports, and the Enforcement Act of 1808 put heavy penalties on the violation of the embargo. These acts proved without effect as far as changing the attitude of the British was concerned and brought great distress on the tobacco industry of Virginia and on the commerce of New England and the Middle States. This policy was abandoned early in 1809. In December, 1806, Jefferson successfully recommended to Congress the prohibition of the slave trade. Following the example of Washington in the refusal to be elected a third time to the presidency, Jefferson, at the close of his second term, took up the care of his plantation at Monticello. Here he ceased entirely from active political life, but by means of his facile pen still exerted an important influence on the government, especially upon his successors and disciples, Madison and Monroe. His house was the Mecca to which all America seemed to turn, his open and generous hospitality finally bringing financial distress upon him—a distress that both the government and private individuals helped to relieve. Jefferson's chief public service during this period was the founding of the University of Virginia, in which he unfolded some highly original ideas regarding higher education by the state, and here, as at Monticello, exhibited remarkable tastes as an architect. Another mark of Jefferson's versatile genius was his proficiency in music, especially in playing the violin. In June, 1826, his health failed rapidly, and he died July 4, the same day that his predecessor in office, John Adams, passed away.

In person Jefferson was tall (6 feet, 2 inches), with a bony but strong frame, angular features, ruddy complexion, sandy or reddish hair, and light hazel eyes. In dress and bearing he was so far removed from the formal as to be almost slovenly. His manners were remarkably winning, and his disposition very kindly, not only to his family and his friends, but to his slaves. While not precisely learned, he probably had the most receptive mind of his generation, and it is by no means certain that, although he was on the whole a far from strong executive, he was not the most influential statesman of his day. In religion it is probable that he was

not far from what was then known and execrated as a freethinker: as an idealist, he did not underestimate the sublimity of Christ's character, but he had no belief in the orthodox theological ideas as to redemption. His views on slavery were far beyond those of his time, but all of his efforts to effect a reform in Virginia were unavailing. The influence that he has had through the Democratic party has been but the most open expression of the deep influence he has had in the democratizing of all American ideas. The unfailing trust which the people of his day put in him was due largely to the deep and steady confidence he had in them.

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JEFFERSON BARRACKS. A United States military reservation and post in Missouri, established in 1826. The reservation, which comprises 1261 acres, is located on the Mississippi, 10 miles below St. Louis. There are a post office, telegraph station, and railroad station at the post, while quarters for 31 officers and 1300 men are provided. Jefferson Barracks was originally a cavalry post equipped with stables. For a number of years it has been known as the Jefferson Barracks Recruit Depot, one of the five large depots at which recruits are received and trained for 36 days before assignment to regiments. It is one of the oldest military posts in the United States, and when it was established St. Louis was merely a trading village. For many years it was the fitting-out rendezvous for important expeditions, and until 1861 hardly a regiment, particularly in the cavalry, could be found which had not at one time been represented in the garrison or made its headquarters at Jefferson Barracks. The St. Louis powder depot and national cemetery are included in the reservation. See DEPOT.

JEFFERSON CITY. The capital of Missouri and county seat of Cole County, near the geographical centre of the State and 125 miles by rail west of St. Louis, on the south bank of the Missouri River, on the Missouri Pacific, the Chicago and Alton, and the Missouri, Kansas, and Texas railroads (Map: Missouri, D 3). Its elevation is more than 600 feet. Among the more notable structures are the Capitol (erected at a cost of $3,500,000), State penitentiary, State armory, Governor's mansion, Supreme Court building, United States courthouse and post office, the county courthouse, Carnegie library, St. Mary's Hospital, and Lincoln Institute (a normal school for the higher education of negroes). The city has also the State and Supreme Court libraries. A fine steel bridge crosses the Missouri River at this point. Jefferson City has valuable natural advantages as the centre of a fertile agricultural and rich mineral region. Coal and zinc abound in the vicinity. It manufactures agricultural implements, boots and shoes, saddletrees, clothing, binding, twine, flour, beer, brooms, foundry products, bricks, etc. There are also railroad shops and roundhouses of the Missouri Pacific. Settled in 1826, Jefferson City was incorporated first in 1839. Under a general legislative act, approved 1893, governing cities of the third class, the government is administered by a mayor, elected biennially, who has important appointive powers, and a unicameral council. Pop., 1900, 9664; 1910, 11,850; 1914 (U. S. est.), 12,780; 1920, 14,490.

JEFFERSON RIVER. One of the three rivers which unite to form the Missouri River. It is formed by the junction of the Beaver Head and Big Hole rivers, in the southwestern part of Montana, flows in a northeasterly direction, and, after a course of 150 miles, unites with the Madison and Gallatin.

JEF'FERSONVILLE. A city and the county seat of Clark Co., Ind., on the Ohio River, opposite Louisville, Ky., with which it is con-

nected by two railroad bridges, and on the Pittsburgh, Cincinnati, Chicago, and St. Louis, the Louisville and Northern, the Baltimore and Ohio Southwestern, and the Cleveland, Cincinnati, Chicago, and St. Louis railroads (Map: Indiana, F 8). It is situated at the head of the Ohio Falls, which afford good water power; has a United States quartermaster's supply depot, the Indiana Reformatory, an orphans' home, and city and State Reformatory libraries. A considerable amount of strawberries is shipped from here, and there are extensive manufactures of river steamboats and freight and passenger cars, cement, and numerous other industries of less importance. The government is administered, as provided under the Indiana laws, by a mayor, and a council, which elects subordinate officials, excepting police commissioners, who are appointed by the mayor. Pop., 1900, 10,774; 1910, 10,412; 1920, 10,098.

JEFFERY, jĕf'ĕr-ĭ, Edward Turner (1843–). An American railroad president. He was born at Liverpool, England, and came to the United States in 1850. Entering the employment of the Illinois Central Railroad Company in 1856, he was its superintendent in 1877–85 and general manager in 1885–89. He visited the Paris Exposition to make a report on it for the citizens of Chicago in 1889, and then served as chairman of the building and grounds committee of the Columbian Exposition until 1891. He was president from 1891 to 1912, and thereafter chairman of the board directors, of the Denver and Rio Grande Railroad Company; was receiver in 1893–95, and thereafter president, of the Rio Grande Southern; became chairman of the board of directors of the Western Pacific in 1905; and held also the presidency of the New Orleans and Northwestern and the Rio Grande Junction railways and the Utah Fuel Company and directorships in many other corporations.

JEFFREY, jĕf'rĭ, Edward Charles (1866–). An American botanist. He was born at St. Catharines, Ontario, Canada; graduated from the Collegiate Institute of that place in 1879 and from the University of Toronto in 1888; and studied at Harvard University (Ph.D., 1898), where he was assistant professor of vegetable histology and general morphology from 1902 to 1907 and thereafter professor of plant morphology. His researches deal particularly with the evolution of fossil plants, the anatomy of plants and the structure of coal and lignites, and the morphology of vascular plants.

JEFFREY, Francis, Lord (1773–1850). A Scottish critic and lawyer, born in Edinburgh, Oct. 23, 1773. He was educated at the Edinburgh high school, the universities of Glasgow and Edinburgh, and at Queen's College, Oxford; and he studied law in Edinburgh. During this early period he read widely and practiced both verse and prose writing. In 1794 he was called to the bar. Two years before this he became a member of the Speculative Society (in connection with the University of Edinburgh). Jeffrey soon became prominent among the members by the keenness and liveliness of his intellect and the eloquence of his style, but his progress at the bar was slow, partly on account of the antipathy which then existed to literary lawyers and partly on account of his political opinions, which were Whig. Meanwhile he and several other young men then in Edinburgh, ambitious of finding a wider outlet for their talent than the discussion in the Speculative Society or the practice of the bar afforded, planned a critical journal. The first proposer of the scheme was Sydney Smith. The result was the establishment (1802) of the *Edinburgh Review* (q.v.), of which Jeffrey soon became editor, an office he retained till 1829. In politics the *Review* was Whig. Jeffrey, however, confined himself mostly to literary reviews, in which he criticized with great severity the new school of poetry, represented by Coleridge, Wordsworth, Byron, and Shelley. This criticism is now generally discredited; it was perverse and hard, but, nevertheless, shrewd and brilliant. After some years Jeffrey's practice at the bar began to increase; in jury trials he shone to great advantage, particularly in the trials for sedition between 1817 and 1820. In 1830 he became Lord Advocate for Scotland, and after the passing of the Reform Bill he was returned to Parliament for the city of Edinburgh, which he continued to represent till 1834, when he gladly retired to accept a judgeship in the Court of Sessions. During the latter years of his life Jeffrey resided at Craigcrook Castle, near Edinburgh, where he died Jan. 26, 1850. He was twice married, his second wife being Charlotte Wilkes of New York. Accessible volumes of selections are *Essays: English Poets and Poetry* (1905) and *Literary Criticism* (1910), edited by D. Nicol Smith. Consult: H. T. Cockburn, *The Life of Lord Jeffrey* (Edinburgh, 1852; reissue, 1872); Thomas Carlyle, *Reminiscences*, vol. ii (London, 1881); John Morley, "Memorials of a Man of Letters," in his *Studies in Literature* (ib., 1897); L. E. Gates, *Three Studies in Literature* (New York, 1899); H. H. Joline, *A Famous Reviewer* (ib., 1910).

JEFFREYS, jĕf'rĭz, George, Lord (1648–89). An English judge, born at Acton in Denbighshire, Wales. Though the son of a squire of small means, Jeffreys obtained a fair education at Shrewsbury, at St. Paul's, and at Westminster under Dr. Busby; in 1662 he matriculated at Trinity College, Cambridge, which he left the following year without a degree to enter the Inner Temple, London. Admitted to the bar in 1668, with small legal learning, but with a powerful voice and bold address, he soon gained a large practice. About 1672 he deserted his popular constituency and began to cultivate the court party. His ability, zeal, wit, eloquence, and capacity for making friends among unscrupulous attorneys won him rapid advancement, and he became Chief Justice of Chester in 1680, a baronet in 1681, and Chief Justice of England in 1683. He was foremost in the prosecutions of Archbishop Plunket and Stephen Colledge and aided in destroying popular government in London, pushing on the quo warranto proceedings which deprived London of its charter. Charles II, who despised him, consented to his appointment as Chief Justice, swore him as a Privy Councilor in 1683, and connived at and took advantage of his unscrupulousness. Jeffreys was unfair in his rulings in the trial of Algernon Sidney. He condemned Sir Thomas Armstrong without a trial and sent him to his death loaded with insults. He advised James II to collect the customs revenue and use it without a vote of Parliament. His career seemed to culminate in 1685, when he browbeat Titus Oates at his trial. He was created Baron Jeffreys of Wem and was the virtual ruler of Lon-

don and disburser of all legal patronage. In this year also he traveled the western circuit, his Bloody Assizes condemning hundreds to death, without even the semblance of a fair trial, for their complicity in the insurrection headed by the Duke of Monmouth, among them Alice, Lady Lisle; he assigned over 800 persons to his favorites to be sold as slaves, and imprisoned and maimed hundreds more; yet James II made him Lord Chancellor and Keeper of the Great Seal. He joined with James (if, indeed, he did not advise it) in the arrest and imprisonment of the seven bishops. Frightened at length, in 1688 he attempted to undo some of his autocratic deeds, but the movement came too late. His master James II fled, and he disguised himself in the dress of a common sailor, but was recognized in spite of his disguise and taken to the Tower, where he died April 18, 1689, of a malady from which he had long suffered. In private conversation after his fall he alleged that he lost the favor of James because he would not be still more vindictive in his bloody circuit. Occasionally he did an act that indicated some recognition of the principles of human kindness. In criminal cases he has had, perhaps, no equal among judges for baseness. In civil cases, on the contrary, he is said to have been able and upright and surpassed by few men in the clearness of some of his opinions.

Bibliography. The most complete account of his life is found in Woolrych, *Memoirs of the Life of Judge Jeffreys* (London, 1827). Consult also: North, *Life of Lord Keeper Guilford* (ib., 1826); Roscoe, *Lives of Eminent British Lawyers* (ib., 1830); Burnet, *History of my own Time* (ib., 1838); Roberts, *The Life, Progresses, and Rebellion of James, Duke of Monmouth* (ib., 1844); *Reports of State Trials;* Lord Campbell, *Lives of the Lord Chancellors,* vol. iv (ib., 1849–57); Bent, *The Bloody Assizes* (Edinburgh, 1890); Irving, *Life of Judge Jeffreys* (London, 1898); T. B. Macaulay, *History of England,* vols. i, ii (New York, 1899).

JEFFRIES, jĕf'rĭz, JOHN (1744–1819). An American physician, born in Boston. He graduated at Harvard in 1773, afterward traveled in Europe, and attended classes at the medical colleges in London and Aberdeen. Returning to America, he practiced in Boston until the city was evacuated by the British, when he accompanied the English troops to Halifax. He distinguished himself as an army surgeon, and in 1779 was appointed surgeon major of the British forces in America. He was greatly interested in scientific experiments, more especially in the construction of balloons, with a view to atmospheric experiments, and accompanied François Blanchard in his balloon trip from Dover across the Channel, on which occasion the aëronauts landed in the midst of the Forest of Guienne in France. In 1789 he returned to Boston, where he continued the practice of his profession until his death. A lecture delivered by him in 1789 is said to have been the first public lecture on anatomy given in New England.

JEHAN, SHAH. See SHAH JEHAN.

JEHO'AHAZ (Heb. *Yehō'āhāz,* or *Yō'āḥāz,* Yahwe holds fast). 1. King of Israel 814–797 B.C. He succeeded his father, Jehu, and in the eyes of the compiler of the Book of Kings was a wicked and inefficient ruler. During his reign the power of Israel was brought very low by the Aramæans of Damascus (2 Kings xiii. 1–9). The "saviour" mentioned in verse 5 has been thought by some to be Adadnirari III of Assyria. 2. King of Judah 608 B.C. He succeeded his father, Josiah, and reigned three months. He was captured at Riblah on the Orontes by Pharaoh Necho, sent to Egypt, and died there (2 Kings xxiii. 31–34). In Jeremiah (xxii. 11) he is called Shallum.

JEHO'ASH (pseudonym of SOLOMON BLOOMGARDEN) (1870–). A talented Yiddish poet, born at Verzhbolovo, Province of Suwalki. Beginning to write at an early age, he first attracted attention by his poems, some of which were included in the *Jüdische Bibliothek.* In 1890 he emigrated to the United States, 10 years later becoming a regular contributor to *Die Zukunft,* a Yiddish periodical. His fame in America dates from 1907, when the first volume of his poems appeared. Since then 10 volumes of his writings have been published, including four volumes of translations. In 1911 appeared 1 volume of fables, some prose works, and the *Dictionary of Hebrew Elements in Yiddish,* edited by him and C. J. Spivak.

JEHOASH. See JOASH.

JEHOL, zhā'hôl (Chin. *Jê-ho,* hot river). A large and important city of Inner Mongolia, situated in a finely wooded region north of the Great Wall, near the borders of Manchuria and 140 miles northeast of Peking, with which it is connected by a good road. The town is mostly inhabited by Chinese immigrants from Shansi and Shantung. Population, exclusive of numerous Lamaistic monasteries, about 25,000. It is a trading town and is noted for its inlaid tables and boxes. There are here an Imperial hunting park and a summer palace called in Chinese Pi-shu-shan-chwang (mountain lodge for avoiding the heat). The latter was built in 1703 on the model of the Yuen-ming-yuen, or summer palace near Peking, destroyed by the Anglo-French forces in 1860. In a beautiful valley in the vicinity are several large Lama monasteries, the chief of which are the Potala and the Teshilumbo. Jehol was the refuge of the Imperial court in 1860, when the French and English occupied Peking, and in 1912, when the last Manchu Emperor abdicated. Consult: Edkins, in the *Journal of the North China Branch of the Royal Asiatic Society* (Shanghai, 1865); Williamson, *Journeys in North China, Manchuria, and Mongolia* (2 vols., London, 1870); *Journal of the Royal Geographical Society* (ib., 1874); R. O. Franke, *Beschreibung des Jehol-Gebietes in der Provinz Chihli: Detail Studien in chinesischer Landes- und Volkskunde* (Leipzig, 1902).

JEHOSH'APHAT (Heb. *Yehōshāphāt,* Yahwe judges). The fourth King of Judah (877–848 B.C.). He succeeded his father, Asa, and reigned 25 years. The compiler of the Book of Kings commends him for his piety (1 Kings xxii. 43), and the Chronicler enlarges upon this notice and exalts Jehoshaphat's measures for the defense of his kingdom and his success in war (2 Chron. xvii–xx). During a large part of his reign he was practically a vassal to the kings of Israel, for his visit to Ahab, and his campaigns with the latter (1 Kings xxii. 3–40) and Jehoram (2 Kings iii. 7–27), as well as his going into battle dressed in his full robes, while Ahab went in disguise (1 Kings xxii. 30), were probably enforced by the northern rulers. Jehoshaphat tried to establish communication

with the gold country Ophir, but failed, his ships being destroyed by a storm (1 Kings xxii. 48). He was succeeded by his son Jehoram.

JEHOSHAPHAT, VALLEY OF. A valley which the prophet Joel (iii. 2–12) foretells is to be the scene of the judgment of the heathen after the return of Judah and Israel from captivity. No such valley is mentioned elsewhere in the Bible, and it is doubtful whether the writer had any particular site in mind. It has been thought, however, by some scholars that the prophet referred to the valley of Berachah, in which King Jehoshaphat of Judah is said to have gained a notable victory over the Ammonites, Moabites, and Edomites (2 Chron. xx. 26). Another and more popular view identifies the valley of Jehoshaphat with that commonly called Kidron in the Bible—the deep ravine which separates Jerusalem from the Mount of Olives. This view, which can be traced back to the fourth century, has been adopted by travelers of all ages and faiths. It is noticeable that in a Midrashic work the statement is found, "A valley called Jehoshaphat does not exist." Consult Neubauer, *La géographie du Talmud* (Paris, 1868). See KIDRON.

JEHO'VAH. A word used in the Authorized Version of the English Bible as the name of the national deity of the Jews in the designation of certain shrines such as Jehovah-jireh (Gen. xxii. 14), Jehovah-nissi (Ex. xvii. 15), and Jehovah-shalom (Judg. vi. 24). It had already appeared in Tyndale's translation of the Pentateuch (1530) in Ex. vi. 3 under the form Iehouah, and in various other Protestant versions. The Hebrew word in these passages, which occurs in the Bible 5410 times, is generally rendered "the Lord" in the English translations. It was expressed in writing, as was the custom among the Jews in earlier times, without any signs indicating the vowels, simply by four consonants corresponding to our Y H W H—the tetragrammaton, as it has been called. When vowel signs were added to the consonantal text of the Hebrew Bible, in the eighth century A.D., as a means of preserving the traditional pronunciation of the sacred literature, those of Adonai (my lord) were attached to the tetragrammaton as an indication that the name was to be pronounced as though it were Adonai (q.v.), or those of Elohim (God) were attached if an Adonai preceded it; but the Masorites did not intend that it should ever be pronounced either Yehowah or Yehowih. By a misunderstanding mediæval Christian scholars combined the vowels of Adonai with the consonantal frame, thus producing the form Jehova, Iehovah. It is commonly stated that this error was unknown until 1520, or, by those who know when Galatinus published his *De Arcanis Catholicæ Veritatis*, until 1518. Moore, however, has called attention to the testimony of Voisin, the editor of the *Pugio Fidei*, of Raymundus Martini, in 1651, that he found the name Jehova in three manuscripts of this work, one of them written in 1381. While doubting that Raymundus himself wrote the name in 1278, as was maintained by Voisin, he concludes that it must have been familiar to copyists of the *Pugio* in the fourteenth century.

While the hybrid form thus goes back to the error of some Christian scribe in the Middle Ages, the Masoretic direction to pronounce the tetragrammaton Adonai must have been a very old tradition at the time when the vowel signs were invented, for the custom had already been introduced when the Greek version of the Law was made in the third century B.C. What led to this practice of substituting Adonai (and hence *Kyrios*, *Dominus*, the Lord) is not known with certainty, but various reasons have been suggested, such as the easier and more general observance of the Third Commandment, if the holy name was not pronounced, or the feeling that the genuine personal name of the deity was too sacred and too powerful to be used except on extraordinary occasions and by any one but the high priest, or the preference for a term that should not bring to mind the old tribal deity after a more transcendental conception had been gained. Adonai was probably chosen in the vast majority of cases because it had often been employed in direct address to the deity, had not seldom been connected with the proper name, and as an appellative was translucent, dignified, and appropriate.

The avoidance of the use of the original name led to the gradual loss of the true pronunciation, though the repeated interdictions against uttering it render it probable that it was still known among the Jews as late as the tenth century A.D. The Samaritans seem to have continued longer than the Jews to pronounce the holy name. Theodoret (*Questio xv in Exodum*) declares that they pronounced it Ιαβε, i.e., Yave; and though *shema* (the Name) has been substituted for it, there is unimpeachable evidence that even the Samaritans of to-day know that Yahwe was the original pronunciation. Pagan magicians, Gnostics, and Christians learned what the name was; hence the Ethiopic Yawe, and the forms Ιαβα (pronounced Yava) and Ιαωουηε (Iaoue) in magical papyri. Yahwe was seen to have been the true pronunciation of the tetragrammaton by Génébrard (in 1567) and others, before it was recognized again by Gesenius and Ewald, as has been shown by Moore. The name goes back at least to the middle of the ninth century B.C., as it is found in the Mesha inscription, and it is, after all, most probable that the Moabitish King pronounced it Yahwe, and not Yaho(h), or Yahwah. As to the meaning of Yahwe, Ex. iii. 14 clearly connects it with the root *haya*, 'to be,' 'to become,' and the phrase has generally been understood to mean 'I am what I am'; but Paul Haupt has recently suggested that it might be read *ahye asher yihye*, 'I call into existence what comes into existence' (*Studien. Wellhausen gewidmet*, p. 211, Giessen, 1914). Wellhausen explains it from a root *hawa*, 'he goes through the air' (*Israelitische und jüdische Geschichte*, p. 23, 7th ed., 1914). Others think of a root suggesting 'he sends down, i.e., lightnings.' The presumption is in favor of the etymology suggested by Ex. iii. 14, 'the Maker.'

But another form of the name than the tetragrammaton once existed. The Jews on Elephantine in the fifth century B.C. wrote the name YHW, but also YHH, which seems to indicate that the pronunciation was either always Yaho, or sometimes Yaho, sometimes Yahu. This Yaho was rendered into Greek Ιαω (Iao), and frequently found in Greek papyri and among later writers; the *h*, or *spiritus asper*, was generally elided, but in a demotic papyrus (Leyden A 65) the aspirate *h* is still shown, and in the corresponding Greek text its place is taken by an epsilon. Yaho is found frequently in the-

ophorous names shortened to Yeho or Yo, both in the Hebrew Bible and in inscriptions recently discovered at Samaria and at Jericho. Yaho or Yahu also underlies the rendering of Hebrew names in Assyrian. Of this form Yah, found in the phrase *Hallelu Yah* (Praise ye Yah!) and also independently, is no doubt an abbreviation, as is seen in the case of names like Yeshayahu (later Yeshayah), Yirmyahu (later Yirmyah). It is not so easy to decide whether Yahu or Yaho is a shortened form of Yahwe, this a lengthened form of Yahu, or whether both are independent. The analogy of Asur, Asir, Asher, Ashur, and even Anshar (see ASSUR) suggests that the form may have varied in different localities and ages, that Yahwe may be due to a desire to find a meaning in what was not a translucent name, and that there may have been a welding together into one of two entirely distinct divinities. It is possible that the name Yahwe, as well as the etymology of it that suggests a creator, is due to the Levites, whose teachings spread from Kadesh Barnea through the Negeb and Judah to Israel; that a god Yahu was widely worshiped in Syria in earlier days, as it is certain that in the Hammurapi period and in the time of the Kassites Yau was worshiped in Babylonia; and that in course of time the distinction between them was obscured. Concerning the meaning of Yahu nothing is known. It has been held that Yahwe was taken over by Moses from Jethro and his people, the Midianites. But there is nothing in Ex. xviii that forces us to conclude either that Moses had been converted to the god of Jethro or Jethro to the god of Moses. (See MOSES; PENTATEUCH.) Consult: Driver, "The Tetragrammaton," in *Studia Biblica* (Oxford, 1885); Smend, *Alttestamentliche Religionsgeschichte* (Freiburg, 1893); Dalman, *Der Gottesname Adonai* (Leipzig, 1896); G. F. Moore, in *Old Testament and Semitic Studies* (Chicago, 1908); Clay, *Amurru* (Philadelphia, 1909); Sellin, in *Mitteilungen der deutschen Orientgesellschaft*, No. 41 (Berlin, 1909); Lyon, in *Harvard Theological Review* (Cambridge, 1909); Grimme, in *Orientalische Literaturzeitung* (Leipzig, 1912); Leander (ib., 1912); König (ib., 1913); Schmidt, in *Journal of Biblical Literature* (Boston, 1915).

JEHOVIST, jē-hō'vĭst. See ELOHIST AND YAHWIST.

JE'HU (Heb. *Yēhū*, perhaps from *Yehō-hū*, Yahwe is he). Tenth King of Israel (c.842–815 B.C.), son of Jehoshaphat and grandson of Nimshi. From the position of one of the body guards of Ahab he rose to that of general under Joram. He seized the opportunity of Joram's absence in Jezreel, whither he had gone to seek healing from his wounds received in the battle with the Aramæans of Damascus, to seat himself on the throne. Having control of the army intrusted to him for the protection of the border city Ramoth-Gilead against the Aramæans, Jehu proceeded against his royal master, slew Joram and also Ahaziah, King of Judah, who was on a visit to the King of Israel. He also had Jezebel, the wife of Ahab, put to death and, not content with this, brought about a wholesale massacre of Ahab's (or Joram's) family and also of 42 kinsmen of Ahaziah. This story of Jehu's conspiracy is told (2 Kings ix–x) in connection with the narrative of the prophet Elijah. Jehu's deeds are portrayed as retribution for the judicial murder of Naboth (1 Kings xxi), and he is represented as the instrument of Yahwe to bring about the destruction of Ahab. Such an interpretation, of course, reflects the later religious point of view; but it would seem that Jehu indeed posed as the devotee of Yahwe, for he follows up his destruction of the house of Ahab by an extermination of the prophets and priests of Baal. By a cunning stratagem he collects them together in the temple court and puts them to death (2 Kings x. 18–28). Whatever his motives may have been, he does not appear in the light of a religious reformer to the later Old Testament writers, who cannot disguise the fact that Jehu was not a Yahwe worshiper according to their ideals. In fact, he maintained the "high places" with the Canaanitish rites and associations, and the triumph of Yahwe simply meant for Jehu an absorption of Baal's rôle by the Hebrew deity. The political activity of Jehu was mainly directed towards the subjugation of Judah, which under Ahab had practically become a vassal of Israel. (See JEHOSHAPHAT.) At the close of his reign, however, Judah was in a somewhat more favorable position than at the beginning. In 842 B.C., shortly after mounting the throne, Jehu purchased the favor of Shalmaneser III of Assyria (860–825 B.C.) by rich gifts. The Assyrian king laid siege to Damascus, and on his return from his campaigns erected a monument in Nineveh (the so-called black obelisk of Shalmaneser III, now in the British Museum), on which, among other events, he depicted this tribute of Jehu. The latter, however, gained little by currying favor with Assyria. Damascus again began to stir itself and assumed the offensive against Israel, and before the end of Jehu's reign his kingdom was weakened on various sides, though he was able to hand over the succession to his son Jehoahaz (q.v.).

JEHU. A popular term for a driver, especially for one who drives rapidly, derived from Jehu, the son of Nimshi, mentioned in 2 Kings ix. 20.

JEHU'DA, BEN SAMUEL. See JUDAH, BEN SAMUEL.

JEJU'NUM (Neo-Lat., from Lat. *jejunus*, empty). The middle portion of the small intestine, situated between the duodenum and the ileum and forming about one-third of the length of this portion of the intestinal tract. It derives its name from the fact that in post-mortem examinations it is almost always found empty. The jejunum is wider, more vascular, and of a deeper color than the ileum; its walls are also much thicker, but there is no sharp line of division between the two portions. The surface for absorption is much increased by folds of the mucous membrane and the submucous tissue, the valvulæ conniventes, which are also present in the upper half of the ileum.

JE'KYLL, DR. See STRANGE CASE OF DR. JEKYLL AND MR. HYDE.

JELALABAD, je-lä'lä-bäd', or **JALALABAD.** A town of Afghanistan, 96 miles east of Kabul, on the Kabul River, near the Khyber Pass (Map: Afghanistan, O 5). Its defenses were destroyed at the British evacuation of Afghanistan in 1842. The town occupies a very strong natural position, is of great strategic importance as controlling the entrance to north India through the Khyber Pass, and is the winter residence of the Ameer of Afghanistan. Pop. (est.), 4000. The place was heroically defended by Sir Robert Sale against the Afghans in 1842.

JELF, William Edward (1811–75). An English divine and classical scholar, son of Sir James Jelf, of Gloucestershire, and brother of Dr. Richard William Jelf. He was born at Gloucester and was educated at Eton and Christ Church, Oxford. From 1846 to 1848 he was one of the Whitehall preachers, and in 1857 gave the Bampton lectures before the university. His most important publication was his *Grammar of the Greek Language,* chiefly from the German of Raphael Kühner (2 vols., Oxford, 1842–45; 4th ed., 1866), which was considered a marked improvement on all earlier Greek grammars in the English language.

JELINEK, yĕl'ĭ-nĕk, Carl (1822–76). An Austrian meteorologist, born at Brünn in Moravia. He was educated in Vienna and in 1843 became assistant in the Vienna Observatory. In 1847 he went to the Prague Observatory, where he was associated with Kreil in researches on terrestrial magnetism and meteorology. From 1852 to 1863 he was professor of mathematics in the Prague Polytechnic and then returned to Vienna as director of the Central Meteorological Institute. He was prominent in the meteorological congress at Leipzig in 1872. With Hann he edited the journal of the Austrian Meteorological Society, of which he was a founder. He took a prominent part in the reform of Austrian technical education and published *Anleitung zur Anstellung meteorologischer Beobachtungen* (1869; 4th ed., 1893–95) and *Psychrometertafeln* (5th ed., enlarged by Pernter, 1904).

JELLACHICH DE BUZIM, yĕl'lâ-chĕch de bo͞o'tsĕm, Joseph, Count (1801–59). Ban of Croatia. He was born at Peterwardein in Slavonia, Oct. 16, 1801. His father, the descendant of an old Croatian family, was a general in the Austrian service and attained some distinction in the Turkish and Napoleonic wars. Joseph Jellachich, after several years of service on the Turkish frontier, in which he distinguished himself by his courage and skill, became colonel of the first border regiment of Croatia. In 1848 he was appointed by the Emperor Ferdinand general and Ban or Governor of Croatia, and as such he headed the movement of the Southern Slavs of Hungary against Magyar domination. He was urged on in this course by the court of Vienna, which saw in him a convenient instrument for checking the progress of the revolution in Hungary. In September, 1848, Jellachich invaded Hungary with a powerful army and advanced upon Budapest. He was repulsed at Pákozd (September 29), but effected a junction with Windischgrätz before Vienna and defeated Perczel at Moor (December 29). He suffered a disastrous defeat at Kis-Hegyes, and after the termination of the revolutionary struggle returned to Agram as Ban. He was made a count in 1855 and died at Agram, May 20, 1859. He published a volume of poems, among them military songs which became popular.

JELLICOE, jĕl'ĭ-kō, Sir John Rushworth (1859–). An English naval officer. Educated at Rottingdean, he entered the navy in 1872; served in the bombardment of Alexandria and in the battle of Tel el-Kebir in 1882; in 1893 as commander was wrecked on the *Victoria;* and in 1898–1901 was in China, where he commanded the naval brigade and was chief of staff to Admiral Seymour in the relief of the Peking legations, being terribly wounded in the lungs. He was director of naval ordnance from 1905 to 1907, then was promoted rear admiral, and in 1908–10 was Lord Commissioner of the Admiralty and Controller of the Navy. He commanded the Atlantic fleet in 1910–11 and the second squadron home fleet in 1911–12, and in December, 1912, became Second Sea Lord of the Admiralty. When war broke out in 1914, he commanded the home fleet. See War in Europe.

JELLIFFE, jĕl'ĭf, Smith Ely (1866–). An American neurologist, born in New York City. After graduating from the Brooklyn Polytechnic Institute in 1886 and from the College of Physicians and Surgeons (Columbia) in 1889, he studied also in Europe. He was professor of pharmacognosy and technical microscopy at the College of Pharmacy (Columbia) (1897–1907) and instructor in materia medica and therapeutics (1903–07) at the College of Physicians and Surgeons (Columbia), clinical professor of mental diseases at Fordham University (1907–12), and adjunct professor of diseases of the mind and nervous system at the New York Post-Graduate Hospital and Medical School after 1911. From 1905 to 1909 he was associate editor of the *New York Medical Journal;* after 1902 managing editor of the *Journal of Nervous and Mental Disease;* editor of the *Medical News* (New York) in 1900–05 and of the *Nervous and Mental Monograph Series* after 1907; and coeditor with Dr. W. A. White of the *Psychoanalytic Review* in 1913. Besides translating and editing many foreign texts he edited, with White, *Modern Treatment of Nervous and Mental Diseases* (2 vols., 1913); revised Butler's *Materia Medica* (1902) and *Shaw on Nervous Diseases* (1903); and is author of *Outlines of Pharmacognosy* (1904).

JELLINEK, yĕl'ĭ-nĕk, Adolf (1821–93). An Austrian Jewish theologian, born in Moravia, and educated at Prague and Leipzig. He was a rabbi in Leipzig and, after 1857, in Vienna, where he founded a school for the study of the Talmud. A famous preacher, he published, besides 200 sermons: *Sefat Chachamhim,* explaining Persian and Arabic words in the Talmud (1846–47); *Beiträge zur Geschichte der Kabbala* (1851–52); *Auswahl kabbalistischer Mystik* (1852); *Thomas von Aquino in der jüdischen Litteratur* (1853); *Philosophie und Kabbala* (1854); *Der jüdische Stamm* (1869); *Der jüdische Stamm in nicht-jüdischen Sprichwörtern* (1881–85); and, in Hebrew, a collection of essays, *Kontresim* (1877–84).

JELLINEK, Georg (1851–1911). A German jurist, son of Adolf Jellinek. He was born at Leipzig and was educated there, at Vienna, and at Heidelberg. Leaving the employ of the Austrian government in 1879, he became a member of the legal faculty at Vienna, then at Basel (1889), and in 1891 at Heidelberg. Among his works are: *Die socialethische Bedeutung von Recht, Unrecht und Strafe* (1878; 2d ed., 1908); *Die Lehre von den Staatenverbindungen* (1882); *Oesterreich-Ungarn und Rumänien in der Donaufrage* (1884); *System der subjektiven öffentlichen Rechte* (1892; 2d ed., 1905); *Adam in der Staatslehre* (1893); *Das Recht der Minoritäten* (1898); *Das Recht des modernen Staates* (1900; 2d ed., 1905); *Verfassungsänderung und Verfassungswandlung* (1906); *Der Kampf des alten mit dem neuen Recht* (1907).

JEL'LYBY, Mrs. A sham philanthropist in Dickens's *Bleak House.*

JEL'LYFISH'. The popular name for any

of the free-swimming medusoid or ctenophoran cœlenterata (q.v.). The name is obviously applicable because of the transparent gelatinous material which makes up the bulk of the body. In a stricter sense the name is applied only to the larger medusæ, such as those of the genera *Aurelia*, *Cyanea*, etc., which are frequently cast up on seabeaches. Under such circumstances the external form and beauty are generally obliterated, and the animal is literally only a mass of jelly. This has the general form of a saucer or concave disk, whence the name Discophora has been applied to the group—from the underside of which hang the pendent feeding and reproductive organs. Consult: Alexander Agassiz, "North American Acalephæ" (containing an extensive bibliography), in *Memoir of the Museum of Comparative Zoölogy*, vol. i (Cambridge, 1865); G. J. Romanes, *Jelly-fish, Star-fish, and Sea-urchins: Being a Research on Primitive Nervous Systems* (New York, 1885); Agassiz and Mayer, "Acalephs from the Fiji Islands," in *Bulletin of the Museum of Comparative Zoölogy*, vol. xxxii (Cambridge, 1899); A. G. Mayer, *The Medusae of the World* (Washington, 1911). See CTENOPHORA; MEDUSA SIPHONOPHORA; and Colored Plate of MEDUSÆ AND SIPHONOPHORA.

JEMAPPES, zhe-måp′. A manufacturing town in the Province of Hainault, Belgium, on the Haine, 5 miles southwest of Mons (Map: Belgium, B 4). It has an industrial school, coal mines, iron, glass, and porcelain factories. It is celebrated for the victory won here by 46,000 French, under Dumouriez and the future King Louis Philippe, over 26,000 Austrians, under the Duke of Saxe-Teschen, Nov. 6, 1792, the former losing 4000 men and the latter 7000. This victory gave the Republic the possession of Belgium. Pop., 1900, 12,778; 1910, 14,270.

JEMEZ, hā′mās. A Pueblo village of Tanoan stock, situated on Jemez River, a western affluent of the Rio Grande, about 35 miles westward from Santa Fe, New Mexico. The inhabitants are peaceable and selfsupporting, with fine fields and orchards. Few of the native arts are maintained, but interesting dances are still to be seen. Pop., about 500. See PUEBLO; TANOAN STOCK.

JENA, yā′nä. A famous university town in the Grand Duchy of Saxe-Weimar-Eisenach, Germany, situated amid precipitous chalk hills on the left bank of the Saale, 10 miles southeast of Weimar (Map: Germany, D 3). It has two fine churches—the fifteenth-century late-Gothic Michael's Church and the high-vaulted collegiate church. The old moats encircling the town have been replaced by fine promenades with monuments of famous scientists. There are in the city many tablets in honor of men who have been associated with the university—Fichte, Schiller, Arndt, Hegel, Reuter, Schelling. Jena also has memories of Luther in the old Black Bear Inn; but the old castle in which Goethe more than once sojourned was torn down in 1905 to make place for a new university building. Jena is the seat of the famous university, with a library of 270,000 volumes. (See JENA, UNIVERSITY OF.) The educational institutions comprise also a Gymnasium, a number of other secondary schools, and scientific organizations. The chief manufactory is the famous Zeiss Optical Works, where lenses are made from Jena glass. The town also makes bricks, vaseline, pianos, soap, and smoked meats. It does a large book business. The Lichtenhainer beer, made in the vicinity, is famous. Pop., 1900, 20,686; 1910, 38,487, chiefly Protestant. Jena is noted as the scene of a great battle (Oct. 14, 1806), in which about 65,000 Prussians under Prince Hohenlohe were completely defeated by nearly 100,000 French under Napoleon. Little Jena was included in the city limits in 1909.

JENA, UNIVERSITY OF. A German university which is the outgrowth of a Gymnasium or high school founded by John Frederic, Elector of Saxony, about 1547, as a centre of Protestant teaching. It was authorized by the Emperor Ferdinand I as a university in 1558 and soon became famous. Its most flourishing period was under the patronage of Duke Charles Augustus, from 1787 to 1807. Among the famous names connected with the university are those of Fichte, Schelling, Hegel, and Oken in philosophy, Schiller (who lectured here in history for 10 years), the brothers Schlegel, Voss, Fries, and Krause. The university is associated with the rise of the Burschenschaften in 1815. Much of its distinction in recent times has been in biology, philosophy, and theology, the most noted names connected with these departments being those of Haeckel and Eucken. In theology Jena represents the most liberal tendencies. Through the influence and benefactions of Carl Zeiss the university has developed considerable research in optics. Through its educational courses and its Seminar, or practice school, Jena has exercised great influence on education in England and America. New university buildings were added in 1908. The university had in 1913 some 2187 students. Its budget is about 480,000 marks. The library contains 270,000 volumes, 300,000 dissertations and pamphlets, and 1000 volumes of manuscripts. The influential *Litteraturzeitung für Deutschland* (1785–1874) was issued from Jena for nearly a century. Consult A. Stier, "Jena," in *Die deutschen Hochschulen, Illustrierte Monographien* (Berlin, 1908).

JENATSCH, yā′nätch, GEORG, or JÜRG (1596–1639). A Swiss soldier and leader in the party strifes of Switzerland during the period of the Thirty Years' War. He was born at Samaden, studied theology at Zurich, and became a Protestant pastor at Veltlin and leader of the Protestants in Grisons. In 1618 he outlawed the Plantas, leaders of the Spanish and Catholic sympathizers, and so put himself for a time at the head of the Patriotic party. Three years later he killed one of these leaders and had to flee. After the entry of the Austrians he was forced to leave Grisons and served under Mansfeld and under the Duke de Rohan. When Rohan did not fulfill the wishes of the Patriotic party (restoration of the Valtellina to the Grisons), Jenatsch turned Catholic and entered the Austrian and later the Spanish service. He was murdered at a banquet by Planta's followers. Jenatsch is portrayed in K. F. Meyer's historical novel *Georg Jenatsch* (Davos, 1894) and by Dierauer (Saint-Gall, 1896).

JENCKES, jĕnks, JOSEPH (1656–1740). A Colonial Governor of Rhode Island, born at Pawtucket. He was a surveyor and acted for Rhode Island in the settlement of the Massachusetts boundary and later served Massachusetts in her disputes with Maine and New Hampshire. In 1721 he went to England to bring the boundary question before the King. After many years in the Legislature and 10 years' service as Deputy Governor, he was elected Governor

(1727). In this capacity he vetoed (in 1731) an act authorizing the issue of paper money. He refused reëlection in 1732. According to story, Jenckes was 7 feet, 2 inches tall and of symmetrical figure.

JENCKES, Thomas Allen (1818–75). An American legislator and lawyer, born at Cumberland, R. I. Graduating at Brown University in 1838, he was admitted to the bar in 1840. He was government counsel in the suits against the Crédit Mobilier and was engaged in patent cases, especially those on the Sickles and Corliss steam engine and the rubber patents of Day and Goodyear. He was intimately connected with the State government during Dorr's Rebellion (1842); became Secretary of the Governor's Council; served in both bodies of the State Legislature; and practically unaided carried his point (Peckham *v.* Burrows) that the Legislature could order a new trial. He was elected to Congress by the Republican party in 1862 and served until 1871. He introduced the general bankrupt law of 1867, as well as important bills for the revision of copyright and patent statutes. His name is especially identified with efforts for the reform of the civil service. In 1868 he prepared an elaborate report on the civil service of other countries, and by speeches and reports he promoted the passage of the law which lies at the basis of the reform. Consult *First Report of the United States Civil-Service Commission* (Washington, 1884).

JENGHIS KHAN, jĕn'gĭz kän. See Genghis Khan.

JEN'KIN, Henrietta Camilla (Jackson) (c.1807–85). An English novelist, born in Jamaica. After marrying Charles Jenkin, a British naval officer, in 1832, she lived in Paris, Genoa, and Edinburgh. Her novels include: *Violet Banks, and its Inmates* (1858); *Cousin Stella* (1859); *Who Breaks, Pays* (1861); *Skirmishing* (1862); *Once and Again* (1865); *Two French Marriages* (1868; reprinted in New York as *A Psyche of To-Day*, 1868); *Madame de Beauprés* (1869); *Within an Ace* (1869); *Jupiter's Daughters* (1874).

JENKIN, Henry Charles Fleeming (1833–85). An English engineer and electrician. He was born at Stowting Court, Kent, England, and, after being instructed at a number of educational institutions, graduated from the University of Genoa as Master of Arts in 1850. While engaged in electrical engineering connected with cable testing and laying, he became acquainted with Sir William Thomson, afterward Lord Kelvin, and later a partnership was established, and many important cables were laid under their direction. In addition to his work in telegraph and cable engineering, Jenkin was also associated with Sir William Thomson and C. F. Varley in the invention and construction of electrical instruments. At Sir William's suggestion he was made a member of the committee appointed by the British Association to consider and determine practical electrical units and prepared a number of important reports on this subject. He also devised the system of telpherage for the transportation of goods from place to place and was interested in questions of mechanical and civil engineering as well as electrical matters. In 1865 he became professor of engineering in University College, London, and in 1868 he accepted a call to a similar chair in the University of Edinburgh, which he held until his death. In 1865 he was elected a fellow of the Royal Society of London, and in 1879 was elected vice president of the Royal Society of Edinburgh, the larger part of his many scientific papers appearing in the *Transactions* and *Proceedings* of these two societies. He was an LL.D. of Glasgow University and was a man of letters and broad information as well as a successful scientist. He was particularly interested in sanitary reform and organized societies for this purpose in Edinburgh and elsewhere. He was the author of a work on *Electricity and Magnetism* (1873). He contributed to the 9th edition of the Encyclopædia Britannica. His *Papers, Literary, Scientific, etc.*, edited by Sidney Colvin and J. A. Ewing, with a memoir by R. L. Stevenson, were published in 1887.

JEN'KINS. A town in Letcher Co., Ky., 139 miles from Ashland, on the Sandy Valley and Elkhorn Railroad. It is situated in a rich bituminous coal field. Jenkins was converted in 1911–12 from a thickly wooded place to a model little mining town by the Consolidation Coal Company. The project involved the expenditure of an enormous sum of money and is considered a most remarkable engineering feat. Pop., 1914 (local est.), 5000.

JENKINS, Charles Jones (1805–83). An American statesman and jurist, born in Beaufort District, S. C., and educated at the University of Georgia and Union College. He was elected to the Legislature of Georgia in 1830, served a short term as Attorney-General, and was in the Georgia House from 1836 to 1850 as leader of his party and as Speaker. Although he was a Democrat, he supported Harrison (1840) and Clay (1844). Jenkins was chairman of the State Convention which, in the platform of 1850, threatened secession; in the same year he refused the portfolio of the Interior. He was State Senator from 1856 to 1860 and judge of the Supreme Court from 1860 to 1865; was elected provisional Governor in 1865, served until 1868; and was president of the Constitutional Convention of 1877. Consult C. C. Jones, *Life and Services of C. J. Jenkins* (Atlanta, Ga., 1884).

JENKINS, Edward Hopkins (1850–). An American agricultural chemist. He was born at Falmouth, Mass.; in 1872 graduated from Yale University (Ph.D., 1879) and studied at the University of Leipzig (1875–76). He served as chemist (1877–1900), vice director (1882–1900), director after 1900, and treasurer after 1901 of the Connecticut Agricultural Experiment Station. From 1897 to 1903 he was chairman of the Connecticut Sewage Commission. In 1913 he served as president of the Association of Agricultural Colleges and Stations. He published *The Small Rock Garden* (1913).

JENKINS (John) Edward (1838–1910). An Anglo-Indian lawyer, politician, and author, born at Bangalore, India. He was educated at McGill University and at the University of Pennsylvania and studied law at Lincoln's Inn, London, where he was admitted barrister in 1864. He acquired a lucrative colonial practice; was counsel for the coolies on the Demerara Coolie Commission in 1870; was agent general for Canada in 1874–76; and was a member of the Royal Commission on Copyright in 1876–77. After an unsuccessful contest as a Liberal candidate for Truro in 1870, he represented Dundee in Parliament in the Liberal interest from 1874 to 1880; but as an Independent Liberal and Imperialist, and later as a Conserva-

tive, failed in his canvasses for Edinburgh in 1881 and for Dundee in 1885 and in 1896. For 24 years he edited the *Overland Mail* and the *Homeward Mail*. He was a prolific political and miscellaneous essayist, and as a novelist produced several works, of which *Ginx's Baby, His Birth and Misfortunes* (1870), published anonymously, was his first success. Among his later writings are: *Lord Bantam* (2 vols., 1871); *Barney Geoghegan, M.P., and Home Rule at Saint Stephen's* (1872); *Little Hodge* (1872), which had a great vogue; *The Devil's Chain* (1876); *Lutehmee and Dilloo: A Study of West Indian Life* (3 vols., 1877); *The Captain's Cabin: A Christmas Yarn* (1877); *Janus, or the Double-Faced Ministry* (1877); *Jobson's Enemies* (3 vols., 1879–82); *Lisa Lena* (2 vols., 1880); *A Paladin of Finance* (1882); *A Week of Passion, or the Dilemma of Mr. George Barton the Younger* (3 vols., 1884); *A Secret of Two Lives* (1886); *Pantalas* (1897); *A Fantasy of Faith* (1900).

JENKINS, Sir Leoline (1623–85). An English judge and diplomat, born at Llantrissant, Glamorganshire. He entered Jesus College, Oxford, in 1641, served in the Royalist army during the Civil War, and fled to the Continent in 1655. After the Restoration he was fellow (1660–61) and head (1661–73) of Jesus College. He was appointed registrar of the consistory court of Westminster in 1661, deputy professor of civil law at Oxford in 1662, deputy judge of the court of the arches in 1664, judge of the admiralty court in 1665, Privy Councilor in 1680, and judge of the prerogative court of Canterbury in 1689. He was knighted for diplomatic services in France by Charles II, represented England at the congresses of Cologne (1673) and Nimeguen (1676–79), and served as Secretary of State in 1680–84.

JENKINS, Thornton Alexander (1811–93). An American naval officer. He was born in Virginia and entered the United States navy in 1828 as a midshipman. He spent the greater part of his life in the service and rose to be rear admiral in 1870, retiring from active duties in 1873. He served with the Mediterranean, African, and North and South Atlantic squadrons until 1845, when he was deputed to investigate the lighthouse systems of Europe. Out of this investigation grew the Law of 1852, framed by Jenkins, under which the Lighthouse Board was administered until merged into a bureau of the Department of Commerce in 1910. After serving on the coast of South America and in Central America, and in Mexico during the war with that country, Jenkins was promoted to a captaincy in 1862 and did good service during the Civil War. He had command of one of the monitors at the battle of Mobile Bay and was highly commended in the report of Admiral Farragut. In 1865 he was chief of the Bureau of Navigation; 1869–71, naval secretary of the Lighthouse Board; 1871–73, in command of the East India squadron. In 1876 Jenkins had charge of the exhibit of the United States Navy Department in the Centennial Exhibition at Philadelphia.

JEN'KINSON, Charles and Robert, first and second Earls of Liverpool. See Liverpool.

JENKINS'S EAR, War of. The popular name of the war between Spain and Great Britain in 1739, which was occasioned chiefly by the complaint of Robert Jenkins, an English ship captain, that he had lost an ear and had undergone other tortures at the hands of the Spaniards. This outbreak was swallowed up in the War of the Austrian Succession.

JEN'KINTOWN. A borough in Montgomery Co., Pa., 10 miles north of Philadelphia, on the Philadelphia and Reading Railroad (Map: Pennsylvania, L 7). It is in a fertile agricultural district and has railroad switch works. There is a public library here. Pop., 1900, 2091; 1910, 2968.

JENKS, Arthur Whipple (1863–1922). An American Protestant Episcopal theologian. He was born at Concord, N. H., and graduated from Dartmouth College in 1884 and from the General Theological Seminary in 1896. He was ordained a deacon in 1892 and a priest in 1893 in the Protestant Episcopal church and was rector of St. Luke's Church at Woodsville, N. H., in 1892–95. He served as professor of ecclesiastical history at Nashotah House, Wis. (1895–1901), at Trinity College, Toronto, Canada (1901–10), and at the General Theological Seminary after 1910. He received the degree of D.D. from Dartmouth in 1911. He published *Notes for Meditation on the Beatitudes of the Psalter* (1914) and was a contributor to the New International Encyclopædia.

JENKS, Edward (1861–). An English authority on law, born at Clapham, Surrey. He was educated at Dulwich College and at King's College, Cambridge, of which he was scholar and fellow. For a year (1888–89) he lectured at Pembroke and Jesus colleges, Cambridge, then removing to Australia to be dean of the faculty of law in the University of Melbourne. He returned to England in 1892, was Queen Victoria professor of law in University College, Liverpool (1892–96), reader in English law at Oxford, and tutor and lecturer at Balliol College until 1903, and principal and director of legal studies of the Law Society. In addition he served as examiner in the universities of Oxford, Dublin, Durham, London, and Wales, and for the Civil Service Commission, was made honorary secretary of the Society of Public Teachers of Law, and for some years edited the *Independent Review*. His works include: *Constitutional Experiments of the Commonwealth* (1891); *The Doctrine of Consideration in English Law* (1893); *The Government of Victoria, Australia* (1893); *History of the Australasian Colonies* (1895; 3d ed., rev., 1912); *Outline of English Local Government* (1894; 2d ed., 1907); *Law and Politics in the Middle Ages* (1897); *Modern Land Law* (1899); *A Short History of Politics* (1900; 12th thousand, 1902); *Edward I* (1902); *Parliamentary England* (1903); an exhaustive *Digest of English Civil Law* (1905 et seq.), with others; *Husband and Wife in the Law* (1909); *Short History of English Law* (1912).

JENKS, Jeremiah Whipple (1856–). An American economist and educator, born at St. Clair, Mich. He graduated at the University of Michigan in 1878, studied for several years in Germany, taking his doctorate at the University of Halle in 1885, and after his return studied law and was admitted to the bar. Previous to his residence abroad, he had taught at Mount Morris College, and in 1886 he returned to educational work as professor of political science and English literature at Knox College. Subsequently he held the chair of political economy and social science at Indiana University (1889–91) and then for 21 years a similar chair at Cornell. In 1912 he was ap-

pointed professor of government and director of the division of public affairs in the School of Commerce, Accounts, and Finance, New York University.

Besides his professorial duties he found time to do much as a government expert. In 1899–1901 he was in Europe as agent of the United States Industrial Commission on Investigation of Trusts and Industrial Combinations in the United States and Europe; for a time he was consulting expert on trusts for the Department of Labor; in 1902 he visited Egypt, India, Burma, the Straits Settlements, Java, and the Philippines as special commissioner of the War Department, investigating questions of currency and internal taxation, labor, and police; in 1903 he was employed by the Mexican government as special expert on currency reform; and in 1903–04 he was a member of the United States Commission on International Exchange, in special charge of the reform of the currency of China. He was appointed in 1907 a member of the United States Immigration Commission. He became director of the Far Eastern Bureau, New York, in 1913. His publications include: *Henry C. Carey als Nationalökonom* (1885); an important discussion of *The Trust Problem* (1900; 6th ed., 1912); *Industrial Combinations in Europe* (1901); *Report on Certain Economic Questions in the English and Dutch Colonies in the Orient* (1902); *Citizenship and the Schools* (1906); *The Political and Social Significance of the Life and Teachings of Jesus* (1906); *Life Questions of High School Boys* (1908); *Principles of Politics* (1909); *Governmental Action for Social Welfare* (1910); *The Immigration Problem* (1913), with W. J. Lauck; *The Making of a Nation* (1913), with Prof. C. F. Kent. In addition he was editor and part author of vols. i and xiii of *Trusts and Industrial Combinations* (1900, 1901), the title of the Industrial Commission's reports; and part author and compiler of *Reports of the Commission on International Exchange* (1904, 1905).

JENKS, Joseph (1602–83). An American Colonial inventor, born of Welsh parentage in Hammersmith, London, England. He learned the trade of a founder and machinist, and emigrated to Massachusetts Bay about 1645. In the same year he settled at Lynn, Mass., where a little later he became superintendent of an iron foundry—the first to be established in America. Jenks himself was the first founder in iron and brass of whom there is any record in the Colonies. He had considerable ability as an inventor, and to him, on May 6, 1646, the General Court of Massachusetts granted a patent for "an engine for mills to go by water," the first recorded American patent. Later Jenks was granted patents for scythes, saws, and other edged tools. In 1652 he made the dies for the new Colonial coinage, among the coins struck from his dies being the famous "pine-tree" shilling. In 1654 he contracted with the selectmen of Boston to construct "an engine to carry water in case of fires." Consult Lewis and Newhall, *History of Lynn* (Boston, 1865).

JENKS, Tudor (1857–1922). An American writer. He was born in Brooklyn, N. Y., graduated from Yale in 1878 and from Columbia Law School in 1880, and after seven years' law practice in New York was from 1887 to 1903 an editor of the *St. Nicholas Magazine.* His numerous and varied books include: *The Boys' Book of Exploration* (1900); *Galopoff, the Talking Pony* (1902); *Capt. John Smith* (1904); *In the Days of Chaucer* (1904); *Capt. Myles Standish* (1905); *In the Days of Milton* (1905); *In the Days of Shakespeare* (1904); *In the Days of Scott* (1906); *In the Days of Goldsmith* (1907); *The Book of Famous Sieges* (1909); *When America Became a Nation* (1910); *What Shall I Be?—A Sailor* (1911).

JENKS, William (1778–1866). A Congregational clergyman. He was born at Newton, Mass., graduated at Harvard in 1797, and served as pastor at Bath, Me., 1805–17. He was also a chaplain in the War of 1812 and professor of Hebrew and English literature at Bowdoin College. In 1826 he went to Boston and there played a prominent part as pastor, philanthropist (especially as the friend of sailors), and scholar. He was one of the founders of the American Oriental Society and of the American Antiquarian Society of Worcester, Mass. He published *The Comprehensive Commentary of the Holy Bible* (1834), of which it is said 120,000 volumes were sold; also an *Explanatory Bible Atlas and Scripture Gazetteer* (1849).

JEN'NER, Edward (1749–1823). An English physician, the discoverer of vaccination as a preventive of smallpox. He was born at Berkeley in Gloucestershire, where his father was vicar. With a view to his entrance into the medical profession, young Jenner was apprenticed to Daniel Ludlow of Sodbury, to learn surgery and pharmacy. In 1770 he went to London and became a student at St. George's Hospital and was a resident for two years in the family of John Hunter. Under Hunter's recommendation, young Jenner received the appointment to prepare and arrange the specimens of fauna and flora brought home by Captain Cook from his first voyage of discovery in 1771. Jenner's success in this matter led to his being offered the position of naturalist of Cook's second expedition, which he declined. He preferred life in a village and became a country surgeon in Berkeley, devoting the time not required by the practice of his profession to ornithology, botany, and mineralogy. Jenner appears to have been the first to suggest that angina pectoris is due to hardening of the coronary arteries. He also described the implication of the heart in cases of rheumatism, of which he was probably the discoverer. In 1792 he was invested with the degree of M.D. by the University of St. Andrews, Scotland.

The discovery of the prophylactic power of vaccination, on which Jenner's fame chiefly rests, was communicated to Edward Gardner in 1780. Jenner had given much thought and time to the study of smallpox, cowpox, and swinepox, and the development of the two latter diseases when communicated to man. He at first considered cowpox to be caused by the contagion of "grease," a hoof disease of horses. In conversation with Hunter in 1770 he had suggested the possibility of the prophylactic power of cowpox. A dread of disappointment influenced him to spend many years in observation and investigation before promulgating his discovery. He inoculated his son with swinepox and ascertained that the boy was proof against smallpox. Jenner performed his first public inoculation with vaccine on May 14, 1796. After passing through the disease of vaccinia the patient was exposed to smallpox by having its virus introduced into his arms, but without effect. Subsequent experiments yielded similar results. In

1798 he published the paper on vaccination, detailing the whole matter and stating his belief and his proofs. In the same year he visited London in order to demonstrate the truth of his assertions; but he was unable to prevail upon any one to submit to vaccination and was bitterly attacked by both physicians and clergymen. In one year, however, a revulsion of feeling took place, and a large number of leading physicians in the capital city declared, over their signatures, their confidence in vaccination, and the day was won. Jenner's high principle and pure motives were shown in his refusal to accept the suggestion of Cline, of St. Thomas's Hospital, to the effect that he should settle in London, where Cline promised him £10,000 a year as a result of his practice. Jenner gave almost his entire time to the demonstration and defense of his discovery, and his practice was nearly annihilated. A petition to Parliament by his friends resulted in a vote of £10,000 to Jenner in 1802, and he received a second grant of £20,000 in 1807. Yet inoculation, in spite of the fact that many deaths resulted from it, was continued at the Smallpox Hospital in London till 1822. In 1811 Jenner received a diamond ring from the Empress of Russia as a token of her admiration. She had the first child vaccinated in Russia named Vaccinoff and pensioned it for life. Jenner was named the first Honorary Associate of the Physical Society of Guy's; he was elected mayor of his native town; he received the freedom of the city of Dublin and of the city of Edinburgh; he was elected an honorary fellow of the Royal College of Physicians of Edinburgh; Oxford granted him the degree of Doctor in Medicine; the naval physicians and surgeons presented a gold medal to the discoverer, upon the adoption of vaccination in the British army and navy. France, Germany, Italy, Spain, Russia, and the United States adopted the practice of vaccination. The Hindus and the Chinese followed the example. In the East the appreciation of Jenner's labors and achievements was shown in public subscriptions of £4000 from Bengal, £2000 from Bombay, and £1383 from Madras. A statue of Jenner was placed in Gloucester Cathedral as a result of a public subscription, and in 1858 a statue was erected in London. In 1815, upon the death of his wife, Jenner retired to Berkeley, where he died of apoplexy.

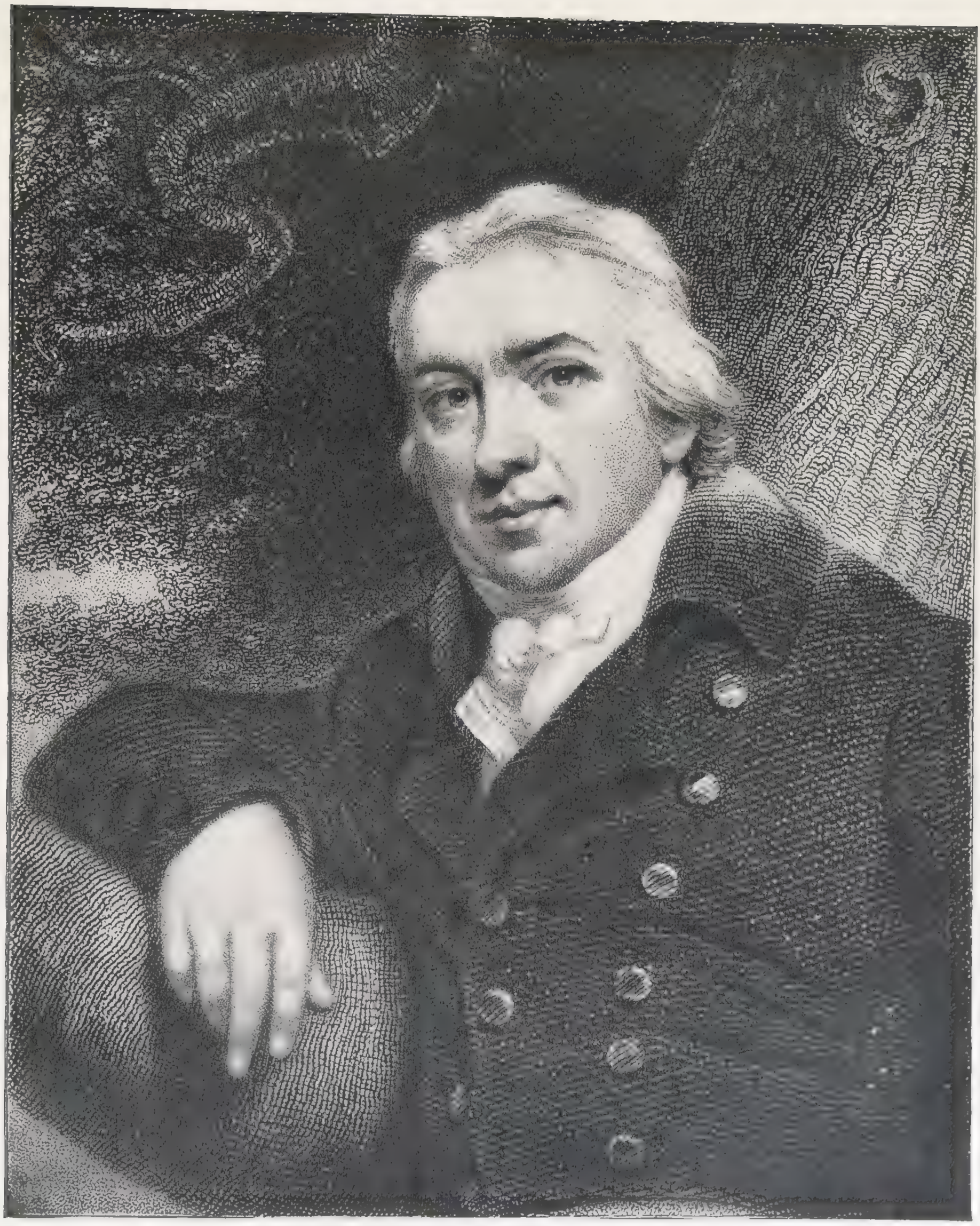
Among Jenner's published works are: "On the Natural History of the Cuckoo," in *Philosophical Transactions* (1788); "A Process for Preparing Pure Emetic Tartar," in *Philosophical Transactions* (1793); *Inquiry into the Cause and Effect of the Variolæ Vaccinæ* (1798); *Farther Observations on the Variolæ Vaccinæ* (1799); *A Continuation of Facts and Observations Relative to Variolæ Vaccinæ* (1800); *A Complete Statement of Facts and Observations Relative to the Cow-Pock* (1800); *On the Origin of Vaccine Inoculation* (1801); *On the Varieties and Modifications of the Vaccine Pustule, Occasioned by an Herpetic State of the Skin* (1804); "Observations on the Distemper in Dogs," in *Transactions of the Medico-Chirurgical Society* (1809); "Two Cases of Smallpox Infection, Communicated to the Fœtus in Utero," in *Transactions of the Medico-Chirurgical Society* (1809); *A Letter to C. H. Parry, on the Influence of Artificial Eruptions in Certain Diseases Incidental to the Human Body* (1822). Consult J. Baron, *Life of Jenner* (2 vols., London, 1838), and "Edward Jenner: His Life, his Work, and his Writings," in *British Medical Journal*, vol. ii (ib., 1902). See VACCINATION.

JENNER, SIR WILLIAM (1815–98). An English physician and surgeon, born at Chatham. He graduated M.R.C.S. at University College, London, in 1837, and M.D. in 1844, and in 1852 became a fellow of the Royal College of Physicians. In 1847, as a member of the staff of the London Fever Hospital, he commenced his minute observations on 1000 cases of fever, which resulted in the absolute differentiation of "typhus" and "typhoid," an achievement which established his fame. Their dissimilarity as "continued fever" had already been noticed, but was not confirmed until the publication of Jenner's conclusions. From 1849 he was professor of pathological anatomy at University College and assistant physician of the College Hospital, becoming physician in 1854. He resigned in 1876, became a consulting physician three years later, was named physician in ordinary to the royal family in 1861, and attended the Prince Consort in his last illness. In 1868 he was made Baronet and in 1872 Knight Commander of the Bath for his services during the illness of the Prince of Wales. His publications include: *On the Identity and Non-Identity of Typhoid Fever* (1850); the Gulstonian lectures on *Acute Specific Diseases* (1853); *Diphtheria: Its Symptoms and Treatment* (1861); *Lectures and Essays on Fevers and Diphtheria* (1893); *Clinical Lectures and Essays on Rickets, Tuberculosis, Abdominal Tumours and Other Subjects* (1895). Consult article, by D'Arcy Power, in *Dictionary of National Biography* (supp., vol. iii, London, 1901).

JEN'NET (OF. *genette*, Sp. *ginete*, nag, horseman, probably from Ar. *Zanāta*, name of a Barbary tribe famed for its cavalry). A breed of Spanish horses, which originated in the Middle Ages from a cross between an Arabian stallion and a native mare. They were widely celebrated for speed and grace, having much of the high-stepping action of the barb, and are believed to have contributed much to improve the stock of northern Europe about the sixteenth century.

JEN'NINGS. A city and the parish seat of Jefferson Davis Parish, La., 40 miles west of Lafayette, on the Southern Pacific Railroad and on the Mermenteau River (Map: Louisiana, D 6). It is situated in a rich rice, farming, fruit-growing, and lumbering region, and has machine shops, large rice mills, saw mills, and a screen and pump factory. The city contains a Carnegie library, St. Henry's Academy, an Elks Home, sanitarium, and fine high school and Federal buildings. The water works are owned by the municipality. Jennings adopted the commission form of government in 1913. Pop., 1900, 1539; 1910, 3925.

JENNINGS, HERBERT SPENCER (1868–). An American zoölogist. Born at Tonica, Ill., he was educated at the University of Michigan (B.S., 1893), at Harvard University (Ph.D., 1896), and at Jena, Germany (1896–97). He taught botany at the Montana State Agricultural College in 1897–98 and zoölogy at Dartmouth College in 1898–99 and at the universities of Michigan (1900–03) and Pennsylvania (1903–05). In 1906 he became professor of zoölogy, and in 1910 director of the zoölogical laboratory, at Johns Hopkins University. He directed the United States Fish Commission Biological Survey of the Great Lakes in 1901,



EDWARD JENNER

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became associate editor of the *Journal of Experimental Zoölogy* and of the *Journal of Animal Behavior*, and served as president of the American Zoölogical Society (1908–09) and of the American Society of Naturalists (1910–11). He published *Anatomy of the Cat* (1901), with Jacob Reighard; *Behavior of the Lower Organisms* (1906); and other researches on the physiology of microörganisms, on animal behavior, and on philosophical biology. In 1909 Clark University gave him the degree of LL.D.

JENNINGS, Louis John (1836–93). An Anglo-American journalist, editor, and author, born in London. In 1860 he joined the staff of the London *Times* and in 1863 went as its special correspondent to India, for a period acting as editor of the *Times of India*. After 1865 he succeeded Dr. Charles Mackay as the *Times* representative in the United States. In 1867 he married Miss Madeline Henriques, of New York, and took up his residence in that city. He was appointed to the editorship of the New York *Times*, and his tenure of that office was marked by his scathing and dauntless exposure of the malpractices in the municipal government of New York, which resulted in the prosecution and condemnation of the chief members of the Tweed Ring. In 1876 he returned to England and engaged in various literary pursuits and in politics, being elected Conservative member for Stockport in 1885 and 1886. His published works include: *Eighty Years of Republican Government in the United States* (1868); *Field Paths and Green Lanes: Being Country Walks Chiefly in Surrey and Sussex* (1877); *Rambles among the Hills in the Peak of Derbyshire and the South Downs* (1880); *The Millionaire: A Novel* (3 vols., 1883); *Mr. Gladstone: A Study* (1887). His last literary work was the editing of Lord Randolph Churchill's *Speeches with Notes and Introduction* (1889).

JENNINGS, Samuel (?–1708). An English Quaker, famous as a preacher and legislator in America. He emigrated from Buckinghamshire to Burlington, N. J., in 1680, and three years later, having previously acted as deputy, he was elected Governor of West Jersey, but afterward became a judge in Philadelphia. There he mixed in the controversies of the day, and when George Keith made a schism in the Quaker camp, it was Jennings who denounced him and upheld the action of his American coreligionists at the notable trial in London (1694). Upon his return to America he again made his home in Burlington, N. J., but frequently went on preaching tours through the Quaker districts of the other Colonies. He became Speaker of the local House and was instrumental in obtaining the recall of the unpopular British Governor, Lord Cornbury, and in establishing order in the civil government of West Jersey.

JENNINGS, Sarah, Duchess of Marlborough (1660–1744). Wife of John Churchill, Duke of Marlborough (q.v.). She was born May 29, 1660, the daughter of Richard Jennings. She entered the household of Mary of Modena, the second Duchess of York, while still young, and became an attendant of the Princess Anne (later Queen Anne). Anne was an amiable but weak woman, and she was soon under the complete control of the beautiful and imperious Sarah Jennings. About 1676 John Churchill fell in love with her, and they were married two years later. By her influence over Anne she was of great assistance to her husband's career; but this was also cut short by her quarrels with Queen Anne, arising through the favor the latter showed to Mrs. Masham (q.v.). About the beginning of 1711 the Duchess of Marlborough was dismissed from all her offices. Thereafter her life consisted chiefly of a series of quarrels and lawsuits with friends and relatives. She died Oct. 18, 1744. There is an interesting correspondence in existence which she and Queen Anne carried on under the pseudonyms of Mrs. Freeman and Mrs. Morley respectively. Consult: *Private Correspondence of Sarah, Duchess of Marlborough* (2 vols., London, 1838); K. B. Thompson, *Memoirs of Sarah, Duchess of Marlborough* (2 vols., ib., 1839); Murray, *Letters of the Duchess of Marlborough* (ib., 1875); J. F. Molloy, *The Queen's Comrade* (ib., 1901); Mrs. O. S. C. Colville, *Duchess Sarah* (ib., 1904); S. J. Reid, *John, Duke, and Sarah, Duchess, of Marlborough* (New York, 1914).

JENSEN, yĕn'sĕn, Adolf (1837–79). A German song composer, born in Königsberg. He studied a short time under Ehlert and Marpurg, but was chiefly self-taught. He traveled and taught in Russia to secure funds for further study, and after his return was conductor at the Posen City Theatre in 1857. He lived in Copenhagen for two years in order to be near Niels Gade, after which he returned to Königsberg. From 1866 to 1868 he taught at Tausig's school in Berlin. While here his health gradually failed, compelling him to retire to Dresden, then to Gratz, and finally to Baden-Baden, where he died of consumption. He was a gifted and poetical writer of *Lieder* in the genre of Schumann and Franz and ranks little below those composers. His published songs number about 160 and include *Der Ungenannten*, six love songs after Geibel; six *Liebeslieder; Dolorosa*, six poems by Chamisso; *Gaudeamus*, 12 songs for bass; and some instrumental music, especially for the piano. He also wrote an opera entitled *Turandot*. Consult A. Niggli, *Jensen* (Berlin, 1900).

JENSEN, Gustav (1843–95). A German composer and violinist, born at Königsberg. He studied in Berlin under Laub, Dehn, and Joachim. From 1872 till his death he was professor of counterpoint at the Cologne Conservatory. As a composer, he lacks the charm and spontaneity of his brother Adolf (q.v.). Nevertheless his chamber music, choruses, pieces for piano, and songs command respect. His editions of older violin music, published under the title *Klassische Violinmusik*, are of permanent value.

JENSEN, Peter (1861–). A German Assyriologist, born in Bordeaux, France. He studied at the universities of Leipzig and Berlin. Devoting himself to the study of Semitic and Hittite archæology, after 1895 he was professor of Semitic philology, and of Oriental history in the Summer Session, at the University of Marburg. Among his publications are *Kosmologie der Babylonier* (1890); *Die Hittiter und Armenier* (1898); *Die Mythen und Epen der Babylonier* (1900); *Das Gilgameschepos in der Weltliteratur* (1906); *Moses, Jesus, Paulus* (1st and 2d ed., 1909; 3d ed., 1910); *Hat der Jesus der Evangelisten wirklich gelebt?* (1910).

JENSEN, Wilhelm (1837–1911). A German novelist, born at Heiligenhafen in Holstein. He studied medicine, later philosophy and litera-

ture, at Kiel, Würzburg, and Breslau, and lived later at Munich and Stuttgart, where he edited, from 1868, the *Schwäbische Volkszeitung;* at Flensburg, where he edited the *Norddeutsche Zeitung* (1869–72); at Kiel, at Freiburg in Breisgau, and, after 1888, in Munich. His earlier stories, under the influence of Storm (q.v.), e.g., *Die braune Erica* (1868) and *Eddystone* (1872), were prose idyls admirable in their descriptions. Urban and higher social life then attracted him, and with the novel *In der Fremde* (1887) he seemed to be emulating the French Bourget. Later he returned to his earlier manner, e.g., in *Im Zwing und Bann* (1892), a story of the Black Forest, scenes from which he described admirably in the well-illustrated *Der Schwarzwald* (3d ed., Berlin, 1901). His work is characterized by originality of fancy and emotional scenic description, but lacks clearly drawn characters. His shorter stories surpass his novels. Many of his poems are good. He published a great deal. Jensen published the poems *Vom Morgen zum Abend* and *Gesammelte Gedichte* (1897). His latest work includes the romance *Der Schleier der Maja* (1902); *Gäste auf Hohenaschau* (1904); *In Majorem Dei Gloriam* (1905); *Unter der Tarnkappe* (1907); *König Friedrich* (1908); *Die Nachfahren* (1909); *Deutsche Männer* (1909); *Ausgewählte Gedichte* (1913). Consult: Eadmann, *W. Jensen* (Leipzig, 1907); H. R. Jockisch, "Wilhelm Jensen, ein Widmungsblatt zum siebzigsten Geburstage des Dichters," in *Westermann's Monatshefte*, vol. li (Brunswick, 1907); Ludwig Fulda, article in the *Berliner Tageblatt*, No. 602 (Berlin, 1912).

JENSON, Nicolas (c.1400–80). A French stamp cutter and printer, born at Tours. He is supposed to have been sent by Charles VII from Paris to Mainz in 1458 in order to learn the art of printing. In 1470 he went to Venice, where in the following year he printed his first book; and before his death, in 1480, he produced from his presses no less than 155 volumes, including many editions now celebrated. Instead of the Gothic or black letters he introduced the antique or Roman characters in many of his books, and his style of type was soon copied in all Latin countries. Jenson was created Count Palatine by Pope Sixtus IV. Consult T. L. DeVinne, *Notable Printers of Italy during the Fifteenth Century* (New York, 1910).

JENYNS, jĕn'ĭnz, Soame (1704–87). An English author. He was born in London and was educated at St. John's College, Cambridge, but left before he had completed his course. He first attracted attention by writing, shortly after leaving Cambridge, a poem entitled *The Art of Dancing* (1727). He sat almost continuously in Parliament from 1742 to 1780 and in 1755 was appointed a Commissioner of the Board of Trade. A man of wealth and leisure, he cultivated the acquaintance of literary people and acquired a reputation, wholly undeserved, as a wit and writer. In thought he was shallow, in style wordy and turgid. His book entitled *A Free Enquiry into the Nature and Origin of Evil* (1757) was the subject of one of Dr. Johnson's most scathing and brilliant criticisms in the *Literary Magazine.* His best-known work was his *View of the Internal Evidence of the Christian Religion* (1776), which reached a tenth edition by 1795 and was translated into several Continental languages. His collected *Works* were published in 1790.

JEOFAILS, Statutes of. See Statutes of Jeofails.

JEOPARDY, jĕp'ar-dĭ (from OF. *jeu parti*, divided game, even chance, ML. *jocus partitus*, even chance, from Lat. *jocus*, jest, game, and *partitus*, p.p. of *partire*, to divide, from *pars*, part; influenced by popular etymology with OF., Fr. *jeu perdu*, lost game). In law, the peril incurred by a criminal process. The fifth amendment to the Constitution of the United States declares that no person shall be subject for the same offense to be twice put in jeopardy of life or limb. A similar provision is found in various State constitutions. Like most constitutional guarantees of protection to the individual, this is but a reënactment of a common-law rule; one which was enforceable in a criminal proceeding under the plea of *autrefois acquit* (q.v.). It is said that the phrase "jeopardy of life or limb" referred originally to the hazard of a party to a trial by battle (q.v.). At present, however, it denotes the risk imposed upon one who is subjected to a strictly criminal prosecution. The constitutional provision does not apply to a defendant in a civil action.

As to the question, at what stage of a criminal prosecution the accused is put in jeopardy to which he shall not be subjected a second time, the answers are not uniform. The great weight of authority supports the view that "a person is in jeopardy when he is put upon trial, before a court of competent jurisdiction, upon an indictment (q.v.) or information (q.v.) which is sufficient in form and substance to sustain a conviction, and a jury has been impaneled and sworn to try him." He then stands before the jurors as his judges, and, if he is charged with a capital crime, his life is in their hands. Accordingly, if he is acquitted by them, or if they are discharged by the court without his consent, except in cases of extreme necessity, such as the sickness or death of a juror, the constitutional provision applies, and he is not liable to a second prosecution. On the other hand, if the court had no jurisdiction of the case, or the indictment were fatally defective, or if the prisoner after conviction secured its reversal, the provision does not protect him from another trial. Consult Cooley, *General Principles of Constitutional Law* (Boston, 1900).

JEPHSON, jĕf'son, Robert (1736–1803). An Irish poet and playwright, who was a soldier in early life. He rose to be an infantry captain, but retired on half pay about 1763, and lived for the four following years in England, where he became friendly with Garrick, Goldsmith, Johnson, Burke, Reynolds, Townshend, Burney, and other lights in the literary, dramatic, and artistic firmament. He was always popular because of his Irish wit and social temperament; his plays were successfully produced in London, and after his return to Dublin he was master of the viceregal horse for many years and member of the national Parliament (1793). His tragedies are: *Braganza* (Drury Lane, 1775); *The Law of Lombardy* (1779); *The Count of Narbonne* (Covent Garden, 1781); *Julia, or the Italian Lover* (Drury Lane, 1787); *Conspiracy* (Drury Lane, 1796). In lighter vein he wrote the farce *The Hotel, or the Servant with Two Masters* (1784); *Campaign, or Love in the East Indies*, a comic opera (acted at Covent Garden in 1785, and presented in abbreviated form under the title *Love and War* in 1787); and the farce *Two Strings to your Bow* (Covent Garden,

1791). He published also in verse *Roman Portraits* (1794), and a satire on the French Revolution called *The Confessions of Jacques Baptiste Couteau* (1794).

JEPHTHA, jĕf′thâ, *Ger. pron.* yĕf′tä. An oratorio by Handel (q.v.), first produced in London, Feb. 26, 1752; in the United States, Feb. 7, 1867 (Boston).

JEPH′THAH (Heb. *Yiphthāh*, he, i.e., the El, opens). A Gileadite, one of the judges of Israel. The story of his career, according to Judg. xi–xii, is as follows: He was a bastard and, being driven from home by his brothers, became the leader of a band of brigands. When the Ammonites oppressed Israel, the Gileadites appealed to Jephthah for aid. He rebuked them for coming to him only because in distress, but agreed to help them on condition that, if successful, he should remain their leader. Accordingly he went forth to battle against the Ammonites, first vowing to offer to Yahwe in case of success whatever should come to meet him from the door of his house on his return. He overcame the Ammonites, routing them entirely. On his return home his daughter, his only child, came forth out of the house, the first one to meet him. Being told of her father's vow, she agreed to its fulfillment, and Jephthah "did with her according to his vow" (Judg. xi. 39). Her fate was afterward bewailed by the daughters of Israel four days every year (Judg. xi. 39–40). The Ephraimites picked a quarrel with Jephthah because he had not asked them to join in the war against the Ammonites (cf. Judg. viii. 1). A combat ensued, and Jephthah was victorious. The story goes that, with his Gileadite forces, he held the fords against the Ephraimites and put to death every fugitive who betrayed his Ephraimitic origin by his inability to pronounce his *sh* sound, saying "sibboleth" for "shibboleth." Jephthah's judgeship lasted for six years, and he was buried in Gilead.

The story of Jephthah, when critically studied, reveals a curious mixture of myth and uncertain tradition. By general agreement among critics, the interview between Jephthah and the King of the Ammonites (Judg. xi. 12–28) is regarded as unhistorical, for the sufficient reason that the section in question refers to the Moabites. In the above account of Jephthah, therefore, no mention has been made of it. But there are other problems more difficult to solve. The account of the quarrel of the Ephraimites with Jephthah is so similar to an incident in the career of Gideon (Judg. viii. 1–3) that it is difficult to resist the conclusion that the incident has nothing to do with Jephthah. The incident with Jephthah's daughter rests presumably upon some actual occurrence of child sacrifice; and it has been suggested by Duhm that the name Jephthah was originally Jiphthahel, or 'the god who opens (the womb),' and to whom, therefore, the first-born belonged. In the form in which it is told is an attempt to account for a four days' festival celebrated annually in Gilead and elsewhere in Palestine, a feature of which was weeping by women. This festival is, without much question, that of Tammuz (q.v.)—the young god who is slain by a cruel goddess, and for whom the women (as the official mourners in the Orient, ancient and modern) sing dirges. This festival, we know from Ezekiel (viii. 14), was observed by Hebrews till a comparatively late date. There remains Jephthah's conflict with the Ammonites; and since this account contains an incident, as above pointed out, which confuses Moabites and Ammonites, it is clear that the later Hebrew writers did not have any very definite knowledge of Jephthah's career. His name remained in the memory of his people as a liberator from oppression by an enemy, but who the enemy was—whether Moabites or Ammonites—appears to have been forgotten. Consult commentaries on Judges by Moore and Budde, and the Hebrew histories of Stade, Guthe, Wellhausen, Kittel, etc.

JEPSON, Edgar (?–). An English novelist. He was born in London, studied at Leamington College and graduated B.A. at Balliol College, Oxford, and lived in Barbados in 1889–93. His books include: *Sibyl Falcon* (1895); *The Passion for Romance* (1896); *The Keepers of the People* (1898); *On the Edge of the Empire* (1900); *The Dictator's Daughter* (1902); *The Admirable Tinker* (1904); *The Lady Noggs, Peeress* (1905); *The Triumphs of Tinker* (1905); *The Four Philanthropists* (1906); *Tangled Wedlock* (1906); *The Mystery of the Myrtles* (1907); *Arsène Lupin* (1908); *No. 19* (1909); *The Girl's Head* (1910); *Captain Sentimental* (1911); *Pollyooly* (1911); *The House on the Mall* (1912); *The Terrible Twins* (1913); *The Intervening Lady* (1914); *Whitaker's Dukedom* (1914).

JEQUITINHONHA, zhā′kē-tē-nyō′nyâ, or Rio Grande do Belmonte. A river on the east coast of Brazil, rising in the Serra do Espinhaco, in the Province of Minas Geraes, southwest of the town of Diamantina. It flows northeast, falling into the Atlantic at Belmonte, 200 miles south of Bahía (Map: Brazil, J 7). Its length is estimated at about 600 miles. The upper course, flowing through a mountainous country, is very rapid and forms a number of cataracts, one of which, the Salto Grande, has been compared with Niagara. Its lower course, in the State of Bahía, is through a flat country, where it is navigable for light vessels for about 60 miles.

JEŘÁBEK, yĕr′zhä-bĕk, Františ ek (1836–93). A Bohemian dramatist, born at Sobotka and educated in theology and philology at Leitmeritz and at Prague. He lived in the latter city, where he taught school and was prominent in journalism as editor of *Pokrok*, and in politics as a member of the Bohemian Diet and the Austrian Reichsrat. His dramas, all of unusual technical merit, include: *Hana* (1858); *Svatopluk* (1859); *Vesclohra* (1861); *Cesty veřejného minčni* (1866); *Služebnik svého pána* (Faithful Servant of his Master, 1870; Ger. trans., 1892), a powerful social play dealing with the conflict between intellect and capital; *Syn člověka* (The Son of Man, 1878), an historical play; and *Závist* (1885), portraying Bohemia in the time of Podiebrad. He also wrote a valuable history of early romantic poetry, *Stará doba romantického básnictví* (1884).

JERAHMEEL, jĕ-rā′mĕ-ĕl *or* yā-rā′mâ-ĕl (Heb., El pities). The name of a tribe in the district of southern Syria called the Negeb (q.v.). In 1 Sam. xxvii. 10 David tells Achish that he has made a raid against the Negeb of Judah, the Negeb of the Jerahmeelites, and the Negeb of the Kenites; and in 1 Sam. xxx. 29 he sends of the spoil of Ziklag to the cities of the Jerahmeelites and the cities of the Kenites as well as to various cities of Judah. At that time Jerahmeel seems to have inhabited the centre of the great plateau of the Negeb, east

of the Cherethites, or Cretans, and south of the Calebites, both mentioned in 1 Sam. xxx. 14, west of the Kenites, and north of the Amalekites, whose northern border apparently was the Wadi Kdēs. They consequently occupied the part of the Negeb in which the ruins of important Byzantine cities still stand. Like the neighboring tribes, they were incorporated by David in the Kingdom of Judah. Hence their cities are counted as belonging to the tribe of Judah (q.v.), and in 1 Chron. ii. 9 Jerahmeel appears as the son of Hezron, the son of Perez, Judah's son with Tamar. When Jerahmeel is represented as the older brother of Caleb, this may indicate that the Jerahmeelites were considered as a more important people and known to have lived longer in the land than the Calebites. As the Jerahmeelite cities are also ascribed to Simeon, it is possible that this tribe was dispossessed by the Jerahmeelites. They seem to have been of Edomitish origin and were probably related to the Calebites and the Kenites. When the Nabatæans drove the Edomites out from their mountains across the Arabah into the Negeb, the Jerahmeelites and their kindred moved north into Judah, then decimated by the exile; but they seem to have maintained their separate tribal organization. Whether the name of the eponymous ancestor is that of their chief deity, "the pitying El," and identical with the Rahman of the Arabs, cannot be determined with certainty. Their location in earlier times renders it extremely probable that they exercised a considerable influence on the southern tribes, and therefore indirectly on all Israel; but until further testimony is brought forth the precise nature of this influence can only be conjectured. It is Cheyne's merit to have called attention to the importance of this tribe; and the services rendered by this eminent scholar by his attempt to recover its lost history and his demand for a more searching criticism of genealogies and place names should not be overlooked because of the violent textual emendations and the uncontrollable theories, similar to those of other scholars in reference to the Kenites, to which his discovery led him. *The Chronicles of Jerahmeel* is a collection of late Jewish legends of no historical value; this work has been published by M. Gaster (Orient Translation Fund, 1899). Consult: S. A. Cook, in *Encyclopædia Biblica* (4 vols., New York, 1899–1903); T. K. Cheyne, *Biblica Critica* (London, 1904); id., *The Decline and Fall of the Kingdom of Judah* (ib., 1908); id., *Fresh Voyages on Unfrequented Waters* (ib., 1914); Ed. Meyer, *Die Israeliten und ihre Nachbarstämme* (Halle, 1906); Nathaniel Schmidt, "The Jerahmeel Theory and the Historic Importance of the Negeb," in *Hibbert Journal* (London, 1908); T. K. Cheyne, *The Veil of Hebrew History* (ib., 1913).

JERBA, jĕr'bȧ, or **GERBI**. An island off the east coast of Tunis, Africa, in the Gulf of Cabes. Area, 425 square miles. The surface is level, and the soil fertile. The natives are engaged in the cultivation of dates and olives and the manufacture of silk and woolen fabrics. The town has a sponge market and an export trade in fruits. Pop., about 45,000, consisting largely of Berbers. There are on the island some Roman remains and an old Spanish castle. The chief town is Haumt-es-Suk, with a population of 3000. Jerba is the ancient Meninx, the island of the lotus-eaters. It has been occupied by the French since 1881.

JERBO'A, or GERBOA (from Ar. *yarbū'*, flesh of the back and loins, oblique descending muscle jerboa; so called from the great muscular development of the hind legs). A small rodent of the genus *Dipus* and family Dipodidæ, related to rats and mice and remarkable for its kangaroo-like characteristics. (See Plate of MICE AND JERBOAS with the article MOUSE.) The forelegs, more used as hands than as feet, are very small and have five toes, while the hind limbs are excessively long and strong and have only three toes, of which the middle (III) is prolonged. The tail is long, cylindrical, covered with short hair, and tufted at the end. The jerboas are inhabitants of sandy deserts and wide grassy plains in Asia and in eastern Europe and north Africa. They are burrowing animals, nocturnal, and feed upon roots, seeds, herbage, insects, birds' eggs, and the like, and where numerous greatly damage the grain crops. Their great legs enable them to flee from danger in enormous leaps, but when undisturbed they walk upright, one foot after the other, and do not hop like a kangaroo. They hibernate in the colder countries, but do not lay up stores as do many mice. The best-known species is *Dipus ægypticus*, of the north African plains. It is from six to eight inches long besides the tail, which is longer than the body.

Another group of jerboas, principally Asiatic, is distinguished by having five toes on the hind feet, and includes the alactaga (*Alactaga decumana*), an animal as large as a rat and one of the most characteristic animals of the Kirghiz steppes. Several lesser species of the same genus exist, and the great Siberian jumping rabbit of the genus *Euchoreutes* is another relative. Finally, the familiar jumping mouse (q.v.) of the United States is one of this family, as also are the ratlike rodents of northern Europe and Asia of the genus *Sminthus*, whose legs are all of nearly equal length, and whose habits are arboreal. These more regular forms are supposed to have least departed from the ancestral type. Consult: W. T. Blanford, *Observations on the Geology and Zoölogy of Abyssinia* (London, 1870); id., "Zoölogy and Geology of Eastern Persia," in his *Eastern Persia*, vol. ii (ib., 1876); id., *Fauna of British India: Mammalia* (ib., 1888–90); M. W. Lyon, *Comparison of the Osteology of the Jerboas and Jumping Mice* (Washington, 1901).

JERDAN, jĕr'dan, WILLIAM (1782–1869). A London journalist of Scottish birth. He left Kelso, his native place, for a writer's office in Edinburgh, but by 1806 had gone to the metropolis to engage in newspaper work, and made himself famous, a few years later, as the reporter who laid first hold upon Spencer Perceval's assassin in the lobby of the House of Commons. He was contributor to and editor of various journals, and from 1817 to 1850 was connected with the *Literary Gazette*, first as editor and shareholder, then as sole owner from 1842. His intimate association with the leading literary men of his time makes interesting reading of his reminiscences and *Autobiography* (4 vols., 1852–53), supplemented by *Men I have Known* (1866). Jerdan helped to establish the Royal Society of Literature (1821) and was always popular with his brother authors, who presented him with a testimonial upon his retirement in 1853, when the government gave him a pension of £100.

JER'EMI'AD. An expression, applied, often

derisively, to speeches or writings of a perfervidly denunciatory character or in a strain of both violent and prophetic denunciation. The term is derived from the lamentations of Jeremiah. See JEREMIAH, LAMENTATIONS OF.

JER'EMI'AH (Heb. *Yirmeyāh, Yirmeyāhū*, Yahwe casts, hurls). One of the greatest of the Hebrew prophets. He was the son of Hilkiah and a member of a priestly family dwelling at Anathoth near Jerusalem. While the earliest references to him in the Old Testament are not older than the second century B.C., still it is possible, from a study of his discourses in the book that bears his name, to follow the general course of his career. The date of his birth may be fixed approximately at about 650 B.C., since we know that in 625 B.C. he came forward into public notice. Whether or not there was a local cult at Anathoth, to which Jeremiah may at one time have been attached, it is probable that after 620 B.C. the prophet's home was at Jerusalem, and that he remained there till the capture of the city. What called him to his prophetic ministry was the approach of the Scythians from the north. Having relieved their allies the Assyrians by forcing the Medes to abandon the siege of Nineveh in 625 B.C., the Scythians went forth to attack Psammetichus I of Egypt, who had been besieging Ashdod, a city claimed by Assyria. They were bought off by the Egyptians, but their coming into Syria filled Jeremiah (and also Zephaniah) with a conviction that Yahwe meant to punish through these his people Judah. Jeremiah frequently seems to have transferred to the Chaldæan power this rôle of punisher of Judah. The death of Josiah at Megiddo in 608, which threw the country into confusion, may have led to a reaction against the religious reforms instituted by the King, and which by his tragic death were demonstrated to be futile in averting the displeasure of Yahwe. In Jehoiakim's reign he seems to have protested against this King's guilty conduct in undertaking great building enterprises without paying the laborers engaged (xxii. 13 ff.). Even though his predictions concerning Jehoiakim failed and the King apparently died in peace and was "joined to his fathers," Jeremiah still looked for a Chaldæan army and threatened Jehoiachin and his mother with exile (xxii. 24–27, 29). Jeremiah develops into a prophet of gloom and woe, declaring that neither prayers nor sacrifices will avail to ward off the coming disaster, and that even the temple of Yahwe may be wiped out, as a punishment for the long period of defection on the part of the people. The refrain which sounds throughout his discourse is "too late." When the end came. Jeremiah counseled submission to Chaldæan authority. He deprecated, as did Josiah (q.v.), reliance upon Egypt, and he did not favor the attempt of Zedekiah to throw off the Babylonian yoke. In assuming this attitude Jeremiah was guided by his stern but profound conviction that the people of Yahwe had been guilty and must suffer the consequences. Naturally such a position rendered him exceedingly unpopular. He was denounced as manifesting lack of patriotism and no doubt endured much suffering and persecution, even though the accounts of his martyrdom were subsequently exaggerated. After the destruction of Jerusalem, in 586 B.C., he went to Egypt, if we may rely upon the statement embodied in the editorial revision of his utterances (xliii. 6, 7).

Bibliography. Cheyne, *Jeremiah: His Life and Times* (London, 1888); Marti, *Der Prophet Jeremia von Anatot* (Basel, 1889); Lazarus, *Der Prophet Jeremias* (Breslau, 1894); Schmidt, "Jeremiah," in *Encyclopædia Biblica* (New York, 1901); Erbt, *Jeremia und seine Zeit* (Leipzig, 1902); Gillies, *Jeremiah: The Man and his Message* (London, 1907); Buttenwieser, *The Prophets of Israel* (New York, 1914).

JEREMIAH, BOOK OF. The second of the Latter Prophets in our present editions of the Hebrew Bible, though, according to the order given in the Babylonian Talmud (*Baba bathra* 14 b, 15 a) and followed in many manuscripts, it occupies the first place. In the general superscription the book is designated as "The word of Jeremiah, son of Hilkiah, who was of the priests in Anathoth in the land of Benjamin" (i. 1); i. 2 states that "the word of Yahwe came to him in the days of Josiah, son of Amon, king of Judah, in the thirteenth year of his reign"; and i. 3, that "it came in the days of Jehoiakim, son of Josiah, king of Judah, unto the end of the eleventh year of Zedekiah, son of Josiah, king of Judah, even to the deportation of Jerusalem in the fifth month." Apparently verse 2 was the heading of a book containing only oracles supposed to have come at the time when the prophet was called to his work; and verse 3 was added subsequently, when the book had come to contain prophecies of a later date, but as yet none that could be supposed to be later than the fall of Jerusalem in 586 B.C. In subheadings there are 27 other time indications, and in most instances there are direct ascriptions to Jeremiah in connection with them. The dates, however, are not in chronological order; prophecies assigned to Jehoiakim's time sometimes follow utterances said to have been made in the days of Zedekiah. Since Baruch is introduced in xxxvi. 4 ff. as the scribe to whom Jeremiah dictates his discourses in the fourth year of Jehoiakim, it has been supposed that the whole book came from him, and that he wrote the superscriptions. But there is no evidence of this, and it cannot even be rendered probable that the roll read by Baruch to Jehoiakim and rewritten by him after its destruction by the King has been preserved in the present volume. The one sentence quoted from that roll (xxxvi. 29) is not found in any oracle said to have been uttered by Jeremiah in the period before 604 B.C. A careful study of the headings tends to show that they were the work of editors and copyists living at different periods subsequent to the time of Jeremiah and Baruch. Their value is very great, however, for the aid they render in recovering earlier collections and in exhibiting the successive stages of redaction. They seem to indicate that the present work is a compilation of seven smaller collections, and that each of these once had an independent existence. These are: (1) i–xx; (2) xxi–xxiv; (3) xxv, xlvi–li; (4) xxvi–xxix; (5) xxx–xxxiii; (6) xxxiv–xxxix, xlv; (7) xl–xliv. Chapter lii is an appendix to the book. That the prophecies in chapters xxv, xlvi–li once circulated as a separate collection is evident from the different places they occupy in the Hebrew text and in the Greek version. While in the latter these oracles against foreign nations occupy a central position in the volume, like the similar prophecies in Isaiah and Ezekiel, they are in the former relegated to the end. More exactly their place is between xxv. 1–13

and 15–38 of the Hebrew text. Chapters xl–xliv cannot have formed a part of the volume when i. 3 was added to the superscription, for they deal entirely with things later than the fall of Jerusalem. Chapters xxx, xxxi are referred to as a book, and chapters xxxii, xxxiii, seem to be expansions of this book. It is probable that chapters i–xx formed the book to which the heading i. 2 was given, the editor supposing that all the prophecies came from the thirteenth year of Josiah. While it is frequently affirmed that the oracles came to Jeremiah, it is only in li. 60 that it is distinctly stated that he wrote the words against Babylon. Strangely enough, there is no prophecy in the whole volume that is more widely regarded as un-Jeremianic by interpreters belonging to different schools. Except in this case, the editors of the various collections apparently looked upon Jeremiah as an oracle giver, a public speaker, a preacher of righteousness and foreteller of coming doom, rather than as a holy penman, a scribe. This may have been due to the casual reference to Baruch.

The aim of the men who made these collections was evidently a twofold one: they were anxious to preserve what they, rightly or wrongly, regarded as genuine utterances of Jeremiah, as oracles of him who had foreseen the future and accurately foretold the destruction of temple, city, and dynasty; and they were desirous to furnish food for religious thought, stimulate holy sentiments, give comfort, encouragement, and hope by depicting the true prophet, uncompromising in his fidelity to Yahwe, full of deep love for his people, yet unsparing in his denunciations, even though he spoke with a bleeding heart. Very few scholars have any doubt that in these collections a number of actual utterances of Jeremiah have come down to us, and some reliable accounts of occurrences in his life. With most confidence such sayings of his are looked for in the first and second of the seven booklets (i.e., chaps. i–xxiv). But even here modern scholars are inclined to consider many passages as doubtful. The strongest evidences against Jeremianic authorship are cited by them in the case of the prophecies against foreign nations (chaps. xlvi–li). Though some go so far as to consider no part of chapters xxx–xxxiii as a genuine work of Jeremiah, there is a widespread feeling that some nucleus in chapters xxx–xxxi may have come from him. In the narratives, found in collections (4), (6), and (7), some episodes are very widely regarded as historical, while others are looked upon with suspicion even by the more conservative critics. It is thought probable that chapter lii comes from some good old source also used, though not so fully on some points, in 2 Kings xxv.

Though much excellent work was done by earlier scholars, both Catholic and Protestant, in elucidating the meaning of the various parts of the book, modern critical study may be considered as having begun in earnest with Dahler in 1825 and Movers in 1837. Dahler studied the book as a collection of somewhat independent sections, not coming from Baruch's pen, and divined the poetic character of Jeremiah's oracles, though he did not recognize a definite metre. Movers accepted the view, first propounded by Michaelis, that there were two recensions of the book, but took a long step forward by recognizing the impossibility of ascribing the longer text to Jeremiah or Baruch, and by assigning this text to a much later time, in his opinion the age of Nehemiah. More recent phases of criticism are represented by Pierson, Budde, Stade, Schwally, Smend, Davidson, Schmidt, Cornill, Duhm, Cheyne, Peake, and others. Pierson, in 1877, seems to have been the first to question seriously the historical character of some of the stories concerning the prophet. His criticism, though keen, was not always convincing, but where it has been known it has proved stimulating. Budde, in 1878, showed that chapters l–li have peculiarities that seem to preclude a Jeremianic origin, and this view has now been accepted by a very large number of scholars. Stade (1884–92) pointed out what appeared to him to be the secondary character of many psalm fragments and elegies, of the same nature as those in Lamentations (q.v.), interspersed between unquestionably genuine Jeremianic oracles. More or less convincing attempts have since been made, however, to vindicate these for the prophet. Schwally, in 1888, reached the same conclusions as regards chapters xlvi–xlix that Budde had adopted anent chapters l–li, and his opinion has also been widely accepted, sometimes on different grounds, though there are some independent scholars who maintain that in these oracles remnants have been preserved of actual utterances by Jeremiah. Smend, in 1893, indicated the difficulties with assuming that chapters xxx–xxxi come from Jeremiah, though many scholars have since suggested that here also there may be a Jeremianic nucleus. Davidson, in 1899, distinguished between the stories that seemed to him well informed and trustworthy and those in which "the narrator dramatizes the information at his command" and regarded such a passage as xlii. 7–22 "a free construction from the hand of the historian," and this "both on account of its rather debased style and its other peculiarities." Schmidt, in 1900 and 1901, was led by an examination of the superscriptions to the view that the book has grown up from the earlier collections which have been indicated above, very much after the fashion of the Book of Isaiah. He discarded as fruitless the search for Baruch's roll (mentioned in xxxvi. 29), assigned many more oracles to later times on internal grounds, and questioned the historical character of some of the stories he supposed to have been taken from a biography of the prophet written long after his death. The subsequent discovery of the Elephantine papyri (q.v.) has shown that in one respect his suspicions were not well founded, since there were early settlements of Jews in Egypt and they worshiped other gods as well as Yahwe; but it has otherwise thrown no light on the historicity of the accounts in chapters xl–xliv. Cornill, in 1901, recognized a metre in the poetical utterances of Jeremiah, but supposed that many of his sayings were not in poetic form. Duhm, in 1901, independently reached very similar conclusions to those of Schmidt on many points, but he adhered to the theory that Baruch's roll can be recovered in the present book, and he presented as a criterion of genuineness the peculiar metre characteristic of Jeremiah's oracles. His conviction that the prophet spoke exclusively in poetry led him to the position that only 60 short poems of 268 verses belong to Jeremiah, that 220 of the remaining 350 verses come from Baruch, and that 880 are from the hands

of later supplementers. While in general agreement with the type of criticism that deviates most from traditional views, Cheyne, in 1911, was disinclined to assign a date as late as the Hasmonæan period for any part of the book; and Peake, in 1912–13, was inclined to seek for a Jeremianic nucleus wherever recent criticism, with which he dealt very fairly, seemed to yield the promise of such an original element.

Many difficulties worthy of serious consideration have been urged by conservative exegetes, and there can scarcely be said to be the same degree of unanimity among scholars as in the case of the Book of Isaiah (q.v.), though even in reference to that great thesaurus of prophetic oracles new points of view are being urged at the present time. Extraordinarily great problems are offered both by textual and historical criticism. While there is a strong presumption in favor of the view that a certain poetic form, a distinct rhythm and metre such as prophets in their moments of inspired exaltation naturally adopted, characterized the genuine Jeremianic prophecies, it cannot be regarded as absolutely certain that the prophet always employed it. Buttenwieser has recently maintained that Jeremiah did not know how to write, and therefore dictated his words to Baruch. This is difficult to believe, since he belonged to a priestly family. But if for some reason he was unable to put his discourses into writing, or did not care to do so ordinarily, not only Baruch but others who desired to take down his prophecies may have failed to recognize their poetic form or paid no attention to it, writing solely to record the substance, and later copyists may have departed even more radically from the original form. The margin necessarily left to the subjective judgment of the interpreter is very wide. However peculiar a man's style may be, it is subject to change in the course of 40 years; and what to one scholar may appear unmistakably to betray a later origin may to another seem quite in harmony with what is generally admitted as genuine. In such matters only a prolonged coöperation of competent students approaching the text from different points of view can lead to relatively assured results.

Bibliography. Among the commentaries the following deserve special mention; Dahler (Leipzig, 1825), Rosenmüller (Berlin, 1826), Ewald (Stuttgart, 1840; 2d ed., ib., 1868), Hitzig (Leipzig, 1841; 2d ed., ib., 1866), Neumann (ib., 1856–58), Graf (ib., 1862), Keil (ib., 1862), Rowland Williams (London, 1871), R. P. Smith (New York, 1875), Le Hir (Paris, 1877), Scholz (Wurzburg, 1880), Schneedorfer (Prague, 1881), Trochon (Paris, 1883), Cheyne (London, 1883–85), Orelli (New York, 1887; 3d ed., 1905), Knabenbauer (Paris, 1889), Ball, in *Expositor's Bible*, vol. i (London, 1890), Giesebrecht (Göttingen, 1894; 2d ed., ib., 1907), Bennett, in *Expositor's Bible*, vol. ii (ib., 1895), Streane (London, 1895), Myrberg (Upsala, 1896), Duhm (Freiburg, 1901), Cornill (Leipzig, 1905), Driver (London, 1906), Peake (ib., 1912–13); see also Movers, *De Utriusque Recensionis Vaticiniorum Jeremiæ Indole et Origine* (Hamburg, 1837); Pierson, *Israels Profeten* (Leyden, 1877); Budde, in *Jahrbücher für deutsche Theologie* (Gotha, 1878); Stade, in *Zeitschrift für alttestamentliche Wissenschaft* (Giessen, 1884, 1885, 1892); Schwally (ib., 1888); Cheyne, *Jeremiah: His Life and Times* (London, 1888); Marti, *Der Prophet Jeremia von Anatot* (Basel, 1889); Smend, *Alttestamentliche Religionsgeschichte* (Freiburg, 1893); Nathaniel Schmidt, in *The New World* (Boston, 1900); id., "Jeremiah, Book of," in *Encyclopædia Biblica* (New York, 1901); Cornill, *Die metrischen Stücke des Buches Jeremia reconstruirt* (Leipzig, 1901); Erbt, *Jeremia und seine Zeit* (ib., 1902); Giesebrecht, *Jeremias Metrik am Texte dargestellt* (Göttingen, 1905); Gillies, *Jeremiah: The Man and his Message* (London, 1907); Cheyne, "Jeremiah," in *Encyclopædia Britannica* (11th ed., Cambridge, Eng., 1911); Buttenwieser, *The Prophets of Israel*, vol. i (New York, 1914); Davidson, in Hastings, *Dictionary of the Bible* (ib., 1899).

JEREMIAH, Epistle of. See Apocrypha, *Old Testament.*

JEREMIAH, Lamentations of. The name given in the English Bible to a short book placed immediately after the Book of the Prophet Jeremiah. In the Hebrew it is called *'Ekāh* ('How,' the first word), sometimes also *Kinōth* ('Dirges'), and is placed among the Hagiographa. The title in the Greek version is Θρῆνοι, *Thrēnoi*, a translation of *Kinōth*. The book consists of five chapters, which may be designated as so many elegies or dirges over the desolation of the land, the exile of the people, the destruction of the first temple, the fall of the Kingdom of Judah, and the writer's own woes. Properly speaking, only chapters i, ii, and iv are dirges, bewailing the death of the Jewish nation. Chapter iii deals with the affliction of the people, or rather of the pious section of the community. Chapter v is in the form of a prayer. The elegies are in poetical form, the metre of the first four being that commonly employed in dirges in the ancient and modern Orient—the so-called Kinah strain. Each verse member is divided by a cæsura into two unequal parts, of which the first is the longer; the second usually presents an enforcement of the thought contained in the first. This unequal proportion between the two parts of a verse member gives to the lines a limping character. In chapters i and ii the verses consist of three members; in chapter iii of one member; in chapter iv of two members. The metre of the fifth poem consists of three-toned lines. The structure of the elegies is very artificial. The first, second, and fourth each contain 22 verses, each verse beginning with a different letter of the Hebrew alphabet arranged in the usual order, except that in i and iv the seventeenth letter of the alphabet, according to the ordinary arrangement (*pe*), precedes the sixteenth (*ayin*). In chapter iii the same order of the letters of the alphabet is followed as in i and iv, but there are three successive lines beginning with the same letter, making 66 verses in all. Chapter v contains 22 verses, but their initial letters are not in alphabetic order.

The contents of the five elegies may be summarized as follows: 1. Lamentation over the state of Jerusalem after the people had been carried captive; its sins acknowledged as the just cause of its misfortunes; Yahwe approached with penitence as the only source of help. 2. The destruction of the city and sufferings of its people lamented; false prophets condemned; Yahwe again invoked as alone able to save. 3. Description of the affliction of the religious community under the type of a single individual, as in the songs of the "servant of Yahwe" in Isaiah (q.v.). The sufferings are regarded as just pun-

ishments, and the speaker expresses confidence in Yahwe's ultimate compassion. 4. Lamentation over present conditions in contrast with former prosperity; all misfortune confessed to be the result of transgression and sin. 5. A final appeal to Yahwe; the calamities of the nation again recited; the sins that caused them penitently confessed; and Yahwe entreated to turn His people back to Himself and to renew the blessings they had formerly enjoyed. The last verse contains a sentiment that was considered to be of ill omen, and hence in reading the book it became customary to repeat the preceding verse, which embodies the appeal for a return of divine grace.

Concerning the authorship and date of the poems, opinions are at variance. The internal evidence is not conclusive. The tradition assigning the entire book to Jeremiah may be traced to the Greek version, but it should be noted that not all manuscripts contain this ascription. The tradition is thought by some to be based upon the late statement in 2 Chron. xxxv. 25 that Jeremiah was the author of an elegy upon King Josiah. On the whole, modern scholars reject Jeremiah's authorship of the book. But it is freely admitted that it shows influences of his style and thought. The compositions are evidently specimens of the elegiac literature of the Jews, suggested by the national catastrophe and the sufferings of the postexilic community, especially during the first century after the return and again under the Seleucid rule. Some critics think that no two poems have the same author, and the most plausible arrangement with respect to date is ii, iv, i, v, iii. Chapters ii and iv have more in common than any of the others. Comparison with sentiments in the Psalms that belong to the later Persian period speaks in favor of placing these two chapters about the middle of the fourth century B.C. There is no reason to assume a long interval between ii and iv on the one side and i and v on the other. Chapter iii may belong to the age of Greek supremacy.

Consult: commentaries of Ewald, Thenius, Nägelsbach, Keil, Payne Smith, Cheyne, Plumptre, Löhr, *Die Klagelieder Jeremias* (Göttingen, 1891–94), and Minocchi, *Le Lamentazioni di Geremia* (Rome, 1897), and the Introductions to the Old Testament by Driver (rev. ed., 1910) and Sellin (1913). For the metre, consult Budde's articles in the *Zeitschrift für alttestamentliche Wissenschaft* (1882–94), and in the *New World* (Boston, March, 1893).

JEREMIAH, Short Prophecy of. See Apocrypha, *Old Testament.*

JÉRÉMIE, zhā'rā'mē'. A port of the Republic of Haiti, situated on the north shore of the southwest peninsula of the island of Haiti, 120 miles west of Port au Prince (Map: West Indies, D 3). It is celebrated as the birthplace of the elder Dumas. It has a poor harbor. It is the residence of a United States consular agent and exports cacao, coffee, and logwood. Pop., 5000.

JERES, Conde de. See Cervera y Topete, Pascual, Conde de Jerez, Marqués de Santa Anna.

JÉREZ DE LA FRONTERA, hā'rāth dā lā frôn-tā'rā, or Xérez. A famous city in the Province of Cadiz, Spain, situated near the river Guadalete, 33 miles by rail and 14 miles in a straight line northeast of Cadiz (Map: Spain, B 4). It is surrounded by extensive vineyards, which furnish the world-famous sherry wine. The town is divided into two parts, of which the old one is surrounded by the remains of Moorish walls. There are an old Moorish castle, several theatres, and a bull ring. The educational institutions of the city include a high school, schools of law, medicine, and agriculture, a literary and scientific society, and a municipal library housed in the interesting old consistorial palace. In the neighborhood of the city is the convent of La Cartuja, considered the grandest architectural monument of the province; it is surrounded by fine gardens, the entrance to which is in the form of a large triumphal arch. Among the chief objects of interest in the town are the immense wine cellars, or *bodegas,* in which are stored large casks of sherry and other wines, which are exported mostly to Great Britain, the United States, and France. Pop., 1887, 61,708; 1900, 60,846; 1910, 62,628. Jérez was once a Roman colony and fell into the hands of the Arabs at the beginning of the eighth century. The great battle in which the Saracens overwhelmed the Visigoths was fought here in 711. In 1264 it was taken by Alfonso X of Castile. Peter the Cruel had his young wife, Blanche de Bourbon, murdered here in 1362.

JÉREZ DE LOS CABALLEROS, dā lōs kä'-bā-lya'rōs. A town of southwest Spain in the Province of Badajoz, 15 miles from the Portuguese frontier (Map: Spain, B 3). It is a handsome town, situated among the mountains, surrounded by gardens and orange groves, and dominated by a fortress with three enormous towers. It has two theatres, two hospitals, and a bull ring. There are several flour mills and manufactures of leather, soap, and pottery. Pop., 1900, 10,095; 1910, 10,940. The town is supposed to have been founded by the Phœnicians. It was captured from the Moors by Alfonso IX of Leôn, who handed it over to the Knights Templars, whence the name Caballeros.

JERFALCON. See Gyrfalcon.

JERICHAU, jā'rē-kou, Jens Adolf (1816–83). A Danish sculptor, born at Assens (Fünen). He studied in his native country and under Thorvaldsen at Rome. He established a reputation by a frieze, representing the marriage of Alexander the Great and Roxana, for the Royal Palace at Christiansborg, and after his return he was made professor at the Academy of Copenhagen (1849). Among his principal works are "Hercules and Hebe," "Penelope," "The Panther Hunter," "Adam and Eve after the Fall," "Christ," "David," and the monuments to Oersted and Andersen at Copenhagen.—His wife, Elizabeth Baumann (1819–81), born at Warsaw, Poland, was a genre painter of note. She studied at Düsseldorf and devoted herself at first to Slovakian, then to Italian, Greek, and Egyptian subjects. Her paintings are deficient in drawing, but show ability in the use of decorative color.—Their son, Harald (1851–78), born at Copenhagen, a pupil of his mother and afterward of Bénouville in Rome, was a landscape painter of some distinction. He painted Roman, Greek, and Turkish subjects.

JERICHO, jĕr'ĭ-kō. An ancient city of Palestine, about 15 miles east-northeast of Jerusalem, in the Jordan valley, north of the Dead Sea (Map: Palestine, C 4). A Canaanitish city existed here before the invasion of Palestine by the Hebrew tribes. Joshua is said to have captured and destroyed it. The story of

the manner in which the wall fell, after the children of Israel had marched around it seven times blowing their trumpets (Josh. ii–viii), is regarded by many students as a legendary embellishment. It seems to have been the inner wall of stone, with its towers and its parallel wall of brick, that stood there in the pre-Israelitish period. Judging from the account of the spoils, the city must have been very rich, and that is borne out by the results of the excavations.

According to Josh. vi. 26 the conqueror pronounced a curse upon any one who should rebuild the city. This is thought by some scholars to be a reflection of the feelings aroused by the rebuilding of the city by Hiel of Bethel. He is said to have laid the foundation thereof with the loss of Abiram his first-born and set up the gates thereof with the loss of his youngest son Segub (1 Kings xvi. 34). The impressive wall uncovered by Sellin and Watzinger shows the extraordinary power and skill of this man. It coils like a gigantic serpent around the whole city, solidly built, though without mortar, with nowhere a corner, a bastion, or a tower. A large structure within this wall has been supposed by the excavators to be Hiel's house. Hiel apparently shunned no sacrifice to carry out his project, and the cost he paid created or strengthened the idea that the city lay under a curse. There is evidence that it was inhabited during the centuries preceding Hiel's enterprise, but on a smaller scale than later.

King Zedekiah was captured in the plain of Jericho (2 Kings xxv. 5). From the fifth to the second century B.C. there was a Jewish settlement in Jericho. Some jar handles have been found on which are written in Aramaic letters the name of the god Yahu or Yah. Down to this time the city was located at the foot of Mount Karantal, at Tell el-Sultan, near the spring called Ain el-Sultan, whose waters are supposed to have been healed by Elisha (2 Kings ii. 19–22). Farther south, at Tell abu-alaik, the ruins of the Jericho of the Hellenistic period stand. These have been excavated by Sellin under the auspices of the Deutsche Orient-Gesellschaft in 1909 and 1911. The outlines of a theatre or hippodrome were discerned and aqueducts and cisterns found. This is the Jericho on which Herod lavished his care (Josephus, *Jewish War*, i, 21, 9). Through this city Jesus passed on his last journey to Jerusalem, when Zacchæus climbed into the sycamore tree to see him (Luke xix. 1–8). Vespasian destroyed the city, but it was rebuilt. At the time of Constantine it was the seat of a bishop. Justinian caused a "church of the mother of God" to be restored and a hospice for pilgrims to be erected. The Jericho on the present site, El Riha, grew up in the time of the Crusades. A church and a castle testify to the presence of the Crusaders there. Jericho is situated in an extremely fruitful district, yielding figs, grapes, balsam, honey, etc. Josephus and Strabo speak of it in enthusiastic terms. As late as the seventh century A.D. palm trees were common, but it is not certain that Deut. xxxiv. 3 alludes to it as the city of palm trees. The village is the seat of a mudir and has about 300 inhabitants. Karantal is the traditional place of the temptation of Jesus. There are many hermits' caves and chapels there. Much remains still to be done before Jericho can be said to be completely excavated, but the work carried on by Sellin and Watzinger has been sufficient to indicate from the remains the general course of the history of the city. Consult: Guérin, *Samarie*, vol. i (Paris, 1874); Vincent, in *Révue Biblique* (ib., 1908–10); G. A. Smith, *Historical Geography of the Holy Land* (16th ed., London, 1910); Thiersch, in *Zeitschrift des deutschen Palästina Vereins* (Leipzig, 1913); Sellin and Watzinger, "Jericho: Die Ergebnisse der Ausgrabungen," in *Wissenschaftliche Veröffentlichung der deutschen Orient-Gesellschaft*, vol. xxii (ib., 1913).

JERICHO, ROSE OF. A Syrian cruciferous plant. See ROSE OF JERICHO.

JERKED MEAT, or **JERKEY** (Chilean *charqui*, dried beef). Meat preserved by drying in the sun. Hot dry weather is essential to the process. In the case of beef the fat is completely removed, and the lean meat is split into thin flakes, which are slit at irregular intervals in order to facilitate the drying. These thin steaks are spread out, or hung up in the sun, in a spot where there is a free circulation of air. The drying process takes from one to three days, depending upon the climate, and when completed the meat is brown, tough, and leathery, and will keep indefinitely if preserved from moisture and insects.

Venison and mutton are also preserved in the same manner, occasionally being cut into strips instead of flakes, dipped in brine, or smoked slightly.

The Indians of North America used to prepare quantities of buffalo meat in this manner, a portion of which was afterward pounded to make pemmican (q.v.). Good jerkey is eaten either cooked or raw, is exceedingly nourishing, and when raw has a rather pleasant, slightly saline flavor.

JERKER. The river chub. See CHUB.

JERMYN, jĕr'mĭn. A borough in Lackawanna Co., Pa., 12 miles northeast of Scranton, on the Lackawanna River and on the Delaware and Hudson and the Ontario and Western railroads. It is situated in a productive anthracite coal field, and, besides coal mines, the industrial establishments include cut-glass works, silk, powder, grist, planing, and saw mills, bottling works, and fertilizer factories. Pop., 1900, 2567; 1910, 3158.

JER'OBO'AM I (Heb. *Yārŏb'ām*, probably 'Amm fights'). The first King of the Kingdom of Israel (c.953–932 B.C.). He was the son of Nebat of the tribe of Ephraim and had charge, under King Solomon, of the house of Joseph. He conspired against Solomon, but failed in his venture and was compelled to flee to Egypt (1 Kings xi. 26–40). The details of the movement, which was probably instigated by the restless spirit of the north under Judæan rule, are not furnished. The incident of the prophet Ahijah (1 Kings xi. 29–39) is thought by some critics to be a legendary embellishment; but there is nothing improbable in the attitude of Ahijah or the symbolic act, though the original oracle seems to have been expounded in later times. On the death of Solomon Jeroboam returned from Egypt and took the lead in another revolt at Shechem. Formal demands were made of Rehoboam, the son of Solomon, to reduce the taxes and otherwise change the policy adopted by his father. Rehoboam naturally refused, and the northern tribe seceded, Jeroboam becoming King of Israel (1 Kings xii. 2–20). Wars between Jeroboam and Rehoboam and his successor, Abijam, were frequent (1 Kings xiv. 30; xv. 7). The compiler of the Book of Kings,

writing from the exilic point of view, which recognized the temple at Jerusalem as the only legitimate centre of Yahwe worship, represents Jeroboam as fearing defection if the people continued to journey to Jerusalem for worship, and for this reason setting up a cult of his own at Bethel and at Dan (1 Kings xii. 26–33). It is the opinion of scholars at present, however, that, as a matter of fact, the idea of centralization of worship in one place did not exist at this time, and the northern tribes naturally recognized Bethel and Dan (q.v.) as they did other sanctuaries of the north as suitable places of worship. At these places a yearly harvest festival was celebrated on the fifteenth day of the eighth month, and Yahwe was worshiped under the form of a golden or gilded image of a bull. See GOLDEN CALF.

JEROBOAM II. King of Israel (c.782–740 B.C.). He was the son of Joash or Jehoash, third King of the Jehu dynasty. The account of his reign (2 Kings xiv. 23–29) is exceedingly brief, but shows that he was a warrior who succeeded in restoring the prestige of his kingdom and regaining from the ruler of Damascus regions lost by his predecessors. Whether, however, he actually secured control of Damascus and Hamath, as is stated, is doubtful. If he did so, it must have been with the help and connivance of Assyria. The ministry of Amos (q.v.) and Hosea (q.v.) falls in Jeroboam's reign, which must in every respect have been an eventful one. Consult Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

JEROME, jē-rōm'. A town in Yavapai Co., Ariz., 44 miles by rail northeast of Prescott, on the United Verde Railroad (Map: Arizona, C 3). It is situated in a rich copper country, and there are extensive mines. Gold is also found here. Points of interest in the vicinity are Montezuma Wells, Montezuma Castle, Fort Whipple, and Camp Verde, a government post. Pop., 1900, 2861; 1910, 2393.

JEROME, JEROME KLAPKA (1859–). An English humorist, born at Walsall, Staffordshire, May 2, 1859. He was educated at the Philological School, Marylebone. As a young man, he was for a time a clerk in a railroad office and later an actor at Astley's Theatre, London, and in the provincial cities. Subsequently he became in turn a journalist, a teacher, a shorthand writer, and a lawyer's clerk. A brief account of his experiences on the stage he gave in *On the Stage—and Off* (1888), followed a year later by *Stage Land*, dealing with the conventions of the drama. His connection with the theatre enabled him to write several good comedies and farces: *Barbara* (1886); *Sunset* (1888); *Wood Barrow Farm* (1891); *New Lamps for Old* (1890); *Mac Haggis* (1897); *Miss Hobbs* (1900). Among his clever essays and sketches or short stories are: *Idle Thoughts of an Idle Fellow* (1st ser., 1889; 2d ser., 1898); *Three Men in a Boat*, his most humorous production (1889); *Diary of a Pilgrimage*, sketches of an excursion to the Oberammergau Passion Play (1891); *Novel Notes* (1893); *John Ingerfield, and Other Stories* (1893); *Sketches in Lavender* (1897); *Paul Kelver* (1902); *Tommy & Co.* (1904); *The Passing of the Third Floor Back* (1907), in which Sir Johnston Forbes-Robertson played with great success; *They and I* (1909); *The Master of Mrs. Chilvers* (1911); *Esther Castways* (1913); *Poor Little Thing* (1914). In 1914 he came to America to give readings from his most popular books.

JEROME (Lat. *Hieronymus*, from Gk. Ἱερώνυμος, *Hierōnymos*), SAINT (c.340–420). The most learned of the early fathers of the Latin church. His full name is usually given as Sophronius Eusebius Hieronymus, and he was born in Stridon, a town on the border of Dalmatia and Pannonia. Prosper of Aquitania gives 331 as the year of his birth, but that is probably too early. It may have been 342 or 346. Among his eminent contemporaries were Ambrose and Augustine. His parents were wealthy Christians. Jerome was educated in Rome, under the rhetorician Ælius Donatus, where his tastes foretold the scholar; he began to gather a library by copying manuscripts for himself. Here also he received baptism. His strictly theological studies were begun in Treves and continued in Aquileia, where he had Rufinus as a comrade and friend. Traveling in the East, Jerome fell sick (in Syria) and passed through a religious experience in which he was led to adopt the ascetic life. He saw a vision, and heard a voice saying, "Thou are not a Christian, but a Ciceronian!" This he took as a divine rebuke of his fondness for the classics, and he resolved henceforth to abandon secular literature altogether. But his writings show that he never really shook off the influence of his classical training. Jerome's hermit life began in 374, in the desert of Chalcis (the Syrian Thebais), where he studied Hebrew with a converted Jew. After visiting Antioch and Constantinople, where he met Gregory of Nazianzus, Jerome spent three years in Rome (382–385), in close association with Pope Damasus, at whose wish he commenced his translation of the Scriptures into Latin. His Roman career began with great popularity, but ended with unpopularity and bitter quarrels. During these years he became acquainted with certain noble Christian ladies, especially Marcella and Paula, who were devoted to the Church and aided it with their wealth. Paula and her daughter, Eustochium, accompanied Jerome to the East, where they settled at Bethlehem (386). Here Paula built a monastery for men, over which Jerome presided, and cloisters for women, which were under her own direction. Jerome spent the remaining 35 years of his life here, engaged in study and writing, in the practice of asceticism, and in theological controversies.

Jerome's life and work illustrate the combination and conflict of pagan and ascetic Christian ideas, so common in the fourth century. He has been described as a precursor of the Humanists, but this takes into account only one side of his character. He was also an exponent of the monastic ideal, whose growth he furthered, particularly in the West. His later life was filled with theological controversies in which he sometimes displayed an extreme asperity. For the history of his age, Jerome's numerous writings are of the highest value. His Latin translation of the Bible, far superior to any of the Latin versions which preceded it, lies at the basis of the Vulgate. (See BIBLE.) He also wrote commentaries on several books of the Bible. His work entitled *Illustrious Men* (*De Viris Illustribus*), written in 392, is a series of 135 short biographies of Christian leaders, beginning with St. Peter and ending with Jerome himself. It was largely compiled from the *Ecclesiastical History* of Eusebius. He trans-

lated and continued Eusebius' *Chronicle.* (See EUSEBIUS OF CÆSAREA.) More than 100 of his *Letters* have been preserved, in which many varying topics are discussed in a very interesting and lively way. This collection was much read throughout the Middle Ages. Among his ascetic treatises the *Twenty-second Epistle,* addressed to Eustochium, is one of the most famous. Other similar treatises are the lives of Paul of Thebes, of St. Hilarion, and of Malchus, and the bitter polemics against Jovinian and Vigilantius. Jerome became involved in warm disputes with his old friend Rufinus—over the theology of Origen, which he came to oppose bitterly—and with the Pelagians. The most interesting part of his correspondence is with Augustine, who had great respect for him, but disagreed with some of his positions.

Jerome's works were first edited by Erasmus (9 vols., Basel, 1516–20). The best edition is by Vallarsi (11 vols., Verona, 1734–42; Venice, 1766–72; reprinted by Migne in *Patrol. Lat.,* vols. xxii–xxx). The best edition of the *De Viris Illustribus* is by Richardson, in *Texte und Untersuchungen,* vol. xiv (Leipzig, 1896). An English translation of his principal works is in *The Select Library of Nicene and Post-Nicene Fathers,* edited by Schaff and Wace, vols. iii and vi (New York, 1892 et seq.).

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JEROME, THOMAS SPENCER (c.1863–1914). An American classical scholar, son of a rich miner and railway man who became Governor of Michigan. He graduated at the University of Michigan in 1884, studied law there and at Harvard, and practiced in Detroit for a few years. Then, with his friend C. W. Freer, he settled in Capri, Italy, where he became consular agent and began a great critical study of Roman history, which was interrupted by his sudden death. His published work, *Roman Memories in the Landscape Seen from Capri* (1914), made up of his miscellaneous notes and brought out at the very time of his death, is a brilliant example of modern psychological analysis of the Latin historians.

JEROME, WILLIAM TRAVERS (1859–). An American lawyer, born in New York City. He received his academic training at Williston Seminary, at a preparatory school in Switzerland, and at Amherst College. On account of ill health he was forced to leave college in the junior year, but in 1892 was given an honorary A.M. degree. In 1884 he graduated from the law school of Columbia University. As assistant district attorney of New York County in 1888–90, and as assistant counsel for the Lexow Committee (see LEXOW, CLARENCE), he gained a first-hand knowledge of criminal conditions in the city. In 1895 he managed the anti-Tammany campaign which brought about the election of Col. A. L. Strong as mayor. Appointed by Strong a judge of the court of special sessions, he served until 1901, when he was elected district attorney on the Democratic ticket. He proceeded to reorganize the office force and began an energetic prosecution of gambling houses—in order to be in close touch with conditions taking up his residence and opening an auxiliary office on the East Side; and he drew up and advocated before the Assembly a bill which granted immunity to witnesses in the gambling-house cases. The honesty and efficiency with which he conducted his office made him widely popular irrespective of party; and when, in 1905, he ran for reëlection on an independent ticket, he received contributions from many States of the Union. He made a vigorous campaign and was elected. In his second administration he conducted the prosecution in both of the trials of Harry K. Thaw for the murder of Stanford White (q.v.). In 1908 he was severely censured by the press for failure to prosecute certain individuals charged with crime. Governor Hughes appointed a commissioner to investigate the charges, and Jerome was entirely exonerated. After Thaw had been sent to Matteawan State Hospital for the Criminal Insane, and a legal fight for his release had been begun, in 1913 Jerome was retained as counsel by the State Attorney-General. His success in this contest was followed by Thaw's sensational escape to Canada. Again the former district attorney's services were secured, but in January, 1915, without public explanation, he was dropped from the case. (See THAW CASE.) Jerome published *Liquor Tax Law in New York* (1905).

JEROME OF PRAGUE (?–1416). The associate of John Huss. He was born at Prague in the latter half of the fourteenth century. After attending the university of his native town, he continued his studies at Oxford, Heidelberg, Cologne, and Paris, where he attracted attention by his defense of Wiclif. He took his master's degree at Paris and taught there and also at Cologne. After a journey to Jerusalem he returned to Prague in 1407 and began to introduce the writings and opinions of Wiclif in his native land. His reputation for learning was so great that his advice was taken by Ladislas II, King of Poland, with respect to the reorganization of the University of Cracow in 1410. He entered into the contest carried on by his friend Huss with more zeal than judgment. He publicly trampled the relics under his feet, committed to prison the monks who did not share his opinions, and even ordered one of them to be thrown into the Moldau. When Huss was arrested at Constance, Jerome hastened to defend him, but not receiving a safe-conduct, for which he had applied, set out to return to Prague. He was arrested at Hirschau, April, 1415, and conveyed in chains to Constance. Here he was cast into a dungeon and placed on trial. After some months' imprisonment he recanted his opinions, September, 1415, but in May, 1416, abjured his recantation with horror, and was burned at the stake, May 30. Consult William Gilpin, *Lives of John Wicliff and of the most Eminent of his Disciples* (New York, 1814), and the life by Heller (Lübeck, 1835) and by Becker (Nördingen, 1858). See HUSS, JOHN; CONSTANCE, COUNCIL OF.

JERRARD, jĕr'ärd, GEORGE BIRCH (c.1803–63). A British mathematician, son of a major general. He studied at Trinity College, Dublin, graduating B.A. in 1827. His *Mathematical Treatises* (1832–35) and *Essay on Resolution of Equations* (1859) marked him as the prede-

cessor of Cayley and Cockle among English writers on the theory of equations.

JERROLD, jĕr'old, Douglas William (1803–57). An English humorist, born in London. Though Douglas was sent to school, he mostly educated himself, reading, as time went on, Latin, French, Italian, and the English dramatists. From time to time as a boy he appeared on the stage. He took a child's part in *The Stranger*, and acted in *The Painter of Ghent* in 1835, and played Master Stephen in *Every Man in his Humour* in 1845; but he disliked acting. In 1813 he was appointed midshipman in the royal navy. After the Napoleonic wars he found employment in London as a printer's apprentice and as compositor. After some success at dramatic criticism he began writing for the stage. His first comedy, *More Frightened than Hurt*, written in 1818, was well received at Sadler's Wells Theatre in 1821. *Beau Nash*, a three-act comedy dealing with the history of the gambler Richard Nash (q.v.), was played at the Haymarket and published in 1825. But his great success was *Black-Eyed Susan*, which ran for 300 nights at the Surrey Theatre in 1829. Thereafter he wrote many comedies and farces, among which are *Time Works Wonders* and *The Bubbles of a Day*. In the meantime he was contributing essays and sketches to the magazines, from which he made a collection, *Men of Character* (1838). In 1841 he joined the staff of *Punch*, where first appeared (1846) the popular *Caudle Lectures*. He became in 1852 editor of *Lloyd's Weekly* newspaper. Among his works are *The Story of a Feather* (1844) and *The Chronicles of Clovernook* (1846). Though not a great writer, Jerrold was one of the most brilliant wits of his time. Consult W. B. Jerrold, *Life and Remains of Douglas Jerrold* (London, 1859), and W. C. Jerrold, *Douglas Jerrold and Punch* (New York, 1911).

JERROLD, William Blanchard (1826–84). An English journalist and author, eldest son of Douglas Jerrold. He was born in London. He studied art and did some good work in illustration, but defective sight compelled him to abandon his profession for literature. On the death of his father, in 1857, he became editor of *Lloyd's Weekly*, a position that he held till his death. In this paper Jerrold advocated the interests of the working classes. During the Civil War in the United States he took the side of the North. He also had a leading hand in founding the International Copyright Association, of which he was president. He wrote four successful comedies and farces, of which the best known is *Cool as a Cucumber*, produced at the Lyceum Theatre in 1851. Of his several novels, *Up and Down in the World* (1863) was most read. Two solid works from his pen are *Life and Remains of Douglas Jerrold* (1859) and *Life of Napoleon III* (4 vols., 1874–82).

JER'SEY. The largest and southernmost of the Channel Islands (q.v.), lying 15 miles north of the French coast, 17 southeast of Guernsey, and 88 southeast of Portland Bill (Map: France, N., C 3). It is of oblong form, 11 miles long, 4 to 6 miles wide, with an area of 45 square miles. It has a bold and lofty northern coast, with picturesque rocky inlets, and slopes to the south, east, and west, where it is indented by large open, sandy bays. The interior is mostly table-land, well wooded, especially in the valleys along the many winding streams which intersect the island. Various fruits, potatoes, and tomatoes are important crops. Jersey is divided into 12 parishes. The principal town, Saint Helier (q.v.), is connected by rail with Gorey village and harbor on the east, dominated by the imposing mediæval castle of Mont Orgueil; and on the west with the small, neat town of Saint Aubin, the line also extending to the Corbière, the southwest extremity of the island, where is a notable lighthouse. A fine panoramic view of the island is obtained from La Hogue Bie, or Prince's Tower, a building raised on a prehistoric tumulus. Jersey is famous for its breed of cattle (cattle in 1911 numbered 12,031). The island gave its name to New Jersey in 1664. It is the seat of a United States consular agent. Pop., 1891, 54,518; 1901, 52,576; 1911, 51,898. Consult: Noury, *Géologie de Jersey* (Paris, 1887); Black, *Guide to the Channel Islands* (11th ed., London, 1902); G. F. Carey, *Channel Islands* (New York, 1904); J. E. Morris, *Channel Islands* (ib., 1911).

JERSEY, The. The hulk of a 64-gun vessel in Wallabout Bay, Brooklyn, used by the British as a prison ship during the Revolution. The ship was never cleaned and for seven years was a centre of disease. It held 1200 prisoners. During her use as a prison ship 11,000 are said to have died and been buried on the Brooklyn shore. In 1902 the sunken hulk was discovered during operations connected with the building of a dock on the spot. Consult T. Andros, *The Old Jersey Captive* (Boston, 1833), and *Recollections of the Jersey Prison-Ship from the Original Manuscript of Captain Thomas Dring, One of the Prisoners*, edited by H. B. Dawson (Morrisania, N. Y., 1865).

JERSEY BLUE. An American breed of large domestic fowls, having a bluish plumage. The breast and fluff are light blue; hackle and sickles, blue black; feet, dark blue. They are not popular, either as table fowls or as egg producers, but are hardy and easily kept.

JERSEY CATTLE. See Cattle.

JERSEY CITY. The second largest city of New Jersey, and the county seat of Hudson County; an important railroad terminal point and a commercial and manufacturing centre (Map: New Jersey, D 2). It is on the peninsula formed by the Hudson River on the east and the Hackensack River and Newark Bay on the west and is opposite New York City, connected by steam ferries and the passenger tunnels of the Hudson and Manhattan Railroad. The Morris Canal has its eastern terminus in the city. The Central of New Jersey, the Erie, the Pennsylvania, the Lehigh Valley, and the West Shore railroads, whose depots are used by a number of other roads, also terminate here. The steamers of several transatlantic steamship companies sail from this port.

The city occupies an area of 12,288 acres and includes six small parks which comprise about 20 acres, and a new county park of 200 acres. It has good electric-railway service, the lines connecting with Newark, the Oranges, Rutherford, Passaic, Paterson, and towns in Hudson and Bergen counties. There are very few unpaved streets in Jersey City. Many of the avenues on the hill section back of the main portion are noteworthy for beautiful residences. In the western part of the city is the magnificent Hudson Boulevard, which extends through the entire length of Hudson County, 14 miles, and 5 miles into Bergen County. Since the completion of the Hudson tunnels this avenue is being

filled with apartments. Among the more prominent buildings are the city hall, with a soldiers' and sailors' monument; the Fourth Regiment Armory; many new public schools; St. Francis, Christ, and city hospitals; a new post office; the public library, containing over 100,000 volumes; a courthouse erected in 1910 at a cost of $3,300,000; a historical museum, in which are preserved many Colonial documents of interest; and the People's Palace, a nonsectarian amusement institution built by Joseph Milbank and presented to the First Congregational Church. St. Peter's College (Roman Catholic), opened in 1878 and at present attended by about 450 students, is a well-known institution of learning. Besides 15 parochial schools, which provide for 12,500 pupils, there are in the city 34 public elementary schools and 2 high schools with accommodations for 38,000 pupils and having a property valuation of $5,800,000. There are several convents and a full equipment of asylums, homes, and other charitable institutions.

Jersey City is almost inclosed by water, thus affording excellent docking facilities, which, with its railroad connections, have aided its development as a shipping and receiving point, though officially it has no identity as a separate port, since its returns are included in those of the customs district of New York. It has also large slaughtering and meat-packing interests and extensive manufactures. The Pennsylvania and Erie railroads have large grain elevators here, and there are plants of the American Sugar Refining Company, Colgate and Company, and the Lorillard tobacco factories, which rank with the largest. Among products of other industrial establishments are candles, crucibles, lead pencils, patent iron dump carts, gas engines, compressed gas, glass, locomotives, railroad cars, iron and steel, zinc, copper, boilers, planing mill, foundry and machine-shop products, chemicals, paints, paper boxes, canned soups, motion-picture films, cordage, oakum, jewelry, and pottery.

Jersey City was the first large city in the East to institute a commission form of government, which in 1913 superseded the former administration. It was adopted in April, 1913, and the first primary election was held in May. The number of persons desiring office was reduced to 10, and in the final election, held in June, five commissioners were chosen. These then assumed the control of the municipal government. They are elected for four years, and one of their number is chosen mayor. He receives a salary of $5500. The other four members of the commission are paid $5000 a year. They are known as the commissioners of public safety, of streets and public improvements, of revenue and finance, and of parks and property. These men have legislative as well as executive power, and the laws made by them are known as ordinances. The board of education consists of 13 members, one from each city ward and one at large, appointed by the executive. The city appropriated, in 1914, $3,707,500, of which $273,000 went to the department of public affairs, $82,000 to revenue and finance, $551,000 to streets and public improvements, $1,306,000 to public safety, $183,000 to parks and public property, $549,907 for schools, and $19,000 for the municipal law department.

Pop., 1850, 6856; 1900, 206,433; 1905, 232,699; 1910, 267,779; 1914, 293,921; 1920, 297,864.

In 1638 Abraham Isaacson Planck, a Dutchman, bought the land on which Jersey City stands. Later it passed into the hands of another Dutchman, Michael Pauw, and from him the old name Paulus Hoeck, or Hook, was derived. In 1776 fortifications were thrown up here by the Americans, but were captured later in the year (September) by the British. On Aug. 19, 1779, Lieut. Col. Henry Lee, "Light Horse Harry," with about 200 men, surprised the English garrison, and, with a loss of only two killed and three wounded, secured 159 prisoners, partially destroyed the works, and returned in safety. The exploit is regarded as one of the most brilliant feats of the Revolution. The British retook the place and remained in possession until the close of the war. In 1804 a town was laid out and incorporated as the city of Jersey. In 1820 it was reincorporated, this time as Jersey City, but did not become a distinct municipality until 1838. Bergen and Hudson were annexed in 1869 and Greenville in 1873, and a new charter was secured in 1889. Consult: S. A. Green, "Capture of Paulus Hook," in *Historical Magazine*, vol. iv (2d ser., Morrisania, N. Y., 1868); Alexander McLean, *History of Jersey City* (Jersey City, 1895); H. P. Eaton, *Jersey City and its Historic Sites* (ib., 1899); W. G. Muirheid (ed.), *Jersey City of To-Day* (2d ed., ib., 1910); Daniel Van Winkle, "Powles Hoek and Old Jersey City," in Historical Society of Hudson County *Papers*, No. 9 (ib., 1913).

JERSEY SHORE. A borough in Lycoming Co., Pa., on the Susquehanna River, 15 miles west by south of Williamsport, on the New York Central and Hudson River and the Pennsylvania railroads (Map: Pennsylvania, G 4). It is located in a farming district and has railroad shops, cigar factories, a foundry, and a large silk mill. Pop., 1900, 3070; 1910, 5381.

JER'SEYVILLE. A city and the county seat of Jersey Co., Ill., 66 miles southwest of Springfield, on the Chicago, Peoria, and St. Louis and the Chicago and Alton railroads (Map: Illinois, D 7). It has a Carnegie library and a fine courthouse. The county fair grounds are located here. The city is the centre of a fertile agricultural region, carries on a considerable trade in produce, fruit, grain, live stock, etc., and has manufactories of shoes. Settled in 1839, it was first incorporated in 1867. The government is administered under a revised charter of 1897, which provides for a mayor, elected biennially, and a council. Jerseyville owns its water works. Pop., 1900, 3517; 1910, 4113.

JERU'SALEM (Heb. *Yĕrūshālayim*, Gk. *Ἱερουσαλήμ, Hierousalēm*, Lat. *Hierosolyma*). The chief city of Palestine (Map: Palestine, C 4). The name is of great antiquity, being found on seven of the Tell el-Amarna letters written by Abdi-chiba, ruler of the city, to his master, Amenophis IV of Egypt, c.1400 B.C. (See AMARNA LETTERS.) The original form as found on these tablets was *Urusalim*. On the inscriptions of the Assyrian kings it is spelled *Urusalimmu*. The meaning of the word is uncertain. In the early period of their occupation of Canaan the Hebrews also called it "the city of the Jebusites" or "Jebus" (Judg. xix. 10–11). The fortified part of the old Jebusite city was also called Zion (cf. 2 Sam. v. 7). The city rebuilt on the old site by the Emperor Hadrian (136 A.D.) was named by him Ælia Capitolina, but the ancient name continued in use. The Mo-

hammedans call it el-Kuds (the holy). See special map with PALESTINE.

The Modern City. The dome of the church of the Holy Sepulchre is located in lat. 31° 46′ 45″ N., long. 35° 13′ 25″ E. The city is distant 33 miles from the Mediterranean and 15 miles from the northern end of the Dead Sea. It is situated on a spur from the main ridge or watershed of Palestine, which runs out eastward for a mile and a half and then deflects to the south for nearly the same distance. On three sides—east, south, and southwest—the city is bounded by deep ravines. The plateau thus formed was originally broken by minor valleys and hills. The highest summit was at the southwest angle. Between this broad western hill and the eastern part of the spur was a valley—the Tyropœon (i.e., the cheese makers). The eastern hill, with several distinct summits, was somewhat long and narrow, sinking rapidly at its southern end. The three valleys, the Kidron on the east, the Tyropœon in the middle, and that of Hinnom on the south and west of the western hill, unite south of the city. At their junction the elevation is about 2000 feet above the sea. The summit of the western hill is over 2500 feet above sea level, that of the eastern somewhat less. For its water supply Jerusalem depends mainly on artificial pools to which water is brought from a distance or on cisterns which conserve the water of the rainy season. The only perennial spring is the Virgin's Fountain, called Gihon in the Old Testament, located in the Kidron valley about one-third of a mile north of the junction of the three valleys. At the junction there is another spring, Bir Eyub (Job's well), called En Rogel in the Old Testament, which, however, is supplied by the surface drainage of the valleys and fails during the dry season of the year. The upper portion of the Tyropœon and several minor ravines are now almost entirely obliterated by the accumulated rubbish of 3000 years' checkered history. The climate of the city is not unhealthful, but the unsatisfactory sanitary conditions produce frequent outbreaks of fever and other epidemics. The mean annual temperature is about 62°, the extremes being 25° and 112°. The annual rainfall averages a little over 23 inches. The Jerusalem of to-day is surrounded by a long and tortuous wall, built by Soliman the Magnificent in the first half of the sixteenth century and practically coinciding with the fortifications of the city at the time of the Crusades. The wall is surmounted by 38 towers and is pierced by eight gates, of which the most important are the Jaffa Gate on the west, the Damascus Gate on the north, and the newly opened Gate of Abd-ul-Hamid, a short distance north of the Jaffa Gate. The inner city is divided into four parts. The Mohammedans occupy the northeastern and largest portion adjoining the Haram esh-Sherif; the Armenians live in the southwest, the Jews in the southeast, and the Christians in the northwest adjoining the outer city. The town is laid out irregularly, and the space is unequally distributed. The streets are narrow, tortuous, and dirty. The Jerusalem of the present, with its mercantile houses, hotels, stores, various educational and philanthropical institutions, has very little suggesting the city of the past. The historical interest of the city centres around the Haram esh-Sherif (the site of the temple; see TEMPLE AT JERUSALEM; OMAR, MOSQUE OF), the church of the Holy Sepulchre, and the Via Dolorosa (q.v.). Of the modern religious edifices may be mentioned the Latin patriarchal church, the German church of the Redeemer, the French church of Sainte-Anne, the Coptic and the Franciscan monasteries, and the Armenian patriarchal buildings. The outer town, which has grown up since 1858 to the northwest of the old city, contains many Christian churches and hospices, hospitals, schools, missions, and monasteries, as well as consulates and many private residences. In the neighborhood are a number of Jewish colonies. In regard to sanitary conditions the outer city is not above Jerusalem proper. The city is connected by carriage roads with Jaffa, Bethlehem, Hebron, and Jericho, and by a narrow-gauge railway line (54 miles), operated by a French company, with Jaffa. The chief industry of Jerusalem is the manufacture of articles from olive wood and mother-of-pearl. The trade is chiefly in the hands of the Jews. Administratively the city is the capital of a sanjak and has two councils, in which the recognized religious communities are represented. Jerusalem is the seat of a Roman Catholic, a Greek Catholic, and an Armenian patriarch, an Anglican bishop, and numerous consuls. The permanent population, which has been increasing rapidly during recent years, is estimated at 64,000, of whom the Jews constitute over one-half, the Mohammedans exceeding 7000, and the Christians numbering over 10,000. The annual number of pilgrims and tourists is estimated at an average of 15,000.

The Ancient and Mediæval City. Of the history of Jerusalem up to the time of David very little is known. The notices in the Tell el-Amarna letters and the statement in Gen. xiv. 18 only show that it was a place of some importance long before the Hebrew occupation. The account of the conquest of the region south of Jerusalem by the tribe of Judah (Judg. i. 8, 21, in which verse 8 seems to be a late gloss, and verse 21 is to be corrected according to Josh. xv. 63) shows that the city was too strongly fortified to be taken. With this the other ancient reference (Judg. xix. 10–12) agrees. It remained a Jebusite city until its capture by David. Its King, Adoni Zedek, was captured, it is true, by Joshua at the battle of Makkedah (Josh. x. 5–26), but the city remained in the hands of the Canaanites.

When David became King over all Israel (2 Sam. v. 1 et seq.), he discerned the advantages of Jerusalem and determined to make it his capital and sanctuary. He succeeded in taking it from the Jebusites and at once set about improving and fortifying it as the seat of his kingdom (2 Sam. v. 6–12). Soon after he removed thither the ark of Jehovah from its obscurity at Kirjath-Jearim (2 Sam. vi; 1 Chron. xi. 4–9). On the basis of the description by Josephus (*Jewish War*, v, 4, 1) the long-current opinion has been that the citadel taken by David and the city which he walled and improved occupied the high southwestern hill. But excavations and discoveries of remains of old walls and other ancient structures during the past 40 years have resulted in the accumulation of a body of evidence which necessitates an entirely different view. This newer view alone agrees with the incidental topographical notices in the Old Testament. The citadel of the Jebusites was on Ophel, the southern part of the eastern hill, east of the Tyropœon valley.

THE MOSQUE OF OMAR AND THE HARAM ESH-SHERIF

Between it and the other summit to the north, which was later occupied by the temple, but was then used as a threshing floor (cf. 2 Sam. xxiv. 15–25; 1 Chron. xxi. 18–30; xxii. 1; 2 Chron. iii. 1), lay a depression, afterward gradually filled up by later building operations. It was thus isolated on all sides. At the foot of its eastern slope was the only natural spring in the vicinity, anciently called Gihon (1 Kings i. 33, 38, 45; 2 Chron. xxxii. 30; xxxiii. 30), afterward named the Virgin's Fountain, while the surrounding hills and valleys were waterless. The slopes were steep and easily fortified. The exact location of David's palace and other buildings (cf. Neh. iii. 16) is not known, nor the extent of the fortifications built by him. This hill, originally called Zion, now became known also as the City of David. It is probable that the Tyropœon valley to the west and the southern and eastern slopes of the western hill were settled to some extent. David or Solomon may have thrown a wall (the first wall of Josephus' description) about these settlements, though no satisfactory evidence of this is at hand. This wall ran about due west from the southwest corner of the temple hill as far as the northwest corner of the southwestern hill; then, turning southward and swinging around the southern slopes of this hill, it crossed over to the south of Ophel, there joining the fortifications of the City of David. The chief feature of David's fortifications was Millo (literally "filling," probably a rampart or embankment constructed by filling in between retaining walls), often mentioned, but not yet identified.

What David began his son Solomon enlarged. On the hill north of the somewhat small and unpretentious palace of David he built a series of buildings on a scale of magnificence hitherto unknown in Israel. After the necessary leveling of the surface, which involved the partial filling up of the depression between Zion and the northern hill, and the laying of the substructures, especially heavy retaining walls on the south, west, and east faces of the north hill, Solomon built (1) a new royal palace with its adjuncts and (2) a sanctuary or temple. The palace was a complex of buildings consisting of the house of the forest of Lebanon, constructed of cedar pillars and beams, 50 cubits wide, 100 long, and 30 high, a throne hall, 30 × 50 cubits, with porticoes, and the palace proper or royal dwelling; somewhere near were apartments built for his Egyptian queen and also the prison (1 Kings vii. 1–12; Jer. xxxii. 2; Neh. iii. 25–27). These buildings were arranged in the order given from south to north, the house of the forest of Lebanon being nearest David's old palace, the royal dwelling being nearest the temple. They were not all on the same level, but were on successive terraces, the palace occupying the highest. On a still higher elevation than the palace were the courts and buildings of the temple. The temple (see 1 Kings vi and vii. 13–50) was built on the site of the threshing floor of Araunah (1 Chron. xxii. 1). The main building was of great beauty, though comparatively small (20 × 60 cubits, exclusive of the vestibule or porch and the side chambers, 1 Kings vi. 3–6), of stone and cedar. At the entrance stood two large bronze pillars of symbolic significance (1 Kings vii. 15–22). It was surrounded by a court in which were the altar of burnt offerings and the great molten sea or reservoir (1 Kings vii. 9–12, 23–47). A passageway led from the court to the palace below (2 Kings xi. 13, 16; xvi. 18). At the dedication of the temple the ark was "brought up" from the City of David (1 Kings viii. 1, 3; cf. ix. 24) to the new sanctuary. To the temple mount, now considered the dwelling place of Yahwe, Israel's God, the name Zion was transferred (cf. Amos i. 2; Mic. iv. 2; Isa. viii. 18, etc.). The temple and palace area were encircled by a strong wall. The city of Solomon was thus larger and more magnificent than that of David. The great buildings and main fortifications were still mostly, if not entirely, on the eastern hills. Thence the city gradually spread westward, covering the slopes of the Tyropœon valley and the western hills. With the secession of the northern tribes from the rule of the house of David (c.933 B.C.) Jerusalem's importance was diminished. For nearly two centuries it was barely able to hold its own. It was captured several times, and not until the prosperous reigns of Uzziah and his son Jotham (2 Chron. xxvi, xxvii) were extensive improvements undertaken. They greatly strengthened the fortifications by building strong towers near the gates and at the corners of the wall. Hezekiah (c.720–689 B.C.), having rebelled against Sennacherib, King of Assyria, and realizing that his capital was likely to be besieged by the Assyrian invaders, paid especial attention to the fortifications and the water supply. In place of the extramural surface conduit that conducted the waters of Gihon along the eastern and then across to the western side of Ophel he had an underground conduit tunneled a distance of 1700 feet to convey the water of Gihon to the Pool (or reservoir) of Siloam, on the southwest slope of Ophel, near the mouth of the Tyropœon valley. This conduit was discovered in 1886 by Dr. Schick. An old Hebrew inscription on the wall of the tunnel about 25 feet from the Pool of Siloam tells of the meeting of the two parties of workmen working towards each other in constructing the tunnel. (See SILOAM.) The pool was hewn out of the rock and measured 71 feet north and south by 75 feet east and west. Stone steps led down to it. Lower down the valley Hezekiah constructed a new reservoir to hold the overflow of Siloam. Walls and fortifications for the protection of these works were also erected (cf. Isa. xxii. 7–11; 2 Kings xx. 20; 2 Chron. xxxii. 5; 2 Kings xxv. 4). Doubtless the city by this time contained also numerous cisterns for holding surface water. The surplus waters of Siloam were used for the royal gardens about the southern slope of Ophel. Sennacherib did not lay regular siege to Jerusalem, and for nearly 100 years after Hezekiah the city was in comparative peace. Samaria had been captured in 722 B.C., and Jerusalem was now without a rival in Palestine, though Judah was but a vassal state of the Assyrian Empire. The city grew; in the reign of Josiah (639–608 B.C.) we read of a "second quarter" of the town (2 Kings xxii. 14; Zeph. i. 10), and the mention of numerous gates in Jeremiah and in Nehemiah's account of his reconstruction of the old walls makes it likely that by the time of the capture by Nebuchadnezzar the city wall inclosed the "second quarter" as well as the southwestern and eastern hills. This wall, perhaps begun by Hezekiah (see above), probably extended westward from the temple area, which was already well fortified, along the line of Josephus' second wall

(*Jewish War*, v, 4, 2). After submitting to Nebuchadnezzar (597 B.C.), the city rebelled and in 587–586 sustained a long and terrible siege of one year, five months, and seven days. On its capture the temple was burned, the walls broken down, the city laid in ruins, and the best part of the population deported (2 Kings xxiv and xxv; also Jeremiah and Ezekiel, passim).

For 50 years the city was a desolation. In 536 B.C. Cyrus gave permission to the Jews in Babylonia to return to Palestine. Upward of 50,000 availed themselves of the opportunity. But as the royal decree had contained no permission to rebuild the city walls, the second temple, on the same site as the old one, but less pretentious, and completed about 516, was at first without walls (Ezra i–vi; see also Haggai and Zech. i–viii). No permanent success in walling the city that again began to grow up near the temple was achieved until the arrival of Nehemiah (c.445 B.C.) as royal governor. This energetic man retraced and rebuilt the old wall of preëxilic days in the remarkably short time of 52 days, putting the whole available population at work. The description contained in Neh. ii. 12–16 and iii is an invaluable source for the topography of the old city, but details must be omitted here. The city area thus walled in being sparsely inhabited, Nehemiah persuaded many to take up their residence there (xi. 1 et seq.). The adoption of Ezra's "book of the law," corresponding practically to the "priestly" portion of the Pentateuch, as the constitution of the community completed the transition from the old Hebrew religion to Judaism, and of Judaism Jerusalem now became the head. Foreigners were, as far as possible, excluded from citizenship. (See Ezra ix–x and Neh. ix–xiii.) In Nehemiah's restoration the old palaces of the preëxilic city were not rebuilt.

From Nehemiah to Alexander's conquest of the East, Jerusalem enjoyed a century of quiet prosperity under Persian rule. Whether the conqueror visited the city is doubtful. For 100 years after Alexander, Jerusalem was subject to Egypt, and though Ptolemy I is said to have worked some devastation (Josephus, *Ant.*, xii, 1), this century was one of prosperity. The high priest Simon II (c.220–200 B.C.) was an able ruler and did much to improve the city (see Ecclus. l. 1–4). In 197 B.C. Jerusalem passed to the control of the Græco-Syrian Kingdom of Antioch. The growth of a liberal Hellenistic party in Jerusalem and the opposition it stirred up led to troublous times. At the accession of Antiochus IV Epiphanes (175 B.C.), Jason, a member of the pro-Greek party, was appointed high priest, and a gymnasium was erected in Jerusalem. These measures enraged the conservative element, and so bitter was the opposition that Antiochus IV in 168 B.C. determined to put an end to the Jewish faith. Great massacres took place in Jerusalem, the walls were broken down, a strong fortress, called the Akra, built on the site of the old City of David, was filled with a Syrian garrison, and finally, in December, 168, the temple was defiled, the altar polluted by sacrifice of swine and by the erection thereon of an altar (or statue) to Jupiter. This was the "abomination of desolation" (cf. Dan. xi. 31; 1 Macc. i; 2 Macc. iii–vii; and Josephus, *Ant.*, xii, 5, 1–4). After the first victories of Judas Maccabæus, a priest of a family called Hasmonæan, and his brothers, the temple was purified, worship restored (165 B.C.), and the temple hill strongly fortified. In 142 B.C. the Syrian garrison evacuated the Akra, or fortress of the City of David, south of the temple (1 Macc. xiii. 49–53). The Jews, under the leadership of Simon Maccabæus, now restored and greatly strengthened the old walls (1 Macc. xiv. 37). One great change was wrought by Simon in the general appearance of the city. The hill on which the old City of David had stood was leveled and greatly reduced in height so as to make the temple hill command the whole eastern part of the city. The result was that the depression between the two eastern hills was now entirely filled up, and its existence was soon entirely forgotten (Josephus, *Jewish War*, v, 4, 1, according to the correct interpretation).

Under the Hasmonæans Jerusalem entered on an unprecedented era of prosperity. It was now the great pilgrim shrine of the Jewish world. A palace was built on the hills west of the temple mount, the Tyropœon valley being bridged to permit of easy access to the temple. The tower of Hammeah (Neh. iii. 1) northwest of the temple was also greatly strengthened. The capture of the city by Pompey (63 B.C.) entailed no serious disaster. The acme of prosperity was attained under Herod the Great (37 B.C.). Besides a complete reconstruction of the temple on a scale truly magnificent, involving the expenditure of vast sums of money, he built the Xystus, an open place surrounded by a gallery beneath the palace of the Hasmonæans, his own great palace on the western side of the western hill, with its three massive towers Phasael, Hippicus, and Mariamne, the large reservoir Amygdalon north of the palace, a hippodrome probably south of the temple mount, and a theatre somewhere in the south part of the city. In addition to these great works many minor improvements were made, such as paving, draining, leveling, and the general strengthening of the fortifications. Other improvements were undertaken after Herod's day, such as the palaces built by the royal family of Adiabene on the southern extension of the temple hill (Josephus, *Jewish War*, iv, 9, 11; v, 6, 1; vi, 6, 3), the enlargement of the Hasmonæan palace by Agrippa II in 62 A.D. (Josephus, *Ant.*, xx, 8, 11), and the third wall, begun by Agrippa I (41–44 A.D.), completed shortly before the siege by the Romans, rendered necessary by the growth of the city to the northwest and north. Such was the Jerusalem of New Testament times. According to Josephus, the different quarters of the city were known as (1) the upper city, i.e., the high southwest hill; (2) the temple area; (3) the lower city or Akra, the portion of the eastern hill south of the temple hill; (4) the new city, or Bezetha, i.e., the quarter north of the temple hill; and (5) the northern quarter, i.e., north of the old (first) wall and west of the temple (cf. Josephus, *Jewish War*, v, 4, 1).

This city, with its beautiful palaces and more beautiful temple, was laid in ruins in the terrible siege and capture by the Romans under Titus in 70 A.D. (cf. Josephus, *Jewish War*, books v, vi, and vii, 1, 1). Only a few remnants of the western fortifications were left standing. With this catastrophe the history of ancient Jerusalem came to its close.

The History and Topography of Modern Jerusalem. For 60 years Jerusalem was practically in ruins. About 130 the Emperor Ha-

drian visited it and determined to rebuild it. The desperate rebellion of the Jews under Bar Cochba led him to make it a pagan city and prohibit all Jews from entering it. The new city was called Ælia Capitolina. The wall with which Hadrian encircled it was, in general, on the line of the old wall, except on the south, where it left a large portion of the old city, including the whole of the City of David, outside the inclosure. The rebuilding caused a great change in the levels, owing to the vast accumulation of rubbish rendering the whole surface more uniform than that of the old city had been. In some places the former city was buried to a depth of 80 feet, making identifications of many ancient places uncertain, if not impossible.

Nothing is known of the city from Hadrian to Constantine the Great. The pagan population was gradually supplemented by Christians. With the recognition of Christianity as the religion of the Empire, pilgrims began to flock to Jerusalem to visit the holy places. The church of the Holy Sepulchre (see HOLY SEPULCHRE) was built by Constantine's orders. Other buildings of like character were added as the centuries went by. Jerusalem became a Christian city, the favorite resort of religious devotees from all quarters of Christendom. Among the noteworthy buildings belonging to this period the church of St. Stephen, north of the city, built by the Empress Eudocia (450–460), who also rebuilt the ancient southern wall, and the great church of St. Mary on the temple hill, built by Justinian c.532, deserve mention.

The Christian city, after being captured by the Persians under Khosru in 614, but recovered by the Emperor Heraclius in 628, was taken by the Moslems in 637 under the Caliph Omar. The Christians were treated leniently. A mosque, The Dome of the Rock, was erected about 691 by the Caliph Abd-al Malik over the rock which, in all probability, was the altar place of Solomon's temple. When in 969 the Egyptian Fatimite caliphs became rulers of Jerusalem, the condition of the Christian population became more serious. The Seljuk Turks conquered the city in 1077, and their maltreatment of Christians was one of the chief causes of the Crusades. In 1099 the Crusaders, under Godfrey of Bouillon and others, gained possession of the city. Moslems and Jews were severely treated. Jerusalem was once more a Christian city. The churchmen of the crusading forces immediately set about the election of a patriarch, probably expecting the temporal dominion to go with the spiritual, but the secular princes insisted on the choice of a king. The crown was declined by Raymond of Toulouse, and possibly also by Robert of Normandy. Godfrey of Bouillon was the final choice, though he refused to wear "a crown of gold in the place where his Saviour had worn a crown of thorns," and called himself simply protector of the Holy Sepulchre. The new state won its first victory at Ascalon a few days later and was soon fully organized with Western laws. Godfrey died in a year and was succeeded by his brother Baldwin, Count of Edessa. He succeeded in enlarging his kingdom by the conquest of Arsuf and Cæsarea in 1101, of Acre (Ptolemais) in 1104, of Tripolis in 1109, and of Berytus and Sidon in 1110. The other Christian lordships of the East acknowledged him definitely as their suzerain. He died on his way back from an expedition against Egypt in 1118, designating as his successor his brother Eustache, or, failing him, his cousin Baldwin of Edessa. The latter being on the spot, the barons decided to avoid an interregnum by crowning him at once. Baldwin II also extended the boundaries of his kingdom. In 1124, with Venetian aid, he made the important conquest of Tyre. His reign was a constant series of conflicts, but before his death, in 1131, the Kingdom reached the height of its power. None the less its existence was precarious; the feudal system, which had been a help in its establishment, now tended to dissension, and under the next King, Fulk of Anjou (1131–43), the decline began. During the minority of Baldwin III (1143–62) Edessa was conquered and destroyed, 30,000 Christians being slaughtered. The news of this disaster called out the Second Crusade, which did nothing to strengthen the Kingdom. Amalric (1162–73) attempted the conquest of Egypt, but was opposed by Saladin, who was now rising to supreme power among the Moslems. In the reign of Guy of Lusignan, whose title came through his wife, Sibylla, mother of Baldwin V, Saladin defeated the Christian army in the decisive battle of Tiberias and on Oct. 2, 1187, took Jerusalem and cast down the cross from the mosque of Omar. The titular kingship came in 1225 by marriage to the Emperor Frederick II, who secured possession of the city (except two mosques) by a treaty with the Sultan Kameel in 1229; but, owing to his conflict with the holy see, he was obliged to crown himself, not a single ecclesiastic being willing to sanction his title. In 1244 the city was stormed by the Kharezmians and passed finally out of Christian hands, and the fall of Acre in 1291 was the definite close of the real history of the Kingdom. The title of King of Jerusalem, however, was for a long time borne by the kings of Naples and Sicily, from whom it passed to the house of Lorraine and, by the marriage of Maria Theresa (1736), to the Hapsburgs. The Emperor Ferdinand I (1835–48) finally renounced it. For further details on the mediæval history, see CRUSADES, and consult the authorities there referred to.

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JERUSALEM, ASSIZE OF. See ASSIZE OF JERUSALEM.

JERUSALEM, COUNCILS OF. A number of councils were held in Jerusalem, of which the following are the most important: 1. The first Christian council, often called the Apostolic Council (Acts xv. 1–31), was held about 51 A.D., to consider questions raised in the church of Antioch concerning the obligation of Gentile Christians to observe the Jewish law. By the decision of the council it was declared to be necessary for such Christians to abstain from (*a*) meats which had been offered to idols, (*b*) blood and strangled things, (*c*) fornication. This council seems to have comprised only one church, that in Jerusalem, though this church may have embraced several local congregations in that city, organized as a church in common. 2. In 335 a council, formed of the bishops who had assembled for the consecration of the church of the Holy Sepulchre, restored Arius to fellowship and allowed him to return to Alexandria. 3. About 346 Maximus, of Jerusalem, and 60 other bishops, on the return of Athanasius to Alexandria, revoked the decree against him and drew up a letter to his church. 4. In 399 a council held in consequence of a letter from Theophilus of Alexandria on the decree passed against the Origenists assented to it and resolved not to have fellowship with any who denied the equality of the Son with the Father. 5. In 553 the acts of the fifth Ecumenical Council (Constantinople) were received by all the bishops of Palestine assembled at Jerusalem, except Alexander of Abilene, who was consequently deposed. 6. The most important council held in Jerusalem was that of 1672. It was convened by Dositheus, Patriarch of Jerusalem, and was composed of more than 60 bishops and other officers in his diocese. Its object was to oppose Calvinism, which had been introduced into the East by Cyril Lucaris. Its measures led to its being charged with favoring Roman Catholicism and occasioned considerable trouble in the Church. See GREEK CHURCH.

JERUSALEM, LATIN KINGDOM OF. See LATIN KINGDOM OF JERUSALEM.

JERUSALEM, TEMPLE AT. See TEMPLE AT JERUSALEM.

JERUSALEM, yâ-rōō′zà-lĕm, WILHELM (1854–). An Austrian philosopher and psychologist. He was born in Drĕnic, Bohemia, was educated at Prague, specializing first in classical philology and then in pedagogy, and taught in secondary schools in Nikolsburg (1878–85) and Vienna (1885–1907) and then became lecturer in the University of Vienna. Among his valuable works covering various branches of philosophical study are: *Zur Reform der philosophischen Propädeutik* (1885); *Psychologische Sprachbetrachtung* (1887); *Lehrbuch der empirischen Psychologie* (1888; 5th ed., 1912); *Laura Bridgman* (1890); *Die Urteilsfunktion* (1895), an excellent summary of different theories of the nature of the logical "judgment"; *Einleitung in die Philosophie* (1899; 6th ed., 1913), which has been translated into English (1910), Russian, Polish, and Japanese; *Der kritische Idealismus und die reine Logik* (1905); *Gedanken und Denker* (1905); a translation (1908) of William James's *Pragmatism; Die Soziologie des Erkennens in der Zukunft* (1909).

JERUSALEM ARTICHOKE. See ARAUCARIA; ARTICHOKE.

JERUSALEM CHAMBER. A room adjacent to Westminster Abbey, built in 1376–86, so named from tapestries formerly hung there and representing scenes from the history of Jerusalem. It is now the meeting place of the Upper House of Convocation of the Province of Canterbury. The room contains frescoes of the death of Henry IV, who died in it, and of the coronation of Queen Victoria.

JERUSALEM CHERRY. The popular name of an ornamental species of the genus *Solanum*, of which *Solanum pseudocapsicum* and its hybrids are the most important species. As grown under glass for decorative purposes, it ranges from 1 to 3 feet in height, carrying numerous bright-green oblanceolate or oblong short-petioled leaves, small white flowers, and a profusion of bright red or yellow fruits about ½ inch in diameter, which constitute the chief beauty of the plant. It is easily propagated either by seeds or cuttings.

JERUSALEM CORN. A variety of nonsaccharine sorghum. See ANDROPOGON; SORGHUM, *Nonsaccharine*.

JERUSALEM CREED. A confession of faith taught by Cyril of Jerusalem in his catechetical lectures before 350. It is preserved as follows in Cyril's discourses: "I believe in one God, the Father Almighty, maker of heaven and earth, and of all things visible and invisible; and in one Lord Jesus Christ, the only begotten Son of God, begotten of the Father before all worlds, very God, by whom all things were made, who was incarnate and made man, crucified and buried, and the third day ascended into the heavens, and sat down at the right hand of the Father; and is coming to judge quick and dead. And in the Holy Ghost, the paraclete, who spake by the prophets; and in one baptism for the remission of sins; and in one holy catholic church; and resurrection of the flesh; and in life everlasting." It is of great historical interest, as being the basis of the Constantinopolitan creed of 381. Consult Schaff, *Creeds of Christendon*, vol. ii (New York, 1878), and Curtis, *History of Creeds and Confessions* (Edinburgh, 1911). See NICENE CREED; CREEDS AND CONFESSIONS.

JERUSALEM DELIVERED. See GERUSALEMME LIBERATA.

JERUSALEM OAK. An herb of southern Europe. See CHENOPODIUM.

JERVIS, jĕr′vĭs *or* jär′vĭs, JOHN, EARL OF ST.

VINCENT (1735–1823). A British admiral. The second son of Swynfen Jervis, barrister, he was born at Meaford, Staffordshire, Jan. 9, 1735. After education at Burton-on-Trent and at Greenwich, he entered the navy in 1749. He obtained a commission as lieutenant in 1755, and during some years was engaged in active service on the North American station. In 1769 he commanded the *Alarm* frigate in the Mediterranean, and when it was paid off made a tour of inspection of the naval arsenals of France and northern Europe. His next command was the *Foudroyant*, of 80 guns, the finest two-deck ship in the British navy. Engaging the *Pégase*, 74 guns, off Brest, in 1782, he took her without the loss of a man. In 1783 he entered Parliament for Launceston. In 1787 he was made rear admiral and in 1793 commanded the naval part of the expedition against the West India Islands, Sir C. Grey commanding the troops. Although the French were well prepared and fought desperately, every island fell in succession into the hands of the British. In 1795 he was made an admiral and given the command of the Mediterranean fleet. On Feb. 14, 1797, with 15 sail of the line, he encountered the Spanish fleet of 27 sail off Cape St. Vincent, and the battle of St. Vincent was fought. The genius of Nelson contributed greatly to the success of the day. For this victory the King created Jervis Earl of St. Vincent, and Parliament settled upon him a pension of £3000 a year. After having by great firmness repressed a mutiny off Cadiz, which threatened the loss of the whole fleet, he was compelled by ill health to return home. He was soon applied to by government to subdue the spirit of sedition which had openly manifested itself in the Channel fleet, and his endeavors were eminently successful. After having held the appointment of First Lord of the Admiralty (1801–03) and at the age of 72 for a second time commanded the Channel fleet, he retired into private life, and died March 13, 1823. A public monument was erected to his memory in St. Paul's Cathedral. St. Vincent ranks among the foremost naval commanders who broke the maritime power of France and Spain and established the naval supremacy of Great Britain. Consult Brenton, *Life and Correspondence of John, Earl of St. Vincent* (London, 1838), and Tucker, *Memoirs of . . . the Earl of St. Vincent* (ib., 1844). But these books have been largely superseded by Laughton, *From Howard to Nelson* (ib., 1899); A. T. Mahan, *Types of Naval Heroes* (Boston, 1901); Anson, *Life of John Jervis, Admiral Lord St. Vincent* (London, 1913).

JERVIS, jĕr'vĭs, JOHN BLOOMFIELD (1795–1885). An American civil engineer. He was born at Huntington, Long Island, and was brought up at Rome, N. Y. After receiving a common-school education he began work on the Erie Canal, was promoted in two years from axeman to resident engineer in charge of 17 miles of the canal, and in 1824 was in control of one-seventh of the canal. In the following year he became assistant engineer of the Delaware and Hudson Canal Company, in 1830 became chief engineer of the Albany and Schenectady Railroad, and in 1836, after taking a prominent part in the enlargement of the Erie Canal, began the work of constructing the Croton Aqueduct. The Cochituate Aqueduct (Boston) and the Hudson River Railroad between New York and Albany were constructed largely from his plans and under his supervision. He retired in 1858 from the presidency of the Rock Island, but after three years was chosen superintendent of the Pittsburgh, Fort Wayne, and Chicago Railroad, and in two years brought its stock up from a value of eight cents on the dollar to a point where it paid a dividend of 10 per cent. He received the degree of LL.D. from Hamilton College in 1878. Port Jervis, N. Y., was named in his honor. He wrote: *Railway Property* (1859); *The Construction and Management of Railways* (1861); *Labor and Capital* (1877).

JERVOIS, jĕr'vĭs, SIR WILLIAM FRANCIS DRUMMOND (1821–97). An English soldier and engineer, born at Cowes, Isle of Wight. After early education at Gosport and Woolwich he entered the Royal Military Academy at Woolwich in 1837 and two years later received a commission in the Royal Engineers. In 1841 he proceeded to the Cape of Good Hope and for seven years was engaged in professional duties, besides being employed in active service against the Boers and Kaffirs. He returned to England in 1848; continued on active engineering duty; received various promotions; and in 1856, when commanding royal engineer of the London Military District, was appointed assistant inspector general of fortifications. In 1857, during the threatened war with France, he was made secretary of the National Defense Committee. His report and recommendations for the defenses of London and the nation were accepted by Parliament and carried into effect. In 1862 he was appointed director of works for fortifications and in 1864 and 1865 inspected the fortifications of Canada and its eastern seaboard, also visiting the principal Eastern forts of the United States during the Civil War. Until 1874 he was actively engaged at home and in the colonies—Halifax, Bermuda, Gibraltar, Malta, and India—superintending the execution of a system of Imperial defense. Jervois saved £40,000 on the sum of £7,460,000 which had been voted for defense. From 1875 to 1877 he was Governor of the Straits Settlements; from 1878, when he was made G.C.M.G., to 1882 he was Governor of South Australia; and from 1882 to 1889 was Governor of New Zealand. In all these positions he distinguished himself by his ability and energy and was notably popular. Some of his papers on the coast defenses of England and the colonies and on England's defensive policy were separately published.

JESH'URUN (Heb. *Yeshurūn*). A poetical or symbolical name for Israel, used three times in Deuteronomy (xxxii. 15; xxxiii. 5, 26) and once in Isaiah (xliv. 2). The underlying root of the word, *yashar*, denotes "straight, upright," and it seems to be a formation designed as a symbolical play upon Israel, artificially separated into two elements, *yshr* (= *yashar*) and *el*.

JESI, yā'zê, or **IESI** (Lat. *Æsis, Æsium*). An episcopal city in the Province of Ancona, Italy, 17 miles by rail southwest of the city of Ancona, on a hill beside the river Esino (Map: Italy, D 3). It has mediæval walls, a cathedral dedicated to the martyr St. Septimius, the first Bishop of Jesi (308), and the twelfth-century church of San Marco. There is a fifteenth-century city hall, once the convent church San Floriano, and a library with paintings by Lorenzo Lotto. Jesi was the birthplace of Emperor Frederick II and of the composer Gio-

vanni Pergolesi. The composer Spontini was born in a neighboring village. There are schools of music and design, a private female normal school, a gymnasium, several technical schools, and a seminary. The city manufactures paper, bricks, silk, wool, soap, matches, hats, and rope. As the city is an important centre of local trade, there are many fairs. Wine and oil are marketed here. The river Æsis (modern Esino) from 250 to 82 B.C. formed the northern boundary of Italy. The town of Æsis was a recruiting station for the Roman army. Pop. (commune), 1901, 22,308; 1911, 24,777.

JESPERSEN, yĕs'pĕr-sĕn, JENS OTTO HARRY (1860–). A Danish philologist, born at Randers. He studied law and languages at the University of Copenhagen, where, after gaining the degree of Ph.D., he became professor of English language and literature (1893). In his books Jespersen treats mainly of phonetics. His principal work is the large *Fonetik, Læren om Sproglyd* (1897–99), which is the first complete presentation of phonetics in Danish. Of the periodical *Dania* he, with Kr. Nyrop, was editor from 1890 to 1903. He wrote: *The Articulation of Speech Sounds* (Marburg, 1889); "Danias Lydskrift," in *Dania* (1890); "Til Spörgsmaalet om Lydlove," in *Nordisk Tidskrift for Filologi*, vol. vii (1886; in German, in *Internationale Zeitschrift für allgemeine Sprachwissenschaft*, vol. iii); *Chausers Liv og Digtning* (1893); *Progress in Language* (1894); *Sprogundervisning* (1901; Eng. trans., 1904); *Phonetische Grundfragen* (1904); *Growth and Structure of the English Language* (1905); *John Hart's Pronunciation of English* (1907); *Modern English Grammar* (1909); *Lehrbuch der Phonetik* (1913). In 1886 he helped found Quousque Tandem, a Scandinavian society for improved instruction in languages, and through various channels he exerted a large influence upon the teaching of languages in Denmark. Jespersen became vice president of the Association Phonétique Internationale, was elected officer or member of many other societies, Danish and foreign, and in 1906 was awarded the Volney prize of the French Institute. In 1904 he lectured at St. Louis and in 1909–10 at the University of California and Columbia University, where he was made honorary doctor.

JES'SAMINE. An ornamental shrub which bears fragrant flowers. See JASMINE.

JES'SAMY BRIDE, THE. A name given to Mary Horneck, a relative of the artist Reynolds and supposed to have been the object of Goldsmith's affection. The word "jessamy" probably represents jasmine and is used to indicate the daintiness and grace of her person.

JES'SANT (probably from OF. *issant*, pres. p. of *isser, eisser, iesser*, to issue, from Lat. *exire*, to go out, from *ex*, out + *ire*, to go). In heraldry, a term frequently used as synonymous with *issuant*, rising, as a demilion is often represented doing, from the bottom line of a field or upper line of an ordinary. Jessant is sometimes used improperly for *naissant*, or rising from the middle of an ordinary. See HERALDRY.

JESSE, EDWARD (1780–1868). An English writer on natural history, born at Hutton-Cranswick, Yorkshire. He early showed a love of plants and animals, fostered by his places of residence, Richmond and Bushey parks, and he should be credited with much that was done to beautify Hampton Court. He was made deputy surveyor of royal parks and palaces. Though he was no great scientist, there is pleasant reading in his *Gleanings in Natural History* (1832–35), *An Angler's Rambles* (1836), *Scenes and Tales of Country Life* (1844), *Anecdotes of Dogs* (1846), and *Lectures on Natural History* (1861), as well as his descriptions of jaunts to Hampton Court, Windsor, and Eton. He edited Walton's *Compleat Angler*, and White's *Selborne*, with a biographical introduction.

JESSE, JOHN HENEAGE (1815–74). An English historical writer. He was educated at Eton and became an Admiralty clerk, but was devoted to literature early in life, and his first poem, "Mary Stuart," was published in 1831. He wrote *London: Its Celebrated Characters and Remarkable Places* (3 vols., 1871), but made a specialty of memoirs, of which *George the Third* (3 vols., 1867) was his best effort. The others include: *The Court of England during the Reign of the Stuarts* (1840); *The Court of England from the Revolution to the Death of George II* (3 vols., 1843); *George Selwyn and his Contemporaries* (4 vols., 1843); *The Pretenders and their Adherents* (2 vols., 1845); *Richard the Third and Some of his Contemporaries* (1862); *Celebrated Etonians* (2 vols., 1875). American editions of most of the above-mentioned memoirs appeared at the close of the last and the opening of the present century.

JESSE, RICHARD HENRY (1853–). An American educator, born in Lancaster Co., Va. He studied at the University of Virginia (1873–75, 1878) and in Europe (1885, 1890, 1905–06). For some years he was connected with secondary schools as teacher or principal, from 1884 to 1891 he was professor of Latin at Tulane University, and thereafter until his retirement in 1908 was president of the University of Missouri, also holding the chair of ancient and mediæval history. At various times he served as president of the Missouri State Teachers' Association, the Southern Association of Colleges and Secondary Schools, the National Association of State Universities, and the Baptist Congress. In 1904 he was awarded a commemorative diploma and medal at the St. Louis Exposition for his services to education. He is author of *Missouri Literature* (1901), with E. A. Allen, and of papers in the transactions of various societies.

JESSEL, jĕs'el, SIR GEORGE (1824–83). An English judge, born in London. He was educated at University College, London, becoming a fellow in 1846, and in 1847 was called to the bar at Lincoln's Inn, becoming bencher in 1865. He was returned to Parliament for Dover in 1868, was appointed Solicitor-General in 1871, and in 1873 became Master of the Rolls and Privy Councilor. The second Judicature Act of 1881 relieved him of duty in the rolls court and made him president of the first court of appeal, and there he served until his death. Jessel was the first Jew to participate in the executive government of England, to sit on the judicial bench of Great Britain, and to become Privy Councilor. As a judge, he was noted for his comprehensive and accurate legal knowledge and for his dispatch.

JES'SICA. Shylock's beautiful daughter, in Shakespeare's *Merchant of Venice*.

JESSO, yĕs'sō. An island of Japan. See YEZO.

JESSONDA, yĕ-sōn'dä. An opera by Spohr (q.v.), first produced in Cassel, July 28, 1823.

JES'SOPP, AUGUSTUS (1823–1914). An

English clergyman and author, born at Albury Place, Hertfordshire. He was educated at St. John's College, Cambridge, was select preacher at Oxford in 1896, and held honorary fellowships at both universities. He began his clerical life as curate of Papworth St. Agnes, Cambridgeshire (1848–54), but was head master in Helston Grammar School, Cornwall, for four years, and in a Norwich academy for 20 years, before he was made rector of Scarning, Dereham, Norfolk, in 1879. In charge of this parish he remained until 1911. From 1902 to 1910 Dr. Jessopp was chaplain in ordinary to King Edward VII. His literary work includes an edition, with life, of John Donne's *Essays in Divinity* (1855); *One Generation of a Norfolk House* (1878); *History of the Diocese of Norwich* (1879); *Arcady for Better for Worse* (1881); *The Coming of the Friars* (1888); *Trials of a Country Parson, Random Roaming,* and *Frivola* (all 1896); *Before the Great Pillage* (1901); and the biographies of Queen Elizabeth and some of the famous men of her time in the *Dictionary of National Biography.* In 1914 appeared *England's Peasantry, and Other Essays.*

JES'SUP, Henry Harris (1832–1910). An American Presbyterian missionary. He was born at Montrose, Pa., son of the jurist William Jessup (1797–1868); graduated at Yale in 1851 and at Union Theological Seminary in 1855; and immediately entered the foreign-missionary service of the Presbyterian church in Tripoli, Syria. In 1860 he was transferred to Beirut and became prominent at that important station. He wrote, besides various works for the American Mission Press at Beirut: *The Women of the Arabs* (1873); *The Mohammedan Missionary Problem* (1879); *The Greek Church and Protestant Missions* (1884); *Kamil, a Moslem Convert* (1899); *Fifty-Three Years in Syria* (1910).

JEST (OF. *geste,* exploit, tale of adventure, from ML. *gesta,* deed, from Lat. *gestus,* p.p. of *gerere,* to carry on). The word *geste,* meaning originally something done, a deed, an exploit, came to be a name for the record of exploits in history or story. It was so used in Middle English, but gradually came to assume its exclusive modern sense of a joke or piece of fun. A stage in the transition from story to humorous story and trick, and finally to witty saying, is marked by the geste of Robin Hood, narrating the shrewd practices of this outlaw and his merry men. Though the word in its modern sense is of comparatively recent date, the jest itself is of ancient origin. Collections of jests passed from the East to the Greeks, then to the Romans, and from classic literature spread throughout Europe in the Renaissance period, uniting with that stream of story and witty remark which flows from men of all races and of all times. The earliest of modern jest books, dating from the fifteenth century, were in Latin and were known as *facetiæ* (q.v.). A notable volume was the *Liber Facetiarum* (1470) of the Florentine Poggio, of which the best stories found their way into the anecdotal literature of Italy, France, Germany, and England. For Italy may be cited Pietro Aretino and the vast body of *novelle,* dealing with the incidents of everyday life; and for France the *contes* and *joyeux devis* of Rabelais and his school. Among the earliest German jest books were the Latin *Facetiæ* of H. Bebel (1508) and the *Schimpf und Ernst* of the monk Johannes Pauli (1519), largely compilations for which Poggio was freely used. Native German humor of the period is perhaps best seen in the Low Saxon *Eulenspiegel* (q.v.) (1515), which in a mutilated form early passed into France and England. Eulenspiegel (i.e., owlglass), from whom the book derives its name, is a knavish peasant who plays his tricks upon his more prosperous countrymen. In England there had long been books sharing in the literature of jest. Such, e.g., was the *De Nugis Curialium* (twelfth century) of Walter Map. But the flourishing period of the jest book in England, as in the rest of Europe, was during the sixteenth and seventeenth centuries. From the press of John Rastell issued two interesting collections—*The Merry Gests of the Widow Edith,* in verse (1525), and *The Hundred Merry Tales* (1526). The latter volume is mentioned by Beatrice in *Much Ado about Nothing* (II, i, 135). These were succeeded by *Merry Tales and Quick Answers* (about 1535), containing 114 anecdotes. It became customary for compilers to father their collections upon some well-known historical character who might or might not have been a wit. Famous books of this kind were: *The Merry Tales of Skelton* (1566 or 1567), attributed to John Skelton, who after his death gained the reputation of a wag; *The Jests of Scogan* (1565–66, probably), said to have been gathered by Andrew Boorde (q.v.), a witty physician, from the sayings of a fool at the court of Edward IV; *Tarlton's Jests* (3 parts, 1592, 1600, 1611), named from the great comedian; and *The Jests of George Peele* (1607), containing perhaps some escapades of the dramatist. This practice of placing a name on the title-page that would sell the book continued into the nineteenth century, receiving its most abused illustration in the collections purporting to have been "transcribed from the mouth of Joe Miller" (q.v.), an actor of the eighteenth century. *The Merry Tales of the Mad Men of Gotham,* dating from the sixteenth century, were given a habitation in Nottinghamshire. The little pamphlet circulated as a chapbook in England and Scotland well into the nineteenth century. Other collections are *Pasquil's Jests, Mixed with Mother Bunch's Merriments* (1604); *The Pleasant Conceits of Old Hobson, the Merry Londoner* (1607); and the racy *Wit and Mirth* of John Taylor (q.v.), the water poet. These books are only a small section of a vast literature of jest which pervaded popular tales and prepared the way for the realism of the modern novel. The jest was fused with the novel of manners by Theodore Hook (q.v.) in his *Sayings and Doings* (London, 1824–28). The older English jests were edited by W. C. Hazlitt under the title *Shakespeare Jest-Books* (3 vols., ib., 1864). The interesting jest literature of Germany and its influence is discussed by C. H. Herford in *The Literary Relations of England and Germany in the Sixteenth Century* (Cambridge, England, 1886). Consult Ernst Schulz, *Die englischen Schwankbücher bis herab zu "Dobsons drei Bobs"* (Berlin, 1912). See also the remarks on the Spanish rogue story in the article on the Novel.

JESTER. A clownish wit, akin to the court fool (q.v.), often called the jester, or the King's jester, and simply one kind of minstrel. (See Minstrel.) The jester in the Sanskrit drama

is represented by the *vidusaka*, a character of mingled gluttony, cowardice, and knavery, redeemed only by his unswerving devotion to the King, who is his companion. It is noteworthy that the *vidusaka* is always a Brahman, a fact which is plausibly explained by the supposition that he was a stock character borrowed by the classic Hindu drama from the folk plays. In Latin comedy the intriguing slave Davos is perhaps a prototype for ignoble but amusing characters in modern comedy. During the Middle Ages weirdly dressed and clownish devils either terrified or entertained by their antics the onlookers at the miracles and mysteries. In Spain the *gracioso*, or jesting buffoon, has the same function in the dramas of Lope de Vega, Calderón, and other dramatists, as Vidusaka had in India. In Italy Pantaleon, an old buffoon in Venetian costume, and Arlecchius were indispensable personages in the *Commedia dell' arte*, and they passed through France into England.

JESUITS, jĕz'ū-ĭts (Fr. *Jésuite*, from Neo-Lat. *Jesuita*, from Lat. *Jesus*), or SOCIETY OF JESUS. A religious order of the Roman Catholic church. The preliminary step to the foundation of the society was taken when, on Aug. 15, 1534, Ignatius of Loyola (see IGNATIUS), with eight associates—Pierre Le Fèvre, a Savoyard; James Laynez, Francis Xavier, Alfonso Salmeron, and Nicholas Bobadilla, Spaniards; a Portuguese, Simon Rodriguez; Claude Lejay and Paschase Brouet—took, in the chapel on Montmartre, Paris, vows to make a pilgrimage to the Holy Land and devote themselves to the conversion of the infidels. Owing to the breaking out of war with the Turks, they could not make the pilgrimage as planned, so they applied themselves to various spiritual works in and around Venice, from which it had been their intention to sail. They lived more or less in common, but were not united in a formal way until 1538, when the first idea of permanent organization came. They went to Rome and laid the preliminary sketch of the constitution of their proposed order before Pope Paul III, who approved it in 1539. The formal creation of the Order of Jesuits was made by bull dated Sept. 27, 1540. In founding the Jesuits, Ignatius is often said to have contemplated repairing the losses occasioned to the church by Luther; but at this time he had scarcely heard of him. His object was the increase of devotion among the adherents of the church. The motto of the new order was *Ad Majorem Dei Gloriam*, often abbreviated A. M. D. G. (to the greater glory of God). The members bound themselves, besides the usual three vows of religious orders—poverty, chastity, and obedience—by a fourth vow to go as missionaries wherever the Pope might send them.

The order was inaugurated in 1541 by the election of Ignatius as general. He wished to refuse this office at first, but was finally prevailed upon to accept it. The name chosen—Society (or more properly Company) of Jesus—was meant to recall that Ignatius' idea in its foundation was that they were to be a band of soldiers in the army of the church. What time he could spare from the government of the society and his many good works the general devoted during the next 10 years to the drawing up of the formal Constitutions and rules of the order. In 1550 these were submitted to the members and received certain modifications in detail. The revised text, written by Ignatius himself and known as the autograph text, was then sent to all the fathers, even to those in India, and suggestions asked. Such as seemed proper were incorporated in a third text, which forms the Constitutions of the Jesuits now in force. These are essentially from the hand of Ignatius, never having received any important modification. They are considered by Jesuits of the present day as the palladium of their existence as a religious order. The most important parts of the Constitutions are those that prescribe the training to which each member of the order shall be subjected. The formation, as it is called, of the Jesuit for his life work takes about 18 years. As a rule, before entrance into the order he has already pursued studies equivalent to those required for the collegiate degree of A.B. The first two years of novitiate are spent in spiritual exercises, prayer, meditation, and ascetic reading, in the practice of mortification, and in humble occupations of various kinds. During his first year the novice devotes 30 days of retreat, as it is called, in absolute silence, to making the spiritual exercises of St. Ignatius. These consist of meditations on the last four things to be remembered and on the life of Jesus Christ. Every year of his life afterward, no matter what his status in the society, at least eight successive days are devoted to the same purpose. At the end of the second year of novitiate the candidate takes simple vows of poverty, chastity, and obedience. Then two years are devoted to the study of the humanities and the modern languages. After this three years are given to philosophic and scientific studies, during which, though a definite course is marked out for all, opportunities are provided for those who wish to pursue special studies. At the completion of these seven years of study of self, the humanities, philosophy, and science the young Jesuit, usually now about 25 years of age, is sent to teach for five years in a Jesuit college. If he has shown predilection and talent for some special study, he will, as far as circumstances permit, be assigned to teach this branch. He is not confined to one class during his years of teaching, but is supposed to go up with his class during the course, thus providing for his own mental development as well as the consistent progressive formation of his students. After the period of college work the Jesuit studies theology for three years and then is advanced to holy orders. For one year more theological studies are continued, and then opportunities are given the young priest for mission work and spiritual employment of various kinds for a year, after which a final year of novitiate, called the third year of probation, is prescribed. During this year the Jesuit devotes himself exclusively to the study of spiritual things, his own character, the ways and means of the Institute of the society, its rules and Constitutions. During his third year the 30 days' retreat of silence and prayer, according to the method of the spiritual exercises of St. Ignatius, is once more made. After this final year of probation the candidate is admitted to the last solemn vows, now four in number, because they include a special vow of obedience to the Pope. Those who accomplish this full course are called professed fathers.

The rules prescribe in detail the Jesuit's daily occupation, and, as far as circumstances allow,

a definite routine is followed very exactly by all the members of the order. The Jesuit rises at 5 A.M. Half an hour is given to physical preparation for the day. He devotes one hour to mental prayer, for which there has been 15 minutes of preparation the night before. He then hears mass or, if a priest, says mass. About 7 A.M. he breakfasts, and after a few minutes devoted to a review of his morning meditation, and especially the practical resolutions that it has led him to, he begins the day's work, whatever it may be—studying, teaching, preparing sermons, missions or retreats, or writing books or articles. He is advised by his rules not to continue any one form of occupation, whatever it may be, for more than two consecutive hours without a diversion of mind for some minutes at least. About noon he devotes 15 minutes to a review of his morning's work and plans the work of the afternoon, so as to do better. Dinner is taken in common, and then, according to rule, one hour is passed in recreation in common. About 9 P.M. the community assembles for the recital of the litany of the saints and of the Blessed Virgin. This is the only daily spiritual exercise in common enjoined by rule. Even this did not originate with Ignatius himself, but with St. Francis Borgia, the third general of the society. Ignatius wished to leave his order free for work and study, depending on the constant direction of the motives of their work to make them spiritual men. The litanies are followed by 15 minutes devoted to the selection of a passage of the life of Christ for meditation next morning. Then follows the evening examination of conscience. At 10 o'clock all are in bed, unless special permission is given for further work. The *Monita Secreta* (q.v., Secret Admonitions), a masterpiece of craft and duplicity, supposed to have been issued for the private direction of thoroughly initiated members of the order, is now acknowledged by all serious authorities to be an invention of the enemies of the Jesuits.

The government of the Society of Jesus, though often spoken of as autocratic, is a striking example of a limited constitutional authority, practically the first of its kind. The order is governed by a general, whose power, said sometimes to be absolute, is strictly limited by the Constitutions. He is elected by a general congregation and holds his office for life. He may be deposed by a general congregation under certain conditions prescribed by the Constitutions, though such an incident has never happened in the history of the order. A general congregation is composed of the general, or his deputy, and the five assistants who form his council, besides the provincials, or heads of provinces, and two deputies from each province. The provincial deputies are elected by the professed fathers and the rectors of the province. When the general congregation, which has no fixed time, meets, all important concerns come before it. It alone has power to dissolve a college or professed house or a novitiate once established. The general has power to dispense with some provisions of the Constitutions in particular cases, but he cannot alter or annul them. All others in authority hold office for a limited time, usually for three years. The assistants who compose the general's consultors are elected by the general congregation and are chosen from certain groups of provinces. At the present time there are the Italian assistancy; the French; the Spanish, which includes also missions in South America; the German, which includes the Low Countries and Austria; and finally the English, including England and North America, with missions in South Africa and in India. For the assistance of the general there are also an admonitor and a father confessor. The general's admonitor is bound to inform him of any faults he may commit. While the general consults with his assistants, he is not obliged to follow their advice, even when unanimous.

There are four classes of Jesuits: 1. Professed fathers, who, after their 18 years of preparation, have taken the four solemn vows mentioned above. It is from this class alone that the general and all the higher officials of the society are chosen. 2. Coadjutors, spiritual and temporal. Spiritual coadjutors are priests whose health or talents have not permitted them to reach the standard of knowledge required for professed fathers and who help in preaching, teaching, and the direction of souls. Temporal coadjutors are the lay brothers to whom the menial offices and certain minor duties are assigned. 3. Scholastics, who, having passed through the novitiate, are engaged either in their own studies or in teaching in the colleges. 4. Novices, who, after a short trial as postulants, are engaged for two years exclusively in spiritual exercises, prayer, and ascetic reading and practices.

The administrative and executive government of the society is intrusted under the general to provincials who are named by the general and hold office for three years. In each province the superiors of the colleges, professed houses, and novitiates are appointed by the general, who receives from them at stated intervals—monthly from provinces, quarterly from colleges and novitiates—a detailed report of the character, conduct, and occupation of each member of the society. Far from making a system of espionage, this detailed knowledge only gives superiors such information with regard to subjects as enables them to make the best possible use of them with the least possible danger of failure under trying circumstances. Ignatius gave his order no distinctive dress (though that of the Spanish priests of that time has come to be adopted by Jesuits generally), so that they might be freer for intercourse with the world.

The Jesuits spread rapidly. At the death of Ignatius (1556) there were 1000 members of the order, in 12 provinces. At the end of the century there were over 10,000. When the celebration of the centenary of their foundation came in 1639, they numbered over 13,000. A century and a quarter later, at the time of their suppression, there were 22,600 Jesuits throughout the world. Wherever they were, they were considered as the special upholders of the papacy and the most faithful defenders of the Roman Catholic church. This accounts for most of the opposition to them. When there was difficulty between the Republic of Venice and the Pope, during the first half of the seventeenth century, the Jesuits were excluded from the Venetian states. Their close adhesion to the Pope made their position in France often insecure. Gallicanism saw in them implacable opponents, and Jansenism (q.v.) recognized them as the foes most to be feared. The Sorbonne and the University of Paris opposed the introduction of the society into France and always continued to be

jealous of the educative influence acquired by it. Finally, Mme. de Pompadour became a bitter enemy because the Jesuits refused her the sacraments unless there should be an end of her liaison with the King. The philosophic party was opposed to the Jesuits because it saw in them the most prominent factor in the conservation of Catholic thought and education. This united opposition brought about the exiling of the Jesuits by royal edict throughout the French dominions in 1764. The example was followed in a few years by the other Bourbon courts—Spain, Naples, Parma, and Modena. In 1759, through the machinations of the Prime Minister Pombal, who saw an opportunity of enriching himself at their expense, the Jesuits had been expelled from Portugal. The charges that they were the source of the attempt upon the King's life and were fomenting disaffection among the Indians in the so-called reductions of Paraguay, recently transferred from Spain to Portugal, were evidently trumped up. Pope Clement XIII (1758–69) interposed vainly in their behalf and used every effort to reconcile the governments. Pope Clement XIV (1769–74), pressed by the ambassadors of so many Catholic governments, at length issued, July 21, 1773, the brief *Dominus ac Redemptor Noster*, by which, without adopting the charges made against the society or entering in any way into the question of their justice, acting solely on the motive of "the peace of the church" he suppressed the society in all the states of Christendom. Submission to the brief was immediate and complete. In Spain and Portugal the members of the society were driven into exile. In other Catholic countries they were permitted to remain as individuals, engaged in the ministry or in literary occupations. Two non-Catholic governments, those of Frederick the Great of Prussia and Catharine II of Russia, refused to allow the brief of suppression to be published in their dominions because they could not replace the Jesuits as educators. In these states the Jesuits retained a quasi-corporate existence as a society for education.

What was meant to be the suppression of the society proved but a temporary suspension. In 1792 the Duke of Parma secured a partial reorganization for his dominions. In 1801 Pope Pius VII (1800–23) permitted the formal reestablishment of the Jesuits in Lithuania and White Russia and with still more formality in Naples in 1804. On Aug. 7, 1814, by the bull *Solicitudo Omnium Ecclesiarum*, the complete rehabilitation of the order was made. Since then the Jesuits have continued to spread all over the world.

Among the works of the Jesuits there is none to which they devoted themselves with more zeal or, we may add, with greater success than that of the education of youth. St. Ignatius himself insisted on this and was the first to make education the special ministry of a religious order. The principles to guide the society in its educational work were laid down by Ignatius in the fourth part of the Constitutions. This was, however, only an outline of a system of education. At first the Jesuits adopted the methods of teaching then followed in the various Catholic schools of Europe, drawing chiefly from the traditions of the great University of Paris, the alma mater of St. Ignatius and his first companions, though with due attention also to the developing methods of the humanistic schools of the Netherlands, then justly celebrated. The theory that the Jesuits' method of education was borrowed largely from the "Plan of Studies" of John Sturm of Strassburg is now admitted to be false. From 1540 to 1599 the society was engaged in forming a complete system of studies. Plans were drawn up and put in practice in various colleges, as, e.g., those of Nadal and Ledesma. The practical system thus created was completed under Acquaviva, the fifth general of the society, who ruled during its most brilliant period (1581–1615). In 1584 a committee of six experienced Jesuit teachers of different nationalities drew up a preliminary plan which was tried in all the colleges of the society. The results of this five-year trial were reported to Rome, and the suggestions made were employed in drawing up a modified plan, which was sent to the various colleges in 1591. After this plan had been tested for over five years, the final plan was drawn up and formally issued in 1599. This is the famous *Ratio Studiorum*, which was the fruit of long and patient efforts and the result of the combined wisdom of the whole society. The system is divided into three parts: (1) *studia inferiora*, inferior studies, which consist chiefly of linguistics, the literary study of the classical languages with history, archæology, etc., as collateral branches; (2) arts, or philosophy, consisting of philosophy, mathematics, and the natural sciences as far as they were known and cultivated in those times; (3) theology. In the lower course, that of humanities, there were ordinarily five classes, in some places six. These were called the grammar classes, first, second, and third, then humanities, or poetry and rhetoric. After the restoration of the society at the beginning of the nineteenth century the needs of the times demanded a change in the educational system. Father Roothaan, then general, proceeded with the same care as Acquaviva in securing the opinions of the best educators in various countries. The revised *Ratio Studiorum* was published in 1832. This was not definitive, but was considered subject to such further changes as might prove advisable in the course of time and the progress of education. The principles of the old *Ratio Studiorum* are preserved, but greater attention is recommended to the natural sciences, and special care is to be devoted to the teaching of the mother tongue. The Jesuits have always been markedly successful in the teaching of Latin and Greek. The essence of their method is the prelection or preliminary explanation of a passage by the teacher, followed by the pupil's study of it and then by recitation, which includes grammatic, historic, and other details. Imitative themes are a prominent feature, and, as far as possible, the pupil is brought to a speaking knowledge of the language studied. Frequent repetitions are recommended. The thoroughness of this system is exemplified by their own mastery of the Latin tongue and the lasting knowledge acquired by their students, especially in the classic languages. How well the recommendation to devote more attention to the sciences has been carried out is shown by the fact that such great astronomers of the nineteenth century as De Vico, Perry, and Secchi were Jesuits.

The number of the colleges increased very rapidly. Within 50 years after the papal approbation the Jesuits had colleges all over the

world, not only in Europe, but in the Indies, China, Japan, Mexico, and Brazil. At the time of the death of Acquaviva (1615) the society had 372 colleges. Shortly before the suppression of the society, about the middle of the eighteenth century, there were 728 colleges, many of which had an average attendance of 1500 or more, while in some the number of students was from 2000 to 3000, and no college is mentioned with a lower number than 300. Taking the lowest possible average, the 700 Jesuit colleges must have had about the middle of the eighteenth century 300,000 students. This influence was all the more important as they insisted on moral and religious training. Such Protestant writers as Ranke, Paulsen, Quick, and others candidly admit that the Jesuits during these centuries were the best educators, so that many parents not of the Catholic faith intrusted the education of their sons to them. The spread and development of Jesuit colleges during the nineteenth century was slow but steady. The order had to struggle against great difficulties. The colleges which it possessed before the suppression were in the hands of the civil authorities. The persecutions and expulsions of the society from various countries prevented the establishment of new colleges and put an end to those already in being. Notwithstanding this, in the year 1906 the Jesuits had about 220 colleges throughout the world with more than 55,000 students. There were more than 20 new colleges established from 1900 to 1905, but the Associations Law in France caused the suppression of nearly as many others. In the United States they have colleges at Worcester, Mass., Boston, New York City (Fordham University), Georgetown, D. C., Jersey City, N. J., Washington, D. C., Baltimore, Chicago, Cincinnati, Detroit, Milwaukee, Omaha, St. Louis, St. Mary's, Kans., Galveston, Mobile, New Orleans, Denver, San Francisco, Santa Clara, Cal., Buffalo, Cleveland, Spokane, and Manila, P. I. The Jesuits also have charge of the Apostleship of Prayer, or League of the Sacred Heart (q.v.).

The Jesuit missions are the source of the greatest honor to the order. St. Francis Xavier's (q.v.) work in the Indies recalled the apostolic times. He knew how to organize his many missions, so that his numerous converts became faithful Christians in the best sense. His brethren on the missions imitated his example and almost rivaled his success. Venerable Joseph Anchieta, called the Apostle of Brazil, before the end of the sixteenth century organized missions among the natives of that country into settlements of the kind that in Paraguay, later, were called reductions. The first reduction of Paraguay was founded in 1610. For nearly a century and a half the native converts lived in ideal peace and happiness. These native Christian communities have been the admiration of students of social science ever since. At the beginning of the seventeenth century, after 20 years of patient effort, Father Ricci succeeded in getting audience of the Emperor of China. His skill in applied mathematics and mechanics gained him the favor of the Emperor, and he obtained protection for the Christians in China. Scholarly successors, equally able and zealous, Schall, Verbiest, and Bouvet, continued the good influence over the Emperor. Unfortunately, after a time, the controversy over the Chinese rites took place. Certain practices of their former lives, which, in imitation of the Apostles, the Jesuits allowed their converts still to keep up, seemed to the Dominicans to savor of idolatry. In the midst of the disputes the Imperial favor was lost, and persecutions wiped out the Chinese missions. The Japanese missions were begun in 1549 by St. Francis Xavier, and in 30 years had grown to number 200,000 Christians. Bloody persecutions, continuing for nearly three centuries, made numbers of martyrs; but with a marvelous tenacity, though all their priests had been put to death, the survivors handed down their faith from generation to generation, and when Japan was once more opened to Europeans in the nineteenth century, there were still natives ready to welcome the Catholic missionaries as their long-lost fathers. In India Robert de' Nobili (1605) took up the difficult task of living as a high-caste Brahman, fulfilling rigidly their precepts of abstinence and avoiding all contact with other castes. After years of patience he succeeded in making numerous converts. The careers of Fathers Lallemont, Brebœuf, and Jogues among the Huron and Iroquois Indians were a succession of sufferings and hardships, deliberately undertaken, calmly borne, and heroically persisted in by men of gentle breeding and deep culture. The Jesuit missions were always centres of civilization as well as religion. When the United States government took possession of the Philippines, the Jesuits in charge of the observatory at Manila were asked to collate the information with regard to the archipelago in the possession of members of the order, and this was published in two large volumes with an atlas at the Government Printing Office (*El Archipiélago Filipino*, Washington, 1900). In 1914 the Jesuits numbered 8178 priests, 4400 scholastics, and 4137 lay brothers, making a total of 16,715. There were 28 provinces. The Rev. Francis X. Wernz, a distinguished canonist, the general of the whole society, died in 1914, and on Feb. 11, 1915, Father Wlodimir Ledochowski (q.v.), nephew of the late Cardinal Mieczyslaw Ledochowski, was elected general.

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JESUIT'S BARK. An old name for cinchona (q.v.).

JESUIT STYLE. The name frequently applied to the baroque style of architecture in its ecclesiastical phases. It is marked by pretentious, theatrical decoration, a flagrant misuse of stucco enrichments, recourse to figure sculpture in extreme and sensational attitudes, and a general disregard of restraint and refinement. Its name is due to the great number of Jesuit churches erected in this style during the seventeenth century in Italy and Germany. Its beginnings are seen in the church of the Gesù at Rome (1568), and its culmination in that of Santa Maria della Vittoria, by Maderna, and in many German churches. See BAROQUE.

JES'UP, MORRIS KETCHUM (1830–1908). An American merchant and philanthropist. He was born at Westport, Conn., and was educated there and in New York City. In 1843 he entered the employ of a manufacturing firm at Paterson, N. J. In 1852 he went into business on his own account, from which he retired in 1884. He is best known for his philanthropic work and his interest in scientific exploration. He was one of the organizers of the United States Christian Commission during the Civil War, was one of the founders of the Young Men's Christian Association, and its president in 1872, was president after 1860 of the Five Points House of Industry, of which he was one of the founders, and after 1881 was president of the New York City Mission Society, for which he built the De Witt Memorial Church in Rivington Street. In 1881 he became president of the American Museum of Natural History. To this institution he gave much during his life and at his death left over $1,000,000. He presented Jesup Hall to the Union Theological Seminary, and endowed the Jesup North Pacific Expedition for scientific research. He was chosen president of the New York Chamber of Commerce and was president of the International Congress of Anthropology in 1902. To the subject of Southern education, especially that of the negro, he gave much time and thought. He was treasurer of the Slater Fund at its beginning, and he was also made a member of the Peabody Educational Board and of the General Education Board. In 1905 he was knighted by the Czar for philanthropic work. Consult *Resolutions in Appreciation of Morris Ketchum Jesup*, by Trustees of American Museum of Natural History (New York, 1908), and W. A. Brown, *Morris Ketchum Jesup* (ib., 1910). In 1915 the Metropolitan Museum, New York, received by bequest of Mrs. Jesup a large and valuable collection of paintings.

JESUS, SOCIETY OF. See JESUITS.

JESUS, SON OF SIRACH, sī'răk. See ECCLESIASTICUS.

JESUS, WISDOM OF. See ECCLESIASTICUS.

JESUS CHRIST. In order to appreciate the work of Jesus, it is necessary to understand the political and religious condition of the Jewish people, to whom he belonged and among whom his work was carried out. *Politically.*—The Jews were subjects of the Roman Emperor, the dominion of the Romans having been established by Pompey in 63 B.C. After that time various adjustments of Palestine's relations within the Empire took place, and when Jesus began his public ministry the government of the country was divided as follows: Galilee, with the land to the north, east, and southeast of the Sea of Galilee, was under the rule of Philip and Antipas, sons of Herod the Great, who, as *rex socius*, had had the entire land as his kingdom. Philip's territory was the land north and east of the Sea of Galilee (Ituræa and Trachonitis); the territory of Antipas was Galilee itself and the land southeast of the Sea of Galilee (Peræa). Both regions were ruled as tetrarchies. On the other hand, Judæa, Samaria, and the land of Idumæa, south of Judæa, were more distinctly provinces under the rule of a Roman procurator (Pontius Pilate), who to a certain degree was subordinate to the Governor of the Province

of Syria. This continued to be the political situation throughout the ministry of Jesus. (See HEROD.) *Religiously.*—The Jews had returned from their exile with a new hold upon the monotheism of their religion and a new devotion to Yahwe's law. This spirit had been strengthened by the persecutions which they had undergone under the rule of the Seleucidæ and the revolt by which, under the Maccabees, they had broken from that rule, producing at the time of Jesus' ministry an exaggerated conception of the ceremonial requirements of the Mosaic law, in the interpretation of which had arisen a body of legal refinements that added greatly to the burden of the law and to the power of those who administered it. See MACCABEES; JEWS.

It was a characteristic of Jewish life, however, to combine religion and politics. As a result, there arose in the nation during the time of the Maccabæan revolt, when the religious and political elements in the people's life were brought to accentuation, two great parties, whose significant influence increased as with the religious elements in the national life were mingled with increasing energy the political. These parties were the Pharisees and the Sadducees (qq.v.). The Pharisees (literally *Separatists* or *Purists*) were the party of religion. The characteristic of their creed was the scrupulous observance of the law. They represented the religious idea dominant among the people since the return from Babylon, while, in their devotion to the conception of the theocracy and their expectation of a Messiah who should restore it to its independency, they expressed what in general were the people's political views. They were, in brief, the popular party. The Sadducees (a name derived from Zadok, the priest whom Solomon put in the place of Abiathar, 1 Kings ii. 35) were the party of the priesthood. They represented the priestly nobility, and their object was the retention of priestly power in the state. They were largely indifferent to religion as such, giving their thought rather to politics, in which their aim was to keep in favor with the ruling power.

In addition to these were two minor parties, which more or less added to the politico-religious confusion of the times. Of these parties the political was the party of the Herodians, the religious, the party of the Zealots (qq.v.). The Herodians arose with the introduction into Jewish politics of the family whose name they bore, and were committed to the political interests of that family in its effort to establish a rule in Palestine, the spirit of which would be a union of Judaism and Hellenism. With them the religious element was minimized, if it was present at all, though they did not hesitate to combine with the religious parties when their aims could thus be furthered. The Zealots arose with the recession of the Pharisees from active interest in national affairs. Their principles were those of the Pharisees, only they were ready, as the Pharisees were not, to carry these principles into action to any extent. In this party, consequently, the religious element resulted in a fanaticism which made them the most dangerous factor in the troublous conditions of the times.

Separate from all these parties stood the Essenes (q.v.), who were unique in their absolute removal from all politics and their complete dissociation from the public worship of the temple. They were characterized by the strictness of their community life, their strenuous regard for ceremonial purity, their unselfish practice of the community of goods, and their uprightness of life. Their organization was confined to Palestine, and their main roots were laid in Pharisaic Judaism. Yet they were subject to foreign influences, Oriental rather than Greek, which contributed largely to their isolation among the parties of the land. In fact, they were a sect rather than a party, and as a sect emphasized the idea of an exclusive brotherhood.

Of these parties and sects the people were most influenced by the Pharisees, who best expressed popular ideas, and with whom the people came most vitally in contact, especially through the authoritative channels of the temple, the synagogues, and the schools. In fact, the control of the last two institutions was almost wholly in the hands of the Scribes, who were the expounders and administrators of the law, and who almost exclusively belonged to the Pharisaic party; while in the temple itself their influence and authority was an increasingly important factor. This popular influence of the Pharisees was naturally most felt in Judæa and Jerusalem, where the observance of the national religion was concentrated, and where the religious rulers had their home, but there and elsewhere there were those among the people who, while reverencing the Scribes and following the general line of their directions, still held to a direct fellowship with God in worship and life.

From this survey it is clear that Jesus, while finding a special receptivity among these devout ones of the people, as a religious teacher and worker among the Jews must have come more or less into contact with the sects and parties of the land; that this contact, in proportion as Jesus' position involved opposition to national ideas and customs, must have been one of conflict; and that this conflict, in proportion as the parties combined politics with their religion, must have been one of menace to his work and to his life.

As given in the Gospel history, Jesus' life and work most naturally divides itself into two prominent periods—the *Galilean Period*, which was largely one of construction, centring upon the gathering around himself of a body of disciples; and the *Judæan Period*, which was largely one of instruction, having as its object both the preparation of his disciples for the closing events of his life and the presentation to the Jews of his Messianic claims. Between these two main periods lay the short *Intervening Period* covered by his withdrawal into the regions of northern Galilee; while preceding them was the *Preliminary Period* of his younger years, leading up to his formal induction into his work and his early ministry in Judæa; and following them was the *Culminating Period* of his life, issuing in his betrayal, crucifixion, resurrection, and ascension.

A. **The Preliminary Period.** (*a*) *The Period of his Early Life.*—Jesus was born in the sixth or seventh year before the Christian era, towards the close of the reign of Herod the Great. (See NEW TESTAMENT CHRONOLOGY.) It is quite impossible to read the record of his birth as given in the Gospels of Matthew and Luke without realizing that the circumstances preceding and attending it were of such supernatural character as to mark it as miraculous.

Attempts have been made to show that the sources of the record were legendary; but these are confronted with difficulties which compel the conviction that the narrative is trustworthy. (See GOSPEL, *Nativity.*) His birth occurred in the town of Bethlehem in Judæa, where Joseph and Mary had gone for the purpose of registration in connection with one of the Imperial enrollments customary in the provinces. After Herod's death Jesus' home was in Nazareth until the time of his formal entrance upon his public work. Of these early years practically no information has come to us, the Gospels giving, besides the summary statements of Luke (ii. 40, 52), but one event of that time, his visit to the temple (Luke ii. 41–51), while the extracanonical traditions referring to this period are worthless. (*b*) *Induction into Public Work.*—Though the Gospels do not give the processes of development by which Jesus came finally to the consciousness of his Messiahship and his Messianic work, yet the disclosure which they make of the relations of the disciples to their Master shows that the way by which they came to realize that he was some one greater than a prophet was the way by which he himself came to the consciousness of his unique spiritual relation to God. They saw and he knew that, unlike all others around him, he had no consciousness of sin in himself. Spiritual communion between himself and his Father was uninterrupted and unclouded, and his life was an unimpaired realization of this fellowship. Conviction of this fact doubtless came to him gradually, as knowledge of self and its relations to God generally comes to the soul; but this consciousness must have pressed upon him the question as to what such a fact involved for him in the work and service of life; for such relationship with God could only mean that there was a work for him to do which would measure up to the unique character of the relationship. Otherwise, what was the reason for the relationship and this conviction of a work his Father had ready for his doing? It was with this consciousness of himself that he heard of the message of the Baptist that the Kingdom of God was at hand, and it must have been with the conviction that the establishment of this Kingdom was the work to be committed to him that he came to the Jordan to be baptized, as a public confession of his consecration to this work. At all events, with the baptism in Jordan at the hands of John the Baptist, it is clear that to Jesus' mind his work was formally undertaken, and that he conceived of his work, not as that of a rabbi, nor even as that of a prophet, but as that of the Messiah foreshadowed and promised to the people of God in the Old Testament Scriptures. Following upon his baptism Jesus retired to the neighboring wilderness. There for a season he was subject to an inward struggle with thoughts which this public consecration to his mission most naturally brought to him—a struggle rightfully termed a temptation; for, having consecrated himself to this great work, the question was now before him, in what spirit and by what means and methods he should carry it out. The more exalted one's mission to the world, the more real are the testings of character in its accomplishment. From this period of inward conflict he returned to the scene of his baptism, where he met certain of the Baptist's disciples, to whom he had been pointed out by their teacher. They were Andrew and Simon, his brother, Philip and Nathanael, and, apparently, also John, all of them residents of Galilee. This acquaintance proved to be the beginning of their discipleship, and their discipleship formed the nucleus of all of Jesus' subsequent following. (*c*) *Early Judæan Ministry.*—After a short visit to his home Jesus returned to Judæa to be present at the Feast of the Passover, in the spring of the year (27 A.D.). While there he made a public declaration of his mission of religious reform by driving out of the temple the traders and money changers, who had been gradually permitted by the priests to bring their business within the sacred inclosure.

There was nothing formal about this act. Conscious as he was of his intimate fellowship with his Father and of the deeply spiritual work his Father had given him to do, it was impossible that the commercialized life of the temple should stand before him as anything save a corruption of its worship, whose right to exist he must challenge in this public act. Nor was there anything light-hearted in what he did. He clearly foresaw that the ceremonialism which had made such corruption possible would not accept the spiritual claims with which it was challenged, and that in rejecting these claims he himself would be rejected as making them, and that the rejection of himself would inevitably involve a hostility whose bitterness would have but one fatal end. The experience of the prophets would have justified an ordinary spiritual insight into the religious life of Judaism in coming to such a conclusion, and Jesus' knowledge of the religious forces with which he was confronted was something more than that of an Old Testament seer. At the same time Jesus was not fatalistic in what he did and said on this occasion. His message and mission were to the heart and will of men, and from the beginning to the close of his work he moved with a hope that men would hear the glad tidings of the message he bore them and throw themselves into his mission for the establishment of the Kingdom of God in the world.

But here, in this first act of his ministry, his hope was disappointed. The people felt the power of the conscious authority with which he challenged the corruption of the temple life; they were impressed with the miracles he performed, but they were not brought to any personal commitment of themselves to him—Nicodemus, who, during his stay in the city, sought an interview with him, was a type of this halfway belief in him; so Jesus withdrew from the city and for a while—possibly during the summer and autumn—remained in Judæa, carrying on, with such of his disciples as had accompanied him to the feast or as had attached themselves to him in Jerusalem, a simple work among the people. Upon the imprisonment of the Baptist, however, he withdrew permanently into Galilee, passing through Samaria, in a village of which region, Sychar by name (the modern Askar), he spent a few days in successful work. Coming finally to Galilee, he made Capernaum his home and the centre of his work. Here he called to his more formal following Simon and Andrew and John, who had come to him at the Jordan, and with them James, the brother of John, and in their company he began his stated ministry.

B. **The Galilean Period.** The heart of Jesus'

mission was to awaken men to the fact of the love which God had for them and through such awakening to relate their living in loving obedience to his will. So he announced to them that the Kingdom of God was at hand, and in order to let them see the reality of its presence wrought before them those wonder deeds which to their minds, trained in the Hebrew religion, must have shown in action the divine forces against the evil influences of sin. The casting out of demons, the cleansing of lepers, the raising of the dead—these were not merely proofs of Jesus' power, but evidences of the fact that the forces of the Messianic age were being released upon the world; for demonic possessions were considered as directly due to Satan, while leprosy was a recognized emblem of the corruption of sin, and death was looked upon as its punishment. In showing himself master of these Jesus not simply aroused attention to himself as a prophet in Israel, but as a prophet who had a direct message to the religious life of the people. This message, however, would not have been understood had his miracles been unaccompanied with instruction. As a matter of fact, it was poorly understood even then; but slow to understand it as were the people to whom it was given and even his chosen disciples, we can comprehend how it came that such portions of it as have been preserved to us in the composite address known as the Sermon on the Mount and in the group of parables delivered by the Sea of Galilee are of the character they are. The atmosphere in which the Jew had been religiously trained being that of ceremonial righteousness, it was necessary, from Jesus' point of view, to emphasize the higher character of the righteousness which his religion required, and yet its essential identity with the real righteousness demanded in the law. It was equally necessary to make clear the divisions and separations which such requirements would bring among men, and the judgment involved in such process. The character of this newer righteousness is brought out in the Sermon on the Mount, delivered towards the beginning of his Galilean work. The judicial results involved in it are portrayed to a large extent in the parables which were uttered towards the close of that work.

With this purpose of announcing by deed and word the advent of God's Kingdom in the world, Jesus carried on his work from Capernaum as a centre. His method was to make stated tours of the neighboring towns and villages, heralding the fact that the Kingdom of God was at hand and proclaiming his authority in this announcement by miraculous deeds. Three of these tours are reported in the Synoptics during this period of his Galilean work: (1) Mark i. 35–39, Matt. iv. 23–25, Luke iv. 42–44; (2) Luke viii. 1–3; (3) Mark vi. 6, Matt. ix. 35–38, xi. 1. These tours in Galilee afforded Jesus the opportunity he desired of coming widely in contact with the people of the country and bringing before them his message. With his presence among them in the streets and market places, teaching and working miracles, there could be no ignorance of the fact that a prophet had arisen in Israel and a new message had come to the people from Yahwe. As a result, Jesus secured to himself a large following among the people, who became increasingly enthusiastic as the conviction that he might possibly be the national Messiah grew upon them. As this following increased in numbers, he organized it more formally by the selection of 12 of his disciples to a closer relationship to himself. (See Apostle.) To these he increasingly directed his instruction, with a view to the work he looked forward to their doing as his future representatives. We have a formal exhibition of such instruction in the discourse of Matthew x.

But the religious conceptions of the people had been dulled by ceremonial formalism and hardened by political misfortunes; it was inevitable, therefore, that such a teacher and worker as Jesus would not find acceptance with their religious leaders, in whom this condition was most realized, nor with that portion of them most under the influence and control of these leaders. For this reason Jesus had selected Galilee as the place for his constructive work. The people of the north were less ecclesiastical and more receptive to such a message as he had to deliver and such a mission as he had to perform. While, as the Messiah, he must give his message finally to the religious centre of the land, and while the desire of winning that centre to the Kingdom of God must have been great in proportion as the centre held in itself the people's future, yet it was clear that such winning of men to the Kingdom was more probable in Galilee than in Jerusalem and Judæa. On this principle he had done his work and spent his time in the northern portion of the country. At the same time the fact of hostility to Jesus among the Jerusalem leaders not only early manifested itself in that city, but, as their representatives from time to time went into Galilee and came in contact with Jesus' work, it showed itself even there. Indeed, all the political parties were opposed to him and came gradually to combine in persecution of him. The offense which united them was the spiritual character of his mission; though, under the leadership of the Pharisees, the main point of attack, both in Jerusalem and in Galilee, was the free and independent attitude Jesus maintained towards the ceremonial regulations of the law, particularly those which gathered around the observance of the Sabbath.

As his popularity with the multitudes increased, it took upon itself more and more a political character, until, after the feeding of the 5000, the enthusiasm of the people led them to a public effort to force Jesus as the nation's Messiah into a political revolution against Rome. It was clear that the Master could meet this crisis in only one way. He must present to the people in a way they could not misunderstand the essential opposition of his mission to their political hopes. This was the motive of the profoundly spiritual discourse on the Bread of Life (John vi), which was delivered in the synagogue at Capernaum shortly after this feeding of the multitude. But so steeped were the people in their nationalism that its only effect was a confusing of their false views of Jesus and a benumbing of their superficial devotion to his cause. In fact, it broke his influence with them and practically ended his work in Galilee.

C. **The Intervening Period.** With his work in Galilee brought thus to an end, it was natural that his thoughts should turn to Jerusalem. If the political hopes and passions of the common people had turned them against the spiritual character of his mission, then there was nothing further for him to accomplish among them, and

there remained only the religious centre of the people's life to which he could appeal. His hope that the covenant people would hear him and return to fellowship with God had been again unfulfilled, but it was not to be abandoned until he had delivered his message to the holy city, the heart of the nation's religious life. With this hope he goes up to Jerusalem soon after the Passover referred to in John vi, which, inasmuch as it came at or near this crisis of his Galilean work, he did not attend. He makes the occasion of his visit the unnamed feast mentioned in John v. 1*—most likely the Pentecost following the Passover of chapter vi—and while at the feast performs a notable miracle and in connection with it delivers a searching discourse. But again his hope of the people's receptivity to his message and their acceptance of his mission is disappointed, and he sees instead a hostility develop which is consummated in a determination to put him to death.

Confronted with such a situation, he must leave the city. He must leave it, however, not to return to his Galilean work, for that now was over, but to go into the unjewish regions north and east of Galilee, where organized work could be laid aside and the time given to the thought which must now be pressing upon him as he sees clearly the coming of the long-foreshadowed closing of his life, and the opportunity embraced of bringing his disciples to such an understanding of the spiritual character of his Messiahship as would carry them through the tragedy of his death and send them out to herald his message of God's love and God's claims to the uttermost parts of the world.

So understood, this time spent in the region of Tyre and Sidon and in the Decapolis is an essential part of Jesus' preparation for his closing ministry in Jerusalem and not another ministry among unjewish folk, undertaken as a judgment upon the unreceptivity of the people of his own land. The public work he does is desultory and in a manner forced upon him, for he could not be hid; but the moving purpose of his retirement, apart from meditation upon the coming crisis in his own life, was the instruction of the disciples in the spiritual character of his Messianic work. That this is so is clear from the disciples' confession of his Messiahship with which this period was closed, the exultant approval with which this confession was received on the Master's part, and the statement that from this time on he began to disclose to the disciple band the inevitable catastrophe which awaited the further progress of his work (Matt. xvi. 13–28 and parallels). The falling away from him which had been occasioned by his recent discourse in Capernaum had depressed them, especially as they came to realize its positive and permanent character. On the other hand, they themselves shared the popular conceptions of the promised Messianic age as an age which would be national as well as religious (see Acts i. 6), so that to their minds the ultimate issue of the Master's mission could not possibly involve his death. They were thus disposed to resent such an outlook on his part. But Jesus was clearly conscious that it must be met at last in Jerusalem. His final return to Galilee from the north consequently was not to resume there his work among the people, but to pass through that region on his last journey to Jerusalem.

D. **Judæan Period.** This journey brought him to the city at the Feast of Tabernacles (28 A.D.), not, however, as an attendant upon the feast, but apart from it, arriving after the feast had begun, apparently in order to avoid as far as possible the ceremonial atmosphere, while taking advantage of the presence of the people to get his message to them as a spiritual reality in and of itself. He found the people full of discussion about him, wondering why he had not come up to the feast, and largely divided in their opinions regarding him. To their confusion of mind, he spoke unhesitatingly, criticizing the unbelief which underlay it, and asserted with full frankness of claim his own divine authority. But whatever hope he may have had that these claims would be accepted, the only outcome of his discourse—apart from a passing arousal of a wavering attraction towards him—was such embitterment of feeling against him that his life was endangered and he withdrew from the city. Shortly before the Feast of Dedication, however, he returned, throwing the people anew into discussion and division by a significant miracle upon a man born blind and by further discourses. But these things resulted simply in another threatening of his life, which again compelled him to leave the city. This withdrawal was of longer duration and for the greater part spent at a distance from the city. It was mostly occupied with an instruction of the disciples and the multitudes, having in view the approaching crisis of his work and life. Miracles, however, were performed—among them the remarkable one at the grave of Lazarus, the result of which in its impression upon the people was so compelling as to crystallize the enmity against him among the authorities into a definite determination to put him to death.

E. **Closing Period.** On the approach of the Passover (29 A.D.) Jesus returned for the last time towards the city, reaching Bethany six days before the event. On the Sunday of Passover week, in the midst of a large concourse of people, attracted to him from among the pilgrims to the feast, he entered the city with a publicity of popular enthusiasm superficial as that in Galilee had been, and yet impressive enough to arouse to renewed bitterness the enmity of both Sadducees and Pharisees. During the rest of that day, as well as on Monday and Tuesday, he remained in the city, withdrawing to Bethany for the night, where he also spent in retirement the whole of Wednesday and most of Thursday. These days in the city were given to an unrestrained presentation of his Messianic claims that brought him into open conflict with Pharisees, Sadducees, and Herodians together. So came to final issue the hostile purpose of his enemies. This issue was reached on the night of Thursday. On that night Jesus ate with his disciples a meal, in connection with which he referred to his approaching death clearly and distinctly as a sacrifice for sin. (See GOSPEL, *Lord's Supper.*) Leaving the house where the supper had been eaten, the Master goes out with his disciples across the Kidron to an olive orchard which had been transformed into a private garden, where with the three disciples with

*A careful study of the events narrated in the Fourth Gospel shows several displacements of the original sequence, the most obvious of which is that of the fifth chapter, which should follow and not precede the sixth. Consult Lewis, *Disarrangements in the Fourth Gospel.* See also JOHN, GOSPEL OF.

whom he had been most intimate he retires for prayer. Facing as he did the nearness of a murderous death, it was but natural that there should have been agony in this prayer; but, with our understanding of Jesus' consciousness of himself and his mission, this could not have been the mere fear of physical dissolution, even with all the certainty of violence which surrounded it, but rather the realizing sense of its significance as the answer of sin to the love of God. That, in obedience to the Father's command, he must let this take its course and through the perfidy of one of his own disciples realize itself—this was the cup which he prayed if possible might not be pressed to his lips. While in this garden, he was apprehended by a band from the chief priests and Pharisees. This band was under the lead of Judas Iscariot, one of the Twelve, who had betrayed him to the authorities. Upon his arrest he was taken before Annas, an ex-high priest, by whom he was examined. He was then led before a hastily gathered meeting of the Sanhedrin, where such process of trial as might be called by that name was gone through with, at the close of which he was subjected to a personal examination by Caiaphas, the high priest. In this examination Jesus is challenged to confess to his Messianic claims. Though he had been silent against all the fabricated charges of the trial, against this challenge—fundamental and essential as it was —he could not hold his peace, and his admission of the claims is his condemnation by the council. As the morning dawned, Jesus is bound as a prisoner and led away to the Governor, Pontius Pilate, with charges which provoked discussion between Pilate and the leaders and induced Pilate to question Jesus as to himself and the charges brought against him. From this questioning Pilate was convinced of Jesus' innocence and resorted to various expedients to save him from the hatred of the rulers. This, however, was a difficult task; for the rulers had gathered to their aid and support the populace, who, disappointed at Jesus' failure to realize their political hopes, had turned revengefully against him and, with the chief priests and elders, were insistent on his death. Finally, through a shrewd presentation of the case as one involving his political attitude to the Emperor, Pilate was induced to yield and give Jesus over for crucifixion. This final act in the great drama of this wonderful life was carried out at a place outside the city, named by the Fourth Evangelist Golgotha (John xix. 17). Its location is impossible of certain identification; but it was evidently an eminence easily in sight of the passing public, in fact prominent enough to be visible from afar. Here Jesus was crucified between two outlaws. Around the crosses were gathered a riotous mob of people and religious officials from the city, a few of the more loyal disciples, and the Roman guard, who watched the agony of the hours till death mercifully intervened. Upon them all the tragedy of this scene wrought a deep impression. Those whose enmity to Jesus had brought the deed about doubtless had not conscience enough to suffer remorse; certain it is that to the Master's disciples it marked the end of all their hopes. On the evening of the day the body was taken by Jesus' friends from the cross, through Pilate's permission, and hastily laid in a sepulchre near at hand. On the first day of the week which followed certain of the women disciples, going to the tomb for the purpose of completing the burial, found that the stone had been rolled away and the sepulchre itself was empty. Later on that day Jesus himself appeared to the women, and then to other of the disciples in various places and to varying numbers, and these appearances were repeated at intervals during 40 days. There was no doubt in the minds of the disciples to whom these appearances came that they had had intercourse again with the Master whom they had known and followed during his ministry in Galilee and Judæa. In fact, it was upon this conviction alone that they recovered from the hopeless despondency into which his death had thrown them, and it was upon their positive testimony of this personal intercourse with their resurrected Master that the Christian community in Jerusalem was later established and the Christian Church throughout these ages has lived and wrought its mission in the world. During this post-resurrection period Jesus gave himself to interpreting to his disciples the meaning of his death in the light of the Old Testament Scriptures, and to further instructing them in "the things pertaining to the kingdom of God" (Acts i. 3), and at some time within this period he laid upon them the specific commission to go out into all the world as his representatives and bring men into his discipleship (Matt. xxvii. 18–20). Finally, in a company of the disciples whom he had led out from the city to Bethany, he was taken from them into heaven. (See GOSPEL, *Resurrection.*) From Bethany the disciples, returning to Jerusalem, waited until the day of Pentecost, when, under manifestations of special inspiration from heaven, they began their work of the proclamation of Jesus' religion to the world.

It is not possible in the compass of a brief article, if indeed it is necessary, to estimate the character of a personality unique in human history as was this. Varying as are the opinions which have gathered around his life and work, his advent into the world has set in motion a reformation of its thought and living which has not only continued in its development throughout these centuries but is in a more vital realization of itself to-day than it has ever been. And the significant thing about the power of this movement is that it comes, not from the impression created by the wonder deeds which he performed, which, after all, were not so many, nor from the influence wrought by the peculiar teachings which he uttered, which, taken all in all, were not so extensive, but from the influence and the impression of himself. It was this that from the first laid hold of his disciples and in the dark hour of his death would not leave their minds. It was this fact of the experience of Christ that made the fact of his life among them so significant and has convinced the centuries that have followed that this personality is not the creature of a literary imagination nor even of a pious sentiment, but a divine event in the human history of the world.

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JESUS CHRIST IN ART. The representations of Jesus Christ are the most important part of Christian iconography (q.v.). In the early period art did not try to embody God the Father or the Holy Ghost in any human form—the former, if attempted at all, was symbolized by a hand appearing out of a cloud; the latter, by the form of a dove. Even in the acts of creation and in the Old Testament events embodying relations between God and man, it is always the Son who is represented by the artist. The early Church possessed no authentic portraits of Jesus. During the first three centuries the traditional opinion was that he was unsightly in appearance, according to the familiar passage, "He hath no form nor comeliness . . . there is no beauty that we should desire him" (Isa. liii. 2). In the early fourth century Eusebius, in the well-known reply to a letter from the Emperor Constantine's sister, who desired a portrait of Christ, stated that no such portraits existed. Not until the eighth century does one of the fathers, John of Damascus, venture to describe Christ's personal appearance, and yet even during the early centuries there were various theories on the subject. Broadly speaking, there were two schools: one, chiefly the African church, maintained that Jesus was ugly, in order to proclaim the triumph of mind over matter, of internal over external beauty, and out of hatred for the Hellenic pagan worship of the beautiful; the other, mainly the Greek fathers, refused to see in him anything but perfection. The Latin church did not intervene forcibly on either side. At all events, the early Church was hostile to any but symbolic representations of the Redeemer, and during the first three centuries his portraiture in art was carefully avoided.

Early and Middle Ages. In early Latin art, represented in the catacomb frescoes (second to fourth centuries) and sculptured sarcophagi (third and fourth), he is a youth, beardless, with long curly hair—so young that by no possibility could it be supposed to be the portrait of a man of 30. Artists evidently wished to avoid being accused of attempting any such thing. But before the close of the fourth century St. Augustine speaks of the different types of portraits of Christ which artists were then attempting. Of these types one survived all others and with modifications was handed down to the Renaissance. It was purely conventional, and only later writers sought to base it upon early tradition, such as the description in the spurious "Letter of Lentulus," and the acheiropoetic images, or miraculous portraits, like the handkerchief of Veronica. This type had an oblong oval face, with broad smooth forehead, straight slender nose, arched brows, hair parted in the middle and falling in long ringlets over the shoulders, a full beard of moderate length, and an expression grave but sweet. This bearded, poetic, and intellectual type originated with Greek Christian art and was brought by it to Italy. Some examples of it appear in the catacombs; imperfectly in the sarcophagi (a fine example in the Lateran Museum); better in the frescoes (at St. Calixtus and St. Pontianus); coarsely at Santa Costanza; more refined in the mosaics of Santa Pudentiana (c.400), Rome, and Sant' Apollinare Nuovo (c.500–550), Ravenna. It is primarily intended to represent the Christ triumphant, transfigured, or in heaven, not the Christ of the earthly miracles. The beardless type became entirely obsolete before the close of the fifth century. Christ was represented bearded and somewhat older, whether on earth or in heaven. In turn, this type was replaced by a third, usually called the Byzantine, because it is the prevailing one in surviving Byzantine churches. It represents the Redeemer as aged, with elongated face, long beard, deep-set eyes, and an expression of lifelessness. The transition to this type appears at the end of the fourth century in the mosaics of St. Paul Without the Walls, and in the fifth century in Sant' Apollinare in Classe Fuori, Ravenna. It dominated the art of the Christian world until the advent of the Gothic period in northern Europe and the beginnings of the Renaissance in Italy. Mention should be made of late nineteenth-century efforts to trace the origin of these Christ types to certain ancient gods: the youthful, beardless type to Apollo, the Good Shepherd type to Dionysus, and the later bearded type to Æsculapius or Jupiter Serapis. The proof advanced for these theories, however, is not sufficient to establish their probability. The changes in the Christ type from the earlier youthful to the later ascetic ideal were more likely conditioned by the increased emphasis upon the dogma of the deity of Christ and the corresponding change in the ideals of the times.

During the second century almost the only way of presenting him in the catacomb frescoes was as the Good Shepherd, either carrying a lamb on his shoulders or in the midst of the sheep; then, in the third century, came the first use of the scene of the Adoration of the Magi, and perhaps even earlier the Baptism, the Samaritan woman at the well, and the Resurrection of Lazarus—subjects used as symbols and not as episodes. The commonest method was to present Christ under symbols that only the faithful would recognize—as the Lamb, the Fish, the Vine, as Orpheus charming with his music. With the triumph of Christianity (312) a new stage opened, in which on the one hand the art of the catacombs is continued in the sculptured sarcophagi, and on the other the monumental art of the basilicas strikes a new note in representations of Christ. Such episodes of the life of Christ as would be suitable were carved on the sarcophagi, but as yet no complete historic series of these episodes were attempted. Christ triumphant was enthroned in the apses of the new churches; enthroned or seated on a globe or standing among the Twelve Apostles, teaching them and giving Paul and Peter authority to preach and govern. The scene is in the heavenly Jerusalem, and from beneath his feet flow the four rivers of Paradise. The spiritualizing of the scenes continued up to the fifth century—the mosaics of Santa Costanza (c.330), Santa Pudentiana (c.400), Santa Maria Maggiore (c.436), and St. Paul (c.450), all in Rome, show how the visions of St. John acquired more and more influence, until the culmination is reached in the 24 elders casting their crowns before a radiant bust of Christ in a medallion, with the four living creatures on either side. While this spiritual element was being developed, art was beginning to construct, also under Greek influence, a complete series of pictures of the life of Christ, in three main groups: (*a*) Infancy, (*b*) Miracles, (*c*) Passion; beginning with (1) the Annunciation, (2) Adoration of the Magi, (3) Massacre of the Innocents, (4) Presentation in the Temple, (5) Flight into Egypt, etc. The collection of sarcophagi in the Lateran Museum in Rome gives the best series of subjects illustrating the miracles—the wooden doors of Santa Sabina (fifth century) and the mosaics of Sant' Apollinare, Ravenna, the most detailed series of the Passion scenes, which were still without any element of suffering. Christ even here was the triumphant King. In the Santa Sabina reliefs is the first known portrayal of the Crucifixion. The Sant' Apollinare series of c.500 admirably illustrate their transitional age. In the 13 scenes from the miracles Christ is the beardless youth of the Christian sarcophagi (fourth century); in the 13 scenes from the Passion he has the later, more majestic, bearded type of the heavenly and triumphant Christ. The favorite scene in the apse of the basilicas is Christ on a throne or a globe, his head surrounded by a nimbus, holding a book in his left hand and blessing with his right, accompanied by angels and saints, who replace the apostles of the fourth century, except occasionally, though Peter and Paul are often retained. Sometimes—as at St. John Lateran, St. Paul, and San Venanzio—only a bust of Christ appears in the clouds. Until the ninth century the popularity of the Apocalypse and the scenes from the heavenly Jerusalem caused the lamb to be retained as an emblem of Christ, even after a council of the Church had forbidden such pictures. The period from c.500 to 800, therefore, while it witnesses the creation of a positively individual type of Christ and gives artists the liberty of portraying all the events of his life—even those of the Passion—lays but little stress on the humanity and the sufferings, much on the divinity and triumph, of Christ. The Carlovingian age (800–1000) inaugurated the idea of the terror-striking Christ. The Apocalyptic scenes were partly replaced by realistic Last Judgments. The story of the painter missionary Methodius terrifying the Bulgarians into conversion by such a painting is typical. At the beginning of the period it is not universally so—witness the beautiful mosaics of Santa Prassede in Rome. The type of Christ, also, still breathes majestic sweetness and calm. Byzantine art probably invented at this time some of its most beautiful types of Christ, handed down since by tradition—Christ winged as the Angel of the Divine Will, or as the High Priest. The illuminated manuscripts of this period, both Byzantine and Carlovingian, give the most varied material for study. A favorite new composition is Christ crowning the Emperor (or Empress) of the East or West. In the eleventh and twelfth centuries Christ becomes more and more the severe Judge, with whom the Virgin and John the Baptist act as intercessors, though he is still surrounded by the four cherubim Evangelists, the Twelve Apostles, and sometimes the 24 elders. But he no longer appears seated on a globe or a throne with a few saints in the celestial sphere—he is almost always brought into immediate contact with human affairs. The frescoes of Ferentillo, San Tommaso in Formis, San Pietro in Grado, in Pisa, the mosaics of Torcello, and innumerable other works of the eleventh and twelfth centuries show the increasing emphasis upon the severe side of Christ's character and the theological and dogmatic tendency. The growing asceticism of the type of Christ is shown also in Byzantine art, which, however, retains much beauty and serenity, which it does not lose until the twelfth century. The mosaics of San Marco in Venice, of the cathedral of Cefalù, of Monreale, and the Capella Palatina in Palermo are among the most important series of scenes and types of Christ. The Byzantine conception, as expressed in the Greek *Guide to Painting*, edited and translated by Didron and Durand, should be read in the presence of such mediæval works, to show how traditional and carefully taught were all representations of the Saviour, as to type, age, garments, color, attitude, grouping with other figures, etc.

The devotional idealism and realism of the thirteenth and fourteenth centuries dispute the field with the power to recreate a spiritual type of Christ. In Italy the tendency was to give prominence to the sufferings of Christ. This is painfully evident in those Crucifixions of the Berlinghieri, of Margaritone, Cavallini, Giovanni Pisano, and other painters and sculptors. The emaciated and distorted body, the drawn face, the gaping wounds, are intended to excite a sentimental piety. French Gothic art was more sedate. The Christ carved for the cathedrals was the divine Teacher. The statue of the Beau Christ of Amiens is typical of a large class, to be met with in Chartres, Rheims, Paris, and elsewhere. Comparing the art of the West, both in its works and in such literary treatises as

that of Durand (*Rationale Divinorum Officiorum*), it is evident that the West is comparatively narrow in its range of representations, and that it lays increasing emphasis on the psychological, even the pathological, side of Christ's life—a side very lightly touched upon in the East. At the same time representations of the three persons of the Trinity became common in the West for the first time, often strangely imagined. For the first time, also, the scene of the Virgin and Child is often repeated. Not that it was entirely unknown in earlier times, but its sudden popularity accords with the humanitarian and psychological period. At the close of the Middle Ages we are confronted by two important factors: first, the death of the Christian (Byzantine) art of the East, which removes what was at that time the most original and spiritual element in representations of Christ; second, the revival of painting under Giotto and his successors. Both of these factors had an important bearing on the later development.

Renaissance and Modern Types. During the Renaissance painting became the favorite means of depicting the Christ type—rather than sculpture, which is concerned chiefly with the human body, or mosaics, the chief value of which is decorative. With a marvelous union of wholesome naturalism and classic idealism the Italian painters of this period established an ideal type of Jesus and left representations of his life which became the models of future painting and still dominate our conceptions of the subject. Every significant phase of his existence on earth and in heaven, from the "Annunciation" (q.v.) to the "Last Judgment," was portrayed with loving care and skill. Most frequent of all was the representation of the infant Jesus with his mother; this subject, usually termed "The Madonna," will be found treated under that heading. Among the scenes of his life represented, the following are treated in special articles of this ENCYCLOPÆDIA: "The Nativity," usually combined with "The Adoration of the Shepherds"; "The Adoration of the Magi"; "The Massacre of the Innocents"; "The Flight into Egypt"; "The Marriage of Cana"; "The Last Supper"; "Ecce Homo"; "The Crucifixion"; "The Bewailing of Christ," usually called "The Pietà" (q.v.); "The Resurrection"; "Christ's Appearance to the Magdalen," usually called "Noli me Tangere" (q.v.); "The Supper at Emmaus"; "The Last Judgment."

During the late thirteenth and the fourteenth century, although the grandiose, mediæval type of Christ still prevailed, there was increasing freedom in depicting his life. The Sienese, chief of whom was Duccio, clung to the Byzantine ideal, with an increasing tendency to soften the type, while the Florentines, at whose head stands Giotto, cherished a less conventional and more virile ideal. The union of these two tendencies promoted the type of the mild and suffering Christ, which reached its culmination in the paintings of Fra Angelico. During the fifteenth century the Florentines, from Masaccio on, depicted the strong and virile type, and this was the ideal of the Realists, some of whom, like Andrea del Castagno, represented Christ as little more than a peasant. The Umbrians, on the other hand, continued the Sienese tradition of the mild and suffering Redeemer, as may best be seen in the works of Perugino. Practically every important painter of the Italian Renaissance endeavored to realize the Christ type and depicted scenes from his life. The Christ ideal of the Renaissance was perhaps most perfectly realized by Leonardo in "The Last Supper," by Titian in his "Tribute Money" and other masterpieces, and by Raphael in such paintings as "The Transfiguration" and the cartoons for the Sistine tapestries. Following the ascetic tendencies of the Counter Reformation, Italian painting of the seventeenth century emphasized the suffering Christ, as may especially be seen in the many "Ecce Homo's" by Guido Reni and others.

The portrayal of Jesus and his life was a theme of no less importance in northern painting. In Flanders during the fifteenth century Jan van Eyck established a type which greatly influenced the painting of the succeeding epoch, and such masters as Rogier van der Weyden, Dirck Bouts, and Hans Memling represented scenes of his life with power and pathos. The type culminated in the beautiful and serene Christ of Gerard David. The subject was a favorite one with Quenten Metsys, whose "Ecce Homo's" are well known. Among German painters of the Renaissance Dürer deserves special mention for the powerful yet serene Christ type which he so often painted and engraved. Among the Flemings of the eighteenth century Rubens stands preëminent for his powerful representations, while Van Dyck's Christ type is more refined. Among the Dutch and, indeed, among the painters of all times, Rembrandt stands unrivaled in his presentation of the human side of Christ's nature, particularly in its pathetic phases.

The Spanish school depicted especially Christ's suffering and developed a type in which realism was combined with ascetism and solemnity. The Christ types of El Greco, Vicente Juanes, and Murillo are probably the finest of the school. During the eighteenth century all religious subjects lost their former importance in painting, and even the nineteenth century produced little worthy of comparison with the great works of the past. Mention should be made of the pure Greek conception embodied in Thorvaldsen's marbles. In painting the sincerest work has been done by the Germans and English. Early in the century the German Nazarenes (q.v.) revived religious painting with more piety than artistic ability. At the middle of the century the Pre-Raphaelites, especially Holman Hunt and Burne-Jones, painted the life of the Redeemer with much reverence and infinite detail. In the late nineteenth century Eduard van Gebhardt painted scenes from his life with great power and originality, and Gebhardt's work was continued, with deep pathos, by Fritz von Uhde, who depicts Jesus surrounded by the people of the present day. Far better known in Germany and elsewhere are the paintings of Joseph Hoffmann, but this is due to pleasing illustrative qualities rather than to depth of sentiment or real artistic merit. In France many of the great painters, like Flandrin and Delacroix, represented scenes of Jesus' life, but their paintings are more important from the artistic than from the religious standpoint. But during recent times a few French painters, foremost among whom are Dagnan-Bouveret and L'Hermitte, have painted canvases of profound artistic and religious significance. Mention should also be made of the well-known aquarelles and illustrations of James Tissot, who with infinite care and patience has

depicted Christ and the holy personages as types of present-day Jews of Palestine.

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JESUS COLLEGE, Cambridge. A college of Cambridge University. It was founded in 1496 by John Alcock, Bishop of Ely, on the site, and in part with the property, of the nunnery of Sts. Mary and Rhadegunde, which dated from 1133 and had become bankrupt in revenues, reputation, and numbers. The buildings of the college, which date from the twelfth to the nineteenth century, are among the most attractive in Cambridge, comprising as they do the old nunnery buildings and church, as well as the later collegiate additions. The almost monastic seclusion of the college and its quiet charm well warrant to-day the title bestowed on it by James I, *Musarum Cantabrigiensium Museum*, the house of the Cambridge muses. The college consisted, in 1913–14, of a master, 12 fellows, and 30 scholars, with college officials and some 212 undergraduates. It presents to 16 livings. Among the worthies of Jesus College are Archbishops Cranmer, Bancroft, and Sterne, Bishops Pearson, Fox, and Fisher, John Strype, John Bale, Laurence Sterne, and S. T. Coleridge. Consult A. Gray, *Jesus College, Cambridge* (London, 1902). See Cambridge, University of.

JESUS COLLEGE, Oxford. A college of Oxford University. It was the first college founded after the Reformation and owes its establishment to Dr. Hugh ap Rice, or Price, who in 1571 was granted a charter for its foundation by Queen Elizabeth. Later the Queen added a gift of part of the land on which the college now stands and timber from the royal forests and took the title of founder. The college was intended for Welsh students, who still form the largest part of its membership, and it has always been closely associated with Wales and the Welsh marches. The earls of Pembroke are its hereditary visitors. The college developed greatly in the seventeenth century by the benefactions and influence of two of its masters. The first of these, Sir Eubule Thellwall, obtained a new charter from James I, added in 1621 to the buildings, and doubled the endowment. The second was the distinguished diplomat Sir Leoline Jenkins, who became master of the college in 1661 and added greatly to its resources by bequest in 1685. Its buildings, chiefly of the sixteenth and seventeenth centuries, have been restored since 1850 and are now very attractive. The library is rich in scarce books and manuscripts, particularly those connected with the history and literature of Wales. In 1913–14 the college consisted of a master, 10 fellows, 34 scholars, and 186 undergraduates. See Oxford University. Consult E. G. Hardy, *Jesus College, Oxford* (London, 1899).

JET (OF. *jet, jaet, jayet, gayet*, Fr. *jayet, jais*, from Lat. *gagates*, Gk. γαγάτης, *gagatēs*, jet, from Γάγης, *Gagēs*, Γάγαι, *Gagai*, a town and river of Lycia in Asia Minor, where the mineral abounded). A black variety of bituminous coal that is easily cut and carved and takes a high polish. It occurs at various places in Bavaria, Bohemia; Aude, France; Germany; near Villaviciosa, Spain; also in the Tertiary clays along the coast of Yorkshire, England, especially at Whitby, where it is found mixed with fragments of bituminized wood of coniferous trees in the upper lias or alum shale of that district. Owing to the high polish that it takes, it is extensively used as material for dress trimmings and mourning jewelry. Among the Greeks it was considered a remedy for toothache when powdered and mixed with wine, and was applied, with beeswax, to tumors. Popular belief attributed to it a power of revealing faithlessness. See Lignite.

JETSAM, jĕt'sam (corrupted form of *jetson, jettison*). Goods which go down with the ship on which they are carried, or which are cast overboard from a vessel in peril of storm or capture and then sink and do not come to the surface. Such goods do not come under the description of "wreck," which, by a rule of the common law, under certain conditions, was forfeited to the crown, but continues subject to recovery by the owner. See Flotsam; Derelict; Jettison; Wreck.

JETTÉ, zhĕ'tā', Sir Louis Amable (1836–1920). A Canadian jurist and statesman. He was born at L'Assomption, Province of Quebec, and was educated at L'Assomption College. He studied law, was called to the Quebec bar in 1857, and practiced his profession in Montreal. He also contributed to the political press and became editor of *L'Ordre* (Montreal). His connection with several noted legal cases gained him prominence, and he decided to enter politics. In 1872–78 he was a Liberal member of the House of Commons for Montreal East. In the latter year he also became professor of civil law in Laval University and later was appointed dean of the law faculty. From 1878 to 1898 he was a puisne judge of the Superior Court of Quebec and for the next 10 years Lieutenant Governor of Quebec. In 1903 he was one of the two Canadian members of the Alaska Boundary Tribunal in London (see Alaska, *Boundary Dispute*), and in his decision dissented from the majority. In 1901 he was knighted (K.C.M.G.). In 1909 he was appointed Chief Justice of the Court of King's Bench (P. Q.), and in the same year was made Commander of the French Legion of Honor. He was one of the commissioners for the revision of the Civil Code of Quebec and published *Observations relatives au code de procédure civil* (1888).

JET'TING. See PILE; FOUNDATION.

JET'TISON (OF. *getaison, gettaison,* from Lat. *jactatio,* a throwing, from *jactare,* frequentative of *jacere,* to throw). In maritime law, the throwing overboard of a ship's cargo, either in whole or in part, in cases of necessity, so as to lighten the vessel in a storm, or to prevent capture by pirates or the public enemy, or for other justifiable cause. The power to jettison a cargo is lodged by the law in every master of a ship while upon the high seas and in extremity of danger. The loss sustained by the sacrifice does not fall upon the master or upon the owners of the vessel, but primarily upon the owner of the cargo. But as he is sacrificed for the general good, he is entitled by the doctrine of general average to a pro rata contribution from the several persons interested in the ship, freight, and cargo, though there are exceptions to this rule where the goods were carried on deck. When the goods sacrificed by jettison have been insured, the insurer has the benefit of this contribution or average to the extent of his loss. See AVERAGE, IN MARITIME LAW.

JET'TY (OF. *jetee, getee,* Fr. *jetée,* p.p. of OF. *jetter, jeter,* Fr. *jeter,* to throw, from Lat. *jactare,* frequentative of *jacere,* to throw). An embankment or pier extending into a lake or ocean for the purpose of controlling sand drift which would otherwise shoal up a channel or encroach on the shore. In strict parlance such embankments for the latter purpose are called groins or groyns (see SHORE PROTECTION), while jetty is reserved for structures built out from the mouth of a river to deepen the channel over the bars that otherwise would form across the mouth. A jetty is sometimes confused with a breakwater (q.v.). The two may be similar in construction, but the jetty is designed to accelerate a current and thereby cut a deeper channel, whereas a breakwater is merely a protection of a harbor against the severity of the open sea. Quite possibly, however, the same structure may serve both purposes.

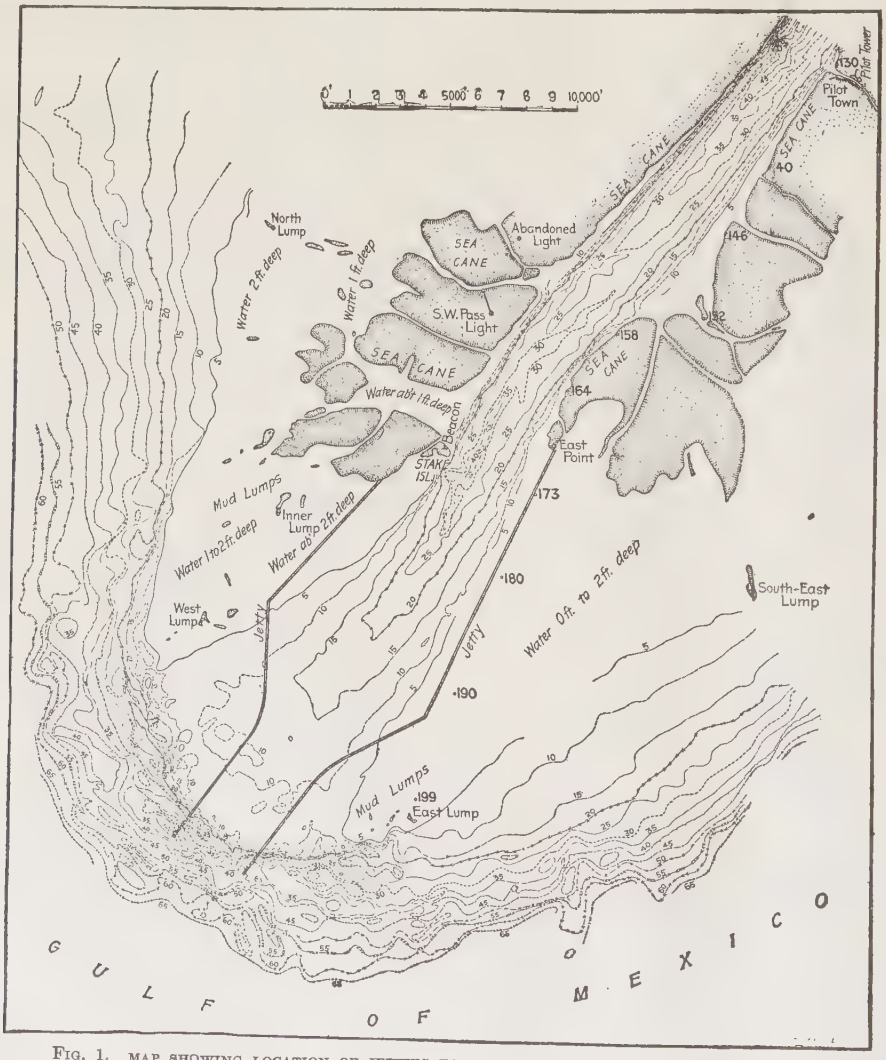

FIG. 1. MAP SHOWING LOCATION OF JETTIES FOR SOUTHWEST PASS OF MISSISSIPPI RIVER.

On an exposed coast there is generally a considerable drift of sand or shingle along the shore, due either to the prevailing wind or to offshore currents. An alluvial river emptying

into the sea will at the same time carry down with it a great quantity of silt and sand which, coming in contact with the littoral drift and the dead water of the open sea, is deposited as a bar which shoals the channel just beyond the mouth and, in extreme cases, forces the river into one or more other outlets. For purposes of navigation it is necessary to cut through this bar to preserve the channel depth. Dredging is often resorted to for this purpose, but the jetty has been found to be one of the most effective methods inasmuch as it is automatic in its action.

Jetties are built generally of large broken stone which is dumped in a self-shaping mound seaward from shore, either from a trestle, a barge, or the already completed jetty. Other materials which are used are timber, earthwork, cut stone, concrete block, and wood mattresses. The structure is similar to a breakwater, and all of the methods of construction described under BREAKWATER apply equally well to jetties.

Twin jetties are two embankments roughly parallel (though often converging towards the outer end) projecting from either side of the nel of some old jetties which may or may not be influencing the scour.

Jetties have been constructed at the mouth of too many rivers to note here, but brief description will be given of the notable and typical examples of the Danube and Rhone in Europe and the Mississippi and Columbia in the United States.

Mississippi Jetties. The most famous jetties in the world are those at the mouths of the Mississippi River, although they were built subsequent to, and partly as a result of the lessons from, those at the Rhone and the Danube. It is well known that the Mississippi River makes its way to the Gulf of Mexico through three great branches or passes. On the extreme left to the east lies Pass à l'Outre, about 14 miles in length to land's end. In the middle lies South Pass, which, before its improvement, was about 12 miles long. On the right, to the west, lies Southwest Pass, about 17 miles to land's end. In 1874, after a very bitter controversy, Congress authorized Capt. James B. Eads to improve the South Pass by the construction of two parallel jetties at his own expense, with the provision

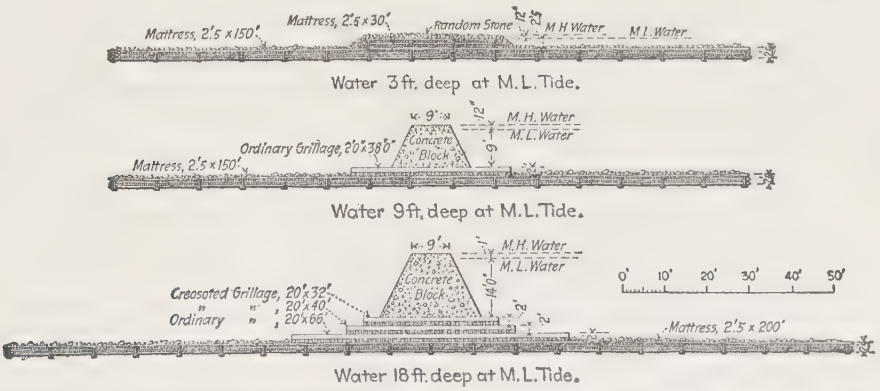

FIG. 2. TYPICAL CROSS SECTIONS OF EAST JETTY FOR SOUTHWESTERN PASS OF MISSISSIPPI RIVER.

river mouth and forming a continuation of the river banks, so that by confining the river its current is concentrated and its force increased sufficiently to scour a channel across the bar and to deposit its drift and sediment out in deep water. At the same time the windward jetty keeps the littoral drift from depositing at the river mouth. The obvious difficulty in the method is that in time the deposit beyond the jetty head may tend to form a new shoal, which for a time can be kept clear by dredging, but which eventually may require a lengthening of the jetties.

Practically all jetty construction is of the twin jetty type, but there have been built single jetties, on the leeward side of the channel, with the idea that the sand drift will drive the channel to the jetty and the latter will hold it in one position, with a consequent improvement in depth. As a rule the theory does not work out in practice. At Aransas Pass, Texas, there has been built a special type of single jetty, called by its inventor a "reaction breakwater," which has a specially curved plan designed to force the paralleling current alongside the jetty, where it can scour out a channel. Its principle is very debatable and its success doubtful in the one example because of the presence in the channel that he was to receive payment therefor when he secured a final permanent depth of 26 feet in the 350-foot channel between the jetties. The east jetty was made 11,800 feet long from land's end to 30 feet of water in the Gulf; the west jetty was 7800 feet long and was built 1000 feet from the east jetty and generally parallel with it. The first work was to drive a row of piles spaced 12 feet apart to mark the inner lines of the two jetties. These piles served to guide the operations of sinking the mattresses and were not intended to give strength to the work.

The jetty structures proper consisted of several layers of willow mattresses, loaded down with stone. The first layer was composed of mattresses 100 feet long and 50 feet wide, and the succeeding layers of mattresses of the same length, but decreasing in width to the top mattress, which was 20 feet wide. Generally four courses or layers of mattresses were sufficient to bring the mattress work to the water surface. Each mattress was composed of four layers of willow brush, which, when compressed, gave it a thickness of about 2 feet. The mattresses were built on launching ways on shore, towed into position behind the guide piles and sunk by loading them with stone. After the mattress work was thoroughly settled, the sea end of each

jetty was surmounted by a capping of concrete blocks. The work was started in June, 1875; by August, 1876, a depth of 20 feet had been secured, by February, 1878, a depth of 22 feet, by July, a depth of 24 feet, and by October, 1878, 30 feet. Captain Eads's theories were thus vindicated, and experience has proved them correct.

In 1899 the United States Army Engineers submitted plans for the construction of jetties at the mouth of the Southwest Pass of the Mississippi River, according to the design shown in the accompanying figures. Construction of the jetties was commenced in December, 1903, and completed January, 1908, at a cost of about $2,627,000. Extension of the east jetty for 3000 feet and of the west jetty for 3750 feet was commenced in 1909 and completed in 1912. The final depth gained by the jetties with the aid of extensive dredging is 35 feet. A résumé of this improvement and of the previous work on the South Pass by William Starling, United States Engineer Corps, was published in *Engineering News* (New York) of Aug. 23 and Oct. 4, 1900. See Mississippi River.

Columbia River Jetty. The Columbia River, ever since its discovery in 1792, has been the chief harbor of the Pacific Northwest, but the shifting character and variable depth of the bar channels have always caused its entrance to be held in terror by mariners and shipowners. To improve these conditions a jetty extending out seaward from the south cape was completed in 1895. Its total length was nearly 4½ miles. It was constructed by sinking mattresses of brush 3 feet thick and 40 feet wide and surmounting them by a mound or ridge of rubble stone. From a low-water depth, generally of 19 feet to 22 feet, in shifting and uncertain channels across the bar, the depth was increased to 30 feet in a single channel. The improvement did not prove permanent, as a gradual shoaling set in, and by 1902 the channel had moved to an unstable location and was only 21 feet in depth. In 1903 a plan was begun of making a 2½-mile addition to the south jetty, a 2½-mile north jetty, and an enlargement of the present section. The south jetty and enlargement were about completed in 1913.

Rhone River Jetty. One of the earliest large jetties was built at the eastern outlet of the Rhone River in 1852–57. Here embankments were built along both sides of the channel, closing off five minor outlets and extending out to within half a mile of the offshore bar, thereby concentrating all of the flow in a single outlet. The improvement in channel depth for a time was marked, but soon the bar formed again beyond the jetty head, owing to the shallow offshore depth, absence of littoral current, heavy sediment, and poor wind conditions. A new canal exit for the river had to be built in 1863–73, but the lessons learned from the structure were put to good use in later structures, notably the Danube jetties.

Danube River Jetties. Shortly after the Rhone improvement, work was started on the jetties at the Sulina or central mouth of the Danube. In 1858–61 twin jetties of rubble on piles and later (1866–71) with concrete block topping were carried through a 9-foot depth over the bar to the 18-foot depth offshore. They were about 4600 feet long and 600 feet apart at their extremities. Completed in 1861, they had by 1872 increased the through channel depth to 20½ feet and later to 24 feet.

Consult: E. H. Corthell, *The Mississippi Jetties* (New York, 1881); L. M. Haupt, "Jetties for Improving Estuaries," in *Journal of Franklin Institute* (Philadelphia, 1888); papers on "Harbors," presented before the International Engineering Congress, St. Louis, 1904, in *Transactions of the American Society of Civil Engineers*, vol. liv, part A (New York, 1905); Perilli, "Jetties of Armored Concrete," in *Report of International Congress on Navigation* (Brussels, 1905); *Engineering News* (New York, 1874–); *Reports of Chief of Engineers, United States Army* (Washington, D. C.).

JEU DE PAUME, zhē de pōm (Fr., tennis), Hall of the. A famous building in Versailles, in which the members of the Third Estate in June, 1789, met after finding the assembly room closed against them. The hall contains a great painting by David depicting the taking of the celebrated oath of the Tennis Court.

JEUNE, Paul Le. See Le Jeune, Paul.

JEUNESSE DORÉE, zhē'nĕs' dō'rā', La (Fr., gilded youth). A name given to a political party in Paris during the French Revolution. The term was first used by contemporaneous historians of the Revolution in 1797 by François Xavier Pagès in his *Histoire secrète de la révolution française* and has been frequently used by later writers on the Revolution, like Mignet, Thiers, Thibaudeau, and Prudhomme. It consisted of young men who, under the leadership of Fréron, endeavored to bring about a counter-revolution after the fall of Robespierre. The party was also nicknamed the *Muscadins* (scented darlings) and *Petits Maîtres* (elegants). The term and its English equivalent, "gilded youths," is commonly applied at present to the idle rich young men about town that are found in every great city. See Incroyables.

JEV'ONS, Frank Byron (1858–). An English educator and religious historian. He was educated at Wadham College, Oxford. In 1882 he joined the faculty of Durham University, where he was tutor in classics until 1910 and also censor of unattached students (1892–96), senior proctor (1896–99), university treasurer (1898–1902), subwarden (1902–09), and principal of Bishop Hatfield's Hall after 1896. In 1910 he was appointed professor of philosophy. He became an alderman of the Durham County Council in 1913. His writings, those treating of religion being especially important, include: *A History of Greek Literature* (3d ed., 1889); *The Prehistoric Antiquities of the Aryan Peoples* (1890); *Plutarch's Roman Questions* (1892); *A Manual of Greek Antiquities* (2d ed., 1895); *An Introduction to the History of Religion* (2d ed., 1896); *Evolution* (1900); *Religion in Evolution* (1906); *Study of Comparative Religion* (1908); *Idea of God in Early Religions* (1910); *Comparative Religion* (1913); *Philosophy: What Is It?* (1914).

JEVONS, William Stanley (1835–82). An English economist, born in Liverpool. He was a grandson of William Roscoe, the eminent historian, educated at University College, London, and made a fellow of his college in 1862. He held a position in the Sydney (Australia) mint (1854–59). In 1866 he received the appointment of professor of logic and mental and moral philosophy, and Cobden lecturer in political economy in Owens College, Manchester; in 1872 he was elected a fellow of the Royal Society, and in 1876 received the honorary degree of LL.D. from the University of Edinburgh.

During the latter year he was appointed professor of political economy in University College, London. Failing health caused him to relinquish his Manchester professorship in 1881. In the following year he was drowned while bathing at Bexhill, Sussex. Few writers of recent years have had a wider influence. His *Treatise on Logic* substitutes for the familiar conceptions a mathematical foundation of the syllogism, which has been widely adopted by later writers. Among theoretical economists he is most widely known by his *Theory of Political Economy*, which develops the theory of final utility which has occupied a conspicuous place in writings of later theorists. He is best known to general readers by his *Investigations in Currency and Finance*, his *Money and the Mechanism of Exchange*, and especially by the *Coal Question*, which at the time of its publication (1865) set all England in a ferment. The thesis of the work was the dependence of England upon coal, the approaching exhaustion of its deposits, and the gradual decline of English preëminence in the industrial world. Jevons had planned to write a systematic treatise on economics, but this work was never finished. The manuscript parts, with a number of essays contributed to periodicals, were published in 1905 under the title of *Principles of Economics*.

JEW'EL. See GEMS; JEWELRY.

JEW, THE WANDERING. See WANDERING JEW, THE.

JEWEL, JOHN (1522–71). A prominent English churchman of the time of Elizabeth. He was born in the Parish of Berimber or Berrynarbor, Devonshire, May 24, 1522. While a student at Oxford, he was led to favor reformed doctrines, and for openly inculcating them he was deprived of a fellowship at Corpus Christi on Mary's accession in 1553. Later he was induced to sign adherence to a form of doctrine essentially Roman Catholic; but he repented of his act and in 1555 fled to Frankfort, where he abjured his recantation. He lived at Strassburg and Zurich until Elizabeth's accession, when he returned to England (1559), was one of eight Protestant divines appointed by the Queen to dispute with a similar number of Roman Catholics, and in 1560 was made Bishop of Salisbury. In 1562 he published his work in defense of the English church, *Apologia Ecclesiæ Anglicanæ*, which was condemned by the Council of Trent. It was translated into English the same year, and by Elizabeth's order a copy was placed in every parish church. Thomas Harding published *An Answer to Doctor Jewel's Challenge* (1564), to which Jewel replied (1565); then Harding published a *Confutation of an Apology* (1566) and was answered by Jewel in a *Defense of the Apology* (1567). He died at Monkton Farleigh, Sept. 23, 1571. His complete works were issued with memoir, by Featley (London, 1609); by Ayre, with memoir, for the Parker Society (4 vols., Cambridge, 1845–50); and by Jelf (8 vols., Oxford, 1848). Consult his biography by C. W. Le Bas (London, 1835).

JEW'ELL, MARSHALL (1825–83). An American politician, born in Winchester, N. H. After receiving a common-school education, he learned the tanning business in a belting manufactory established by his father at Hartford, Conn., learned telegraphy, and after several years as a telegraph operator in the South and West returned to Hartford in 1850 and became a member of his father's firm. He accumulated a large fortune, became interested in numerous business enterprises and in Republican State politics, and, after being the unsuccessful candidate for Governor in 1868, was elected in 1869. Defeated for reëlection in 1870, he was again successful in 1871. In 1873 he was sent by President Grant as Minister to Russia, whence he was recalled in the following year to take the portfolio of Postmaster-General in Grant's cabinet. In this capacity he served until July, 1876, when he resigned in consequence of a disagreement with the President over the action of Secretary Benjamin H. Bristow (q.v.) in connection with the "Whisky Ring" frauds. In 1880 he opposed Grant's renomination, and as chairman of the Republican National Committee conducted the Garfield campaign.

JEWELL, THEODORE FRELINGHUYSEN (1844–). An American naval officer, born at Georgetown, D. C. He graduated at the Naval Academy in 1864 and served in defenses of Washington in the summer of 1863. Jewell commanded at the Naval Torpedo Station (1890–93), was superintendent at the naval gun factory up to 1896, and commanded the *Minneapolis* in the war with Spain and the *Brooklyn* in the Philippine Islands. In March, 1904, he was promoted to the grade of rear admiral and shortly afterward was placed in command of the European squadron. He retired in November, 1904. He is the author of numerous articles on professional subjects, especially ordnance and torpedoes, with the development of which he was closely identified.

JEW'ELRY (Eng. *jewel*, a finished gem, Fr. *joyau*, OF. *jouel*, ML. *jocāle*). Ornaments for the person, especially mounted gems or precious stones, and objects made of gold or silver. (See also DIAMOND; ENAMEL; GEMS; PEARL; RING.) Originally jewelry was part of the goldsmith's work—the *minuteria*, or small work, of the Italians, who called plate (q.v.) *grosseria*, or large work. As pointed out by H. Clifford Smith, jewelry naturally divides into five different classes,—objects worn (1) on the head—diadems, tiaras, aigrettes, hairpins, jewels for the hat and cap, earrings; (2) on the neck—necklaces, with their various pendants; (3) on the breast—brooches, clasps, buttons; (4) on the limbs—armlets, anklets, bracelets, rings; (5) at the waist—girdles, with their various attachments and pendants, such as chatelaines, pomanders, scent cases, rosaries. While jewelry to-day is worn principally by women, among savage and barbarous races it is worn principally by men—not only to beautify the body, but also as a mark of rank and dignity, and as charms and religious symbols.

Egypt. Of ancient Egyptian jewelry, rich in colored gems and glazes, much has been preserved in Egyptian tombs. The best collection is in the Museum at Cairo, but there are also important collections in the Louvre, the British Museum and at Berlin and Munich. The Egyptians preferred chasing and engraving to other methods of ornamenting metal, but they were skilled in soldering and repoussé (q.v.), and indeed in all the processes known to-day except enameling. (See ENAMEL.) Extraordinary evidence of what they could do is the jewelry of five princesses of the twelfth dynasty (about 2400 B.C.), discovered in 1894 at Dashur. The most important pieces are three openwork *pectorals*, inlaid with jewels, two gold crowns (one flat openwork with inlay, the other a wealth

of tiny florals mounted on filigree) and a dagger with inlaid handle.

About 1000 years later is the jewelry of Queen Aah-hotp, coarser than that of Dashur, but ingeniously worked. The diadem of gold has a sphinx couchant each side of a box ornamented in checker pattern with red and blue pastes, and bearing an inscription in gold on lapis lazuli. The flexible gold chain of plaited wire terminates in ducks' heads, and carries suspended by a tiny ring a scarab of gold inlaid with lapis lazuli. The flat hinged bracelet, similar to those used to-day, shows repoussé figures on gold ground inlaid with lapis lazuli. As shown by the sculptures and the paintings that represent bracelets by bands of red and blue, many Egyptians wore two on each arm—one on the wrist and one above the elbow. But the commonest ornament, and the most necessary, was the finger ring that served as signet, with the owner's emblem engraved on the metal or on a scarab or other stone set in it. The pectoral, as the name indicates, was worn on the breast suspended by ribbon or chain.

The best Phœnician jewelry has been found in Cyprus, but it also occurs in Phœnician settlements at Sardinia, Crete, and Rhodes. It is a mixture of Egyptian and Assyrian forms, the latter of which are known to us almost exclusively from the bas-reliefs. About Phœnician jewelry much has been learned from sculptured busts like those of Yecla, now in the Madrid Museum, and the "Lady of Elché," in the Louvre, adorned with three necklaces carrying urn-shaped pendants, with elaborate diadem encircling the forehead, and with sumptuous coiffure.

Greece. Prehistoric Greek jewelry is best illustrated by the finds at Mycenæ and Cyprus, the former those of Schliemann now preserved in the Museum at Athens. Spiral patterns almost identical with the Celtic are common, and there are cuttlefish, starfish, butterflies, and other naturalistic forms expressed in repoussé. Especially numerous are the small round gold plates with perforations for attaching to the clothing; and especially noteworthy the gold diadems in the shape of long oval plates covered with rosettes in repoussé. Of later Greek jewelry the most brilliant collections are that in the Hermitage at St. Petersburg, unearthed from the tombs of Kerch and the Crimea, and the one discovered in 1905 under the temple of Artemis at Ephesus—1000 pins, brooches, beads, and stamped disks of gold—part of which is in the British Museum, but most in Constantinople. Exceedingly rich in ancient Greek jewelry has proved to be the part of Italy known as Magna Græcia. A famous burial wreath found at Armento, purchased about 1826 by Ludwig I of Bavaria, and now in the Antiquarium at Munich, is composed of roses, narcissus, myrtle, and oak leaves, enlivened by small figures of genii. Also from Magna Græcia is the extraordinarily and exquisitely beautiful gold crown in the British Museum acquired in 1898 from the collection of Count Tieszkiewicz. In granulated work the Greeks were rivaled only by the Etruscans, but they preferred filigree ornamentation—fine threads of gold delicately twisted upon the surface. Enamel they used sparingly. Gold was their favorite material, and they excelled in repoussé, chasing, engraving, and intaglio cutting, and developed to great perfection the art of soldering small objects to thin surfaces and joining the thinnest metal plates together. For designs they went straight to nature, associating simple and simplified fruit, flower, and foliage motifs with naturalistic animal and human forms. Their invention was particularly fertile as applied to earrings, both ring-shaped and pendent. See the article EARRING.

Etruria. For the Etruscans jewelry had a special charm, and though their later work is coarser, their early goldsmiths excelled in fineness and elaboration and were able to unite metals by solvents unknown to us, so that no traces of solder remained. Especially did they understand and freely employ granulation (*pulvisculus aureus*, as the Romans called it) for the decoration of gold surfaces with grains of gold of microscopic size—an art mentioned by Cellini in his *Trattato dell' Oreficeria*, but not commonly practiced in the Renaissance. In the nineteenth century it was revived by Castellani, of Rome, who discovered among the Abruzzi goldsmiths, to whom the processes had come by inheritance from antiquity. Examples of his work were exhibited at London and at Philadelphia in 1876. Important collections of Etruscan jewelry are those in the Vatican, the Louvre, the British Museum, and at Berlin and Munich.

Rome. From Etruscan and Greek jewelry is derived Roman, which under the Republic was worn modestly, but under the Empire extravagantly and luxuriously. Pliny describes a lady at a betrothal as covered from head to foot with pearls and emeralds. Coiffures were heavy with jewels and precious metals. An ancient Roman hairpin in the British Museum is 8 inches long and crowned with a Corinthian capital on which stands Aphrodite. Pearls were used lavishly, especially on earrings. Seneca complains that: "Two pearls beside each other, with a third above, now go to a single pendant. The extravagant fools probably think their husbands are not sufficiently plagued without their having two or three heritages hanging from their ears." Necklaces were often double or triple, of plaited or linked gold; or richly mounted with precious stones, especially after the Oriental conquests of Pompey, who found in the captured treasury of Mithridates "jewels for the breast and neck all set with gems"; or composed of beads of stone or glass or amber, especially the latter, which was regarded as a talisman against witchcraft and other perils. Amber with a small insect in it was particularly prized, "being valued," says Pliny, "no matter how small, at more than a healthy living slave." Cameos, large intaglios, and Imperial gold coins were popular as pendants, and the coins were also made up into bracelets. Especially extravagant were the Romans with their rings. Martial speaks of a man who wore six on each finger, and advises another who had one of monstrous size to wear it on his leg instead of on his hand. The signet use of the ring continued, and every Roman appears to have chosen his own subject or device—the portrait of a friend or an ancestor, or some symbol from poetry or mythology, serving, like the coat of arms of the Middle Ages, as a mark of identification. Rings as well as bracelets in the form of serpents were much in vogue, and also those shaped like an Herculean knot. Bezels were sometimes hollow and filled with poison for use in case of emergency. Of the officer in charge of the temple of Jupiter Capitoline, Pliny says: "Being arrested, he broke

the stone of his ring between his teeth and expired on the spot."

Byzantium. Byzantine jewelry links the ancient and the modern world, having transmitted antique processes and designs not only to Russia, that still reproduces them, but also to western Europe, that until the twelfth century was decoratively subservient. Byzantine jewelry is, however, a compromise between Orient and Occident. It retains the craftsmanship of the ancient Roman Empire and the dignity of classic traditions modified by Christian ideas, but adds the patient skill of the Oriental in executing exuberant decoration. The style is admirably illustrated by the contemporary mosaic portraits of Justinian and Theodora at San Vitale in Ravenna. The garments of the Empress and her attendants are stiff with gold and richly set with jewels; pearls, rubies, and emeralds enrich her neck and shoulders and cover her head, hanging from her temples in festoons down to her breast. The most usual type of earring from the sixth century on is crescent-shaped, in gold repoussé openwork, showing a cross pattée inside a circle, supported on either side by peacocks confronted. Of course the favorite breast pendant is the cross, but not till after the fifth century. One of the finest examples that have survived is the Beresford-Hope cross in the British Museum, dating from the eighth century. It is made of two plates of gold hinged to form a reliquary, with figures executed in translucent cloisonné enamel—on one side, the crucified Saviour with busts of the Virgin and St. John; on the other, the Virgin full-length with the heads of four saints. Of the many Byzantine finger rings that have survived, most bear Christian symbols, and more are in gilded bronze than in gold.

Germania. The Gothic and other Germanic tribes had jewelry copied from Persia or farther east—colored stones, usually garnets, or cut red glass inserted in thin gold plate or placed side by side with strips of gold between. The treasure of Petrossa in the Bucharest Museum contains some of the earliest examples, dating from the fourth century A.D., among them a bird-shaped breastplate, three bird-shaped brooches, and a crescent-shaped collar rich with precious stones. Of more refined workmanship is the regalia of Childeric I, founder of the Merovingian dynasty, who was buried at Tournai in Languedoc in 481 A.D. His grave was accidentally exposed by a peasant in 1653, and the precious objects it contained—a sword, a bracelet, brooches, buckles, about 300 gold bees that adorned a mantle, and a signet ring with oval engraved gold bezel bearing the inscription *Childirici Regis*—were transferred to the Bibliothèque Nationale in Paris. Most wonderful of all is the treasure of Guarrazar, 11 jeweled gold crowns, found near Toledo in Spain in 1858, and divided between the Cluny Museum at Paris and the Royal Armory at Madrid. The most important of those at Madrid is the crown of King Svinthila (621–631 A.D.), set with large pearls and cabochon sapphires arranged in rose-shaped patterns. Suspended by chains from the lower rim is a fringe of letters set in the cloissonné manner with red-glass paste, and spelling *svintilanus rex offert*. Prolific in Anglo-Saxon jewelry have proved the ancient graves of England, particularly those of Kent, Sussex, and the Isle of Wight. The British Museum has a rich collection of decorated hairpins; beaded necklaces with pendants; brooches, many of cruciform shape; girdle buckles of gold, silver, or bronze. Of Celtic jewelry, the Dublin Museum has much —perhaps the richest collection in Europe of prehistoric gold ornaments. Among the numerous torques, the largest, over 5 feet long and weighing 27 ounces, is supposed to have been worn over the shoulder and across the breast.

Mediæval. About mediæval jewelry from the ninth century on, graves give us little information, the custom of burying objects with the dead having been forbidden by Charlemagne. But the inventories of the period show an astounding wealth of precious stones and gold and silver ornaments; and the brasses, tombstones, and illuminated manuscripts give us considerable assistance. During the Crusades the Byzantine and Oriental influence was increased by the knights who brought back from Syria, Palestine, and Constantinople (Byzantium) not only impressions of Oriental culture but actual specimens of Oriental jewelry. There began a regular importation of goods and workmen from Asia Minor to Venice, Genoa, and Pisa, who under the banner of the Cross reëstablished their trade with the East. By the beginning of the thirteenth century the West appears to have learned its lesson and became practically independent of its former sources of supply. The methods and practices of jewelers then are preserved in the monk Theophilus' famous *Schedula Artium*, in which he describes all minutely. In the monasteries sumptuous objects were made for ecclesiastical use, Limoges becoming the chief centre for enamel work, the process being champlevé generally on copper. In the Gothic thirteenth, fourteenth, and fifteenth centuries, shapes became slighter and more elegant, with more detail and delicacy. Gothic architecture and window tracery penetrated the designs, enamels becoming translucent and modeled in low relief, usually on silver. In the fourteenth century the costumes of the laity began to be luxurious with jewelry. The inventories of Charles V of France and his three brothers—the dukes of Anjou, Berry, and Burgundy—are a revelation as regards the possible extent of personal splendor and ostentation. But the culmination was reached in Flanders under the Burgundian dukes of the fifteenth century—Philip the Good and Charles the Bold—whose court was the richest and most fashionable in all Europe. Pearls and precious stones entered from the Orient at the great port of Bruges, and, as is shown by the portrait painters of the period, garments were sewn thick with them. Especially interesting is the painting by Petrus Christus, of Bruges, known as the "Legend of St. Eloi and St. Godeberta," picturing the interior of a Flemish goldsmith's shop.

Italian Renaissance. Italian Renaissance jewelry merits the high reputation it has always had. During the fifteenth century, while the arts in Flanders, France, Germany, and England were still Gothic, the revival of the classic had already taken place in Italy. In this movement Florence led, though rivaled by Venice, the wealthiest city and most important port in Europe. The goldsmiths emerge from the subordinate status occupied in the mediæval guild, and attain fame as free artists. Many of them become painters, sculptors, and architects, and their trade is regarded as the best apprenticeship for the arts of design. Among the great names are those of Ghiberti, Maso di Finiguerra,

Pollaiuolo, Verrocchio, Caradosso, Botticelli, and Ghirlandaio (q.v.). Noteworthy are the intricate settings devised by Botticelli for the neck pendants of the three Graces in his "Primavera." Noteworthy also are the jewels in Ghirlandaio's portrait of Giovanna Tornabuoni, formerly in the Kann and now in the Morgan collection—one worn on the lady's breast, a ruby in claw setting with small beryl above and three pendent pearls below; the other in a recess beside her, a ruby surrounded by two pearls and three beryls, beautifully set and surmounted by a winged dragon with a sapphire over its head.

While the designs of antiquity excel in abstract beauty of form and color, and those of the mediæval craftsmen possess a peculiarly naïve and ingenuous charm, it cannot be denied that the jewels of the Renaissance, enriched with every variety of ornament that the goldsmith could devise, are in their own manner incomparable. Though some by overelaboration may lose balance and dignity, the majority possess qualities rarely found together save at this remarkable period—boldness of conception, richness of form, and extraordinary refinement of technique. Hammering, chasing, casting, and particularly enameling, are all perfectly accomplished. The variety is astonishing. There is none of the monotonous repetition characteristic of most modern jewelry.

The value of Renaissance jewels is independent of their intrinsic worth or the cost of the materials. When the Countess of Châteaubriand was requested to return to Francis I the precious ornaments that were desired by her successor in the royal favor, she sent them to the melting pot first, thus making the gift trivial instead of magnificent. Throughout the best period sculpture is prominent; human and animal figures in relief or in the round find a place on the majority of jeweled compositions; subjects are pictured from history and mythology, religion and romance. Grotesque patterns, like those copied from the unburied frescoes of ancient Rome by Raphael and his pupils for the decoration of the Loggie of the Vatican, are a frequent source of inspiration.

Of sixteenth-century Italian Renaissance jewelry there still exists an abundance, but the sixteenth-century painters, unlike those of the fifteenth century, do not illustrate jewels generously. The foremost name is that of the Florentine goldsmith Benvenuto Cellini (q.v.), whose popularity long caused all the finest examples to be attributed to him, regardless of the facts. If one believes what he himself wrote in the fascinating narrative of his life and adventures, one is tempted to associate him with all the finest creations of his time and to picture his services as competed for by cardinals, popes, and kings. Yet the only quite authenticated example we have of his work as goldsmith is the famous saltcellar at Vienna, the attribution being disputed of jewels such as "Leda and the Swan" at Vienna, the "Chariot of Apollo" at Chantilly, and the mountings of the two cameos, "The Four Cæsars" and "The Centaur and the Bacchic Genii," in the Bibliothèque Nationale at Paris.

Germany. About 1515 the wide circulation of engravings and illustrated books of Italian Renaissance jewelry impelled the German goldsmiths to cultivate Renaissance ornament, and before long the richness of their invention began to overshadow the Italians. Among famous German designers of jewelry are Dürer and Holbein, the former the son of a goldsmith. In Germany, Renaissance ornament lost much of its original purity and became a mixed style composed of strap and ribbon work and intricate architectural motifs.

France. France was the first country to adopt the new Italian style, and from the beginning of the reign of Francis I, French jewelry was closely modeled on Italian, and many Italian jewelers settled and worked in Paris—among them Cellini, from 1540 to 1545. As a collector, Francis I surpassed even Henry VIII and Pope Paul III. But actual examples of French Renaissance jewelry are few, almost the only ones being the wonderful mounted cameos in the Bibliothèque Nationale. Among the chief designers who engraved models for jewelry were Jean Duvet (goldsmith to Francis I and Henri II), Jacques Androuet Ducerceau, Etienne Delaune, René Boyvin, and Pierre Woeiriot.

One of the acquisitions of Henry VIII just before his death was the great pendant of Charles the Bold, the last Duke of Burgundy, captured by a common Swiss soldier from his tent after the memorable defeat at Granson in 1475 and later sold by the magistrates of Bern to a merchant of Augsburg, who sold it to Henry VIII. In the centre was a splendid pyramidal diamond ⅝ of an inch square, surrounded by three large rubies, called the "Three Brothers" from their equality in size and weight, and by four enormous pearls. The last we hear of the famous jewel is in 1623, when James I had it refashioned for the use of Charles and Buckingham on their visit to Spain, the King writing to his son: "I send for your wearing the Three Brethren, that you know full well, but newlie sette."

In the baroque seventeenth century, gorgeousness and glitter rather than color and good design were sought. Stones that had formerly been cut *en cabochon*, or in other simple forms, were elaborated with facets like diamonds, and pearls were in immense demand. Flowers painted in natural colors on enamel and sometimes modeled in relief were the principal decoration of pendants.

Modern. As in the other arts (see INTERIOR DECORATION), so in jewelry, rococo naturalistic designs and unsymmetrical outlines dominated during the first half of the eighteenth century, simple classic forms during the last half. The fashionables of the Directoire who could afford it wore ancient Greek and Roman jewels; the rest, facsimiles of ornaments unearthed at Pompeii or pictured on ancient vase and mural paintings and sculptures. The affected classicism of the Empire stimulated the use of engraved gems, and cameos and intaglios often occupied positions of honor beside important diamonds. The metal work of the early nineteenth century was poor—either pinchbeck imitation or thin and light.

The leader in the revival of jewelry as a personal and individual art at the close of the nineteenth century was René Lalique (q.v.), whose exhibits at the Salon of 1895 and the Exposition of 1900 created a sensation. But the permanent reorganization of the industry depends largely upon the enthusiastic though often inefficient work of Arts and Crafts societies and schools, particularly those of England, Germany, Austria, and the United States. While machine-made jewelry is not

necessarily ugly, it is apt to lack the qualities that distinguish good art from bad art. Everything is stereotyped, the different parts being stamped out in quantity by steel dies, especially in imitation jewelry, where stones in paste and glass are mounted on cheap electroplated alloys.

One of the first artistic industries established in the American Colonies was that of the goldsmith, who in every large town produced trinkets for the Indians and popular articles of jewelry, particularly snuffboxes. In 1788 no less than 35 goldsmiths took part in the procession in Philadelphia celebrating the adoption of the Constitution. Providence has long been a jewelry centre. In 1805 four firms there employed 30 men making simple finger rings, gold beads, and silver spoons. Attleboro, Newark, and New York became active a little later, and all four cities produce much cheap jewelry, using alloyed and hammer-plated, and after 1860 electroplated, metals. See PLATED WARE.

United States Statistics. In 1909, according to the thirteenth census of the United States (published 1913), the jewelry industry of the United States was concentrated in the States of Rhode Island, New York, Massachusetts, and New Jersey, and the percentage of the value of the product for that year for the principal centres was as follows: Providence, 25.1 per cent; New York, 23.9; Newark, 16.4; Attleboro, 9.2.

The jewelry industry is one of considerable importance, and the thirteenth census, quoted above, reported that in 1909 there were 1537 establishments engaged in this branch of manufacturing, which includes the working of gold, silver, platinum, gold-filled metals, gold plate, brass, copper, or other metal, with or without precious or semiprecious stones. In addition there were included gold and silver mountings for various articles of more or less utility, and jewelers' findings, as well as statistics of establishments engaged in setting diamonds and other stones and in chasing gold and silver for the trade. The 1537 establishments produced in the year 1909 an output of $80,349,874, of which the cost of materials amounted to $36,674,859, so that there was added by manufacture $43,675,015. The average number of wage earners in the industry was 30,347, and their wages represented a total of $18,357,950.

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JEWELS OF THE MADONNA. See GIOJELLI DELLA MADONNA.

JEW'ETT, CHARLES COFFIN (1816–68). An American librarian. He was born in Lebanon, Me., graduated at Brown University in 1835 and at Andover Theological Seminary in 1840, where, while a student, he acted as librarian. He became librarian at Brown University in 1841 and from 1843 to 1848 was professor of modern languages there. He then became librarian of the Smithsonian Institution and from 1855 until his death was superintendent of the Boston Public Library. He was the first of the modern school of American librarians, and his *Notices of Public Libraries in the United States of America* (1851) and his *Smithsonian Report of the Construction of Catalogues of Libraries* (1853) were of much value and marked a great advance over earlier writings in this field in America. At Boston he prepared the card catalogue of the public library, one of the first instances of the use of the card catalogue in public libraries. Mr. Jewett was president of the first American convention of librarians—that of 1853, held in New York.

JEWETT, MILO PARKER (1808–82). An American educator, born in St. Johnsbury, Vt. He graduated at Dartmouth College in 1828 and at the Andover Theological Seminary in 1833, became professor of rhetoric and political economy two years later in Marietta College, Ohio, resigned in 1838 after adopting Baptist tenets, and in 1839 founded the Judson Female Institute in Marion, Ala., which he conducted until 1855. He then established a seminary for young ladies at Poughkeepsie, N. Y., where he aided Matthew Vassar in planning Vassar College, of which he became the first president in 1862. He resigned his office in 1864 and in 1867 removed to Milwaukee, Wis. His publications include: *Baptism* (1840); *Education in Europe* (1863); *Relations of Boards of Health and Intemperance* (1874); *The Model Academy* (1875).

JEWETT, SARAH ORNE (1849–1909). A writer of stories of New England life, born in South Berwick, Me., Sept. 3, 1849. Miss Jewett, born of New England stock, made her first serious entry into literature in 1869 by publishing a story in the *Atlantic Monthly*. Her books, mainly consisting of short stories and sketches, include: *Deephaven* (1877); *Play Days* (1878); *Old Friends and New* (1879); *Country By-Ways* (1881); *The Mate of the Daylight* (1883); *A Country Doctor* (1884), a novel; *A Marsh Island* (1885), a novel; *A White Heron, and Other Stories* (1886); *The Story of the Normans* (1887); *The King of Folly Island, and Other People* (1888), which contains some of her best work; *Betty Leicester* (1890); *Tales of New England* (1890); *A Native of Winby* (1893); *The Life of Nancy* (1895); *The Country of the Pointed Firs* (1896); *The Queen's Twin* (1899); *The Tory Lover* (1901), an historical novel. Her stories and sketches are admirable in their simple and intimate portrayal of New England character in its finer and gentler moods. Her work is distinguished for its naturalness and is a valuable contribution to the fiction dealing with American life. Consult C. M. Thompson, "The Art of Miss Jewett," in the *Atlantic Monthly*, vol. xciv (Boston, 1904), and *Letters*, edited by A. Fields (ib., 1911).

JEW'FISH'. Any of several groupers of tropical American waters and the largest of the sea-bass family Serranidæ.

1. A guasa (*Promicrops guttatus*), common on both coasts of Mexico and about Florida and the West Indies and known in the vicinity of Pensacola as warsaw (a corruption of guasa,

q.v.). It is a robust species, with a big, flat head and a huge mouth with formidable teeth. It has a voracious appetite. The color of the young is pale olive green, with five crossbars of darker green; but as the fish grows older the general hue becomes dark olive green. It haunts rock places. Ordinary specimens do not often exceed 20 pounds in weight, but one was brought to New York in 1874 which weighed 300 pounds. For illustration, see WARSAW.

2. The black jewfish of Florida, also called warsaw and mero de alto by fishermen, is a related species (*Garrupa nigrita*), which ranges from South Carolina to Brazil, but is not present on the Pacific side of Central America. Few have been examined which weighed less than 100 pounds, and specimens exceeding 500 pounds are recorded. Its color is chocolate brown, varying to blackish gray, without markings, and little paler on the ventral parts, and the fish is a favorite object of sport with rod and line. Consult Holder, *Big Game Fishes* (New York, 1903).

3. On the coast of southern California, an immense fish of the same family and habits (*Stereolepis gigas*), brownish with large greenish-black blotches, and the ventral fins black. It is 5 to 7 feet long, reaches a weight of 500 pounds, and frequents the neighborhood of rocky islands. The flesh of the smaller specimens, often called black sea bass, commands a high price.

JEWISH ART. A term properly applied to art as practiced by the Jews in Palestine before the capture of Jerusalem by Titus, as the conditions of the dispersion afterward did not allow of any independent art. The earliest archæological material known is their pottery, which has been found in considerable quantities, especially at Tell el-Hesy, where Professor Petrie's (q.v) systematic excavations enabled him to distinguish several periods marked by superimposed strata of ruins. His periods are: (1) An Amorite, (2) a Phœnician, and (3) a Jewish period. Jewish designs seem mainly to be copies of Phœnician models, which were themselves copies of other Oriental arts. In the same way the Jewish glyptics were remotely derived, through the Canaanites and Phœnicians, from the glyptics of Babylonia and Assyria; the Hebrew seals, few of which are earlier than the Maccabæan age, varying only by the predominance of floral and geometric design, owing to the aversion of the Jews to reproducing the human figure. Nothing remains of Jewish metal work; carving in wood and ivory and overlaying with metal were practiced, but no works are extant; nor do we know anything of the artistic character of Jewish pictorial decoration, weaving, or embroidery. The tombs near Jerusalem (Tombs of the Kings, etc.) and scattered throughout Palestine are similar to the late Hellenistic and Roman works of their class throughout Syria (see TOMB), and Herod, when reviving the prosperity of Palestine, rebuilding the temple, and founding Cæsarea, with its magnificent structures, frankly adopted the style of Roman art. To this time and to the succeeding century belong the few remaining ancient synagogues in Galilee.

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JEWISH CHAUTAUQUA SOCIETY, THE. Conceived and founded in 1893 by its chancellor, Dr. Henry Berkowitz, of Philadelphia, for the "dissemination of a knowledge of the Jewish religion by fostering the study of its history, literature, etc.," this society is modeled on the mother Chautauqua of New York. In 1897 the first assembly was held in Atlantic City, and this focusing of the work has so greatly prospered that the original session of two weeks has now been extended to three. Here the creation of departments for study and entertainment is similar to those of other Chautauquas. More than this, the influence of the society has resulted in the London Jewish Study Society. The official organ was, until 1907, the *Menorah Magazine* of New York, and there is also an *Assembly Record*, published at Philadelphia, besides special series of various publications. The society was incorporated in 1899 and is administered by the following officers: a chancellor, a president, a treasurer, a secretary and director, a field secretary, a board of trustees, and an educational council. The society has a membership of 3000. It conducts a correspondence school and reading circles, for which course books and syllabi are issued dealing with biblical and postbiblical history and literature and the Hebrew language. Consult the *Menorah Magazine* (New York, since 1897); *Special Series No.* 7 of the Jewish Publication Society of America (Philadelphia, 1902); *Reports of the United States Commissioner of Education.*

JEWISH EDUCATION. See JEWS.

JEWISH LANGUAGE AND LITERATURE. See JEWS.

JEWISH SECTS. A term applied to certain divergent schools of religious thought and practice, or organized parties, among the Jews.

The *Samaritans* may be regarded as a Jewish sect, inasmuch as they recognized the binding authority of the Law of Moses, but, on the other hand, limited the sacred writings to the Pentateuch, established a cult of their own on Mount Gerizim (see EBAL AND GERIZIM), maintained a certain opposition to the cult in Jerusalem, and took no part in the movements that led to the establishment of rabbinical Judaism. Manasseh, the son of Joiada, is said to have been the first high priest, and the temple to have been built in the days of Alexander; and there is still a small community celebrating every year the Passover on Mount Gerizim. See SAMARITANS.

The *Pharisees* are first heard of in the days of Jonathan (161–143 B.C.), but may have existed for some time then. They were distinguished by their belief in the resurrection and a world to come, intense Messianic expectations, reliance upon angelic ministrations, certain customs of purification, and a tendency to defend apparent deviations from the written Law by an appeal to the "oral Law" claimed to have been transmitted from Moses. In the days of Herod there were 6000 members of this sect. Their views and attitude influenced greatly the later rabbinical development. See PHARISEES.

The *Sadducees* apparently came into existence about the same time as a party banded together to insist upon a literal interpretation of the

Law, to oppose the novel teachings concerning a resurrection from the dead and a world of spirits, to maintain a more conservative type of thought and piety, and to emphasize freedom of the will and moral responsibility. Whether they were called Sadducees because they were "just," organized by one named Zadok, or at first adherents of the Zadokite line of high priests, is uncertain. They ceased to have any influence after the fall of Jerusalem in 70 A.D. See SADDUCEES.

Another sect that probably also grew up in the second century B.C. was the *Essenes*. They formed a kind of brotherhood, chiefly intent upon the exercise of practical virtues and ruled by a severe code of morals. In the time of Philo and Josephus there were several thousand members, some living a stricter monastic life at Engedi, others scattered in various communities, living in matrimony. They believed in a spiritual resurrection, opposed oath taking, the law of retaliation, divorce, and private wealth, and they occupied themselves much with secret books. See ESSENES.

The *Covenanters of Damascus*, a sect arising in the middle of the second century B.C., has been unknown until the publication by Schechter of some of its documents in 1910. He identifies them with the Zadokites described by the Karaite Kirkisani in 637 A.D. It seems to have been after the overthrow of the old high-priestly family that a company of Judæans left their homes and took up their abode in Damascus and the neighboring region. They departed widely from the teaching and practice of the Pharisees, against whom they made many accusations: they forbade divorce; they looked forward to the coming of a Messiah, not from Judah or David's line, but "from Aaron and Israel," consequently a priest; and they regarded it to be wrong to kindle the altar fire and offer sacrifice. They apparently cherished the Book of Hagu and the Book of Jubilees among their scriptures; and the present documents may be as old as the beginning of the first century B.C. See ZADOKITES.

According to Epiphanius, there was a Jewish sect, the *Nasaræans*, living "in Galaaditis, Basanitis, and the region beyond the Jordan," which "existed before Christ and did not know Christ" and differed from other Jews only in regarding the Law of Moses they had as more accurate, refusing to offer sacrifices, and abstaining from animal food. See NASARÆANS.

The *Dositheans* probably go back to pre-Christian times. They show certain similarities to the Zadokites. There is a growing conviction among scholars that *De Vita Contemplativa* is a genuine work of Philo, and consequently the picture of the *Therapeutæ* a description, more or less idealized, of an actual Jewish sect living on the shores of Lake Mareotis, south of Alexandria. It shows marked affinity to the Essenes. See THERAPEUTÆ.

JEWISH YEAR. See CALENDAR.

JEW LIZARD. An agamoid lizard of Australia which, when excited, expands the pouch of its throat into the appearance of a beard; hence often called bearded lizard.

JEW OF MALTA, mąl'tą, THE. A tragedy by Marlowe, written at a date which is uncertain, but must have been subsequent to 1588. It was acted between 1591 and 1596 and was first published in 1633, edited by Thomas Heywood. Shakespeare was indebted to Marlowe's play for suggestions in the *Merchant of Venice*, though the plot was mainly taken from other sources.

JEWS (OF. *Geu, Jeu*, Fr. *Juif*, It. *Giudeo*, Ger. *Jude*, Lat. *Judæus*, Gk. *'Ιουδαίος, Ioudaios*, from Heb. *Yehudah*, Judah). The name of a people belonging to the Semitic family of nations. (See SEMITES.) Originally it designated the members of the tribe of Judah; then the citizens of the Kingdom of Judah, which included various ethnic elements (see JUDAH); later the inhabitants of Judæa under foreign rule or temporarily independent, as under the Hasmonæans (see MACCABEES); and finally, all followers of the Jewish religion, whether they lived in Palestine or were dispersed among the nations, who were descendants of the ancient occupants of Judæa, traced their lineage to any of the tribes of Israel, or were proselytes to the faith. This later usage made it possible to apply the term to the tribes of Israel in earlier times, all the more readily as, after the fall of the independent kingdoms, Israel came to be employed as a designation of the exiles of both, and of all who regarded themselves as the sons of the patriarch Israel. (See JACOB.) Since the term Hebrew was used in early records of Abraham, Joseph, the people of Goshen, and the Israelites in the period of the Judges, though perhaps exclusively by foreigners (see HEBREWS), this also came into vogue as a name of the descendants par excellence of Abraham. Hence Jew, Israelite, and Hebrew have been used indiscriminately in regard to the same people, and the modern attempts to differentiate between them have never been consistently carried out or found a very general recognition. For the sake of convenience the first of these names may here be adopted in its widest sense.

Ethnology. The Jews were long considered as a striking example of a pure, unmixed race. Historical research, however, has tended to show that this assumption was not well founded. Even the earliest traditions suggest a mixed origin. The patriarchs are represented as marrying Aramæan, Canaanitish, and Hittite wives, and some of the tribes, evidently less closely related to the main body, as being the offspring of concubines. The invaders seem to have mixed freely with the various peoples settled in Palestine during the long period of gradual absorption. The racial distinctions between the former and the Canaanites, the Hittites, and the Philistines (qq.v.) were very marked. A mixture of the blond and the brunette races appears to have taken place, similar, though on a smaller scale, to that between the Northern, the Alpine, and the Mediterranean races in Europe. Even the Semitic element is likely to go back ultimately to a blend of heterogeneous stocks. See ARABIA; SEMITES.

It is difficult to determine how nearly related Israel and Judah were. There was always a consciousness of distinction. The difference is striking between the Judæans represented by Egyptian artists in the time of Sheshonk I and the Israelites represented by Assyrians on the obelisk of Shalmaneser III. The genealogical scheme which made Judah a son of Israel seems to have been preceded by the conception that they were brothers (in 2 Sam. xix. 44 the words, "I am the firstborn," have been preserved in the Greek), but such brotherhood need not involve a common origin or even blood kinship at all, as may be seen from Gen. ix. 25, 26, where Shem, Canaan, and Japheth (qq.v.) are repre-

sented as brothers. The spread of Yahwe worship to the northern tribes and the union of Israel and Judah in the time of David and Solomon brought them together very closely. Many tribes, most of them of Edomitish origin (see CAIN, CALEB, JERAHMEEL, KENITES, KENIZZITES), were united in the Kingdom of Judah. There does not appear to have been any ban upon intermarriages with foreigners until comparatively late times. The example set by the kings would naturally be followed by the people. The missionary movement, to which the eloquent descriptions of Israel as the Servant of Yahwe in the last chapters of the Book of Isaiah (q.v.) gave such an impetus, brought numerous proselytes to the Jewish fold. To break down prejudices against intermarriage and cordial relations with foreign peoples the books of Ruth and Jonah were written.

It has been shown that a considerable part of the South Russian Jews are the descendants of the Chazars, a people of Turkish origin, who adopted the Jewish religion towards the end of the seventh century A.D. Hence the extraordinarily divergent physical type prevailing among them in spite of a common dialect, a common religion, and freedom to intermarry with other Jews. Wherever the Jews have settled, and particularly in countries where discriminations against them have never existed or have been removed, there are noteworthy admixtures of other blood and approximation in craniological and other somatic characteristics to those of the peoples of their environment. Nevertheless, religious and social isolation and a remarkable assimilative power have tended to produce a distinct type. The modern Jew may be described as short, with dark hair and eyes, rather swarthy skin, somewhat broad-headed, with a characteristic facial expression, full lips, ample beard, etc. (See the Colored Plate under EUROPE, PEOPLES OF.) The majority of ethnologists are agreed that in early times the predominant Semitic (and Jewish) type was dolichocephalic, a type characteristically Arab and preserved by the Jews of Africa and perhaps most of the so-called Sephardim (q.v.).

Among the distinguishing mental and moral traits of the Jews may be mentioned: distaste for hard or violent physical labor; a strong family sense and philoprogenitiveness; a marked religious instinct; the courage of the prophet and martyr rather than of the pioneer and soldier; remarkable power to survive in adverse environments, combined with great ability to retain racial solidarity; capacity for exploitation, both individual and social; shrewdness and astuteness in speculation and money matters generally; an Oriental love of display and a full appreciation of the power and pleasure of social position; a very high average of intellectual ability.

History. 1. *The Earliest Period* (c.2100–c.1440 B.C.).—Native traditions, preserved in song and story, and some allusions in contemporaneous foreign records are the only sources for our knowledge of this period. They are indeed too uncertain and fragmentary to give us anything like a continuous history, yet they may allow us, when taken together, to catch occasional glimpses of actual occurrences or at least to divine the general trend of development that preceded the first important conquests in Syria. For a summary of the traditions, see PENTATEUCH, ABRAHAM, ISAAC, JACOB, JOSEPH, MOSES.

Historians are not inclined at the present time to assume that any real traditions underlie the stories of the creation, the garden of Eden, the antediluvians, the deluge, the tower of Babel, the dispersion of mankind, and the patriarchs from Noah to Abraham. Even Terah, the father of Abraham, is generally identified with the divinity bearing the same name. But the historical character of Abraham is still an open question. It has long been recognized that a foreign source is likely to have been used in Genesis xiv. The Elamitish and Babylonian names inspire confidence (see AMRAPHEL, CHEDORLAOMER, ARIOCH, TIDAL); the identification of Amraphel with Hammurapi (2124–2081 B.C.) is highly probable; the names of the kings of the pentapolis have an Amoritish sound; and the reference to Abram the Hebrew would be natural in a Babylonian or Amoritish document, though it may be explained as a clever archaism. The extent of the source used can only be ascertained by future discoveries. But even if Abraham should prove to be the local numen of Hebron, as some scholars think, it is significant that tradition made him a contemporary of Hammurapi. This may show that somehow a memory was preserved of an early immigration at this time of ethnic elements counted as belonging to the Habiri, or Hebrews. Though Chedorlaomer's name has not yet been found in any cuneiform inscription, an expedition into Syria by an Elamitish king, accompanied by his vassals, is no longer thought incredible. (See ELAM.) The occasion may indeed have been the spread of Hittite power in Syria (see HITTITES) and the consequent invasion of Egypt by the Hyksos, and the first appearance of the Habiri in Palestine may have been more easily remembered because it came at this important epoch.

Some of the Hebrews in the widest sense seem to have established themselves in the following centuries east of the Dead Sea and in Mount Seir. The fact that not only a list of eight Edomitish kings earlier than Saul, but also of dukes reigning in Edom before them, has been handed down in Genesis xxxvi, may indicate that some of them were settled east of the Arabah (q.v.) long before the tribes of Israel invaded the East Jordan country. They also seem to have overflowed into the Negeb (q.v.). Tradition likewise ascribed to Moab kings at an early date, and Ammon probably settled its land not much later. None of these peoples, though reckoned as kinsmen, were thought of as having gone down into Goshen. There is nothing improbable in the settlement of a part of the Habiri in Goshen, the land southwest of the Negeb extending towards the Nile (see GOSHEN) during the Hyksos period, possibly as early as in the nineteenth century B.C. That Jacob-her appears as the name of one of the Hyksos kings can scarcely be an accident. It would be natural to suppose that these Habiri were driven east of Goshen when the Hyksos were expelled from Egypt and pursued to Sharuhen in 1575 B.C., even though no reliance be placed upon the traditions recorded by Manetho, and that they continued to lead their nomadic life in the land of Midian, having successfully escaped their pursuers to the other side of the Gulf of Akabah. Towards the end of this period some of them seem to have been settled around Kadesh Barnea (q.v.).

Scholars are divided in their judgment as to the great figure to whom tradition ascribed so important a rôle at this time. While some maintain that Moses was the leader of his people from Egyptian territory first to Sinai, then to Kadesh, and finally to the East Jordan country, and an oracle giver with whom at least the Decalogue (q.v.) in its earliest form originated, others regard him as the mythical ancestor of the Levitic priesthood at Kadesh Barnea. No criterion has yet been found by which any part of the Pentateuchal legislation can be separated from its Palestinian background and vindicated as the product of Moses's pen; the story of his life in Exodus and Deuteronomy shows such manifest mythical motives, later recasting and successive expansions, and is at any rate so overlaid with legendary embellishments, that no conclusive verdict can be reached (see PENTATEUCH), and there exists at present no external testimony worthy of consideration. (See MOSES.) But whatever view is taken of Moses's personality, this phase of the nomadic or seminomadic people's life must, in view of the later development of the Yahwe cult fostered by the Levites, be considered as marking an epoch.

2. *The Invasion of Syria and the Judges* (c.1440–c.1050 B.C.).—It may have been at the time of Egyptian weakness after the death of Thothmes III in 1447 that Israelitish tribes invaded the country occupied by the Amoritish kings Sihon of Heshbon and Og of Edrei in Bashan. The memory of this earliest forcible invasion of Syria was preserved in the Song of the Crossing of Arnon (Num. xxi. 14, 15), the Song of the Capture of Be'er (xxi. 17, 18), and the Song of Sihon's Conquests (xxi. 27–30). There is no evidence that these lyrics reflect later historic situations, and our present knowledge of the Amorites (q.v.) has increased the probability of these kingdoms and their overthrow. Three tribes—Reuben, Gad, and Manasseh—took possession of the country north of the Arnon and east of the Jordan, though subsequently Reuben was driven out of the part of Moab once held by Sihon. Other tribes pushed their way across the Jordan, and towards the end of the fifteenth century B.C. the Habiri began to make themselves felt in Palestine, as the Tell el-Amarna tablets (see AMARNA LETTERS) indicate. From the account in Judges i, it is evident that the Canaanite, Amorite, and Hittite population was by no means exterminated, but that the Israelitish tribes wedged their way into the country and only gradually gained the upper hand and secured possession of the land. Cities were indeed besieged and battles fought, but connubial and commercial relations were also established. The transition to agricultural and urban life was necessarily a slow process. A comparison of the Amarna correspondence with the Book of Joshua suggests that the situation presented in the former is earlier than that in the latter.

The battle of Gibeon referred to in an old song taken from a collection called the Book of Jashar (Josh. x. 13) may have been fought c.1350 B.C. Paul Haupt ("Die Schlacht von Taanach," in *Studien Julius Wellhausen gewidmet;* Giessen, 1914) has plausibly conjectured that the famous battle described in the Song of Deborah (Judg. v) took place in 1250 B.C. towards the end of the reign of Ramses II (1310–1244). Six tribes participated in this battle: Naphtali, Issachar, Zebulon, Ephraim, Machir, and Benjamin. These, with Reuben, Gilead, Gad, Dan, and Asher, mentioned in the song, evidently formed the confederacy of Israel. Judah, Simeon, and Levi were apparently not counted as a part of Israel. An Egyptian hymn of victory coming from the fifth year of Meren Ptah (c.1240) describes his conquests in Syria over Hittites, Canaanites, and Israelites. The statement, "Israel, his people are few, his seed exists no more," is, of course, an exaggeration, but may indicate a serious defeat for the confederacy, possibly soon after the battle on the Kishon, while Ramses II was still alive. In the reign of Ramses III (1200–1169) the Philistines, whose home was in Caphtor (Crete), attacked Egypt, and being repulsed settled on the coast of Syria. As long as they were occupied with subduing the Canaanites, they were looked upon by the Hebrews as rendering a good service. See JAPHETH.

The tribes of Israel were exposed to raids from the east by Moabites, Ammonites, Midianites, and Minæans. Against them leaders from one tribe or another went forth with such forces as they could gather. When they were successful, they brought deliverance, respite for a while from similar invasions, and prestige for themselves. Such leaders of bands were called *shofetim*, as they were termed *shapiti* by the Assyrians; in Tyre and Carthage the chief magistrates were designated as *shofetim, suffetes*, and in course of time the heroes of this period—Ehud, Barak, Gideon, Jephthah, and even Samson—appeared in the light of "judges" of all Israel. One of these warriors, Abimelek, became city king in Shechem, but was not able to maintain himself. Sometimes the tribes that constituted Israel made war upon one another (Judg. xix–xxi). When the Philistines had firmly established themselves in their pentapolis, they set out to conquer the whole land that has been named after them Palestine. Israel was subdued, probably in the first part of the eleventh century B.C.

The transition from seminomadic to agricultural life naturally affected the religious ideas and practices. As the various tribes came into possession of fields and vineyards, they felt the necessity of seeking the favor of those local numina, male and female, who were supposed to have given the rain and the sunshine in the past; and as they took over the sanctuaries, the sacred trees and fountains, and the high places, they worshiped there many "lords" (Baalim) and many goddesses (Ashtaroth) whose individual names have not come down to us. The later historians were well aware of the flourishing polytheism of this period, and from their standpoint regarded the foreign invasions, the oppression by enemies, and the general distress of the time as punishments for this worship of many gods. Some peculiar facts, such as the extreme rarity of names compounded with Yahu (see JEHOVAH), have led scholars to question whether this deity was at all worshiped in Israel during this period. But it is significant that the priesthood at Dan traced its descent to Jonathan, a name compounded with Yahwe, and considered this Levite as the grandson of Moses; that the father of Gideon, Joash, has a name of the same type; and that, if any of the extant witnesses to the text can be trusted, Yahwe was used in the Song of Deborah. Since Dan appears to have been set-

tled "where the stream breaks forth" already at the time of the battle of Taanach, it would seem probable that the Levites had been driven from their homes around Kadesh Barnea, perhaps at the same time when the Simeonites were driven out of their cities in the Negeb by the Jerahmeelites, before the middle of the thirteenth century B.C. With the Levites the Yahwe cult may have spread to Dan, Ophrah, Shiloh, and many other centres. There is indeed nothing to prevent the assumption that, in spite of the worship of a multitude of gods, the Yahwe cult was already at this time felt to some extent to be a bond of union between the tribes of Israel. It may, however, have taken a somewhat deeper root in Judah, though we unfortunately know very little about this tribe before David.

3. *The United Kingdom* (c.1050–953 B.C.).—The deliverance from the Philistine yoke came through Saul, a Benjamite, who was proclaimed King by the prophet Samuel (q.v.), and his valiant son Jonathan. Saul seems to have been the first to unite all the tribes of Israel, and it is probable that what was then the tribe of Judah, south of Jerusalem, also formed a part of his Kingdom. This is indicated both by the fact that there were Judæan warriors, like David and his brothers, with Saul, and by the war he fought with the Amalekites in the Negeb. How long Saul reigned is not known, since the text in 1 Sam. xiii. 1, which now reads "Saul was one year old when he began to reign, and he reigned two years over Israel," is manifestly corrupt. He fell in the battle of Mount Gilboa c.1033 B.C. The Philistines regained control of a large part of the Kingdom, but east of the Jordan, at Mahanaim, Saul's son Ishbaal maintained himself for seven years. Meanwhile David (q.v.) had built for himself a kingdom, with Hebron for its capital, made up of heterogeneous elements—Calebites, Kenites, Kenizzites, Jerahmeelites, and Judæans—known as the Kingdom of Judah. After the murder of Ishbaal (c.1026) he came into possession of Israel. His general, Joab, captured for him Jerusalem from the Jebusites, and from this capital his power spread to the adjoining countries. He conquered the Aramæan states of Zobah, Beth Rehob, Ishtob, and Maacah, held the Amalekites in check, and incorporated Edom, Ammon, and Moab in his empire. He was in league with Hamath, Geshur, and Tyre. His son Solomon (c.993–953 B.C.) divided his kingdom into 12 administrative districts, built a royal temple in Jerusalem and many palaces, caused dissatisfaction and serious insurrections by the heavy taxation necessary to carry out his building enterprises, undertook an expedition to Ophir, and had relations with Hiram of Tyre, the King of Egypt (possibly Pesebkhenno II), and the Queen of Sheba, who may have sought an alliance with him against the Minæans. The weakness of the Egyptian, Hittite, Assyrian, and Babylonian kingdoms, and the unusual qualities of Saul, David, and Solomon, made it possible to develop and to maintain for nearly a century this Hebrew power in Syria.

4. *The Kingdom of Israel* (c.953–c.723 B.C.).—Under the leadership of Jeroboam I (c.953–932 B.C.), Israel, forming the bulk of the nation, seceded. Jeroboam made Shechem his capital and showed special favor to the ancient temples at Bethel and Dan. The invasion of Syria by Sheshonk I (c.948 B.C.) seems to have affected Israel as well as Judah. His son Nadab (c.932–930) was overthrown by Baasha (c.930–906), a strong ruler who fixed the capital at Tirza. Ela (c.906–904) and Zimri (c.904–903) were followed by Omri (c.903–872), a very capable ruler, who made Samaria his capital, waged war with Damascus, and conquered Moab, as the Mesha inscription attests. Ahab (c.872–851) gained a notable victory over Damascus, capturing Bar Hadad I and obtaining valuable commercial advantages for Israel in the Aramæan capital. He took part in the coalition of Syrian states against Shalmaneser III, sending 10,000 men to the battle of Karkar (854). His alliance with Tyre was sealed by a marriage to Jezebel, daughter of Ito Baal. The erection of a Melkart temple in Samaria led to the struggle with Elijah (q.v.). Ahab fell on the battlefield at Ramoth-Gilead. His sons Ahaziah (c.851–849) and Jehoram (c.849–843) succeeded him. Mesha of Moab revolted in the time of Jehoram, and a punitive expedition ended in defeat after Mesha had resorted to the sacrifice of his son to save his capital.

The dynasty was overthrown by Jehu (c.843–814), who murdered the Queen mother and many members of the royal family, established the Yahwe cult by massacre of the priests of Melkart and destruction of their temple, paid tribute to Shalmaneser III of Assyria in 842 B.C., and lost the East Jordan country to Hazael of Damascus. Joahaz (c.814–797) was practically a vassal of Bar Hadad II of Damascus. The later weakness of Bar Hadad II, who was defeated by Adadnirari V (812–783) and by Zakir, King of Hamath, allowed Joash (c.797–782) to reconquer much territory in the east and the north. He also fought with Amaziah, whom he took prisoner, and captured Jerusalem. The long reign of Jeroboam II (c.782–740) witnessed further expansion and a sudden accession of wealth that led to industrial slavery of the lower classes. Prophets like Amos and Hosea appeared urging justice and equity and predicting disaster. Zechariah (740) and Shallum (740) could not maintain themselves, Menahem (740–737) only with the support of Assyria. In the time of Pekahiah's (737–735) successor, Pekah (735–734), a league was formed with Rezin of Damascus, and an attempt was made to force Ahaz of Judah to unite with them. He appealed to Tiglath-pileser IV (745–728), who captured the East Jordan country and a part of Galilee. Hoshea (734–725) revolted and surrendered himself in 725, while his city was probably taken, as the Babylonian Chronicle suggests and the Hebrew records declare, by Shalmaneser V, apparently in the year 723. Sargon II (722–705) carried away about 27,290 people. Yet there was a revolt again in 720.

The exiled Israelites were placed in various towns in Mesopotamia and Media. The bulk of Israel unquestionably remained in the land. To take the place of the exiles, four Arabic tribes from Hejaz were sent to Samaria in 715. Later Asurbanipal (668–625) sent deportations from Babylon, Kutha, Sippara, Awwa, and Hamath. The mixed population worshiped many gods, but the Yahwe cult continued and gained in strength. This was no new thing, since the worship of other gods had always coexisted with the worship of Yahwe in Israel. If some of the remaining Israelites felt the attraction of the new gods, many of the newcomers were anxious to learn the manner of the

god of the land to whom the sacred places had belonged. Concerning the Assyrian, and later Chaldæan, Province of Samaria we know very little. The raids made upon the sanctuaries at Bethel and in the cities of Samaria by Josiah (2 Kings xxiii. 15–20), if historical, are not likely to have affected profoundly the religious life. It is not improbable that the later cult community at Shechem (see SAMARITANS) was chiefly made up of old Israelitish families who had adhered to a stricter worship of Yahwe. As for the exiles in Mesopotamia and Media, they were probably absorbed in the native population, though there is no reason to doubt that some of them may have continued, even in a foreign land, to worship Yahwe, and their descendants may subsequently have drifted into communities of Judæan exiles. The search for "the lost ten tribes" has been occasioned by the false conception that the entire population was carried away and yet maintained its ethnic peculiarities, and has been encouraged by fanciful combinations that lack all scientific value.

5. *The Kingdom of Judah* (c.953–586 B.C.).—The secession of Jeroboam and the establishment of the Kingdom of Israel left to the house of David little more than the founder of the dynasty had possessed before the death of Ishbaal. The chief additions were Jerusalem, with the adjoining territory of Benjamin and the suzerainty over Edom. But the fine capital with its temples and palaces, the Negeb with its ancient shrines, the alp land beyond the Arabah with its Judæo-Edomitish population, the traditions of the great rulers, David and Solomon, and the attachment to Yahwe, somewhat stronger in Judah than in Israel, were valuable assets. Rehoboam (c.953–937), whose headstrong policy led to the disruption, saw his capital invaded by Sheshonk I (c.948). This raid, however, does not seem to have had any permanent effect. He left his reduced territory to Abijam (c.937–934). Asa (c.934–877) made an alliance with Bar Hadad I of Damascus. Jehoshaphat (c.877–848) allied himself with Jehoram of Israel and attempted to send an Ophir expedition from Ezion Geber. Jehoram (c.848–845) lost Edom, and Ahaziah (c.845–843) was murdered by Jehu. Athaliah, the daughter of Ahab and Jezebel, reigned c.843–836. By a coup d'état of Jehoiada, a powerful priest, Joash came into power (c.836–796). He was assassinated, as was his successor, Amaziah (c.796–777), who reconquered Edom. Uzziah (c.777–737) seems at first to have been a vassal of the King of Israel, Jeroboam II. He became a leper, and Jotham was appointed coregent. After his death Jotham reigned alone (c.737–735). In the time of Ahaz (c.735–715) Pekah and Rezin threatened Judah, to force this state into the union against Assyria, but Ahaz preferred to pay tribute to Tiglath-pileser IV, before whom he appeared in person at Damascus (732 B.C.). His reign probably saw both the humbling of Israel by this Assyrian King and the final capture of Samaria by Shalmaneser V in 723 and Sargon II in 720. Hezekiah (c.715–686) may have been in league with Ashdod against Assyria in 711, and certainly received an embassy from Merodach Baladan (Mardukapaliddin) of Babylon and took part in a general revolt which led to Sennacherib's invasion in 701.

The influence of the prophet Isaiah was strongly felt in the reigns of Ahaz and Hezekiah, and Micah also appeared at this time. A reaction against the teaching of these prophets took place in the days of Manasseh (c.686–639). He seems to have adopted a policy of submission to Assyria, favored Assyrian customs, and given much offense to the prophets and their followers by introducing new features into that polytheistic worship which had never been suppressed in Judah. As his reign was long, peaceful, and prosperous in spite of this policy, it was quoted a century later, by those who preferred other gods, as an evidence against the profitableness of worshiping Yahwe. (See JEREMIAH.) His son Amon (c.639–637) was followed by Josiah (c.637–608). In 625 the Scythians, having come to the rescue of their allies, the Assyrians, by relieving the siege of Nineveh, swept on through Syria to punish Psammetichus I, who had invested Ashdod, a city over which Assyria claimed authority. Jeremiah and Zephaniah interpreted their coming as betokening Yahwe's purpose to punish through them the people of Judah for their sins. In 620 a law book was found in the temple (see DEUTERONOMY) which caused Josiah to destroy other sanctuaries and kill their priests, while centralizing the Yahwe cult in Jerusalem. He died in the battle of Megiddo, defending his Assyrian liege lord against the invasion of Necho II of Egypt. His son Jehoahaz (c.608) was made King by the people, but removed by Necho II after three months. The Egyptian King then made another son of Josiah, Jehoiakim, ruler (c.608–597). In collecting the tribute imposed by Necho he had resort to a taxation so heavy as to be oppressive, and yet he undertook to build by forced labor a palace ceiled with cedar and painted with vermilion, for which he was severely censured by Jeremiah. The prophet Uriah was slain for rebuking the King. It may have been after a battle at Carchemish between Necho and Nebuchadnezzar II of Babylon (probably in 605) that Jehoiakim paid tribute for three years to the Chaldæan King; then he revolted, though Nebuchadnezzar did not have opportunity to undertake his punishment until 597. He escaped, however, the fate foretold by Jeremiah and intended by Nebuchadnezzar, as he died in peace at Jerusalem; but Jehoiachin (597) was carried away to Babylonia with 10,000 citizens of Jerusalem (2 Kings xxiv. 14).

Zedekiah was made King. He entered into a league with Apries (Hophra) of Egypt, and there was a strong party in Jerusalem who favored armed opposition to the Chaldæan suzerain. Jeremiah was persecuted for denouncing this policy, but his fears were realized. After an unsuccessful sortie Zedekiah was captured, saw his sons killed before him, and was then blinded. The city was bravely defended, but finally taken in 586; 74 prominent men were put to death by Nebuchadnezzar, 834 were carried away captive from Jerusalem in 586, and possibly 3023 Jews from the surrounding country in the same year, if 7 is an error for 17 in Jer. lii. 28, as Ewald suggested, and finally 745 Jews were carried away by Nebuzaradan in 581, probably after another insurrection (Jer. lii. 29–30). Either in 586 or in 581 the temple was burned with fire. Gedaliah was made Chaldæan governor of the land in 586 and took up his residence at Mizpah, but was slain two months later by Ishmael b. Nethaniah of the seed royal. Under the leadership of Johanan b.

Kareah some Jews fled to Egypt and settled at Tahpanhes for fear of the consequences of this murder. The number is not given, but it can scarcely have included "all the remnant of Judah," as 745 Jews were deported to Babylonia in 581; and it is thought by some scholars that, even after these deportations and emigrations, the bulk of the population of the Kingdom of Judah still remained in the land under Chaldæan rule.

6. *The Chaldæan and Persian Periods* (586–332 B.C.).—The fall of Jerusalem, the destruction of the temple, the overthrow of the Davidic dynasty, and the deportation or flight of thousands of citizens threatened the Jewish people with extinction. It was saved by the fact that these things had been foreseen by the prophets. Their oracles were proved true by the events, and this enhanced their prestige; their conception of Yahwe, his justice, indifference to the cult, and purely ethical demands, tended to give assurance that their religion could live, even though the temple was gone, and "the remnant" they foresaw might turn to Yahwe, preserve its distinctness, and gain prosperity, even though the independence of the nation was lost.

When Amil Marduk in 561 removed Jehoiachin from his prison and "set his throne above the thrones of the kings that were with him in Babylon" (2 Kings xxv. 28), new hopes were aroused, and it is thought by some scholars that it was the birth of a child to this scion of the long-lived Davidic dynasty that inspired the pictures of the coming monarch in Isa. ix. 1–6; xi. 1–10. Collections of prophecies were made, and to the ancient denunciations many a word of good cheer was added. The Pentateuch in its earliest form, as a connected whole, beginning with the stories of Genesis and ending with the laws and exhortations of Deuteronomy, is likely to have appeared at this time, though many changes and additions may belong to a subsequent period. (See PENTATEUCH.) In Nabunaid's reign (556–539) the career of Cyrus filled the Jews everywhere with lively expectations. These may be seen in Isaiah xiii–xiv, xxi and, in the opinion of many scholars, also in xl–lv, though the references to Cyrus here may possibly be secondary. (See ISAIAH.) In December, 539, Babylon fell into the hands of Cyrus. In 537 he is said to have given permission to the Jews to return to Palestine. Their condition was such (see BABYLONIAN EXILE) that it is extremely doubtful whether a considerable number took advantage of this opportunity. Furthermore, there is no hint of returned exiles in the prophecies of Haggai and Zechariah, and Neh. i. 2, 9 clearly indicate that in the fifth century B.C. the inhabitants of Jerusalem were regarded as "those remaining there after the captives had been carried away."

But in the time of Darius Hystaspis the temple was rebuilt. This sanctuary, which was less magnificent than Solomon's temple, but became the home of a purer worship, was completed in 516. Zerubbabel was then Persian governor, and from Zechariah's prophecies it may be inferred that certain hopes of national independence clustered around this Davidic descendant, so that even a golden crown was sent from Babylonian Jews for the coronation. What became of Zerubbabel is not known. In the twentieth year of Artaxerxes, Nehemiah was sent as governor to Jerusalem with authority to rebuild the walls of the city. The Elephantine Papyri (q.v.) have rendered it probable that his sovereign was Artaxerxes I, and consequently the year of his appointment 445 B.C. In spite of many obstacles he succeeded in accomplishing his purpose. Ezra (q.v.) obtained permission from Artaxerxes to return with a company of his countrymen, 1754 in number, in the seventh year of the King's reign. As only the name is given and there were three kings with this name, it is not certain whether Artaxerxes I is meant or Artaxerxes II. Most scholars think of the former, but there is much to be said in favor of the latter. The date would be either 458 or 398. Ezra is described as "the writer of the Law." This may mean anything from a mere copyist to an author; it quite probably indicates that he not only copied the Pentateuch as it was in his time, but also amplified and edited it. This law book seems to have been adopted as the official code. According to Josephus (*Ant.*, xi, 7), the temple was defiled and many Jews enslaved by Bagoses (or Bagoas), probably in 383; and an early chronologist (preserved in Syncellus, i, 486) tells of the participation of the Jews in the insurrection against Artaxerxes III and the exile of many to Hyrcania by the Caspian Sea and to Babylonia (c.350 B.C.). The fortification of the city by Nehemiah and the national feeling engendered by Ezra's measures against mixed marriages prepared the way for this rebellion. Characteristic of the period was the development of a theocratic form of government with the high priest for its head and the Pentateuch as the law of the land. This theocracy was more democratic than the earlier monarchical régime. While the Book of Ezekiel, sections of the Book of Isaiah, and the Memoirs of Nehemiah and Ezra, as well as some cuneiform documents, allow us to catch glimpses of the life of the exiles in Susa, Babylon, and Nippur, on the Chebar and the Ahava, the Elephantine Papyri have given us a more intimate knowledge of a Jewish community at the southern end of Egypt, having its own Yahu temple, its syncretistic form of religion, its peculiar standards and customs, while in contact with both Jerusalem and Samaria and cognizant of what was going on in these places; and these papyri are dated in various years of the fifth century B.C.

7. *The Macedonian Period* (332–143 B.C.).—Alexander met with serious resistance in Syria only at Tyre and Gaza. The Jews submitted quietly to the new ruler. There is no real evidence that he visited Jerusalem, but it cannot be said to be improbable. His policy resembled that of Cyrus. He was prepared to conciliate the nations he conquered and permitted them to retain as much liberty as was consistent with a recognition of Macedonian supremacy. This liberty was extended to the religious cult, with which Alexander was careful not to interfere. In fact, he seems to have been particularly anxious to visit famous shrines and to gain the favor of influential priesthoods. He may have learned something concerning the Jews through his teacher Aristotle and been curious to see their sanctuary. After Alexander's death his empire went to pieces, and his generals fought for the several parts. Laomedon at first secured the satrapy of Palestine and Phœnicia, but Ptolemy, the son of Lagus, who had become satrap of Egypt, dispossessed him in 320 B.C. Antigonus deprived him of these provinces in

315, but they were restored after the battle of Ipsus in 301 to Ptolemy, who in 305 had assumed the title of King. Many Jews left Palestine for Egypt in the time of Ptolemy I, and soon the Jewish colonies in Egypt far outnumbered those in Babylonia.

The Egyptian dispersion, destined to be of vast importance in the development of Judaism and Christianity, gradually spread from the delta in the north to the boundaries of Ethiopia in the south, over Cyrenaica to the territory of Carthage. The Jews in Alexandria are said by Josephus (*Ant.*, xii, 3, 1) to have enjoyed equal political rights with the Macedonians. Duchesne (*Origines du culte chrétien*, p. 2; Paris, 1889), Willrich (in *Beiträge zur alten Geschichte*, vol. iii, pp. 403 ff.; 1903), and Wellhausen (*Israelitische und jüdische Geschichte*, pp. 225 ff.; 7th ed., Berlin, 1914) maintain that Josephus has used a misleading term to indicate the privileges of religious freedom and separate jurisdiction which they enjoyed, and that they could not have had the citizen's franchise and a share in the government, since they were unwilling to take part in the official cult. On the other hand Schürer (*Geschichte des jüdischen Volkes*, vol. iii; Leipzig, 1909) holds the testimony of Josephus and Philo to be decisive and thinks of the Jews as forming separate *φύλαι*, *phylai*, not bound to observe the official religious ceremonies in exercising their rights as citizens. The decision is difficult. There can be no doubt, however, that they often rose to high positions in the state. Their artisans and workmen were held in esteem. While there is no record of any Jew having occupied a chair in the University of Alexandria, the fact that it was a Museum, a temple to the muses, with an officiating high priest, may have served as a bar. A somewhat extensive literature seems to have been produced, including the Greek translation of the Hebrew Scriptures, begun in the reign of Ptolemy II Philadelphus (285–247), a work of extreme difficulty and of very great importance. This version naturally estranged the people more and more from the language of the fathers; it became a standard of style as well as an authority in matters of faith and gave rise to a large number of religious or philosophical writings. As Palestine was a province of Egypt until 200 B.C. the Hellenizing influence was felt even among the Aramaic-speaking Jews there, especially in Jerusalem. It makes itself noticeable in the wisdom literature. Ptolemy III (247–221) was favorable to the Jews, but Ptolemy IV (221–204) seems to have reversed this policy.

Ptolemy V (204–181) lost Palestine and Cœle-Syria after his general, Scopas, had been defeated by Antiochus III at Panium in 200 B.C. The Jews were treated less generously by the Seleucid rulers than by the Ptolemies. Seleucus IV (187–175) sent Heliodorus to plunder the temple in Jerusalem (2 Macc. iii. 7–40). At this time a priestly family, the Tobiads, rose to power and influence, vying with the high-priestly family of the Oniads. When Antiochus IV Epiphanes (175–164) came upon the throne, Onias III was forced to flee to Antioch, and the Tobiads supported against him his brother Jason, who sought the King's favor by introducing Hellenic customs, but after three years (174–171) was overthrown. Menelaus, a member of the Tobiad family, was then recognized by Antiochus as high priest and continued to further the Hellenizing process. The aristocracy of Jerusalem fell in with the King's strong desire that Greek customs, and even Greek religion, should everywhere in the empire supplant what appeared to him as barbarous ideas and practices. But the rivalry of the parties for position caused a revolt in favor of Onias. Menelaus, however, was reinstated by Antiochus on his return from his first Egyptian campaign in 169 and remained in office until 162. The King entered the temple and confiscated some of its treasures as punishment for the rebellion. The following year, after he had been humiliated in Egypt by Popilius Lænas, he sent Apollonius to take further measures. His force must have met with opposition, for the walls and some of the houses were torn down, many were put to death, and others fled, leaving only the "apostates," i.e., the Hellenists and the foreigners. The Akra, or citadel, was rebuilt and provided with a garrison. The temple was partly destroyed and then dedicated to Zeus Olympius, whose altar, or image, was placed on the great altar of Yahwe. A royal decree was sent from Antioch ordering the cessation of the Yahwe cult, prohibiting the celebration of sabbaths and festivals, as well as the performance of circumcision, and commanding that all copies of the Law be delivered up and burned. Altars were built in every village, images of the gods erected, and the Jews were forced to offer impure sacrifices and to observe Greek rites. This took place in 168.

But deliverance came through Mattathias, son of Johanan, of the family of the Hasmonæans, and his three sons—Judas, surnamed Maccabæus, Jonathan, and Simon. Mattathias lived at Modein, near Lydda. When called upon to sacrifice to the Greek gods, he refused and slew the first Jew who complied. With a band of followers determined to defend themselves even on the Sabbath, he began a rebellion which was continued, after his death in 166, by Judas. Judas defeated Apollonius, then Seron at Beth-Horon, then Nicanor and Gorgias at Emmaus, and finally Lysias himself in 165. The city of Jerusalem was taken, and the temple rededicated to Yahwe in December, 165, though the citadel remained in the hands of the Seleucids. After the death of Antiochus IV an attempt to capture the Akra itself forced Lysias to action. He defeated Judas at Beth-Zechariah, took Beth-Sura, and besieged the temple mountain in 163. The Jews suffered much, but Lysias treated them generously; Menelaus was deposed, and Alcimus made high priest in 162. This last high priest of the Zadokite line was driven away by the Maccabees; Nicanor was sent with an army to reinstate him, but was defeated in March, 161, at Adasa. It was probably in 160 that Judas fell in a battle with Bacchides at Elasa. Jonathan became the leader. He sided with Alexander Balas (q.v.) and was made high priest in 152 and meridarch at the wedding of Alexander and the Egyptian princess in Ptolemais in 150. He fought for Balas until 145 and then sided with Demetrius, whom he defended with 3000 men in his own capital and who recognized his position. Subsequently he left Balas for Trypho and drove the troops loyal to Demetrius out of Ashkelon, Gaza, and Beth-Sura. Finally, Jonathan was suspected and arrested by Trypho, who later executed him at Baskama. The full independence of Judæa was effected by his successor, Simon.

8. *The Hasmonæan Period* (143–63 B.C.).—On the coins which signalize the sovereignty of the Hasmonæan rulers 170 Sel., i.e., 143/2 B.C., is counted as the first year of Simon. It was not, however, until 141 that the Akra was captured and the Seleucid garrison driven out. But he was the founder of the dynasty, and events were dated in the years of his reign as in ancient times. He made a treaty with the Romans and cared for his people, until he was murdered at Dok by his son-in-law Ptolemy in 135. His son John Hyrcanus (135–104) was attacked by Antiochus VII Sidetes in 130, and Jerusalem was forced to capitulate, the walls were razed, Joppa and Gezer were ceded, and John must take part with Antiochus in the Parthian campaign, from which he probably gained his surname Hyrcanus. But Antiochus lost his life and his eastern provinces in 129, and John Hyrcanus was able not only to recover independence, but also to increase the boundaries. He conquered Medaba and Samaga, subdued Shechem, and is said to have destroyed the temple on Mount Gerizim; and he took possession of Idumæa, i.e., the territory south of Judah, and forced the inhabitants to become circumcised. With the aid of the Romans he also maintained himself against Antiochus IX and conquered the Greek city of Samaria. His son Aristobulus I (103–102), who assumed the title of King, conquered some Ituræans and forced them to adopt the Jewish religion. His brother Alexander Jannæus (102–75) extended the borders of Judah in the Philistine plain and the East Jordan country. His kingdom compared favorably with that of David, for while the ancient territory of Edom was now in the hands of the Nabatæans, the powerful Philistine cities now Hellenized were, with the exception of Ashkelon, conquered or held by him. The Pharisaic party called in Demetrius III Eucerus and with the aid of the Macedonian soldiers defeated their King in battle (88 B.C.), but 6000 men deserted from the camp of the victors and defeated the rest. Alexander crucified 800 Pharisees as a punishment, and then went forth on new campaigns, from which he returned in triumph three years later. He advised his widow, Salma Alexandra (75–67), to live in peace with the Pharisees. This she did and governed prudently for nine years. In her time probably falls the organization of the Sanhedrin (q.v.) as a "collegium" having among its members scribes and Pharisees. Alexandra's sons Hyrcanus II and Aristobulus II (67–63) became rivals. As Alexandra could not be high priest, Hyrcanus had during her reign occupied this position. Since he was the first-born he became King, but after a few months Aristobulus conquered him with Arab troops and made himself ruler. Hyrcanus, however, at the instigation of Antipater, an Idumæan, the father of Herod, fled to the Nabatæan King Aretas, who was induced by the promise of a cession of the territory that had been acquired by Alexander Jannæus to take up arms on his behalf. This led to the interference of the Romans, who were then fighting both in Syria and Armenia. Jerusalem was captured in 63 B.C. by Pompey, who had decided in favor of Hyrcanus, and Judæa was made dependent on the Roman Province of Syria.

The Maccabæan uprising and the Hasmonæan kingdom were of great importance for the future of the Jews. They awakened a keen national sentiment. Not only freedom had come, but also power. The little people felt itself to be in the midst of the conquest of the world. In vain would the nations rebel against Yahwe and his anointed, the King in Zion. If he was not of the seed of David, Yahwe had placed him on the throne of David, and the promises to David applied to him; if he was not of the seed of Aaron, he had the zeal of Phinehas; he was a king and priest after the order of Melchizedek. The Psalter reflects the eschatological mood. Out of this grew the hope of a future Messiah, either a king who should be a genuine descendant of David (cf. the Psalms of Solomon), or a priestly ruler, a descendant of Aaron and Israel, as the Covenanters of Damascus desired. (See JEWISH SECTS.) A new zeal for the Law also developed as a consequence of the attempts by enemies of the Jewish religion to destroy this treasure. This created an eagerness to collect and edit all other sacred books. The perils passed of a Hellenization that would have robbed the Jews of their distinctive religious life without enabling them to make any other contribution that could compensate for so serious a loss.

9. *The Roman Period* (63 B.C.–395 A.D.).—Pompey established the Roman power in Syria. Hyrcanus was appointed ethnarch and high priest. Aristobulus, his two sons, Alexander and Antigonus, and two daughters were carried captive to Rome. In 54 B.C. Crassus plundered the temple, which Pompey had piously spared. He fell shortly afterward in the war against the Parthians, and his companion, Cassius Longinus, succeeded in completely routing the army of Aristobulus, who had been released by Cæsar. Meanwhile the war between Cæsar and Pompey broke out. In Syria the partisans of the latter were numerous and contrived to poison Aristobulus and execute his son Alexander, who were Cæsareans (49 B.C.). After the death of Pompey, however, Hyrcanus, or rather Antipater the Idumæan (who was both his minister and master), saw the necessity of securing the favor of Cæsar. With Hyrcanus II ended the line of Hasmonæan princes, who had exercised, at least nominally, supreme authority both in the civil and religious affairs of Palestine, though in the time of Alexandra the real religious authority had passed into the hands of the priesthood, and especially of the Sanhedrin. The Idumæan (Herodian) dynasty, which succeeded the Hasmonæan, virtually commenced with Antipater, who prevailed on Cæsar to restrict Hyrcanus to the high-priesthood and obtained for himself the office of procurator of Judæa, while his eldest son, Phazael, was appointed governor of Jerusalem, and his youngest son Herod governor of Galilee. The Jewish or National party took alarm at this sudden increase of Idumæan power, strife ensued, and ultimately Antipater perished by poison; but Herod, by the assistance of the Romans, finally entered Jerusalem in triumph (37 B.C.) and caused Antigonus, the last male representative of the Hasmonæan line and his most dangerous enemy, to be put to death.

After Herod's death (4 B.C.) Archelaus, one of his sons, ruled Judæa, Samaria, and Idumæa as ethnarch; Antipas, another son, became tetrarch of Galilee and Peræa; and a third son, Philip, became tetrarch of Trachonitis. But the arbitrariness and cruelty of Archelaus made him hateful to the people, and Augustus, listening to their just complaints, banished him to Vienne in Gaul (6 A.D.). Judæa was now

ruled by Roman procurators. During the government of the first of these, Coponius, the party of the Zealots arose among the Jews, founded by Zadok and Judas of Galilee, who protested against the taxes imposed by the Roman government as a sinful servitude. In 28 A.D. John the Baptist appeared as a prophet. He was suspected of political motives, wrongly no doubt so far as he was himself concerned, though some of his disciples may have cherished ambitions for him, and he was put to death by Herod Antipas in 29 A.D. Already before the death of Herod, probably in 6 B.C., Jesus of Nazareth had been born. After the death of John the Baptist he appeared independently as a prophet, proclaiming the advent of the kingdom of heaven on earth and set forth and illustrated the principles of righteousness implied in God's government over human society. He did not favor rebellion against Roman rule and apparently had no ambition to become a Messiah or King of Israel, but was wrongly charged with this and put to death under Pontius Pilate. The precise year when this event occurred, which has had an incalculable influence on the history of the Jews, is not known, but it must have been between 29 and 36 A.D.

In the year 38 the Emperor Caligula issued an edict ordering divine honors to be paid to himself as Cæsar. Everywhere throughout the Roman dominions the Jews refused to obey. The order was given to Petronius, the Roman governor of Syria, to use violence if necessary in setting up the statue of the Emperor in the temple at Jerusalem. At Alexandria a massacre took place, and for a moment it seemed as if all the inhabitants of Judæa, too, were doomed to perish; but Herod Agrippa I, tetrarch of northern Palestine and a friend of Caligula, dissuaded the Emperor from carrying out his design. Petronius did not enforce the Emperor's order and escaped punishment through the murder of Caligula in 41. The accession of Claudius, on the assassination of Caligula, seemed the dawn of a brighter day. Herod Agrippa, a loyal friend and favorite of the new Emperor, obtained the dominion over all the parts once ruled by his grandfather Herod, and many privileges were through his influence granted to his Jewish subjects and even to foreign Jews. They received the rights of Roman citizenship (41 A.D.), and Herod even tried to conciliate their religious prejudices by the strictness with which he observed their law; yet the National party remained in an almost permanent state of mutiny, while the followers of Jesus suffered persecution at the hands of Herod. After the death of Herod Agrippa I, his son being but a youth of 17, the country was again subjected to Roman governors. The land was overrun by robbers and assassins, some of whom professed to be animated by religious motives, while others were mere ruffianly freebooters and cutthroats; the antipathy between Jews and Samaritans waxed fiercer and fiercer, and the latter waylaid and murdered the orthodox Galileans as they went up to worship at Jerusalem; all sorts of impostors, fanatics, and pretenders to magic made their appearance; the priesthood was riven by dissensions; and the hatred between the populace and the Roman soldiery (mostly of Græco-Syrian origin) increased. In 66, in spite of all the precautionary efforts taken by Agrippa, the party of Zealots burst into open rebellion, which was terminated (70) by the conquest of Jerusalem by Titus, the destruction of the temple, and the massacre and banishment of thousands of Jews, who were scattered among their brethren in all parts of the world. The defense of Jerusalem, as narrated by Josephus, is a magnificent example of heroism. Considerable numbers were allowed to remain in their native country, and for the next 30 years, although both hated and treated with rigor, they appear, on the whole, to have flourished. The Emperor Nerva was lenient to them as to the rest of his subjects, but as soon as they had attained some measure of political vitality their turbulent spirit broke out anew. Their last attempts to throw off the Roman yoke, at Cyrene (115), Cyprus (116), Mesopotamia (118), and Palestine under Simon Bar Cochba (132–135), were defeated after enormous butchery. The suppression of Bar Cochba's insurrection by the capture of Bethar, the great stronghold of the Jews (135), marks the final desolation of Judæa and the dispersion of its inhabitants. The whole of Judæa was laid waste, and it is said that about 985 towns and villages lay in ashes, and 50 fortresses were razed to the ground; the new city founded by Hadrian on the site of Jerusalem was named Ælia Capitolina, and on the site of the temple a sanctuary in honor of Jupiter Capitolinus was erected, containing an equestrian statue of the Emperor Hadrian. The hardships to which Jews were subjected were again alleviated in the reign of Antoninus Pius (138–161), whom the Jewish writers represent as secretly attached to their religion. Heliogabalus (218–222) patronized Jewish practices, such as circumcision and abstinence from swine's flesh. Alexander Severus (222–235) also placed Abraham on the same level as he did Christ and obtained from the grateful people the title of "father of the synagogue." Generally speaking, from the close of the second century till the establishment of Christianity under Constantine, when their hopes were once more dashed to the ground, the Jews of the Roman Empire appear to have prospered. In this period falls the redaction of the chief code and basis of the oral Law, the Mishna, completed by Jehuda Hanasi (the prince), or Hakadosh (the holy), president of the great school at Tiberias (150–210)—upon which code were grafted subsequently the two gigantic commentaries or complements, the Palestinian and Babylonian Gemaras.

The Babylonian Jews were even more fortunate than their western brethren, though they did not perhaps attain the meridian of their prosperity till the establishment of the Persian dynasty of the Sassanids in 226, after the downfall of the Parthian dynasty. Their leader was called the Prince of the Captivity and was chosen from among those held to be descended from the house of David. He lived in great splendor and was even permitted to exercise political functions in the Jewish community. The Jews of Babylonia were wealthy and pursued all sorts of industrial occupations. They were merchants, bankers, artisans, husbandmen, and shepherds and had the reputation of being the best weavers of the famous Babylonian garments. The reputation for learning of the Babylonian schools, Nehardea, Sura, and Pumbeditha, was very great. Their condition at this time farther east is uncertain, but it seems possible that they had obtained a footing in

China at quite an early date. They were discovered there by the Jesuit missionaries of the seventeenth century, especially at Kai-fong-fu, where they had a large synagogue. They followed in their prayers and observances rabbinical Judaism, having remained in close connection with their brethren in Persia. The tablet inscriptions in their synagogues were in the Persian language. In 1901 certain Jews in Shanghai entered into communication with the very few who had preserved their identity. In Europe the ascendancy of Christianity proved baneful to the condition of the Jews. Imperial edicts and ecclesiastical decrees vied with each other in the rigor of their intolerance towards all who did not accept Christianity. The Jews were prohibited from making converts, from invoking (in Spain at least) the divine blessing on the country, from marrying Christian women or holding Christian slaves; they were burdened with heavy taxes; yet despite persecution, they seem to have flourished. They are found in large numbers in Illyria, Italy, Spain, Minorca, Gaul, and the Roman towns on the Rhine; they were agriculturists, traders, and artisans and held land. Constantius, during whose reign a fierce insurrection incited by his Coregent Gallus broke out among the Arians and Jews (353), terms them, in a public document, "that most hateful of all people"; yet in spite of this we find them filling important civil and military positions and exercising the influence that springs from the possession of wealth and knowledge. The brief rule of Julian (361–363) even shed a momentary gleam of splendor over their destinies, and he appears to have favored the rebuilding of the temple at Jerusalem. The death of the Emperor frustrated this plan. The establishment of Christianity as the official religion of the Empire in 378 and the suppression of all other forms of religion exposed the Jews to serious persecutions. When Theodosius died in 395 and divided his empire between his two sons, Arcadius and Honorius, the Jews in the East, except those under Sassanid rule, became subject to the Emperor in Constantinople, those in the West to the Emperor in Rome.

10. *The Byzantine Period* (395–622).—Within the Byzantine Empire the Jews were subject to much restrictive legislation and were frequently harassed by their Christian neighbors. In 418 they were excluded from the military service; in 429 the patriarchate at Tiberias was abolished; in Egypt the Jews as well as the pagans were persecuted by Cyril of Alexandria. In the time of Justinian (527–565) there were constant struggles between Christians and Samaritans as well as between Christians and Jews, and the Emperor issued decrees against both. It is interesting to observe that he recommended the oldest Greek version, permitted the use of Aquila, but forbade the elders to give the haggadic exposition after the reading of the lesson from the Law. In Italy, Sicily, and Sardinia the Jews were for the most part unmolested. In the sixth and seventh centuries the Franks and the Visigoths in Spain inflicted on them frightful persecutions. In Persia the Jews were treated well under Sassanid rule. After the destruction of Jerusalem by Titus many fugitives had settled in Arabia, and by the year 300 they had become quite powerful in Yemen and elsewhere. About 360 the Aksumite King Ela Amida conquered Yemen. When he was driven out in 378, Jewish influence became paramount. The Himyarite kingdom of Dhu Nuwas was a Jewish kingdom. It was overthrown in 525 by Elesbaha, King of Aksum (see Ethiopia), with the aid of the Sabæan and Hadramautian rulers. This gave the Christian religion a firmer hold on South Arabia and probably drove some of the Jewish communities farther north.

11. *The Jews in the Moslem World* (622–).—At first Jewish tribes around Mecca and Medina were favorably regarded by Mohammed, but when it became evident that they would not accept Islam, they had to pay dearly for their loyalty to their own faith. Mohammed subdued the Khaibar tribes in 627, and most of the Arabian Jews removed to Syria and Mesopotamia. The spread of Mohammedanism through western Asia, the Mediterranean regions, Africa, and Spain was, nevertheless, advantageous to the Jews. Excepting incidental persecutions, such as those in Mauritania (790) and in Egypt (1010), they enjoyed under the caliphs and Arabian princes comparative peace. In Moorish Spain their numbers increased greatly, and they became famous for their learning, as well as for commercial and industrial activity. They were husbandmen, landed proprietors, financial administrators, counselors, secretaries, astrologers, or physicians to the rulers, and were untrammeled in the exercise of their religion. This period may well be considered the golden age of Jewish literature. Poets, orators, and philosophers arose among them, and to them and the Arabs is due no small share in the preservation and subsequent spreading of ancient classical literature, more especially philosophy, in Europe. In Babylonia the Jews were also for a long time treated well by the Ommiad and especially the Abbaside caliphs. But as the caliphate passed into the hands of rulers hostile to them, persecution began even there. Before the end of the eleventh century the rabbinical schools were closed, the best of the community had fled to Spain, and those that remained were reduced to an abject condition from which they have never risen. In Italy, where they were settled in large numbers in Bari, Taranto, and Otranto, their position was made tolerable by pecuniary sacrifices.

The spread of the Turkish power came to the Jews in Asia Minor as a relief from the persecutions that had been started by the Byzantine Emperor Basil II (957–1025) and continued by several of his successors. The Crusades brought sufferings not only to the Jews of the Occident, but also to those who were found in the East. After the fall of the Byzantine Empire in 1453 the Jewish communities began to grow in its chief cities, the Osmanli Turks granting them freedom of worship, though often withholding from them other rights, such as that of purchasing and holding real estate. They were allowed to reopen their schools, to establish synagogues, and to settle in all the commercial towns. Among the Jews expelled from Spain at the end of the sixteenth century many found their way to the Levant. There are to-day considerable communities in Constantinople, Adrianople, Smyrna, Aleppo, Damascus, and other cities. In Palestine they are rapidly increasing. Only a minority can now trace their descent to the refugees from Spain in the time of Isabella I; the majority are recent immigrants from eastern Europe, Bohkara, and Yemen. There may be 100,000 Jews in Palestine to-day, more than one-half of them in the city of Jerusalem.

In spite of the efforts of their European and American brothers to ameliorate their condition, most of them are very poor. Much has been done in recent years to furnish educational facilities and opportunities for economic betterment to the rising generation. The number of Jews in Arabia is not very large, yet they enjoy some independence. Those in Persia have in the last centuries sunk into ignorance through oppression and the general sluggishness prevailing in that country. Jews are found in Afghanistan and carry on trade between Kabul and China, and in Bokhara, where they possess equal rights with the other inhabitants and are skilled in the manufacture of silks and metals. They are also found in considerable numbers in Tunis, Algiers, Tripoli, and Morocco, where they have had colonies for perhaps more than 1000 years, which were largely reënforced in consequence of the great Spanish persecutions. They are especially numerous in Fez and Morocco, though they are often shamefully treated. In Egypt they are comparatively few in number at the present time, the only important communities being in Alexandria and Cairo. On the Abyssinian Jews, living in the midst of a Christian population itself surrounded by Moslem neighbors, see FALASHAS.

12. *The Jews in Mediæval and Modern Europe* (622–).—While Mohammed was making his appeal to the Jews of Medina, their brethren were suffering for their faith in Spain, defending it in Italy, and seeking converts for it in Russia. They were destined to be relieved of their sufferings and have a long period of prosperity in Spain through the influence of the faith Mohammed preached, to buy toleration in Italy in an age which saw papacy reach the climax of its power, and to make converts to their own faith of the whole kingdom of the Chazars, the greatest power in Russia. As they pushed their way from land to land in Europe their career was almost everywhere one of alternating prosperity and adversity, toleration and bitter persecution. Their lot in *France* during the eighth and ninth centuries was quite favorable, especially in Paris, Lyons, Languedoc, and Provence. They possessed lands and houses and, in the south, held public offices. Their Talmudic schools flourished. At the court of Louis le Débonnaire (814–840), who maintained as a principle the obligation to protect all his subjects, irrespective of their faith, they acquired great influence. Before long, however, under his successors, kings, bishops, feudal barons, and even the municipalities joined in a carnival of persecution. From the eleventh to the fourteenth century, especially during the religious excitement wrought by the Crusades, their history is a series of massacres. All manner of wild stories were circulated against them; it was said that they were wont to steal the Host and to stick it contemptuously through and through, to inveigle Christian children into their houses and murder them, to poison wells, etc. Occasionally their debtors, high and low, had recourse to what they called Christian religion as a very easy means of getting rid of their obligations. Thus Philip Augustus (1180–1223), under whose rule the Jews seem to have held mortgages of enormous value on the estates of church and state dignitaries, simply confiscated the debts due to them, forced them to surrender the pledges in their possession, seized their goods, and banished them from France; the decree appears to have taken effect chiefly in the north; yet in less than 20 years the same proud but wasteful monarch was glad to let them come back and take up their abode in Paris. Louis IX, who was a very pious Prince, among other religious acts canceled a third of the claims which the Jews had against his subjects, "for the benefit of his soul." An edict was also issued for the seizure and destruction of their sacred books, and we are told that at Paris (1242) 24 carts filled with copies of the Talmud, etc., were consigned to the flames. In the reign of Philip the Fair they were again expelled from France (1306) with the usual accompaniments of cruelty; but the state of the royal finances rendered it necessary, 10 years later, under Louis X, to recall them; and they were allowed to enforce payment of the debts due to them, on condition that two-thirds of the whole should be given up to the King. The semireligious disorders, known as the rising of the shepherds, which broke out in Languedoc and the central regions of France (1321), were signalized by horrible massacres of the Jews. (See PASTORELS.) In the following year the plague broke out, and the wildest crimes were laid to their charge. They were held responsible, likewise, for the Black Death which appeared in 1348. In whole provinces every Jew was burned. At Chinon a deep ditch was dug, an enormous pile raised, and 160 of both sexes burned together. Yet Christianity never produced more resolute martyrs than these Jews, who met their tortures chanting hymns of rejoicing. Finally, Sept. 17, 1394, they were indefinitely banished from central France.

The first appearance of the Jews as traders in *England* dates from the period of the Saxons. They are mentioned in the ecclesiastical constitutions of Egbert, Archbishop of York, 740. The first real settlement was made under William the Conqueror, who, with his son William Rufus, favored them; the latter, on the occasion of a public debate between them and the Christians, even swore with humorous profanity that if the rabbins beat the bishops, "by the face of St. Luke" he would turn a Jew himself. The same reckless monarch carried his contempt for the religious institutions of his Kingdom so far that he actually farmed out the vacant bishoprics to the Jews; and at Oxford, even then a seat of learning, it has been surmised that they possessed three halls—Lombard Hall, Moses Hall, and Jacob Hall—where Hebrew was taught to Christians as well as to the youths of their own persuasion. As they grew in wealth they grew in unpopularity. On the day of the coronation of Richard the Lion-Hearted (1189) some foreign Jews being perceived to be witnesses of the spectacle, from which their nation had been strictly excluded, a popular commotion against them broke out in London; their houses were pillaged and burned. Sir Richard Glanville, the Chief Justice of the realm, acting under the orders of the indignant King, partially succeeded in arresting the havoc and even in bringing some of the mob to justice (three were hanged). Similar scenes were witnessed at Norwich, Edmundsbury, Stamford, and York; in the last of these towns most of the Jews preferred voluntary martyrdom in the synagogue to forced baptism. When Richard returned from Palestine, though they were still treated with great rigor, their lives and wealth were protected for a consideration. John at first cov-

ered them with honor; but the popular and priestly hatred only became the stronger, and the vacillating King turned on his protégés, after they had accumulated wealth, and imprisoned, maltreated, and plundered them in all parts of the country. Under Henry III, accused of clipping the coin of the realm, they had as a penalty to pay the royal exchequer (1230) a third of their movable property. The unfounded stories of the crucifixion of the Christian boys, William of Norwich (1144) and Hugh of Lincoln (1255), roused the populace against the Jews. Some efforts were made to induce them to give up their profession of usury, as was also done in France and elsewhere during the same period; but they were so heavily taxed by the governments of Christendom, and at the same time so completely debarred from almost every occupation, that they could find no other means of subsistence. The attempt made by the Dominican friars to convert them failed utterly, and in 1253 the Jews—no longer able to withstand the constant hardships to which they were subjected in person and property—begged of their own accord to be allowed to leave the country. Richard of Cornwall, however, persuaded them to stay. Ultimately, under Edward I in 1290, they were driven from England, pursued by the execrations of the infuriated rabble, and leaving in the hands of the King all their property, debts, obligations, and mortgages. They emigrated for the most part to France and Germany, though it has been shown that some remained behind and managed to conceal themselves from the authorities. The number of Jews in England at the time of the expulsion is estimated at about 16,000.

In *Germany* they were looked upon as the special property of the sovereign, who bought and sold them, and they were designated his *Kammerknechte* (chamber servants). About the eighth century they were found in all the Rhenish towns. In the tenth century they were in Saxony and Bohemia; in the eleventh, in Swabia, Franconia, and Vienna; and in the twelfth, in Brandenburg and Silesia. The same sort of treatment befell them in the Empire as elsewhere; they had to pay all manner of taxes and to present gifts, to mollify the avarice or supply the necessities of emperors, princes, and barons. Only here and there did they possess the rights of citizens or were they allowed to hold immovable property. Repeatedly the emperors gratified at once their piety and their greed by canceling the Jews' pecuniary claims. In many places they were compelled to live in a certain part of the town, known as the *Judengasse* (Jews' street) or ghetto. As elsewhere in Christendom, so in Germany, the Crusades kindled a spirit hostile to the "enemies of Christ." The word *hep* (said to be the initials of *Hierosolyma est perdita*, Jerusalem is taken) throughout all the cities of the Empire became the signal for massacre, and, if a fanatic monk sounded it along the streets, it threw the rabble into paroxysms of murderous rage. The Jews were expelled, after being plundered and maltreated, from Vienna (1196), Mecklenburg (1225), Breslau (1226), Brandenburg (1243), Frankfort (1241), Munich (1285), Nuremberg (1390), Prague (1391), Mainz (1420), Saxony (1432), Bavaria (1450), and Regensburg (1476).

Switzerland, whither they came at a comparatively late period, began to persecute them about the middle of the thirteenth century. They were expelled from Bern (1288), Zurich (1436), Geneva (1490), Basel (1576), and Schaffhausen (in the fifteenth century).

In *Spain*, as we have seen, the condition of the Jews was long favorable. During the whole of the brilliant period of Arab and Moorish rule in the peninsula they were almost on terms of equality with their Mohammedan masters, rivaled them in letters, and probably surpassed them in wealth. Nor was this state of things confined to those portions of Spain under the sovereignty of the Moors; the Christian monarchs of the north and interior gradually came to appreciate the value of their services, and we find them for a time protected and encouraged by the rulers of Aragon and Castile. But the extravagance and consequent poverty of the nobles, as well as the increasing power of the priesthood, ultimately brought about a disastrous change. Gradually the Jews were deprived of the privilege of living where they pleased, their rights were diminished, and their taxes augmented. In Seville, Cordova, Toledo, Valencia, Catalonia, and the island of Majorca outbursts of priestly and popular violence took place (1391–92); immense numbers were murdered, and wholesale theft was perpetrated by the religious rabble. Escape was possible only through flight to Africa or by accepting baptism at the point of the sword. Many thousands became enforced converts to Christianity, though many of these, known as *Maranos*, secretly continued to profess the rites of the Jewish religion. In 1480 the Inquisition was introduced. Hundreds of Jews were burned at the stake. Sometimes the popes, and even the nobles, shuddered at the fiendish zeal of the inquisitors and tried to mitigate it; but in vain. At length the hour of final horror came. In 1492 Ferdinand and Isabella issued an edict for the expulsion, within four months, of all who refused to become Christians, with the strict inhibition to take neither gold nor silver out of the country. The Jews offered an enormous sum for the revocation of the edict and for a moment the sovereigns hesitated, till Torquemada, the Dominican Inquisitor General, dared to compare his royal master and mistress to Judas. To the number of 300,000 (some even give the numbers at 650,000 or 800,000) they resolved to abandon the country, which a residence of seven centuries had made almost a second Judæa to them. Almost every land was shut against them. Some ventured into France; others into Italy, Turkey, and Morocco, in the last of which countries they suffered the most frightful privations. Of the 80,000 who obtained an entrance into *Portugal* on payment of eight gold pennies a head, but only for eight months to enable them to obtain means of departure to other countries, many lingered after the expiration of the appointed time, and the poorer were sold as slaves. In 1496 King Emmanuel commanded them to quit his territories, but he at the same time issued a secret order that all Jewish children under 14 years of age should be torn from their mothers, retained in Portugal, and brought up as Christians. Agony drove the Jewish mothers into madness; they destroyed their children with their own hands and threw them into wells and rivers, to prevent them from falling into the hands of their persecutors. The miseries of those who embraced Christianity, but who for the most part secretly adhered to their old faith,

were hardly less dreadful, and it was far on in the seventeenth century before persecution ceased. Suspected converts were burned as late as 1766 in Portugal and 1821 in South America.

The wanderers appear to have met with better treatment in *Italy* (and Turkey) than elsewhere. During the fifteenth and sixteenth centuries they are to be found—except at intervals of persecution—in almost every city in Italy, chiefly engaged in money lending. Abrabanel, perhaps the most eminent Jewish scholar and divine of his day, rose to be confidential adviser to the King of Naples. The invention of printing, the revival of learning, and the Reformation are generally asserted to have been beneficial to the Jews; but this can be regarded as true only in a limited sense. When the Jews began to use the presses at their earliest stage for their own literature, sacred and otherwise, the Emperor Maximilian was urged to order all Hebrew writings to be committed to the flames, and but for the strenuous exertions of Johann Reuchlin (q.v.), ignorance, treachery, and bigotry might have secured a triumph. Luther, in the earlier part of his career, looked with no unfavorable eye on the adoption of violent means for their conversion; but, on the other hand, we find at least one distinguished Roman Catholic, Pope Sixtus V, animated by a far more wise and kindly spirit towards them than any Protestant prince of his time. In 1558 he abolished all the persecuting statutes of his predecessors, allowed the Jews to settle and trade in every city of his dominions and to enjoy the free exercise of their religion, and in the administration of justice and taxation placed them on a footing with the rest of his subjects. That the Reformation itself had nothing to do with subsequent ameliorations in the condition of the Jews is plain from the fact that in many parts of Germany, Protestant as well as Catholic, their lot became actually harder than before. They were driven out of Bavaria (1553), out of Brandenburg (1571), and similar treatment befell them elsewhere. What really caused the change in their favor was the great uprising of human reason that marked the middle of the eighteenth century.

Holland was one of the first countries in modern times to rise out of the barbarism of the Middle Ages. As early as 1593 it permitted Jews to settle and trade, though they did not acquire the rights of citizenship till 1796. Holland, therefore, became a refuge in the seventeenth century, of which the Spanish Maranos availed themselves; and by the middle of that century Amsterdam had a considerable Jewish population, renowned for its learning and enterprise. Nor has there been any instance of persecution of Jews in Holland from the time of their entrance to the present day, except such as orthodox Jews themselves indulged in against "heretics," e.g., the cases of Gabriel Acosta and Spinoza (qq.v.).

In *England* the edict of Edward I remained in force for more than 300 years, though Jews are known to have lived secretly in London and to have had a synagogue there during the whole of this period. The first attempt made by the Jews to obtain a legal recognition in England was during the Protectorate of Cromwell in 1655. (See MANASSEH BEN ISRAEL.) Cromwell himself was favorable to their admission; so were the lawyers; but the nation generally, and particularly the emphatically religious portion of it, were strongly hostile to such a proceeding; and the wearisome, controversial jangling of the divines appointed to consider the question prevented anything from being done till the reign of Charles II, who, standing much and frequently in need of their services, permitted them quietly to settle in the land. In 1723 they were permitted to give evidence in courts of justice; in 1753 they obtained the right of naturalization. Since 1830 civic corporations, since 1833 the profession of advocate, and since 1845 the offices of alderman and of Lord Mayor have been opened to them. The last triumph of the principle of toleration was achieved in 1858 by the admission of Jews into Parliament. In the year 1885 Lord Rothschild took his seat as a member of the House of Lords, and in 1914 Sir Rufus Isaacs became Lord Chief Justice of England.

Some of the exiles from Spain and Portugal found their way into *France*, where they long lingered in a miserable condition. In 1550 they were received into Bayonne and Bordeaux; they were also to be found in considerable numbers in Avignon, Lorraine, and Alsace. In 1784 the capitation tax was abolished. In 1790, in the early period of the French Revolution, the Jews presented a petition to the national representatives, claiming full rights as citizens. Mirabeau was among their advocates, and their cause was not unsuccessful. From this time their technical designation in France has been *Israélites*. In 1806 the Emperor Napoleon summoned a Sanhedrin of Jews to meet in Paris, to whom a variety of questions were put, mainly with a view to test their fitness for citizenship. Their answers were satisfactory, and they were allowed to reorganize their religious institutions in the most elaborate manner. No material change has since taken place in the laws regarding them, though since 1895 anti-Semitism has been very virulent in France and was especially noteworthy in connection with the case of Alfred Dreyfus (q.v.).

Jews appeared in *Russia* at an early date; in the seventh century the ruler of the Chazars and part of his people were converted to Judaism. During the Middle Ages, as in most countries of Christendom, they were received, persecuted, and banished. Admitted into Russia proper by Peter the Great, they were expelled—to the number of 35,000—by the Empress Elizabeth in 1742. The partition of Poland (1772–95) brought a large Jewish population under Russian sway. Readmitted by Catharine II into Russia proper, they were further protected by Alexander I, who in 1805 and 1809 issued decrees insuring them full liberty of trade and commerce; but of the liberties which he conferred upon them they were deprived by the Emperor Nicholas. After 1835 a scheme of gradual emancipation was entertained by the government and was partially carried out by Nicholas I and Alexander II. But the reaction under Alexander III, due to the influence of Pobiedonostseff, procurator of the Holy Synod, was of the direst consequences to the Jews. From the year 1881 and the promulgation of the Ignatieff Law of 1882, the most restrictive measures have been piled up against them. They have been confined to one huge ghetto—the Pale of Settlement—and since 1891 the laws have been applied with the utmost severity. The Jews have been forced out of all offices of trust and from nearly all the professions, restricted in the

use of schools and universities, and have been forced to live in the direst poverty and neglect. Their only hope lies in conversion to the Orthodox faith or in emigration. Fully 800,000 have sought safety in flight and have settled in various parts of Europe and America. Many have benefited by the munificence of the late Baron Maurice de Hirsch (q.v.), from whom the Jewish Colonization Association received many millions of dollars. The Jews are more numerous in Russia than in any other part of the world, being found mainly in those portions of the Empire which formed part of the ancient Kingdom of Poland, and the governments nearest to these territories. As early as 1264 the Jews enjoyed in Poland and in Lithuania certain important privileges. They were favored by Casimir the Great of Poland (1330–70), because of the love he bore to a Jewish mistress. After 1348 their numbers were swelled by fugitives from Germany and Switzerland. For many years the whole trade of the country was in their hands. During the seventeenth century and the greater part of the eighteenth, however, they were much persecuted and sank into a state of great ignorance and poverty; but education—in spite of the severity and barbarism of Russian intolerance—has, since the French Revolution, made great progress among them.

Frederick the Great of *Prussia* showed himself singularly harsh towards the Jews. All manner of taxes were laid upon them, only a certain number were allowed to reside in the country, and these were excluded both from the most honorable and the most lucrative employments. This condition was ended by the Prussian edict of toleration (1812), by which the Jews were placed almost in an equal position as citizens with other Prussians. Thereafter the tendency was to enlarge their liberties, and the revolution of 1848 finally gained them full emancipation, although, owing to the subsequent reaction, it was slowly carried out. But a few years after the formation of the German Empire a new kind of anti-Jewish persecution took its rise, under the name of anti-Semitism (q.v.), and from Germany it spread to Austria, Belgium, Switzerland, and France. It was started as a political move, the promoters desiring to discredit the Liberals and Socialists through the Jews. The old blood accusation has often been revived, and the Jews have been gradually forced out of all offices of public trust and of government appointment. In the smaller German states full rights were likewise legally conceded to the Jews. The first German national assembly, held in Frankfort in 1848, contained many prominent Jewish members. In *Austria* the Emperor Joseph II distinguished himself by passing an act of toleration (1782). This act was extraordinarily liberal in its provisions for the Jews. Not till 1867, however, did they acquire the right to possess land. The anti-Semitic agitation has been exceedingly strong in Austria, and attempts have been made (1890–96) to reënact former restrictive measures, especially in Vienna, where an anti-Semitic board of aldermen existed for many years. In *Hungary* the Jews, who had long enjoyed important privileges and who had been protected by the nobility, were emancipated at the time of the revolution of 1848, in which they were patriotic to a man. In that Kingdom they are on an absolute equality with the Christians. The Jews have lived in *Rumania* (Moldavia, Wallachia) since the thirteenth century. They have not fared better there than in other parts of Europe. The severest persecution came over them during the last quarter of the nineteenth century. In spite of the Treaty of Berlin (1878) the government refused to naturalize the Jews and has gradually forced them out of all but a few employments and driven them altogether from the schools. The financial and economic crisis of 1899 and 1900 made the lot of Rumanian Jews unbearable, and they have been forced to leave the country in large numbers. *Spain* began to tolerate the Jews again in 1837, and they can follow trade or agriculture like other Spaniards; but few Jews have as yet cared to venture back to a land that is filled with mournful recollections. *Portugal* has about 400 Jews, and the Jewish religion is legally tolerated there. *Switzerland* long treated them harshly, but while they now enjoy full personal liberty in all cantons, popular ill will has interfered with the exercise of some of their religious observances. In *Denmark*, since 1814, they have been on a footing of equality as citizens with native Danes. In *Sweden* they obtained admission into Stockholm and three other cities in 1776 and have since been admitted to citizenship on the same basis as native Swedes. In *Norway* they were not admitted until 1860, but now enjoy all the rights of citizenship.

Jews at an early date settled on the *American* continent, exiled from Spain and Portugal, or taking part in the Dutch and English enterprises in the New World. In the sixteenth century we find some in Brazil, whither they had been sent in company with convicts. In 1642 a large number of Portuguese Jews came from Amsterdam and settled in Pernambuco and Surinam. From here they spread to Guadeloupe, Cayenne, and Curaçao. The strong arm of the Inquisition was felt also in Brazil, and many were compelled to comport themselves as Christians (Maranos) or to emigrate to the West Indies. There were Jews in New Amsterdam as early as 1652; others came from Brazil in 1654. They were not heartily welcomed, and therefore betook themselves to Newport and Providence, R. I. The Newport congregation was strengthened by fresh arrivals from Lisbon (1755) and Curaçao. The old synagogue there is still standing. At the end of the seventeenth century there were some Jews in Maryland. Pennsylvania, Georgia, and the Carolinas were the next places of settlement. This was during the first half of the eighteenth century. During the struggle for independence the Jews attached themselves to the nation under whose wing they had thus found protection. There were nine Jewish signers of the nonimportation resolution drawn up in Philadelphia in 1768. Jews were in the Charleston regiment of militia, and three Jews served on the staff of De Kalb. Haym Solomon enjoyed an enviable reputation as one who aided the Continental Congress with his money. Forty-four Jews figured in the War of 1812, 58 in the Mexican War, and in the War of the Rebellion they were to be found in large numbers both on the Northern and Southern sides. During the nineteenth century the Jews spread over the whole extent of the United States, and important congregations have also grown up in the larger cities of Canada. From 1830 to 1870 the immigration came largely from the southern states of Germany and from Hungary. The riots and persecutions

in Russia have driven hundreds of thousands of Jews to the United States. To these have been added large numbers from Galicia and Rumania, who have for the most part settled in the large business centres; though efforts have been made to found agricultural colonies for them in Delaware, New Jersey, the Dakotas, Pennsylvania, Connecticut, and also in Argentina.

Judaism at the Present Time. In taking a rapid survey of the Jews as they exist to-day, we see at one and the same time a great diversity coupled with a fundamental conformity. This diversity has arisen from the attempt which the Jew is bound to make to fit his ancient beliefs and ceremonies into modern ways of thinking and modern conditions. Outwardly the Jews may be divided into two distinctive classes, the so-called *Ashkenazim*, or the descendants of the Jews of middle and eastern Europe, and the *Sephardim*, or descendants of the Jews who lived formerly in Spain and Portugal. Brought up under different conditions, the Sephardim had the benefit of a general culture earlier than had the Ashkenazim, and so imbued were they with the Spanish and Portuguese civilization that they carried it with them wherever they went after the expulsions of 1492 and 1496. To this day, whether in Europe, Asia, North Africa, or America, Sephardim are apt to congregate among themselves, having their own synagogues and their own ecclesiastical authorities. They are readily distinguished from the Ashkenazim by their names and in the synagogue by their more Oriental pronunciation of the Hebrew and certain peculiarities in their ritual. They are, however, few in number and by intermarriage with Ashkenazim are gradually losing their identity. Judaism was never a favorable ground for the growth of sects. The enmity of the outside world produced a solidarity which triumphed over all attempts at division. The only sect that may be said to exist to-day is that of the Karaites, who probably do not number more than 15 or 20 thousand and are to be found in southern Russia, in various parts of the Turkish Empire, and in Egypt. The Samaritans, of whom about 200 souls still live in Nablus, the ancient Shechem, can hardly be counted as among the Jews, since they live a life entirely apart from the rest of the community and seek to preserve their ancient schismatic condition. Among the Ashkenazic Jews there are in reality only two divisions, the orthodox and the reform, and even here these divisions are by no means clearly cut. There being no Jewish church as such, and each community, and even each congregation, being a law unto itself, the greatest variety is found, starting with the ultraorthodox and reaching down to the most radical reform. For purposes of distinction we may speak of the three following divisions: orthodox, conservative, and reform Jews. The orthodox Jew believes in the absolute authority, not only of the Bible as the Word of God, but also of the traditional body of laws, statutes, and observances which have grown up around the written Law in course of time and which form the oral Law. After passing through various codifications, from the time of the two Talmuds (fourth to sixth century), this Law was put into some sort of final shape by Joseph Caro (sixteenth century). His *Shulhan Aruk* is considered the norm by which the orthodox Jew regulates both his religious and his everyday life. He believes that a strict performance of all its minor regulations is obligatory upon him on all occasions and at all times. The conservative Jew holds in practice also to the validity of both the oral and the written Law, but is a little less rigid in his observances and believes that some concession ought to be made to the spirit of the times and the conditions of modern life. Reform Judaism takes quite a different attitude respecting both the written and the oral Law. It professes to see a regular development in both and believes that Jewish belief and Jewish practice are supple enough to adapt themselves to all changes of environment and to all phases of human thought. Commencing with Moses Mendelssohn, towards the end of the eighteenth century, this reform has made greatest progress in Germany and the United States. Starting as an attempt to modernize the public worship of the synagogue, it has gradually so developed as to become a sort of Unitarianism modified by peculiar Jewish observances. It has more or less radical ideas in regard to the inspiration of the Bible; it has largely introduced the vernacular into the synagogue service, from which it seeks to remove all traces of its Oriental origin; and discards the separation of the sexes, the covering of the head, and the observance of the second-day festivals. In some places Sunday services have been introduced, in addition to those on the historical Sabbath (in Berlin as early as 1840, in the United States during the last quarter of the nineteenth century). In only one place (Chicago) has the Saturday service been entirely discarded in favor of the Sunday. Between these divisions, however, there are many subdivisions, and the words "orthodox" and "reform," as regards the Jews, are loosely and variously applied.

It is impossible to give a single description of the Jewish rites and ceremonies of to-day, because of the diversity which exists. Nominally, the seventh day is the day of the Jewish Sabbath; the demands made by modern commercial life render an observance of the day extremely difficult, and, except a small number of the orthodox, most Jews to-day keep their places of business open on the Sabbath. The festival of the New Year and the Fast of the Day of Atonement, both of which occur in the months of September and October, are perhaps the two festivals which are most rigidly observed. The Passover festival, which falls usually in the month of March or April, is still observed by most Jews, who abstain for a week from eating leaven. The celebration of the Pentecost festival (end of May or beginning of June), which commemorates the giving of the Law on Mount Sinai, has been made more solemn by the reform Jews, among whom it is the day of confirmation. Formerly (and this is the rule to-day in orthodox Jewish congregations) boys were confirmed at the age of 13, in whatever month they reached that period of life. Reform Judaism has substituted for this the annual day of confirmation, in which the girls participate together with the boys. The Feast of Tabernacles (celebrated in the autumn), which commemorates the dwelling of the Israelites in booths during the passage through the wilderness, is still universally observed in some manner or other. The minor festivals, such as the Ninth of Ab, the day upon which the temple in Jerusalem was destroyed; Purim, the commemoration of the deeds of Esther and Mordecai; as

well as other minor festivals, are to-day observed only by the orthodox; though there is a tendency, even among reform Jews, to lay more than ordinary weight upon the celebration of the *Chanukkah*, which recalls the national regeneration under the Maccabæan heroes. The dietary laws, as laid down in the Bible and interpreted by the rabbinical authorities, are universally held to be binding among the orthodox Jews, while only a few of the reform Jews observe them through ancient habit or through veneration of the past.

The use of the Hebrew language among the Jews has generally given way to the vernacular of the countries in which they live. Of late, however, there has been a certain revival in the use of Hebrew, due to the more national Jewish sentiments which have inspired large numbers of the Jews. In the Jewish colonies in Palestine, Hebrew is the vernacular, and a number of Jewish journals and reviews are published in Hebrew, not only in the East, but in various parts of Europe. The Judæo-German, or Yiddish, has also experienced a revival. This language, which has as its base a dialect of German spoken in the Rhine regions during the Middle Ages, has become, through the expansion of the German Jews eastward, the common tongue of several millions of Jews living in Russia, Austria, and the Balkan Peninsula. When these Jews were again driven westward, during the closing quarter of the nineteenth century, they carried this Yiddish with them into the new ghettos of western Europe and northern America. In the large cities of these countries many Yiddish daily and weekly papers are published. Because of contact with many other languages and civilizations, this Yiddish has become variously modified by the introduction of Russian, Polish, High German, and English terms and forms.

The training of men for the Jewish ministry was in former times peculiarly one-sided. The seminaries, or *yeshibas*, devoted their time exclusively to rabbinical jurisprudence and Talmudic law; secular learning was looked at askance, as the rabbi was not a minister in the modern sense of the word, but a legal adviser and a judge in matters of religious dispute. Very early in the nineteenth century the need for some more modern course of instruction was felt. A seminary for the training of teachers was founded as early as 1809 in Cassel, Germany. The first regular seminary for the training of rabbis, however, was founded in Padua in 1829. In 1854 the conservative seminary was established in Breslau; this was followed by similar institutions in Berlin, London, Paris, Budapest, and Vienna. In the United States, after some abortive attempts in the sixties and seventies of the nineteenth century, the Hebrew Union College was founded in 1875 at Cincinnati, by the Union of American Hebrew Congregations, under the presidency of Isaac M. Wise. Dr. K. Kohler was elected its president in 1903. This Union, founded in 1873, comprised all the important congregations of the United States which had a leaning towards reform. It consisted in 1914 of 189 congregations. The college is generally recognized as the training place of ministers for this wing of the synagogue. It attempts to give its students an historical knowledge of the development of Jewish history and the Jewish religion and to fit them for active preachers and communal workers. As its graduates cannot serve in orthodox congregations, the Jewish Theological Seminary was established in 1886 in the city of New York for the purpose of training rabbis who shall understand the principles of Jewish law and be able to interpret it practically to the congregations whom they are to serve. In the year 1902 the Jewish Theological Seminary of America was enlarged, and Prof. S. Schechter, of Cambridge, England, was called to be the president of its faculty. In the year 1893 a training school for religious school-teachers was founded at Philadelphia, with the money left to the Mikwe Israel Congregation, of that city, by Hyman Gratz. It is called Gratz College. In 1908 the Dropsie College for Hebrew and Cognate Learning was opened in Philadelphia, as a postgraduate institution leading to the degree of doctor of philosophy. Dr. Cyrus Adler, of Washington, D. C., was called as president of this college. In 1893 the Jewish Chautauqua Society (q.v.) was founded by Dr. Henry Berkowitz, of Philadelphia, which carries on a sort of Jewish university extension work, by means of Chautauquan circles in various States and a summer meeting at Atlantic City. This gave rise in 1899 to the Jewish Study Society in London. Work on these lines is also done by the Young Men's Hebrew Associations, the first of which was founded in New York in 1874, and which are now to be found in nearly all the larger cities in the United States. A Jewish publication society was founded in Philadelphia in 1845, and a second one in New York in 1873, but both of these were short-lived. In 1888 the Jewish Publication Society of America was organized in Philadelphia and has since then published a number of works dealing with Jewish history and Jewish life. The only Jewish learned society in the United States is the American Jewish Historical Society, founded in 1892. In 1893 the Jewish Historical Society of England was founded. A similar society (Société des Etudes Juives) exists in France, and its interests cover the whole of Jewish history; while in Germany there are over 100 Jewish literary societies which give courses of lectures on Jewish subjects and publish a yearbook. The National Council of Jewish Women, an American organization established in 1893, has endeavored to foster the religious spirit in the home by the personal influence of its members and by organized philanthropic effort. The Intercollegiate Menorah Association was organized in 1913. Its purpose is the study and advancement of Jewish culture and ideals among college men. It has at present over 20 societies.

One of the peculiar features of American Judaism is the large development of the Sabbath schools attached to the congregations. As early as 1838 a general Sabbath school was organized in Philadelphia for Jews of all shades of belief. In 1845 the movement spread to New York, in 1848 the Hebrew Educational Society was founded in Philadelphia, and in 1864 the Hebrew Free School Association was incorporated in New York.

The arrival of large numbers of Jews from Russia and Rumania has made necessary the founding of manual training and technical schools, in which the rising generation may be taught handicrafts, from which they have largely been excluded by legislation in eastern Europe. Such schools exist in New York, Philadelphia, Chicago, and other cities and have been fostered especially by the Baron de Hirsch Fund.

A remarkable development in modern Jewish life is that of the Zionist movement. In a measure it is the continuation of the old Jewish hope of restoration to the land of Palestine. It is also the Jewish answer to anti-Semitism. Starting with a pamphlet by Dr. Theodor Herzl of Vienna (*A Jewish State: An Attempt at a Modern Solution of the Jewish Question*, Vienna, 1896; Eng. trans. by D'Avigdor, London, 1896), it soon took hold of the Jewish people, and Zionist societies and clubs are now to be found wherever Jews exist. The object of the Zionist movement is to found a secure and legal home for the oppressed Jews in Palestine. The Federation of American Zionists was organized in 1897 and has held 17 annual conventions. It has 14,000 shekel payers and 102 societies. The Jewish Colonial Trust has been organized by the International Congress and has its head offices in London. See ZIONIST MOVEMENT.

There being no international Jewish organization, except that of the Zionist congresses, the Jews in each country have been forced to band themselves together in various ways in order to subserve interests, social and economic, which they have in common. In France the Alliance Israélite Universelle (q.v.), founded in Paris in 1860, has not only looked after the interests of Jews in Mohammedan countries supposed to be in the sphere of French influence, but has also on several occasions used its good offices to procure the amelioration of the condition of the Jews wherever its influence could be brought to bear. In England the Board of Jewish Delegates has attempted to do the same thing. Austria has its Israelitish Alliance, and Germany its Union of Congregations (Deutsch-israelitische Gemeinde-Bund). In the United States no such single union has been possible. The Union of the American Hebrew Congregations comprises those bodies which belong to the reform wing of the synagogue, and a union of orthodox Hebrew congregations was founded in New York in 1886. About the middle of the nineteenth century, when Jews were scattered in out-of-the-way places, a number of orders similar to that of the Freemasons were called into being. The B'nai B'rith (Sons of the Covenant), founded in the United States in 1843, in 1913 had 412 lodges and 38,447 members in America and a few in Germany, Rumania, Austria, Algeria, Bulgaria, and Egypt. Other similar societies are the Sons of Benjamin, the Free Sons of Israel, and the Free Sons of Judah. As the number of Jews in the United States increased, extensive calls were made upon the Jews already domiciled there to provide adequately for their more unfortunate brethren. Many homes for orphans have been established, also homes for the aged, and hospitals. A Jewish Agricultural and Industrial Aid Society was organized in 1900, which assists Jewish immigrants to become farmers by helping them to find suitable farms, loaning them money on favorable terms, and maintaining a Farm Labor Bureau. A Jewish Agricultural Experiment Station was organized in 1910. The National Jewish Fraternal Congress, organized in 1911, has 600,000 members in constituent orders. A National Jewish Immigration Council was organized in 1911, and in the same year a National Union of Jewish Sheltering Societies. In 1889 Rabbi Gustav Gottheil organized the first Sisterhood for Personal Service, in connection with the Temple Emanu-El in New York City. Since then such societies, in which the work is done by the women of the congregation, have become attached to nearly every important synagogue in the land. The National Federation of Temple Sisterhoods was organized in 1913 and now consists of 71 societies. In most of the cities the work of the Jewish charities has been organized, so that one central body directs it in a large measure—the United Hebrew Charities of the City of New York. On Dec. 1, 1899, a national conference of Jewish charities in the United States was held at Cincinnati, with the end in view of bringing about a greater coöperation among the relief societies situated in the various parts of the country. Of more recent date is the attempt by the Jews to do settlement work in the congested districts of the large cities where the poorer Jews live—a work until now undertaken almost exclusively by Christian organizations. The Educational Institute, in New York, is a sort of people's palace, and a regular Jewish settlement exists in Chicago. No account of Jewish charitable endeavor during the nineteenth century would be complete without the particular mention of Baron and Baroness de Hirsch, who bequeathed 300,000,000 francs for the purpose of aiding the oppressed Jews of eastern Europe. This fund is in the hands of a private corporation composed of a few trustees and has its seat in Paris. It has spent vast sums in colonizing some 5000 Jews in the Argentine Republic; it assists colonization in Canada and has recently taken over the Jewish colonies established by Edmund de Rothschild in Palestine; it also maintains schools and homes in several American cities to which the Russian Jews have emigrated. See HIRSCH, MAURICE, BARON DE.

JEWS IN THE WORLD

Europe	....	9,105,608
Austria-Hungary	1910	*2,258,262
Belgium	1910	15,000
Bulgaria	1910	37,656
France	1911	100,000
Germany	1910	615,021
Italy	1901	35,617
Netherlands	1910	106,309
Rumania	1900	269,015
Russia	1897	†5,215,805
Switzerland	1910	19,023
Turkey	1904	‡188,900
United Kingdom	1911	§245,000
Australasia	....	20,000
Asia	....	344,115
India	1911	20,980
Afghanistan	....	18,135
Asiatic Turkey	....	‖177,500
Palestine	....	‖78,000
Persia	1904	49,500
Africa	....	393,209
Abyssinia	....	6,500
Algeria	1906	¶64,645
Egypt	1907	38,635
Morocco	1904	¶110,000
South Africa	....	46,769
Tripoli	1901	**18,660
Tunis	1904	¶108,000
America	....	2,183,414
Argentina	1911	55,000
Canada	1911	75,680
Mexico	1911	8,972
United States	1910	2,043,762

* Hungary, 1,313,687. † Poland, 1,321,100. ‡ Turkish Empire, 344,400. § British Empire, 455,135. ‖ To Turkish Empire. ¶ To France. ** To Italy.

Statistics. According to the latest issue of

the American Jewish Year Book (1913), "the total number of Jews in the world may be estimated at 12,000,000," of whom, in round numbers, 9,125,000 are assigned to Europe, 2,043,000 to North America, 62,000 to South America, 355,000 to Asia, 395,000 to Africa, and 20,000 to Australasia. This estimate is very conservative. The figures actually given amount to about 90,000 more; the latest of them come from the year 1911; the largest figure, that for Russia, is based on the census of 1897. In spite of emigration, persecution, and unfavorable conditions, it may be questioned whether the Jewish population in Russia has remained stationary since 1897; but there are no reliable data for the increase, if there has been a growth.

In view of the increase through immigration and excess of births over deaths, it may be regarded as certain that there were on Jan. 1, 1915, more than 2,500,000 Jews in the United States and more than 1,000,000 in New York City. More than 10 per cent of the population of New York State is Jews; it has been estimated that the Jewish population exceeds 100,000 also in Pennsylvania, Illinois, Massachusetts, Ohio, New Jersey, Missouri, and California, and there is no State or Territory in the United States in which there are not some Jews.

Language. By the Hebrew language is usually meant the language in which all the books of the Old Testament are written except parts of Daniel (q.v.) and Ezra (q.v.). The expression "Hebrew language" is not found in the Old Testament. In its place we have "speech of Canaan" (Isa. xix. 18) and "Jews' language" (2 Kings xviii. 26, 28; Neh. xiii. 24), corresponding to the general use of the term "Jew," i.e., Judæan, for the entire nation in the later books. This "language of Canaan" belongs to the northern branch of the Semitic family of languages. It is practically identical with the Phœnician, with the speech of the Syrian correspondents of Amenhotep III and IV, as occasional lapses into the vernacular in the Amarna letters (q.v.) show, and with the Moabitish, as the Mesha inscription shows. Some traces of dialects appear in the Old Testament (cf. Judg. xii. 5, 6), and it is not improbable that there were characteristic differences of pronunciation and expression between Judah and Israel, Galilean and Ephraimitish, East and West Jordan tribes, just as at a later time there were dialectical differences between Judæan, Samaritan, and Galilean Aramaic. In writing Hebrew the alphabet employed was the old North Semitic (see ALPHABET; BIBLE, *Text of the Old Testament*), and this was still used for official purposes (e.g., on coins) as late as in the time of Simon Bar Cochba (132–135 A.D.). In writing the Aramaic vernacular, however, a more cursive hand was introduced, with a tendency towards more square characters. This was particularly the case when the writing material was papyrus, and may be seen in one of the Elephantine Papyri (q.v.) from the year 484 B.C. In Palestine the Jews employed, when writing their Aramaic dialects, the modification of the North Semitic alphabet used in Syria by Palmyrenes, Nabatæans, and other Aramaic-speaking peoples. It was called the "Assyrian" script (Assyrian being used in the sense of Syrian) or the "square" writing. The earliest examples in Palestine are found in two inscriptions at Arak al-Amir, probably written by Hyrcanus, grandson of Tobias, between 183 and 175 B.C. This square Aramaic script was adopted by the Jewish scribes in copying the Holy Scriptures, probably in the first century B.C., since Yodh could be familiarly referred to in the following century as the smallest letter (Matt. v. 18), while the Samaritans continued to copy the Law in the Hebrew, i.e., the old North Semitic characters. (Cf. Driver, *Notes on the Hebrew Text and the Topography of the Books of Samuel, with an Introduction on Hebrew Palæography and the Ancient Versions*, 2d ed., Oxford, 1913.) For the grammatical structure and general characteristics of the Hebrew language, see SEMITIC LANGUAGES. On other languages spoken by the Jews, see ARAMAIC; LADINO; YIDDISH.

A grammatical treatment of the Hebrew first commenced after the language ceased to be spoken by the people. The vocalization and accentuation of the text originated in the sixth and seventh centuries after the time of Christ. (See MASORA.) The Jews made the first attempt at a system of grammar about the dawn of the tenth century, after the example of the Arabians, and originally even in the Arabic language. Rabbis Saadia Gaon (Saadia ben Joseph, died 942), Jehuda Hayyug (c.1030), Jonah (Ibn Janach, c.1030), Abraham ben Ezra (died 1167), and David Kimchi (died 1235) were the first grammarians. The dictionary of the last was long considered the best. The founder of the study of Hebrew among Christians was Johann Reuchlin (died 1522), who, however, like the grammarians of the next age, Buxtorf and others, strictly adhered to Jewish tradition and method. A new era began when the study of other members of the Semitic family of languages, Syriac, Arabic, and Ethiopic, enlarged the field of view. Albert Schultens (died 1750) and Nikolaus Wilhelm Schröder (died 1798) are noteworthy in this work. The development of Assyriological research during the nineteenth century has added much to our knowledge of the relation of Hebrew to the other Semitic dialects. Wilhelm Gesenius (died 1842) was by far the greatest of Hebraists up to his time. His *Hebräische Grammatik* (Halle, 1813; 27th ed. by Kautzsch, Leipzig, 1902; several Eng. trans., including one by the Americans Mitchell and Price, 2d ed., from the 25th German ed., Boston, 1894), *Thesaurus Linguæ Hebraicæ* (Leipzig, 1829–42), completed by Rödiger, and shorter *Hebräisches und chaldäisches Handwörterbuch* (2 vols., Leipzig, 1810–12; 14th ed. by Buhl, 1905; Eng. trans. by Tregelles, Robinson, and others) were not only better than any previously produced, but are still those in most general use. Since Gesenius noteworthy grammars have been written in German by Ewald (Leipzig, 1827), Olshausen (Brunswick, 1861), Stade (Leipzig, 1879), and König (ib., 1881–97), and dictionaries by Fürst (ib., 1837–40) and by Siegfried and Stade (ib., 1873). The grammatical and lexicographical researches of Lagarde (died 1891) and Barth deserve special mention. The Hebrew-English dictionary by Brown, Driver, and Briggs (Boston, 1906) gives the results of the latest scholarship and research.

Literature. Only a scanty portion of ancient Jewish literature has come down to the present day. The Tell el-Amarna tablets show that writing on clay was known in Palestine as early as 1400 B.C. Whether the "journals of his

fathers" which Zakar Baal, of Byblos, ordered to be read to Wen Amon in the reign of Ramses XII (c.1118 B.C.), according to the Golénischeff Papyrus, were written in cuneiform characters is not certain, but probable. Yet it is not altogether impossible, if they came from Zakar Baal's father and grandfather, that they were written in the North Semitic alphabet, since this method of writing may have been invented before the first half of the twelfth century. (See ALPHABET.) There is no reason to doubt that the Habiri, or Hebrews, referred to in the Tell el-Amarna tablets, knew how to use the cuneiform script, but they probably adopted the Semitic alphabet soon after its invention. Some of the songs and stories of earlier ages may never have been written down at all before they were recorded in the new alphabetic script a century or more before David, and some that had been known through cuneiform inscriptions may at that time have been written down in the alphabetic script. The bulk of the remains of ancient Jewish literature is to be found in the Old Testament, and since the latest portions of the Old Testament bring us down to the Hasmonæan age, it embraces a period of more than 1000 years. To the Old Testament, however, as preserved in the Jewish canon of scriptures, must be added as properly belonging to ancient Jewish literature, not only the deuterocanonical books (q.v.), but also a large number of apocryphal books, originally written in Hebrew or Aramaic. (See APOCRYPHA.) With reference to form and contents this literature may be divided into poetry (lyric, didactic, and religious), history (including legends, traditions, and myths in historical garb), legal codes, religious discourses, romances, apocalyptic works, and philosophical disquisitions. The oldest specimens are probably found in the lyric poems, e.g., the Song of the Crossing of Arnon (Num. xxi. 14 f.), the Song of the Capture of Be'er (Num. xxi. 17 f.), the Song of the Conquests of Sihon (Num. xxi. 27–30), the Song of Deborah (Judg. v), and the Fable of Jotham (Judg. ix. 7 ff.). The earliest collections of traditions, historical reminiscences, stories, songs, legends, and laws (like the Covenant Code, Ex. xxi. 23–xxiii) may have been made towards the end of the period of the Judges. Among the remnants that seem to indicate a wealth of lyric poetry in the age of David and Solomon are David's Elegy on Saul and Jonathan (2 Sam. i. 17 ff.), the Blessing of Jacob (Gen. xlix), the Prophecies of Balaam (Num. xxii–xxiv), and the Blessing of Moses (Deut. xxiii). A number of oracles, in poetic form, uttered by prophets in the eighth, seventh, and sixth centuries B.C. have come down to us, though in collections of a much more recent date. It is possible that the period of the exile saw the addition of Deuteronomy (q.v.) to the Story of Origins and the Story of Moses and the Legislation, by which the earliest form of the Pentateuch as a whole seems to have been constituted, though it was afterward greatly expanded. Characteristic of the Chaldæan and Persian periods was the attention bestowed on the Law and the prophetic collections. Much new material, legislative, narrative, and prophetic, seems to have been added to earlier works and collections. Still later apparently, and belonging chiefly to the Græco-Macedonian period, are philosophical productions, as Job, Proverbs, Ecclesiasticus, Ecclesiastes; the great body of the religious poetry (the Psalter), though some of the psalms in a theologically less developed form may have originated in the preëxilic epoch; and the romances, such as Ruth, Esther, Judith, and Tobit. For details, see the articles on the separate books of the Hebrew canon; also BIBLE; DEUTEROCANONICAL BOOKS; APOCRYPHA; PENTATEUCH; PROPHECY; APOCALYPTIC LITERATURE.

Though the uncertainty concerning the dates of the numerous works that make up Jewish biblical literature renders it difficult to divide its contents into definite periods, it is generally admitted that periods may be fixed, having certain literary characteristics, even if there is no agreement among scholars as to the number of productions that properly belong to this or that period. There is a *first* period, ending with the disruption of the Kingdom in c.953 B.C., to which, as is generally recognized, some of the finest of Hebrew lyrics belong, and, in the judgment of many scholars, a not inconsiderable portion of story and legislation as well. The characteristic of the *second* period (c.953–586 B.C.) is unquestionably the appearance of the oracles of the great preëxilic prophets and the records of the reigns of the Israelitish and Judæan kings, whatever other literary products may likewise be regarded as belonging to it. That a gathering together of old material into larger collections is one of the chief marks of the *third* period (586–332 B.C.) will be widely acknowledged, even if the extent of editorial freedom and activity in bringing out larger volumes of history, legislation, and poetry may be differently defined.

A *fourth* period (332–165 B.C.) is characterized by one work that can be dated with certainty, Ecclesiasticus i–xliii, as the grandfather of the translator, who came to Egypt in 132 B.C., must have written about 180 B.C. A comparison of this work with other specimens of the wisdom literature has convinced many scholars that such products of the same spirit and intellectual milieu as Job, Proverbs, and possibly Ecclesiastes, belong to the same period. To this age belongs also essentially that great achievement of the Jews of Egypt, the translation of the Hebrew scriptures into Greek, though we know from the prefaces to Esther and Ecclesiasticus that this activity continued into the following period.

The *fifth* period (165 B.C.–135 A.D.) is characterized by several tendencies. One was legalistic, having to do with the interpretation of the Law. The *Midrash* (q.v.), or the inquiry into the meaning of the sacred text, was divided into *Halacha*, which considered the exegesis and completion of the written code through the oral Law, with a view to practical results, and *Haggada*, which sought the essence of the religious and historical interpretations. At first both were the oral deliverances of the Sopherim, or scribes, but gradually written memorials made their appearance. The public interpretation of the scriptures in schools and synagogues, the independence of the Sanhedrin, the strife of sects, and the influences of Alexandrian culture furthered this development. We possess in the Pirke Aboth and other tractates of the Mishna, and also in the texts of the Covenanters of Damascus, written c.100 B.C., evidences of this activity; but the written targums, or Aramaic versions of the Bible, belong to a later period. (See TARGUM.) Another tendency was apoc-

alyptic. While none of the great apocalyptic works is dated, the false ascription to some ancient seer making this impossible, internal evidence often points with apparent conclusiveness to the time of composition, and it may be regarded as certain that a number of apocalypses ascribed to Daniel, Enoch, Moses, Baruch, and Ezra come from this period. Less conclusive is the evidence that the period saw a great development of psalmody. But there can be little doubt that the Psalter of Solomon (q.v.) was written in the middle of the first century B.C., and many scholars maintain that the bulk of the Psalms in the Hebrew canon were written in the Maccabæan and Hasmonæan periods. The development of Hellenistic literature in Egypt, culminating in Philo, not only affected Palestinians like Josephus and showed itself in many of the deuterocanonical and apocryphal works, but also influenced Saul of Tarsus, the author of the Fourth Gospel, and other Christian writers who, nurtured in the principles of Judaism, retained many traces of their ancestral culture, feeling, and faith. The reaction against Hellenism, which saved the synagogue from being absorbed by the church, was led by such doctors of the oral Law as Hillel, Shammai, Johanan ben-Zakkai, the Gamaliels, Eleazar ben-Hyrcanus, Joshua ben-Hananya, Ishmael, Akiba, and others, to whom the honorary title of rabbi (master) or talmid hakam (disciple of the wise) was given. Besides the Hasmonæan and Bar Cochba coins, Greek and Latin inscriptions of this period are extant.

The *sixth* period reaches from 135 to 475. Instruction in the Halacha and Haggada now became the principal employment of the flourishing schools in Galilee, Syria, Rome, and, after 219, in Babylonia; the most distinguished men were the masters of the Mishna (q.v.) and the Talmud (q.v.)—viz., Eleazar ben-Jacob, Jehuda, Jose, Meir, Simeon ben-Yohai, Jehuda the Holy, Nathan, Hiyya, Rab, Samuel, Johanan, Hunna, Rabba, Rava, Papa, Ashe, and Abina. Besides expositions, ethical treatises, stories, fables, and history were also composed; the liturgy began to assume larger dimensions, the targum to the Pentateuch and the Prophets was completed, and the calendar fixed by Hillel the Second, 340. After the suppression of the academies in Palestine, those of Mesopotamia—viz., at Sura, Pumbeditha, and Nehardea—became the centres of Jewish literary activity. On Sabbaths and festal days the people heard, in the schools and places for prayer, instructive and edifying discourses. Of the biblical literature of the Greek Jews we have only fragments, such as those of the versions of Aquila (q.v.) and Symmachus (q.v.).

The *seventh* period was from 475 to 740. By this time the Jews had adopted the language of the country they happened to dwell in. During the sixth century the Babylonian Talmud was concluded, the Palestinian Talmud having been edited about 100 years before. Little remains of the labors of Jewish physicians of the seventh century or of the first *geonim*, or presidents, of the Babylonian schools, who first appear in 589. On the other hand, from the sixth to the eighth century, the Masora was developed in Palestine (at Tiberias), and besides a collection of the earlier haggadas (e.g., *Bereshith rabba*), independent commentaries were likewise executed, as the *Pesikta*, the *Pirke of Eliezer* (700), etc. See MIDRASH; HAGGADA.

In the *eighth* period (from 740 to 1040) the Arabs, energetic, brilliant, and victorious in literature as in war, had appropriated to themselves the learning of Hindus, Persians, and Greeks, and thus stimulated the Oriental Jews, among whom now sprang up physicians, astronomers, grammarians, commentators, and chroniclers. Religious and historical haggadas, books of morality, and expositions of the Talmud were likewise composed. The oldest Talmudic compends belong to the age of Anan (c.750), the earliest writer of the Karaite Jews. The oldest prayer book was drawn up about 880, and the first Talmudic dictionary about 900. The most illustrious *geonim* of a later time were Saadia (died 942), equally famous as a commentator and translator of Scripture into Arabic, a doctor of law, a grammarian, philosopher, and poet; Sherira (died 998), and his son Hai (died 1038), who was the author, among other works, of a dictionary. From Palestine came the completion of the Masora and of the vowel system; numerous *midrashim*, the hagiographical targums, and the first writings on theological cosmogony were also executed there. From the ninth to the eleventh century Kairawan and Fez in Africa produced several celebrated Jewish doctors and authors. Learned rabbis are likewise found in Italy after the eighth century, e.g., Julius in Pavia, etc. Bari and Otranto were at this time the great seats of Jewish learning in Italy. After the suppression of the Babylonian academies (1040) Spain and Egypt became chief seats of Jewish literature. To this period belong the oldest Hebrew codices, which go back to the ninth century. Hebrew rhyme is a product of the eighth, and modern Hebrew prosody of the tenth century.

The *ninth* period (from 1040 to 1204) is the most splendid era of Jewish mediæval literature. The Spanish Jews busied themselves about theology, exegetics, grammar, poetry, the science of law, astronomy, mathematics, philosophy, rhetoric, and medicine. They wrote sermons and ethical and historical works. The languages employed were Arabic, rabbinical Hebrew, and ancient or classical Hebrew. We can only mention here the great doctor, Samuel Halevi (died 1055), and the renowned Maimonides, whose death closes this epoch. The literature of the French rabbis was more national in its character and kept more strictly within the limits of the Halacha and Haggada. In Languedoc, which combined the literary characteristics of France and Spain, there were celebrated Jewish academies at Lunel, Narbonne, and Nîmes, and we find Talmudists, such as Berchia Halevi, Abraham ben-David, etc. The fame of the Talmudists of Germany, especially those of Mainz and Regensburg, was very great. Among the most illustrious Jewish writers of this period belonging to that country are Simeon, the compiler of the Midrashic collection known as the *Yalkut*, Joseph Kara, and Petahya. Only a few names belong to Greece and Asia; still the Karaite Jews had a very able writer in Juda Hadassi (1148).

The *tenth* period (from 1204 to 1492) bears manifest traces of the influence exercised by Maimonides. Literary activity showed itself partly in the sphere of theologicoexegetic philosophy, partly in the elaboration of the national law. With the growth of a religious mysticism there also sprang up a war of opinions between Talmudists, philosophers, and cabalists. The

most celebrated Jews of this period lived in Spain, later in Portugal, Provence, and Italy. To Spain belong (in the thirteenth century) the poet Jehuda al-Hanzi, etc. In the fifteenth century a decline is noticeable. Books written in Hebrew were printed at Ixar in Aragon (1485), at Zamora (1487), and at Lisbon (1489). During this epoch the chief ornaments of Jewish literature in Languedoc were Moses ben-Abraham, David Kimchi, Jeruham, Farissol, Isaac Nathan, the author of the Hebrew Concordance. In Italy, Jewish scholars employed themselves with the translation of Arabic and Latin works. Works of an æsthetic character were written by Immanuel ben-Solomon, the author of the first Hebrew sonnets, and by Moses de Rieti (born 1389), who wrote a Hebrew imitation of the *Divina Commedia*. It was here that the first Hebrew books were printed, at Reggio, 1475; Pieve di Sacco, 1475; Mantua, 1476; Ferrara, 1477. In France mention may be made of the collectors of the Tosaphot, Moses de Coucy and Jehiel ben-Joseph. Germany produced a multitude of writers on the Law, such as Eleazar Halevi, Meyer of Rothenburg, Asher, Isserlin, Lippmann. Most of the extant Hebrew manuscripts belong to this period, but a great part of mediæval Jewish literature lies still unprinted in the libraries of Europe.

The *eleventh* period (1492 to 1755) is marked by erudition in many fields and some noteworthy advances by radical thinkers. In Italy and the East (1492), in Germany and Poland (1550), as well as in Holland (1620), Jewish scholars worked printing presses, while numerous authors wrote in Hebrew, Latin, Spanish, Portuguese, Italian, and Judæo-German. Some of the most eminent theologians, philosophers, jurists, historians, mathematicians, poets, commentators, lexicographers and grammarians of this period among the orthodox Jews were Isaac Abrabanel, Elia Miahrahi, I. Arama, J. Habib, Elias Levita, Obadiah Sforno, Joseph Cohen, Gedalia ibn-Yahya, Sal. Usque, Asaria de Rossi, David de Pomis, David Gans, Isaac Troki, I. Luria, J. Caro, M. Alshech, M. Jafé, J. Heller, I. Aboab, Manasseh ben-Israel, David Conforte, Leo de Modena, B. Musaphia, J. Eybeschütz, D. Oppenheimer, J. Emden, and M. C. Luzzatto. A bold thinker, who met with a sad fate because of his opposition to accepted beliefs, was Uriel da Costa, and the greatest philosopher the Jewish people has produced was Baruch Spinoza, whose influence for a long time was felt more strongly in the Christian world than in Jewry.

The *twelfth* period extends from 1755 to the present time. Encouraged by the spirit of the eighteenth century, Moses Mendelssohn opened to his coreligionists a new era which, as in the Middle Ages, first manifested itself in the national literature. Its character, contents, expression, and even its phraseology, were changed. Poetry, language, philology, criticism, education, history, and literature have been earnestly cultivated. Among the illustrious names of the early part of this period may be mentioned Ezekiel Landau, Elias Wilna, J. Berlin, Mendelssohn, Maimon, Bendavid, Beer, Euchel, Benzebh, S. Dubno; but the real foundation for the work of the modern critical school was laid by L. Zunz, whose *Gottesdienstliche Vorträge der Juden* (Berlin, 1832; 2d ed., Frankfort, 1892) brought light for the first time into the history of the Midrashic literature, and whose works on the religious poetry of the Jews have served as a basis for all later scholars. He was ably seconded by S. L. Rapoport, N. Krochmal, M. Jost, S. D. Luzzatto, and M. Steinschneider. Among those who have continued the work done by Zunz may be mentioned A. Geiger, L. Dukes, M. Sachs, S. Munk, Reggio, Z. Frankel, L. Löw, H. Graetz, D. Rosin, M. Joel, A. Jellinek, W. Bacher, J. Derenbourg, S. Buber, M. Kayserling, M. Güdemann, D. Kaufmann, A. Neubauer, A. Berliner, D. Chowlson, A. Harkavy, S. Schechter, Isidor Loeb, Marcus Jastrow, Morris Jastrow, Gustav Gottheil, J. R. Gottheil, Kaufmann Kohler, Emil Hirsch, and C. G. Montefiore.

A great influence has also been exerted by the journals and periodicals which in part are devoted to purely literary questions and in part treat of religious and practical affairs. One of the first of these was the *Meassef* (Collector) published by the circle which gathered around Mendelssohn. L. Philippson in Bonn, A. Geiger in Berlin, Szanto in Vienna, Lehmann in Mainz, Fürst in Leipzig, and I. M. Wise in Cincinnati were among the pioneers in modern Jewish journalism. They have been followed by a host of others. The leading periodicals are Z. Frankel's *Monatsschrift für die Geschichte der Juden* (Breslau, 1851 et seq.); *Monatsschrift für die Wissenschaft des Judenthums* (Berlin, 1883 et seq.); *Revue des Etudes Juives* (Paris, 1879 et seq.); *Jewish Quarterly Review* (London, 1888 et seq.), new series (Philadelphia, 1910 et seq.); *Jewish Review* (London, 1910 et seq.). Besides these periodicals mention should also be made of the powerful influence exerted by the *Jewish Encyclopædia* edited by Isidore Singer (New York, 1901–06).

There is no country in Europe which does not count Jews among the foremost representatives of its intellectual progress. In Germany some of the greatest professors at the universities and academies have been Jews. The list includes the names of Gans, Benary, Weil, Benfey, Bernays, Stahl, Derenbourg, Valentin, J. Kaufmann, Spitzer, Lazarus, Herz, Steinthal, and Barth. To these may be added Bréal, Oppert, H. Weil, Salomon Reinach, Th. Reinach, S. Munk, and H. Derenbourg in France, Sylvester in England, G. Brandes in Denmark, D. H. Müller in Austria, S. D. Luzzatto in Italy, and I. Goldziher in Hungary. Conspicuous in literature and the various fine arts are the names of Heinrich Heine, Ludwig Börne, Rahel Levin (Varnhagen), Berthold Auerbach, Marcus Herz, Jules Janin, Max Nordau, Israel Zangwill, Mark Antokolski, James Darmesteter, Catulle Mendès, Felix Mendelssohn-Bartholdy, Halévy, Waldteufel, Meyerbeer, Moscheles, Joachim, Rubinstein, Wieniawski, Grisi, Costa, Rachel, Dawison, Dessoir, Bernhardt.

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teristics of Modern Jews" and "The Comparative Distribution of Jewish Ability," in the *Journal of the Anthropological Institute of Great Britain and Ireland* (London, 1886); id., *Studies in Jewish Statistics* (ib., 1891); Alsberg, *Rassenmischung im Judentum* (Berlin, 1891); Luschan, "Die anthropologische Stellung der Juden," in the *Correspondenzblatt der deutschen anthropologischen Gesellschaft* (Brunswick, 1882); Jacques, "Types juifs," in the *Revue des Etudes Juives* (Paris, 1893). For Hebrew history and religion and the postbiblical period to the destruction of Jerusalem, the histories of Stade, Kittel (2d ed., Gotha, 1909–12), Guthe, Buhl, Cornill, Köhler, Klostermann, Wellhausen (7th ed., Berlin, 1914), Renan, Piepenbring, and Kent represent modern scholarship. Eduard Meyer, in *Entstehung des Judentums* (Halle, 1896) and *Die Israeliten* (ib., 1906), deals with two important periods; for a later period cf. Schlatter, *Geschichte Israels von Alexander dem Grossen bis Hadrian* (2d ed., Leipzig, 1906). For the general history of the Jews, but chiefly for the period after 70 A.D., the most comprehensive work is Graetz, *Geschichte der Juden von den ältesten Zeiten bis auf die Gegenwart* (11 vols., Berlin, 1854–75; abridged Eng. ed., 5 vols., Philadelphia, 1873), but Jost, *Geschichte der Israeliten seit der Zeit der Makkabäer bis auf unsere Zeit* (10 vols., Berlin, 1820–47), still possesses independent value. Other general histories are Heinrich Ewald, *Geschichte des Volkes Israel*, to the time of Bar Cochba (7 vols., 3d ed., Göttingen, 1864–78; Eng. trans., 5 vols., London, 1869–74), and H. H. Milman, *The History of the Jews* (rev. ed., 2 vols., New York, 1909). There are briefer histories by Geiger, Cassel, and Graetz. Useful compends are Lady Magnus, *Outlines of Jewish History* (Philadelphia, 1890), and Reinach, *Histoire des Israélites*, with bibliography (2d ed., Paris, 1902). The best sketches are by James Darmesteter, *Coup d'œil sur l'histoire du peuple juif* (Paris, 1881; Eng. trans. in *Selected Essays of James Darmesteter*, Boston, 1895), Dubnow, *Die jüdische Geschichte* (Berlin, 1898), and Philippson, *Neueste Geschichte des jüdischen Volkes* (ib., 1908). Consult also the Hebrew archæologies of Nowack and Benzinger (3d ed., Tübingen, 1907); A. P. Stanley, *Lectures on the History of the Jewish Church* (3 vols., London, 1864–76; 3 vols., New York, 1901–02); Goldziher, *Der Mythos bei den Hebräern* (Leipzig, 1876); Hommel, *Die Semiten und ihre Bedeutung für Kulturgeschichte* (ib., 1881); id., *Die vorsemitischen Kulturen in Aegypten und Babylonien* (ib., 1882); Renan, *Le judaisme comme race et comme religion* (Paris, 1883); Montefiore, *Lectures on the Origin and Growth of Religion as Illustrated by the Religion of the Ancient Hebrews*, Hibbert Lectures (London, 1893); Leroy Beaulieu, *Israël chez les nations* (2d ed., Paris, 1893; trans., New York, 1895); Edersheim, *History of the Jewish Nation* (London, 1896); Barton, *A Sketch of Semitic Origins* (New York, 1902); Schürer, *Geschichte des jüdischen Volkes in Zeitalter Jesu Christi* (4th ed., Leipzig, 1901–11; Eng. trans., 5 vols., New York, 1896); I. Abrahams, *Jewish Life in the Middle Ages* (London, 1896). For special periods and places the works are exceedingly numerous. The following may be mentioned: Wertheimer, *Geschichte der Juden in Oesterreich* (Leipzig, 1842); Lindo, *History of the Jews of Spain and Portugal* (London, 1848); Derenbourg, *Essai sur l'histoire et la géographie de la Palestine* (Paris, 1867); Bédarride, *Les Juifs en France, en Italie et en Espagne* (3d ed., ib., 1867); Güdemann, *Geschichte des Erziehungswesens und der Cultur der abendländischen Juden* (5 vols., Vienna, 1873–91); Goldschmidt, *Geschichte der Juden in England*, part i (Berlin, 1886); Scherer, *Beiträge zur Geschichte des Judenrechtes im Mittelalter*, vol. i (Leipzig, 1901); Abbott, *Israel in Europe* (London, 1905). For the United States the publications of the American Jewish Historical Society (Baltimore, 1893 et seq.) may be consulted, and for Germany those of the Gesellschaft für die Geschichte der Juden in Deutschland (Berlin, 1886 et seq.). 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For Jewish literature, consult: Steinschneider, *Jewish Literature* (London, 1857); Zunz, *Die synagogale Poesie des Mittelalters* (Berlin, 1855–59), which combines with the treatment of the poetry a history of the cruelties of the Middle Ages; the other writings of Zunz are also of much value; Karpeles, *Geschichte der jüdischen Litteratur* (Berlin, 1886); id., *Jewish Literature and Other Essays* (Philadelphia, 1895); Deutsch, *The Talmud* (ib., 1895); Arsène Darmesteter, *The Talmud* (ib., 1897); Abrahams, *Chapters on Jewish Literature* (ib., 1899); Lazarus, *The Ethics of Judaism*, English translation by Henriette Szold (ib., 1900). The *American Jewish Year Book*, edited by Cyrus Adler (ib., 1899 et seq.), gives much valuable information, and the great *Jewish Encyclopædia* (12 vols., New York, 1901–06) is a comprehensive work.

JEWS, Exchequer of the. In early English history the Jews did not form an integral part of the body politic, but constituted a special status, dependent directly upon the crown and subject to any restrictions and exactions the King might impose upon them. In 1194 proctors or judges were appointed to deal with cases in which Jews were concerned. In the thirteenth century these officials presided over the exchequer chamber set apart for Jewish revenue and accounts and were sometimes known as "justiciars deputed to the charge of the Jews," sometimes as "justiciars of the exchequer of the Jewry." In their judicial capacity these officials tried offenses in which non-Jews would have had to appear before the King's ordinary justices; they also decided civil suits between Jews, or between Jews on the one hand and Christians on the other. As fiscal officials, they presided over the exchequer chamber of the Jews and saw that all claims which the King

had against Jews, or arising out of transactions in which Jews were involved, were presented and enforced. They provided the sheriff of each county with lists of the sums which he was expected to collect from the Jews; they kept records of royal claims on the Jews and their debtors and administered property that came into the King's hands on account of the Jews. In the first instance the Jewish revenue was paid into the great exchequer, whence it was transferred to the exchequer of the Jews, to be kept until the King needed it. The institution disappeared with the expulsion of the Jews under Edward I.

JEWS'BURY, Geraldine Endsor (1812–80). An English novelist. She was born at Measham, Derbyshire, and was the daughter of a Manchester merchant. She was left motherless at an early age and was educated by her sister Maria Jane (afterward Mrs. Fletcher), a popular author. An early acquaintance with Thomas Carlyle and his wife and other literary and artistic celebrities helped to develop her powers, and her first novel, *Zoe, the History of Two Lives* (1845), was the forerunner of a succession of works, which include: *The Half Sisters* (1848); *Marian Withers* (1851); *The History of an Adopted Child* (1852); *Angelo, or the Pine Forest in the Alps* (1855); *Constance Herbert* (1855); *The Sorrows of Gentility* (1856); *Right or Wrong* (1859).

JEWSBURY, Maria Jane (1800–33). An English author, born at Measham, Derbyshire, sister of the preceding. At the age of 18 she began to write poetry for the newspapers of Manchester, where she lived. Her first prose work, *Phantasmagoria, or Sketches of Life and Character,* was published in Leeds (1824). It was followed by *Letters to the Young* (1828); *Lays of Leisure Hours* (1829); *The Three Histories—of an Enthusiast, a Nonchalant, and a Realist* (1830). She married the Rev. William K. Fletcher (1832), chaplain to the East India Company, and died of cholera in a little more than a year after she had gone with him to India.

JEW'S-HARP (*Jew* + *harp,* in allusion to the use of the harp, as David's harp, among the Jews). A simple musical instrument, made of metal. It is held between the teeth, and the sound is produced by the inhaling and ejecting of the air from the lungs, while at the same time an elastic tongue or spring, which is fixed in the middle of the frame, is set into vibration by being twitched by the finger. It is an old invention, being mentioned by Prätorius in his *Organographia* (1619) under the name of crembalum.

JEW'S MALLOW. An annual potherb. See Corchorus.

JEWS'-THORN. A spiny Old World shrub which bears an edible fruit. See Jujube.

JEX-BLAKE, Sophia (1840–1912). An English physician, born at Brighton. She was a tutor in mathematics at Queen's College, London, in 1858–61. She then traveled in Europe and America, became interested in the medical education of women, and in 1866 began the study of medicine under Dr. Lucy Sewall in Boston. Returning to England in 1868, she matriculated in medicine at the University of Edinburgh in the following year, but was not permitted to finish the course, although she contested the action of the university authorities in the law courts. She was a leader in opening the London School of Medicine for Women in 1874. Her own medical education she completed at the University of Bonn, receiving the degree of M.D. in 1877. At Edinburgh she opened a Dispensary for Women and Children in 1878, the Cottage Hospital in 1885, and in 1886 the Edinburgh School of Medicine for Women, of which she was dean until her retirement in 1899. She is author of *American Schools and Colleges* (1866); *Medical Women* (1872; 2d ed., 1886); *Care of Infants* (1884; 2d ed., 1903).

JEYPORE, jī-pōr′. Another spelling for the name of a native State of India, and its capital. See Jaipur.

JEZ'EBEL (Heb. *'Izebel*). The daughter of Ethbaal, King of Tyre, and wife of Ahab, King of Israel. Ahab's marriage with a Tyrian princess (1 Kings xvi. 31) was a political device to insure the alliance with Tyre. As a symbol of the alliance, a temple to Baal Melkart, the god of Tyre, seems to have been built. The worship of this god was probably very similar to the Baal cult that already flourished in Israel and not very different from the Yahwe cult as it was then practiced. To a later age the act of Ahab in marrying a "Canaanitish" woman appeared as a heinous offense, and accordingly both Ahab and Jezebel are represented in Kings and Chronicles in the most unfavorable light. In Ahab's reign a strong movement led by Elijah (q.v.) against the Baal cult set in, and Jezebel is represented as having been one of the strongest and bitterest opponents of Elijah. Hence the later biblical writers cannot find enough to say against her. She is represented as cruel, intent upon exterminating the prophets of Yahwe, and is made responsible for the murder of Naboth (q.v.). These charges can scarcely be regarded as borne out by the evidence when a careful textual and historical criticism has been applied. She survived her husband for 14 years and was murdered (2 Kings ix. 30–37) by Jehu (q.v.) at the time that he seized the throne of the northern kingdom (c.843 B.C.). Consult the histories of Israel, and Schmidt, "The Sins of Jezebel," in *Journal of Biblical Literature* (Boston, 1915). See Ahab.

JEZI'RAH (Heb. *sēfer yesīrāh*), or Book of Creation. One of the chief cabalistic books of the Jews, containing a mystical account of the creation of the universe. See Cabbala.

JEZREEL, jĕz′rē-ĕl (Heb. *yizre'el,* God sows). A town of ancient Palestine in the territory of Issachar (Josh. xix. 18) (Map: Palestine, C 2). Near by was fought the battle in which Saul fell (1 Sam. xxix. 1 et seq.). The town contained a palace, which was the residence of Ahab and Jezebel (1 Kings xviii. 45–46; 2 Kings ix. 30). After their time it was deserted. In the time of Eusebius and Jerome it was known under the names Esdraela and Stradela, and in the history of the Crusades we meet with it as Parvum Gerinum. The modern Arabic name of the place is Zerin; it contains only slight ruins, of little interest.

JHANSI, jän′sē. The headquarters of a district of the same name, United Provinces, India, 60 miles northeast of the city of Gwalior (Map: India, D 4). It is surrounded by a wall from 18 to 30 feet high, 6 to 12 feet thick, and 4½ miles in circuit. The town is important as the central junction of four lines of the Indian Midland Railway system. It has manufactures of silk, rugs, and brassware. The large rail-

way shops employ more than 2000 hands. It is the centre for agricultural products of the district. Pop., 1901, 55,724; 1911, 70,208. The formidable fort on an elevated rock, commanding the city and surrounding country, belongs to the British government.—JHANSI NAOABAD, with the civil station and military cantonment (pop., 3000), adjoins the city and is the capital of the British District of Jhansi in the Allahabad division, Northwest Provinces. The European garrison was massacred during the mutiny of 1857, and Jhansi was only recovered the following year after a siege of 12 days and a large loss of life.

JHELAM, jē'lŭm, or **JHELUM**. The ancient Hydaspes, the westernmost of the five rivers of the Punjab, India. Its source is at Vernag in Kashmir, 12 miles east of Shahabad, where it issues from an octagonal tank in a garden fed by springs from the Bunihal Pass in the Western Himalayas (Map: India, B 2). Its course is northwest past Islamabad and Srinagar to the Wulur Lake, whence it flows southwest through the Barambula Pass and again northwest to Mazufurubad. Here it bends directly southward and forms the boundary of Kashmir and the Punjab to Jhelam, where it assumes a southwesterly trend and, continuing past Jalalpur, Pind Dadan Khan, Bhera, Shahpur, and Shahiwal, joins the Chenab below Kadirpur after a course of 490 miles. It is navigable by river craft for the greater part of its course and abounds in fish. On its banks Alexander the Great built a war fleet and fought a battle with Porus. It is an important Himalayan example, in its pathway through Kashmir, of a wide and fertile plain made by a locally aggrading stream which has caused a vast deposit of alluvium and much meandering.

JHERING, yā'rĭng, HERMANN VON (1850–). A German naturalist in Brazil. A son of the jurist, Rudolf von Jhering, he was born in Kiel and was educated at Giessen, Leipzig, Berlin, and Göttingen. He was privatdocent at Erlangen and Leipzig until 1880, when he went to Brazil. There he became naturalist of the Museu Nacional in Rio de Janeiro and later director of the Museu Paulista in São Paulo. The name Amphineura and the grouping of the Neomenia, Chætoderma, etc., under this name were due to him (1876), though he erroneously included them in a division of worms; and his work in zoölogy, paleontology, and anthropology has a particular value because of his knowledge of South America. He edited the *Revista do Museu Paulista* (1895 et seq.) and wrote: *Vergleichende Anatomie des Nervensystems und Phylogenie der Mollusken* (1877); *Rio Grande do Sul* (1885); *Anthropology of the State of São Paulo* (2d ed., 1906).

JHERING, RUDOLF VON (1818–92). A German legal scholar, born at Aurich, Hanover, and educated at Heidelberg, Munich, Göttingen, and Berlin. He became instructor at Berlin (1843) and professor at Basel (1845), Rostock (1846), Kiel (1849), Giessen (1852), Vienna (1868), and Göttingen (1872). He was made a noble by the Emperor of Austria in 1872. Trained in the historical school, Jhering forsook it for a philosophical method which aimed to show the psychological development of law by examples drawn from the national character of the Romans. This was in direct contravention to Savigny's method. Jhering's great work (unfinished), which brought him rank as one of the foremost of nineteenth-century authorities on jurisprudence, was *Geist des römischen Rechts auf den verschiedenen Stufen seiner Entwickelung* (1852–65; 6th ed., 1907 et seq.; It. trans. by Bellavite). He published also: *Zivilrechtsfälle ohne Entscheidungen* (1847; 11th ed., 1909); *Die Jurisprudenz des täglichen Lebens* (1870; 13th ed., 1909; Eng. trans. by H. Goudy, *Law in Daily Life*, 1904); *Der Kampf ums Recht* (1872; 17th ed., 1910); *Der Zweck im Recht* (2 vols., 1877–83; 4th ed., 1904–05; Eng. trans. of vol. i by I. Husik, *Law as a Means to an End*, 1914); *Scherz und Ernst in der Jurisprudenz* (1885; 10th ed., 1909); and the posthumous *Entwickelungsgeschichte des römischen Rechts* (1894), and *Vorgeschichte der Indoeuropäer* (1894). With Karl Gerber he founded in 1856, and thereafter edited, the *Jahrbücher für die Dogmatik des heutigen römischen und deutschen Privatrechts*. Consult: A Merkel, *R. von Jhering* (Jena, 1893); E. Hurwicz, *Rudolf von Jhering und die deutsche Rechtswissenschaft* (Berlin, 1911), with bibliography; Gustav de Szászy-Schwarz, "Rudolf Jhering et son œuvre," in *Revue de Hongroie*, vol. xii (Budapest, 1913).

JIB (from Dan. *gibbe*, Swed. *gippa*, Dutch *gijpen*, to turn suddenly, jibe). A triangular sail which is set on the *jib stay*, a rope extending from the jib boom or extremity of the bowsprit to the fore-topmast head. Nearly all sailing vessels larger than a catboat have jibs, the exceptions being mostly vessels with a lateen rig. The forward and upper side of a jib lies along the stay, to which it is secured by *hanks* or *travelers*, and is inclined to the horizon at an angle varying from 30 to 60 degrees. The after edge or leech is more nearly vertical, and the foot is almost horizontal. The jib serves to balance the effect of the after sails and keep the ship's head from coming up to the wind. The *jib boom* is a spar projecting from the bow of a vessel over which the jib is set. In large sailing ships the jib boom projects through a hole in the bowsprit cap, and its inner end or heel is secured on top of the bowsprit. Sometimes there is a *flying jib boom*, a light spar lying partly on the jib boom, to which it is secured, and projecting beyond it to give a lead to the flying jib and foreroyal stays. The *flying jib* is a sail similar to the jib, but smaller, and is set on the flying jib stay. The *jib foresail* is the forestaysail of a sloop. The *jib guy* is a rope giving lateral support to the jib boom. It leads from the head of the latter to the end of the whisker boom and then to the forecastle rail. When two sails are set between the fore-topmast stay and jib stay, they are called *inner* and *outer jibs*.

The *jib netting* is a network with meshes 4 to 6 inches across, which is placed under the jib boom and seized to the whisker booms and jib guys. It serves to keep the jib from hanging down into the water when hauled down and is a safeguard to the men furling it in heavy weather. The *jib stay* is a rope forming part of the standard rigging of a ship and serves to set the jib upon. It leads from the fore-topmast head to a sheave or hole in the outer end of the jib boom, thence under a cleat on the dolphin striker and in to the bow. The *flying jib stay* is a rope similar to the jib stay, but leading from the fore-topgallant masthead to the end of the flying jib boom, thence to the dolphin striker and to the bow. The *jib topsail* is a light sail on

the topmast stay of a small schooner or sloop. See SAIL.

JIBE. To shift over a boom mainsail or spanker when the wind is aft, or nearly aft, so that the wind will fill it on the other side. When the sail is a large one, the sudden change of the wind pressure from one side to the other usually causes the vessel to heel over at a considerable angle, and if the operation is carelessly done in a strong breeze the vessel may capsize. The operation of wearing in a small fore-and-aft rigged vessel is usually called *jibing*, on account of the jibing of the mainsail. Jibing the spanker is of rare occurrence, as it is usually taken in when the wind is very far abaft the beam.

JIBO'A, or JIBO'YA. A native name in Brazil for a boa—more particularly, on the Amazon, the thick-necked boa. See BOA.

JICARILLA, hē'kȧ-rē'lyȧ. A tribe of Athapascan stock formerly occupying parts of Arizona and New Mexico. They were composed of two bands—the Llanero ranging east of the Rio Grande, the Ollero to the west. Both bands are now living on a reservation in northern New Mexico and number 694. They are generally considered a division of the Apache (q.v.), because of similarity in language, but have always been politically independent. Their culture bears some resemblance to that of the Plains Indians. Consult P. E. Goddard, "Jicarilla Apache Texts," in American Museum of Natural History, *Anthropological Papers*, vol. viii (New York, 1911), and id., *Indians of the Southwest*, in American Museum of Natural History, "Handbook Series," No. 2 (ib., 1913). See INDIANS.

JICIN, yē'chĕn. A town of Bohemia. See GITSCHIN.

JID'DAH, or JEDDAH (Ar. *Juddah*). The most important trading port on the Red Sea, situated on the coast of the Hejaz, Arabia, about 60 miles west of Mecca (Map: Turkey in Asia, D 7). It is a well-built, prosperous-looking walled city, with wide streets and fine buildings, the chief of which are the Governor's residence, the customhouse, the mosques, and the fort. The climate is exceedingly hot and the water supply defective. Jiddah was formerly the trading centre between Arabia and Africa, and its annual commerce amounted to about $4,500,000, but now is less than one-quarter of that amount. The city is more important as a landing place for pilgrims to Mecca than a trading centre, though it is still the chief market for pearls, mother-of-pearl, black coral, coffee, balsam, aromatic herbs, horses and donkeys, and a depot for Oriental carpets and other goods. Two lines of steamers connect it with Suez, the Suez-Aden boats touch here, and consulates of most of the powers are maintained. More than 60,000 pilgrims pass through the city yearly, and outside the city is one of the holy places of the Moslem world, the tomb of Eve. During the Wahhabite wars Jiddah was taken by the Egyptians. Since 1840 it has belonged to Turkey. On June 15, 1858, Christian missionaries were murdered in the city, and a month later it was besieged for three days by an English man-of-war. The population is estimated at 30,000 and is exceedingly heterogeneous.

JIG, or **GIGUE,** zhēg (OF., Fr. *gigue*, jig, OSp., OIt. *giga*, fiddle, from MHG. *gīge*, Ger. *Geige*, Icel. *gigja*, fiddle). The name of a short piece of music much in vogue in olden times, of a joyful and lively character, and in $\frac{3}{8}$ or $\frac{3}{4}$, also in compound time ($\frac{6}{8}$, $\frac{9}{4}$, etc.); used formerly as a dance tune. It consists of two parts of eight bars each, and the shortest notes are quavers. When it became a regular part of the suite (q.v.), its dimensions were extended. It was customary to close all suites or partitas with a *gigue*. The dance is rapid and irregular, and, although originally a form of country-dance, has been modified by its introduction into various countries until scarcely anything of its early character remains.

JIG. A device for separating heavy minerals of an ore from the barren gangue rock, or for separating two or more minerals varying considerably in specific gravity. Hand jigs are used on small operations or by prospectors, and mechanical jigs for larger operations. The hand jig consists of a square box having a screen for the bottom; this box is suspended from a spring pole or lever in a larger box containing water; a charge of ore is shoveled into the suspended box, and an up-and-down or jigging motion imparted to it through the spring pole. The heavy ore or mineral settles to the bottom, and lighter rock which rises to the surface is removed by hand. Mechanical jigs consist of a series of boxes or one long box separated into from three to six independent compartments by cross vertical partitions; each compartment is then divided into two sections by a longitudinal vertical partition which extends from the top of the box to a depth of about one-third of the height of the box; this longitudinal partition permits the passage of water between the two sections. One side of each compartment is then fitted with a fine screen or grating, and the other side is fitted with a plunger. The plunger is suspended by a steel rod, or support, from an eccentric which revolves around a central longitudinal shaft. Each compartment is then filled with water; sized ore is fed to the screen with a stream of water to wash the surface of the material to succeeding boxes; and the central shaft is then revolved, causing the plungers to move up and down, resulting in the water first being forced into the section containing the ore and then being sucked back. The crushed ore is raised en masse from the screen bottom by the force of the water, thereby permitting the heavy minerals to fall back to the screen in advance of the lighter ore or waste rock. This continued action of the plunger results in layers being formed of heavy minerals next to the screen and the lighter minerals and waste on the surface; the surface material is washed by the surface current of water to the second and succeeding compartments. The minerals which have settled are drawn from each compartment through an automatic gate. With lead-zinc sulphide ores in a siliceous gangue the first compartment will collect and discharge practically pure galena (lead sulphide), which is the heaviest mineral; the second compartment will discharge a middlings product consisting of galena attached to silica and galena attached to blende (zinc sulphide); the third compartment will discharge practically pure blende; the fourth compartment will discharge a middlings product of blende attached to silica; and the fifth compartment, a very low-grade middlings product. All of the middlings product must be re-crushed, sized, and re-treated. From the tail end of the compartments the waste rock is

washed away by the surface current of water. A small amount of water is fed constantly to the plunger side of each compartment. This type is known as the Hartz jig.

The size of each section or screen area varies greatly; usually it is 10 to 12 inches wide by 20 to 24 inches long; the Cooley jig, used in Joplin, Mo., is 18 to 24 inches wide by 24 to 36 inches long. The Hancock jig differs from the Hartz jig in that the screen forms the bottom of a movable box suspended in water which is raised and lowered mechanically by supports connected to an eccentric. The action of this jig is identical to that of the Hartz jig, gives very satisfactory results, and has a large capacity. Various types of jigs are manufactured, differing in methods of drawing off the products and in design of eccentric, but the principle of separation is the same in all types.

With heavy ores it is customary to feed nothing over about ½ inch or under 1/10 inch; there are a few exceptions to this. With coal mixed with slate the largest size is usually about 1½ inches. The preliminary sizing for the most efficient work consists of separating into such sizes that the smallest grain of heavy material will settle with the same velocity as the largest grain of light mineral. In the separation of blende (zinc sulphide) from quartz gangue the most efficient results are obtained by sizing into the following products: coarse, ½ to ¼ inch; medium, ¼ to ⅛ inch; and fine size, ⅛ to 1/16 inch; the fine size is often fed to concentrating tables. See ORE DRESSING.

JIGGER, jĭg′ẽr (corruption of *chigoe*, the native name), or RED BUG. See CHIGOE, 2.

JILL. See JACK AND JILL.

JIM CROW. A negro song (1835) introduced by T. D. Rice in Louisville, Ky., and at the Adelphi in London.

JIMÉNES, hē-mā′nās. See XIMÉNES.

JIMÉNES DE CISNEROS, FRANCISCO. See XIMÉNEZ DE CISNEROS, FRANCISCO.

JIMÉNES DE QUESEDA. See XIMÉNEZ DE QUESADA.

JIMÉNEZ DE RADA, dā rä′dä, RODRIGO (c.1170–1247). A Spanish historian, born probably in Navarra. He was educated in Paris, entered the Franciscan Order, and became Archbishop of Toledo in 1208. Afterward he was made Cardinal. His contemporaries considered him the most scholarly cleric in the world. He wrote at the bidding of St. Ferdinand of Castile his *Historia Gothica* (so named by him, but more commonly called *Chronica Rerum Gestarum in Hispania*), which he himself translated into Castilian as the *Historia de los Godos* (c.1241). It covers the time from the invasion of the Goths to the year 1243 and was exceedingly influential in the world of letters.

JIM′MU TEN′NO (Sinico-Japanese, Jimmu the Emperor). The first ruler of Japan, and the reputed founder of the line of mikados that has continued to the present time, Yoshihito, the Mikado now (1915) on the throne, being the hundred and twenty-second or, according to some, the hundred and twenty-third. He was said to have been a descendant in the fifth degree of Ten-sho Dai-jin, or Amaterasu, the sun goddess. His reign is said to have begun in the year 660 B.C. and to have ended in 581 B.C., after having conquered all his enemies in the south and west and established his throne in Yamato, the central part of the main island of Japan. There he married a lady named Hime-tatara-isuzu-himeno-mikoto, daughter of one of the rulers of the country. He is said to have died at the age of 137. His burial place is situated on an isolated hill on the northeast side of Mount Unebi in Yamato. His anniversary is February 11, when salutes are fired in his honor. The era of Jimmu Tenno is that from which the Japanese reckon. If he ever existed, he was probably one of the early—or perhaps the earliest—invaders of Japan, entering the country from the southwest.

JIMSON WEED. A weed of the nightshade family. See STRAMONIUM.

JINGAL, jĭn′gąl (Hind. *jangāl*, Marathi, *jejāl*, swivel gun). A long, heavy musket or small gun, using a ball weighing a quarter of a pound or more, formerly much used in China and Korea and still employed to some extent. It is supported when being aimed by an iron crutch pivoted about the middle of the barrel. It is usually breech-loading, and fitted to be charged by a separate brass chamber inserted into the bore and held in place by a wedge-shaped key.

JINGLE, ALFRED. See PICKWICK CLUB.

JINGLE SHELL. A species of *Anomia*, a bivalve shell related to the oyster, in which the upper valve is convex, smooth or rough, while the lower valve is concave, with a deep rounded notch in front of the cartilage process; the animal is anchored by a plug passing through the notch in the lower valve. It lives attached to oysters and other shells, and these are modified so as to acquire the irregular form of the surface on which they rest. One species lives on the coast of northeastern America; but the jingle shell proper is a larger golden-yellow species from the tropics.

JIN′GOISM (from *jingo*, perhaps a corruption of St. *Gingulphus*, or a corruption of Basque *Jinkoa, Jainkoa, Jeinkoa*, contracted from *Jaungoicoa, Jangoicoa*, lord of the high, God). A term coined from the ancient slang expression "by Jingo," owing to an incident of British politics in 1877, when England was undecided whether to interfere forcibly in the war between Russia and Turkey. The Liberals, led by Gladstone, were in favor of leaving Turkey to itself, while the Conservatives, under Lord Beaconsfield, the Premier, were determined to protect Turkey from Russia. During the winter of 1877–78 the excitement in London became intense, and wherever the fighting spirit prevailed it freely found vent in a doggerel first sung at a music hall:

> "We don't want to fight, but by Jingo, if we do,
> We 've got the ships, we 've got the men, we 've got the money too."

"Jingo!" shouted with a significant emphasis, was derisively cast as a nickname at the warlike party. The term, corresponding to "spread-eagleism" in America and *chauvinisme* in France, has ever since been applied to the warlike advocates of British Imperial sway and has been taken up with a similar meaning in the United States. Consult J. A. Hobson, *The Psychology of Jingoism* (London, 1901), and F. H. S. Escott, "The Analysis of Jingo," in the *Fortnightly Review*, vol. lxxvii (ib., 1902).

JINGO-KOGO, jĭn′gō-kō′gō (Sinico-Japanese, Jingo the Empress). A legendary ruler of Japan, named Okinaga-Tarashi-Hime, wife of Chuai Tenno, the fourteenth Mikado (191–200

A.D.). A rebellion having broken out in Kiushu, he set out to suppress it, accompanied by his wife, then with child. He died in camp, a fact which she suppressed, and, having appointed a general to continue the war there, she assumed the regency, assembled another great army, and fitted out a fleet to invade Korea. She led the expedition in person, and so formidable was the armada that the King of Shiraki became terror-stricken on its approach and immediately submitted, swearing to pay tribute to Japan forever. The kings of Koma and Kudara also submitted on the same terms; and, laden with gifts and bringing many hostages, the warlike Regent returned after an absence of nearly three years to Japan and gave birth to a child, who afterward became Ojin Tenno, the fifteenth Mikado, and later was canonized as Hachiman, the god of war. As Regent, his mother ruled Japan until 270 A.D. She is worshiped to this day under the name of Kashi Dai Myojin. On her legendary conquest of Korea are based the traditional claims of Japan upon that country.

JINIGARÁN, hē'nē-gä-rän', or **GINIGARÁN.** A town of the Province of Negros Occidental, Philippines, situated on the west coast of the island of Negros, on the Guimras Strait, 29 miles south of Bacôlod. Pop., 1903, 14,256.

JINN (Ar., from *janna*, to be veiled, be dark), often written GENII. Supernatural beings of Arabic folklore and religion. Mohammed believed in their existence, and the seventy-second sura of the Koran is named after them. According to tradition, the Prophet recognized five orders of such creatures. They are both male and female; eat, drink, and propagate their kind, and die, though they generally live very long. Some are good, some bad; some are Mohammedans, some infidels. They were created 2000 years before Adam, of smokeless fire, and in the early time were ruled by a race of kings each named Solomon. Their home is the mountain called Kaf, supposed to encompass the earth; but they haunt all sorts of places, rivers, ruined buildings, ovens, baths, etc. They are in the sea, on land, and in the air. They assume what form they choose, and appear to men as dogs, cats, serpents, and in other animal forms, as human beings, and in the whirlwinds, dust clouds, and the like. They are the authors of many of the ills to which men are subject, but also confer benefits, and, in general, whatever the mind of the untutored cannot conceive of as done by human means is ascribed to them. It was they who built the pyramids. Solomon, son of David, acquired great power over them, and innumerable stories are told of the great things he accomplished with their help. They are identical with the spirits and demons that play so large a part in the religious literature of the Babylonians and Assyrians. Consult: Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898); Fossey, *La magie assyrienne* (Paris, 1902); and, for the Arabian demons, Lane, *Manners and Customs of the Modern Egyptians* (London, 1837); id., *The Thousand and One Nights*, notes (ib., 1838–40).

JINNISTAN. See DJINNESTAN.

JINRIKISHA, jĭn-rĭk'ē-shâ (Sinico-Japanese, man-power vehicle). A light two-wheeled hooded carriage, much resembling a miniature hansom cab without the driver's seat at the back. It is drawn by a man, however, instead of a horse. Near the outer end of the shafts is a crosspiece used by the runner in pulling the carriage. With a cord attached to the crossbar, one or two or more outrunners can assist when extra speed is needed or the burden is especially heavy, though ordinarily the jinrikisha is almost wholly a single or double passenger vehicle only. The *hiki*, or puller, is not usually troubled with very much clothing in summer time. He can go at a great pace for long distances, frequently from 30 to 40 miles a day, arriving at his destination apparently as fresh as when he started. An American Baptist missionary named Goble claimed the invention of the jinrikisha, in 1869; but Takayama Kosuka, of Tokyo, was the first to obtain government permission to run the new vehicles, early in the same year, and another Japanese improved the rude original by supplying springs and designing the hood or calash top, adding wheel guards. Then followed a period of lavish decoration. The change from the *kago*, or palanquin, was easily made, the bearers becoming pullers. At present the decoration is very simple, generally confined to the family crest or to a single symbol. The jinrikisha has been introduced into several Asiatic countries and in India is vulgarly called ricksha and has even found a place in literature. Useful applications of this vehicle have been made in the army.

JIRÁSEK, yē'rä-shĕk, ALOIS (1851–). A popular Bohemian historical novelist and dramatist, born at Hronov. In 1888 he became professor in a Gymnasium at Prague. His numerous novels, covering Bohemian history from the earliest times, evince great faithfulness to historical truth. They include: *Nevolnice*, on the heathen period; a trilogy *Mezi proudy* (Between the Streams), on the times of Huss; and *Maryla* and *V cizích službách* (In the Foreign Service), dealing with the period after Huss. His collected works, including several dramas, were published at Prague (1899 et seq.).

JIREČEK, yē'rā-chĕk, HERMENEGILD (1827–). A Bohemian writer on Slavic law, born at Hohenmauth (Vysoké Mýto) in Bohemia and educated at Prague. He became an official in the Department of Public Education when he was 27. His earliest literary activity was in the field of fiction, and he published a collection of tales, *Novely*, in 1853. His writings on Slavic history, law, and literature include: *Ueber Eigentumsverletzungen und deren Rechtsfolgen nach dem altböhmischen Rechte* (1855); *Die Echtheit der Königinhofer Handschrift* (1862), with his brother Josef, in which he defended the authenticity of a document now generally admitted to be spurious; in Bohemian, a work on Slavic law up to the thirteenth century (1863–73); a collection of Slavic folk laws (1880); *Codex Juris Bohemici* (1867–98); *Antiquæ Boemiæ Topographia Historica* (1892); and *Unser Reich vor 2000 Jahren* (1893), continued by *Unser Reich zur Zeit der Geburt Christi* (1896).

JIREČEK, JOSEF (1825–88). A Bohemian educator, scholar, and critic, brother of the preceding, born at Hohenmauth and educated at Prague. In 1871 he was made Minister of Public Instruction in Hohenwart's cabinet, from which he was forced by German opposition. A faithful subject of the Emperor, he entered the Austrian Reichsrat in 1879. His earlier literary work was mainly educational, including the valuable manual *Anthologie z literatury české* (1858–61). Besides his work in Old Czech gram-

mar, and an essay written together with his brother, Hermenegild Jireček, entitled *Die Echtheit der Königinhofer Handschrift* (1862), mention should be made of his valuable reprints from Bohemian literature, including works of Koldin (1876) and Dalimil's chronicles (1878); of the two histories of literature, general and encyclopædic, to the close of the eighteenth century, *Rukověť k dějinám literatury české* (1874–75), his most important work, and the other dealing with Bohemian hymnology, *Dějiny církevního básnictví českého* (1878); of an anthology (1858–61) and biographical dictionary (1875–76) of Czech literature; of his contributions to *Slovník naučný*, the Bohemian encyclopædia; and of his edition of the collected works of his father-in-law, Paul Safařík (q.v.). Consult Helfert, *Joseph Jireček* (Vienna, 1890).

JIREČEK, Konstantin Josef (1854–). A Bohemian writer on Slavic history, son of Josef Jireček, who had married a daughter of Safařík. He was born in Vienna and was educated at Prague, was appointed docent of history at the University of Prague (1877), and after traveling in the South Slavic countries was made secretary (1879) and chief (1881) of the Bulgarian Ministry of Education. Having resigned, he became President of the Council of Public Instruction and director of the museum and library of Sofia. He returned to Prague in 1884, to teach universal history in the Bohemian University, and in 1893 was appointed professor of Slavic history at Vienna. In 1898 he was made a member of the Vienna Academy of Sciences. His works, mostly on the Balkan Slavs, include, among others: *Geschichte der Bulgaren* (1876; also in Czech and Russian); in Bulgarian, a bibliography of that literature (1872); *Die Heerstrasse von Belgrad nach Konstantinopel und die Balkanpässe* (1877); *Die Handelsstrassen und Bergwerke von Serbien und Bosnien im Mittelalter* (1879); in Czech, *Excursions in Bulgaria* (1880); *Das Fürstentum Bulgarien* (1891); *Die Romanen in den Städten Dalmatiens während des Mittelalters* (1901–04); *Geschichte der Serben*, vol. i (1911), the standard history of Servia. A bibliography of Jireček was published in the *Transactions* of the Society of Sciences of Sofia (1905).

JIRÓN, hē-rōn′. A town of the Department of Santander, Colombia, on the Río de Oro, 6 miles southwest of Bucaramanga. There are gold washings in the river. The surrounding region produces cacao, coffee, quinine, and tobacco. Its industries are the manufacture of hats and cigars, and it has trade in tobacco, hats, and cattle. It was founded in 1631. Pop., 1912, 5898.

JITOMIR, zhī-tō-mēr′. A city of Russia. See Zhitomir.

JIUJITSU. See Wrestling.

JIVARO, hē-vä′rō. An important confederacy or group of tribes apparently constituting a distinct stock, scattered in the forests along the Marañon (Amazon), chiefly on the north or Ecuador side, about the confluence of the Pastaza and Santiago. They are a vigorous, wild, and warlike people, but at the same time honorable and faithful, and were never subjugated by the Incas (see Quichua), and only temporarily brought under the dominion of the Spaniards, whom they expelled in a general revolt in 1599. Their general appearance indicates muscular strength and activity and quick intelligence. They live in well-built wooden houses, with platform beds instead of hammocks; cultivate corn, beans, and bananas, and weave cotton cloth. They use the blowgun, bow, lance, and shield, and wear their hair long and flowing, with headdresses of bright feathers. Their ordinary dress is a shirt without sleeves and a pair of short trousers, but in war they are stripped and painted. They are noted for preserving the dried heads of enemies slain in battle (see Head Hunting) and for the practice of taking a strong emetic every morning as a preparation for the day's work. They have developed a system of signaling by means of large drums kept in every village, by which the approach and strength of an enemy can be made known, or the warriors called to battle. Consult Rivet, *Les indiens jibaros* (Paris, 1908), and Beuchat and Rivet, in *Anthropos*, vols. iv, v (Salzburg, 1909–10).

JO′AB (Heb. *Yōāb*, Yahwe is father). Son of Zeruiah and nephew of King David, as well as commander of David's army (2 Sam. ii. 13; 1 Chron. xi. 6). He performed valuable services for David, his chief achievements being the overthrow of the army of Saul's son, Ishbosheth, led by Abner (2 Sam. ii. 12–31), his wars against the Ammonites (xi; xii. 26–31), and his overthrow of the conspiracy of Absalom (chap. xviii). For killing Absalom contrary to orders David deposed him in favor of Amasa (2 Sam. xix. 14), and soon after he treacherously slew his rival (xx. 8–10). At the close of David's life Joab joined Adonijah in his attempt to secure the succession to the throne and was executed by Solomon's order after David's death (1 Kings ii. 28–34).

JOACHIM, yō′ä-kĕm, Joseph (1831–1907). A distinguished Hungarian violinist. He was born at Kittsee, near Pressburg, Hungary, of Jewish parents. His father was engaged in commercial pursuits, but discovered his son's musical proclivities, and at the age of five years placed him under Szervaczinsky, the celebrated concert master of Budapest. After two years' study he made his first public appearance, playing duets with his master, after which he studied under Böhm at Vienna. In 1841 he was a pupil at the Vienna Conservatory, studying counterpoint under Hauptmann, and in 1843, when only 12 years of age, distinguished himself at a concert of Madame Viardot-Garcia in Leipzig. In the spring of 1844 he visited England, where he was enthusiastically received, returning to Leipzig in November of the same year to play at one of the Gewandhaus concerts. Adopting the advice of his friends David and Mendelssohn, he determined to continue his studies at Leipzig. He made visits to England at intervals until 1862, after which his appearance in London became an annual event. He was appointed concert master in 1849 of the orchestra at Weimar during the régime of Liszt, whose views were so diametrically opposed to his own ideals that a disagreement was inevitable. He left Weimar in 1854 to accept the post of concert conductor and solo violinist at the court of Hanover, where he married Amalie Weiss, a well-known contralto singer. In 1868 he was appointed head of the Hochschule für ausübende Tonkunst. His most important work is the Hungarian Concerto in D minor. His other compositions include overtures and incidental music to various plays; several marches and trios; ballads, and various forms of chamber music. His most salient characteristics as a player are reflected in the gen-

eral character of his written work, which is marked by sincerity, depth, and tenderness. It was as a quartet player, however, that his intellectual superiority over contemporary violinists was most marked; his quartet party, consisting of himself, as first violin, De Ahna, second violin, Hausmann, 'cello, and Wirth, viola, have never been excelled. As a soloist, he earned for himself the title of king of violinists. He was known as the greatest master of style, repose, and tone of his day. Consult: A. Moser, *Joseph Joachim* (Berlin, 1904); J. A. Fuller-Maitland, *J. Joachim* (London, 1905); *Letters from and to Joseph Joachim*, selected and translated by Nora Bickley (ib., 1914).

JOACHIM, Order of Saint. A secular order founded in 1755 by the Duke of Saxe-Coburg-Saalfeld and other nobles and originally called the Order of Jonathan. The device of the order was: *Deo, Principi, Legi.* Its objects were benevolent. It had three classes, and its membership was restricted to the nobility. The order disappeared about 1840.

JOACHIM FREDERICK (1546–1608). A German bishop and Elector of Brandenburg, son of the Elector John George. He was made Bishop of Brandenburg and Havelberg, and Archbishop of Magdeburg. In 1570 he married and so forfeited his archiepiscopal seat in the German Diet. In 1598 he succeeded to the electorate and made his son, Christian William, Bishop of Magdeburg. He founded the Joachimsthal Gymnasium of Berlin.

JOACHIM (jō'ȧ-kĭm) **OF FLO'RIS** (c.1145–c.1202). A monk of the twelfth century, reverenced as a prophet by many in his own time and for two centuries later. He was born at Celico, near Cosenza, Calabria, about 1145, became a Cistercian monk, and in 1177 is mentioned as abbot of Coraca. After some years he resigned and betook himself to the wilderness near Cosenza for study. There he founded a monastery, San Giovanni in Fiore, 25 miles east of Cosenza, and a new order (Ordo Florensis). His order was absorbed by the Cistercians in 1505. Joachim divided all time into three dispensations: (1) that of the Father from the creation to the birth of Christ; (2) that of the Son, from the birth of Christ to 1260; (3) that of the Spirit, from 1260 to the end. His three principal writings are: *Liber Concordiæ Novi ac Veteris Testamenti* (printed at Venice, 1519); *Psalterium Decem Chordarum* (1527); *Expositio Apocalypsis* (1527). Some of his opinions concerning the Trinity were condemned by the Lateran Council of 1215. In 1254 a Minorite, Gherardino, of Borgo, San Donnino, who considered Joachim's works inspired, brought them out with an introduction, in which he described them as the "Everlasting Gospel" (*Evangelium æterne*). He made a sensation and led to their condemnation by the University of Paris on 31 propositions taken from his introduction and the writings of Joachim. Pope Alexander IV in 1255 examined by commission these alleged heretical statements, with the result that Gherardino was censured, but Joachim was not.

Bibliography. The earliest lives extant are published by the Bollandists in *Acta Sanctorum* (Antwerp, 1643–86). Consult: Xavier Rousselat, *Etude d'histoire religieuse aux 12e et 13e siècles, Joachim de Flores, Jean de Parma et la doctrine de l'évangile éternel* (2d ed., Paris, 1867); Döllinger, *Fables Respecting the Popes of the Middle Ages* (Eng. trans., New York, 1872); Schneider, *Joachim und die Apokalyptiker des Mittelalters* (Dillingen, 1873); Wilhelm Preger, "Das Evangelium Æternum und Joachim von Floris," in *Munich Akademie der Wissenschafte, historische Classe, Abhandlungen*, vol. xii (Munich, 1874); Haupt, *Zur Geschichte des Joachimismus* (Gotha, 1885); J. E. Renan, "Joachim de Flore et l'évangile éternel," in his *Nouvelles études d'histoire religieuse* (Paris, 1899); P. E. L. Fournier, *Etudes sur Joachim de Flore* (ib., 1909).

JOACHIMSTHAL, yō'ȧ-kĕms-täl'. An ancient town in Bohemia, Austria, situated in the Erzgebirge at an elevation of 2365 feet, 12 miles north of Karlsbad (Map: Austria, C 1). It has a fine modern church and a sixteenth-century Rathaus with a library. In ancient times Joachimsthal was famous for its silver mines, and the Joachimsthaler, coined from native silver by the counts of Schlick after 1517, had a very wide circulation. The name was subsequently abbreviated to the modern German thaler. (See Dollar.) The present silver output is only nominal. Uranium is worked in quantities (there is a plant for its commercial production), also bismuth and nickel. The government has bought the pitchblende mines here and produces radium. A tobacco factory employs 1200 hands; there are manufactures of gloves, paper, lace, corks, and dolls. Pop., 1900 (commune), 7378; 1910, about 8000.

JOAN, jō-ăn' *or* jōn, Pope. The name of a supposed female occupant of the papal chair following Leo IV (died 855) and preceding Benedict III (died 858). The story represents her as born in Germany of English parentage. Assuming the dress and character of a man, she went to Athens and thence to Rome, where, under the name of Johannes Anglicus (John of England), she is alleged to have gained distinction as a scholar, entered holy orders, and risen through various gradations to the papal sovereignty itself. The story goes on that she was seized with the pains of childbirth on the occasion of a public procession and died in delivery. The legend takes various forms in different writers. The story of a female pope is told by a French Dominican, Steven of Bourbon (died c.1261), in his work upon the *Seven Gifts of the Holy Spirit.* He is thought to have copied from an earlier Dominican, John of Mailly. A third Dominican, Martin Polonus or Martin of Troppau (died 1278), helped to spread the story. Its unhistoric character was first shown by the French Calvinist David Blondel, *Eclaircissement de la question si une femme a été assise au siège papal de Rome* (Amsterdam, 1647); *De Joanna Papissa* (ib., 1657), and is now universally admitted. It probably grew up from the survivals of local folk tales and the explanations of certain antiquities and Roman customs. Consult: Friedrich Spanheim, *Histoire de la papesse Jeanne* (2 vols., The Hague, 1736); Alexander Cocke, *Present for a Papist; or, The History of the Life of Pope Joan* (London, 1740); Wensing, *Over de Pansin Johanna* (The Hague, 1845); Döllinger, *Fables Respecting the Popes of the Middle Ages* (Eng. trans., New York, 1872); E. D. Rhoïdes, *Pope Joan* (Eng. trans., London, 1886).

JOAN'NA (1479–1554). Queen of Castile. She was the second daughter of Ferdinand the Catholic of Aragon and Isabella of Castile. She married Philip, son of Emperor Maximilian I, and by the death of her brother and her elder

sister and the latter's infant son she became heiress to the crowns of Castile and Aragon. On the death of Isabella, in 1504, Joanna succeeded as Queen of Castile, but, as she was partially insane, she did not actually rule. On the death of her husband (1506) she became wholly insane and passed the rest of her life in the castle of Tordesillas. Her son Charles became King of Spain in 1516 and Holy Roman Emperor, as Charles V, in 1519. Her younger son, Ferdinand, became Roman Emperor in 1556. Consult W. H. Prescott, *History of Ferdinand and Isabella* (many editions).

JOANNA I (c.1327–82). Queen of Naples from 1343 to 1382, Queen of Sicily after 1356, and Countess of Provence. She was the daughter of Charles, Duke of Calabria, and of Marie of Valois, and became Queen on the death of her grandfather, Robert the Wise. She was already married to her cousin Andrew, brother of Louis the Great, King of Hungary. This marriage had been made when they were mere children, in order to conciliate the rival claims to the throne of the two branches of the house of Anjou. By the will of Robert Joanna was proclaimed his heiress; Andrew was to be only Coregent and Duke of Calabria. Moreover, Joanna was to become Queen only when 25 years of age. This will was unsatisfactory to all parties. Joanna succeeded in having herself crowned at once by the authority of the Pope; by the influence of Louis the Great Andrew was also crowned. In 1345 the latter was murdered by conspirators, who, it was generally believed, were instigated by Joanna. Louis of Hungary declared war to avenge his brother's murder. In 1347 Joanna married Louis of Taranto, but both were soon driven out by Louis the Great, who captured Naples and had himself crowned King. He was soon compelled to return home, as his army was decimated by the plague. In the meantime Joanna and her husband had taken refuge with the Pope at Avignon. They secured money by selling to the latter Avignon, which was a fief held by Joanna. They returned to Naples and drove out the Hungarian garrisons. Louis the Great made another expedition in which he was at first successful. Then he met with reverses which led to a treaty suspending hostilities on condition that Joanna should be tried for the murder of Andrew and if found guilty should forfeit the kingdom to Louis. She was adjudged innocent in 1352 by the papal court, and she and Louis of Taranto were crowned. The latter died in 1362, and Joanna married, about a year later, James of Aragon, titular King of Majorca. She allowed him no share in the government, and he spent his life in quest of adventure, generally outside the Kingdom of Naples. After he died, in 1375, Joanna married Otho of Brunswick, who received the title of Prince of Taranto. When Urban VI and Clement VII were elected to the papacy by the rival factions of cardinals (1378), Joanna favored the latter. Urban thereupon crowned Charles of Durazzo King of Naples, which he claimed to control as a papal fief. Charles, who was a cousin of Joanna, had been named by her as her successor before her last marriage. Later she had changed her will and named as her heir Louis of Anjou, brother of Charles V, King of France. Charles of Durazzo, with the aid of the Pope and of Louis the Great, succeeded in capturing Joanna and had her put to death, May 22, 1382. She had two children who died in infancy. Joanna was a wise ruler, capable and generous. Her court was renowned for its magnificence. Consult: Battaglia, *Giovanna prima, regina di Napoli* (Padua, 1835); Baddeley, *Queen Joanna I of Naples, Sicily, and Jerusalem* (London, 1893); Scarpetta, *Giovanna I di Napoli* (Naples, 1903); Francesca M. Steele, *The Beautiful Queen Joanna I of Naples* (London, 1910).

JOANNA II (1371–1435). Queen of Naples from 1414 to 1435. She was a daughter of Charles III of Durazzo and was the successor of her brother Ladislas. Her first husband was William of Austria, her second James of Bourbon, Count of La Marche. She was of a very dissolute character, and her government was disturbed by constant feuds and insurrections. Her second husband at one time imprisoned her, only to be himself finally driven from the country. Louis of Anjou sought to deprive Joanna of the throne of Naples, but she called to her aid Alfonso V of Aragon and adopted him. Soon, however, she tired of Alfonso and used the powerful house of Anjou thereafter as a counterpoise to the claims of Aragon. Consult Crivelli, *Della prima e secunda Giovanna, regine di Napoli* (Padua, 1830).

JOANNE, zhō'ăn', PAUL BÉNIGNE (1847–). A French geographer, born in Paris. He studied at the lyceums of Saint-Louis and Louis-le-Grand, but after being admitted to the bar he left the law to become assistant and successor to his father, who was editor of the *Guides Joanne* for the Hachette Library. His own greatest achievement is the *Dictionnaire géographique et administratif de la France et de ses colonies* (7 vols., 1889–1905).

JOANNES, jō-ăn'nēz, ISLAND OF. See MARAJÓ.

JOAN (jōn *or* jō-ăn') **OF ARC** (Fr. *Jeanne d'Arc*), THE MAID OF ORLÉANS (c.1412–31). She was born between 1410 and 1412, in the village of Domremy, near Vaucouleurs, France. She was the daughter of well-to-do peasants and was taught the duties of a girl in her station. When about 13 years of age, she believed that she heard an angel's voice, saying, "I come from God to help thee to live a good and holy life. Be good, Jeannette, and God will aid thee." Gradually "the voices" talked to her more frequently, and she believed them to belong to St. Michael, St. Catharine, and St. Margaret. St. Michael gave to her directions which finally became very definite: "Daughter of God, thou shalt lead the Dauphin to Rheims, that he may there receive worthily his anointing." For four years the "voices" continued to speak to Joan, and the condition of France in the meanwhile became more and more desperate. Henry VI of England had been crowned, at Paris, King of France (1422). The Regent, the Duke of Bedford, was victorious almost everywhere. The Dauphin, Charles VII, weak and vacillating, held little territory and was called in derision, by the English and the Burgundians, "the King of Bourges." Towards the close of 1428 the English laid siege to Orléans, and, although the city was well garrisoned, its defenders finally lost heart and at the beginning of 1429 the place seemed destined soon to be captured. Joan's "voices" had become more distinct and more imperative, until finally she obeyed, and sought the French commander at Vaucouleurs. Her story was at first rejected as that of one insane, but she went a second time and suc-

ceeded in getting an escort to Charles VII, to whom she rode in male attire (February, 1429). By his command Joan was admitted to an examination by learned theologians, from which she emerged triumphant. The Dauphin thereupon resolved to employ her. A suit of armor was prepared for her, and she had a white banner made, representing God blessing the fleurs-de-lis. This she herself carried into the front of every battle.

In April preparations were being made to send a convoy with provisions to Orléans. Joan led the troops, and on April 29, 1429, reached the city, still closely besieged by the English. From May 4 to 8 she made successful sallies upon the English, which resulted in their being compelled to raise the siege. Joan was wounded, but not severely. From this time she was known as "the Maid of Orléans." The national ardor of the French was rekindled to the utmost, and Joan became the dread of the previously triumphant English. Between June 12 and 18 the French won notable victories under Joan's leadership. By her own people she was beloved and revered as God's agent; by the English she was believed to be a witch. After some delays she persuaded the Dauphin to allow himself to be conducted to Rheims, where he was crowned (July 17, 1429). From this time her fortune changed, and she failed in several undertakings, notably the capture of Paris. The popular explanation of her failure was that she had broken her sword. It was one which she had miraculously discovered at Fierbois. One day, the story goes, she struck with the flat of this sword some common women whom she found in the camp. The sword broke, and the pieces could not be welded together. Joan took part in many conflicts, until, on May 23, 1430, she succeeded in entering with a few troops into Compiègne, which Burgundian forces were besieging. On the same day, in a sally which she led from the town, she became isolated from her followers and was taken prisoner. Her captors sold her, six months later, to the English. She was taken to Rouen and confined in chains. She was urged to put on female attire, but refused, because she was forbidden by her "voices." Wearing men's clothes and cutting off her hair were two of the main charges against her when she was brought before the Inquisition. She was tried in the ecclesiastical court, as a sorceress, by the Bishop of Beauvais, assisted by members of the University of Paris, which was under English control, and a specially delegated inquisitor. The trial dragged on for months, and Joan faced her judges boldly. One of the judges disguised himself and, pretending to be a fellow-prisoner, won her confidence and secured a great deal of information about "the voices," which was used in the trial. She was threatened with torture to no effect. Finally, on 12 charges which were drawn up by the judges, she was condemned to be burned to death, but she recanted her alleged errors and expressed penitence. Her punishment was then commuted by the ecclesiastical authorities into perpetual imprisonment. The English, however, felt it necessary to have Joan put to death. The events of the next few days are obscure; but it is certain that Joan again put on the male attire which she had abjured. The resumption of these garments and expressions of regret for her recantation were made grounds for concluding that she had relapsed. She was condemned and burned at the stake (May 30, 1431).

After the execution attempts were made to blacken her character in the popular French opinion, but with little success. Her family, by King Charles's influence, obtained in 1450 a revision of her trial, and in 1455 she was formally pronounced to have been innocent.

The memory of the Maid of Orléans during the centuries succeeding the Hundred Years' War never probably enjoyed that general reverence among the French people which her services to her country would seem to have merited. Voltaire's *La Pucelle* expresses the views of the eighteenth-century philosophers regarding the Maid. In the nineteenth century, however, her fame underwent rehabilitation. In 1875 the question of her canonization came up before the Roman Curia, and she was beatified by Pius X, the reigning Pope, April 11, 1909. In literature the character of Joan of Arc has been variously treated. Shakespeare's *Henry VI* reflects the contemporary English opinion, which regarded Joan as a sorceress in league with the devil. In Schiller's beautiful *Jungfrau von Orleans* she is depicted, on the contrary, as a virgin mystic, who, in fulfillment of her heaven-appointed mission, spurns all earthly love and dies in the moment of victory with the banner of the Christ child in her arms.

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JO'ASH, or **JEHO'ASH** (Heb. *Yehōāsh*). 1. King of Judah, son of Ahaziah (c.836–796 B.C.). On the death of Ahaziah, Athaliah, his mother, massacred all the royal children except Joash, an infant of one year, who was saved by his aunt, Jehosheba, and kept in hiding by her for six years, during which time Athaliah governed the land (2 Kings xi. 1–3). In the seventh year Joash, by the help of Jehoiada, the high priest, was put upon the throne (2 Kings xi. 4–16). Joash reigned 40 years (2 Kings xii. 1). We know but little of his long reign. The most noteworthy event recorded was his conflict with Hazael, King of Syria (2 Kings xii. 18–19). Joash was murdered by his servants (2 Kings xii. 20–21) and was succeeded by his son Amaziah. It has been suggested that the assassination of the King may have been an act of private vengeance for his murder of Zechariah, the son of Jehoiada the priest (2 Chron. xxiv. 21). The references to religious conditions under Joash in Kings and Chronicles, where the King is represented as instituting religious reforms at the beginning of his reign and reverting to "idolatry" subsequently, are believed by some not to rest upon genuine tradition. 2. King of Israel, son and successor of

Jehoahaz (c.797–782 B.C.). He was one of the most warlike kings of the north (2 Kings xiii. 12, 25), and during his reign of 17 years (2 Kings xiii. 1) he brought the Kingdom of Judah to a position of vassalage. His victory over Amaziah was followed by his breaking down of the wall of Jerusalem (2 Kings xiv. 9–14).

JOB (Heb. *Iyyōb*). The hero of the Book of Job, which in the Jewish canon follows the Psalter and Proverbs in the third division of the Old Testament, known as *Kethubhim* or *Hagiographa*. The Book of Job in its present form belongs to that part of ancient Jewish literature which is commonly designated Wisdom Literature, and which, including such books as Proverbs, Ecclesiastes, Ecclesiasticus, and the Wisdom of Solomon, is didactic in purpose and concerned with discussions or considerations of the problems of life. In the Book of Job the problem is the cause of suffering. As a setting for the philosophical discussions on this problem, the following situation is set forth. A pious man by the name of Job, whose home is in the land of Uz and who is blessed with wealth and children, is put to a severe test by God at the instance of Satan, who raises the suspicion that Job's piety is connected with his prosperity. Job is deprived of his possessions and of his children, but remains pious and God-fearing. Satan, not yet satisfied, proposes as a severer test striking Job with a painful and loathsome disease. Job endures in silence and resignation, resisting the temptation suggested by his wife to "curse God" and make an end of his sufferings. Three friends come to visit him—Eliphaz the Temanite, Bildad the Shuhite, and Zophar the Naamathite (chaps. i–ii, containing the prologue). There now begins a series of discourses (iii–xxxi) between Job and his three friends, Job bewailing his sufferings and declaring that he does not merit the punishment heaped upon him, his friends answering in turn and trying to prove, each in his way, that suffering is due to guilt. There are three cycles of speeches and replies. Following Job's lament in chapter iii, the first of these cycles occupies chapters iv–xiv, the second xv–xxi, and the third xxii–xxxi. Chapters xxxii–xxxvii introduce a fourth personage, Elihu, who endeavors to convince Job of his error in questioning the justice of divine government. In xxxviii–xlii. 6 Yahwe Himself is brought in as the speaker, rebuking Job for his presumption in attempting to fathom the secrets of God and demonstrating the limitations of human power. Job in reply confesses his ignorance and his error in giving utterance to words without insight. The book closes (xlii. 7–17) with an epilogue in which the three friends are rebuked by Yahwe; they are ordered to bring an offering of seven bullocks and seven rams in the presence of Job, who is to intercede with Yahwe on their behalf. As for Job, his property is restored to him and increased twofold, and seven sons and three daughters are born to him: he dies happy and full of years.

There are two features of the book that strike one at the first glance: (1) that the story of Job has nothing to do with the religious problem that forms the kernel of the book; (2) that the close of the story, in which Job is justified and rewarded, hardly accords with the light in which he appears in the course of the discussion of the problem. It is probable that chapters i, ii, xlii. 7–17, represent what has survived of a popular story, written in prose, in which a pious man endured severe tests without ever losing his patience or sincere resignation to the divine will. This attitude he apparently maintained throughout in the prose story, in speeches now lost, since Yahwe refers to him (xlii. 7) as having spoken the right thing concerning Him, while the friends so utterly failed to say the right thing that Yahwe is angry with them, and their lives are in danger and can be saved only through Job's intercession. Job is then rewarded for his steadfastness and unswerving piety. The moral was that a just man may suffer as though he were unjust incidentally, as a trial of his loyalty, but that before the end comes he will, if truly righteous, be restored to prosperity and rewarded in addition for the sufferings he has endured. It may be supposed that this folk story fell into the hands of a great poet, who substituted for the speeches of Job and his friends the series of poetic dialogues in which he considers, in a highly artistic and profoundly thoughtful manner, the question whether the suffering that man endures is in all cases due to his own guilt, or, in other words, whether God, the author of everything, acts according to recognized standards of justice. That He does so is the ordinary view of religious people represented by the three friends. Job, acknowledged to be a good and pious man, seems to prove the contrary; and the arguments against the conventional views come therefore with great force from his mouth. Incidentally a second question is raised and by implication answered: Is the popular story correct in assuming that a pious man will endure suffering that he considers unjust in silence and resignation? The discourses of Job in which he curses the day of his birth (iii), declares that his sufferings are out of all proportion to any possible wrongs that he may have committed (vi), takes a most gloomy view of human life (vii), bitterly accuses God of not acting fairly, of not permitting one to plead his case (ix), boldly asserts that he is in the right, and that no one can answer the arguments he presents (xiii), and charges God with persecuting him (xiii. 20–22; xvi; xix. 22)—show that even a truly righteous person, for such Job is assumed to be, may in the agony of his soul cry out in protest against what he deems an undeserved fate. It is particularly noteworthy that the poet puts upon the lips of Job a protest against the kind of apologetics that is nothing but special pleading, partisan advocacy, implying suppression of the truth and affirmation of what is obviously false, in the supposed interest of God (xiii. 7, 8), and a confident assertion that a bold, sincere, and manly scrutiny of the facts is morė welcome on high than the hypocrisy that dares not raise its voice except in terms of flattery. The author, indeed, seems to raise the question as to the seat of authority, Eliphaz making his appeal to revelation and inspiration, Bildad to tradition, and Zophar to the majority, while Job appeals to the facts and to his private judgment. Having rejected the theory of the friends that adversity is an unfailing sign of divine anger, provoked by human sin, and prosperity a sign of divine favor, rewarding human righteousness, Job is forced to face the problem of God's nature, a problem which does not exist to the friends, and makes his appeal from a God who may inspire fear, but not respect, to a God in whom power and wisdom wait on justice and love—a great Avenger who will vindicate his

character, even though to a mistaken human judgment death may set upon it the final stamp of guilt (xix. 26 ff.). The friends never mention the possibility of a squaring of accounts in a future life; Job refers to this "hope of man" most sympathetically where he pictures himself as waiting on his sentinel's post in the nether world until God should call him back to life, filled with longing for the work of his hands (xiv. 13 ff.), but only to reject it as a fancy and without ever allowing it to influence his argument.

The Book of Job in the new form, it may well be supposed, would have been offensive to religious circles. This appears indeed to have been the case; and, as a consequence, a number of interpolations were made in the speeches of Job, calculated to remove their sting, just as in the Book of Ecclesiastes words and phrases are added here and there which give a different turn to the thought. That the entire book was not rejected was due to the weight attached to the speeches of the three friends. Here were three men noted for their wisdom—friends, moreover, of Job—who all agreed that God was just and that Job was wrong in questioning the divine justice. Three against one represents a powerful majority. Moreover, their arguments seemed forcible. Eliphaz is certainly right in declaring (v) that no mortal is righteous before God; nor can any one gainsay Bildad when he declares (viii) that we are not wiser in penetrating the divine will than our ancestors were; and Job himself declares his acquiescence in Zophar's panegyric on divine wisdom (xi), which is so far superior to human knowledge and power. It might easily seem, therefore, despite the cruel charges brought by the friends against Job that he must have committed some awful crime, that Job's charges against God were not justified, and merited the rebuke they received at the hands of his friends. All, therefore, that was needed to make the Book of Job acceptable and teach just the contrary lesson that God was just and that Job deserved the test, was to take the edge off some of Job's utterances. This was not difficult, for even in the boldest passages of the book the expression is somewhat veiled.

It must not be supposed that the Book of Job as we have it was produced "at one sitting," as it were; it is a growth, and the very popularity which it appears to have enjoyed was a factor in accounting for modifications to which it was submitted. The introduction of Elihu is an illustration of the thesis regarding the gradual formation of the present book. There is no reference to Elihu in the prologue. His speeches are not essential either to the story or to the moral of the book. They are simply a reiteration of the whole problem—the reason and object of suffering, the righteousness of God, the value of faith, and the beneficence of divine government. How and when the speeches of Elihu came to be united with the Book of Job are questions in regard to which scholars have not yet reached general agreement. It is plausible to suppose that the Book of Job found imitators. The problem was attractive, and other writers tried their hand at presenting the arguments in favor of the current religious attitude. The speeches of Elihu impress one in this way as another Book of Job in epitome. Lastly, the speeches of Yahwe (xxxviii–xlii. 6), forming a separate part, while they do not offer a solution of the problem of suffering, still reënforce the attitude of the pious—that man, not having been present at creation and not being admitted into the counsels of the Almighty, dare not and must not question divine justice. These speeches again add nothing to the situation nor to the moral; but they add another witness against Job, and so powerful a one that Job must needs confess his error. The introduction of Yahwe, who severely rebukes Job, contradicts the epilogue in which Yahwe turns with favor to Job and rebukes Job's friends, although the latter have all throughout pleaded Yahwe's cause. The speeches of Yahwe out of the storm are likely to have taken the place of some words of Yahwe in the prose story of a different tenor which the author of our present dialogues did not care to change. That Job's confession of his error is a later addition seems to be evident from xxxi. 40, where it is said, "Here end the words of Job."

The Book of Job in its present form is probably postexilic, and the tendency at present among scholars is to bring the date down towards the third century B.C. One reason for the favor which the book attained in pious circles was the similarity between Job and Israel which naturally suggested itself. Job's sufferings typified Israel's fate. His resignation in the popular story served as an example to the postexilic Jewish community to endure in faith and patience, while the justification of Job by Yahwe Himself is one form of the presentation of the problem, and his restored happiness and prosperity were interpreted as an assurance of the glory that was destined to be again Israel's lot.

Bibliography. Consult the Old Testament introductions, and the commentaries of Ewald, Delitzsch, Dillmann, Duhm, Merx, Hitzig, Davidson, Budde, Siefried, Zöckler; also Budde, *Beiträge zur Kritik des Buches Hiob* (Bonn, 1876). On the text, consult: Bicknell, "Kritische Bearbeitung des Job-Dialogs," in *Wiener Zeitschrift für die Kunde des Morgenlandes* (Vienna, 1892–93); id., *Das Buch Hiob nach Anleitung der Strophik und der Septuaginta* (ib., 1894). On the growth and purport, consult: Renan, *Le livre de Job* (Paris, 1859); Green, *The Argument of the Book of Job Unfolded* (New York, 1873); Fairbairn, "The Problem of Job," in *The City of God* (London, 1886); Cheyne, *Job and Solomon* (ib., 1887); Bradley, *Lectures on the Book of Job* (Oxford, 1887); Meinhold, "Das Problem des Buches Hiob," in *Neue Jahrbücher für deutsche Theologie* (Bonn, 1892); Laue, *Die Composition des Buches Hiob* (1896); Castelli, *Il poema Semitico del Pessimismo* (Milan, 1897); Schmidt, *The Messages of the Poets* (New York, 1911), where an extensive bibliography is also given; Barton, *The Book of Job* (ib., 1912).

JOB, TESTAMENT OF. A Jewish apocryphal book. It is mentioned in an edict on canonical and spurious books issued by Pope Gelasius I (c.496) as an apocryphon. The Greek text was published by Angelo Mai in his *Scriptorum Veterum Nova Collectio*, vii (Rome, 1833), reëdited by James from a Paris manuscript, in *Apocrypha Anecdota* (Cambridge, 1897), and published again, with an introduction and an English translation by K. Kohler, in *Semitic Studies in Memory of Rev. Dr. Alexander Kohut* (Berlin, 1897). That it is a Jewish midrash, and not a Christian story, is evident from the absence of any distinctive Christian doctrine, and the prohibition "Take not unto yourselves wives from

strangers." Kohler thinks that it came from Essene circles, and the conception of immortality is in favor of this assumption. The children of Job were seen, adorned with crowns, standing near the glory of God; the three daughters, when they put on the three-stringed girdles, were transfigured; and He who sat upon the Great Chariot came and took the soul of Job away with a kiss and carried it to the east, where the heavenly throne stood. The book reveals the same kind of traditions concerning Job that are met in the Greek translation and in the Targum on Job. Consult, in addition to the works quoted above, Kohler's article in *The Jewish Encyclopædia*, vol. vii (New York, 1904).

JOBERT DE LAMBALLE, zhō'bâr' de läN'-bâl', Antoine Joseph (1799–1867). A French surgeon. He was born at Matignon, studied medicine at Paris, and in 1830 became surgeon at the Hospital Saint-Louis. He was elected to the Academy of Medicine in 1840 and to the Academy of Sciences in 1856. Jobert was a brilliant and resourceful operator, best known for his masterly use of *autoplastie*, the repair of diseased parts by healthy neighboring tissue, and especially for the operation which he styled *élitroplastie*, an autoplastic cure of vaginal fistula. He wrote: *Traité théorique et pratique des maladies chirurgicales du canal intestinal* (1829); *Etudes sur le système nerveux* (1838); *Traité de chirurgie plastique* (1849); *De la réunion en chirurgie* (1864).

JOB'S COMFORTER. A popular expression for one who, like Job's friends, while pretending sympathy in times of distress, presents the most hopeless side of the trouble and attributes it to the sufferer's shortcomings. The term is also used of boils, which formed part of Job's afflictions.

JOBSON, jŏb'son, Frederick James (1812–81). A Wesleyan clergyman. He was born at Northwich, Cheshire, became an architect, but in 1834 a minister, and rose to great eminence. His early studies are shown in his *Chapel and School Architecture* (1850), which had considerable influence in improving such structures of his denomination. His travels as a representative of the British Conference produced *America and American Methodism* (1857) and *Australia, with Notes by Way of Egypt, Ceylon, Bombay, and the Holy Land* (1862). Consult his life by Gregory (London, 1884).

JOB'S TEARS, *Coix lachryma-jobi.* An East Indian cereal of stout habit, botanically allied to maize, which sometimes reaches a height of 8 feet. It derives its name from the tearlike form of the hard, shining, bluish-white seeds, which are sometimes made into bracelets, necklaces, and rosaries, and are also used for food in India, where it is somewhat cultivated. It has become naturalized in Spain and Portugal, where flour is occasionally made from it. It is cultivated as a curiosity in the United States and elsewhere. See Chrysolite; Peridot.

JOB'S WIFE, Lamentation of. See Apocrypha, *Old Testament.*

JOCASTA. In Greek legend, the mother and wife of Œdipus (q.v.).

JOCELIN DE BRAKELOND, jŏs'lĭn de brāk'lŏnd. An English monk who flourished 1200 A.D. He was trained as a novice under Samson of Tottington, in 1182 became chaplain to Samson, was elected abbot in that year, and was later successively guest master (1196–1200) and almoner (1212). He is characterized as extremely devout. He wrote a chronicle of St. Edmunds Abbey from 1173 to 1202, which was carefully edited by J. G. Rokewood for the Camden Society (London, 1840; new ed., 1905), and of which striking use has been made by Carlyle in *Past and Present* (1843; book ii, "The Ancient Monk").

JOCHMUS, yōg'mōōs, August Giacomo, Baron de Cotignola (1808–81). A German soldier of fortune and Imperial Minister, born at Hamburg. He was engaged in business, then studied military science in Paris, and in 1827 went to Greece, where he served as adjutant under General Church and in 1832 became Minister of War. But the National party forced him to leave three years afterward. He went to England and from there with the Foreign Legion to Spain; in 1838 he was back in England, and Palmerston sent him to Constantinople to plan the Syrian campaign with Ponsonby. In 1840 he went to Syria, was promoted to division commander in the Turkish army, and was chief of staff in the allied army which captured Acre. After that battle he became commander in chief of the Turkish army of occupation and later Minister of War. He returned to Germany in 1848, and in March of the next year was appointed by the Vicar of Germany, Archduke John, Imperial Minister of the Navy and of Foreign Affairs, a post which he held until December, 1849, when he retired. He was made lieutenant field marshal commanding a division in the Austrian army in 1859, but did no further fighting. In 1870–71 he made a trip around the world. He wrote *Der syrische Krieg und der Verfall des Osmanenreichs seit 1840* (1856). His collected works, edited by Thomas (1883–84), contain his correspondence with Archduke John of Austria.

JOCRISSE, zhō'krĭs'. A character in French popular comedy, first seen towards the end of the sixteenth century. He usually represents a stupid countryman and became well known in the eighteenth century through Dorvigny's *Le désespoir de Jocrisse.* The name is popularly used also of a married man too much concerned with domestic matters.

JODELLE, zhō'dĕl', Etienne, Sieur de Lymodin (1532–73). A French dramatic poet, painter, sculptor, engraver, and architect, and member of the Pléiade (q.v.), sometimes called, though with insufficient reason, the founder of French tragedy and comedy—the former by his *Cléopâtre captive* (1552) and *Didon se sacrifiant* (before 1558), the latter by *Eugène.* In a sense these were the first "regular" French dramas, though they were so solely through imitation of Latin dramatists in work that appealed only to scholarly imagination. However industriously imitated, they had no hold on the popular stage, which till the time of Alexandre Hardy (q.v.) was untouched by the scholastic spirit. There is a modern edition of Jodelle's *Works* by Marty-Laveaux (Paris, 1868–70). Consult Faguet, *La tragédie française au XVIème siècle* (Paris, 1883), and Rigal, *De Jodelle à Molière* (ib., 1905).

JODELN, yō'deln (dialectic Ger.). A peculiar manner of singing by using the falsetto voice in harmonic progressions, with sudden and unexpected changes to notes of the chest register. It exists chiefly among the Tyrolese and the Swiss.

JODHPUR, jŏd-pōōr', or **MAR'WAR.** The largest of the native Rajputana States, India

(Map: India, B 3). It is bounded on the north by Bikanir and Jaipur, on the east by Ajmere-Merwara and Kishangarh, on the south by Palanpur and Sirohi, and on the west by Sind and the Rann of Cutch. Area, 34,963 square miles. It is traversed by the Luni, which divides the state into unequal portions. The soil is almost entirely sandy and sterile; only the valley of the river and the southeast are fertile, where cotton and wheat are largely grown. Camels, cattle, and sheep are bred. Iron, zinc, and salt are the chief minerals; marble is quarried and woolens are manufactured. Capital, Jodhpur. Pop., 1901, 1,935,565; 1911, 2,057,553.

JODHPUR. The capital of the native Rajputana State of Jodhpur, or Marwar, India, 98 miles west of Ajmere, with which it is connected by rail (Map: India, B 3). It is situated on the south slope of a range of red sandstone hills and is surrounded by a wall 6 miles in circuit and pierced by six gates. It is dominated by an imposing fortress, 400 feet above the plain. Within the massive walls of the fortress are ancient palaces and the Maharajah's treasury. Several magnificent tanks supply it with water by means of pipes; the town also has elaborately constructed and deep wells. Richly carved temples and houses, hospitals, a college, a wheat market, and public gardens adorn its streets. The Darbar High School (occupying the Talati Mal, an old palace), the arts college, a boarding school, and special schools to teach Sanskrit, telegraphy, and surveying, form the chief educational institutions. The palaces of the present Maharajah and his predecessor are on the southeast; the town is electrically lighted. The Jubilee buildings, the public offices of the British Agent, are fine modern buildings in the native style. Jodhpur has well-established institutions and is a flourishing commercial centre. It has manufactures of ivory, lacquer ware, brass and iron utensils, and dyestuffs. The Maha Mandir (great temple), ½ mile to the northeast, occupies a wall-inclosed suburb of 800 houses, to which it gives its name. Jodhpur was founded in 1459, the prior capital having been Mandor, 3 miles north, which has interesting ruins of temples, palaces, and tombs. Pop., 1901, 60,437; 1911, 59,262.

JODL, yō'd'l, Friedrich (1849–1914). A German philosopher, born and educated at Munich. He was docent there for five years, professor at Prague in the German university from 1885 to 1896, and then took a chair (1896) in philosophy at Vienna. During his stay in Prague Jodl was prominent in the work of the association for the advancement of things German in Bohemia. In 1890 he became an editor of the *International Journal of Ethics.* He is the master of a remarkably clear style and wrote, besides several monographs on ethical subjects: *Leben und Philosophie David Humes* (1872); *Kulturgeschichtschreibung* (1878); *Geschichte der Ethik in der neueren Philosophie* (vol. i, 1882, 2d ed. 1906; vol. ii, 1889, 2d ed. 1912); *Moral, Religion, und Schule* (1892); *Lehrbuch der Psychologie* (1899; 3d ed., 2 vols., 1908); *Ludwig Feuerbach* (1908).

JODO, jō'dō. See Ts'ing-tu.

JO'EL (Heb. *Yōēl,* Yahwe is God). The son of Pethuel and second (or, according to the order in the Greek version, the fourth) of the twelve Minor Prophets. Concerning the life of Joel absolutely nothing is known, except the fact, gathered from his work, that he prophesied in Judah. The occasion for his prophecy was a destructive plague of locusts, accompanied by a severe drought. The prophecy consists of two parts: (1) (i. 2–ii. 17) A vivid description of the devastation that the plague is causing in the land and a call for repentance, to be manifested by fasting, solemn assemblies, and mourning; this is accompanied by an assurance that repentance will bring forgiveness and renewed prosperity, and will keep off the "day of Yahwe," which, however, is sure to come. (2) (ii. 18–iii. 21) The statement, evidently following repentance on the part of the people, that the plague has departed, and that Yahwe will bless the land with material prosperity and ultimately with a gift of prophecy for all flesh. A description follows of the day when Yahwe will gather the nations together in the valley of Jehoshaphat (q.v.) and judge them for their wrongs against Israel. There are two different problems connected with the book, viz., the meaning of the locusts spoken of and the date of the prophecy. Some critics take the locusts allegorically, as a figure for the enemies of Jerusalem; others take the locusts literally, a plague of locusts being no unusual thing for Palestine. The date must be fixed entirely by internal evidence, and this has produced two widely different views—(*a*) one favoring a preëxilic date, preferably in the days of Joash, (*b*) another in favor of a postexilic date. The main criterion is the list of nations mentioned as enemies of Judah—the Phœnicians, Philistines, Egyptians, and Edomites. The reference to the Greeks (iii. 6) and the fact that there is no mention of the Aramæans, Assyrians, or Chaldæans among the enemies, are potent reasons in favor of the later date, after the return of the exiles, in the days of Ezra and Nehemiah. The trend of opinion is now quite general towards this date.

Joel is full of lofty imagery, and his language is pure and eloquent. The book presents many parallels with other Old Testament books—e.g., Isaiah (cf. Joel i. 15; ii. 10; iii. 10, respectively, with Isa. xiii. 6, 10; ii. 4), Ezekiel (cf. Joel ii. 28; i. 15; ii. 1, 2, respectively, with Ezek. xxxix. 29; xxx. 2, 3), and Amos (cf. Joel iii. 16; iii. 18, respectively, with Amos i. 2; ix. 13). It has been attempted to settle the vexed question of the date by means of these parallels; but naturally there is great difference of opinion as to which prophet is borrowing. Consult: Credner, *Der Prophet Joel übersetzt und erklärt* (Halle, 1831); Wünsche, *Die Weissagung des Propheten Joel übersetzt und erklärt* (Leipzig, 1872); Merx, *Die Prophezeiung des Joel und ihre Ausleger* (Halle, 1879); and the authorities referred to under Minor Prophets.

JOE MILLER'S JESTS. See Miller, Joseph.

JOE'-PYE' WEED. A North American medicinal plant. See Eupatorium.

JOFFRE, zhō'fr', Joseph Jacques Césaire (1852–). A French general, born in Rivesaltes, Pyrénées. In 1868 he entered the Ecole Polytechnique to study military engineering. He entered active service in September, 1870, in an artillery battery in the Franco-Prussian War, after which he returned to the Polytechnique. He became a captain in 1874 and helped plan the defenses of Pontarlier. In 1883–84 he fought under Courbet in Tongking, and in 1893 under Dodds in Dahomey. He was prominent in the French occupation of Timbuktu in 1894 and in the fortification of Diego Suarez in Mada-

gascar in 1897. After his return to France he was a professor in the Higher War School for a time and was promoted brigadier general of a division. In July, 1911, while he was commanding the Second Army Corps at Amiens, he was appointed chief of the general staff. The three years' military service law for the French army was largely due to Joffre's efforts. For his services in the earlier part of the European War President Poincaré conferred on him a military medal in November, 1914. The article WAR IN EUROPE contains a discussion of his work as head of the French army.

JOGGS. See JOUGS.

JOGUES, zhōg, ISAAC (1607–46). A Jesuit missionary to the North American Indians, born in France. He joined the Society of Jesus in 1624 and in 1636 was ordained and sent to the Huron mission, then the most dangerous of all which the society maintained in the New World. There he labored until 1639, when he was chosen for the new and even more perilous mission among the Tobacco Nation. Two years later he made the long and arduous journey to Sault Ste. Marie, where he preached to an assemblage of 2000 Algonquins, and soon after his return he set out for Three Rivers to procure supplies for the Huron mission. As he was crossing the Lake of St. Peter on his return, he and his companion, Goupil, were captured by the Iroquois. The prisoners were taken to the Mohawk villages and fearfully tortured. Goupil was finally killed, but Jogues was kept as a slave. His pitiable condition excited the compassion of Dominie Megapolensis and other Dutchmen at Rensselaerswyck, who finally succeeded in smuggling him aboard a vessel, which conveyed him down to New Amsterdam, where Director General Kieft received him kindly and sent him to France. The story of his sufferings had preceded him, and on his arrival he was received as a hero; even the Queen showed him marked attention, and the Pope gave him a special dispensation which enabled him to say mass despite the mutilated condition of his hands. He soon returned to Canada, however, and two years afterward again went to the Mohawk villages; but this time as an ambassador from the Canadian government and as the founder of a new mission, the Mission of the Martyrs. Having accomplished his political object, which was to confirm the Mohawks in their adhesion to a recently signed treaty of peace, he returned to Quebec, but went back once more to work among the Mohawks. There having been a change in the feelings of the Indians, he was soon subjected to torture, and finally one night as he entered a lodge to which he had been invited for a feast a savage sprang from the darkness and struck him dead. The place of his martyrdom, Ossernenon, near Auriesville, N. Y., has become a place of pilgrimage to Roman Catholics. Consult: Francis Parkman, *The Jesuits in North America* (Boston, 1864; new ed., 1898); Camille de Rochemonteix, *Les jesuites et la nouvelle France* (Paris, 1895); R. G. Thwaites (ed., *The Jesuit Relations* (73 vols., Cleveland, 1896–1901); Martin, *Father Isaac Jogues*, translated by Shea (New York, 1896).

JOHAN'NA. One of the Comoro Islands (q.v.).

JOHANNESBURG, yō-hän'nes-bŭrg. The largest and most advanced city in South Africa, situated in the Transvaal Province, at an altitude of 5735 feet, in the midst of the gold district, 35 miles south of Pretoria (Map: Africa, G 7). It is connected with Pretoria, Delagoa Bay, Cape Town, and Port Elizabeth by rail, and is a modern city, intersected by parks and broad thoroughfares, lined with fine buildings, including theatres, clubs, and a stock exchange; it is electrically lighted. In 1906 the installation of electric street railways was begun, and, by 1913, 63 miles of track had been laid. It has the Transvaal University College (founded in 1903), a good art gallery, a library of 32,000 volumes, and an observatory. An imposing fortress erected by the Boers, but now dismantled, commands the town. Johannesburg was founded in 1886 and grew rapidly, owing to its location on the Witwatersrand gold fields, one of the richest gold-mining districts in South Africa. It was the seat of the Uitlander disaffection which led to the war with Great Britain (1899–1902). Pop., 1896, 99,800 (including 8000 Boers, 43,000 natives, and 34,000 British); 1904, 158,580 (83,902 whites, 62,524 natives, and 12,154 other colored); 1911, 237,104 (Europeans, 119,953; natives, 117,151). Johannesburg was captured, without opposition, by the British under Lord Roberts on May 29, 1900. A notable feature in the neighborhood is the national Boer monument commemorating the declaration of independence in 1880, which stands on the open veldt near the suburb of Krugersdorp.

JOHANNES CLERICUS. See LE CLERC, JEAN.

JOHANNESEN, yō-hän'ne-sen, EDVARD HOLM (1844–1901). A Norwegian Arctic navigator and hunter, born in Balsfjorden. His successful ice navigation of Barents and Kara seas in 1869 gained for him a medal from the Swedish Academy of Sciences. In 1870 he circumnavigated Nova Zembla, the first so to do. In 1878, rounding Nova Zembla to the north, he discovered and circumnavigated in Kara Sea, in 77° 31′ N., 86° E., Ensomheden (Einsamkeit or Lonely) Island, snow free and a resort of sea game. In 1887 he discovered to the east of Northeast Land a high, snow-covered island in 80° 10′ N., 30° 32′ E., called New Iceland, possibly the same as White Island. These discoveries brought him the gold medal of the Swedish Academy of Sciences.

JOHANNES SECUNDUS, jō-hăn'nēz sē-kŭn'dŭs (1511–36). A Latin poet, born at The Hague. His true name was Jan Nicolai Everaerts. He studied law at Bourges, but early devoted himself to the fine arts, but more especially to poetry. He traveled in Italy and Spain, became secretary to Cardinal Tavera, Archbishop of Toledo, and accompanied Charles V on his expedition to Tunis. His poems are admired for their classical purity, delicate sentiment, and graceful imagery, and have been translated into several foreign languages. The best known among them are the *Basia* (1539). A complete edition of his *Opera Poetica* was published by his brothers in 1541.

JOHANNES VAN DEWALL, yō-hän'nâs vän dā'vâl. The pseudonym of the German novelist August Kühne (q.v.).

JOHANNOT, zhō'â'nō', CHARLES (1793–1825), ALFRED (1800–37), TONY (1803–52). Three brothers, all engravers, the younger two also historical painters, born in Germany of French parents—Charles at Frankfort, Alfred and Tony at Offenbach. Their father, François, was a silk manufacturer in Offenbach until 1806, when financial reverses obliged him to emigrate.

He was also a painter of flowers and is said to have been the first to print music from stone, introducing the art of lithography into France. Charles engraved illustrations, after Desenne, for Tasso's *Aminta* and Voltaire's *Paul et Virginie*. Alfred learned engraving from his brother Charles, and collaborated with his brother Tony in illustrations for the French translation of the works of Byron, Cooper, and Scott. Many engravings by Alfred and Tony are signed *Johannot frères*. Alfred exhibited with great success at the Salon and was decorated by the King. Three of his paintings are at Versailles. Tony was a vignettist of the first order, and his illustrations rank with the best of the eighteenth century. He is credited with more than 3000 engravings, besides illustrations for over 500 books and pamphlets. He exhibited at the Salon regularly after 1831, was decorated in 1840, and two of his paintings are at Versailles.

JOHANNSDORF, yō'hâns-dôrf, ALBRECHT VON. A German minnesinger from Bavaria, who flourished between 1185 and 1209 and probably took part in the Crusade of 1190. His love songs are full of natural feeling, mingled with a current of religious enthusiasm. Consult Lachmann and Haupt, *Des Minnesangs Frühling* (Leipzig, 1888), and Bartsch, *Liederdichter*, xxxv.

JOHAN'SEN, JEAN MCLANE (1878–). An American portrait painter, wife of John C. Johansen. She was born in Chicago and studied at the Chicago Art Institute and under Duveneck and Chase in New York. Her art is unaffected in conception and bold in treatment. Her first picture to attract attention was a "Girl in Gray," now in the Art Museum of Toledo. Among other noteworthy works are: "On a Hill Top" (Salon, 1908); "Mother and Babe" (1911); "Girl in Green" (1912); the portrait of Mrs. Henry Hammond and daughter, awarded the Shaw prize, National Academy of Design, in 1912; "Brother and Sister" (1913). She won the Elling prize in 1906 and the Burgess prize in 1907 (both awarded by the New York Art Club), and first prize at the International Art League of Paris in 1907. She was elected an associate of the National Academy of Design.

JOHANSEN, JOHN CHRISTEN (1876–). An American portrait, figure, and landscape painter. He was born in Copenhagen, Denmark, was brought to America in infancy, and studied at the Art Institute, Chicago, then under Duveneck, and also in Paris under Constant Laurens and Whistler. In 1901 he removed to Chicago, but returned in 1906 to spend several years in France and Italy. A master of technique and possessor of a strong romantic individuality, he is especially clever in working out novel problems of color and in handling light. His portraits are sincerely fresh and personal renderings; among his sitters are many persons prominent in the academic, scientific, and social worlds. His architectural views of Venice, exhibitions of which have been held in London and New York, have achieved especial success on account of the novelty of color scheme and treatment. Among his best-known paintings are: "October, Sear and Gold," purchased by the Chicago Municipal Art League in 1903; "Piazza San Marco," Art Institute, Chicago; "Fiesole," Richmond Gallery; portraits of Professors Daniels and McLaughlin and "Sunrise in Venice" (1911); portrait of J. H. Kehler (1911); "In the Sewing Room" and "Approaching Storm" (1912). He received the Young prize at Chicago in 1903, a gold medal at Buenos Aires in 1910, and the Saltus gold medal, National Academy of Design, in 1911. He became an associate of the National Academy and made his residence in New York. He married Jean McLane. (See JOHANSEN, JEAN MCLANE.)

JOHANSSON, yō-hâns'sŏn, KARL FERDINAND (1860–). A Swedish philologist, born at Misterhult and educated at Upsala, where he became docent and afterward professor of Sanskrit and of comparative philology (1893). Besides some 70 articles in *Bezzenbergers Beiträge*, *Kuhns Zeitschrift*, *Indogermanische Forschungen*, *Nordisk Tidskrift for Filologi*, etc., contributed to those journals especially after 1900, he wrote: *De Derivatis Verbis Contractis Linguæ Græcæ Quæstiones* (1886); *Några ord om dialekter, Specielt de Grekiska* (1888); *Beiträge zur griechischen Sprachkunde* (1890); *Indiska sagor, översatta från sydbuddhistiska originaltexter* (1907). In 1906 he became coeditor of *Le Monde Oriental*.

JOHN, THE APOSTLE. One of the Twelve Apostles, commonly believed to have been the "beloved disciple" and the author of the New Testament books known as the Gospel of John, the three Epistles of John, and the Revelation. This traditional view is involved almost necessarily with the supposition that the Apostle John lived to a great age, that the last period of his life was spent in Asia Minor, and that the New Testament books written by him were all the product of his later years. As nearly every point of the traditional view is now disputed by many of the foremost New Testament scholars, it will be necessary to review the ancient evidence regarding the life of the Apostle John and try to ascertain its actual significance and value.

1. *The Earliest Evidence, that of the Synoptic Gospels, the Acts, and the Pauline Epistles, all well within the Limits of the First Century A.D.* The first notice of John in the Synoptic Gospels is in Mark i. 19–20 = Matt. iv. 21–22. Here we find that early in Jesus' ministry John, with his brother James and his father Zebedee, was engaged in the fishing business on the Sea of Galilee. They had boats, nets, and hired servants. Jesus, passing by, summoned the two brothers to leave their occupation and follow him. They obeyed and along with another pair of brothers, Peter and Andrew, similarly summoned, they constituted the first group of followers or disciples of Jesus (cf. Mark i. 29). Luke's account of the same incident (Luke v. 1–11) differs somewhat from that in Mark and Matthew, though agreeing as to the main points noted above, while adding the statement that Peter was in partnership with James and John. Later, when Jesus selected 12 of his followers to be more closely and permanently associated with him, John with his brother James was one of the 12 who were later known as the Apostles (Mark iii. 14 ff. = Luke vi. 13 ff.; cf. Matt. x. 2–4). In all three lists the four names of the two pairs of brothers stand at the head. At the raising of Jairus's daughter Peter, James, and John were the only disciples Jesus allowed to enter the house with him (Mark v. 37 = Luke viii. 51). Similarly these three alone were privileged to witness the transfiguration scene (Mark ix. 2 ff. = Matt. xvii. 1 ff. = Luke ix. 28 ff.). On one occasion John (probably in conjunction with his fellow disciples), seeing a certain one casting out demons in Jesus' name,

although not one of Jesus' disciples, forbade him to do so, as he was not a disciple. For this he was rebuked by Jesus (Mark ix. 38–41 = Luke ix. 49–50). It may be that this zeal for his Master and the incisive, uncompromising disposition it evidenced, in which his brother shared, led Jesus to give them the surname Boanerges (sons of thunder, Mark iii. 17). The same trait of character is disclosed in the incident, related only by Luke (ix. 51–56), when James and John wished to call down fire from heaven on the inhospitable Samaritans. On this occasion also Jesus rebuked them. As Jesus and his disciples were drawing near the city of Jerusalem on his last journey thither, James and John, apparently through their mother, made the request that in the coming Kingdom they might have the seats of honor at his right and left hand. The answer of Jesus indicated to them that their devotion to him would involve suffering and death similar to his own, but contained no promise of special honors (Mark x. 35 ff. = Matt. xx. 20 ff.). According to Mark (xiii. 3), it was to the four—Peter, Andrew, James, and John—that Jesus privately made known the course of future events. According to Luke (xxii. 8), Peter and John were the ones to whom Jesus intrusted the preparations for the Last Supper, and on these two with James the brother of John he leaned for comfort and sympathy in his hour of trial and agony in Gethsemane (Mark xiv. 33 = Matt. xxvi. 37).

The impression produced by the Synoptic narrative is that John was a Galilean, of a family possessed of at least moderate means. As Galilee was largely a bilingual country, it is easily credible that John could speak and possibly write Greek, though his mother tongue was Aramaic. When a boy, he might have learned Hebrew in the synagogue school. He gave a whole-hearted response to Jesus' summons and with his brother James and his friends Peter and Andrew soon belonged to the circle of followers with whom Jesus was most intimate.

In the record of the very early years of the Church as given in Acts, John holds a prominent place, as the Synoptic record would lead us to expect. He is usually associated with Peter, who seems to have been the chief speaker, and no word of John's is recorded (Acts i. 13; iii. 1, 3, 4, 11; iv. 1–32; viii. 14 ff.). The last notice of John in Acts does not necessarily refer to a date later than about 35 or 36 A.D., about the time of the persecution that followed the martyrdom of Stephen, when many of the Christians fled from Jerusalem. His brother James was put to death by Herod, certainly not later than 44 A.D. (Acts xii. 2). That John was in Jerusalem after this, and considered one of the three "pillars" of the Palestinian church, is practically certain from Paul's account of the Council in Jerusalem (c.49 A.D.), at which John, Peter, and James (the Lord's brother) gave formal sanction to Paul's apostolic status (Gal. ii. 1–10, the only reference to John in Paul's letters). All this, our earliest and most undisputed information regarding John, carries us no farther than c.50 A.D., but may be said fairly to imply that he was one of the three or four most prominent Apostles and to prepare us for other traditional information to the same effect.

2. *The Tradition Concerning a John in Asia Minor.* We may begin with the Book of Revelation. This book claims to have been written by some one named John (Rev. i. 1, 4, 9; xxii. 8). Assuming that the work is a unity and is not pseudonymous, questions that do not concern us here, it is certain that the book witnesses to the fact or tradition that a certain John was a man of the greatest influence in the Christian communities of the Province of Asia in early times. As the date of Revelation cannot be placed later than c.90 or 95 A.D. (it may have been earlier), it makes certain that before the end of the first century A.D. a John was a prominent figure in the Christian circles of Asia. Who was this John? Justin Martyr, who was converted c.130 A.D. in Ephesus, believed that the author was John the Apostle (*Dial.*, 81). All early Christian tradition after Justin is practically unanimous on this point. By writers near the end of the second century a number of interesting details are supplied regarding the Apostle's stay in Ephesus—that once he refused to remain in the same bath with the heretic Cerinthus, and that he lived until the times of Trajan (from Irenæus); that his grave was at Ephesus (from Polycrates); of his wonderful success in reclaiming a young convert from a brigand's life (from Clement of Alexandria); to say nothing of the countless miracles attributed to him in the apocryphal *Acts of John* written between 130 and 180 A.D.

But when we go back earlier than Justin Martyr the evidence becomes more uncertain. The two most important Asia Minor witnesses are Polycarp of Smyrna and Papias of Hierapolis, both of whom lived in the first half of the second century A.D. Irenæus, who heard Polycarp in his early youth, says that he distinctly remembered how Polycarp used to tell of his intercourse with John and others who had seen the Lord (*Ep. ad Flor.*). Papias, however, in the fragments of his work that remain, does not say that he had heard or seen John the Apostle, but does speak of a John "the Elder," who was apparently a prominent Christian, who had seen the Lord and from whom Papias had learned, directly or indirectly, certain things Jesus had said.

These testimonies, it will be observed, cease to be clear and convincing just at the important point, and perplexities now begin. For Papias not only seems to speak of John "the Elder," although early writers who had read his entire work supposed he meant thereby John the Apostle, but in a fragment of his work that has recently come to light says that not only James but his brother John also was slain by the Jews, presumably in Palestine and before the fall of Jerusalem (70 A.D.). If this was so, then the John of Asia Minor who wrote the Revelation must have been some other John than the Apostle, and the known facts of the Apostle's life would be confined to those noted above under section 1. In this case, also, we might assume that a certain John, possibly a disciple of Jesus, found his way in the later years of the first century to Ephesus and there became an influential teacher and was the author of the New Testament books assigned to "John" or "the Elder" (2 and 3 John). In the course of time tradition confused him with the Apostle. Such is the general view, with variations in detail, now favored by many leading scholars.

Its acceptance, however, presents serious difficulties: as (1) the difficulty of explaining how the confusion of persons could have taken place in the very region where the supposed "Elder" was so well known; (2) the fragments of Papias

are not free from suspicion both as to genuineness and exact meaning; (3) the witness of Irenæus as to what Polycarp said, being personal testimony as to what he himself heard Polycarp say, is not to be easily cast aside.

3. *The Fourth Gospel and the Apostle John.* Whether the Fourth Gospel can tell us anything of the Apostle John depends upon what is the true answer to the question raised in section 2 above. If the tradition as we know it from c.130 on is true, the Fourth Gospel is the work of John the Apostle, and, in addition to its own testimony to the literary powers and activity of John in his later years, it adds many details as to his experiences with Jesus to the account given in the Synoptics. For, on this view, there can be little doubt that the unnamed disciple "whom Jesus loved," about whom so much is said, was John himself. But if John was martyred by the Jews before 70 A.D., the Fourth Gospel and the Epistles were by some other author and tell us nothing certain of John the Apostle.

Bibliography. The ablest presentation of the traditional view will perhaps be found in James Drummond, *The Character and Authorship of the Fourth Gospel* (London, 1903); V. H. Stanton, *The Gospels as Historical Documents* (Cambridge, 1903); William Sanday, *The Criticism of the Fourth Gospel* (New York, 1905); Theodor Zahn, *Introduction to the New Testament* (Edinburgh, 1909). The case for the opposing view is ably presented by B. W. Bacon, *The Fourth Gospel in Research and Debate* (New York, 1910), and J. Moffatt, *Introduction to the Literature of the New Testament* (ib., 1911).

JOHN THE BAPTIST. The forerunner of Jesus Christ. The sources on which we depend for our knowledge of the man and his work are: 1. The sections of the Gospels especially devoted to a description of him and his ministry. Of these the accounts in the Synoptic Gospels relate chiefly to his career up to the baptism of Jesus, while the account of the Fourth Gospel is concerned mainly with John's relation to Jesus after the baptism of the latter. 2. The incidental notices of the Baptist in the Gospels, either by the Evangelists themselves or in their reports of Jesus' words. 3. The account of Josephus (*Ant.*, xviii, 5, 2). From these various sources we learn that John the Baptist was born about six months before Jesus, in a town in the hill country of Judæa. The name of the town is not given. The parents were of priestly stock and full of anxious thought and earnest expectation concerning the future of Israel. To this only child, born in their old age and looked upon as a gift of Jehovah, they gave the name John (Hebrew *Johanan*, 'Jehovah is gracious'). Naturally he was well instructed in the religious literature of Israel. To what extent, if at all, he was initiated into the priestly life we are not told. It is noteworthy that the messengers sent to him by the Jerusalem authorities were certain priests and Levites, as though these were best fitted to examine him (John i. 19). The greater part of his early manhood was spent in retirement, in the quiet of the wilderness. But at last, as in the case of the prophets of old, the "word of the Lord" (Luke iii. 2) came to him, and he issued from his retirement with a message such as Israel had not heard for centuries. (For the date, see NEW TESTAMENT CHRONOLOGY.) The scene of his first public appearance was in the lower Jordan valley and the wild slopes of northeastern Judæa (Matt. iii. 1; Mark i. 4; Luke iii. 3). Here, clad in homely garb, eating the simplest diet, he began his public ministry, crying, "Prepare ye the way of the Lord" (Mark i. 2). Hearers soon began to throng about him, the whole country was agitated, and even from Galilee the crowds gathered to hear the great preacher.

The message of the preacher was not a honeyed one. Like the prophets of old, his summons was "Repent!" Righteousness was the one thing needful. For it was a time of crisis; the axe was already laid to the tree; the chaff of the threshing floor was about to be burned; "the day of Jehovah," foretold by the prophets, was at hand (Matt. iii. 2, 7, 10; Mark i. 4; Luke iii. 3, 7–9). Nothing but a thorough repentance, a new moral condition, could save Israel from doom. What made this message so startling was its stern application to Israel, the chosen people. The Messianic age was not painted in glowing colors, as a glorious triumph of Israel over her enemies. No false trust in the boasted descent from Abraham was permitted to blind the eyes or dull the conscience. The Messianic age was to be ushered in by judgment, a judgment that was to sift Israel herself first of all. Only a new, purified, righteous Israel could hope to meet and greet that age with confidence. This coming dispensation held a large place in John's thought. To the many inquiries as to who he claimed to be, his reply was: "I am only the herald, only the voice that prepares the way; the greater one is to follow; one for whom I am unworthy even to do a slave's service" (Matt. iii. 11, 12; Mark i. 7; Luke iii. 15–18). And it was doubtless with reference to this impending age that John instituted the rite of baptism. As a symbol, it was somewhat common in Jewish circles. Ceremonial lustrations with water were frequently practiced. But John's baptism was no ordinary lustration. The requisite to receiving it was a confession of sin, and the baptized one arose from the water, as a member of the new Israel, repentant, and thus ready to meet the Messianic age, which to such would be an age of blessing, not of judgment.

The multitudes that came to hear the Baptist were of two opinions. Some refused to admit the reality of his mission and would have nothing to do with his baptism. Of such a mind were the higher classes. The humbler classes, on the other hand, welcomed him as a true prophet; and many of them, even those most despised and sinful, took his message to heart and were baptized (Luke vii. 29, 30; Matt. xxi. 32). For months, possibly a year, John continued his work—not always in the same place, but never far from the Jordan. He organized a body of disciples and prescribed for them certain regulations touching prayer and fasting (Matt. xi. 2; Luke v. 33, xi. 1; Mark ii. 18 ff., vi. 29). In the course of his ministry—under what circumstances it is not stated—he rebuked Herod Antipas, Tetrarch of Galilee and Peræa, for his adulterous marriage with Herodias, the wife of his brother Philip. This seems to have aroused Herodias, rather than Herod, to anger; for Herod's imprisonment of John which followed was not so much a personal revenge upon his boldness; it was really because Herod feared John's growing influence with the people; in fact, it is not at all impossible that he wished by this imprisonment to save him from the murderous hostility of Herodias, which, if it were realized, he felt might rouse the people

in revolt against him. During his captivity, therefore, his disciples had free access to him, and Herod even delighted to hear his teachings (Mark vi. 14–20; Matt. xiv. 1–5). Finally, however, in the drunken revelry of a birthday feast Herod was trapped by Herodias into ordering his execution, and he was beheaded at the castle of Machærus (Mark vi. 21–29; Matt. xiv. 6–12; cf. the account of Josephus). It seems likely that John's disciples continued their organization for some time afterward. In fact, 20 or more years later followers of the Baptist were found in Alexandria and in Ephesus who had been baptized according to John's rite, but had not seemed to appreciate the presence of the spiritual age for which it was intended to prepare (Acts xviii. 24–xix. 7). In other words, they had been baptized simply in reference to repentance from sin, but not with the emphasis on the Messianic era as already ushered in and partly realized in the Messianic work of Jesus (cf. Acts i. 5; xi. 16). Such a following, existing apart from the Christian communities, may have arisen from that spirit of aloofness from Jesus' work which seems to have developed in the latter part of the Baptist's life, and which afterward may have been emphasized by his disciples into a claim of Messiahship for him (cf. Luke iii. 15; also 1 John v. 6). This following seems to have resolved itself into several definitely heretical sects, some of which persisted into the latter part of the second century.

As to the relation of John to Jesus, it is not likely that there was any intimate acquaintance between them before their public work began (John i. 31), though their mothers were related (Luke i. 36). But the report of the great excitement in the lower Jordan valley reached Nazareth, and in due time among those presenting themselves for baptism was Jesus of Nazareth. The message of John had summoned him to the establishment of this new age as the work which, in the consciousness of his unique relations to God, he realized was the work he was intended to do; for to Jesus this rite was as really a symbol of his moral attitude of consecration to his work as it was to the people a symbol of their moral attitude of repentance in preparation for this work. In its administration both John and Jesus were fulfilling its expression of their right relations to this Messianic work which was to be accomplished. The Baptist discerned that there stood before him no ordinary person, and he was unwilling to baptize the candidate, but yielded at Jesus' reasoning that "so it becometh us to fulfill all righteousness" (Matt. iii. 14, 15). Most likely only John and Jesus were conscious of the confirmation of Jesus' consecration to his work which followed in the special endowment of Jesus with the Spirit of his work and in the divine acknowledgment of his act through the voice from heaven (Mark i. 10, 11; Matt. iii. 16, 17; Luke iii. 21, 22; cf. John i. 32–34). Though thus ushered into his public ministry by John, Jesus seems to have had little converse with him subsequently (yet cf. John iii. 26). Nevertheless, Jesus ever recognized the greatness of John's work and character. In his opinion John was no "reed shaken with the wind," but a prophet, the last in the great succession. He was the greatest of mortals (Matt. xi. 7–15; Luke vii. 24–28, xvi. 16). He came in "the way of righteousness" (Matt. xxi. 32), and the result of his work was that many were seeking to enter into the kingdom of heaven as by force. His witness was a witness to the truth, for he was a "burning and shining light" (John v. 33–35). More than all this, he was the one definitely predicted in Mal. iii. 1 as the Elijah who was to come (Mark ix. 13; Matt. xvii. 12). These statements show conclusively that Jesus recognized in John his forerunner, whose duty it was to prepare for his greater ministry. Such preparation was accomplished in two ways. On the one hand, the general awakening of the moral sense of Israel by the Baptist's preaching made Jesus' profounder and higher message more readily and easily apprehended. On the other hand, the definite designation of Jesus as the one who was to come, to a few choice spirits among his followers, led these to Jesus as the first and truest of his disciples (John i. 29 ff.). Notwithstanding, however, Jesus' testimony to John's greatness and recognition of him as his forerunner, he taught that John's conception of his mission was not altogether adequate. The "least in the kingdom"—i.e., the humblest one of those who entered the kingdom along the lines of Jesus' message of the Heavenly Father and His love—was on a higher plane than John the Baptist (Matt. xi. 11; Luke vii. 28). John's prophetic gift and calling did not make him infallible. His view of the Messianic age saw it mainly as one of judgment, sifting, and punishment. Jesus, with just as great an insistence on righteousness, proclaimed it in a gospel of glad tidings as an epoch of release from bondage, an era of comfort to the weary, a welcome to the Father's house. To John the judgment was in the foreground; to Jesus forgiveness was in the foreground, and forgiveness through the service he was to render for its realization. John did not advance beyond the old idea of repentance in order to the escape of judgment; Jesus called for repentance, but in order to a personal relation to himself (Matt. ix. 11–17; Mark ii. 21, 22). With this emphasis upon the judgment character of the coming age, John looked upon Jesus as one who would assert it in the spirit of a Judge. He could not appreciate Jesus as the suffering Servant of the prophets (Isa. liii). He was so thoroughly conscious of his own relations of servitude to Jesus that he could not understand the elements of self-sacrificing service in the ministry which Jesus was carrying out. And so he sent to him his message of confused inquiry, "Art thou he that cometh, or look we for another?" (Matt. xi. 3). It was in the hope that nevertheless the spiritual discernment of John would discover the spirit of his mission that Jesus sent back his messengers with his reply to their master in prison (Matt. xi. 4–6). John, however, most likely carried his confusion with him to his death, and his disciple following confirmed it in the separate organization which they continued to maintain. Consult the various lives of Christ, and H. Köhler, *Johannes der Täufer* (Halle, 1884); H. R. Reynolds, *John the Baptist* (London, 1888); James Stalker, *Two St. Johns of the New Testament* (ib., 1905); A. T. Robertson, *John the Loyal: Studies in the Ministry of the Baptist* (New York, 1911); Blakiston, *John Baptist and his Relations to Jesus* (London, 1912).

JOHN. The name of 23 popes.—John I (Pope, 523–526), a native of Tuscany. Nothing is known of his pontificate except his heading an embassy to the Emperor Justin II at Constanti-

nople, at the request of Theodoric, the Arian King of Italy, in regard to the execution of an Imperial edict against the Arians. On his return he was imprisoned by Theodoric, who was dissatisfied with the result of his mission, and died in captivity. His day is May 27.—JOHN II (Pope, 532–535), a Roman, Mercurius by name. He appealed to Athalaric, King of the Goths, for aid in putting down simony, which was fearfully prevalent. His letters are in Migne, *Patrologia Latina*, vol. lxvi.—JOHN III (Pope, 560–573).—JOHN IV (Pope, 640–642), a Dalmatian by birth. He condemned the Monothelites and insisted that Honorius I had not sanctioned their doctrine.—JOHN V (Pope, 685–686), a Syrian, the first of several popes of Eastern birth, who owed their election to the influence of the exarchs. He had been sent by Pope Agatho as his legate to the sixth general council.—JOHN VI (Pope, 701–705), a Greek. He decided the prolonged conflict between St. Wilfrid of York and the see of Canterbury in the former's favor. His letters are in Migne, *Patrologia Latina*, vol. lxxxix (Paris, 1844–64).—JOHN VII (Pope, 705–707), a Greek, the immediate successor of the preceding. He is said to have persuaded the Anglo-Saxon clergy to abandon their secular dress. Consult, for John IV, V, VI, VII, H. K. Mann, *Lives of the Popes* (London, 1902–06).—JOHN VIII (Pope, 872–882), a Roman by birth and Archdeacon of Rome before his elevation. He supported the claim of Charles the Bald to the Empire and crowned him in 875; two years later he upheld his disputed right in a great synod at Ravenna. The incursions of the Saracens in Lower Italy gave him much trouble, and after strenuously opposing any compromise with them he was obliged to purchase exemption from their attacks by a yearly tribute. He made a determined attempt to reunite the Eastern church with Rome, but was defeated by the crafty stubbornness of Photius (q.v.). His numerous letters are in Migne, *Patrologia Latina*, vol. cxxvi (Paris, 1844–64). Consult, for the Eastern negotiations, Hergenröther, *Photius, Patriarch von Constantinopel* (Regensburg, 1867).

JOHN IX (Pope, 898–900), a Benedictine, the candidate of the Frankish party. His position amid the troubles of the time was very insecure, and, though a zealous man, he accomplished little except the rehabilitation of his predecessor Formosus.—JOHN X (Pope, 914–928), a native of Romagna. He became Archbishop of Ravenna in 905 and was raised to the papacy by the influence of Theodora's faction. But he disappointed their expectations by striving to render his temporal power independent of any party. He defeated the Saracens in person and attempted a reconciliation with the Eastern church. He was imprisoned, and perhaps murdered by Marozia, daughter of Theodora, whose ambitions he opposed. His letters are in Migne, *Patrologia Latina*, vol. cxxxii (Paris, 1844–64).—JOHN XI (Pope, 931–936), the son of Marozia by her first husband, Alberic. She and her other son, Alberic II, practically ruled, leaving none but purely sacerdotal functions to the Pope.—JOHN XII (Pope, 955–964), the son of Alberic II, elected at the age of 18. His name was Octavian; he was the first to introduce the practice of adopting a new name. He gained the support of Otho I, whom he crowned Emperor in 962, but fell out with him afterward and, in consequence of many grievous accusations, was threatened with deposition. He conquered his opponents, but died soon afterward.—JOHN XIII (Pope, 965–972). He was Bishop of Narni before his choice as the candidate of Otho I for the papacy. By his influence with the Emperor John recovered Ravenna and the rest of the *patrimonium Petri*. He crowned Otho's young son as associate in the Empire and aided in procuring for him the hand of the Greek Princess Theophano. His letters are in Migne, *Patrologia Latina*, vol. cxxxv (Paris, 1844–64).—JOHN XIV (Pope, 983–984), previously Bishop of Pavia and Chancellor of Otho II. When the Emperor died and his wife, Theophano, left Rome, John was helpless. Boniface VII, who had seized the papacy on the death of Otho I and had then fled to Constantinople in fear of the counts of Tusculum, now returned and imprisoned him in the castle of Sant' Angelo, where he was done to death four months later. Consult Floss, *Die Papstwahl unter den Ottonen* (Freiburg, 1858). Another John is included in some lists of the popes as the immediate successor of Boniface, but according to modern investigations he has no claim to the title. His inclusion has introduced a confusion into the numbering of the later Johns.

JOHN XV (Pope, 985–996), elevated by Crescentius and his party, and completely under their influence. After his death, Otho III caused the election of his own kinsman Bruno, as Gregory V, but on the Emperor's departure he was driven out by Crescentius, who in 997 set up John Philagathus, a native of the Greek Province of Calabria, as JOHN XVI. He was overthrown by the return of the Emperor and treated with a cruelty which he did not long survive.—JOHN XVII (Pope for a few months in 1003).—JOHN XVIII (1003–09). He effected a temporary reconciliation with the Church of Constantinople and left the name of a learned and pious man. He is said to have retired to a monastery to end his days, but it is not improbable that he was driven out by the son of Crescentius.—JOHN XIX (Pope, 1024–33), a Roman of the family of the counts of Tusculum. He succeeded his brother, Benedict VIII. He attempted to consolidate the renewed union with the East by conceding to the Patriarch of Constantinople, in a sense, the title of Ecumenical; but the feeling of Western Christendom was so strong against the concession that he was obliged to withdraw it, and the breach became wider than ever. He crowned the Emperor Conrad II in the presence of the English King Canute. His letters are in Migne, *Patrologia Latina*, vol. cxl (Paris, 1844–64).—JOHN XX, often called JOHN XXI (Pope, 1276–77), a Spaniard, Peter by name, made Cardinal Bishop of Frascati in 1273. He was a man of great learning, especially in philosophy and medicine. He left some treatises which are interesting contributions to the history of mediæval medicine. His enemies accused him of dealing in magic arts and considered his death by the fall of a ceiling as a judgment.

JOHN XXII (Pope, 1316–34), Jacques d'Euse, a native of Cahors, made Bishop of Fréjus in 1300 and Cardinal Bishop of Porto in 1312. He was chosen Pope after a vacancy of two years and fixed his residence at Avignon. Attempting to carry out in very altered circumstances the vast and comprehensive policy of Gregory VII and Innocent III, he interposed in the contest for the Imperial crown between Louis of Bavaria and Frederick of Austria, in favor of the latter.

He was involved in several other controversies of a more theological nature; that on the poverty of Christ, which sprang up among the Franciscans (see FRATICELLIANS), was partly connected with support given by the recalcitrant members of the order to Louis. His opinion that the just would not be admitted to the beatific vision until the general resurrection was vigorously opposed by many theologians, and he retracted it before his death. He endeavored to propagate the Christian faith in the most distant lands and to promote a crusade, in which he was hindered by the constantly divided state of Christendom. He collected large sums for the treasury of the Church, but his own life was simple and ascetic. Consult: Friedensburg, *Ludwig der Bayer und Friedrich von Oesterreich* (Göttingen, 1877); Verlaque, *Jean XXII, sa vie et ses œuvres* (Paris, 1883); Souchon, *Die Papstwahlen von Bonifaz VIII. bis Urban VI.* (Brunswick, 1888). —JOHN XXIII (Pope, 1410–15), Baldassarre Cossa, of a noble Neapolitan family. He was made Cardinal in 1402. He took a prominent part in the Council of Pisa and in the effort to terminate the great schism by the elevation of Pietro Philargi as Alexander V. On Alexander's death he was chosen by the same dubious authority. He called the Council of Constance (q.v.), by which he was deposed. He fled, but was captured and imprisoned for four years, until he was released by the intervention of his successor, Martin V, who made him dean of the Sacred College. He died and was buried in Florence. Consult, for John XXII, XXIII, Pastor, *History of the Popes*, vols. i–xii (St. Louis, 1898–1913), and Mandell Creighton, *History of the Papacy* (6 vols., New York, 1899–1901).

JOHN I, ZIMISCES (925–976). A Byzantine Emperor (969–976). Nicephorus Phocas, who had mounted the throne by his aid, gave him the chief military command in the Empire. He ably seconded the Emperor in his victorious campaigns against the Saracens, but through jealousy he was deprived of his command. At the same time the Emperor was unpopular, and John was in love with the Empress; consequently he murdered the Emperor and himself mounted the throne. During his reign war was waged successfully against the Russians, whom he drove out of Thrace in 970–973, the Saracens, from whom he recovered part of Syria, and the Bulgarians. He is supposed to have been poisoned while on his return from the campaign in Syria. Consult: Schlumberger, *L'Epopée Byzantine*, vol. i (Paris, 1896), and Edward Gibbon, *Decline and Fall of the Roman Empire* (2d ed., by J. B. Bury, vol. v, London, 1901).

JOHN II, COMNENUS or KALOJOANNES (1088–1143). A Byzantine Emperor, called "The Good." He succeeded his father, Alexius, on the throne in 1118. Although himself a man of high character, and a winner of many victories in his wars against the Turks in Asia and against the Servians and the Hungarians in Europe, yet his administration was weak, and his whole government enfeebled by corruption. Consult Edward Gibbon, *Decline and Fall of the Roman Empire* (2d ed., by Bury, vol. v, London, 1901), and Chalandon, *Les Comnènes*, vol. i (Paris, 1912).

JOHN V. Byzantine Emperor. See PALÆOLOGUS.

JOHN VI. Byzantine Emperor. See CANTACUZENUS.

JOHN VII, VIII. Byzantine emperors. See PALÆOLOGUS.

JOHN I (1350–95). King of Aragon and son of Peter IV, whom he succeeded on the throne in 1387. He maintained a school of troubadours at his court.

JOHN (1513–71). Margrave of Brandenburg-Küstrin, second son of the Elector Joachim I of Brandenburg, born at Tangermünde. He was better known as Hans of Küstrin, from one of the possessions which he secured upon the death of his father in 1535. Although brought up a Catholic, he introduced the Protestant religion into his dominions in 1537 and the next year joined the Schmalkaldic League, though with the express stipulation that it should be for the purpose of protecting religious belief and not for political reasons. Consequently, on the outbreak of the Schmalkaldic War, he joined the Emperor Charles V and took an important part in the battle of Mühlberg, where the Imperial forces gained a decisive victory over the Protestant princes (1547). At length realizing the mistake he had made, he went over to the Elector Maurice of Saxony and exerted himself on the Protestant side during the treaty making at Passau (1552). Internal peace once more restored to Germany, he accompanied the Emperor Charles V in his French campaign and took part in the unsuccessful siege of Metz. His chief title to fame, however, rests in the ability with which he governed his lands. He restrained the nobility, cleared the country of highway robbers, extended its frontiers, and encouraged agriculture, commerce, and industries.

JOHN I (1358–90). King of Castile from 1379 to 1390. He succeeded to the throne on the death of his father, Henry II. To defeat the schemes of John of Gaunt (q.v.), Duke of Lancaster, who had assumed the title of King of Castile, and of Ferdinand of Portugal, he attacked Portugal. Ferdinand submitted in 1382 and made peace by giving his daughter Beatrice, the heiress of Portugal, to John. On Ferdinand's death, in 1383, John again made war upon Portugal in support of the claims of Beatrice, and later fought against John I, who had been elected King of that country, but failed the first time on account of a pestilence and the second time was defeated at Aljubarotta in 1385. See SPAIN, *History*.

JOHN II OF CASTILE (1405–54). Despite the mutually antagonistic opinions of two prominent historians (Menéndez y Pelayo and Burke), the reign of John II of Castile must still be considered of prime importance for the political and literary history of the end of the Spanish Middle Ages. John II, born in 1405, was but two years old at the time of his father's death. Castile again went into the hands of a Regent—Ferdinand, the brother of the late King (Henry III of Castile), who shared the regency with the widowed Queen Katherine (daughter of John of Gaunt and Constance of Castile). Fortunately for Spain, he was the best Regent Castile had yet had. In 1416 Ferdinand (who had become King of Aragon in 1412) died, and two years later Katherine died also, leaving an inexperienced boy of 13 to the tender mercies of dissolute favorites. In 1419, shortly after his marriage (1418) to Mary, the daughter of his uncle Ferdinand, he took the reins of government. From the death of Ferdinand, however, the real ruler of Castile was the celebrated Alvaro de Luna, a relative of the indomitable Antipope Benedict XIII. Accordingly the reign might more appropriately be called the reign

of Alvaro de Luna. Plots and counterplots, revolutions and counter-revolutions, were the order of the day throughout the whole of the long reign. After the death of Queen Mary (1445), Don Alvaro brought about the King's marriage (1450) with Isabel of Portugal, who promptly broke the favorite's power by encouraging the King to assert his independence. In 1453 Don Alvaro was executed. A year after the marriage the Princess, later (after the death of her half brother Henry IV) Queen, Isabella was born.

A period so tumultuous as this would hardly seem propitious for literary productivity, and it is true that the great lights in it are not very numerous; but the sum total of lesser lights makes a galaxy only less brilliant than that of the great *siglo de oro*. John II has many points in common with his great ancestor Alfonso X (the Wise), but those very points in common accentuate the essential differences: John II was literary rather than scientific, pedantic rather than scholarly, formal rather than substantial, graceful rather than profound. Still he gave a not unintelligent protection to literary men and their works and did much for the universities and scholars. Consult: Comte de Puymaigre, *La cour littéraire de Don Juan II, roi de Castille* (2 vols., Paris, 1873); Fernán Pérez de Guzmán, "Generaciones y semblanzas," in *Biblioteca de autores españoles*, vol. lxviii (Madrid, 1877); Marcelino Menéndez y Pelayo, *Antología de poetas líricos castellanos*, vols. iv–v (ib., 1893–94); Emilio Cotarelo y Mori, *D. Enrique de Villena* (ib., 1896); Alonso de Palencia, *Crónica de Enrique IV: traducción castellana por Antonio Paz y Melia*, vol. i, books i and ii (ib., 1904).

JOHN (1167–1216). King of England from 1199 to 1216. He was the youngest son of Henry II by his wife, Eleanor of Aquitaine, and was born on Dec. 24, 1167. His father called him Lackland, probably because Henry had divided his dominions among his elder sons and thus left John without a portion. John was given, in 1177, the lordship of Ireland, and in April, 1185, he went over to take the reins of government, but ruled so badly that he was recalled the following September. John united with his brothers in their repeated rebellions against their father, and it was the sudden communication of the news of his having joined his brother Richard's uprising that caused the death of Henry. When Richard I succeeded to the crown, he conferred upon his young brother earldoms which amounted to nearly one-third of the Kingdom. This did not, however, prevent John from endeavoring to seize the crown during Richard's captivity. John was, nevertheless, pardoned on Richard's return and treated with great clemency and is said to have been designated by his brother on his deathbed as his successor. John hastened, at his brother's death, to obtain the support of the continental barons and then returned to England, being crowned at Westminster May 27, 1199. Arthur (q.v.), the son of his elder brother, Geoffrey, was, according to modern laws of heredity, the lawful heir to the crown, but at this time the rules of succession to the crown were still imperfect. The claims of Arthur were supported by the King of France, but John bought off the latter's influence. In 1200 he obtained a divorce from his first wife, Isabella or Avice of Gloucester, and married Isabella of Angoulême, who was betrothed to Hugh le Brun, son of Hugh, Count of La Marche, one of his vassals. In revenge Le Brun stirred up the nobles of Poitou against him and embraced the cause of young Arthur. In the war which ensued, Arthur, who was again assisted by France, was taken prisoner and confined in the castle of Rouen, where, according to tradition, he was put to death. As a result of the war, the English monarch lost to Philip Augustus of France Normandy, Touraine, Maine, Anjou, and Poitou. In 1207 John quarreled with the Pope concerning the appointment of a new Archbishop of Canterbury, and, as a result, the Kingdom was placed under an interdict in 1208; John in return confiscated the property of the clergy who obeyed the interdict and banished the bishops. He also compelled William, King of Scotland, who had joined his enemies, to do him homage (1209), put down a rebellion in Ireland (1210), and subdued Llewellyn, the independent Prince of Wales (1211). The Pope, in 1212, solemnly deposed John, absolved his subjects from their allegiance, and commissioned Philip Augustus of France to execute his sentence. John, denounced by the Church and hated for his cruelty and tyranny by his subjects, found his position untenable and was compelled, in 1213, to make abject submission to Rome and to hold his kingdom as a fief of the papacy. Philip Augustus, nevertheless, proceeded with his scheme of invasion, though no longer approved by Rome; but the French fleet was totally defeated in the harbor of Damme. Subsequent events, however, proved more favorable to France, and John's strength was crushed in 1214 by the defeat at Bouvines (q.v.). At length the English barons saw the opportunity to end the tyranny of John; they drew up a petition demanding the redress of abuses in the government and the administration of justice and the issuance of a charter of liberties modeled on that of Henry I. This was rejected by the King and became the signal for war. The army of the barons assembled at Stamford and marched to London; they met the King at Runnymede and on June 15, 1215, was signed the great charter, Magna Charta (q.v.). The Pope soon after annulled the charter, and the war broke out again. The barons now called over the Dauphin of France to be their leader, and Louis landed near Sandwich, May 21, 1216, and gained control over a large part of England. John attempted to regain this territory, but in crossing the Welland lost his regalia and treasures and part of his baggage and army. He was taken ill, and died at Newark Castle Oct. 19, 1216. John had five legitimate children: Henry III; Richard, Earl of Cornwall; Joan, Queen of Scotland; Isabella, Empress of the Holy Roman Empire; and Eleanor, whose second husband was Simon de Montfort. One of his illegitimate children married Llewellyn I, Prince of North Wales.

Bibliography. Great Britain Public Record Office, *Calendar of State Papers and Manuscripts*, vol. i (London, 1864); Kate Norgate, *England under the Angevin Kings* (ib., 1887); William Stubbs, *Constitutional History of England*, vol. i (6th ed., Oxford, 1897); Kate Norgate, *John Lackland* (New York, 1902); Davis, *England under the Normans and Angevins* (ib., 1905); Adams, *History of England from the Norman Conquest to the Death of John* (London, 1905); K. H. Vickers, "England in the Later Middle Ages," in his *History of England*,

vol. iii (ib., 1913); S. K. Mitchell, "Studies in Taxation under John and Richard III," in *Yale Historical Publications, Studies 2* (New Haven, 1914).

JOHN II (1319–64). King of France from 1350 to 1364, surnamed "The Good." He succeeded his father, Philip VI of Valois, in 1350, and commenced his reign by acts of despotism and cruelty. The English invaded France, and John was defeated by Edward the Black Prince at Poitiers (q.v.) in 1356. John himself was taken prisoner, carried to Bordeaux and then to London, where he was detained until Oct. 25, 1360. His ransom was fixed by a treaty with Edward III at Brétigny (q.v.). In 1363 he secured for his son Philip the Duchy of Burgundy, which was destined to become a danger to France. His son, the Duke of Anjou, who had been in London as a hostage for the payment of John's ransom, escaped in violation of his parole, and thereupon John voluntarily returned in 1364 as a prisoner to London, where he suddenly died. Consult Lavisse, *Histoire de France*, vol. iv, part i (Paris, 1902).

JOHN III, Vatatzes, or Ducas (1193–1254). Emperor of Nicæa. His skill as a soldier led to his being chosen to succeed Theodore I in 1222. He reorganized the remaining portions of the East Roman Empire, extended his boundaries to Rhodes, defeated the Latin Emperor, and the final recapture of Constantinople was largely due to his efforts, although his own siege of that city in 1235 did not succeed. Consult Pears, *Destruction of the Greek Empire* (London, 1903).

JOHN IV, Lascaris (c.1250–c.1300). Emperor of Nicæa. He succeeded his father, Theodore II, in 1258, when he was scarcely 10 years old. Three years afterward he was deposed and blinded by Michael Palæologus. Consult Pears, *Destruction of the Greek Empire* (London, 1903).

JOHN II, Casimir (1609–72). King of Poland from 1648 to 1668. He was the youngest son of Sigismund III and on his father's death, in 1632, became lord of an extensive appanage in Poland. In 1640, however, he entered the Jesuit Order at Rome and was made Cardinal by Pope Innocent X. Returning to Poland, he was elected to succeed his brother, Ladislaus IV, as King in 1648, and married his widow, Maria Luisa Gonzaga, receiving from the Pope absolution from his vows. The first part of his reign was disturbed by the revolt of the Cossacks under Chmielnicki. In 1655 Charles X of Sweden made war upon Poland and in 1656 was joined by Frederick William, Elector of Brandenburg. In 1657 the Elector went over to the side of Poland, which in return formally renounced its suzerainty over East Prussia. Peace was made with Sweden at Oliva in 1660. By the Treaty of Andrussovo (1667) the Polish King ceded White and Red Russia and the Ukraine east of the Dnieper to Russia. Broken by misfortune, John abdicated at the Diet of Warsaw, Sept. 16, 1668, and retired to France. He died at Nevers, Dec. 16, 1672. See Poland.

JOHN III, Sobieski (1624–96). King of Poland from 1674 to 1696 and one of the greatest warriors of the seventeenth century. He was born at Olesko, Galicia, June 2, 1624, and was educated with great care, together with his brother Mark, by his father, James Sobieski, Castellan of Cracow, a man distinguished in the civil and military life of Poland. The brothers traveled in France, England, Italy, and Germany, until their father's death recalled them home in 1648. Poland was then on the decline and involved in constant wars with Sweden, Brandenburg, Russia, the Tatars, the Turks, and the Cossacks. The Sobieskis, as became their rank and training, entered the military service. Mark fell in battle against the Cossacks; John distinguished himself by his valor and became the most efficient Polish leader of his time. He became grand marshal in 1665 and commander in chief of the Polish forces and Waywode of Cracow in 1667. On Nov. 11, 1673, he defeated the Turks in the great battle of Khotin in Bessarabia. After the death of King Michael Wisniowiecki (1673) he was unanimously elected King of Poland (May 21, 1674). He turned from the French alliance, which seemed cemented by his election, to that of Austria because of a pique on the part of his wife, and when the Turks besieged Vienna in 1683 John hastened to its relief with 20,000 Polish troops. Near Vienna he was joined by the Duke of Lorraine and the Imperial troops, and on September 12 the combined army of 70,000 assailed the Turkish forces under Kara Mustapha in their camp around Vienna. The enemy, whose numbers are estimated at 275,000 men, were overwhelmingly defeated and driven back to the Raab. Sobieski was received with acclaim by the Viennese, but the Emperor Leopold showed strange ingratitude in his treatment of the deliverer and of the Polish army. Sobieski became the hero of Christendom, but this was the climax of his career. He was hampered by the wretched politics of the aristocratic Polish Republic and by the intrigues of foreign parties in his court, and the later years of his life were full of disappointment. He died of apoplexy, June 17, 1696. John Sobieski was not only a statesman and warrior, but a patron of science and literature. His constant wars, however, prevented that attention to the internal condition of Poland which its critical situation urgently required. He had, too, many of the faults of the high Polish nobility, and he was too much under the influence of his wife, an intriguing and frivolous woman. The family of Sobieski was extinguished with the death of the last descendant, in 1875. Consult: Tatham, *John Sobieski* (Oxford, 1881), the Lothian prize essay at Oxford in that year; Dupont, *Mémoires pour servir à l'histoire de Sobieski* (Warsaw, 1885), by a French officer in the Polish service under Sobieski; Salvandy, *Histoire de Pologne avant et sous le roi Jean Sobieski* (2 vols., new ed., Paris, 1855); Coyer, *Histoire de Jean Sobieski* (Amsterdam, 1761 and 1783); Waliszewski, *Acta* (3 vols., Cracow, 1684), extracts from the foreign archives of France in regard to the relations of Sobieski with that country; Rieder, *Johann III., König von Polen* (Vienna, 1883); Chelmecki, *König J. Sobieski und die Befreiung Wiens* (ib., 1883); Du Hamel de Breuil, *Sobieski et sa politique de 1674 à 1683* (Paris, 1894).

JOHN I, the Great (1357–1433). King of Portugal from 1385 to 1433, sometimes known as "The Bastard." He was the founder of the illegitimate Burgundian line and was born at Lisbon (being a natural son of Peter I). In 1364 he was created Grand Master of Aviz. After the death of his half brother, Ferdinand, in 1383, he became Regent and Protector of the Kingdom, and in April, 1385, was chosen King by the Portuguese in violation of the rights of

the Infanta Beatrice, who had married John I, King of Castile. A war followed, resulting in favor of the Portuguese, who won the battle of Aljubarrota, in 1385. In 1415 John took Ceuta from the Moors. The island of Madeira was discovered in his reign largely through the efforts of his son, Prince Henry the Navigator (q.v.). The reign of John I, whose conquests and good government earned him the title of "The Great," marks the beginning of the heroic age in Portuguese history. He died, after a long and glorious reign of 48 years, in August, 1433, and was succeeded by Edward, the eldest of his six sons by his wife, Philippa of Lancaster. Consult H. M. Stephens, *Portugal* (New York, 1893), and V. de Bragança Cunha, *Eight Centuries of Portuguese Monarchy* (ib., 1911).

JOHN II, THE PERFECT (1455–95). King of Portugal from 1481 to 1495. He was born at Lisbon, being the son of King Alfonso V. In his youth he showed himself possessed of high courage and attainments. In 1471 he married Leonora of Lancaster and succeeded his father in 1481. He put to death for conspiracy the dukes of Braganza and Viseu in 1483. During his reign the African coasts were thoroughly explored by Portuguese navigators, and Bartholomeu Días discovered the Cape of Good Hope (1488). By the Convention of Tordesillas (1494) Portugal divided with Spain the newly discovered world in the Western Ocean. (See DEMARCATION, LINE OF.) John II was a monarch of remarkable political sagacity and broad views and sought in every way to promote commerce, art, and industry in his Kingdom. His premature death (Oct. 25, 1495) has been attributed to slow poisoning. His only son, Alfonso, having died in 1491, he was succeeded on the throne by Emmanuel, Duke of Beja, his brother-in-law. Consult J. P. Oliveira Martins, *O principe perfeito* (Lisbon, 1895).

JOHN III (1502–57). King of Portugal from 1521 to 1557. He was the son of Emmanuel the Great, whom he succeeded in 1521. He found Portugal at the very height of its power, but during his reign its influence began to wane, and it lost much of the prestige which it had formerly enjoyed. The Inquisition was introduced, and the control of the University of Coimbra was placed in the hands of the Jesuits. Colonial enterprise, however, continued under his reign. As a result of the Congress of Badajoz (1524), Portugal's title to Brazil was conceded by Spain, and a beginning was made towards the colonization of the country by its division into captaincies which were granted out to the great nobles to be held in feudal tenure. In the East Indies, too, the Portuguese power was greatly extended. Consult V. de Bragança Cunha, *Eight Centuries of Portuguese Monarchy* (New York, 1911).

JOHN IV, THE FORTUNATE (1605–56). King of Portugal from 1640 to 1656 and the founder of the Braganza dynasty. He was born at Villaviciosa in 1604, being descended from both the legitimate and illegitimate royal families of Portugal. Before an almost bloodless revolution raised him to the Portuguese throne in 1640, John IV was Duke of Braganza, which title he had inherited in 1630. In 1633 he married Luisa de Guzmán, oldest daughter of the Duke of Medina Sidonia and a woman of energetic personality. As leader of the patriotic party, he succeeded in 1640 in expelling the Spanish usurpers and making himself King, after the country had been 60 years under the yoke of Spain. His election was ratified by the Cortes in January, 1641. For 15 years John IV ruled Portugal with energy and ability, restoring the finances and promoting commerce and agriculture. The Spaniards were completely defeated early in his reign at the battle of Montijo (1644) and gave no further trouble. In 1649 and 1654 the Portuguese won important naval victories over the Dutch off the coast of Brazil. At the time of his death (Nov. 6, 1656) John had succeeded in restoring Portugal to her place among the nations and establishing his family firmly on the throne. Two of his sons succeeded him in turn, as Alfonso VI and Pedro II respectively, and his daughter, Catharine of Braganza, became the wife of Charles II of England, bringing Bombay as her dowry. Consult: J. Pinto Ribeiro, *Usurpação, retenção, restauração de Portugal, 1642* (Lisbon, 1642); J. de Vasconcellos, *Restauração de Portugal, 1643* (ib., 1643–44); E. de Faria y Sousa, *History of Portugal (down to 1640), Translated and Continued down to this Present Year, 1698, by Capt. John Stevens* (London, 1698).

JOHN V (1689–1750). King of Portugal from 1706 to 1750. He was the son of Peter II, whom he succeeded in 1706 in the midst of the War of the Spanish Succession, in which Portugal was involved as an ally of Great Britain and the Emperor. By the Treaty of Utrecht (1713) Portugal was confirmed in its possession of both banks of the Amazon. The King was a man of strong religious tendencies and devoted much attention to ecclesiastical affairs. Numerous churches and convents were erected, and to this end the army and the navy were allowed to sink into complete inefficiency. For thus turning the entire government of the Kingdom into the hands of the clerics, Pope Benedict XIV in 1748 bestowed upon him and his successors the title "Most Faithful King."

JOHN VI (1767 or 1769–1826). King of Portugal from 1816 to 1826. He was the son of Peter III and of Queen Maria I, who succeeded her father, Joseph I, in 1777. In 1792 Queen Maria became insane, and John took the reins of government into his own hands. In 1799 he was formally declared Prince Regent of the Kingdom. In 1807 Napoleon attempted to force upon the Regent the acceptance of the Continental System (q.v.), and on the latter's hesitation a French army under Junot entered the country. On November 27 the Prince Regent and the court sailed for Brazil, leaving the government in charge of a council of regency under the Marquis of Abrantes. On the death of his mother, in 1816, John became King. In Portugal, where the government after the expulsion of the French was carried on by Marshal Beresford, great dissatisfaction prevailed over the arbitrary character of the latter's rule, as well as over the continued absence of the court. In 1820 the troops at Oporto and Lisbon rose in insurrection and proclaimed a liberal constitution closely modeled on the Spanish constitution of 1812. King John returned to Portugal in 1821, leaving his eldest son, Dom Pedro, as Regent of Brazil, and gave his adhesion to the new constitution. The party of reaction, however, was strong, and headed by Queen Carlotta and her younger son, Dom Miguel, took courage from the presence of the army of the Holy Alliance in Spain to stir up an insurrection in northern Portugal (May,

1823) and succeeded in obtaining control of the King's person. The Cortes was dissolved, a new ministry was appointed, and an absolutist régime established. Alarmed by the liberal leanings of certain members of the new government, Dom Miguel resolved on a coup d'état, which was carried out April 29, 1824. On May 9 King John took refuge on board an English man-of-war and proclaimed his son a traitor. Dom Miguel was forced to yield to the pressure of the Powers and left the country. John was reinstated in power and restored the liberal constitution. He died March 10, 1826. Brazil in 1822 had declared itself independent under Dom Pedro as Emperor, and its independence was acknowledged by Portugal in 1825. On the death of John VI the crown of Portugal also fell to Dom Pedro, who resigned it in favor of his daughter, Dona Maria da Gloria. Consult V. de Bragança Cunha, *Eight Centuries of Portuguese Monarchy* (New York, 1911).

JOHN (1801–73). King of Saxony from 1854 to 1873. He was the youngest son of Prince Maximilian of Saxony and was born at Dresden, Dec. 12, 1801. In his youth he traveled in Italy, where he became an ardent student of Italian literature and a devotee of Dante. In 1830 he became commander of the local militia and was made a member of the Privy Council, taking his seat subsequently in the Council of State. As a member of the Upper Chamber, he exerted a very powerful influence on legislation. On the death of his brother, Frederick Augustus II, Aug. 9, 1854, he became King. In spite of his great attainments his statesmanship was not equal to meeting the crucial problems presented by the progressive rôle of Prussia in German affairs. In the War of 1866, acting upon the advice of his Prime Minister, Count Beust (q.v.), and hoping to strengthen Saxony, he embraced the cause of Austria. Saxony was invaded by Prussian troops, and after the defeat at Sadowa the King was forced to enter into the North German Confederation. He was loyal to the German cause during the Franco-German War of 1870–71 and played his part in the founding of the German Empire. He died at Pillnitz, Oct. 29, 1873. He published an excellent metrical translation of the *Divina Commedia*, with valuable notes (1839–49), under the pseudonym Philalethes. He also left manuscript translations of 70 English poems. He married, in 1822, Amalia Augusta, daughter of Maximilian Joseph, King of Bavaria, by whom he had nine children, of whom his eldest son, Albert, succeeded him.

JOHN OF AUSTRIA (1545–78). A Spanish general, commonly known as Don John (Juan) of Austria. He was the illegitimate son of the Emperor Charles V by Barbara Blomberg, the then unmarried daughter of a citizen of Ratisbon, and was born Feb. 24, 1545. He was not at first acknowledged by his father, who nevertheless provided for his bringing up. In 1550 he was taken to Spain and until 1559 remained under the care of Don Luis de Quijada at the latter's castle of Villagarcía, near Valladolid. In his will Charles V recognized him as his son and intrusted him to the care of his successor, Philip II, who in 1559 granted him the rank of a prince of the house of Austria and an establishment at Madrid. He was educated together with the Infante Don Carlos and Alexander Farnese, Prince of Parma. In 1568 he was given the command of a squadron which operated against the Barbary pirates and in the following year was intrusted with the task of suppressing the Morisco rebellion in Andalusia. Though he was far from cruel by nature and protested earnestly against his instructions, Don John none the less carried them out relentlessly, displaying great military skill in the campaign. By November, 1570, all of the Moriscos had either been killed or made their submission. Upon the formation of the Holy League by Spain, the Pope, and Venice against the Turks in 1571, Don John was given the supreme command of a fleet of more than 200 galleys, with which he won a splendid victory over the superior forces of the Turks at Lepanto, Oct. 7, 1571, killing or taking more than 30,000 of the enemy and releasing more than 12,000 Christian galley slaves. His ambition to establish an independent kingdom for himself in Greece was frustrated by the opposition of the Spanish King. In October, 1573, he took Tunis from the Turks, hoping to make himself ruler of the city; but here, too, his plans shattered against the jealous refusal of Philip II. In 1576 he was appointed Governor of the Netherlands, to succeed Don Luis de Requesens. The Pacification of Ghent, signed in the same year, had united all of the provinces, except Luxemburg, against Spanish misrule, and Don John was forced to make the journey to the north disguised as a slave in the train of Ottavio Gonzaga. From Luxemburg he carried on negotiations with the Estates and was able to enter Brussels (May, 1577) only after he had issued his Perpetual Edict, reaffirming the immunities granted the Protestants by the Pacification of Ghent, and promising in addition the removal of the hated Spanish soldiery from the country. William of Orange, however, continued in his policy of opposition, out of distrust in the promises of the Spanish party, although Don John seems to have carried out the terms of the edict in sending the Spanish soldiers out of the country and delivering a number of castles into the hands of Flemish commanders. In December, 1577, Don John was deposed by the Estates, and William, as Protector of Brabant, took the field against him. With the aid of a Spanish army, brought to the Netherlands by Alexander Farnese, his old schoolmate, Don John won the victory of Gembloux, Jan. 31, 1578, but, for lack of support, was unable to prosecute the campaign. Philip II, who saw in Don John's success a possible danger to himself, delayed in sending him reënforcements, and this enabled the party of Orange to make headway against the Governor. He died suddenly at his camp near Namur, Oct. 1, 1578, his death being attributed to poison administered by order of Philip II. For such a conjecture, however, there is no basis of fact. Consult: Montplainchamp, *Histoire de Don Jean d'Autriche* (Amsterdam, 1690); Sir William Stirling-Maxwell, *Don John of Austria* (2 vols., London, 1883); J. L. Motley, *History of the United Netherlands* (4 vols., New York, 1900); Luis Coloma, *Story of Don John of Austria* (London, 1912).

JOHN OF BRIENNE (?1148–1237). King of Jerusalem from 1210 to 1225 and Latin Emperor of Constantinople after 1229. When Mary became Queen of Jerusalem, the barons sent to Philip Augustus, asking him to choose a husband for her. He named John, who went to the Holy Land and married Mary in 1210. In 1212, on the death of the Queen, he became Regent for his daughter, who inherited the crown. He took an important part in the Crusade of 1218–21.

In 1225 the Emperor Frederick II, who had married John's daughter, forced him to resign the title of King. Soon after John took command of the papal troops in the attack upon Frederick's possessions. In 1229 he was chosen Emperor of the Latin Empire and spent the remaining years of his life in its service. Consult Georges, *Jean de Brienne* (Troyes, 1858). See BALDWIN II.

JOHN OF CAPPADOCIA. Logothete and later prætorian prefect under the Emperor Justinian, after 530 A.D. He filled the Imperial treasury by taxation, but was noted for his dishonesty, cruelty, gluttony, and debauchery. In 541, by a stratagem of Theodora, he was detected in a crime and was exiled. After Theodora's death, in 548, he was recalled to Constantinople, and again reinstated in favor. But he is said to have died in poverty. Consult Edward Gibbon, *Decline and Fall of the Roman Empire* (ed. by J. B. Bury, vol. iv, London, 1898).

JOHN OF DAMASCUS, SAINT (c.700–754). The author of the standard textbook of dogmatic theology in the Greek church. He was born at Damascus about 700 A.D. Like his father, he was a financial officer of high rank under the Caliph of Damascus. Much excited over the Imperial order forbidding the ecclesiastical use of images, he issued three letters, about 730, in behalf of image worship. Being outside of the Greek Emperor's authority, he escaped his wrath; but ultimately his position was made uncomfortable, and soon afterward he became a monk in the convent of Mar Saba, near the western shore of the Dead Sea and some 18 miles southeast of Jerusalem, where he spent the rest of his days in the composition of theological works and was ordained a priest. He died about 754 A.D. and had the honor of being canonized by both the Latin and Greek churches; in the former his day is May 6, in the latter December 4. He is one of the doctors of the Latin church. On account of his eloquence he has received the epithet Chrysorrhoas (the stream of gold). He was a man of extensive erudition and was considered the ablest philosopher of his time; but by some his writings are considered to show weakness of judgment and of critical power. His fame rests upon his three *Operations*, or letters upon image worship (trans. by Allies, *John Damascene's Treatise on Holy Images and Sermons on the Assumption*, London, 1899); and on his *Fount of Knowledge*, in three parts: (1) "Heads of Philosophy," (2) "Compendium of Heresies," and (3) "An Exact Exposition of the Orthodox Faith" (Eng. trans. of the third part by Salmond, in *Nicene and Post-Nicene Fathers*, 2d ser., vol. iv, pp. 1–106). He is also the reputed author of the tale of *Barlaam and Ioasaph*, in which Buddha becomes a Christian saint (Eng. trans. by Woodward and Mattingly, in the Loeb Library, New York, 1914). His complete works are in Migne, *Patrologia Græca*, vols. xciv–xcvi (Paris, 1854–66). Consult, for his biography, Langen (Gotha, 1879); J. H. Lupton (London, 1882); Alexander Whyte, *Father John of the Greek Church* (New York, 1898); Adolf Harnack, *History of Dogma*, vols. iii, iv (Boston, 1897–99); K. I. Burkhard, *Johannes von Damaskus Auszüge aus Nemesius* (Vienna, 1909). Douglas (London, 1901) has made him the subject of a poem.

JOHN OF GAUNT, DUKE OF LANCASTER (1340–99). The fourth son of Edward III of England. He was born at Ghent, whence his name (Gaunt). In the English wars with France and Spain he served with great bravery. He succeeded in 1361 to the Earldom of Lancaster in the name of his wife, Blanche, who was the daughter of Henry, Duke of Lancaster, and whom he had married in 1359. In 1369 his wife died; but two years later John married Constance, daughter of Peter the Cruel, King of Castile, whom the English had been aiding against his rival, Henry of Trastamare (q.v.). Peter the Cruel having been killed in 1369, John claimed the crown of Castile, but was never able to make any headway against Henry. The contest was ended upon the marriage of his daughter to the heir to the throne, in 1388. Meanwhile war had broken out with France also, and as the Black Prince was ill, John took command of the army, but was singularly unsuccessful, and the English lost nearly all of their conquests in France. The domestic affairs of England were also approaching a crisis, for Parliament objected to the corrupt practices of Lord Latimer and Richard Lyons, whom John protected, and to the influence of King Edward's mistress, Alice Perrers. In 1376 the so-called Good Parliament banished her, but, after it was dissolved and the Black Prince had died, John of Gaunt returned to power. He became involved, on account of his hostility to Bishop Wykeham, in a long contest with the clergy, in which he became allied with Wiclif (q.v.). His second wife died in 1394, and in 1396 he married his mistress, Catharine Swynford, whose children, the Beauforts, were declared legitimate by Parliament in 1397. He died Feb. 3, 1399, at Ely House in Holborn. He was the foremost patron of art and literature of his day, among his protégés being the poet Chaucer, whose material fortunes were dependent upon the Duke's career. His son, surnamed Bolingbroke, became in 1399 King of England under the title of Henry IV (q.v.). Consult: William Stubbs, *Constitutional History of England*, vol. ii (Oxford, 1896); Sydney Armitage Smith, *John of Gaunt* (London, 1904); G. M. Trevelyan, *England in the Age of Wycliffe* (New York, 1909); Sydney Armitage Smith (ed.), *John of Gaunt's Register* (2 vols., London, 1911); K. H. Vickers, "England in the Later Middle Ages," in his *History of England*, vol. iii (ib., 1913).

JOHN OF HALIFAX, or HOLYWOOD. See SACROBOSCO.

JOHN OF LEYDEN, properly JAN BEUKELSZOON, BOCKELSON, or BOCKOLD (c.1510–36). An Anabaptist fanatic. He was born in Leyden about 1510. For a time he wandered about as a journeyman tailor and then settled in his native city. Adopting the opinions of the Anabaptists (q.v.), he became one of their wandering prophets. In 1533 he went to Münster with Jan Matthys (Matthiesen), and when the latter lost his life in 1534 became his successor. He set aside the ancient constitution of the city, set up in Münster "the kingdom of Zion," appointed judges, and applied in an extravagant manner the principles of the Old Testament theocracy. He himself became "King of Zion." He introduced polygamy and displayed a great love of kingly pomp. In June, 1535, the town was taken by the Bishop of Münster. John and his chief accomplices suffered death under circumstances of fearful cruelty (Jan. 23, 1536), and his body was suspended in a cage from a church tower. He attempted to save his life by

confession and submission. Consult E. B. Bax, *Rise and Fall of the Anabaptists* (New York, 1903). See ANABAPTISTS.

JOHN OF LUNA. See JOHN OF SEVILLE.

JOHN OF LUXEMBURG (1296–1346). King of Bohemia. His father, the German Emperor Henry VII (Count of Luxemburg), secured for him the hand of Elizabeth, daughter of Wenceslas of Bohemia, and in 1310 he was chosen King of that country. After his father's death, which occurred three years later, he hoped to be elected Emperor, but, finding that his youth was regarded as an insuperable obstacle, he threw all his influence on the side of Louis the Bavarian and against the Hapsburg candidate. Through the favor of the new Emperor he was able to add considerably to his kingdom, and so laid the foundations of that great German-Slavic dominion over which his son, Emperor Charles IV, was to rule. His reign began auspiciously, but was soon disturbed by internal discord, which had its origin in the race hatred of the Germans and the Czechs; and as John, not a great ruler in any case, spent most of his time away from Bohemia waging wars in the interest of Louis, of his native Luxemburg, and of the Teutonic knights, or squandering his kingdom's revenues at the gay court of France, affairs at home, left to the management of deputies, went from bad to worse. So greatly did the feeling of his subjects towards him change during these years that when, in 1339, he became totally blind, the same Bohemians who had welcomed his accession with extravagant demonstrations of joy now felt he was justly punished by God. Other misfortunes overtook him also. His second son, John Frederick, who had married Margaret, famous as Margaret Maultasch, Countess of Tirol, was discarded by his wife, who married the Emperor's son. This and John's growing intimacy with the King of France, whose papal protégé at Avignon had always opposed Louis's claims, led to a rupture between him and the Emperor. In July, 1346, he secured the election of his own son as King of the Romans in place of Louis, who was formally deposed. In the same year he accompanied Philip VI of France in his disastrous campaign against the English, and at the battle of Crécy, guided by a knight on either side, forced his way into the thick of the fight and there was killed. It was at this battle that Edward the Black Prince won his spurs, and, according to Camden, he adopted the Bohemian King's insignia, three ostrich plumes, and the motto "Ich dien," which ever since have been borne by the princes of Wales; but there is no proof for this statement. Consult Weech, *Kaiser Ludwig der Bayer und König Johann von Böhmen* (Munich, 1860), and Schötter, *Johann, Graf von Luxemburg und König von Böhmen* (2 vols., Luxembourg, 1865).

JOHN OF NEPOMUK, or POMUK (?–1393). A popular Bohemian saint of the Catholic church. The history of his life is very uncertain. He is said to have been born at Nepomuk between 1330 and 1340. Having entered into orders, he rose rapidly to distinction, being created a canon of the cathedral of Prague and eventually a vicar-general of the diocese. The legend is that, the Queen of Wenceslas IV having selected him for her confessor, Wenceslas, himself a man of dissolute life, conceiving suspicions of her virtue, required of John to reveal to him what he knew of her life from the confessions which she had made to him. John steadfastly refused, and the King, having first put John to the torture, at which he himself personally presided, had him tied hand and foot and flung, already half dead from the rack, into the Moldau (March, 1393). His memory was cherished with peculiar affection in his native country, and he was eventually canonized as a saint of the Roman Catholic church, his feast being fixed for May 16. By some historians two distinct personages of the same name are mentioned—one the martyr of the confessional zeal, the other of his resistance to the simoniacal tyranny of Wenceslas; but the two are probably identical. The historical John of Pomuk was not the Queen's confessor, but vicar-general of the Archbishop of Prague. The King wished to violate canon law in order to found a new bishopric for one of his favorites, but John refused to accede, and his torture and death followed as in the legend. Consult his life by Wratislaw (London, 1873) and by Frind (Prague, 1879); also August Amrheim, *Historisch-chronologische Untersuchungen über das Todesjahr des heiligen Johannes von Nepomuk* (Würzburg, 1884).

JOHN OF PROCIDA. See PROCIDA, JOHN OF.

JOHN OF SALISBURY (c.1120–80). An English scholar and churchman, for 30 years the central figure of English learning. He was born between 1115 and 1120 at or near Old Sarum. In 1136 he went to France, attended the lectures of Peter Abélard and other famous masters, and remained there for several years, studying logic, grammar, the classics, and theology. He was sent on important missions to Popes Eugenius III and Adrian IV, by whom he was received with great honor. When Thomas à Becket became Archbishop of Canterbury, he was made his secretary, was with him in his exile in France, returned with him to England, and witnessed his martyrdom. In 1176 he was appointed Bishop of Chartres. His greatest works are: *Policraticus sive de Nugis Curialium et Vestigiis Philosophorum* (first printed, 1476), in eight books, a work of great erudition, dealing with government, philosophy, and various learning; and *Metalogicus*, in four books, a defense of the studies of the schools against the sneers of the ignorant. His *Vita et Passio Sancti Thomæ* and his letters, numbering about 300, are of the highest interest. Other works are: *Entheticus*, an elegiac poem containing 1852 lines, which deals with the same subject as *Policraticus; Vita Sancti Anselmi; Historia Pontificalis*. He died at Chartres, Oct. 25, 1180. John of Salisbury is described as a graceful Latin poet, an impressive orator, and by far the most learned man of his age. Consult his *Opera*, edited by Giles (5 vols., Oxford, 1848); Schaarschmidt, *Johannes Saresberiensis nach Leben und Studien, Schriften und Philosophie* (Leipzig, 1862); William Stubbs, *Seventeen Lectures on the Study of Mediæval and Modern History* (3d ed., Oxford, 1900).

JOHN OF SEVILLE, also called JOHN OF LUNA and JOHANNES HISPALENSIS (Hispalis, Seville). A Jewish scholar of the twelfth century. He was engaged by Raimond, Archbishop of Toledo, in the translation of various Arabic works on philosophy and mathematics. He made at least some of his translations in Spanish, and these were put into Latin by Domenico Gondisalvi. Boncompagni published the text of one of his

works, *Alghoarismi de Practica Arismetrice* (Rome, 1857). This is one of the oldest treatises concerning calculations with our numerals and zero. In spite of the title the original Arabic was probably not that of Mohammed ibn Musa (see AL-KHUWARIZMI), since it is much more developed than the arithmetical treatise of the latter.

JOHN OF SWABIA. See JOHN THE PARRICIDE.

JOHN OF WESEL. A German religious reformer who flourished about the middle of the fifteenth century. He was rector of the University of Erfurt (1456–57). He came under the ban of the Church by publishing an article against indulgences and escaped death at the stake only by recanting. He then entered a monastery, where he died in 1481. Of his writings there remain only *De Potestate Ecclesiastica* and *De Indulgentiis*. Consult Ullmann, *Reformatoren vor der Reformation* (2d ed., Gotha, 1866), and Clemen, "Ueber Leben und Schriften Johanns von Wesel," in *Deutsche Zeitschrift für Geschichtswissenschaften*, vol. ii (new ser., Freiburg, 1897).

JOHN THE CONSTANT (1468–1532). Elector of Saxony, son of the Elector Ernest, born in Schweidnitz. He succeeded his brother, Frederick the Wise, in 1525, and soon declared for the Reformation. The next year he entered into the Torgau Union with Philip I of Hesse and attended the Diet of Speyer. In 1528 he ordered a general parochial visitation in his dominions and in 1529 protested against a decision of the Diet of Speyer which was unfavorable to the Reformation. He was a bitter opponent of the Emperor Charles V at the Diet of Augsburg (1530). During the closing years of his life he devoted himself to organizing the Schmalkaldic League (q.v.).

JOHN THE FEARLESS (1371–1419). Duke of Burgundy from 1404 to 1419. He was the son of Philip the Bold. At the age of 25 he joined the King of Hungary against the Turks and was made prisoner at the battle of Nicopolis (1396). After nine months he was ransomed. He succeeded his father in 1404 as Duke of Burgundy, and on the death of his mother in 1405 became Count of Flanders. He was opposed by the French Queen and the Duke of Orléans, his rival. In 1407 he instigated the assassination of the Duke and soon obtained almost supreme power in France. (See CABOCHIENS.) This was followed by a civil war, in which John was aided by Henry IV of England. In 1414 and 1416 he formed alliances with Henry V of England and captured Paris in 1418, but was murdered on Sept. 10, 1419, at the instigation of the Dauphin, son of Charles VI, on the bridge of Montereau, where he had gone to meet the Dauphin. Consult Lavisse, *Histoire de France*, vol. iv, part i (Paris, 1902).

JOHN THE PARRICIDE (1290–?). The assassin of the German Emperor Albert I (of Austria), often known as John of Swabia. He was the son of Rudolph, Albert's brother. John, when he attained his majority, demanded from his uncle the whole or a part of his patrimony, but was met with a curt refusal. After a number of abortive attempts to gain his end, John, with others who had cause to complain of Albert's rapacity, formed a conspiracy against the life of the Emperor. While Albert was crossing the Reuss, near the castle of Hapsburg, on May 1, 1308, he was murdered by the conspirators. John disappeared, and nothing definite is known of his later life, though various accounts represent him as repenting of his deed and expiating his crime in a cloister. He is one of the characters in Schiller's *Wilhelm Tell*. Consult Mücke, *Albrecht I. von Habsburg* (Gotha, 1866).

JOHN, AUGUSTUS EDWIN (1879–). A British painter, draftsman, and etcher, one of the principal leaders of Impression in England. He was born in Wales and studied at the Slade Art School, London, and afterward independently in Paris, where he seems to have been influenced by Puvis de Chavannes. But he learned most from his study of the old masters and was himself wont to say that his earliest masters were Rembrandt and Piero della Francesca. His work, however, is strikingly original. As compared with some Impressionists, he is conservative in methods, especially in the matter of form. This is evident in his admirable drawings, which aroused such favorable criticism at the International Exhibition held in New York in 1913. His favorite subjects are small figures alone or in landscape; these are often types of repulsive ugliness, which at times approach caricature, yet, again, are subtle and naïve. His able portraits are somewhat decorative in treatment, with emphasis upon the salient characteristics of the sitter. In his paintings the line is flowing and easy, the color bright and attractive, the handling free and powerful. Among his best-known paintings are the "Spanish Flower Girl," "Mother and Child," "Seraphita," and several fine scenes from gypsy life. Among his best-known portraits are those of Professor Mackay and the mayor of Liverpool. In the technique of his powerful etchings the influence of Rembrandt is apparent; the best of his plates include several portraits of himself, the "Coster Girl," "Profile of Bella," "Maggie and Lucy," "Quarry Folk," and "The Valley of Time." Although John never gained recognition from the Royal Academy, he exercised a wide influence upon recent British art through his numerous pupils. He became a leader of the New English Art Club, where he chiefly exhibited.

JOHN, BAPTIST JOSEPH FABIAN SEBASTIAN, ARCHDUKE OF AUSTRIA (1782–1859). An Austrian prince and general. He was born at Florence, the son of Leopold I, Grand Duke of Tuscany, afterward the Emperor Leopold II. At an early age John showed considerable military talent, and in the wars with France he played an important part. As commander, he was extremely unfortunate. His army was crushed by Moreau at Hohenlinden (1801); he was defeated at Salzburg soon afterward; shared in the disaster of Austerlitz in 1805; was overthrown at Raab, June 14, 1809; and was unsuccessful in an attempt to join the army of his brother, Archduke Charles, at Wagram. He was popular, however, on account of his amiability, the interest he took in the sciences and public improvements, and above all his favorable attitude towards German unity, in which he stood alone among those who represented the Austrian policy. When the German National Assembly met at Frankfort, after the commotions of 1848, he was called by a great majority, on June 29 of that year, to be Vicar (Reichsverweser) of Germany. The progress of events being unfavorable to the Austrian interests, he resigned his office Dec. 20, 1849.

JOHN, EPISTLES OF. Three of the canonical Epistles of the New Testament. The First

Epistle. The literary form of 1 John is peculiar, and some have considered it a tract rather than an epistle. Yet it seems clear that the writer has a quite definite circle of readers in mind, whom he addresses in a tone of loving but authoritative familiarity; and although without definite address or signature, it is properly designated an epistle. In an introduction (i. 1–4), which reminds one of the Prologue to the Gospel of John, the writer states that the Word, who was manifested, with whom he and others had had personal experience, is the Word of life, to know whom is to have fellowship with the Father and the Son. To assist the readers to realize this truth and experience its joy is the purpose of the message that follows. Since God is light, emphasis is laid upon the necessity and possibility of separation from sin in order to fellowship with the light (i. 5–ii. 6). The result and evidence of fellowship with God is mutual love, the supreme duty of each towards the other (ii. 7–12), while the world with its attractions is to be shunned (ii. 12–17). The readers are then warned against those who deny Jesus to be the Christ (ii. 18–29). The full significance of being children of God is then unfolded (iii. 1–17), the realization of which, through faith, is equivalent to vital union with the truth (iii. 18–24). Once more (iv. 1–6) the false views, the spirit of Antichrist, are mentioned. One must oppose these, holding fast to the manifestation of love in the mission of Jesus, God's Son, and exemplifying it in his life of righteousness, faith, and love of the brethren (iv. 7–21). This gives the victory over the world (v. 1–5). Such is the unimpeachable testimony to Jesus, the Son, in whom is life (v. 6–12). With hints of the practical purpose of the Epistle (v. 13–17), a summary restatement of fundamentals (v. 18–20), and a final exhortation (v. 21), the Epistle closes, somewhat abruptly.

The Epistle itself contains no direct information as to its author, date, and place of writing, or persons addressed. The "we" (i. 1 et seq.) gives place to the singular (ii. 1, 7, 8, 12–14, 26; v. 13). The author thus indicates that he is one with others in his fundamental position, but is personally responsible for the Epistle as a whole. It was a time when new views, especially those of Gnostic tendency, were in the air. The view most repugnant to the author was probably a form of Docetic dualism which denied that Jesus was truly the Son of God and therefore the Christ (ii. 18–25, cf. iv. 1–3; v. 1–13). As this view does not appear to have been elaborated to any great extent when the Epistle was written, as it afterward was, a date somewhere near the beginning of the second century is most probable. The internal evidence being so insufficient, we must fall back (1) on traces of the work in early Christian literature, and (2) on comparison with the Gospel of John for facts touching its origin and destination.

The notices of 1 John in ancient literature are singularly full and direct. From the quotation and allusions in Polycarp's letter to the Philippians (c.115 A.D.), and the use of the Epistle by Papias (according to Eusebius' express statement), its circulation and high standing in Asia Minor soon after 100 A.D. cannot be doubted. It was known in the West as John's before the writing of the Muratorian canon (c.170 A.D.), which quotes its first verse. Irenæus, Clement of Alexandria, and Tertullian all speak of it as by John. That Marcion and possibly the Alogi did not accept it was due to dogmatic, not historical, reasons. If this strong chain of ancient testimony is to be accepted, we are brought to the same general date and situation as that with which the Fourth Gospel (see JOHN, GOSPEL OF) is concerned. A comparison of the vocabulary, leading ideas, and other characteristics of the Epistle with the Gospel has led the majority of scholars (H. J. Holtzmann, P. W. Schmiedel, and a few others are exceptions) to conclude that the two are products of the same mind and hand. A more difficult question is that of the respective dates of the two writings. There are no data at hand to decide this, but most scholars think that the Epistle is later than the Gospel. All that can be said with confidence is that during his sojourn in Asia the writer of the Fourth Gospel sent this message to a circle of believers (not necessarily to the church in Ephesus), with many of whom he was well acquainted, and by whom he was looked up to as a spiritual father, to warn them against dangerous views concerning Christ, and to impress upon them that faith in Christ must manifest itself in love and in a life separate from sin. Around those fundamental thoughts the whole Epistle revolves in a peculiar epigrammatic style, of great external simplicity, yet singularly rich and comprehensive in thought. The teachings antagonized contradicted the most important elements of Christian doctrine taught by the apostolic church. Whether they can be assigned to Cerinthus, the Ephesian heretic, we cannot decide.

The Second and Third Epistles. Unlike 1 John, the Second and Third Epistles have the formal address and signature of ordinary letters. The second is addressed to the "elect lady and her children." It is a question whether this designation indicates a person or a church. If the statement in 3 John 9, "I have written something to the church," refers to 2 John, it is decisive in favor of the former interpretation. On this hypothesis the relation between the two Epistles would be that of a general message to a church (2 John) supplemented by a more private note to an influential member, Gaius (3 John). The contents of the two accord well with this view. The letter to the church praises it for its faithfulness, exhorts to the exercise of mutual love in obedience to the command, warns against those who deny Jesus, the incarnate Messiah, and urges that they have no fellowship with such. It closes with a notice of the writer's intention to visit them soon, and a salutation from the sister church with which the writer was at the time. In the Epistle to Gaius, the elder commends his hospitality to missionary preachers, takes notice of the self-assertion of a certain Diotrephes whom he will bring to terms when he comes, recommends the imitation of the good, praises one Demetrius, and closes with a notice of his expected visit and the usual salutations.

The two Epistles thus seem to be companion letters. Should the address "elect lady" in 2 John 1 be taken to mean an individual, no connection between the two can be posited, except on the basis of a general similarity of style, and the fact that they have been associated in Christian tradition from ancient times, though their early history is obscure. Irenæus (c.180 A.D.) quotes 2 John 11 as a statement by John the disciple of the Lord. The Muratorian canon

(c.170 A.D.) speaks of two Epistles of John after mentioning 1 John; but whether the reference is to 2 and 3 John or to 1 and 2 John is somewhat uncertain. Apparently Clement of Alexandria (c.200 A.D.) was acquainted with 3 John as well as with 1 and 2 John. Origen (c.225 A.D.) says that in his day doubts were expressed regarding their authorship. These doubts persisted, though their cause is not exactly known. Jerome assigned the Epistles positively to the Presbyter John, not to the Apostle. No quotation from 3 John has been discovered in the most ancient Christian writers, and external evidence for it before Origen is lacking. The tradition that the two Epistles were written by the Apostle is supported by the similarity in style, vocabulary, and thought to 1 John. The title Presbyter or Elder in 2 and 3 John is not inconsistent with authorship by the Apostle John, since Peter (1 Peter v. 1) speaks of himself as a "fellow elder." If the "Elder" or "Presbyter" John, mentioned by Papias, was some other one than the Apostle, it is, of course, possible that the letters were written by him, though many scholars continue to identify him as the Apostle. In the nature of the case the date, place of writing, and destination cannot be fixed.

Bibliography. In addition to the works cited under the article JOHN, GOSPEL OF, consult the commentaries of William Alexander (New York, 1881), Alfred Plummer (Cambridge, 1886), B. F. Westcott (3d ed., London, 1892); and especially the full discussions by M. W. Jacobus, in the *Standard Bible Dictionary* (New York, 1909), James Moffat, in his *Introduction to the Literature of the New Testament* (ib., 1911), and A. E. Brooke, in the *International Critical Commentary* (ib., 1912).

JOHN, yōn, EUGENIE. The name of the German author who wrote under the pseudonym E. Marlitt (q.v.).

JOHN, GOSPEL OF. The Fourth Gospel, according to the usual arrangement of the New Testament books. In some ancient manuscripts, such as the *Codex Bezæ*, it stands in the second place, in others in the third, while in some circles it heads the list. Its usual position in ancient times was, however, the same as the present. The general character of this Gospel and the influence it has had upon the Christian thought render it perhaps the most conspicuous book of the Bible and have naturally attracted to it the supreme attention of critical scholarship.

Contents of the Gospel. In striking contrast to the first three (or Synoptic) Gospels, the Fourth Gospel states explicitly the apologetic motive controlling its author in writing it (cf. xx. 30–31). It is in the light of this statement that the outline of its contents should be constructed. Understanding, then, that the author intended so to depict the person and work of Jesus that saving faith in him as the Son of God would result to his readers, the contents may be outlined as follows: *The Prologue* (i. 1–18), in which the profound significance of the historic Christ is set forth: he was the divine Logos incarnate, the life and light of man, who alone has revealed God, but who, when he came to "his own," was not received, though to receive him makes one a child of God. In the Prologue we find the fundamental ideas which the history following is intended to illustrate and prove—the divine glory of Jesus, the nature of the reception accorded him, faith on the part of some with its necessary results and unbelief on the part of others, and the significance of it all for the world.

The Main Narrative, which extends from i. 19 to xx. 29, opens with the events at the Jordan (i. 19–51), where the Baptist makes his confession to the Jerusalem delegation (i. 19–28) and bears his testimony to Jesus before his own disciples (i. 29–36), resulting in the gathering around Jesus of the beginning of a discipleship based on the attractions of a personal acquaintance with him (i. 37–51). This is followed by Jesus' return to Galilee, including the incident of the marriage at Cana, where his glory is displayed and his disciples' faith in him is deepened (ii. 1–12). There is then begun the record of *a series of visits to Jerusalem*, with the miracles and discourses accompanying them, which appears to form the general scheme on which the narrative is framed.

The *first visit* occurs at the Passover following the above return to Galilee (chap. ii). During the feast Jesus discloses himself to the Jerusalem populace as a reformer zealous for the purity of the temple worship by driving out the traders from its courts. The result of this action is an official inquiry as to his authority for such boldness, to which Jesus replies with a challenge to the materialism exhibited in this commercializing of the house of God, predicting a spiritual religion in place of that which they have so grossly degraded (ii. 13–22). The result of his stay in the city is a sort of halfway belief in him on the part of many (ii. 23), of whom Nicodemus is presented as a type, and Jesus' conference with him as representing the noncommittal attitude which Jesus assumed in response to it (ii. 24–iii. 21). Jesus then withdraws into Judæa to a region in the neighborhood of the Baptist's work and carries on a ministry which attracts many to his following, resulting in jealous queries on the part of John's disciples, which were answered with a renewed testimony of John to Jesus (iii. 22–30). The attention of the Pharisees being drawn to the extension of Jesus' work among the people, Jesus returns to Galilee, passing through Samaria, where he has his interview with the woman at the well and wins a general faith from the people of her village (iv. 1–42). On his arrival in Galilee he finds the people receptive to him, because of what they had witnessed of his works during his stay in Jerusalem (iv. 43–45). Coming again to Cana, he heals there the nobleman's son in response to a definite and distinctive faith on the father's part, which was deepened by the miracle and participated in by the entire household (iv. 46–53).

There then follows the *second visit* to Jerusalem, with its healing of the impotent man at the Pool of Bethesda and its following discourse to the people, who, however, are not only no more receptive to him than at the first visit, but, under the influence of their religious leaders, develop a hostility towards him that seeks his death (chap. v). Jesus is then represented as again in Galilee, where he feeds the multitude by the sea and, declining their enthusiastic effort to commit him to a programme of political revolution, returns to Capernaum, where, in a discourse that searches their religious materialism, he presents to the people his spiritual claims for himself and his work. The result of this discourse is depressing—many of

the people falling away from his following, and the disciples themselves renewing their allegiance in a spirit lacking all enthusiasm (chap. vi).

This experience in Galilee is followed by a *third visit* to Jerusalem, at the Feast of the Tabernacles, during which Jesus again discourses to the people, however, practically without any receptive response on their part, but with renewed hostility from the Pharisees and chief priests, culminating in an unsuccessful effort to arrest him (chap. vii). Omitting the incident of the woman taken in adultery (viii. 1–11), which has evidently been interpolated from outside sources, Jesus' teaching is continued. It results, however, in an increasing irritation on the part of the people, ending in an attempt to stone him, from which, however, Jesus escapes (viii. 12–59). In the following chapter there is a *further visit* to Jerusalem, where Jesus restores sight to the man born blind—the miracle developing a controversy between the man and the Pharisees which results in the ecclesiastical disowning of the man and the personal expression to Jesus of his worshipful belief in him (ix. 1–40). Whether the discourse given in the first 18 verses of the tenth chapter belongs to this incident or to a *later visit* at the Feast of Dedication (x. 22, 23), or whether the healing of the blind man took place at this later feast, may be open to debate; but Jesus' teaching, as given in this tenth chapter, rouses the people to added hostility and a renewed effort on their part to lay hands upon him (x. 1–39). Upon this, Jesus withdraws from the city to the other side of the Jordan, where he subsequently receives word of the illness of Lazarus and, *returning to Bethany* and finding him already dead and laid away in the sepulchre, brings him back to life (x. 40–xi. 44).

The result of this astounding miracle is a conviction of faith on the part of many and at the same time a council of the Pharisees to decide upon what was to be done to counteract the increased reputation which it had brought to Jesus (xi. 45–52). The issue of their deliberation is a determination to put Jesus to death (xi. 53). In consequence of this official resolve, Jesus withdraws to a small town a short distance from Jerusalem, where he tarries with his disciples until the time of the Passover Feast (xi. 54–57). Shortly before the feast he *comes back to Bethany*, where a supper is made for him in Lazarus' home. During the supper Mary anoints his feet with costly ointment, and, upon Judas' criticism of the extravagance of the act, he commends her for what she has done (xii. 1–8). On the following day he makes his public entry into the city, accompanied by a following whose enthusiasm depresses with a new irritation the hostile Pharisees (xii. 12–19). There is then narrated the incident of the Greeks at the feast, their desire to see Jesus, and the discourse to the multitude which their request prompts him to deliver—a discourse full of significant allusions to the fatal ending of his work which he already sees approaching (xii. 20–50).

In the narrative scheme of the Gospel this ends his public ministry. The remaining portion of the record is devoted to a disclosure of the intimate fellowship between Jesus and his disciples in the closing hours before his arrest. To this are devoted five chapters (xiii–xvii), the first describing the Last Supper—a meal which, according to this Gospel, preceded the Passover Meal. During this Supper Jesus makes announcement of the coming betrayal of himself by one of the disciple band and singles out Judas as the betrayer, though apparently without bringing the other disciples to a realizing sense of what he meant. Chapters xiv–xvi are then devoted to a record of Jesus' farewell words to the disciples. These are followed by an intercessory prayer, with which the meal is apparently closed. Then comes the narrative of Jesus' arrest by the band led by Judas and the taking of him away to Annas and the high priest Caiaphas for examination, along with which is given the story of Peter's denial (xviii. 1–27). The remainder of this and the first part of the following chapter record the arraignment of Jesus before Pilate, his examination by the Governor, that official's effort to free the Prisoner, and his final surrender to the insistent demand of the chief priests, supported by the now hostile multitude, that Jesus be put to death (xviii. 28–xix. 16). Then follows the narrative of the crucifixion and the hasty entombment (xix. 17–42). The closing chapter gives the visit of Mary Magdalene to the tomb on the first day of the week, her discovery that it was empty, and her hasty report of the fact to Peter, with the hurried repairing of that and "the other disciple whom Jesus loved" to the sepulchre and their return to the city, mystified at the fact which they could not but believe, the appearance of Jesus to Mary after they had left, and his subsequent disclosure of himself to two gatherings of the disciples as they were met together secretly in the city for fear of the Jews (xx. 1–29). The last two verses of this chapter (30 and 31), giving as they do the motive for the preceding narrative of the Gospel, show that the following chapter, with its narrative of the meeting of Jesus with the disciples at the Sea of Tiberias, is an appendage to the Gospel (xxi. 1–23). This added chapter itself is closed with an assurance on the part of those who published the Gospel as to the reliability of the record, with the impression of the writer representing them as to its relation in extent to the whole of Jesus' ministry (xii. 24–25).

This is the arrangement of the contents as we have them in the Gospel before us. That this arrangement is not the original one, however, is evident from some obvious misplacements of the material, whether due to accident or to faulty editorial work—e.g., chapter v is properly to be inserted before vii. 15; vii. 1–14 and viii. 12–20 before vii. 25; vii. 37–44 after vii. 52; xii. 36b–43 after xii. 50; chapters xv and xvi either after xiii. 20 or after the introductory words of xiii. 31, bringing chapter xiv at the close of the valedictory remarks and immediately preceding the intercessory prayer of chapter xvii; xviii. 19–24 after xviii. 13.

The narrative, however, whether in its present or its original arrangement, is in marked contrast with what we find in the first three Gospels and, apart from the character of the contents, naturally arouses the attention of scholarship.

Criticism of the Fourth Gospel. The main question to which this Gospel gives rise is, Can it be considered an historical source for our knowledge of Jesus Christ? The Gospel gives no indication of its authorship, beyond some veiled allusions to one of the disciples, which, however, are of a significant character. They

occur at xiii. 23, xix. 26, xx. 2, xxi. 7, 20, and refer to the disciple as "the disciple whom Jesus loved." This phrase is either the author's way of referring to himself or the editor's way of describing him; in either case, as it is generally conceded, it is intended to identify to the readers the writer of the narrative. Such a phrase naturally could be used only of one of the three disciples whom Jesus had taken into his intimate companionship—Peter, James, or John. Of these, however, Peter is excluded, because of his definite naming in some of these passages along with this peculiarly described disciple (xiii. 23 f.; xx. 2–10; xxi. 7, 20–23; cf. also xviii. 15 f.). James also is excluded because of his early martyrdom (Acts xii. 2, 44 A.D.), which occurred before there was any possibility of this Gospel having been written. John alone remains, and, while he is nowhere else referred to by this description, it is significant that he is found in such companionship with Peter in the life of the Jerusalem church (Acts iii. 1–11, iv. 1–22, viii. 14; cf. also Gal. ii. 9) as would correspond with the companionship of Peter and this described disciple in our Gospel (see above passages; cf. also Luke xxii. 8). The question becomes, therefore, whether the Apostle John could have written this Gospel. In a careful study of the narrative several things become evident. Among the most obvious is that the writer's knowledge of contemporary Judaism and of Palestine is remarkable. He shows himself perfectly at home in regard to numerous details of Jewish national affairs (xviii. 19, 24, 31; xix. 7), Jewish parties (vii. 45–52; xi. 49), Jewish customs (x. 22 [cf. 1 Macc. iv. 59]; vii. 2–13; iv. 45; vii. 37; xix. 31, 42; xviii. 28; xi. 55–57, ii. 1 ff. [cf. iii. 39]; xi. 44; xix. 39 f.), Jewish prejudices (iv. 9, 27; vii. 15, 49), and Jewish Messianic hopes (chap. vii). He has also an intimate knowledge of the topography of Palestine (e.g., i. 28; ii. 1, 11; iii. 23; xi. 54; iv. 5 f., 11, 20; vi. 19, 22–25) and of Jerusalem (e.g., iii. 20; v. 2; viii. 20; x. 23; xviii. 1; xix. 13, 41). Besides this, he is sufficiently acquainted with the Hebrew text to correct the Septuagint rendering of his quotations by the original reading, e.g., the citation from Zech. xii. 10 (xix. 37) and that from Ps. xli. 9 (xiii. 18); while his style bears throughout the Hebrew stamp and betrays a Hebrew influence. These facts can only be accounted for on the supposition that the writer was a Jew of Palestine by birth and education. It is almost inconceivable that a Gentile could have written as he did. At the same time he was a Jew whose break with formal Judaism was complete. He was no longer a Jew at heart. It may be said further that the Gospel seems to have been written by one who was an eyewitness of many of the events he recorded. Attention has often been called to the fact that the references to persons, such as Peter, Philip, Thomas, Judas Iscariot, Pilate, Mary, Martha, and others, brief as they are, betray the impressions made by such persons on one who had seen or heard them. They are remarkably lifelike and tally exactly with what is known of them from other sources. Many incidental touches in the narrative, such as "Jesus sat thus on the well," "it was about the sixth hour" (iv. 6), are best explained as due to personal experience. In addition to such incidental indications of authorship by an eyewitness, there are express statements to the same effect. In i. 14 it is said, "and we beheld his glory." This "we" seems to mean the author addressing his readers. We also at xix. 35 find brief notices by another hand, "he that hath seen hath borne witness and his witness is true, and he knoweth that he saith true, that ye also may believe," and at xxi. 24 that "this is the disciple that beareth witness of these things and wrote these things, and we know that his witness is true." It appears, then, that the work claims to be derived either wholly or in part from written records of an eyewitness. From the last citation it is evident that the claim is that the disciple mentioned in the immediately preceding section (xii. 15 ff.), i.e., the disciple whom Jesus loved, is the witness and recorder referred to. That is, the Gospel proper, which closes with xx. 31, and possibly the additional narrative of xxi. 1–23, were derived from the written and oral testimony of this disciple. As to the *date* of the Gospel, apart from whether the last chapter was written by the author or by another hand or hands, the maturity of the Gospel's thoughts, as seen in the selection of its material, is evidence of the lateness of the writing. For it is difficult to account for such selection, except in the author's times; while the advance which the Gospel's thought shows upon that of the Synoptics finds its natural explanation in the advance of the thought of the Church, which must have progressed with an advance in the age.

There is nothing to determine the *place* of the Gospel's writing, except in so far as the lateness of its date would indicate most probably a place outside of Palestine. As to the *purpose* of the writing, it is clear that the author had no intention of producing a history—for the narrative is too meagre for that—nor of presenting a biography—for all we get is but occasional glimpses of Jesus' life. The closing verses of chapter xx show us that the author's purpose was purely religious—to bring out the personality of Christ as it had impressed itself upon the author's own spiritual life. From all this study of the Gospel's contents it is clear that they confirm rather than contradict an authorship by the Apostle John.

Turning now from the Gospel to the records of the early Church, the facts are these: Writers of the period 170–200 show great familiarity with the Gospel, quoting it frequently and often speaking of John the Apostle as the author. In addition to this there are several explicit statements of importance. Irenæus (c.130–200), whose early home was in Asia Minor, declares that it was by John the Apostle, who spent his last years in Ephesus and there wrote the Gospel to counteract the teachings of Cerinthus (q.v.) (*Adv. Hær.*, ii, 22, 5; iii, 1, 1; iii. 4; xi. 1). Polycrates, Bishop of Ephesus, in a letter to Victor of Rome (c.190), speaks of John, "who reclined on the breast of the Lord," as buried in Ephesus. Polycarp (born or converted about 69 A.D., martyred 155), Bishop of Smyrna, was known to Irenæus, who as a youth heard him tell of his intercourse with John and others who had seen Jesus (Eusebius, *Hist. Eccles.*, v, 20). In such statements we have the testimony of personal experiences carrying us back to John himself. Justin Martyr, writing c.150, who had already spent some time in Ephesus, uses the Gospel as one of the apostolic memoirs, but says nothing about it in particular. Evidence for the existence and use of the Gospel before Justin is not entirely lacking, though not

altogether certain. It is likely that it was known to Ignatius of Antioch (c.110–115), to the writer of the Epistle to Barnabas (c.125), and to the early Gnostic Basilides (c.125). External evidence, then, quite clearly points to the existence of the Gospel soon after 100 A.D., assigns it to John, and indicates Ephesus as the place where it was written. The general bearing of the external testimony is therefore confirmatory of the favorable bearing of the internal evidence to the effect that the Fourth Gospel was written by the Apostle John, late in life, at Ephesus in Asia Minor.

Nevertheless, by some modern critics this view is pronounced untenable. The more important reasons for such an opinion are: 1. The character of the teachings in the Fourth Gospel and the representation there given of Jesus' life and words are, on the one hand, so different from what we have in the first three Gospels, and, on the other hand, fit in so well with the doctrinal developments of the first half of the second century, that it seems necessary, apart from the question of authorship, to consider it a product of early second-century thought. Such a position practically necessitates giving up the Johannine authorship. 2. The evident use made of the Synoptic Gospels by the Fourth Gospel does not accord with apostolic authorship of the latter. 3. The vagueness in the recorded tradition of Asia Minor makes it possible that it was John "the Elder," rather than John the Apostle, who worked there, and that soon after his death, by an easy confusion, much of his activity was ascribed to John the Apostle, who may not have lived in Ephesus at all. 4. Certain particulars in the history of Christianity in Asia Minor, especially the appeal of Polycarp to the authority of John in the quartodeciman controversy, which is said to contradict the statements in the Gospel, show that early in the second century the Gospel was not recognized in that region as of apostolic origin.

The latter two of these arguments rest on such uncertain grounds that much weight should not be attached to them. The quartodeciman controversy in its early stages was concerned with the question of the proper time to begin the observance of Easter, the Christian Passover, and did not touch the question of the particular day of the month when Jesus ate the Last Supper. Polycarp claimed that John had taught them to celebrate the Passover regularly on the 14th of Nisan, the usual Jewish day. Even if, with many, we should hold that the Fourth Gospel places the Last Supper on the 13th of Nisan, Polycarp might easily have made his appeal to John and also considered him the author of the Gospel. The third argument presents a possibility, but not a probability. It may be said with confidence that such a confusion of ideas among men who had personal knowledge of the facts is altogether unlikely. It does not appear to have been noticed by the advocates of this theory that the confusion of John the Presbyter and John the Apostle must have antedated the Gospel itself; for not only xxi. 1–23, but the whole book, rests on the supposition or claim that the Apostle John is its authority. But this involves improbabilities that are fatal to the supposition. There must have been substantial reasons for the claim of the Gospel to be Johannine and for the ready acceptance of it as such by the leaders of the church in Asia Minor. In fact, for the residence in Asia of another so-called Presbyter John we have really no proof whatever.

There remain, however, the first two objections noted above. What is to be said regarding them? That the discourses of the Fourth Gospel are different from those of the Synoptics is not to be denied. Not only do they substitute an allegorical form of statement for the parabolic form so characteristic of Jesus' teachings in the Synoptics, but they almost exclusively substitute Jesus himself as the subject of the discourse in place of the varied and practical topics of the Synoptic talks, while they treat this self subject almost exclusively at the point of Jesus' divinity and his relation to the unseen world (cf. chaps. i–iii, v–viii, x–xvi). In the consideration of these facts it seems as though there should not be ignored the difference in the surroundings in which these two sets of discourses were delivered, the difference in the audiences to which they were spoken, and the difference in the narrators by whom they were reported. There can be no question that there was a development in Jesus' ministry, both in the conditions to which it was subjected and its adjustment to those conditions. It would hardly seem possible that over against this Jesus' teachings should be the same in content and form throughout his ministry. In fact, had the Synoptics represented him as delivering to the peasants of Galilee, who were largely loyal to him, and during the early practical period of his work, the same sorts of discourses on the same sorts of themes as the Fourth Gospel represents him as delivering to the speculative scribes and Pharisees of Jerusalem, who were largely hostile to him, and during the later controversial period of his work, the credibility of the Synoptics would have been justly called in question. And the same suspicion would have been aroused against the Fourth Gospel had it represented Jesus as delivering to the religious leaders of Jerusalem, at the close of his ministry, the same sorts of discourses as the Synoptics represent him as delivering to the country folk of Galilee at its beginning. As a matter of fact, to the extent that the Synoptic discourses are suited to the Galilean crowds and the circumstances of the Galilean work, and the Fourth Gospel discourses to the people and leaders of Jerusalem and the circumstances of the Jerusalem work, to that extent are both sets of discourses supposable.

It is significant that the only discourse which Jesus is represented by the Fourth Gospel as delivering outside of Jerusalem and to a Galilean audience so effectually confused and confounded those who heard it that it practically ended Jesus' successful work in that region. It is quite likely that had Jesus delivered to his Jerusalem audiences a discourse characterized with the beatitudes and the homely phrases of the Sermon on the Mount, it would have been as lost upon their ears as the discourse of the sixth chapter of John was upon those of the Capernaum people. It is no objection to this line of argument to say that the discourse of chapter v was delivered in Jerusalem during the early part of his ministry; for with the right placing of the chapter after the sixth chapter it takes its place with the other discourses of his later Jerusalem work.

And, further, there is the question of the personal qualifications and capacities of John—what he was able to produce. To say that the

theology or philosophy of the book is such that John could not have written it, is to take a purely hypothetical and even arbitrary position. We do not know, and have no means of knowing, what John could have produced. Some one wrote the book, and he was a gifted man. He may as well have been John as any other Christian Jew. That the book marks a stage of thought supplementary to the primitive apostolic and Pauline developments is frankly admitted. If it was by John, it simply reflects the growth of his own religious experience. He had lived close to the Master, he had seen the origin and progress of the Church, he had known Paul, and at last he had lived for some time in the speculative atmosphere of Ephesus. This book gives his final judgments, his memory of Jesus, his impressions of him after these years of experience.

Finally, there is the question of the narrative relation of the Fourth Gospel to the first three. This demands very careful consideration. There can be no doubt of the fact that it was written on the supposition that its readers were acquainted with a Gospel history substantially identical with that in the Synoptics. Its own record is fragmentary and presupposes many things as well known. At the same time its attitude towards this already current history is one of independence. In fact, it is being discovered that at several important points the Fourth Gospel supplies data by which alone the Synoptics can be rightly understood. There is, e.g., in the Synoptics no explanation of why Jesus suddenly gave up his successful work in Galilee to draw aside into that period of retirement in the regions of Tyre and Sidon and the Decapolis. It is a puzzle, apart from the information given us by the Fourth Gospel of the collapse of his Galilean work (chap. vi) and the murderous hostility of the religious leaders in Jerusalem (chap. v). More than this, the Synoptics are not always historically reliable. It is the Fourth Gospel, and not the Synoptics, which gives us the correct statement as to when the Last Supper was had with the disciples. The old contention that either the Synoptics or the Fourth Gospel must be taken as genuine is being abandoned by scholars today, and the conviction is growing that with proper allowances both may be historically accepted.

General Conclusions. In view of all the facts of the case, the Fourth Gospel may be said to be the work, in substance at least, of the Apostle John, written towards the end of his life at Ephesus primarily for Christian circles, to give them an adequate conception of Jesus. The work was written when speculation was rife. Gnosticism was beginning to manifest itself. Terms such as "Logos," adapted from Alexandrian Jewish philosophy, were being used in Christian circles. The central truths of Jesus' unique personal significance were in danger of being obscured. To counteract such teachings John wrote his Gospel, prefacing it with the Prologue, in which he stated his conviction that the one truth that gave life and reality to ideas and speculation concerning the Logos was this, that Jesus Christ was the Logos incarnate, in whom grace and truth, the fullness of the knowledge of God, was manifest and placed within man's reach. The Gospel so written concluded with xx. 31 and may have been known for a time to a limited circle without the concluding chapter. But later, possibly not long before John's death or very soon after the work was published, and in order to correct a wrong impression concerning Jesus' words to Peter in reference to John, the last chapter was added, concluding with the guaranty of the Apostle's authorship of the entire work. No sooner was the work known than it met with acceptance, copies quickly finding their way all over the Christian world. A small sect, later called the Alogi, objected to it, not because they had any more correct knowledge of its origin, but because of its teachings, ascribing it to Cerinthus, according to tradition a bitter opponent of John in Ephesus. By 160–170 it was known and used along with the earlier three Gospels throughout the Christian Church.

Bibliography. The literature of the Fourth Gospel is very extensive. Fairly complete lists will be found in Luthardt, *Saint John, the Author of the Fourth Gospel*, translated by Gregory (Edinburgh, 1875), and in Watkins, *Modern Criticism Considered in its Relation to the Fourth Gospel* (Bampton Lectures, London, 1890). Besides the *New Testament Theologies* of Weiss, Beyschlag, Holtzmann, Stevens, and Feine; the works on the apostolic age by Lechler, Hausrath, Weizsäcker, Bartlett, McGiffert, and Ropes; the *Commentaries* of Meyer, Weiss, Godet, H. Holtzmann, O. Holtzmann, Westcott and Zahn; the various *Lives of Christ*, and the larger *Introductions* to the New Testament, especially those by Weiss, H. Holtzmann, Salmon, Jülicher, Zahn and Moffatt, attention may be called to J. B. Lightfoot, *Essays on Supernatural Religion* (London, 1889); Ezra Abbot, *External Evidence of the Fourth Gospel* (New York, 1891); J. B. Lightfoot, *Biblical Essays* (London, 1893); Lowrie, *Doctrine of Saint John* (ib., 1899); Wendt, *Gospel According to John* (trans., New York, 1902); Stanton, *The Gospels as Historical Documents*, part i (Cambridge, 1903); Drummond, *Character and Authorship of the Fourth Gospel* (New York, 1904); Sanday, *The Criticism of the Fourth Gospel* (Oxford, 1905); Scott, *The Fourth Gospel: Its Purpose and Theology*, in "The Literature of the New Testament Series" (Edinburgh, 1906); Bacon, *The Fourth Gospel in Research and Debate* (New York, 1910); Lewis, *Disarrangements in the Fourth Gospel* (Cambridge, 1910); with articles by Inge and Brooke in *Cambridge Biblical Essays* (London, 1909). See De Boor Fragment.

JOHN, Griffith (1831–1912). A Welsh missionary, born at Swansea and educated at Brecon College, Bedford. He began preaching when only 14 years old, volunteered to serve as a missionary under the London Missionary Society in 1853, and two years later arrived in China. The first five years were spent in evangelical work around Shanghai; he then traveled extensively in central China and went to Hankow in 1861. With his associates he established more than 100 missionary stations in Hupeh and Hunan provinces. His most important work, however, was the translation of the New Testament and the greater part of the Old Testament into Chinese in what is known as the *Wen-li Version*. He established the first Protestant missions in the Yang-tse valley and the theological college that bears his name and published many books and tracts in Chinese. Consult William Robson, *Griffith John, Founder of the Hankow Mission, Central China* (London, 1888).

JOHN, Revelation of Saint. See Revelation of Saint John.

JOHN, Sir William Goscombe (1860–). A Welsh sculptor. He was born at Cardiff and as a youth assisted his father, a wood carver, in the restoration of Cardiff Castle. He went to London in 1882 and studied at the Lambeth Art Schools under Dalou and Frith and afterward at the Academy schools, where he won the gold medal and a traveling scholarship in 1887. In 1890–91 he studied in Paris. His art usually strives to reproduce the severe dignity of the Gothic style and excels in skillful and delicate modeling. Among the best of his ideal works are "Morpheus" and "St. John the Baptist" (Cardiff Gallery); "The Elf" (Glasgow Gallery); "Boy at Play" (Tate Gallery); "Study of a Head" (Liverpool Gallery). His portraits, which are faithful likenesses, include the seated statue of the Duke of Devonshire, at Eastbourne; King Edward VII, at Cape Town; Prince Christian Victor, at Windsor; the historian Lecky, at Trinity College, Dublin, and an equestrian statue of the Earl of Minto, at Calcutta. Among his memorial monuments are those to the Marquis of Salisbury, in Westminster Abbey and Hatfield Church; to Sir Arthur Sullivan, in St. Paul's Cathedral, and to the Coldstream Guards and War Correspondents, also in St. Paul's. John received a gold medal in Paris in 1901, was made a Royal Academician in 1909, was knighted in 1911, and became corresponding member of the French Institute.

JOHN A. GRINDLE, or Johnny Grindle. A quaint name in the Mississippi valley for the curious fish the bowfin (*Amia calva*), also called lawyer. See Bowfin.

JOHN ANDERSON, MY JO. 1. A touching ballad by Robert Burns. 2. An old Scottish song, a dialogue between a man and his wife ridiculing popery.

JOHN BROWN'S BODY. One of the most frequently sung marching songs of the Civil War. The melody is said to have been heard in a Southern colored church and fitted to the words, "Say, brothers, will you meet us?" at a meeting of the Young Men's Christian Association held at Albany about 1860. The music was set to the words of the first stanza by James E. Greenleaf, and the other stanzas were written by C. S. Hall, of Charlestown, Mass., in 1861. Consult H. K. Johnson, *Our Familiar Songs and Those who Made Them* (New York, 1881).

JOHN B. STETSON UNIVERSITY. A coeducational institution founded at De Land, Fla., in 1887. It has a preparatory department, a college of liberal arts, schools of law, technology, music, and art, a normal school, and a business college. It confers the degrees of bachelor of arts, philosophy, science, and laws, and of mechanical, civil, and electrical engineer. The university has a campus of 35 acres and well-equipped modern buildings, in large part the gifts of John B. Stetson, valued at $300,000. Its endowment funds amounted in 1914 to over $1,000,000, and its income to $40,000. It has a library of more than 24,000 volumes. In 1913–14 its students numbered 469, of whom 224 were enrolled in the collegiate department. The number of professors and instructors was 37. The president in 1914 was Lincoln Hulley, Ph.D., LL.D.

JOHN BULL. See National Nicknames.

JOHN BULL; or, The Englishman's Fireside. A comedy by the younger Colman (1805).

JOHN CASIMIR (1543–92). Count Palatine of the Rhine, the fourth son of Elector Palatine Frederick III, born in Simmern. He was reared at the French and Lotharingian courts, and joined the Calvinist church at the same time as his father. He at various times (1575–78) led troops into France to aid the Huguenots and into the Netherlands to aid the Dutch, but achieved little fame as a soldier. On the death of his brother he became Regent of the Palatinate during his nephew's minority and made his Protestant subjects adopt the Calvinist creed—the third time in 10 years they had been forced to change.

JOHN CHINAMAN. See National Nicknames.

JOHN COMPANY. A nickname for the East India Company, originating probably in India, in the eighteenth century.

JOHN CRESCENTIUS. See Crescentius, John.

JOHN CROW. The name in Jamaica and the British Antilles for the turkey buzzard vulture (*Cathartes aura*).

JOHN DAMASCENE. See John of Damascus.

JOHN DORY. The English name of a small group of singular fishes found in the warm seas of the Old World. One species (*Zeus faber*) is well known in the Mediterranean as a food fish, but is uncommon in the Atlantic. Its ugly and extraordinary form is shown in the accompanying illustration. The body is greatly compressed, and the total length rarely exceeds 20 inches. The bony jaws can be widely opened, so that surprisingly large objects may be swallowed, and the fish is active in pursuit of its prey (other fishes), though sluggish at other times. Its body scales are very small, but it is armed with strong fin spines and has a row of large spinous scales along the base of the dorsal fin and in front of the pectorals. The color is usually a pale olive brown, with a large circular spot

JOHN DORY.

nearly black on the middle of the side. Various legends account for this spot. One declares this to be the fish which St. Peter caught in the Lake of Gennesaret and marked with his thumb and finger while taking the tribute money from its mouth; another that the mark was similarly made by St. Christopher, who seized one of these fishes while carrying Jesus through an

arm of the sea. Its flesh is highly esteemed in Europe. Several related species occur in the deeper tropical seas, and all constitute a group of very uncertain affinities.

JOHN FREDERICK I, THE MAGNANIMOUS (1503–54). Elector of Saxony from 1532 to 1547. He was the son of the Elector John the Constant and was born at Torgau, June 30, 1503. In 1532 he succeeded his father in the government conjointly with his brother Ernest, with whom, however, he concluded a partition settlement in 1542, ceding to him the Principality of Coburg. He was from the first an ardent champion of the Reformed faith. With Philip of Hesse he became one of the leaders of the Schmalkaldic League (q.v.), and as such was placed by Charles V under the ban of the Empire in 1546. He successfully defended his territories against an invasion by his cousin, Maurice of Saxony, in the same year; but on April 24, 1547, the army of the Schmalkaldic League was defeated at Mühlberg, and John Frederick fell into the hands of the Emperor. Sentence of death was pronounced on the prisoner, and he was compelled to cede his possessions, together with the electoral title, to Maurice. For five years John Frederick remained in captivity, until, together with Philip of Hesse, he was liberated by the sudden uprising of Maurice against Charles V. The death of his brother Ernest in the same year (1552) placed him in possession of Coburg. He died in 1554. The foundation of the University of Jena was largely due to his patronage.

JOHN FREDERICK II (1529–95). Duke of Saxony, eldest son of John Frederick I. After his father's imprisonment, in 1547, he undertook, in conjunction with his brother John William and in the name of their younger brother John Frederick III, the administration of what remained of the territories of the Ernestine line. Soon after, in accordance with his father's wish, he founded the University of Jena. Upon the death of John Frederick III, in 1565, the two brothers divided their dominions, John Frederick taking Weimar and Gotha, and John William Coburg, who, in 1567, became sole ruler. In 1566, because of the protection which he had afforded the outlaw Wilhelm von Grumbach, he was himself outlawed by the Emperor, was captured in 1567, and was imprisoned until his death. His wife, Elizabeth of the Palatinate, lived with him during 22 years of his imprisonment. Consult Beck, *Johann Friedrich der Mittlere* (Weimar, 1858).

JOHN GEORGE I (1585–1656). Elector of Saxony from 1611 to 1656. He was born March 5, 1585; married Magdalene Sibylle, daughter of Duke Albert Frederick of Prussia, in 1607; and succeeded his brother Christian II as Elector of Saxony, June 23, 1611. The attitude of Saxony, as one of the most powerful of the Protestant states of Germany, was of great importance in the Thirty Years' War; but the course of John George was vacillating, and when he was giving nominal support to one side, he was generally negotiating with the other. When Gustavus Adolphus entered Germany, John George refused him passage across Saxony, and thus prevented the relief of Magdeburg, which was taken by Tilly, whose infuriated troops put most of the inhabitants to the sword. A little later, when Saxony was about to suffer from the advance of the Imperialists, John George concluded a hasty alliance with Sweden, and his troops were on the field of Leipzig or Breitenfeld (September, 1631), but fled early in the day. The Elector sought continually to bring about a peace advantageous to Saxony. In 1632, when Gustavus was in Bavaria, he sought to detach Brandenburg from the Swedish cause, and in 1635 he concluded the Peace of Prague with the Emperor, yielding practically all that the German Protestants had fought for and agreeing to endeavor to secure the general acceptance of the terms. His reward was the hereditary possession of Lusatia. Only Brandenburg and some of the minor states acceded. In 1636 the Saxons were defeated by Banér at Wittstock, and in 1645 the Elector was obliged to conclude an armistice with Sweden. By the Peace of Westphalia he was confirmed in the possession of Lusatia and the bishoprics of Meissen, Merseburg, and Naumburg. John George died Oct. 8, 1656. How much of his changeable and treacherous policy was due to himself, and how much to the intrigues of his most trusted counselor, Von Arnim, it is difficult to determine. His will established three ruling Saxon lines for his sons, in addition to electoral Saxony—Saxe-Weisenfels, Saxe-Merseburg, and Saxe-Zeitz. See ARNIM; GUSTAVUS ADOLPHUS; SAXONY; THIRTY YEARS' WAR.

JOHN GEORGE II (1613–80). Elector of Saxony from 1656 to 1680. He was the son of John George I and was born in 1613. Subsidies received from France in the early years of his reign (against the will of a majority of his subjects) enabled him to gratify his tastes, which were more to him than his crown, and to make Dresden one of the most beautiful cities and art centres of Europe.

JOHN GEORGE III (1647–91). Elector of Saxony from 1680 to 1691, only son and successor of John George II. He took a prominent part in the war between the Empire and Louis XIV of France, which broke out in 1688, and in 1690 was made commander of the Imperial army. One of his sons became King of Poland.

JOHN GEORGE IV (1668–94). Elector of Saxony from 1691 to 1694, son and successor of John George III. He continued the policy of his father during his short reign of three years, maintaining an alliance with Brandenburg and the Emperor, although he maintained an independent attitude towards the latter, which frequently resulted in trouble. As a matter of state policy he married Eleonore, Margravine of Brandenburg-Anspach, but his life is chiefly interesting for the story of his romantic attachment for Magdalene Sibylle von Neitschütz, who was created Countess of Rochlitz by the Emperor.

JOHN GILPIN. The hero of a famous humorous ballad of the same title by William Cowper (1782).

JOHN HALIFAX, GENTLEMAN. A novel by Dinah Mulock Craik (1856).

JOHN HYRCANUS. See HYRCANUS.

JOHNITE. See EXPLOSIVES.

JOHN MARCH, SOUTHERNER. A novel by G. W. Cable (1894). It appeared as a serial in *Scribner's Magazine.*

JOHN NE'POMUK SALVA'TOR, ARCHDUKE OF AUSTRIA (1852–?1891). He was born in Florence, the youngest son of the Grand Duke Leopold II of Tuscany. He entered the Austrian military service and rose through the various ranks to that of major general commanding a division. In 1883 he was transferred to Linz as a punishment for having published a pamphlet

entitled *Drill oder Erziehung?* in which he expressed himself too sharply in opposition to the commander in chief, Archduke Albert. The government was still more irritated when he, as it was asserted, intrigued to have himself appointed successor to Prince Alexander of Bulgaria, on the latter's enforced abdication. Soon after this he was deprived of his military command and left the army. He then studied navigation, passed the examination for ship's captain, and in October, 1889, after having renounced all his titles, rights, and privileges as an archduke, took the name of Johann Orth (from the name of his castle). The next summer he left Hamburg for Buenos Aires, on board his newly purchased sailing ship *Sankt Margaretha.* After touching at Buenos Aires, he continued his voyage in the direction of Valparaiso and never was heard from again. Numerous romantic stories have been told in connection with his strange disappearance, but the probability is that the *Sankt Margaretha* was wrecked on the coast of South America, and that all hands were lost. Besides his pamphlet already mentioned, he left two others on military subjects, *Betrachtungen über die Organisation der österreichischen Artillerie* (1875) and *Geschichte des kaiserlich-königlichen Linien-Infanterieregiments Erzherzog Wilhelm Nr. 12* (1877–80), and a third on spiritualism, entitled *Einblicke in den Spiritismus* (5th ed., 1885). In addition to these he wrote the text of the ballet *Die Assassinen.*

JOHN'NY (JEAN) **CRAPAUD,** krȧ'pō'. A Frenchman. See NATIONAL NICKNAMES.

JOHNNY DARTER. A fish. See DARTER.

JOHNNY GROAT'S HOUSE. See JOHN O' GROAT'S HOUSE.

JOHNNY REB. A nickname used of the Southern soldiers by the Federal troops during the Civil War.

JOHNNY VERDE, or JUAN VERDE. A numerous and excellent food fish (*Paralabrax nebulifer*) of the southern California coast. It is one of the cabrillas, about 18 inches long, mottled greenish in color, and has the general characteristics of a rock bass.

JOHN O' GROAT'S HOUSE (more correctly, JOHNNY GROAT'S HOUSE). A spot on Duncansby Head, the northeastern extremity of the mainland of Scotland, marking one of the limits of that country. Commemorated in Burns's line, "Frae Maidenkirk to Johnny Groat's," it is also widely known as the terminus of cycling and automobile record rides from Land's End, the southwestern extremity of England, a distance of 994 miles. The house stood on the beach at the mouth of the Pentland Firth and was probably built for the reception of travelers crossing the ferry to the Orkneys. Tradition gives a romantic origin. In the reign of King James IV (1488–1513) two or three brothers—Dutchmen named Groot or Scotch Lowlanders named Groat—settled in Caithness and acquired the lands of Warse and Dungansby. When their descendants had multiplied to eight families, disputes arose as to precedency at a yearly festival reunion. John Groat, one of the brothers, settled the controversy by building an eight-sided house, with a door and a window in each side, and an eight-sided table within, so that the head of each of the eight families of Groats might enter by his own door and sit at his own head of the table. The family of Groats still exists, but a small green knoll marked with the foundation lines is all that remains of John o' Groat's house. A neighboring hotel with an appropriate octagonal tower bears the name since 1876. The beautiful shell *Cypræa europæa,* which abounds in the neighborhood, is known as John o' Groat's bucky.

JOHNS, CLAUDE HERMANN WALTER (1857–1920). An English Assyriologist, born in Banwell, Somersetshire. He was educated at Queens' College, Cambridge; was ordained in 1887 after being a secondary-school teacher for seven years; was tutor at St. Peter's, Peterborough, in 1887–92; held the post of lecturer in Assyriology at Queens' College, Cambridge (1895–1909), and at King's College, London (1904–10); and in 1909 became master of St. Catharine's, Cambridge, and canon of Norwich. In his special field of Babylonian law he published: *Assyrian Deeds and Documents of the Seventh Century B.C.* (1898–1902); *The Oldest Code of Laws* (1903); *Babylonian and Assyrian Laws, Contracts, and Letters* (1904).

JOHNS HOPKINS UNIVERSITY. An institution of higher learning in Baltimore, Md., founded by Johns Hopkins (q.v.), who bequeathed over $7,000,000 for the establishment of a university and a hospital. The two institutions are closely affiliated, but each has its own funds and is controlled by a distinct board of trustees. The university was incorporated Aug. 24, 1867, several years before the founder's death, and in 1870 the first board of trustees was created. Early in 1874 the trustees began the work of organization and at the end of that year elected, as president, Dr. Daniel Coit Gilman, who entered upon his duties in February, 1876. Instruction in the department of philosophy began in October of the same year. Temporary buildings were provided in the heart of the city, and the location proved to be so convenient that the university has remained there. In May, 1889, the Johns Hopkins Hospital was opened, and the work of the Johns Hopkins Medical School was inaugurated in 1893. In 1902 a gift of an eligible site in the suburbs of Baltimore was made, and an endowment of $1,000,000 was presented to the university by the citizens of Baltimore. The development of this site was at once undertaken. A botanical laboratory and a greenhouse have been erected, and a fine athletic field is in use by the students. A general scheme of arrangement of the future buildings was adopted by the trustees as the result of a competition by selected architects, and the plans of the important structures were in 1914 either completed or in course of preparation. The academic building and a mechanical and electrical engineering building were occupied in 1914.

The university offers instruction to students of the following classes: 1. Under the faculty of philosophy: (*a*) college graduates and other advanced scholars (men and women) who may proceed to the degree of doctor of philosophy or of master of arts in literature or science, or pursue their studies for any length of time at their own discretion; (*b*) undergraduate students (men only) who are candidates for the degree of bachelor of arts: these may pursue one of five parallel groups of studies; (*c*) students who have taken no degree and who desire to pursue work in the university without aiming at academic honors. 2. Under the faculty of medicine: (*a*) candidates for the degree of doctor of medicine (men and women) for whom a four years' course is provided; (*b*) doctors of

medicine desiring to pursue special graduate courses. 3. In the department of engineering: graduates or undergraduates (men only) looking forward to the profession of engineer. The undergraduate college was organized to meet the needs of those desiring "a systematic discipline in liberal studies," and since 1876 over 2300 students have received the collegiate training. The undergraduate work is rendered effective by certain features of organization not found to the same degree elsewhere. These conditions include the sharp distinction drawn between the disciplinary methods appropriate for undergraduate instruction and the freer methods of advanced study; the group arrangement of studies; the opportunities offered to students of exceptional attainments for carrying on work beyond that required for any degree; and the influence upon younger pupils of the presence of a large body of graduate scholars engaged in specialized work in the various branches of learning. The most striking characteristics of the Johns Hopkins University, however, are the attractions offered to advanced students and the instruction given to them in seminaries and laboratories. These features were made the prime consideration at the inception of the university, at a time when the importance of university work did not receive its full measure of recognition in the United States. The first president succeeded in associating with him a small number of eminent specialists whose high standards and enthusiasm carried the new institution successfully through its experimental period and earned for it primacy in its field. For the encouragement of research among American students, the university annually awards a large number of fellowships and scholarships. Under the auspices of the university are published the *American Journal of Philology*, the *American Journal of Mathematics*, *Memoirs from the Biological Laboratory*, the *Studies in Historical and Political Science*, *Modern Language Notes*, *Hesperia* (devoted to Germanic philology), *Contributions to Assyriology and Comparative Semitic Philology*, and *Terrestrial Magnetism and Atmospheric Electricity*.

The government of the university is vested in a board of 12 trustees, with the president as an ex-officio member. In the philosophical department an academic council, consisting of the president and 10 professors, is in charge of the various departments of study and exercises the right of nominating the instructors and fellows. A board of university studies, consisting of the president, 37 professors, and 14 associate professors, has charge of the instruction of graduate students and of the examination of candidates for the degree of doctor of philosophy or of master of arts. A board of collegiate studies, consisting of the president, the dean of the college, and representatives from each of the chief departments of undergraduate study, directs the college work and conducts examinations for the baccalaureate degree. The Medical School, which is a department of the university and is at the same time closely connected with the Johns Hopkins Hospital, has had a most important influence on the recent advances made in medical education. The course extends through four years. For admission the bachelor's degree is required, or an equivalent course of preliminary training in the liberal arts, and especially in three branches of science—physics, chemistry, and biology. The principal buildings of the philosophical department are McCoy Hall, which contains the library, the chief assembly room, and numerous apartments for literary and historical studies; Levering Hall, devoted to the work of the Young Men's Christian Association; Hopkins Hall, devoted to geology and mineralogy; the Chemical Laboratory; the Biological Laboratory; the Physical Laboratory; the Gymnasium; and the Administration Building. The medical department is provided with five well-equipped laboratories: the Anatomical (known as the Women's Fund Memorial Building), the Physiological, the Pathological, the Clinical, and the Hunterian (for animal surgery). In 1913 the total value of the property under control of the university was $2,312,108, the endowment $5,969,000, and the gross income $377,689. The university has at various times received generous gifts, including one of $307,000 from Miss Mary E. Garrett, of Baltimore, supplementing a previous gift of $112,000 from women in different parts of the country, which enabled the trustees to open the Medical School (1893). Two general subscriptions for the benefit of the university have been made in Baltimore, amounting to nearly $350,000, in addition to the million-dollar endowment fund above referred to. In 1910 the General Education Board offered the sum of $250,000 if the university would secure an additional $750,000 within a specified period—half of the total to be available for buildings on the new site. The sum was oversubscribed within a few months by citizens of Baltimore and other friends. In 1912 the Legislature of Maryland appropriated $600,000 to establish a department of engineering, this sum to be used for buildings and equipment, and by the same Act an annual grant of $50,000 for maintenance was made. For two years the Legislature gave $50,000 per annum, $24,000 annually for the next two years, and $25,000 annually for the past 12 years, for current expenses.

The library contained, in 1914, 182,000 volumes, and more than 2300 periodicals are regularly received. The library supplements the valuable collections of the Peabody Institute, containing 211,000 volumes. The Maryland Geological Survey and the Maryland Weather Bureau are closely connected with the university, occupying rooms in the university buildings. In 1913–14 the faculty included 240 professors, associates, instructors, assistants, and lecturers. In the same year there were 870 students in the regular session, of whom 213 pursued graduate courses under the philosophical faculty, 378 under the medical faculty, and 16 in the department of engineering, and 263 were enrolled in the undergraduate courses, including those expecting to study engineering. In addition 167 teachers and others attended specially arranged afternoon courses of collegiate grade, 70 physicians pursued special courses in medicine and surgery, and 277 were enrolled in college courses during six weeks of summer. The total enrollment, excluding duplicates, was 1325. Dr. Gilman resigned the presidency in 1900, the resignation taking effect at the end of the academic year. Professor Ira Remsen was chosen to succeed him, and he was inaugurated Feb. 22, 1902; in January, 1913, he retired from office. On Feb. 23, 1914, the trustees announced the election of Dr. Frank Johnson Goodnow, of Colum-

bia University, as president, and he assumed his duties Oct. 1, 1914. Consult: *Johns Hopkins University: The Foundation and the Founder* (Baltimore, n. d.); *Retrospect of Twenty Years, 1876–1896* ((ib., n. d.); *Statements Respecting the University Presented to the Public on the 20th Anniversary* (ib., n. d.); D. C. Gilman, *Launching of a University and Other Papers* (New York, 1906); E. E. Slosson, *Great American Universities* (ib., 1910).

JOHN SIGISMUND, sĭj'ĭs-mŭnd, *Ger. pron.* zē'gĭs-mụnt (1572–1620). Elector of Brandenburg, son of the Elector Joachim Frederick. During his reign the dominions of the electors of Brandenburg were increased by the acquisition of Cleves, Mark, Ravensberg, Ravenstein, and the Duchy of Prussia (East Prussia). The first four districts were part of the dominions of the dukes of Cleves, Jülich, and Berg, all of which the Elector claimed as grandson of the eldest daughter of Duke William the Rich. Count Palatine of Neuberg, the husband of a younger daughter, also claimed the territories. After years of dispute the matter was finally arranged in 1630 by an amicable division of the districts. The acquisition of East Prussia was also accompanied by difficulties, notwithstanding the Polish King's promise that the Brandenburg Hohenzollerns should be the heirs of the Prussian dukes. The Prussian nobles preferred the freedom enjoyed by their Slavic neighbors to what they called "the Brandenburg tyranny," and the King of Poland was not unwilling to listen to their petition, so that it was only by giving the greatest concessions that the Elector finally persuaded the King to stand by his promise.

JOHN'SON, Alexander (1835–1913). A Canadian educator and scientist. He was born in Ireland and was educated at Trinity College, Dublin. He came to Canada in 1857 and was appointed professor of mathematics and natural philosophy, and later Peter Redpath professor of pure mathematics, in McGill University, Montreal. In 1867 he became vice dean and, later, dean of the faculty of arts and vice principal of the university. He was acting principal for three years and in 1903–13 was vice principal emeritus. Johnson contributed valuable papers to the *Transactions* of the Royal Society of Canada, of which he was president in 1905, and he also read papers before the British Association for the Advancement of Science. In 1897 he was vice president of the mathematical and physical section of the latter association. He was chairman and secretary of its committee which established a tidal survey for Canada and later was prominent in securing the commencement of a general hydrographic survey of the Atlantic and Pacific coasts. Besides many pamphlets and papers he published *Science and Religion* (1876).

JOHNSON, Alvin Jewett (1827–84). An American publisher, born at Wallingford, Vt. He spent his early years on a farm, then went to Virginia, where he taught school for a time, and finally removed to New York in 1853. The most important of his publications was *Johnson's Universal Cyclopædia*, the publication of which involved him in a bitter dispute with D. Appleton & Co., who afterward bought it and published it as the *Universal Cyclopædia*.

JOHNSON, Alvin Saunders (1874–). An American economist. Born near Homer, Neb., he graduated in 1897 from the university of that State, and in 1902 from Columbia University (Ph.D.), where he was tutor, instructor, and adjunct professor of economics until 1906. He served as professor of economics at the University of Nebraska in 1906–08 and at the University of Texas in 1908–10; was acting associate professor in 1909, and associate professor in 1910–11, at the University of Chicago; and held the chair of economics at Leland Stanford in 1911–12 and at Cornell after 1913. He was assistant editor of the *Political Science Quarterly* in 1902–06 and had charge of the department of economics in the New International Encyclopædia, and is author of *Rent in Modern Economic Theory* (1903), *Introduction to Economics* (1909), and *The Professor and the Petticoat* (1914), a novel.

JOHNSON, Andrew (1808–75). The seventeenth President of the United States of America. He was born at Raleigh, N. C., Dec. 29, 1808. His father lived only four years after Andrew's birth and left no funds for the education of the boy, who at the age of 10 was bound out to a tailor. Lack of education was a great grievance to Andrew, and he resolved to learn to read by himself. For this purpose he passed much of the time between labor and sleep in study. Just before his term of service was out, he went to work on his own account as a journeyman tailor at Laurens Court House, S. C. In 1826 he removed to Greeneville in east Tennessee, where he worked at his trade for about a year and married Eliza McCardle, who taught him writing and arithmetic.

When only 20 years old, Johnson organized a party of workingmen in opposition to the planters. The workingmen chose him alderman that year and reëlected him in the two succeeding years. In 1830 Johnson was elected mayor, serving for three years. To qualify himself for public undertakings, he joined a debating society, most of whose members were students of Greeneville College. In 1834 Johnson took an active part in advocating a new constitution for the State greatly limiting the power of the large landholders; in 1835 he nominated himself for the Assembly, declaring himself a Democrat. He was successful in the ensuing election, but in 1837 failed of reëlection because of his opposition to a financial measure which, as was later proved, he rightly judged to be bad. In 1839 he was again chosen a member of the Legislature. In 1840 he was on the Democratic electoral ticket and made many speeches for Van Buren. The next year he was elected to the State Senate, and in 1843 he was elected a member of Congress, to which he secured four consecutive reëlections. While in the House he supported the annexation of Texas, the Mexican War, the Tariff of 1846, and the Compromise of 1850. He favored the acceptance of the forty-ninth degree of latitude to settle the Oregon boundary dispute and was one of the foremost of the advocates of a homestead law. He was also a firm supporter of the President's veto power and on all occasions was in favor of the greatest economy in public expenditure. Having been gerrymandered out of a seat, he left Congress in March, 1853; but the same year he was chosen Governor of his State, and two years afterward was reëlected after a very turbulent canvass.

In 1857 he was elected to the United States Senate, where he opposed the increase of the

army and the legislation for the Pacific Railroad. He spoke little on slavery except to discourage all agitation of the question, his main interest being centred on the preservation of the Union. In the campaign of 1860, after being himself mentioned for the nomination, he supported Breckenridge until he found that secession was contemplated, when he repudiated him. When he went home in 1861, after opposing secession in the Senate, he was in great danger of his life. He worked hard for the Union cause, and at one time the secessionists turned his family out of their home. Early in March, 1862, Johnson was made military Governor of Tennessee. For a long time he labored earnestly to bring his State back into the Union. Near the beginning of March, 1864, under Johnson's special orders, Tennessee elected officers, both State and local. Three months afterward he was nominated for Vice President on the ticket with Lincoln. Six weeks after the inauguration Lincoln was shot, and Johnson became President. On taking the executive chair he made a brief speech, which was understood to mean that he would deal with the utmost severity with the leading secessionists. Instead of following this policy, his course, after he came under the influence of Secretary Seward, was the very opposite. He hastened to bring Virginia back to the Union, and near the close of June he brushed aside all regulations with regard to trade with the seceding States. He proclaimed general amnesty to all (except a few special classes) who would swear to be loyal to the Union. Under his proclamation provincial governments were set up in a number of the States but a few weeks before in rebellion, and he prepared the way for them to send members to Congress. These acts put him in opposition to the majority of the Republicans in Congress. Congress appointed a committee on reconstruction and on the admission of Southern members to the House, and adopted the Civil Rights Act, adding an act to increase the power and efficiency of the Freedmen's Bureau. These last two bills were vetoed by President Johnson, but they were readopted and passed. This action was severely denounced by the President, who characterized the course of Congress as another rebellion. Disaffection began to work in the cabinet, and three members resigned in consequence of differences with the President.

When Congress declared that the Fourteenth Amendment, giving the negroes citizenship, should be ratified by every seceding State as a preliminary to readmission to the Union, the President vetoed the resolution. During the next session acts were passed requiring the right of voting to be granted without regard to color in Territories applying for admission as States. These, too, were vetoed; but in all cases the bills were repassed and became laws. In March, 1867, in spite of the veto, an Act was passed dividing the Southern States, save Tennessee, into military districts, and trouble immediately arose over the appointments of the generals to command and their functions, Johnson's cabinet, with the exception of Secretary Stanton, supporting him in his obstruction of the legislation of the radicals in Congress. In August Stanton was displaced as Secretary of War, and General Grant was given the position. Stanton protested that his removal was in violation of the Tenure of Office Law which Congress had passed over Johnson's veto in March, 1867; and at the meeting of Congress in September the Senate refused to ratify the suspension, whereupon Grant resigned, and Stanton resumed his post. Five months afterward Johnson again removed Stanton, and put Gen. Lorenzo Thomas in his place. But Congress had taken from the President practically all power, and the Senate now resolved that "the President has no power to remove the Secretary of War and designate any other person to perform the duties of that office." The day after the adoption of the resolutions of the Senate, the House of Representatives determined upon the President's impeachment. The articles of impeachment recited many offenses, the principal of which were the removal of the Secretary of War; the public expression of disregard of and contempt for the legislative branch of the government; the declaration that the one in session was not a constitutional Congress; and particularly his obstruction to the execution of congressional acts. The main point of the defense was that Johnson's course in the work of reconstruction was merely the continuation of a plan resolved upon by President Lincoln and the members of his cabinet. In the Senate, sitting as the court of impeachment, the test vote was: guilty, 35; not guilty, 19. The requisite two-thirds vote not having been obtained, Johnson was acquitted—a result which is now considered just and fortunate by temperate historians. As soon as the trial was over Stanton voluntarily gave up his office and was succeeded by General Schofield.

At the Democratic National Convention in New York, July 4, 1868, Mr. Johnson's name was among the list of candidates for President. On the first ballot he had 65 votes, standing second on the list, George H. Pendleton having 105; but Johnson's vote diminished rapidly until on the nineteenth ballot his name did not appear. On Christmas Day, 1868, he proclaimed complete pardon to all who had been directly or indirectly concerned in secession. This was his last important official act. He was succeeded, March 4, 1869, by General Grant and at once repaired to his home in Greeneville. He was not satisfied with retirement and sought unsuccessfully to be sent to the Senate and also failed as an independent candidate for Congress. At last, in January, 1875, he was chosen United States Senator and was in his seat during the short extra session in March. But his triumph was short, for he died on July 31, 1875. Johnson showed great ability, courage, and political acumen. His messages, which represent his views, whether or not he was their author in the fullest sense, are powerful documents. His bust is in the Senate gallery in the Capitol at Washington.

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Reconstruction, Political and Economic (ib., 1907); id., "A Little More Light on Andrew Johnson," in the *Proceedings of the Massachusetts Historical Society* (Boston, 1905), in which the author maintains that Johnson's first inaugural address was written by the historian George Bancroft.

JOHNSON, Bradley Tyler (1829–1903). An American soldier and lawyer, born at Frederick City, Md. He graduated at Princeton in 1849, studied law at Harvard, and was admitted to the bar in 1851. He was a delegate to the National Democratic Convention at Baltimore in 1860 and joined the majority of his delegation when they withdrew from the convention and united with the Southern wing of the party, which supported Breckenridge and Lane. When the Civil War began, Johnson organized and equipped a company at his own expense, and he took an active part in forming the First Maryland Regiment, of which he became major and subsequently colonel, meanwhile declining a lieutenant colonel's commission in a Virginia regiment because of his belief that his strongest obligation was to his own State. He saw service in the seven days' battles around Richmond in 1862 and was advanced to the rank of brigadier general of cavalry in 1864. As commander of the post at Salisbury, N. C., he used his influence to lessen the suffering among the prisoners and finally obtained their parole. At the close of the war he practiced law in Richmond until 1879, when he removed to Baltimore. His writings include: *Reports of Chase's Decisions on the Fourth Circuit* (1875); *Memoir of Joseph E. Johnston* (1891); an examination of the *Foundation of Maryland and the Maryland Act Concerning Religion* (1883); *Life of General Washington*, in "Great Commanders Series" (1894); and the volume *Maryland in Confederate Military History* (Atlanta, 1899). Consult vol. ii of this *History* for Johnson himself.

JOHNSON, Burges (1877–). An American author, editor, and publisher, born at Rutland, Vt. Graduating from Amherst College in 1899, he served as a reporter for the New York *Commercial Advertiser* and the *Evening Post* in the same year; was literary adviser to G. P. Putnam's Sons in 1900–02 and a member of the literary staff of Harper & Bros. in 1903–06; and then held an assistant editorship on *Everybody's Magazine* for a year and the managing editorship of *Outing* until in 1908 he became president of the publishing house of Thompson, Brown Co. After 1913 he was manager of the educational department of E. P. Dutton & Co. He is author of *Rhymes of Little Boys* (1905); *Pleasant Tragedies of Childhood* (1905); *Beastly Rhymes* (1906); *Rhymes of Home* (1909); *Yearbook of Humor* (1910); *Bashful Ballads* (1911); *Rhymes of Little Folks* (1915).

JOHNSON, Bushrod Rust (1817–80). An American soldier in the Confederate service, born in Belmont Co., Ohio. He graduated at West Point in 1840 and served in the Seminole War and in the war with Mexico. He resigned from the service in 1847, was professor of natural philosophy and chemistry at the Western Military Institute, Georgetown, Ky., in 1848–51, and then for four years superintendent of the institution. In 1855 he became superintendent of the Military College of the University of Nashville. He entered the Confederate Army as a colonel of engineers in 1861 and was made a brigadier general in January, 1862. He was chief of staff at the defense of Fort Donelson and two months later commanded a brigade at Shiloh (April 6 and 7, 1862). At Perryville and at Murfreesboro his brigade was engaged in some of the most desperate fighting, while at Chickamauga, according to Gen. D. H. Hill, it was due to Johnson's initiative that the Confederates swept the Federal right wing from the field. He was commissioned a major general in May, 1864. Towards the close of the war his force joined Lee's army and took part in the actions at Drewry's Bluff and around Petersburg. After the surrender he returned to the Western Military Institute, where he was professor of engineering, mechanics, and natural philosophy during the remainder of his life.

JOHNSON, Cave (1793–1866). An American politician. He was born in Robertson Co., Tenn., received an academic education, studied law, was admitted to the bar, and practiced successfully at Clarksville until his appointment to the bench of the State Circuit Court in 1820. He resigned his judgeship in 1829, upon his election as a Democrat to the Twenty-first Congress. By successive reëlections he served until 1837, when he was defeated by the Whig candidate, but was again elected in 1839 and continued to serve until 1845. He was a ready debater and a stanch supporter of Jackson and opposed with spirit the nullification movement and the United States Bank. In 1845 he entered the cabinet of President Polk as Postmaster-General, serving throughout the administration and favoring the President's Mexican policy, though with little enthusiasm. From 1850 to 1859 he was president of the State Bank of Tennessee and on the outbreak of the Civil War, although an old man, threw himself with energy into the movement to keep Tennessee in the Union, spoke frequently in opposition to secession, and supported and advised Andrew Johnson. In 1863 he was elected as a Unionist to the State Senate of Tennessee, but ill health prevented his taking any part in legislation.

JOHNSON, Charles (1679–1748). An English dramatist, born probably in London. He first studied for the bar, but afterward gave himself to authorship and produced 19 mediocre plays. Pope satirized him in the *Dunciad*. His works include: *The Wife's Relief, or the Husband's Cure* (1711); *Country Lasses, or the Custom of the Manor* (1715); *The Sultaness* (1717), a tragedy taken from the *Bajazet* of Racine; *Cœlia, or the Perjured Lover* (1733).

JOHNSON, Charles Fletcher (1859–). An American legislator. He was born at Winslow, Me., and received the degrees of A.M. in 1879 and LL.D. in 1911 from Bowdoin College. He was principal of schools at Machias, Me., in 1881–86, was then admitted to the Maine bar, and thereafter practiced law at Waterville, Me., where he served for a time as mayor. In 1892 and 1894 he was the Democratic candidate for Governor of Maine, attended the Democratic National Convention in 1904, and served in the Maine House of Representatives in 1905 and 1907. He was chosen United States Senator for the term 1911–17.

JOHNSON, Daniel (1629–75). An English buccaneer, born at Bristol. When 25 years old, he was sold as a slave in the West Indies by the Spaniards, who had taken the merchant vessel in which he was a sailor, but escaped in

1657 and became a rover of the high seas, revenging his wrongs wherever possible upon Spanish shipping and towns. His depredations were upon such a gigantic scale that $25,000 were offered for his capture, and it was at length accomplished by four ships to one. Johnson's wounds were many and dangerous, but the Spaniards waited till they were healed before executing him at Panama.

JOHNSON, Duncan Starr (1867–). An American botanist. He was born at Cromwell, Conn., and was educated at Wesleyan University (B.S., 1892), at Yale, at Johns Hopkins (Ph.D., 1897), and in Munich (1901). At Johns Hopkins he was assistant in botany (1898–99), associate (1899–1901), associate professor (1901–06), and professor after 1906; and he had charge of the work in botany from 1896 to 1900 and of cryptogamic botany from 1901 to 1911 at the Carnegie Institution station for experimental evolution, Cold Spring Harbor, Long Island. His investigations deal with the morphology of various groups, notably of the Marsiliaceæ (water ferns), Hepaticæ (liverworts), and dicotyledons. In the last-named group he gave special attention to the more primitive families, especially the Piperaceæ.

JOHNSON, Eastman (1824–1906). An American genre and portrait painter, born at Lovell, Me., July 29, 1824, and educated in the public schools of Augusta. When 18 years of age, he made several portraits in black and white. In 1845 he spent one year in Washington, D. C., painting the portraits of Daniel Webster and John Quincy Adams. In the three following years, during his residence in Boston, he painted the portraits of Longfellow and his family, of Emerson, and Hawthorne. In 1849 he went abroad, studying with Leutze and at the Royal Academy, Düsseldorf; then in Paris, Italy, and Holland. He spent five years at The Hague, painting with such success that he was offered the position of court painter to remain. His work there included the well-known pictures, "The Savoyard" and "The Card Players." He returned to the United States in 1856, spending one year in the Indian country on the shores of Lake Superior. In 1860 he settled in New York and was elected a member of the National Academy of Design in the same year. He appealed to popular taste, painting simple themes of real life with a sound and thorough technique, little influenced by the Düsseldorf school. His portraits are dignified and fine in characterization; his genre pictures are better than anything done before in the United States —the subjects are treated with a wholesome naturalism and a breadth of handling lacking in his portraits. Many of his works have been lithographed and engraved. Among his chief works are: "Spanish Woman" (1862); "Old Stage Coach" (1871); "Milton Dictating to his Daughters" (1875); "Cranberry Harvest" (1880); portraits of Presidents Cleveland and Harrison, of Theodore D. Woolsey, John D. Rockefeller, William H. Vanderbilt, Cornelius Vanderbilt, William Waldorf Astor, Mrs. Alexander Hamilton, Mrs. Augustus Belmont, and Mrs. Hamilton Fish. The Metropolitan Museum, New York, possesses two portraits by him ("Two Men" and Sanford R. Gifford) and "Corn Husking at Nantucket"; the New York Historical Society, his portrait of Augustus Schell; and the Public Library, New York, his famous "Old Kentucky Home" and two others.

JOHNSON, Edward (1599–1672). An American Colonial official and historical writer, born in Kent, England. He came to Massachusetts Bay with the party of Governor Winthrop in 1630 and engaged in trade with the Indians. In 1642 he was recorder of the meeting which organized the town and church of Woburn, Mass., and he served as recorder of the town until his death. With the exception of 1648, he yearly represented the town in the General Court from 1643 to 1671, being Speaker in 1655 and serving upon many important committees. He published anonymously a *History of New England from the English Planting in the Yeere 1628 Untill the Yeere 1652* (London, 1654), which is better known by the subtitle *The Wonder-working Providence of Zion's Saviour.* Much of the book was copied in the so-called *Gorges Tracts.* It is valuable for the minute account of civil and ecclesiastical procedure in the Bay Colony and was reprinted in *Massachusetts Historical Collection,* 2d series, vols. i, ii, iii, iv, vii, viii. There is also a facsimile edition, with an elaborate introduction by W. F. Poole (Andover, 1867).

JOHNSON, E(mily) Pauline (1862–1913). A Canadian poet. She was born at Chiefwood, on the Grand River Reserve, in Ontario. Her father was George Henry M. Johnson, chief of the Mohawk Indians; her mother, Emily S. Howells, a native of Bristol, England. She was educated by private tutors and at the Brantford Model School. In 1894 she visited England, where she published a collection of poems under the title *The White Wampum.* The volume gained wide attention because of the author's Indian blood and fresh passionate themes. Her later volumes of poems were *Canadian Born* (1903) and *Flint and Feathers* (1912). She also published *Legends of Vancouver* (1911) and two books of fiction, *The Moccasin Maker* (1912) and *Shagganappi* (1913). She died at Vancouver, B. C.

JOHNSON, Emory Richard (1864–). An American economist, born at Waupun, Wis. He graduated from the University of Wisconsin (1888) and in 1893 took his Ph.D. from the University of Pennsylvania, where, after teaching economics for three years at Haverford College, he became professor of transportation and commerce. As an expert on transportation problems, his services were obtained by the United States Industrial Commission (1899), the Census Bureau (1904–05), and the National Waterways Commission (1909). He was a member of the Isthmian Canal Commission (1899–1904) and in 1911 made a report to President Taft on the Panama Canal. In 1907 he arbitrated a dispute between the Southern Pacific and the Order of Railroad Telegraphers. He became director of the Philadelphia Bureau of Municipal Research. Besides editing the *Annals* of the American Academy of Political and Social Science after 1901, he collaborated in the preparation of an economic history of the United States for the Carnegie Institution and published: *Inland Waterways: Their Relation to Transportation* (1893); *American Railway Transportation* (1903; rev. ed., 1908); *Ocean and Inland Water Transportation* (1906); *Elements of Transportation* (1909); *Railroad Traffic and Rates* (2 vols., 1911); *Panama Canal Traffic and Tolls* (1912); *Measurement of Vessels for the Panama Canal* (1913); *The Panama Canal,* with others (1915).

JOHNSON, GISLE (CHRISTIAN) (1822–94). A noted Norwegian Lutheran theologian and author, born at Fredrikshald. A descendant of two of Iceland's most esteemed families, he was educated at Christianssand and Christiania, continued his studies in Berlin, Leipzig, Erlangen, and Paris, and became docent in theology at the University of Christiania in 1849 and was professor from 1860 to his death. Notable for his wide experience and great learning, he exerted a far-reaching influence upon his students and upon the Lutheran church of Norway throughout his long life. He founded many benevolent and educational institutions, as Den norske Lutherstiftelse (1867); was (1847–90) coeditor of *Theologisk Tidsskrift*, founder and (1863–75) editor of *Luthersk Kirketidende;* and wrote many books and articles. Consult: Th. G. B. Odland, "Biografi af Gisle Johnson," in *79de Beretning om det norske Bibelselskab* (Christiania, 1894), and *Norsk Forfatter-Leksikon*, vol. iii (ib., 1892).

JOHNSON, GUY (c.1740–88). An English soldier, famous as an American Royalist. He was born in Ireland and saw service during the French and Indian War, first with the American provincials and later as a cavalry commander under General Amherst. He succeeded his uncle, Sir William Johnson, as Superintendent of Indian Affairs at the latter's death in 1774. At the outbreak of the Revolution his estates in central New York were confiscated by the Americans, and he was obliged to flee to Canada. There he interested himself in inciting the Mohawk Indians, under Joseph Brant, to attack the colonists. In 1783 he was dismissed from the service and five years later died in poverty in London.

JOHNSON, HERMAN MERRILL (1815–68). An American educator. He was born at Butternuts, Otsego Co., N. Y., graduated at Wesleyan University in 1839, and entered the Methodist ministry in 1845. He was professor of ancient languages at St. Charles College, Missouri, from 1839 to 1842, when he was called to a similar position at Augusta College, Kentucky. In 1844 he became a professor in Ohio Wesleyan University and remained there for six years. He accepted the professorship of philosophy and English literature in Dickinson College in 1850 and in 1860 became its president. Dr. Johnson was a contributor to the *Methodist Quarterly Review*, but is best known by his edition of the *Clio* of Herodotus (1850) and his *Orientalia Antiquaria Herodoti.*

JOHNSON, HERRICK (1832–1913). An American Presbyterian clergyman and educator. He was born near Fonda, N. Y., and graduated at Hamilton College in 1857 and at Auburn Theological Seminary in 1860. He was pastor of churches in Troy, N. Y., Pittsburgh, Philadelphia, and Chicago; was professor of homiletics and pastoral theology at Auburn Theological Seminary (1874–80); and from 1880 to 1905 was professor of homiletics in McCormick Theological Seminary. He was moderator of the General Assembly of the Presbyterian church in 1882 and became president of the Presbyterian Board of Education and Board of College Aid. His publications include: *Christianity's Challenge* (1881); *Plain Talks about the Theater* (1882); *Revivals* (1883); *Presbyterian Book of Forms* (1889); *From Love to Praise* (1903); *The Ideal Ministry* (1908).

JOHNSON, HERSCHEL VESPASIAN (1812–80). An American jurist and political leader, born in Burke Co., Ga. He graduated at Franklin College in 1834, studied law and practiced at Augusta, and finally settled at Milledgeville in 1844. In 1843 he was nominated for Congress, but was defeated, and in the campaign of 1844 was a presidential elector. In 1848 he was appointed by the Governor to the seat in the United States Senate made vacant by the resignation of W. T. Colquitt, and in that body he strongly supported the administration's Mexican policy. From his entry into political life he had been a strong States' rights advocate, and in 1849 he was one of the signers of the "Southern Address." His views, however, underwent a radical change at this time, and he became one of the warmest supporters of Clay's scheme of compromise and thereafter allied himself with the Unionist element in the South. He was a judge of the Superior Court of Georgia from November, 1849, to 1853, and was Governor of the State from 1853 until 1857. His well-known conservatism led to his nomination in 1860 as the candidate of the Northern Democrats for Vice President on the ticket with Stephen A. Douglas. With Alexander H. Stephens (q.v.) he did his utmost to check the secession movement in Georgia, but he abided by the decision of the secession convention and threw in his fortune with the Confederacy. He was elected one of the senators from Georgia in the Second Confederate Congress in November, 1862, but early despaired of the cause of the South. He openly advocated peace in 1864, hailed the cessation of hostilities with delight, and in October, 1865, was president of the Georgia convention which repealed the ordinance of secession. On the readmission of Georgia he was, in January, 1866, elected United States Senator, but was not allowed to take his seat on account of war disabilities. In 1873 he was appointed to the bench of the State Superior Court, where he remained until his death.

JOHNSON, HIRAM WARREN (1866–). An American lawyer and public official, born at Sacramento, Cal. He received his academic and legal education at the University of California and was admitted to the bar in 1887. Although regarded as an able and efficient attorney, he did not become generally known to the people of the State until he participated in the trial of the San Francisco graft and boodling cases in 1906 and 1907. When Francis J. Heney was shot down in the court room, Johnson, as the assistant prosecuting attorney who was most familiar with the case, took his place and conducted the prosecution with great ability and success. The result was that Abe Ruef and his associates were convicted and sentenced to a term of imprisonment, and Johnson was regarded as one who had freed the city and the State of their power. He was selected in 1910 by the progressive element of the Republican party for the nomination for Governor. A bitter campaign of five months followed, but Johnson, employing as his chief political doctrine the sentence "The Southern Pacific Railroad must be kicked out of State politics," won the nomination, and after a severe contest he was elected over the Democratic nominee. He began his administration with the avowed intention of cleaning up the State and turning out officeholders who were inefficient and who were controlled by private interest. His first

message to the Legislature urged many radical reforms, including the establishment of a railroad commission, the adoption of the short ballot, and the direct nomination of United States Senators so as to bind the choice of the Legislature to the nominee. He spoke throughout the State in favor of the adoption of an amendment to the State constitution providing for the initiative and referendum in matters of legislation and for the recall of elective officers, including judges. In 1912, at the Republican Convention in Chicago, he was a conspicuous figure. He opposed the candidacy of President Taft, condemned the admission of certain contested delegates, and, leaving the party with the other followers of Roosevelt, was named for the vice-presidency on the ticket of the new Progressive party. In 1913 he signed the Webb Anti-Alien Land Bill, which was passed by the California Legislature to restrict the rights of aliens, particularly Japanese, in that State, and during the controversy which the bill provoked between the United States and Japan he remained firm. Though criticized as insincere in his adherence to the principles of the Progressive party, and in spite of the fact that this party's hold on the country at large had greatly weakened, Johnson was reëlected Governor in 1914 by 188,500 plurality. See CALIFORNIA, *History;* and, for constitutional amendments during his first term, *Government.*

JOHNSON, SIR JOHN (1742–1830). An American Tory leader, the son of Sir William Johnson (q.v.), upon whose estate on the Mohawk River in New York he was born. He was educated at Albany and at New York and took part with his father in the French and Indian War. He was knighted in 1765 and in 1774 succeeded to the baronetcy which had been granted to his father. He retained a great deal of his father's remarkable influence over the Indians, and it was due to this and to the exertions of Joseph Brant (q.v.), Sir William's protégé, that the tribes of the Iroquois Nation, with the exception of the Oneidas and the Tuscaroras, allied themselves with the British at the outbreak of the Revolution. There was a strong Tory element in central New York, and this element Sir John undertook to rally about the standard of Great Britain, organizing the famous loyalist corps known as the Queen's Own American Regiment, or, more familiarly, as the Royal Greens, of which he himself became colonel. With these troops in July, 1777, he joined St. Leger at Oswego and took part in the siege of Fort Stanwix (q.v.) and the battle of Oriskany (q.v.) on August 6 following. Later in the same day on which Herkimer was repulsed in his attempt to raise the siege, a brilliant sortie of the fort's garrison under Marinus Willett compelled Johnson to withdraw across the Mohawk, leaving his camp and equipage in the hands of the Americans. The advance of Arnold to the relief of the fort and the defection of a large part of their Indian allies caused St. Leger and Johnson to abandon the siege on August 22 and retreat northward towards Oswego, thus rendering impossible the proposed coöperation with Burgoyne. During the next two years Johnson continued to direct operations in northern and central New York, and the succession of raids of the Butlers and Brant with their bands of Indians and Tories, resulting in the massacres in the Wyoming and Cherry valleys, forms one of the most unpleasant chapters of the American Revolution. When in the summer of 1779 Washington determined to put a stop to these outrages, he sent General Sullivan at the head of 5000 troops into the region. This force met Sir John Johnson and the Butlers at Newtown (now Elmira) on Aug. 29, 1779, and decisively defeated them. This defeat and the devastation of the Iroquois towns that followed put a stop to the Tory régime in the district, and Sir John retired to Montreal. At the close of the war his large estates were confiscated. He lived the rest of his life in Canada, where for many years he was superintendent general of Indian affairs in British North America. Consult Stone, *Life of Brant* (New York, 1838; Albany, 1865).

JOHNSON, JOHN ALBERT (1861–1909). An American public official, born near St. Peter, Minn. When Johnson was only 13 years old, his father died in the county poorhouse of alcoholic dementia, and he was forced to leave school in order to support his mother. He was employed by various mercantile establishments and for a time was connected with a railroad-construction gang. During all of this time, however, he continued to educate himself by private study. His success in this respect was demonstrated in 1886 when he was made editor of the St. Peter *Herald.* He was active in bringing about civic improvements, providing free public lectures, and establishing playgrounds. His attractive personality and geniality made him extremely popular. In 1894 he entered politics as Democratic candidate for the State Senate; though then unsuccessful, in 1898 he was elected and served in three successive legislatures. He became known for his independence of party partisanship when he opposed Governor Lind (q.v.) on the question of withdrawing Minnesota troops from the Philippines. Johnson was a bold advocate of tariff reform and economy in the administration of the government. In 1904 he was nominated and elected Governor. The campaign was extremely bitter, and personalities entered largely into the speeches. The public issue concerned the merging of the Great Northern and the Northern Pacific railroads (see NORTHERN SECURITIES CASE), but Johnson was taunted with references to his family. His popularity with the Scandinavian element, his public record, and the assaults on his family turned public sentiment in his favor, and he was elected by a plurality of 6000 at a time when Roosevelt carried the State for the Republican national ticket by 146,000. As Governor, he achieved immense success, and through his influence legislation was enacted providing for employers' liability, the abolition of railroad passes, schools for delinquent girls, and a reformation of the civil service; he was also instrumental in effecting local and national reforms in insurance laws. He was reëlected Governor in 1906 by a plurality of 76,000, and again in 1908 by 20,000, although Taft carried the State by 85,000 votes. In the presidential campaign of 1908 Johnson was frequently mentioned for the Democratic nomination, and he received 46 votes in the Denver Convention. His prestige and success as Governor were not diminished by the quiet (though determined) method employed by him in dealing with the miners' strike of 1908. He had long suffered from appendicitis, and in 1909 an operation was performed, but failed to save his life.

JOHNSON, JOHN BUTLER (1850–1902). An American civil engineer and educator. He was born at Marlboro, Ohio, and graduated at the University of Michigan in 1878. He was a member of the United States Lake and Mississippi River Surveys until 1883; professor of civil engineering at Washington University, St. Louis, Mo., from that date until 1898, and dean of the department of mechanics and engineering at the University of Wisconsin from 1898 until his death. The parabolic column formula, which he proposed, bears his name; his name is also connected with the roller extensometer, an instrument used in measuring the stretch in materials under test. In 1884 he assumed charge of the index department of the *Journal of the Association of Engineering Societies*, and in 1891 was put in charge of the timber-testing laboratory at St. Louis by the United States Forestry Bureau. His publications include *The Materials of Construction*, first published in 1897; *Theory and Practice of Surveying* (8th ed., 1904); *Engineering Contracts and Specifications* (3d ed., 1904); and he was joint author of *Modern Framed Structures* (1893).

JOHNSON, JOSEPH FRENCH (1853–). An American economist, born at Hardwick, Mass. He graduated from Harvard University in 1878; studied in Germany for one year; joined the staff of the Springfield *Republican;* was financial editor of the Chicago *Tribune;* and from 1890 to 1893 was proprietor of the Spokane (Wash.) *Spokesman*, which he had established. Thereafter until 1901 he was professor in the Wharton School of Commerce, University of Pennsylvania, and from 1899 to 1903 he lectured also on finance at Columbia University. In 1901 he became professor of political economy in, and in 1903 dean of, the School of Commerce, Finance, and Accounts at New York University. He reported on the national banking system of Canada for the National Monetary Commission and was a member of the commission on new sources of revenue for New York City in 1912 and of the commission to revise the banking laws of the State of New York in 1913. He edited the *Modern Business Series* and the *Journal of Accountancy*, contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA, and published *Syllabus of Money and Banking* (1899), *Money and Currency* (1905; rev. ed., 1914), and *The Canadian Banking System* (1910).

JOHNSON, LIONEL (1867–1902). A British poet and critic, of Irish descent, born at Broadstairs, Kent, and educated at Winchester and at Oxford. In his university days he was much under Walter Pater's influence. Though of a line of soldiers and Protestants, he chose literature for his profession and Catholicism for his creed, and much of his poetry took tone and color from his religion. He was active in the Irish Literary Society of London, founded in the 1890's, and, indeed, should be associated with the movement known as the Irish Literary Revival. (See IRISH LITERATURE, II.) Most of his life was passed in London, where he lived, a bachelor and a scholar, with his many books. For relaxation, he took long country rambles that tried his fragile health. He died on Oct. 4, 1902, in St. Bartholomew's Hospital, of a fractured skull caused by a fall while he was walking in Fleet Street on the night of September 29. "In the bitter pathos of his end he was not with Keats, but with Poe." He produced little, but what he wrote was of fine quality. The range of his scholarship, his taste, and his insight combined to make him an excellent critic, in which capacity he is represented by *The Art of Thomas Hardy* (London, 1894) and *Post Liminium: Essays and Critical Papers* (New York, 1911), edited by Thomas Whittemore. His poetry is marked by depth and restrained intensity of feeling, by refined beauty of form, and by a certain lucidity, wholesome soundness, and ordered firmness of structure that indicate his kinship with the classic spirit. His poems are collected in *Poems* (London, 1895) and in *Ireland, with Other Poems* (ib., 1897). Consult: W. B. Yeats's introduction to selections from Johnson in *A Treasury of Irish Poetry* (ib., 1900); L. I. Gurney, "Of Lionel Johnson, 1867–1902," in *Atlantic Monthly*, vol. xc (Boston, 1902).

JOHNSON, MANUEL JOHN (1805–59). An English astronomer, born in Macao, China, and educated at Addiscombe Military College. He took service in the St. Helena artillery; and, in an observatory built by the East India Company, he made a *Catalogue of 606 Principal Fixed Stars in the Southern Hemisphere* (1835), which won for him the gold medal of the Royal Astronomical Society. He entered Magdalen College, Oxford, in 1835, and on graduation, in 1839, succeeded Rigaud as director of the Radcliffe Observatory, which under his care became not merely a scientific centre, but a gathering place for the leaders of the Oxford High Church party. He published 18 volumes of *Radcliffe Observations* and wrote a catalogue of circumpolar stars, edited by Main in 1860. Johnson was president of the Royal Astronomical Society in 1857.

JOHNSON, OLIVER (1809–89). An American Abolitionist and editor, born at Peacham, Vt. He entered the office of the *Vermont Watchman* at Montpelier as an apprentice, and as early as July 4, 1828, showed his sympathy with the Abolition movement by delivering a speech against slavery. In January, 1831, he began to publish the *Christian Soldier*, and soon afterward became intimate with William Lloyd Garrison. He was one of the founders of the New England Antislavery Society and edited the *Liberator* during Garrison's absence in Europe in 1833. Among the other papers of which he was an editor were the *National Antislavery Standard*, the *Antislavery Bugle*, and the *Pennsylvania Freedman*. He was an associate editor of the *Independent* when Garrison became a contributor in 1868. Later he occupied editorial positions on the *Weekly Tribune* and the *Christian Union*, and after 1881 was connected with the New York *Evening Post*. He published *William Lloyd Garrison and his Times, or Sketches of the Antislavery Movement in America* (1880).

JOHNSON, OWEN (1878–). An American novelist, son of Robert Underwood Johnson, born in New York City and educated at the Lawrenceville (N. J.) School and at Yale University. His story of school life, *The Varmint* (1910), with its boyish high spirits, cleverness, and wholesomeness, is perhaps his best book. His *Stover at Yale* (1911), a college story, frank in its criticisms of certain phases of life in the author's alma mater, aroused a little storm of controversy. Other books of his are: *Arrows of the Almighty* (1901); *In the Name of Liberty* (1905); *Max Fargus* (1906); *The Eternal Boy* (1909); *The Humming Bird*

(1910); *Tennessee Shad* (1911); *The Sixty-first Second* (1912); *The Salamander* (1914; and dramatized). He also wrote the plays *The Comet* (1908), *Comedy for Wives* (1912), and an adaptation from the French, *The Return from Jerusalem* (1912).

JOHNSON, Percival Norton (c.1793–1866). An English metallurgist. He was much employed in consultation at important English mines, was the first to establish rules for accurately determining the composition of bullion, and introduced into England the alloy known as German silver (q.v.). He improved the mechanical plant in some of the Cornish mines and made several important inventions in mining and metallurgy.

JOHNSON, Reverdy (1796–1876). An American jurist, born at Annapolis, Md., May 21, 1796. He was a son of John Johnson, himself an eminent lawyer, who became Chancellor of Maryland. Reverdy was educated at St. John's College at Annapolis, studied law in his father's office, and in 1815 was admitted to the Maryland bar. In 1817 he removed to Baltimore and was successively Deputy Attorney-General of Maryland and for four years a State Senator (1821–25). With Mr. Thomas Harris, he edited the reports of the Maryland Court of Appeals from 1820 to 1826. He gained a high reputation as a profound lawyer and was frequently employed in arguing important cases before the Supreme Court of the United States. He represented his native State in the United States Senate from 1845 to 1849, when he resigned his seat to enter President Taylor's cabinet as Attorney-General. After the death of General Taylor in 1850 Mr. Johnson continued to practice law in Baltimore. In 1863 he was again elected to the United States Senate, but before the expiration of his term was appointed Minister to England in 1868. His negotiations for a settlement of the disputed *Alabama* claims having proved unsatisfactory to the American government, and his convention with Great Britain being rejected by the Senate of the United States, Mr. Johnson was recalled in 1869. During the trial of the assassins and conspirators concerned in the murder of Abraham Lincoln, Mr. Johnson prepared an argument in behalf of Mrs. Surratt (afterward executed for complicity in the assassination) which the military court that tried the case refused to hear. Though not a master of statecraft nor a great politician, Reverdy Johnson was a man of great courage and independence of judgment as well as a consummate lawyer and earned a place of great distinction in the roll of the American bar. He died at Annapolis, Feb. 10, 1876.

JOHNSON, Richard Mentor (1780–1850). An American legislator and politician, Vice President of the United States in 1837–41. He was born at Bryant's Station, Ky., was educated at Transylvania University, studied law and began practice at Grand Crossings in that State. His political career began in 1805 with his election to the Lower House of the Kentucky Legislature. In 1806 he was elected to the Tenth Congress and was reëlected to the Eleventh and Twelfth, serving from 1807 until 1813. At the outbreak of the War of 1812 he returned to Kentucky, where he recruited a regiment of mounted riflemen, serving during the recesses of Congress and occupying his seat during the sessions. In 1813 he raised a second regiment, of which he became colonel and which he commanded in Gen. William Henry Harrison's Canadian campaign. At the battle of the Thames, Oct. 5, 1813, according to tradition, he shot and killed Tecumseh (q.v.). He was not a member of the Thirteenth Congress, but was returned to the House by his constituents in 1814 and served until 1818. In 1819 he was elected to the United States Senate to fill the vacancy caused by the resignation of John J. Crittenden and was later reëlected, remaining in that body until 1829. In the Senate and in the House, of which he was again a member from 1829 to 1837, he was a strong supporter of Jackson, who in 1835 designated him as his personal choice for Vice President. In the Baltimore Convention in May of that year he was placed in nomination, his principal opponent being William C. Rives (q.v.) of Virginia. Opposition to his candidacy continued throughout the campaign, and when the electoral votes were counted it was found that, although Van Buren was elected, Virginia by casting her votes for William Smith of Alabama had prevented the choice of a Vice President. The election was therefore thrown into the Senate, where Johnson was promptly elected, receiving 33 votes to 16 for Francis Granger (q.v.) of New York. Opposition to Johnson having increased, at the Baltimore Convention in May, 1840, after the President had been indorsed and renominated, a resolution was passed declaring "that the Convention deem it expedient at the present time not to choose between the individuals in nomination" for the vice presidency, all of whom, it declared, were worthy of the office. In the electoral college, however, the Democratic electors voted generally for Johnson, giving him 48 votes, L. W. Tazewell of Virginia 11, and James K. Polk 1. In 1844 Johnson entered into the Democratic canvass for the presidential nomination, but was defeated.

JOHNSON, Richard W. (1827–97). An American soldier, born in Kentucky. He graduated at West Point in 1849 and up to the time of the Civil War was employed chiefly on frontier service. In 1861 he was commissioned colonel of the Third Kentucky Cavalry and soon afterward was made a brigadier general of volunteers. He took part as a cavalry commander in the western campaigns of 1861 and 1862 and on August 21 of the latter year was defeated and captured by Col. John H. Morgan, whom he had been sent to drive out of Tennessee. In the battle of Murfreesboro he commanded a division. At Chickamauga his division formed part of the command of General Thomas, and it was one of those which during the battle of Chattanooga charged up the heights of Missionary Ridge. The next year he commanded a division in the Army of the Cumberland during the invasion of Georgia and was severely wounded at the battle of New Hope Church (May 28, 1864). On August 22 of that year he was made chief of cavalry of the Military Division of the Mississippi. He commanded a cavalry division at the battle of Nashville, and on the second day was given the brevet rank of major general of volunteers, supplemented on March 13, 1865, by the brevet rank of brigadier general in the regular army, and on the same day he was brevetted major general in the regular army for "gallant and meritorious services during the war." He was mustered out of the volunteer service on Jan. 15, 1866, and became provost marshal general of the Military Division of the Tennessee, and later acting judge advocate in various mili-

tary departments. He resigned in 1867 with the rank of major, which grade by an Act of Congress (March 3, 1875) was changed to that of brigadier general. He published *A Soldier's Reminiscences in Peace and War* (1866) and a *Memoir of Major General George H. Thomas* (1881).

JOHNSON, Robert Underwood (1853–). An American poet and editor, born at Washington, D. C., Jan. 12, 1853. He joined the staff of the *Century Magazine* in 1873, became associate editor in 1881, and in 1909, on the death of Richard Watson Gilder, succeeded to the editorial chair, which he occupied until May, 1913. He early became noted for his services in behalf of international copyright, as secretary of the American Copyright League doing much to secure the passage of the Law of 1891, for which he was decorated by the French and Italian governments. He had a hand in many important publishing undertakings, and it was on his persuasion that Gen. U. S. Grant wrote his *Memoirs*. He became permanent secretary of the American Academy of Arts and Letters. His writings include *The Winter Hare and Other Poems* (1891) and *Songs of Liberty and Other Poems* (1897). His *Saint Gaudens: An Ode* (third edition of poems) appeared in 1910, and the fourth edition was published under the same title in 1914. With C. C. Buel he edited the well-known *Century* articles relating to the Civil War, afterward published as *Battles and Leaders of the Civil War* (1887–88)—one of the most valuable compilations dealing with the subject.

JOHNSON, Rossiter (1840–). An American editor and author, born at Rochester, N. Y. In 1863 he graduated from the University of Rochester, which gave him the degree of LL.D. 30 years later. He married a daughter of Asahel C. Kendrick, and his sister was the wife of Joseph O'Connor (qq.v.). From 1864 to 1869 he was assistant editor of the Rochester *Democrat* (later *Democrat and Chronicle*), and in 1869–72 he edited the Concord (N. H.) *Statesman*. In 1873–77 he was an associate editor in the revision of the *American Cyclopædia*. He became editor of the *Annual Cyclopædia* in 1883, from 1886 to 1888 was managing editor of the *Cyclopædia of American Biography*, and in 1900–04 was editor in chief of the *Universal Cyclopedia*. Among other compilations edited by him are: *The British Poets* (3 vols., 1876); *Famous Single and Fugitive Poems* (1877); *Play-Day Poems* (1878), an anthology of humorous verse in English; *Fifty Perfect Poems* (1882), with C. A. Dana; the *Little Classics Series* of prose selections (16 vols., 1874–75; two additional vols., 1880; new ed., 1900); *The World's Great Books* (1898–1901); *Twentieth Century Biographical Dictionary of Notable Americans* (1904); the sumptuous and unique *Liber Scriptorum* (1893), in collaboration with J. D. Champlin and G. C. Eggleston; *Anthology of Italian Authors* (1907); *The War in Europe: Its Causes and Consequences* (1914). His original publications include: *Phaeton Rogers* (1881), a boy's story; *Idler and Poet* (1883), poems; *A History of the French War* (1882); *A History of the War between the United States and Great Britain* (1882); *A History of the War of Secession* (1888); *A Short History of the War between the United States and Spain* (1899); *The Story of the Constitution of the United States* (1906); *The Hero of Manila* (1912), a story for boys.

JOHNSON, Samuel (1696–1772). An American educator, born at Guilford, Conn. He graduated at Yale in 1714, became a tutor there in 1716, and in 1720 was ordained pastor at West Haven. Two years afterward he was converted to Episcopacy. From 1754 to 1763 he was president of King's College (later Columbia University), the first to hold that office. Johnson was an ardent polemic and carried on long controversies in behalf of apostolic succession and divine sovereignty. He wrote: *A System of Morality* (1746; reprinted by Franklin as *Elementa Philosophica* in 1752); *Three Letters from a Minister of the Church of England to his Dissenting Parishioners* (1733–37); and an *English and Hebrew Grammar* (1767; 2d ed., 1771). Consult Chandler, *Life* (London, 1824), and Beardsley, *Life and Correspondence of Samuel Johnson* (New York, 1874).

JOHNSON, Samuel (1709–84). An English lexicographer, essayist, and critic. He was born at Lichfield, Sept. 18, 1709, the son of Michael Johnson, a bookseller. He was sent to a dame school, from which he passed to the Lichfield grammar school, where he learned Latin, and then attended for a few months a school at Stourbridge. The years 1727–29 he spent at home in "lounging." Though indolent and desultory, he read widely and wrote some verse. In 1728 he entered Pembroke College, Oxford, where he became known for his various knowledge and a Latin translation of Pope's *Messiah*. At Oxford he learned Greek and read metaphysics. Melancholy by nature, he became a hypochondriac under the pressure of poverty. In October, 1731, he left Oxford without a degree, and two months later his father died, leaving him only £20. In 1732 he was usher in a school at Market Bosworth—a position for which he was particularly unsuited, owing to his extreme nervousness, which manifested itself in facial contortions. Aware of his failure and detesting the employment, he gave up school-teaching and went to live with a school friend in Birmingham. He probably contributed to the *Birmingham Journal*, for the publisher of which he made an abridged translation (1735) of Lobo's *Voyage to Abyssinia*. On July 9, 1735, he married the widow of a Birmingham mercer, his senior by 20 years. His wife's small fortune, about £800, enabled him to open a boarding school for young gentlemen at Edial Hall, near Lichfield. Few pupils attended, but among them was David Garrick. Johnson had for some time been thinking of London, as may be inferred from a letter he sent in 1734 to Edward Cave, proprietor of the *Gentleman's Magazine*, proposing to become a contributor. On March 3, 1737, he and Garrick, each having a few pence in his pocket, went to London. Later in the same year Johnson returned to Birmingham and brought his wife to London. Poor as Johnson had been hitherto, he had now to pass through a severe ordeal. For a period he went about ill clothed and ill fed, and, it is said, sometimes walked the streets with his friend Savage "for want of a lodging." In 1738 he became a regular contributor to the *Gentleman's Magazine*. At first he was employed to edit for Cave the parliamentary debates reported by William Guthrie, and then from July, 1741, to March, 1744, he wrote them himself, sometimes from notes furnished him and at other times from only the names of the speakers, always taking care that the "Whig dogs should not have the

best of it." In the meantime he had published *London* (1738), an adaptation to London life of Juvenal's third satire. It was immediately successful and placed Johnson among the best followers of Pope. In 1744 appeared his *Life of Richard Savage*, which, in depicting the terrible career of this unfortunate poet, throws indirectly much light on Johnson's own hardships. In 1749 he published another adaptation of Juvenal, *The Vanity of Human Wishes*, the finest of his poems. Johnson had long before written a tragedy called *Irene*. In February, 1749, Garrick brought it out at Drury Lane. Though Johnson received from the author's three nights and the copyright nearly £300, it was only a moderate success. The next year he began—writing most of the essays himself—the *Rambler*, a semiweekly in imitation of the *Spectator*, which ran for two years (March 20, 1750, to March 14, 1752). To Johnson, already known as a poet, this periodical gave rank as an impressive moralist. Three days after the last issue of the *Rambler* Johnson's wife died. At this time Johnson was in the midst of his labors on a new *Dictionary of the English Language*. The *Plan* for it, published in 1747, was inscribed to Lord Chesterfield, evidently with a view to that nobleman's patronage. Chesterfield, however, approved of the work in no public manner until December, 1754, when it was near completion. In a memorable letter Johnson then spurned the overtures of the noble lord (Feb. 7, 1755). In the following April the *Dictionary* appeared. For this undertaking Johnson was not fully equipped. He had no knowledge of the English language and literature in its earlier periods; consequently the dictionary was untrustworthy in its etymologies. On the other hand, he had read widely in the seventeenth century and was thus able to illustrate the use of words by admirable quotations. He at once became known as the great lexicographer. His splendid struggle with adversity, however, was not quite over. The next year he was arrested for debt. In 1758 he began a series of essays called the *Idler*, not so good as the *Rambler*, which he carried on for two years. Now occurred one of the most touching episodes in his heroic life, the writing of *Rasselas* (1759), "in the evenings of a week," to pay the expenses of his mother's funeral. It is hardly a novel, but rather a magnificent moral tract, into which are compressed *The Vanity of Human Wishes* and the best of the *Rambler*. In 1762 he accepted, after some hesitancy, a government pension of £300. It was probably in 1763 that Johnson founded his famous Literary Club, which held its meetings at the Turk's Head tavern, and which included the best talkers of the day and the men most distinguished in the arts, among them Goldsmith, Boswell, Burke, Sir Joshua Reynolds, and Garrick. Thereafter his life was passed in comparative ease. In 1763 he had made the acquaintance of James Boswell, his future biographer; and in 1765 he began his intimacy with the Thrales, who received him into their home at Southwark and took him with them to Streatham for the summer months. For 16 years they ministered to his comfort. Composition now becoming very onerous for him, he found an outlet for his thoughts in brilliant conversation. To this period, however, belongs some notable work. In 1765 he brought out an edition of Shakespeare, proposals for which had been issued eight years before. The record of a visit to Scotland and the Hebrides with Boswell in 1773 he published under the title *A Journey to the Western Isles of Scotland* (1775). His literary career closed with the *Lives of the Poets* (1779–81), the most admirable of his essays both in thought and in style. He died in London Dec. 13, 1784, and was buried in Westminster Abbey. The degree of LL.D. he had received both from Dublin (1765) and from Oxford (1775), but he himself rarely used the title. Johnson was the central figure in English literature for a quarter of a century. Time, however, has taken away much of his prestige. As a critic, he is narrow; and his style is ponderous. On the other hand, his opinions show independent and robust thinking; and his style, even in the *Rambler*, has at times a delightful rhythm. Of the charm of his conversations there can never be any question, and, among English conversationalists, the palm by general consent must go to him. Of Johnson as a man the record is complete. Though Boswell noted his sayings and doings in a great variety of situations, nothing was ever said or done to lessen one's respect for his noble qualities of mind and heart.

Bibliography. His *Works*, ed. by Walesby (11 vols., Oxford, 1825); *Lives of the Poets*, with notes and introduction by Waugh (6 vols., London, 1896); *Johnson Club Papers* (ib., 1899); R. B. Hill, *Dr. Johnson: His Friends and his Critics* (ib., 1878); id., *Boswell's Life of Johnson* (6 vols., Oxford, 1887); id., *Letters* (London, 1892); *Johnsonian Miscellanies* (New York, 1897); the lives of Johnson by Leslie Stephen, in "English Men of Letters Series" (London, 1878); F. R. C. Grant, in "Great Writers Series" (ib., 1887), with a bibliography; John Dennis, *Dr. Johnson* (New York, 1905); W. A. Raleigh, *Samuel Johnson* (Oxford, 1907); C. K. Shorter, *Immortal Memories* (New York, 1907); W. A. Raleigh, *Six Essays on Johnson* (Oxford, 1910); H. L. T. Piozzi, *Dr. Johnson's Mrs. Thrale* (New York, 1910); A. M. Broadley, *Doctor Johnson and Mrs. Thrale* (ib., 1910); F. Burney, *Dr. Johnson and Fanny Burney* (ib., 1911); J. C. Bailey, *Dr. Johnson and his Circle* (ib., 1913); and the famous essays by Macaulay and Carlyle. Roger Ingpen's edition of *Boswell's Life* (2 vols., New York and London, 1909), with some two or three hundred illustrations, constitutes a well-nigh complete picture gallery of all Johnson's friends and haunts. See also Boswell, James; Piozzi, Mrs.

JOHNSON, Samuel (1822–82). An American clergyman and reformer. He was born at North Andover, Mass., and graduated at Harvard in 1842 and at the Harvard Divinity School in 1846. He preached for some time at Dorchester, but displeased his congregation there by his opposition to slavery. In 1851 he became pastor of a "free church" in Lynn, Mass., being independent in his religious opinions. He edited, jointly with Samuel Longfellow, a collection of sacred poetry entitled *Hymns for Public and Private Devotion* (1846), and was author of *The Worship of Jesus* (1868) and of *Oriental Religions—India* (1872), *China* (1877), *Persia* (1885). Consult Longfellow, *Memoir of Samuel Johnson* (Boston, 1883).

JOHNSON, Samuel William (1830–1909). An American agricultural chemist, born at Kingsboro, N. Y. He was educated at the Scientific School of Yale College and studied at

the universities of Leipzig and Munich. He was made professor of analytical chemistry at the Yale Scientific School in 1856, taught agricultural chemistry there from 1857 to 1875, and from 1875 to 1896 served as professor of theoretical and agricultural chemistry. From 1877 to 1899 he was also director of the Connecticut Agricultural Experiment Station. In 1858 he was appointed chemist to the State Agricultural Society and began the publication of a series of notable reports upon commercial fertilizers and on other agricultural subjects. These continued after the society was replaced by the Connecticut State Board of Agriculture. He was a member of the National Academy of Sciences and in 1878 was president of the American Chemical Society. His publications include: *Essays on Peat, Muck, and Commercial Manures* (1859); *Peat and its Uses* (1866); *How Crops Grow* (1868); *How Crops Feed* (1870). He edited Fresenius' *Manual of Quantitative Chemical Analysis* (1st, 2d, and 3d eds., 1864, 1875, 1883).

JOHNSON, Thomas (1732–1819). An American statesman, born at St. Leonard, Md. He studied law in Annapolis; was a leader of the pre-Revolutionary agitation in Maryland; became a prominent member of the First Continental Congress, to which he was reëlected in 1776; moved the appointment of Washington as commander in chief (June, 1775); and in 1776 was made brigadier general of the militia of the province, going to Washington's relief in the winter of that year. Early in 1777 he was elected Governor of Maryland and held that office through 1779, acting with much energy and vigor in behalf of the Continental Congress and its forces. He was returned to the Provincial Congress in 1780 and became a member of the House of Delegates in the same year. From 1781 to 1787 he sat in the Continental Congress; he became a supporter of the Constitution and was a member of the Maryland convention which ratified that instrument in 1789. He became associate in the United States Supreme Court (1791), refused to succeed John Rutledge as Chief Justice, and refused the portfolio of State (1795). He was a member of the commission which laid out the city of Washington.

JOHNSON, Thomas Cary (1859–). An American Presbyterian theologian. He was born in Monroe Co., Va. (afterward part of W. Va.), and studied at Hampden Sidney College (A.B., 1882), at the Union Theological Seminary in Virginia, and at Yale. He was professor of Old and New Testament exegesis in the Austin (Tex.) Theological Seminary from 1888 to 1890 and thereafter was a member of the faculty of the Virginia Union Seminary—professor of the English Bible and pastoral theology (1891–92), of ecclesiastical history and polity (1892–1913), and then of systematic theology. He wrote: *A History of the Southern Presbyterian Church* (1894); *John Calvin and the Genevan Reformation* (1900); *The Life and Letters of Robert Lewis Dabney* (1903); *The Life and Letters of Benjamin Morgan Palmer* (1906); *Virginia Presbyterianism and Religious Liberty* (1907); *Introduction to Christian Missions* (1909); *Baptism in the Apostolic Age* (1912).

JOHNSON, Thomas Loftin (usually known as Tom L. Johnson) (1854–1911). An American mayor and municipal reformer, born at Georgetown, Ky. His family having suffered heavy financial losses in the Civil War, in early youth he obtained employment in a street-railway office. He rose rapidly to positions of responsibility and became interested in city transportation problems, inventing several devices, among which were a fare box and the Johnson rail, which he sold for large sums. In 1876 he purchased part interest in a street railway of Indianapolis and later acquired large holdings in Cleveland (where he encountered the fierce opposition of Marcus A. Hanna), in Detroit, and in Brooklyn. All of his lines were made popular and profitable by the introduction of through fares and transfers. In Cleveland he became known also as an iron manufacturer. After disposing of his street-railway interests, Johnson, then a wealthy man, entered politics. In 1898 he was unsuccessful as Democratic candidate for Congress, being defeated by T. E. Burton (q.v.); in 1890 and 1892 he was successful. In his campaigns Johnson announced his adherence to and advocacy of the single-tax ideas of Henry George and of public ownership of utilities, and in Congress he urged especially the adoption of the single tax for the District of Columbia. He attracted national attention by his plans of municipal ownership. Elected mayor of Cleveland in 1901 and thrice reëlected, during this period of eight years Johnson transformed the city government. His persistence and success in introducing radical reforms, and especially his bitter fight to secure three-cent fares over all street-car lines in the city, were matters of country-wide interest. In 1903 he was an unsuccessful candidate for the governorship. His public service ended in 1910. Consult his autobiography, *My Story*, edited by E. J. Hauser (New York, 1911).

JOHNSON, Virginia Wales (1849–). An American author, born in Brooklyn, N. Y. After 1875 she resided in Europe. Her publications, mainly for young people, include: *The Kettle Club Series* (1870); *Joseph the Jew* (1873); *A Sack of Gold* (1874); *The Catskill Fairies* (1875); *The Calderwood Secret* (1875); *The Neptune Vase* (1881); *Tulip Place* (1886); *The House of the Musician* (1887); *The World's Shrine* (1902); *Many Years of a Florence Balcony* (1911); *A Lift on the Road* (1913), short stories.

JOHNSON, Walter Rogers (1794–1852). An American chemist, born at Leominster, Mass. He graduated from Harvard in 1819. From 1839 to 1843 he was professor of physics and chemistry in the University of Pennsylvania. He devoted himself to studying the strength of materials and mechanical construction and wrote: *Use of Anthracite in the Manufacture of Coal* (1841); *Report on Coals* (1844); *Coal Trade of British America* (1850); and several scientific textbooks.

JOHNSON, Sir William (1715–74). A British soldier and superintendent of Indian affairs in America, born in Smithtown, County Meath, Ireland. He was educated for mercantile pursuits, but in 1738 assumed the management of the landed estates of his uncle, Sir Peter Warren, in the Colony of New York. In that year he settled on a tract of land in the Mohawk valley, about 25 miles west of the present town of Schenectady, and at once undertook the improvement and colonization of his uncle's lands. His relations with the Indians, with whom he was soon engaged in trade, were characterized

by honesty and fair dealing. He soon acquired a knowledge of their language, familiarized himself with their customs, and cultivated their friendship. In 1744 Governor Clinton appointed him superintendent of the affairs of the Six Nations, and two years later he was made Indian commissioner of New York. In 1748 he was charged by the government with the defense of the New York frontier, and on one occasion by his tact and personal influence was able to effect the settlement of a difficulty between the Indians and the colonists. In the meantime he had received a royal commission as a member of the Governor's Council, and in 1754 was one of the commissioners to the Albany Convention (q.v.) called to treat with the Indians and at the same time to prepare a plan of union for the Colonies. Upon the outbreak of the French and Indian War (q.v.) he was given sole charge of Indian affairs in New York, was commissioned a major general of Colonial forces, and was charged with the conduct of the expedition against Crown Point. In this capacity he performed valuable service to the Colonial cause by defeating and capturing Baron Dieskau at Lake George. It was largely through his influence that the Six Nations were kept from joining the French in this struggle. For this service he received the thanks of Parliament, accompanied by a grant of £5000, and at the same time was created a baronet, and in the following year was made superintendent of all affairs of the Six Nations and other Northern Indians. He subsequently took part in the futile attempts to relieve Oswego and Fort William Henry and was present at the battles of Ticonderoga and Fort Niagara. In the latter engagement, after the death of General Prideaux, he assumed the chief command, cut to pieces the French army, and compelled the surrender of the fort. Later he led the Indians in an expedition to Canada and was present at the surrender of Montreal. Through his influence the Six Nations, as a whole, were prevented from joining the Pontiac conspiracy, although he was unable to secure the absolute neutrality of the Senecas. In addition to the reward which he had already received, the King granted him a tract of nearly 100,000 acres of land in the Mohawk valley, where he built Johnson Hall, which is still standing and which became the nucleus of Johnstown, N. Y. Here Sir William lived for the remainder of his life in baronial fashion. His last public service was the conclusion of the Treaty of Fort Stanwix in 1768. (See FORT STANWIX.) He died July 11, 1774, in his fifty-ninth year. In 1739 Johnson married the daughter of a neighboring German settler, and by her had three children. After her death he had several mistresses, both Indian and white, one of whom was "Molly" Brant, a sister of the Mohawk chief, Joseph Brant or Thayendanegea. By her he had eight children. Sir William prepared a paper of some value on "The Language, Customs, and Manners of the Six Nations," published in the *Transactions of the Philosophical Society* of Philadelphia for November, 1772, and he wrote a great number of letters of historical value. Consult: *Calendar of the Sir William Johnson Manuscripts*, compiled by Day (Albany, 1909); Stone, *Life of Sir William Johnson* (2 vols., ib., 1865); Griffis, *Sir William Johnson and the Six Nations* (New York, 1891); Buell, *Sir William Johnson* (ib., 1903).

JOHNSON, WILLIAM (1771–1834). An American jurist, born at Charleston, S. C. He graduated at Princeton in 1790; studied law under C. C. Pinckney; was admitted to the bar in 1793; and represented Charleston in the State Legislature from 1794 to 1798, when he received the appointment to the Court of Common Pleas. In 1804 he was appointed to the United States Supreme Court, where his course was marked by great independence, especially in a case based on the Embargo Act, the legality of which he denied. His opposition to nullification was so strong that in 1833 he had to leave his own State. He spent a few months in western Pennsylvania and in 1834 removed to Brooklyn, N. Y. He wrote *Life and Correspondence of Major-General Nathanael Greene* (1822).

JOHNSON, WILLIAM. See CORY, WILLIAM JOHNSON.

JOHNSON, WILLIAM SAMUEL (1727–1819). An American jurist and educator, born at Stratford, Conn. He was the son of the Rev. Samuel Johnson (q.v.), who became the first president of King's College (now Columbia University). He graduated at Yale in 1744 and in 1747 received the degree of A.M. from Harvard. After graduation he planned to enter the Church and worked for a time for the Society for the Propagation of the Gospel, but changed his plans, studied law, and practiced in the courts of Connecticut and New York. In 1761 and 1765 he was a member of the Lower House of the Connecticut Legislature and then was made a member of the Upper House or Governor's Council. In 1765 he was a delegate from Connecticut to the meeting at New York known as the Stamp Act Congress. From 1766 to 1771 he was in London as counsel for the Colony in litigation concerning the title to land secured from the Mohegan Indians. On his return he was again a member of the Governor's Council and in 1772 was made judge of the Superior Court. After the battle of Lexington he was one of a committee sent to General Gage to consider the possibility of peace. He was opposed to the war and during its progress remained quietly at home practicing his profession, though he contributed money to the American cause. From 1784 to 1787 he was a member of the Continental Congress and in 1787 was at the head of the Connecticut delegation to the convention to form the Federal Constitution. He was again made a member of the Governor's Council and also in this year (1787) the first president of Columbia College after its reorganization. In 1789 he was elected the first Senator of the United States from Connecticut. When the seat of government was removed to Philadelphia, he attended one session of Congress, but in 1793 resigned in order to devote his whole time to the college. In 1800, on account of failing health, he resigned the presidency and retired to Stratford, where he lived quietly until his death. He received the degree of D.C.L. from Oxford in 1766 and later LL.D. from Yale. While in London he made many friends, among them being Dr. Samuel Johnson, with whom he corresponded. His letters to the governors of Connecticut during this period, giving his view upon the Colonial situation, are printed in the *Massachusetts Historical Collection*, 5th series, vol. ix. Consult Beardsley, *Life of William Samuel Johnson* (Boston, 1876).

JOHNSON, WILLIAM WOOLSEY (1841–). An American mathematician, born at Owego,

N. Y. In 1862 he graduated from Yale University (A.M., 1868). He served in the United States Nautical Almanac Office in 1862–64; taught mathematics in the United States Naval Academy (1864–70), at Kenyon College, Ohio (1870–72), and at St. John's College, Mo. (1872–81); and in 1881 returned to Annapolis as professor of mathematics. In 1913 he accepted in addition a professorship in the navy. He is author of: *An Elementary Treatise on the Integral Calculus* (1881); *Curve Tracing in Cartesian Co-ordinates* (1884); *The Theory of Errors and Methods of Least Squares* (1890); *A Treatise on Ordinary and Partial Differential Equations* (1889); *An Elementary Treatise on Theoretical Mechanics* (1901); *Treatise on Differential Calculus* (1904); *Differential Equations* (1906); *Treatise on Integral Calculus* (1907); *An Elementary Treatise on the Differential Calculus* (1908).

JOHN'SONBURG. A borough in Elk Co., Pa., 164 miles northeast of Pittsburgh, on the Buffalo, Rochester, and Pittsburgh, the Erie, and the Pennsylvania railroads (Map: Pennsylvania, D 3). It is in a productive farming and lumbering region and has extensive paper mills. There are some deposits of coal, clay, oil, and natural gas. Pop., 1910, 4334.

JOHNSON CITY. A city in Washington Co., Tenn., 106 miles east by north of Knoxville, on the Southern, the Carolina, Clinchfield, and Ohio, and the East Tennessee and Western North Carolina railroads (Map: Tennessee, H 2). It is known as a summer resort, having an elevated site and picturesque mountain scenery. The mountain branch of the United States Soldiers Home and the East Tennessee State Normal School are situated here. There is also a public library. The city is also a manufacturing centre, with woodworking establishments, an iron furnace, rolling mills, cigar, box, table, and furniture factories, a foundry and machine shops, a tannery, and several brick plants. Johnson City is governed under a charter of 1897, which provides for a mayor, elected biennially, and a unicameral council. The water works are owned by the municipality. Pop., 1900, 4645; 1910, 8502; 1914 (U. S. est.), 10,143; 1920, 12,442.

JOHNSON GRASS. A fodder grass of the southern United States. See ANDROPOGON.

JOHN'STON. A town in Providence Co., R. I., adjoining Providence, on the New York, New Haven, and Hartford Railroad. It has worsted mills, wool sorting and scouring works, and a soap factory. Pop., 1900, 4305; 1910, 5935.

JOHNSTON, ALBERT SIDNEY (1803–62). An American soldier, prominent on the Confederate side in the Civil War. He was born at Washington, Ky., Feb. 3, 1803, graduated at West Point in 1826, and was assigned to the Second United States Infantry. He fought in the Black Hawk War, but resigned from the army, April 24, 1834, and emigrated to Texas. In 1836 he joined in the struggle for Texan independence, enlisting as a trooper, but was soon made adjutant general and then commander of the Texan army. In 1838 he was appointed Secretary of War of the young Republic and displayed political wisdom and military ability in dealing with Mexican and Indian encroachments. He resigned his office early in 1840 and became a planter.

When the Mexican War broke out, he became colonel of the First Regiment of Foot Riflemen of Texas, six months' volunteers, and was present at the siege of Monterey as inspector general on the staff of Gen. W. O. Butler. After some years of retirement he was appointed paymaster, in 1849, and colonel of the Second (since Fifth) United States Cavalry, in which his lieutenant colonel was Robert E. Lee, in 1855. In 1857, the Mormons having defied the United States authority, a military expedition was sent against them. At a late period in the summer the Mormons began actual hostilities against the government, destroying its supply train and threatening its troops. In an emergency the command was transferred to Colonel Johnston, whose march to Utah was conducted with rare judgment and courage. He converted an impending calamity into a solution without bloodshed of a serious military and political problem. For these services he was brevetted brigadier general, remaining in command in Utah until Feb. 29, 1860. At the outbreak of the Civil War General Johnston was in command of the Department of the Pacific, with headquarters at San Francisco, but April 10, 1861, he resigned his commission and, proceeding to Richmond, entered the service of the Confederacy, being appointed general and placed in command of the Confederate forces in the West. He held the line of Bowling Green, Ky., from September, 1861, to February, 1862, against greatly superior forces. On the fall of Fort Henry and Fort Donelson (q.v.) in February he effected his retreat through middle Tennessee to Corinth, Miss., where he assembled the entire force under his command east of the Mississippi. Advancing with his army, 40,000 strong, he attacked Grant's army at Shiloh Church unexpectedly on April 6, 1862, and drove him to the cover of his gunboats at Pittsburg Landing, capturing more than 3000 prisoners. At this critical point General Johnston was killed while leading a charge, and a lull ensued in the battle. A few hours later General Beauregard, who succeeded to the command, withdrew the Confederate troops from their advanced position, and Generals Buell and Lew Wallace coming up with reënforcements for Grant during the night, the battle was renewed the next day, and Beauregard was forced to fall back to Corinth. General Johnston was regarded by prominent officers of both armies as one of the most aggressive and brilliant of the Confederate leaders and at the time of his death as unsurpassed in handling large bodies of men in action. In his message to the Confederate Congress President Davis said: "Without doing injustice to the living, it may safely be said that our loss is irreparable." The subsequent history of the war in the West abundantly confirmed this tribute. Consult the exhaustive and valuable biography, *Life of Albert Sidney Johnston* (New York, 1878), by his son, W. P. Johnston.

JOHNSTON, ALEXANDER (1849–89). A political and constitutional historian, born in Brooklyn, N. Y. From 1883 to 1889 he was professor of political economy at Princeton. He wrote a useful and popular *History of American Politics* (1879); *Genesis of a New England State: Connecticut* (1884); *History of the United States for Schools* (1886); *History of Connecticut* (1887); *American Political History, 1763–1876. Part I: The Revolution, and the Growth of Nationality* (1905); *Part II:*

Slavery Controversy, Civil War, and Reconstruction (1906), posthumous. He edited *Representative American Orations* (1885). His article on the history of the United States in the *Encyclopædia Britannica* was later published as a volume. He also contributed to Lalor's *Cyclopædia of Political Science* (1881–84).

JOHNSTON, Alexander Keith (1804–71). A Scottish cartographer, born near Edinburgh and educated at Edinburgh University. His first important work, the *National Atlas,* was published in 1843. Its merits received immediate recognition, and Johnston was appointed Royal Geographer for Scotland. Five years later appeared his *Physical Atlas of Natural Phenomena,* the publication of which was the signal for a shower of honors from the geographical societies of Europe. A second edition, greatly improved, was issued in 1856. In 1850 appeared a very useful *Dictionary of Geography,* better known as *Johnston's Gazetteer* (5th ed., 1877). His *Royal Atlas of Geography* (1861) is probably the most beautiful and minutely accurate ever executed in the English language. He was the draftsman of a vast number of maps which were published separately and in series.

JOHNSTON, Christopher (1856–1914). An American Assyriologist. He was born at Baltimore, Md., graduated from the University of Virginia in 1876 and from the medical department of the University of Maryland in 1880, and practiced medicine until 1888. He then entered Johns Hopkins as a student of Semitics and taught at that university before and after taking the degree of Ph.D. in 1894—as instructor (1891–94), associate (1894–99), associate professor of Oriental history and archæology (1899–1908), and professor. He edited *Ancient Empires of the East* (1906), contributed to the New International Encyclopædia, and published *Epistolary Literature of the Assyrians and Babylonians* (1896).

JOHNSTON, Gabriel (1699–1752). A Colonial Governor of North Carolina. He was born in Scotland and was at one time professor of Oriental languages in the University of St. Andrews, where he had received his education. In 1734 he was appointed Governor of North Carolina, through the influence of the Earl of Wilmington, in whose honor he renamed the town of Newton, calling it Wilmington. Though he was often at odds with the people, he showed himself a man of liberal views, with an earnest desire to promote the welfare of the people. During his administration, which lasted until his death in 1752, the population of the Colony increased about threefold. For an account of his administration, consult Ashe, *History of North Carolina,* vol. i, chap. xix (Greensboro, N. C., 1908).

JOHNSTON, George (1797–1855). A British naturalist, born at Simprin, Scotland. He studied medicine with Dr. Abercrombie, graduated at the University of Edinburgh in 1819, and practiced his profession at Berwick-on-Tweed until 1853. He was thrice mayor of Berwick. Besides numerous contributions to the *Edinburgh Philosophical Journal* and other scientific periodicals, he published: *History of British Zoöphytes* (1838); *History of British Sponges and Lythophytes* (1842); *Introduction to Conchology* (1850); *Terra Lindisfarnensis: The Natural History of the Eastern Borders* (1854).

JOHNSTON, George Ben (1853–). An American surgeon. He was born at Tazewell, Va., studied in the university of that State in 1870–75, and graduated from University Medical College (New York University) in 1876. He became professor of surgery at the Medical College of Virginia and surgeon of the Memorial Hospital, Richmond, Va., of the Johnston-Willis Sanatorium, and of the Abingdon (Va.) Hospital. He served as president of the Southern Surgical and Gynæcological Association (1887), of the Medical Society of Virginia (1897), and of the American Surgical Association (1904–05). Many of his papers were published in the *Medical Register.*

JOHNSTON, Sir Harry Hamilton (1858–). An African explorer, born in London. He was educated at Stockwell Grammar School and at King's College, London, and also studied at the Royal Academy of Arts (1876–80). In 1879–80 he traveled in north Africa and in 1882–83, with the Earl of Mayo, explored Portuguese West Africa and the river Congo. In 1884 he was at the head of a scientific expedition to Mount Kilimanjaro. He explored Lakes Nyassa and Tanganyika in 1889, and in 1900 climbed Mount Ruwenzori. At various times he held consular positions in Africa, from 1899 to 1901 being special commissioner, commander in chief, and Consul General for Uganda Protectorate. He received gold medals from the Zoölogical, Royal Geographical, and Royal Scottish Geographical societies. His works, besides contributions on African ethnology, geography, and zoölogy to scientific and popular periodicals, especially the *Proceedings of the Royal Geographical Society* (1883–90), are: *Essays on the Tunisian Question* (1880–81); *The River Congo* (1884); *Kilimanjaro* (1885); *The History of a Slave* (1889); *Life of Livingstone* (1891); *British Central Africa* (1897); *A History of the Colonization of Africa by Alien Races* (1899); *The Uganda Protectorate* (1902); *British Mammals* (1903); *The Nile Quest* (1903); *Liberia* (1906); *George Grenfell and the Congo* (1908); *A History of the British Empire in Africa* (1910); *The Negro in the New World* (1910); *The Opening-up of Africa* (1911); *Views and Reviews* (1912); *Common Sense in Foreign Policy* (1913); *Phonetic Spelling* (1913).

JOHNSTON, James Finley Weir (1796–1855). An English chemist, born at Paisley. He was educated at the University of Glasgow and later studied chemistry under Berzelius. From 1833 until his death he was reader in chemistry and mineralogy at the University of Durham. In 1849–50 he spent several months in the United States, studying the agricultural conditions of the sections he visited. His writings on scientific agriculture, agricultural chemistry, and allied subjects comprise many volumes, and some of them have passed through a very large number of editions. We may mention here his *Catechism of Agricultural Chemistry and Geology* (1844, and more than 50 subsequent editions in English, as well as translations into several foreign languages); *Notes on North America, Agricultural, Economical, and Social* (1851); *The Chemistry of Common Life* (2 vols.), originally published in 1853–55.

JOHNSTON, John Humphreys (1857–). An American portrait and landscape painter. He was born in New York and studied there under La Farge and in Paris under Lefebvre and Doucet. Although La Farge's influence is

visible in Johnston's methods, color scheme, and sympathetic conception of his subject, his work has a distinctly individual note. For his "Pink Domino" he received the Temple gold medal in Philadelphia in 1896; the "Portrait of the Artist's Mother" is in the Luxembourg Museum; "Moonlight, Finisterre," is in the Carnegie Institute, Pittsburgh. Among the best known of his other paintings are "Sarah Bernhardt as Lorenzaccio" and "Mystery of the Night." He made his home chiefly in Venice, was appointed Chevalier of the Legion of Honor in 1901, and received a gold medal at Munich in 1902.

JOHNSTON, Joseph Eggleston (1807–91). An eminent American soldier, prominent on the Confederate side during the Civil War. He was born near Farmville, Prince Edward Co., Va., Feb. 3, 1807; graduated at West Point in 1829, being a classmate of Robert E. Lee; was made brevet second lieutenant, Fourth Artillery; was engaged for a time in garrison duty; took part in the Black Hawk War; and served in the Seminole War, for part of the time as aid to General Scott, until 1837, when he resigned his commission and became a civil engineer. He reentered the army on July 7, 1838, as first lieutenant of topographical engineers and was brevetted captain on the same date for gallantry in the Seminole War. In September, 1846, he was promoted to be captain. In the Mexican War he served with distinction throughout the Southern campaign, was appointed lieutenant colonel of voltigeurs in April, 1847, and was brevetted major and colonel, United States Army, for his conduct at Cerro Gordo, where he was severely wounded. At the head of the voltigeurs Colonel Johnston took part in the storming of Chapultepec and for gallantry was brevetted lieutenant colonel. In 1853–55 he had charge of Western river improvements and in March, 1855, was appointed lieutenant colonel, First United States Cavalry, after which he was engaged in various duties in Utah, Kansas, and elsewhere. In June, 1860, he was appointed quartermaster general of the army, with the rank of brigadier general. On April 20, 1861, he resigned his commission and was appointed one of the first five brigadier generals in the Confederate service. These five were soon afterward made full generals. Johnston with about 9000 men joined Beauregard at Manassas, and they defeated the Federal army under General McDowell at the first battle of Bull Run, July 21, 1861. In the early part of the campaign of 1862 Johnston had command of all the Confederate forces in Virginia and as such was in charge of the early operations against McClellan in the Peninsular campaign. At the battle of Fair Oaks, May 31, 1862, he was severely wounded and for several months was disabled for service. On reporting for duty in November, he was assigned, notwithstanding the hostility of President Jefferson Davis, to the Military Department of Tennessee. In April, 1863, he reported himself still unfit for active service. Some weeks later, however, he made an attempt to relieve Vicksburg, then besieged by Grant, but was defeated at Jackson on May 14. After the defeat of Bragg by General Grant at Chattanooga, Nov. 24–25, 1863, Johnston was put in command of all the forces of the Southwest. With 55,000 men he first occupied the fortified position of Dalton, Ga. General Sherman attacked him (May, 1864) with a superior force and compelled him to fall back to Resaca; thence, after a severe battle, to Allatoona Pass, to Kenesaw Mountain, where Johnston beat back his assailants, and across the Chattahoochee. General Sherman then threatened his line of communication with Atlanta, his base of supplies and a place of great military importance. Johnston reached that city in July, 1864, and determined to hold it to the last; but the authorities at Richmond were dissatisfied with his Fabian policy and on July 17 ordered him to turn over his command to General Hood. Near the close of February, 1865, after Sherman had captured Atlanta and marched without opposition to Savannah and into South Carolina, Johnston, at the earnest request of General Lee, was assigned to the command of the remnant of the Army of the Tennessee and of all the troops in South Carolina, Georgia, and Florida and was ordered to "concentrate all available forces and drive back Sherman." But his force being inferior to that of Sherman, he was several times defeated, and on April 26, 1865, having learned of Lee's surrender of the Army of Northern Virginia, and after consultation with President Davis and members of the Confederate cabinet, he capitulated to Sherman at Durham's Station, N. C., upon terms similar to those agreed upon at Appomattox. The testimony of Johnston's principal opponents and of an able and impartial British military critic must be taken as a fair estimate as to his merits as a soldier. General Grant said: "I have had nearly all the Southern generals in high command in front of me, and Joe Johnston gave me more anxiety than any of the others." Sherman said he was "equal in all the elements of generalship to Lee." Colonel Chesney wrote: "If men were to be judged of solely by the difficulties they overcame, independently of the direct results achieved, then General Johnston might fitly head the list of great American commanders; for on his side was neither the supreme military power wielded by Grant, nor the prestige which made Lee almost independent of those who nominally controlled him; much less the harmony of thought and action with his superior which assisted Sherman from first to last. . . . In all these points, therefore, he was at a striking disadvantage as regarded his opponent; yet with these against him, and with but one-half the number of the Federals, he contrived to hold them back, led though they were with such versatile skill and unwearied energy as the records of modern war can hardly match, for nearly two months and a half, . . . a feat that should leave his name in the annals of defensive war at least as high as that of Fabius or Turenne or Moreau." After the war Johnston resided for several years in the South, holding offices in railroad, express, and insurance companies. He was elected to Congress from the Richmond district of Virginia in 1876 and was appointed United States Commissioner of Railroads in 1885 by President Cleveland. He was a pallbearer at the funerals of Grant and Sherman. He published a *Narrative of Military Operations during the Late War* (1874). Consult Hughes, *General Johnston* (New York, 1893), in the "Great Commanders Series."

JOHNSTON, Mary (1870–). An American novelist, born at Buchanan, Botetourt Co., Va. She was educated at home and began authorship with *Prisoners of Hope* (1898), which was followed by *To Have and to Hold* (1899) and *Audrey* (1902), all stories of Colonial Vir-

ginia, which had, each, a good reception. Her novels include also: *Sir Mortimer* (1904); *The Goddess of Reason* (1907); *Lewis Rand* (1908); *The Long Roll* (1911); *Cease Firing* (1912); *Hagar* (1913); *The Witch* (1914). *Audrey* and *Sir Mortimer* were dramatized.

JOHNSTON, Richard Malcolm (1822–98). An American author, born in Hancock Co., Ga., March 8, 1822. He graduated at Mercer University, Georgia (1841), taught for a year, was admitted to the bar, practiced successfully, became professor of literature in the University of Georgia (1857), left this post at the outbreak of the Civil War, opened a boarding school for boys at Sparta, Ga., removed this institution in 1867 to Baltimore Co., Md., and maintained it there many years. Towards the end of his life he resided in Baltimore. He gained literary mark by sketches of rural Georgia, *Dukesborough Tales*, first printed in the *Southern Magazine* and collected in 1883. He contributed frequently to magazines and published: *A History of English Literature* (1879), with W. H. Browne; *Old Mark Langston* (1884); *Two Grey Tourists* (1885); *Mr. Absalom Bilingslea and Other Georgia Folk* (1887); *The Primes and their Neighbors* (1891). *Dukesborough Tales* contains his best work. He wrote a *Biography of Alexander H. Stephens* (1883), with W. H. Browne.

JOHNSTON, Robert Matteson (1867–1920). An American historian. Born in Paris, he was educated in France, England, and Germany, graduated from Cambridge University (M.A.) in 1889, and became a barrister at law of the Inner Temple. In 1904 he lectured at Harvard University and Mt. Holyoke College, in 1907–08 was professor of history at Bryn Mawr College, and after 1908 was assistant professor of history at Harvard. He is author of *The Roman Theocracy and the Republic, 1846–49* (1901); *Napoleon: A Short Biography* (1904); *The Napoleonic Empire in Southern Italy and the Rise of the Secret Societies* (1904); *The Memoirs of Malakoff* (1907); *American Soldiers* (1907); *The French Revolution* (1909); *The Corsican* (1910); *The Holy Christian Church* (1912); *Mémoire de Marie Caroline, reine de Naples* (1912); *Bull Run* (1913).

JOHNSTON, Samuel (1733–1816). An American jurist, born at Dundee, Scotland, nephew of Gabriel Johnston. His parents emigrated to Chowan Co., N. C., when he was three years old. He was admitted to the bar and was elected to four provincial congresses, over the last two of which he presided. He was moderator of the General Meeting at Newbern in 1775 and by virtue of this office was chief magistrate of North Carolina between the abdication of the last royal Governor and the accession of the first State Governor. From 1780 to 1782 he was a member of the Continental Congress, in 1788 was president of the State convention which rejected the Federal Constitution, and in 1789 was president also of that which ratified it. From 1787 to 1789 he was Governor of North Carolina, and on the expiration of his term of office he was chosen by the Federalists a United States Senator, in which capacity he served from 1790 to 1793. He was appointed judge of the Superior Court in 1800, but resigned three years later and passed the remainder of his life in retirement.

JOHNSTON, W(illiam) Dawson (1871–). An American librarian. He was born at Essex Center, Vt., graduated from Brown University in 1893, and studied at the University of Chicago (1893–94) and at Harvard University (A.M., 1898). He was an instructor in history at the University of Michigan (1894–97) and at Brown (1899–1900), an assistant in the Library of Congress (1900–07), lecturer at Simmons College (1905–07), and served as librarian of the Bureau of Education, Washington (1907–09), of Columbia University (1909–14), and of the Public Library at St. Paul, Minn., after 1914. He is author of *History of the Library of Congress* (1904) and *Special Collections in Libraries in the United States* (1912), with I. G. Mudge.

JOHNSTON, William Preston (1831–99). An American educator, son of Albert Sidney Johnston. He was born in Louisville, Ky., was educated at Centre College, at Georgetown, Ky., and at Yale (1852), and was admitted to the Kentucky bar in 1853. He was commissioned as major in the Confederate army in 1861, served as Jefferson Davis's aid-de-camp, and was captured with him. In 1867 he was chosen professor of history and literature in Washington and Lee University, became president of Louisiana State University in 1880, and first president of Tulane in 1884. He was a regent of the Smithsonian Institution. He wrote a valuable *Life of Albert Sidney Johnston* (1877); several volumes of verse; a genealogy of the Johnstons; *The Prototype of Hamlet* (1890).

JOHNSTON CITY. A city in Williamson Co., Ill., 5 miles north of Marion, on the Illinois Central and the Chicago and Eastern Illinois railroads (Map: Illinois, G 10). It is in a productive coal, fruit, and grain country, and has 17 coal mines within a radius of 4 miles. Pop., 1900, 787; 1910, 3248.

JOHN'STONE. A manufacturing town and police burgh in Renfrewshire, Scotland, on the Black Cart, 11 miles west of Glasgow (Map: Scotland, D 4). It has large manufactories of paper, shoes, iron, brass, machinery, and textiles. Elderslie, the traditional birthplace of Wallace, is a mile to the east. Pop., 1901, 11,155; 1911, 12,045.

JOHNS'TOWN. A city and the county seat of Fulton Co., N. Y., 50 miles by rail northwest of Albany, on Cayadutta Creek, and on the Fonda, Johnstown, and Gloversville Railroad (Map: New York, F 4). It was settled about 1760, was named, in 1771, after Sir William Johnson (whose mansion, erected in 1761–62, is still standing), was incorporated as a village in 1808, and was chartered as a city in 1895. It was the scene of many important councils with the Indians, and in the fall of 1781 a small American force under Col. Marinus Willett defeated here a small British force under Major Rose, the latter losing about 60 in killed, wounded, or captured. Besides Johnson Hall, there are two buildings of historic interest—the courthouse and the jail, both built in 1772. A public-library building has been presented to the city by Andrew Carnegie, and there is an old ladies' home. Johnstown has extensive manufactures of gloves and mittens, leather, knit underwear, baseballs, glovemakers' tools, gelatin, fur coats, shirts, etc. As provided under the original city charter, the government is vested in a mayor, elected every two years, who appoints the chief of police and chief of fire department, and a uni-

cameral council, of which the executive is a member. The school and water boards are independently elected by the people. The city owns its water works. Pop., 1900, 10,130; 1910, 10,447; 1914 (U. S. est.), 10,582. Consult Frothingham, *History of Fulton County* (Syracuse, 1892).

JOHNSTOWN. A city in Cambria Co., Pa., 78 miles east of Pittsburgh, on the Pennsylvania and at the terminus of a branch of the Baltimore and Ohio Railroad (Map: Pennsylvania, D 7). It occupies, at an elevation of about 1300 feet, an area of 7 square miles, being situated in the irregular and narrow valley formed by the confluence of Stony Creek and the Conemaugh River. Among public buildings of note are the Conemaugh Valley Memorial and two other hospitals, the high school, Carnegie library, and the city hall. There are 23 acres of public parks, and Grand View Cemetery is of special interest as the burial place of 800 unidentified victims of the disastrous flood of 1889. The city is well known as the centre of an extensive iron and steel industry, the Cambria Steel Company alone employing some 22,000 men. There are also another large iron and steel plant here, and planing mills, brickyards, fire-clay-products works, breweries, furniture factories, and extensive manufactures of radiators. Coal is mined and shipped in large quantities, and iron ore, fire clay, and limestone are found in the vicinity. Founded in 1791, Johnstown was incorporated in 1889 and adopted the commission form of government in 1914. On May 31, 1889, as a result of heavy rains, the dam across the South Fork, a branch of the Conemaugh River, 12 miles directly east of the city, but more than 18 miles along the stream bed, was carried away, thus releasing Conemaugh Lake, a body of water 2½ miles long, 1½ miles wide at its greatest width, and in many places as much as 100 feet deep. The valley was quickly engulfed, Johnstown and surrounding villages were submerged, 2235 lives were lost, and property worth, according to some estimates, as much as $10,000,000 was destroyed. (See Dams and Reservoirs.) Aid poured in from all parts of the country, fully $3,000,000 in cash and material being contributed, and the city was quickly rebuilt and has grown steadily. Pop., 1900, 35,936; 1910, 55,482; 1914 (U. S. est.), 64,642; 1920, 67,327.

JOHN WARD, PREACHER. A novel by Margaret Deland (1888), similar in character to *Robert Elsmere.*

JO'HORE. An independent native state, occupying the southern extremity of the Malay Peninsula and embracing an area of about 9000 square miles. It is a progressive state under a sultan, whose foreign relations are controlled by Great Britain. The revenue, derived chiefly from customs dues, exceeds the expenditure by about $1,000,000. The chief products of Johore are rubber, coffee, pepper, gambier, gutta-percha, and sago. Pop., 1912, 180,412, chiefly Moslems.

JOIE DE VIVRE, zhwä de vē'vr', La (Fr., The Joy of Living). A sombre romance by Emile Zola (1884).

JOIGNEAUX, zhwä'nyō', Pierre (1815–92). A French journalist, agronomist, and politician, born at Ruffey-lès-Beaune. He was educated at the Parisian Central School of Arts and Manufactures and entered into political journalism in opposition to the government of Louis Philippe as an editor of the *Journal du Peuple.* For his connection with *L'Homme Libre,* he was put in jail for four years (1838–42) and thus gained the material for *Les prisons de Paris* (1841). Joigneaux became a member of the Constituent Assembly and edited the *Feuille du Village* (1849–51), but was banished to Belgium (1851–59) and on his return occupied himself with writing, chiefly upon agricultural subjects. In 1871 he was elected to the National Assembly, holding his seat until 1889, when he was elected to the Senate. His books include: *Histoire anecdotique des professions en France* (1843); *Les paysans sous la royauté* (1850–51); *Dictionnaire d'agriculture pratique* (1835); *L'Agriculture dans la Campine* (1859); *Légumes et fruits* (1860); *Conseils à la jeune fermière* (1861); *Culture de la vigne et fabrication des vins en Belgique* (1862); *Pisciculture et culture des eaux* (1864); *Nouvelles lettres aux paysans* (1871); *Les ephémérides Joigneaux* (1878); *Monographie de la commune de Ruffey-lès-Beaune* (1888).

JOIN'DER (Fr. *joindre,* OF. *joindre, juindre,* from Lat. *jungere,* to join; connected with Gk. *ζευγνύναι, zeugnynai,* Skt. *yuj,* to join, and ultimately with OChurch Slav. *igo,* Lith. *jùngus,* Goth. *juk,* OHG. *joh,* Ger. *Joch,* AS. *geoc,* Eng. *yoke*). In pleading and practice, the joining or uniting together of parties, issues, or causes of action for the purpose of securing a convenient and complete determination of an entire matter in controversy in a single action.

To entitle persons to be joined as parties plaintiff or defendant in an action, there must be some privity or mutuality of interest between them in respect to the claim or defense. The joining of causes of action in one suit is permitted as a matter of convenience and to save multiplicity of actions. The chief requisite is that they shall be of the same general nature and not be inconsistent.

The phrase *joinder of issue* is also employed to denote the final phase in the process of pleading, when the matter or matters in dispute between the parties to an action have been sifted out from their allegations and admissions and clearly defined. The parties are then said to "be at issue." See Action; Issue; Pleading; Practice.

JOIN'ERY. The art of joining or framing together the wooden interior finishings of buildings, such as the doors, windows, shutters, stairs, etc. It is, however, usually confined to dadoes, door trims, and cabinetwork. The term is becoming obsolete. See Building; Cabinetwork; Carpentry.

JOINT (OF. *joint, joinct,* from Lat. *junctus,* joint, from *jungere,* to join; connected with Gk. *ζευγνύναι, zeugnynai,* Skt. *yuj,* to join, and ultimately with Eng. *yoke*), or Articulation. In anatomy, the connection existing between any of the denser component parts of the skeleton, whether bone or cartilage. The structures which enter into the formation of the more complex joints are bone, ligament, cartilage, fibrocartilage, and synovial membrane. Bone is the fundamental part of all joints. Ligament is very generally the bond of union between bony segments. Cartilage (either articular, costal, or membraniform) is found as a layer between surfaces or an incrustation upon the opposing ends of bones or as an extension of a bone to reach a given point. Fibrocartilage is either disposed about the circumference of an articular

cavity in order to deepen it or is connective or separative. Synovial membranes, when articular, exist as thin sacs containing a little fluid wherewith the joints are lubricated from their position between the opposing bones. Joints vary in their degree of motion. They are arranged in three classes: 1. *Synarthrosis,* or immovable joint, of which there are three varieties. 2. *Amphiarthrosis,* or joint of limited motion, also called "synchondrosis," or "symphysis," of which there are three types. 3. *Diarthrosis,* or freely movable joint, of which there are three varieties.

Synarthrosis is divided into: (*a*) Sutura, in which there is a union of bone by a series of processes and indentations which fit closely together. There are three types of sutura, viz., sutura dentata, where the indentations are large and extensive, as in the joints between the parietal bones of the skull; sutura serrata, where the dovetailing is smaller and more regular, as in the suture between the frontal bones in youth; sutura limbosa, where there are beveled margins and dentated processes, as in the joint between the frontal bone and the parietal; harmonia, in which there is a mere coaptation of two rough bony surfaces, as between the two halves of the upper jaw; and squamosa, formed by thin, beveled margins overlapping each other, as in the squamoparietal suture. (*b*) Schindylesis, in which a thin plate of bone is inserted into a cleft, as where the rostrum of the sphenoid articulates with the vomer. (*c*) Gomphosis, in which a bone is implanted firmly into a socket of another bone, as where the teeth are inserted into the alveolar processes of the jaw.

The three main varieties of diarthrosis are: (*a*) Enarthrosis, or ball-and-socket joint, as in the case of the head of the humerus in the glenoid cavity of the scapula; (*b*) Arthrodia, including all articulations of flat or nearly flat surfaces, as in the joint between the acromion process of the scapula and the clavicle; and (*c*) Ginglymus, or hinge joint, as in the articulation of the bones of the knee, elbow, and ankle. The joints admitting of angular, lateral, or rotary motion are all called ginglymus. Some anatomists call articulation that admits of rotary motion diarthrosis rotatorius.

Amphiarthrosis includes synchondrosis, or union by cartilage, syndesmosis, or union by ligament, and syssarcosis, or union by muscular tissue. As an example of synchondrosis, the union between the two bones of the pelvis, in front, is excellent. This is generally termed the symphysis pubis. Joints admit of the following varieties of motion: flexion, extension, adduction, abduction, rotation, circumduction, and gliding movement. The hinge joints and ball-and-socket joints are most useful in securing flexion and extension; the ball-and-socket joints in securing adduction, abduction, circumduction, and rotation; while arthrodial joints alone secure gliding movement. Consult Cunningham, *Textbook of Anatomy* (New York, 1913).

JOINT. In mechanics and building, a device for, or method of, attaching together two or more pieces of a machine or structure; also the place of such union. Joints are movable or fixed. To the first class belong the hinge (q.v.), pivot, and swivel, the compass joint and rule joint, the knee or toggle joint, ball-and-socket and universal joint, all of which permit a partial rotation in one or more directions of one of the members. A swivel is a link with a stem pivoted into a ring or seat; a rule joint and compass joint are designed to secure great rigidity of rotation in the plane of the two members, the first by multiple small knuckles and a long pin, the second by a short pin and broad, flat knuckles.

Pipes are joined end to end in various ways: by flanges bolted together (flange joint), by the insertion of the tapered end of one into the flared bore of the other, by screw-threaded couplings and unions, by wiped joints of melted solder (for lead pipes only), and, where the direction of the pipes changes at the joint, by one-eighth turns, quarter turns, etc. A tee joins two pipes in a line to a third at right angles.

In carpentry a butt joint, or abutment joint, is one where the end of one piece abuts against the end or side of another; a mitre joint unites two pieces at an angle, the ends being cut to meet in a plane which bisects that angle. When a round or square projection (tenon) on the end of one piece fits into a corresponding hole (mortise) in the other, the joint is a mortise and tenon. When one-half the thickness of each piece is cut away so that at their junction the two pieces are flush, they are said to be halved into each other. A halved joint between two pieces in the same straight line is a lap joint. If the meeting surfaces are cut to a slight angle with the axis of the timbers and provided with projections or serrations that engage into each other, they form a scarf joint, which is generally locked by a wedge or key. In masonry, in floor laying, and in lathing, to break joints is to arrange the vertical or the end joints so that no two (or in lathing no more than five or six) in consecutive courses shall be in a continuous line.

In steel construction, columns, beams, etc., are secured at the joints either by fishplates, angles, or specially shaped pieces, riveted to each of the meeting pieces, or, in the case of bridge trusses and roof trusses, sometimes by pin joints. See BUILDING; CARPENTRY; MASONRY.

JOINT ADVENTURE, ENTERPRISE, or **TRADE.** A phrase sometimes applied to a business undertaking by two or more persons, in the nature of a partnership, but which is limited to a single transaction or set of transactions. The expression is more commonly used, however, of joint undertakings in which the essential element of partnership—a business carried on in common with a view to profit—is wanting. An example of this use is afforded by an agreement between the owner of an invention and another to take out a patent in their joint names and sell the right to use it, dividing the profits. Such persons are not carrying on a business, but are engaged in a joint adventure. Pooling arrangements between competitors in business are ordinarily joint enterprises and not partnerships. Each competitor remains sole owner and manager of his separate business, while all are jointly interested in the pool made up of their various earnings. Consult the authorities referred to under PARTNERSHIP; CONTRACT.

JOINT ILL, or OMPHALOPHLEBITIS. An acute infectious disease of newborn animals, principally colts and calves, occurring in the first few days of life and not later than the first four weeks. The symptoms consist in swelling of one or more joints and of the navel. The animals are stiff and lie down the greater part

of the time. High fever and rapid pulse and breathing are characteristic. The disease arises from infection in the navel at the time of birth or soon after, and a purulent discharge from the navel is seen in all advanced cases. The infection spreads through the umbilical vein, and abscesses may ultimately be formed in the muscles near the navel or even in the lungs and liver. The majority of such cases end in death. In order to prevent the occurrence of the disease the stables should be kept clean and the navel should be treated with an antiseptic solution immediately after birth. Swollen joints may be daily painted with tincture of iodine; internal doses of quinine and hyposulphite of soda three times a day sometimes give good results. Consult F. Hutyra and J. Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol. i (Chicago, 1912), and E. W. Hoare, *A System of Veterinary Medicine*, vol. i (ib., 1913).

JOINT LIABILITY. A mutual or common responsibility of two or more persons for some act or duty, which so binds them all that one cannot be held or released without the others. It is the direct opposite of "several liability," where an individual is bound personally, irrespective of his relations to others. Persons more frequently become jointly and severally liable on a bond or other obligation. In such cases the obligee or owner of the bond or obligation can sue either separately or both together at his option. Where judgment is recovered against persons jointly, and not severally, liable, the judgment creditor can levy execution against the goods of either or both of them at his option, but can have only one satisfaction. In either of the above cases, if the judgment is satisfied out of the goods of one, that one is entitled to contribution (q.v.) from the other, i.e., to be reimbursed the proportionate share the other should have paid; and this right he can enforce by action.

At common law the death of one joint obligor terminated his liability, and the survivor or survivors continued solely liable; but this rule is now changed in most jurisdictions by statute, and the estate of the deceased is liable for his share. In the absence of statutes to the contrary the discharge of one person jointly liable by operation of law, as by bankruptcy, does not release the others even for the proportionate share of the bankrupt. See CONTRACT; BOND.

JOINT OWNERSHIP. A general expression for the ownership by two or more persons, in common, of one and the same piece of property. The ownership of any property, real or personal, may be thus shared. The expression is not of precise legal signification, but is generally employed to include such various forms of common ownership as joint tenancy, tenancy in common, parcenary, and tenancy by entireties, and sometimes, also, the ownership of property by partnerships and unincorporated joint-stock associations. These differ greatly in their characteristics and in the nature of the rights which they confer, but they all have the common characteristic that each individual owner's interest is an undivided share of the entire property affected and not a definite part or parcel of the whole. The various forms of joint ownership are considered under their appropriate titles. See also OWNERSHIP; PROPERTY.

JOINTS. A name given to the divisional planes which traverse rocks, separating them into irregular prismatic blocks. All consolidated strata, whether of igneous or sedimentary character, are broken by joints, although some variations are observable depending upon the different rock materials. In sedimentary rocks the joints are usually arranged in two series that intersect each other at a high angle and are approximately perpendicular to the bedding planes. When the strata are inclined, one series in most cases trends with the dip, while the other follows the direction of the strike, thus giving rise to the classification of dip joints and strike joints. In igneous rocks there is a wider range in the number and direction of the joint planes. Granite and other coarse-grained rocks of igneous nature are often traversed by two sets of perpendicular joints forming columns and by a third set intersecting the other two and articulating the columns into segments. The finer crystalline masses such as basalt exhibit a great number of joints so arranged as to form complex polygonal prisms of remarkable regularity. This is well shown in the illustrations of Fingal's Cave (see STAFFA) and Giant's Causeway (q.v.). Jointing is of great assistance to quarrying operations; the rock is readily removed in blocks, which could be obtained by sawing or blasting only with difficulty. The cause of joints is variously explained as the result of contraction of rocks upon cooling or drying, of earthquake shocks, and of compression strains. See GEOLOGY.

JOINTS, COMPARATIVE ANATOMY OF. Among invertebrate animals there are many cases of articulation which indicate the presence of joints, but they are mostly confined to that type which is characterized by the presence of jointed appendages, the arthropods. Among the worms we find nothing to which the word "joint" can properly be applied, the relation of the successive segments to each other not justifying the term. It is even open to question whether the relationship of the segments in the arms of crinoids and brittle stars is such that the word "joint" ought to be used. The joints are generally very simple, consisting merely of the connecting of successive skeletal pieces by strips of connective tissue or muscle. In crinoids we find a very peculiar joint, the syzygy, which occurs at more or less regular intervals throughout the length of the arm and may also occur in the stalk. A syzygy has been defined as a joint in which the two skeletal pieces "are closely and immovably fitted together, though they can be separated by alkalies." If the union is still more complete, so that alkalies will not separate the pieces, the result is called ankylosis. In sea urchins we find excellent examples of true joints, in the attachment of the spines to the test by means of ball-and-socket joints, the base of the spine being hollowed out to fit smoothly over a polished tubercle and held in position by a band of muscular and connective tissue. Although the spines of many starfishes show considerable mobility, there is seldom any well-marked joint. The only example of joints among mollusks would seem to be in the connection between the eight pieces of the chiton's shell or in the hinge of a bivalve shell, but these are hardly worthy the designation. Among arthropods (insects, arachnoids, and crustaceans) joints abound, for not only are the antennæ and feet jointed appendages, but even the mouth parts and the wings work upon joints. In all these cases, however, there are no skeletal ossicles, the seg-

ments being merely sections of the uniformly inclosing exoskeleton, with the muscle or connective tissue strands within themselves. The freedom of movement is rendered possible by the marked thinning of the exoskeleton at the joints into a delicate, flexible membrane, while muscles pass from each joint into the next one.

Among vertebrates the various joints are of the same general structure and plan as in man, varying with the degree of ossification and the complexity of the organs concerned.

JOINTS, Diseases of the. Attempts have been made to classify these diseases according to the anatomical condition, as diseases of the cartilage (*chondritis*), the articular capsule (*synovitis*), or of the bone (*osteitis*); but practically the surgeon views inflammation of the joint as a whole, and uses the term *arthritis* oftener than the others. Diseases of the joints are caused by cold, injuries, gout, syphilis, tubercle necrosis, or caries. Water on the knee is the popular name for chronic synovitis of the knee joint, in which there is an effusion of fluid into the synovial cavity. White swelling is the popular name for tubercular arthritis. Dislocation may follow some joint diseases; suppuration may accompany some; while in other cases adhesions growing in the joints may cause fibrous ankylosis, or stiffened joint, or in still other cases denuded articular ends of bones may join together forming bony ankylosis with permanent immovable joint. Rest is the first treatment for a diseased joint, pain being a danger signal that counterindicates activity. Hot and cold affusions to the joint, alternately, with evaporating lotions, are useful in some cases; but domestic treatment of a joint, in ignorance of the conditions, is always hazardous. Even in the hands of competent surgeons many joint diseases are very slow in resolving. See Knee Joint; Arthritis; Gout; Rheumatism; Synovitis.

JOINT-STOCK COMPANY, or **ASSOCIATION.** An association of individuals who unite to carry on business for gain, each taking and holding shares in the common stock. At common law it is a partnership (q.v.) and is subject to the rules of partnership law, and especially to the rule which binds each partner individually to liability for the debts of the firm. It differs from the ordinary partnership, however, in three important respects: 1. Its capital stock is divided into transmissible shares; i.e., any shareholder can sell his shares to a third person, who becomes at once a member of the association, without the assent of the seller's partners. 2. The death of a shareholder does not dissolve the company. 3. The conduct of a joint-stock company's business is always limited to a few persons. A shareholder has, as such, no implied authority to act for the company. In order to bind it he must be designated as a manager, or in some other way receive authority to act for it.

At present, both in England and in the United States, joint-stock companies are generally organized under statutory provisions. The tendency of such statutes is to assimilate these companies to corporations, without really transforming them into artificial persons. In England legislation has gone further in this direction than in the United States. By the Companies Act of 1862 (25 and 26 Vict., c. 89) and acts amendatory thereof it is provided that "any seven or more persons associated for any lawful purpose may, by subscribing their names to a memorandum of association, and otherwise complying with the requisition of the act in respect to registration, form an incorporated company with or without limited liability." If the proposed company is to be an association of limited liability, the word "Limited" must be added to its title. Since the enactment of this legislation joint-stock companies have multiplied and flourished remarkably in England.

They have not gained equal popularity in the United States partly because the organization of corporations under general laws is much easier than in Great Britain, and partly because of the introduction of limited partnerships during the last century. While State legislation varies in matters of detail, it generally provides for the organization of joint-stock companies by the execution of certain written articles of association by the shareholders, and the filing of these articles in designated public offices. Their business is managed by directors and officers duly elected and announced. Actions may be maintained by the company in the name of some designated officer or officers and against the company in such name. When a judgment is obtained against the company in a suit of this kind, execution is issued against the company's property, and not against the officer named as the representative of the company, nor against the property of shareholders. Oftentimes the company is allowed to sue its members, as though they were strangers. But, as a rule, the partnership liability of each shareholder for all the debts and liabilities of the company has not been modified by our legislation. They may be dissolved by the mutual consent of all the shareholders, as in the case of an ordinary partnership, or by a decree of a court in a proper proceeding brought for that purpose. Consult: Lindley, *The Law of Companies* (London, 1889); Hurrell and Hyde, *Law of Joint Stock Companies* (ib., 1898); Birdseye, *New York Statutes*, title "Joint Stock Associations" (New York, 1901); Heinrich Lomnitz, *Die systematische Bearbeitung der Veröffentlichungen von Aktiengesellschaften* (Leipzig, 1908); W. R. Scott, *The Constitution and Finance of English, Scottish, and Irish Joint-Stock Companies to 1720*, vols. i–iii (Cambridge, 1910–12).

JOINT TENANCY. A form of common ownership of real or personal property, in which each owner is conceived of as owning the whole as well as an undivided and proportional share of the property. This is described by the quaint and untranslatable expression that the ownership is *per my et per tout.* It is of a curiously limited character and can exist only when there is a unity of interest, time, title, and possession; i.e., when the owners have identical interests, accruing by one and the same conveyance, commencing at one and the same time, and held by one and the same undivided possession. They must all hold upon one and the same conditions in every respect, each of them being regarded as having possession of every parcel and of the whole estate, not indeed for every purpose, but in respect of tenure and survivorship. For the purpose of alienation each joint tenant has a right only to his undivided relative share of the property, and the purchaser of such right does not succeed to the position of the seller as a joint tenant, but becomes a tenant in common with the survivors of the joint tenancy who have not alienated their shares. If there are two tenants, each may dispose of an undivided half; if four,

an undivided quarter, and so on; but the purchaser cannot enter upon the exclusive possession of his share, for the estate must remain undivided, subject to an entirety of interest on the part of each of the remaining joint tenants, and to what is called the principle of survivorship, by which is meant the right of the last survivor to the whole property. In other words, when one of several joint tenants dies, his share passes to the survivors, and so on until the last survivor takes the whole interest, whatever it may be, and upon his death it will pass to his heirs. This right of survivorship—or *jus accrescendi*, as it is called—is the principal and characteristic incident of a joint tenancy.

An estate in joint tenancy cannot arise by descent or operation of law, but only by purchase or acquisition, as a grant, a devise, or a disseisin. In America such tenancy is comparatively uncommon, the law presuming nothing in its favor, but inclining rather towards tenancy in common, which excludes the principle of survivorship and implies that the estate may be divided and each tenant take his proportionate share. By the common law, indeed, any conveyance to two or more persons without qualification was presumed to be in joint tenancy; but by statute in many American States this presumption has been reversed, and such a conveyance declared to be a tenancy in common unless the deed creating it contains an express statement to the contrary. An exception is, however, generally made in favor of conveyances to executors or trustees, which are still deemed to be in joint tenancy. Joint tenants are regarded in law as a single owner as respects third parties, and they must therefore all be joined in any suits that concern their joint estate. Possession by one tenant is deemed the possession of all, and a conveyance to one a conveyance to all. Consult: James Kent, *Commentary on American Law* (14th ed., 4 vols., Boston, 1896); Sir William Blackstone, *Commentaries* (4th ed., 2 vols., Chicago, 1899); Tiffany, *The Modern Law of Real Property* (St. Paul, 1903). See ENTIRETY, TENANCY BY; JOINT OWNERSHIP; COMMON, TENANCY IN; PARCENARY.

JOIN'TURE (OF., Fr. *jointure*, from Lat. *junctura*, a joining, from *jungere*, to join). A settlement made on a wife or on the husband and wife jointly, to be taken by her in lieu of dower (q.v.) if she survive her husband. It arose during the period of English history when the dower right of the married woman was in abeyance owing to the prevalence of the practice of conveying lands to the use of persons who were not the legal owners. (See DOWER.) Jointure derived its name from the fact that it was a conveyance to the husband and wife as joint tenants with the benefit of survivorship. When the Statute of Uses (27 Hen. VIII, c. 10) transferred the legal title in lands to all who had the use or beneficial ownership, its immediate effect was to revive the dower right of the wife in all such lands. As this would have resulted in giving her a double provision, the same statute compelled her to choose between her jointure and her dower. She could not have both. In this form the jointure has survived in England and in many of the United States, though the practice of settling a jointure upon married women is less common in America than in England.

The expression *equitable jointure* is applied to a similar provision made for the wife under circumstances which do not entitle her to legal jointure as described above. It is, in effect, an extension of the doctrine of jointure effected from motives of humanity and justice by courts of equity. Equitable jointure does not require so many formalities as legal jointure, but in a court of equity any provision made for the wife before the marriage, and then assented to and accepted by her as a jointure, may effectually bar her dower. In that court proof of her assent given before the marriage obviates the necessity of showing that the formalities prescribed by the Statute of Jointures have been complied with. If she be a minor, such assent may be properly given by herself and her guardian or parent. If the jointure, whether legal or equitable in its nature, be not settled upon the wife until after the marriage, it is no further binding upon her than that she must elect at the husband's death to take it in lieu of dower or to take her dower. In some of the United States she is required by statute to make such election within a prescribed time—usually one year—after the husband's death, or, if she do not so elect, she is conclusively presumed to have accepted the jointure. In some States also legal jointure is abolished, and only such as is equitable, i.e., made with her consent before marriage, can absolutely bar her dower. Substantially the same causes may operate to bar jointure as those which may defeat dower; but at law a wife does not lose her jointure, as she would her dower, by eloping and living in adultery, since it is not a mere incident of the marriage relation, but is an interest in land, vested in the woman as her sole and separate property. Consult Sir William Blackstone, *Commentaries on the Laws of England* (4th ed., 2 vols., Chicago, 1899). See DOWER; HUSBAND AND WIFE; MARRIAGE.

JOINT'WORM. Any of several hymenopterous insects of the family Chalcididæ and genus *Isosoma*, and particularly the wheat jointworm (*Isosoma tritici*) and the jointworm of barley (*Isosoma hordei*). The jointworms, although belonging to a family of parasitic insects, are true gall makers, and their larvæ make oblong swellings or enlargements in the stems of wheat, barley, and other small grains or grasses. The galls are commonly found at or near the joints and more frequently in the second joint. The adult insects are small, black, four-winged flies, averaging about ⅛ of an inch in length. The galls usually occur in groups of three or four or more, distorting and greatly weakening the stem. About 40 species are known in the United States. The best remedy consists in burning the stubble after harvest. Cf. GALL INSECTS.

JOINVILLE, zhwăn'vēl', FRANÇOIS FERDINAND D'ORLÉANS, PRINCE DE (1818–1900). Third son of Louis Philippe, King of France (1830–48). He was born at Neuilly, Aug. 14, 1818, was educated at the naval school at Brest, and was made a naval lieutenant in 1838. In 1840 he commanded the frigate *La Belle Poule*, which bore the body of Napoleon from St. Helena to France. In 1843, at Rio de Janeiro, he married Francesca, sister of the Brazilian Emperor, Pedro II. In the same year he was made rear admiral. In 1844, in the war with Morocco, he commanded the French squadron at the bombardment of Tangier and the taking of Mogador and was made a vice admiral. With the other members of the royal family, he took refuge in England after the revolution of 1848. In 1861, with his son, the Duc de Penthièvre, and his

nephews, the Comte de Paris and the Duc de Chartres, he went to the United States, where they joined the staff of General McClellan. The course of France in Mexico, however, made Frenchmen unpopular, and the Prince returned to England in 1862. In 1870 he returned to France and, being forbidden to remain in the country, served under the name of Colonel Lutherod in the fighting about Orléans. He was arrested by order of Gambetta, confined five days in the fortress of Mans, and then sent to England. Being relieved of his political disabilities, he entered the Assembly as a Deputy from Haute-Marne in 1871. He retired from public life in 1876 because of growing deafness and was again sent into exile by the Law of 1886 against the royalist families. He returned to France in 1895 and died June 16, 1900. He was a man of considerable and varied talent, a capable military and naval officer, and a writer of ability. Most of his essays in the *Revue des Deux Mondes* appeared in book form as *Essais sur la marine française: L'Escadre de la Méditerranée* (Paris, 1853) and *Etudes sur la marine .et récits de guerre* (1859; 2d ed., 1870). He also published a book on his experiences in the Civil War, *La guerre d'Amérique, campagne du Potomac* (1872). Of interest especially as to the French revolution of 1848 are his recollections published in 1894 under the title *Vieux souvenirs, 1818 à 1848*.

JOINVILLE, Jean, Sire de (1224–1317). A great French chronicler, hereditary seneschal of Champagne, and Governor thereof during the minority of Jeanne de Navarre, at whose request he wrote or completed his *Histoire de Saint Louis*. He was of a family illustrious in the second, third, and fifth crusades. Reared at the literary court of Thibaut of Champagne, he was already married and father of two children when at 24 he joined at Cyprus Louis IX on his first (the Egyptian) crusade (September, 1248). Joinville was wounded at Mansurah in 1250 and taken prisoner, but after a month he was ransomed. He remained in Egypt and Syria till 1254. The experience satisfied him, and he declined to accompany the King on his crusade to Tunis in 1267. In 1283 Philip III made him Governor of Champagne. His *Histoire*, though made at the request of Jeanne, then Queen, was presented four years after her death (1309) to her son, the future Louis X. There is a letter of 1315 in which Joinville, then over 90, offers to join that King in a campaign against Flanders. He died on Christmas Eve, 1317. At Saint-Jean d'Acre Joinville wrote his *Credo* (1251), a sort of commentary on the Creed, and he recast it in 1287. He was also fond of annotating autographically the papers of his chancellery; and it is now thought, contrary to earlier opinion, that the kernel of his *Histoire* consists, not of the recollections of an old man, but of notes taken during the Egyptian crusade or of personal memoirs written probably soon after 1272. To these memoirs, retouched and expanded, the anecdotal history of the already venerated King was added by the aged Joinville at royal request, probably in 1305. In the later parts there are traces of senility; the memoirs are the work of a keen observer and a born narrator. Here, says Langlois, Joinville reveals himself fundamentally good, straightforward, cautious, filled with an ideal of duty, brave though not fond of blows, careful of his interests and his ease, a jealous conserver of tradition, with just a trace of aristocratic pride and personal vanity, but yet full of good sense, good humor, and dry wit. If Joinville had not written, the classic, popular figure of St. Louis would not be what it is, and there would be something lacking in the history of France. Yet there are but these manuscript copies of the *Histoire*, which for two centuries seems to have been quite forgotten. The works of Joinville were first edited by Antoine de Risux in 1547, and best by Natalis de Wailly in *Jean de Joinville: Histoire de Saint Louis, Credo et Lettre à Louis X*, with a modernized version (Paris, 1874).

Bibliography. Jules Fériel, *Jean, Sire de Joinville, Sénéchal de Champagne* (Chaumont, 1853); Gaston Paris, in his *Littérature française au moyen âge* (Paris, 1893); Delaborde, *Jean de Joinville et les Seigneurs de Joinville* (ib., 1894); and Gaston Paris in *Romania* (ib., 1894); Fitzjames Stephen, *Horæ Sabbaticæ* (London, 1891; English trans. by F. T. Marzials, ib., 1908); *Memoirs of the Lord of Joinville* (new Eng. version by E. Wedgwood, New York, 1906).

JÓKAI, yō'kŏ-ĭ, Maurus (Hung. *Mór*) (1825–1904). A famous Hungarian writer of fiction, born at Komorn (Komárom) Feb. 19, 1825. At Pápa he made the acquaintance of Petőfi (q.v.), with whom he entered into a lasting friendship, the two being the leaders of the young Nationalist party during the revolutionary days of 1848. On March 15 they fought for the "twelve articles" (freedom of the press, etc.). Though admitted to the bar in 1846, he never took up law practice, but devoted himself to literary pursuits. As early as 1842 he composed his first drama, *A Zsidó fiú* (*The Jew Boy*), and published in 1846 his first novel, *Hétköznapok* (*Working Days*), which at once became popular. In 1847 he assumed the editorship of the weekly *Életképek* (*Pictures from Life*), which molded public opinion and guided the minds during those days of social ferment. Two volumes of his tales, *Vadon virágai* (*Wilderness Flowers*), appeared during the same year and attracted general attention to the rising author. After the revolution was crushed out, he was imprisoned at Világos (in 1849), whence after many hairbreadth escapes he was safely brought to Pest by his devoted young wife, later the famous tragic actress Rosa Laborfalvy. These troublous days he described in his *Forradalmi és csataképek* (1849, *Revolutionary Battle Pictures*), followed by a series of novels dealing with the history of Hungary. Of these works the following are best known: *Erdély arany kora* (1851; trans. by Nisbet Bain as *The Golden Era of Transylvania*); *A két szarvu ember* (1852, *The Two-Horned Man*); *Török világ Magyarországon* (1852; Eng. trans., *The Turks in Hungary*); *Egy magyar nábób* (*An Hungarian Nabob*), one of his best novels, describing the life of wealthy Hungarians, "who lived like little potentates in prerevolutionary times"; its sequel, *Kárpáthy Zoltán* (1854, *The Carpathian Sultan*), full of pathos and humor; *A köszivü ember fiai* (*The Sons of a Heartless Man*); *Politikai divatok* (*Political Fashions*); *Mégis mozog a föld* (1866, *And Yet the Earth Moves*); *Az új földesúr* (*The New Landlord*, trans. by A. Patterson, London, 1865), admittedly his masterpiece as regards form and structure; *A jövö század regénye* (1874, *The Romance of the Next Century*); *A ma* (1881, *Our Days*); *Fekete gyémántok* (*Black Diamonds*, trans. into Eng-

lish); *Mire megvénülünk* (*What we are Growing Old for*); *Szerelem bolondjai* (*Love's Fools*); *Nincsen ördög* (*There is No Devil*, trans., New York, 1891); *Rákóczy fiu* (*The Son of Rákoczy*); *Az arany ember* (*The Man of Gold*, trans. as *A Modern Midas*, New York, 1886); *Kétszer kettő négy* (*Twice Two is Four*); *A Tengerszemü hölgy* (1890, *Eyes Like the Sea*). Of his numerous dramas, *King Koloman* (1855), *Manlius Sinister* (1856), *George Dózsa* (1858), *The Martyrs of Szigetvár* (1859), and *Milton* (1878) met with the greatest favor. Jókai's *History of Hungary* (1884) is held in high repute. From 1858 till 1881 he was contributor to and editor of the leading humorous weekly, *Ustökös* (*Comet*), at Budapest; founded the political daily *Hon* (*Fatherland*) in 1863, and became editor in chief of *Nemzet* (*The Nation*) in 1894.

He was elected to the Hungarian Academy in 1858, became a member of the Kisfaludy Society in 1860, and was president of the Petőfi Society after 1878. The fiftieth anniversary of his literary activity was celebrated throughout Hungary in 1894, and an *édition de luxe* of his works was issued in 100 volumes; this edition is, however, far from including all Jókai's literary productions. A supporter of Tisza, Jókai was many times reëlected to the Lower House of the Hungarian Parliament until January, 1897, when he was called by Emperor Francis Joseph to the House of Magnates.

Alert and keen to what was going on in the world, he reflected in his methods the various literary currents prevailing in European literature. Thus, avowedly a pupil of the French Romanticists, particularly Victor Hugo and Alexandre Dumas, at the beginning of his literary career, he became a strong champion of the Realistic school during the last two decades of the nineteenth century. Written in a rich and racy language, vivid in fancy, rich in humor, absorbing in plot, his works are often open to criticism owing to the special nature of his gifts and the rather crude psychology of his heroes; but his writings present a splendid panorama of the political and social life of Hungary, particularly during the nineteenth century, and more especially the period of his country's regeneration (1825–48), the revolution, and the epoch of reaction. Consult L. Névy, *M. Jókai* (Budapest, 1894); R. N. Bain, "Maurus Jókai," in the *Monthly Review*, vol. iv (London, 1901); Temperley, "Jókai and the Historical Novel," in the *Contemporary Review*, vol. lxxxvi (ib., 1904); Emile Horn, "Maurice Jókai," in *Le Carnet*, vol. xix (Paris, 1904); M. Kalmán, *Jókai Már Elete és kora*, part i (Budapest, 1907).

JOKJAKARTA, jŏk'jȧ-kär'tȧ, or DJOCJAKARTA. The capital of a native vassal state on the island of Java, Dutch East Indies, pleasantly situated a short distance from the south coast, 260 miles by rail east-southeast of Batavia (Map: East Indies, D 7). It is a regularly built and fortified town, and the seat of the native Sultan and of the Dutch Resident. Pop., 1900, 72,235; 1905, 79,567. In the vicinity is a magnificent water palace, constructed about 1750. Its paradise gardens and beautiful lakes with luxurious water chambers were the resort of the former sultans in their leisure hours. It is now decayed and visited only by tourists.

JOK'TAN (Heb. *Yoktān*). According to Gen. x. 25–30, son of Eber, a descendant of Shem, and progenitor of the older Arabian tribes. In the tradition of the Arabs, Joktan is identified with Kahtan, the ancestor of the South Arabian clans. The traditions are not thought to have historical value.

JO'LA, or **FEL'UP**. Negroes along the Gambia River, on the extreme west coast of Africa. They belong to the Mande, Mandingan, or Mandenke linguistic group. They are true negroes, tall (67 inches in stature), dolichocephalic, and not at all attractive. Both sexes wear little or no clothing. They are the principal tribe in the region and have imposed their dialect upon other Mandingan tribes in the neighborhood. In some locations they are spoken of as gentle, frank, and honest; in others they are said to be cruel and always at war with their neighbors. In their own country there is neither law nor government, nor any formality in marriage. Consult Madrolla, *En Guinée* (Paris, 1895). See also MANDINGO.

JO'LIBA. A river of Africa. See NIGER.

JOLIBOIS, zhŏ'lē'bwä', CLAUDE EMILE (1813–?). A French archæologist, born in Chaumont-en-Bassigny and educated there. In 1845 he was made professor of history in the Colmar Lyceum, but was dismissed four years later on account of his political views, which involved him in further trouble through the promulgation of them in his newspaper, *Le Républicain du Rhin*, which was suppressed. He was imprisoned (1851–53), upon his release took up his abode in Paris, and in 1859 was made archivist of the Department of Tarn, where he gained medals and honors for the literary work done in connection therewith. His publications include: a translation of *Chroniques de l'évêché de Langres* (1843); *L'Histoire de la ville de Rethel* (1846); *L'Histoire de la ville de Chaumont* (1856); *La roue de fortune* (1857), which is the translation of the fourteenth-century genealogical romance; *La Haute-Marne ancienne et moderne* (1861); *L'Histoire des consuls de la ville d'Albi* (1865); *Albi au moyen âge* (1871); *Dévastation de l'Albigeois par les compagnons de Montluc* (1872).

JO'LIET. A city and the county seat of Will Co., Ill., 37 miles by rail southwest of Chicago, on the Des Plaines River and the Illinois and Michigan Canal, and on the Chicago and Alton, the Atchison, Topeka, and Santa Fe, the Chicago, Rock Island, and Pacific, the Elgin, Joliet, and Eastern, the Chicago, Milwaukee, and Gary, the Chicago, Ottawa, and Peoria, and the Michigan Central railroads (Map: Illinois, H 2). Four miles from the city is the new Illinois State Penitentiary, covering 4000 acres, and there are a public library, St. Joseph's and Silver Cross hospitals, the Illinois Steel Company's Athenæum, a clubhouse for working men, and St. Francis and St. Mary academies. The township high school, which cost about $250,000, is a large building, splendidly equipped. The city contains also Bush and Dellwood parks. Industrial interests are represented by plants of the Illinois Steel Company, American Steel and Wire Company, and the American Sheet and Tin Plate Company, and by stove and boiler works, machine shops, agricultural-implement works, engine, match, box, pottery, brick, and chemical factories, etc. Several of the largest limestone quarries in the United States are here. The manufacturing is largely promoted by power from the river and canal. Joliet is governed by the commission form of government, with a

mayor and four commissioners, elected every four years. The town, named after the famous explorer, was settled about 1831 and was organized as a city in 1852. It owns the water works. Pop., 1900, 29,353; 1910, 34,670; 1914 (U. S. est.), 36,934; 1920, 38,406.

JOLIET, zhō'lyā', CHARLES (1832–1910). A French journalist and author. He was born at Saint-Hippolyte-sur-le-Doubs in the Department of Doubs and was educated at the College of Chartres and the Lyceum of Versailles. In 1854 he entered the civil service. He varied his official labors by dilettante journalism and in 1859 published *L'Esprit de Diderot*. His anagrammatic pseudonym, J. Telio, became well known, and in 1864 he abandoned his official position and thenceforward devoted himself to journalism and miscellaneous literature. His early successes were *Le roman de deux jeunes mariés* (1866) and *Mademoiselle Chérubin* (1870). His fame was enhanced during the Franco-German War (1870–71), and subsequently, by his novels treating of incidents during that turbulent period. Among the more important of these are: *Les romans patriotiques* (1871); *Le train des maris* (1872); *Trois uhlans* (1872); *La foire aux chagrins* (1873). His later works include: *Carmagnol* (1876); *La vipère* (1880), a study of a woman; *Le crime du pont de Chatou* (1882); *Le médecin des dames* (1885); *Violette* (1890), portraying the miseries and splendors of an actress; *Nouveaux jeux d'esprit* (1892).

JOLIET, LOUIS (1645–1700). An explorer of the Mississippi valley. He was a Canadian by birth and was educated for the priesthood in the Jesuits' College at Quebec. His inclination drew him towards the woods, and he soon became known as a voyageur. In 1669 he went with a party to search for copper on the shores of Lake Superior and to discover a more direct route from the upper lakes to Montreal. He penetrated as far west as Sault Ste. Marie. In 1672 Joliet was selected by Frontenac, then newly appointed Governor of Canada, to explore the course of the Mississippi, which was supposed to flow into the "Sea" of California. In December he reached Mackinaw, where he found Père Marquette (q.v.), and remained during the winter. The voyage of exploration was continued in the following May. Seven men in two birch-bark canoes ascended the Fox River, crossed the portage to the Wisconsin, and, sailing down that stream, on June 17 entered the Mississippi, which they descended as far as the Arkansas River. Satisfied that the Mississippi flowed into the Gulf of Mexico and not into the Pacific Ocean, they returned to Quebec by way of the Illinois River and Lake Michigan. Joliet's canoe had been overset in the Lachine Rapids, and all his maps and papers lost, but from memory he drew a map of the discoveries he had made, of which a facsimile is given in Winsor's *Narrative and Critical History*, vol. iv, pp. 208, 210. He was presented with the island of Anticosti and built a fort there. In 1693 he was appointed Royal Hydrographer and in 1697 was granted the seigniory of Joliet, south of Quebec, which is still in the possession of his descendants. Consult: Shea, *Discovery and Exploration of the Mississippi Valley* (New York, 1852); Parkman, *La Salle, or the Discovery of the Great West* (Boston, 1879); Gagnon, *Louis Jolliet* (Quebec, 1902); and for a consideration of the first discovery of the Mississippi, Winsor, *Cartier to Frontenac* (Boston, 1894).

JOLIETTE, zhō-lyĕt'. The capital of Joliette Co., Quebec, on L'Assomption River, 36 miles north by east of Montreal, on the Canadian Northern and the Canadian Pacific railways (Map: Quebec, E 4). It has a Roman Catholic cathedral, a classical college, academies for boys and girls, a hospital, and two orphan asylums. Among its manufacturing establishments are saw, lumber, and grist mills, a biscuit factory, five tobacco factories, two woolen mills, a chemical factory, two paper mills, a sash and door factory, a brewery, and steel and iron foundries. Pop., 1901, 4220; 1911, 6346.

JOLIN, yō-lēn', JOHAN KRISTOFER (1818–84). A Swedish dramatist born in Stockholm. From 1845 to 1868 he was an actor in the Stockholm Theatre and during the latter part of this time was reader and director of the dramatic school. He adapted and translated a number of plays, besides writing several himself, such as the dramas *Mäster Smith* (1847), *Barnhusbarnen* (1849), and *Mjölnarfröken* (1865) and the comedies *En man af verld och en man af värde* (1846), *Min hustru vill ha roligt* (1868), and *Smålands-Petter* (1883), noted for their wit, vivacity, and clever stagecraft. He was also the author of some novels and sketches and a prize poem (1845). His complete works were published in three series, the first in 1872–81, six volumes; the second in 1882–83, five volumes; and the third in 1888.

JOLINE, jō-lēn', ADRIAN HOFFMAN (1850–1912). An American lawyer and writer, born at Ossining, N. Y. He graduated from Princeton University in 1870, studied at Columbia Law School, and was a member successively of various law firms. He became a leader at the bar in questions relating to railroad litigation, trusts, mortgages, and reorganizations, served as general counsel and director of many railroad and other corporate interests, and was receiver of the Metropolitan Street Railway Company of New York City. Joline attracted attention just previous to the presidential campaign of 1912 by the publication of a letter received by him from Woodrow Wilson in 1905, in which Wilson had said, "Would that we could do something at once dignified and effective to knock Mr. Bryan into a cocked hat." An enthusiastic book and autograph collector, Joline published: *Meditations of an Autograph Collector* (1902); *Diversions of a Book Lover* (1903); *At the Library Table* (1910); *Edgehill Essays* (1911); *Rambles in Autograph Land* (1913). His library and autograph collections were sold at auction in 1914.

JOLLY, yōl'lē, FRIEDRICH (1844–1904). A German physician, born at Heidelberg, son of Philipp von Jolly. He studied at Munich and Göttingen. In 1871 he became privatdocent at Würzburg, and in 1873 he went to Strassburg as professor of psychiatry and director of the psychiatrical clinic. There he remained until 1890, when he accepted a similar position at the University of Berlin. Among his publications are: *Bericht über die Irrenabteilung des Juliusspitals* (1873); *Untersuchungen über den elektrischen Leitungswiderstand des menschlichen Körpers* (1884); *Ueber Irrtum und Irrsinn* (1893). For several years after 1890 he was editor of the *Archiv für Psychiatrie und Nervenkrankheiten*, and his later writings were largely in collaboration. Consult Siewerling, *Zur Erinnerung an Friedrich Jolly* (Berlin, 1904).

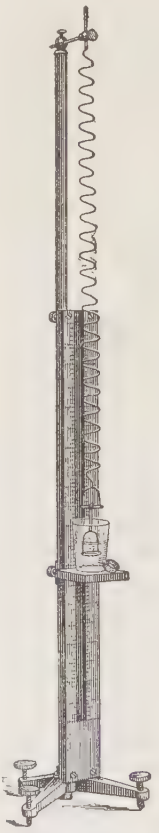
JOLLY, JULIUS (1849–). A German

philologist and Sanskrit scholar, an authority on Hindu jurisprudence, son of Philipp von Jolly. Born at Heidelberg and educated at Munich, Berlin, and Leipzig, he, in 1872, became docent and, five years later, professor of Sanskrit and comparative philology at the University of Würzburg. He traveled two years (1882–83) in India. The most important of his works are: *Ein Kapitel vergleichender Syntax* (1872); *Geschichte des Infinitivs im Indogermanischen* (1873); *Naradiya Dharmasastra* (1876); *The Institutes of Vishnu* (1880; vol. vii of *Sacred Books of the East*); *Tagore Law Lectures* (1885); *A History of the Hindu Law of Partition, Inheritance, and Adoption* (1885); *Manutikāsangraha* (1885–90); *Institutes of Nāradasmriti* (1885–86); *Mānava Dharmasāstra* (1887); *Minor Law Books* (1889; vol. xxxiii of *Sacred Books of the East*). To the *Grundriss der Indoarischen Philologie* he contributed the sections *Recht und Sitte* (1896) and *Indische Medizin* (1901). His biography of *Georg Bühler* appeared in 1899.

JOLLY, Philipp von (1809–84). A German physicist. He was born at Mannheim and studied at the universities of Heidelberg, Vienna, and Berlin. He became connected with the University of Heidelberg in 1834, as privatdocent, and in 1839 was appointed professor, serving until 1854, when he was called to the University of Munich. He was the inventor of many pieces of useful physical apparatus, which, originally designed for his researches, soon found a more general application. Among these are the air thermometer, the Jolly or spring balance for specific-gravity determinations, the copper eudiometer, and the mercury air pump. He also studied various osmotic phenomena, the expansion of gases, and the mass and density of the earth. He was the author of *Anleitung zur Differential- und Integralrechnung* (1846), *Die Principien der Mechanik* (1852), and *Die Physik der Molekularkräfte* (1857). A biography by Böhm was published at Munich in 1886.

JOL'LY BAL'ANCE. A piece of physical apparatus used in determining the specific gravity of small objects, especially minerals. It consists of a vertical standard from the upper end of which is suspended a spiral spring of fine wire. To the lower end of this spring are attached small pans, in each of which consecutively is placed the object whose specific gravity is to be determined. A scale—usually a mirror on which equal divisions are etched—is placed behind the spring, and the position of some fixed point, such as a bead, is noted on the scale. The object is then placed in the upper pan, and the spring being extended, the fixed point will be opposite some lower division on the scale. The amount that the spring is extended is noted, and after removing the object, weights enough to produce an equal extension are put in its place. The object is then placed in the lower pan, which is immersed in a vessel of water, and as the buoyant effort of the latter acts on the object the amount the spring is extended is diminished and the fixed point will be opposite some higher division on the scale, which, of course, is noted. Weights are then added to stretch the spring the same amount. The difference between the weights required to stretch the spring from its zero point to where it rests when the body is weighed in the air, and the amount required to bring it to the position it assumes when the pan and body are in the water, divided into the total weight, gives the specific gravity.

The usual arrangement of the apparatus is to have two pans, the lower of which is kept submerged in the water so that the conditions remain constant whether the body is placed in the upper or lower pan. The etched mirror usually employed forms an admirable scale, inasmuch as it enables the observer to avoid parallax and determine accurately the position of the fixed point, as when the bead or other point on the spring is seen with the eye, reflected together in the mirror, it implies that the eye, the fixed point, and the scale division are all in a straight line perpendicular to the surface of the mirror. In an accurate determination correction should be made for the temperature of the water, as explained under Specific Gravity, and the wire which carries the lower pan should be as fine as possible to eliminate the effects of capillarity between the water and the wire.



JOLLY BALANCE.

The Jolly balance is used mostly for rapid determination of specific gravity of such objects as mineralogical specimens and does not admit of as great precision as an analytical balance arranged for specific-gravity determinations. The spring must be suited to the weights of the objects which are to be used, so that the extensions will not be produced over too long or too short a range of scale. In the latter case a small error of observation will seriously affect the result. See Specific Gravity.

JOL'LY-BOAT' (*jolly*, from Dan. *jolle*, Swed. *julle*, Dutch *jol*, Eng. *yawl* + *boat*). A small boat similar to a working dingy (see Boat), but generally smaller and broader. It is of cutter model, with a square stern, and usually clinker-built. The term is now little used, but a boat of this character is nearly always carried by merchant vessels.

JOLO. See Sulu.

JOLOF. See Yolof.

JOLY, zhô'lē', Henri (1839–). A French philosopher. He was born at Auxerre, studied at the Ecole Normale Supérieure, and taught at Douai until 1871, and then at Dijon, where he was made dean in 1878. He was assistant at the Sorbonne (1881–83) and taught for a year (1886–87) at the Collège de France. After the suppression of his chair there he returned to Dijon. In 1903 he was elected a member of the Academy of Moral and Political Sciences. His works include: *Eléments de morale* (1880); *Psychologie comparée: L'homme et l'animal* (1877; 5th ed., 1911); *Psychologie des grands hommes* (1883; 3d ed., 1912); *Le crime* (1888); *La France criminelle* (1889); *Cours de philosophie* (9th ed., 1891); *Socialisme chrétien* (1892); *A travers l'Europe* (1898); *Malebranche* (1901); *Sainte Theresa* (1901; Eng.

trans., 1906); *De la corruption de nos institutions* (1903); *La Belgique criminelle* (1907); *La Hollande sociale* (1908); *La Suisse politique et sociale* (1909); *Problèmes de science criminelle* (1910); *L'Italie contemporaine* (1911); *L'Enfant* (1912); *Histoire de la civilisation* (1913).

JOLY, JACQUES CRÉTINEAU-. See CRÉTINEAU-JOLY, JACQUES.

JOLY, jō'lĭ, JOHN (1857–). An Irish physicist. He was educated at Trinity College, Dublin, was demonstrator of civil engineering there in 1882–91 and of experimental physics in 1893–97, and in 1897 became professor of geology and mineralogy. Joly devised a diffusion photometer known by his name; made valuable experiments in the early nineties on color photography, perfecting a system of trichromatic ruled screens and a method which was used (1897) for lantern slides; and determined with great accuracy the melting points of many minerals, inventing a meldometer for this purpose. He estimated the age of the earth from the quantity of sodium in the ocean. Besides many contributions to the *Proceedings*, etc., of the Royal Society and the Royal Dublin Society, he wrote an important book on *Radioactivity and Geology* (1909).

JOLY DE LOTBINIÈRE, zhô'lē' de lôt'bē'-nyâr', SIR HENRI GUSTAVE (1829–1908). A Canadian statesman. He was born at Epernay, France, was educated in Paris, studied law, and was called to the Lower Canada bar in 1855. He practiced his profession in the city and district of Quebec. Entering politics, he was elected a Liberal member of the Canada Legislative Assembly and was prominent in the debates preceding confederation, which he opposed, maintaining that French-Canadian rights would not be adequately protected. After confederation he became a member of the House of Commons and also of the Quebec Provincial Assembly, retaining his seat in both Houses until the abolition of dual representation in 1874. He elected to remain in the Quebec Assembly, where he became leader of the Liberal Opposition. In 1878 he became Premier of Quebec and pursued a vigorous policy of retrenchment, also striving to abolish the Provincial Legislative Council. He resigned in 1879, was again Opposition leader in 1879–83, and in 1885 retired from public life. After 10 years of comparative political inactivity he reëntered politics in 1895 and actively promoted the return of the Liberals to power under Sir Wilfrid Laurier in 1896. In 1897–1900 he was Minister of Inland Revenue in the Laurier administration and in 1900–06 Lieutenant Governor of British Columbia. He was made K.C.M.G. in 1895.

JOMARD, zhô'mär', EDME FRANÇOIS (1777–1862). A French Egyptologist, born at Versailles. He studied at the Ecole Polytechnique and accompanied the French army to Egypt in 1798 as a member of the scientific commission. Returning in 1802, he was appointed secretary to the commission, and in this capacity he edited the great *Description de l'Egypte*, contributing many essays, which were later published separately, and directing the printing for 20 years. In 1821 he took part in founding the Geographical Society of Paris, and in 1828 he became *conservateur administrateur* in the Royal Library. He suggested to Mehemet Ali to send a number of young Egyptians to be educated in Paris under his direction, thus forming the so-called Institut des Egyptiens. The next Viceroy conferred upon him the title of Bey. He wrote, among other works, *Voyage à l'Oasis de Syouah* (1823) and *Remarques sur les rapports de l'Ethiopie et l'Egypte* (1822).

JOMINI, zhô'mē'nē', ANTOINE HENRI, BARON (1779–1869). A French general and writer on military topics. He was born at Payerne in the Canton of Vaud, Switzerland, and began his military career in a Swiss regiment in the French service, becoming Secretary of the Department of War under Masséna in 1799. He left the army in 1801, in 1805 began the publication of his *Traité des grandes opérations militaires*, and in the same year entered the French army, as aid-de-camp on the staff of Marshal Ney. He was present at Ulm (1805) and at Jena (1806), participated in the Prussian campaign of 1807, and was sent to Spain in the following year as chief of staff to Marshal Ney. He served in the Russian campaign of 1812 under Berthier and did good service during the retreat. In 1813 he helped win the battle of Bautzen; but, offended at the treatment which he received from Napoleon, he passed over to the allies and entered the service of Alexander of Russia, to whom he had offered his services some years before while in Switzerland. He refused, however, to fight against France or to divulge the military plans of Napoleon, which were well known to him. Napoleon said of him in St. Helena, "Jomini has not betrayed his colors, he had to complain of great injustice, he was blinded by an honorable sentiment, he was not French, the love of his country did not hold him back." In 1828 he took an active part in the military operations at Varna and in 1829 settled at Brussels. In 1853 he acted as military adviser to the Czar in the Crimean War and returned to Paris after the conclusion of peace in 1856. In 1859 his advice was sought by Napoleon III on the Italian campaign. Jomini was a magnificent tactician and strategist on the field as well as in council. Besides the work already mentioned, his *Histoire critique et militaire des campagnes de la Révolution* (Paris, 1820–24), his *Vie politique et militaire de Napoléon* (ib., 1827), his *Tableau analytique des principales combinaisons de la guerre* (St. Petersburg, 1830), and especially his *Précis de l'art de la guerre* (1836), are of great value to the military student. Consult Lecomte, *Le général Jomini* (3d ed., Lausanne, 1888).

JOMMELLI, yô-mĕl'lē, NICOLÒ (1714–74). A famous Neapolitan composer and one of the most celebrated masters of his time. He was born at Aversa, near Naples, and was educated under Canon Mozzillo, Durante, Feo, Leo, Prato, and Mancini. Previous to his appointment as kapellmeister to the Duke of Württemberg in 1754, his music had been marked by every characteristic of his national school and as such was very popular with his countrymen; but the influence of German ideals during his stay in that country, from 1753 to 1769, had so thoroughly entered into his work that, notwithstanding its increased richness and power in orchestration, it was no longer acceptable to his own Naples, and this neglect is said to have hastened his death. His first serious opera was *Odoardo* (1738), and although *Merope* (1747) was the most popular, his best were *Armida* (1770) and *Ifigenia in Aulide* (1773). Of his sacred compositions, the oratorio *La passione* (1748) is the most important. In 1749 he was chapel-

master of St. Peter's, and the period of his activity there marks the zenith of his power as a Church composer, although by many his *Miserere* is considered his masterwork. His known compositions are 50 operas, five cantatas, four oratorios, and 34 Church compositions. His death occurred at Naples. Consult H. Abert, *Niccolo Jommelli als Opernkomponist* (Halle, 1908).

JO'NAH (Heb. *Yōnāh*, dove). A Hebrew prophet. According to 2 Kings xiv. 25, he was the son of Amittai, a native of Gath-hepher in Zebulon, and prophesied during the reign of Jeroboam II, King of Israel (782–740 B.C.). The subject of his prophecy was the deliverance of Israel from the oppression of the Aramæans of Damascus. (See JEHOAHAZ; JEROBOAM II.) These prophecies must have been delivered early in Jeroboam's reign. They have not been preserved. The fifth book of the Minor Prophets is ascribed to Jonah, but there are serious objections to assigning a preëxilic date to this production. (See JONAH, BOOK OF.) Isaiah xv–xvi. 12 has been attributed to Jonah, but the view is improbable and cannot be proved.

JONAH, BOOK OF. The fifth book of the Minor Prophets. In the superscription the authorship of the book is ascribed to Jonah, the son of Amittai. Considerations of language and style, however, the general thought and point of view, and the psalm in chapter ii, which closely resembles other psalms of late date, make it difficult to believe that the book was written as early as the time of Jeroboam II. It can hardly date before the time of Ezra and is more likely to belong to the Greek period. The psalm in chapter ii may be much later than the rest of the work. The book consists of two sections: (1) the episode of Jonah and the fish (chaps. i, ii); (2) the account of the repentance of Nineveh, Jonah's chagrin at finding his prophecies unfulfilled, and the divine rebuke in consequence (chaps. iii, iv). Chapter i begins with God's command to Jonah to go to Nineveh and proclaim its destruction. Jonah attempts to evade the duty and takes passage on a ship going to Tarshish. A great storm arises on the voyage, interpreted by the sailors as a sign of divine displeasure. Jonah is chosen by lot as the guilty one, confesses, and is cast into the sea and swallowed by a great fish. After three days he is cast forth alive on the shore. Chapter ii is a psalm of thanksgiving for deliverance from the perils of the sea. In chapter iii Jonah obeys the divine command and preaches at Nineveh. In consequence the people of the city, at the command of the King, repent and observe a fast in sign of contrition. God then changes His purpose, and Jonah in consequence is greatly displeased. God rebukes him in an emblematic way by means of a gourd which He causes to grow and furnish shade to Jonah against the heat of the sun for one day. When the gourd perishes, Jonah is in despair because of the discomfort he feels. Thereupon the lesson is made clear that, if he experiences such deep regret for a mere gourd, which, moreover, he had no share in producing, God may have pity on a city like Nineveh, containing such a vast population, many of them innocent and all God's creatures.

Many modern scholars think that the Book of Jonah is to be classed with the homiletic literature of the Jews, along with such books as Tobit and Susannah, which contain a narrative told for religious edification and in illustration of religious doctrines. From this point of view the book emanates from those Jewish circles which did not altogether sympathize with the exclusive conceptions developed by the doctrine of Israel's election, which, besides bringing about a total separation of the Hebrews from the "nations," placed the latter in the light of wicked people, merely because they were not Israelites. The Book of Jonah protests against this view and teaches, by means of a story of a prophet sent against Assyria, that even such a wicked heathen nation as Assyria, the old archenemy of Israel and Judah, could obtain the favor of God. The prophet himself is held up in the light of one who was more concerned with maintaining his prestige than to have his lessons followed. He urges upon God the destruction of Nineveh, despite the repentance shown by the latter. It is also the aim of the author, incidental to his main purpose, to hold the prophets up to ridicule by representing Jonah, the servant of God, as the one really disobedient to divine command. He is the one held responsible for the terrific storm which expresses the divine displeasure, as he is the one who needs the lesson of chapter iv. That the book maintained its place among the prophetic writings publicly read in the synagogue and formed a part of the final canon of Scripture is explained partly by its ascription to a preëxilic prophet mentioned elsewhere and partly by the symbolical interpretation to which it easily lent itself. Jonah as the dove—the favorite bird of sacrifice—symbolized Israel (cf. Ps. lxviii. 13). Nineveh was a disguise for Jerusalem, and the lesson of the city's repentance was intended for the Jews. In this way an interpretation of the book grew up which obscured its real and original purport.

Concerning the historicity of the book opinions have varied widely. But whatever opinion may be held on this point, there can be little doubt that its main purpose and aim was didactic. There is an old story of a man swallowed by a fish which appears in numerous forms among ancient nations—as, e.g., Bel and the dragon, Marduk and Tiamat. A story of a remarkable sea monster also appears to have some connection with the port of Joppa. The most complete discussion of these mythological motives will be found in the recent work of Hans Schmidt. Those who deny the historical character of the book, and regard the story of the prophet and the fish as a work of fiction as much as the parables of Jesus, emphasize, as a rule, more strongly than those who accept it as literal fact, the broad sympathy, the catholicity of sentiment, and the high conception of the divinity which this book reveals.

Consult: the general commentaries on the Minor Prophets (q.v.); Simpson, *The Jonah Legend* (London, 1899); Cheyne, "Jonah: A Study in Jewish Folk-Lore and Religion," in the *Theological Review* (1877); Kalisch, *Bible Studies*, vol. ii (London, 1877–78); Wright, *Biblical Essays* (ib., 1886); Hans Schmidt, *Jona* (Göttingen, 1910).

JONAH CRAB. The name in southern Massachusetts of a crab (*Cancer borealis*) differing from the common rock crab (q.v.) in being heavier, more massive, and in living at low water on exposed and rocky shores, being by its stronger, more solid shell better calculated to withstand the action of the waves; it also occurs as far down as 10 fathoms. It is supplied to the Newport markets in small quantities during the summer season, being considered by

many as preferable to the blue or lady crab (q.v.).

JONAH MARINUS. See IBN JANACH.

JONAS, hō-näs′, ALBERTO (1868–). A Spanish pianoforte virtuoso, born in Madrid. He studied first at the conservatory at Madrid and from 1886 to 1890 at the Brussels Conservatory. During the winter of 1890–91 he completed his piano studies under Rubinstein at St. Petersburg (Petrograd) and in 1891 made his début in Berlin. From 1894 to 1905 he was professor of music at the University of Michigan. In 1906 he settled in Berlin, where he gained great success as a teacher.

JONAS, yō′nȧs, JUSTUS (1493–1555). A German theologian and reformer (originally JOBST KOCH), born at Nordhausen, Saxony. He studied at Erfurt, became professor of law, and in 1521 professor of theology at Wittenberg, where he had studied for a time in 1511. He was ordained priest about 1515 and became pastor at Halle in 1541–46, court preacher at Coburg in 1551, pastor at Ratisbon in 1552, and in the following year became superintendent at Eisfeld. He was an intimate friend of Luther, whom he accompanied to the diets of Worms and Augsburg and assisted in his translation of the Old Testament. He also preached his funeral sermon. By his preaching and his translation into German of the Latin writings of Melanchthon and Luther, beginning with the theses of the latter, he did much to promote the Reformation. Consult Pressel, *Justus Jonas* (Elberfeld, 1862), and Lindsay, *History of the Reformation in Germany* (New York, 1906).

JON′ATHAN (Heb. *Yĕhōnāthān,* Yahwe gives). Eldest son of King Saul and friend of David. He was a valiant warrior, smote a garrison of the Philistines at Geba (1 Sam. xiii. 3), and a little later, assisted by his armor-bearer alone, attacked a Philistine garrison and threw the enemy into confusion (xiv. 1–18). Saul thereupon brought up his forces and completed the rout (vs. 19–23). In connection with this victory it is related that Jonathan, ignorant of a prohibition issued by his father not to partake of food until evening, ate some wild honey and as a consequence, but for the interference of the people, who ransomed their hero, would have been killed (vs. 24–46). The fast, for such it appears to have been, was probably ordained by Saul as a means of securing the assistance and favor of Yahwe in the fight. Noteworthy as Jonathan's achievements in war were, his fame rests upon the friendship between him and David. This, one of the most romantic and attractive narratives of the Old Testament, as related in 1 Sam. xviii–xx, is believed by scholars to be based on facts. Jonathan, together with his father and two of his brothers, fell at Mount Gilboa in a battle against the Philistines (1 Sam. xxxi. 2–6), and David gave a touching expression to his love for Jonathan in his beautiful elegy over Saul and Jonathan (2 Sam. i. 18–27). Consult Schmidt, *Messages of the Poets* (New York, 1911).

JON′ATHAN. The Hasmonæan, brother of Judas Maccabæus (q.v.). On the death of Judas in battle against the Syrians (161 B.C.) the leadership of the struggle of the Jews for national independence devolved upon Jonathan. The odds against him seemed at first overwhelming. The discontented elements of the population, abetted by the Syrians and the renegade high priest Alcimus, a puppet of the Syrians, attempted to crush out the patriotic party. For some time Jonathan maintained himself in the regions east of the Jordan. At length, after the death of Alcimus (May, 160 B.C.), Bacchides, the Syrian governor, having fortified and garrisoned a number of towns in Judæa, returned to Syria. This was Jonathan's opportunity. In a quiet way he managed to increase his influence and more thoroughly organize his party, with the result that after two years the pro-Syrian party became alarmed and sent to Antioch for assistance. Bacchides returned, but found Jonathan so strong that he was compelled to recognize him, and determined to make peace with him. Jonathan took up his residence at Michmash, a few miles north of Jerusalem, and for five years so guided the affairs of the patriots that, notwithstanding the existence of the council at Jerusalem and the Syrian garrisons in the country, he succeeded in uniting the mass of the population under his leadership. The wars of contestants for the throne of Syria proved advantageous to the patriots. Demetrius I was opposed by the pretender to the throne, Alexander Balas. Each of the rivals courted Jonathan's assistance, making him liberal offers both for himself and his country. Jonathan, seeing that Alexander was destined to win, accepted the insignia of princely rank sent him and espoused his cause. In the same year (153 B.C.) he assumed the duties of high priest, which office had been vacant since the death of Alcimus. Alexander, aided by Ptolemy of Egypt, was victorious, and at the celebration of his marriage to Cleopatra, Ptolemy's daughter, Jonathan was an honored guest and was publicly confirmed in his rank and privileges. He was recognized as the military, civil, and religious head of Judæa, subject to the overlordship of Syria. This remarkable success was due to Jonathan's political shrewdness as much as to his military abilities. It was not long, however, before Syrian politics were again disturbed by the appearance of Demetrius II as a rival of Alexander Balas. Demetrius was assisted by Ptolemy and won the day, but Jonathan was strong enough not only to repel an attempted invasion of Judæa, but to gain important military successes in the old Philistine territory. He even advanced a step farther and laid siege to the citadel of Jerusalem, occupied by the Syrian garrison, the symbol of Syrian sovereignty. Jonathan's aim was now evidently complete independence of Syria. Demetrius heard of this and summoned Jonathan before him. Jonathan obeyed the summons without raising the siege. The result of his interview with Demetrius was that, while a considerable tract of territory was added to Judæa's domain, the taxes were materially reduced, and Jonathan was confirmed in his various offices, still the Syrian claim of overlordship was maintained, and the garrison remained in Jerusalem. Soon after this Demetrius, who was unpopular, was forced to meet a rebellion headed by a certain Trypho, who claimed to be espousing the cause of Antiochus, son of Alexander Balas. Though Jonathan assisted Demetrius in suppressing the revolt in Antioch, the King failed to show any gratitude, and in the civil war that followed the Jews favored Trypho. Jonathan now engaged in many active and successful campaigns against the forces of Demetrius, conquered much adjacent territory to the east and south, fortified Joppa, and finally renewed his efforts to reduce the Syrian garrison in the

strong fortress of Jerusalem. He was now a powerful prince with a well-disciplined army of over 40,000 men, and Trypho saw that he must be crushed if his own ambitious designs were to succeed. He entrapped Jonathan by artful means and at first held him for a ransom, but after the ransom was paid foully murdered him (143 B.C.). Jonathan was eminently the politician of the three brothers whose careers were so glorious. His administration of 18 years was a conspicuous success. It was comparatively easy for his brother Simon, who succeeded him, to reap the benefits of Jonathan's policy and secure, in the following year (142 B.C.), complete independence for the Jews. Consult 1 Maccabees, chaps. ix–xiii, and Emil Schürer, *History of the Jewish People in the Time of Christ*, vol. i (New York, 1896).

JONATHAN BEN UZZIEL, ŭz-zī'ĕl *or* ŭz'zī-ĕl. A Jewish scholar, disciple of Hillel (q.v.), who lived about the time of Jesus. He is the traditional author of the Targum, or Aramaic translation of the prophets, but proof of his authorship is entirely lacking; the Targum Pseudo-Jonathan also formerly passed as his work. No details of Jonathan's life are known. See TARGUM.

JONATHAN OLDSTYLE. See OLDSTYLE, JONATHAN.

JONATHAN WILD, THE HISTORY OF. A novel by Fielding (1743).

JONCKBLOET, yōnk'blōōt, WILLEM JOZEF ANDRIES (1817–85). A Dutch critic and historian of literature, born at The Hague. In the University of Leyden he studied medicine, then jurisprudence, and finally literature. He was professor at the Athenæum of Deventer (1847) and at the University of Groningen (1854). In 1864 he was elected to the Lower House of the States-General, but in 1877 returned to literary work, as professor of the literature of the Netherlands, at Leyden. He gave up his professorship in 1883. He edited many mediæval works, both Dutch and French, but his more important publications are: *Geschiedenis der middennederlandsche dichtkunst* (1851–54); *Etude sur le roman de Renart* (1863); *Geschiedenis der Nederlandsche letterkunde* (last ed., 1890).

JONCTIJS, or **JONCTYS,** yōnk'tīs, DANIEL (1600–?). A Dutch poet, born at Dort. He studied medicine, and began to practice at Dort, but the theological party caused him to leave the city on account of a satirical poem, *De Hedendaagsche Venus en Minerva* (1643), directed against them. He afterward became a judge at Rotterdam. His *Rozelyns Oogjes ontleed* (1620–23), a series of love poems, was at one time much admired.

JONES, ALEXANDER (c.1802–63). An American inventor, journalist, and author, born in North Carolina, of Welsh descent. After studying medicine in Philadelphia he went to practice it in Mississippi, but while there undertook to invent an improved cotton gin, which ultimately replaced the old, and made himself so famous that he received an offer to superintend the introduction of his improvements into Hindustan cotton fields. This he declined, but his ingenuity found further outlet in a street sweeper, which he invented while engaged in journalistic work in New York, and in the formulation of a code of ciphers, the first employed by the Associated Press, of which he was agent (1850). For several years he was the writer on commercial topics for the New York *Herald*, contributed to other American and English papers, and wrote: *Cuba in 1851* (1851); *Historical Sketch of the Electric Telegraph* (1852); *The Cymri of Seventy-Six* (1855).

JONES, ALFRED (1819–1900). An American engraver, born in Liverpool, England. He was apprenticed in 1834 to an engraving firm in Albany, N. Y., and later studied at the National Academy of Design, where he received first prize in 1839. He was made a member of the National Academy in 1851. In 1846–47 he worked in England under some of the best London masters of the art of engraving. After 1851 he confined himself chiefly to bank-note engraving. His large plate, "The Image Breaker" (1850), is considered one of the best line engravings produced in the United States. Other fine examples of his work are: "Mexican News" (1851); "The New Scholar" (1850); "The Capture of Major André." His portraits of George Washington, A. B. Durand, and Thomas Carlyle combine line work with etching admirably.

JONES, ALFRED GILPIN (1824–1906). A Canadian statesman, born in Weymouth, Nova Scotia, and educated at the Yarmouth Academy. His active interest in politics did not begin until 1865, when the movement for Canadian confederation brought him out as one of its opponents, and, after the death of the Hon. Joseph Howe, he became the leader of the Nova Scotia opposition to that plan. In 1867 he was elected a member of the Dominion Parliament for Halifax and, joining the Liberal party in federal politics, was made Minister of Militia in the cabinet of Alexander Mackenzie, an office which he held in 1874–78. He served an additional term as member of the Dominion Parliament during 1887–91. In 1900–06 he was Lieutenant Governor of Nova Scotia. Jones, though a United Empire Loyalist by descent and during his earlier career a Conservative, later became a warm supporter of commercial union with the United States and in general was opposed to schemes of Imperial consolidation, whether in trade or politics.

JONES, ANSON (1798–1858). A President of the Republic of Texas, born at Great Barrington, Mass. He studied medicine and, after living for short periods in Philadelphia, New Orleans, and South America, finally, in 1833, settled in Brazoria Co., Tex. He was a surgeon in the Texan army during the war between that country and Mexico and after the cessation of active hostilities was elected a member of the Second Texan Congress (1834). The next year he was appointed Minister to the United States. After his return from Washington he was elected from Brazoria County to the Texan Senate, and in 1841 President Houston appointed him Secretary of State. In 1844 he was elected President of Texas, an office which he held until Feb. 19, 1846, when he turned over the government to J. Pinckney Henderson, the first Governor under the Constitution of the United States. His journal and autobiography were published in 1858. Jones County, and its county seat, Anson, in Texas, were named in his honor.

JONES, CHARLES COLCOCK (1831–93). An American lawyer, born at Savannah, Ga. He graduated at Princeton in 1852 and at the Harvard Law School in 1855, was admitted to the bar in Savannah in the same year, and soon took high rank in his profession. He was elected mayor of the city in 1860. On the passage of the ordinance of secession in 1861, he entered

the Confederate army and served as lieutenant colonel of artillery under Gen. J. E. Johnston until the close of the war. He then removed to New York, where he practiced law until his return to Georgia in 1877. His publications include: *Historical Sketch of the Chatham Artillery during the Confederate Struggle for Independence* (1867); *Reminiscences of the Last Days of Gen. Harry Lee* (1870); *Antiquities of the Southern Indians* (1873); *Life of Commodore Josiah Tatnall* (1878); *History of Georgia* (2 vols., 1883); *English Colonization of Georgia* (1887).

JONES, David Phillips (1841–1903). An American naval engineer, born in Philadelphia, Pa. After serving as resident engineer in the office of the Surveyor-General of Utah Territory, he entered the navy in 1862 as third assistant engineer and in 1862–63, on board the *Cimerone* and later the *Sangamon*, participated in the operations on the James River, Va., and the St. John's River, Fla. In 1864 he was promoted to be second assistant engineer, and on board the *Mendota*, of the James River division of the North Atlantic squadron, was present at the battle of Bermuda Hundred. In 1867 he attained the rank of passed assistant engineer and in 1889 that of chief engineer. During a leave of absence he was constructing engineer of the St. Louis and Southeastern Railway, in 1874–79 was instructor in steam engineering at the United States Naval Academy, in which capacity he organized the department of mechanical drawing for cadet engineers, and from 1885 to 1888 was on duty as professor of mechanical engineering at the Kansas Normal College. From 1889 until his retirement in 1892 he was at the United States navy training station at Newport, R. I. During the Spanish-American War (1898) he was ordered to Pittsburgh, Pa., as chief inspector of steel for that district, and at the close of the war became a consulting engineer at Pittsburgh.

JONES, Ebenezer (1820–60). An English poet. Born in London, of poor parents, he escaped from their rigid Calvinism under the leadership of Robert Owen, Shelley, and Carlyle, and turned to verse making as a relief from office toil. At the age of 23 he published his first volume of poems, *Studies of Sensation and Event*, which met even a worse reception than it deserved. The poet was soured in consequence and took up radical journalism. He returned to the muse only when chastened by domestic unhappiness and sick unto death, and gave evidence by his "Winter Hymn to the Snow," "When the World is Burning," and "To Death," of what he might have done had longer life been granted him. Consult the 1879 edition of *Studies of Sensation and Event*, with a memoir by his brother, Sumner, and corrections and new poems by the poet himself.

JONES, Edward ("Bardy Brenin") (1752–1824). A Welsh harpist and author, born at Llanderfel in Merionethshire. He was an important factor in the encouragement and development of Welsh minstrelsy and devoted his entire life to the study of the harp. He first appeared in London in 1775 and eight years later received the royal appointment of bard to the Prince of Wales. His works include: *Musical and Poetic Relics of the Welsh Bards* (1784 and 1794); *The Bardic Museum of Primitive British Literature*, which contains over 200 Gaelic melodies (1802); *Lyric Airs, Consisting of Specimens of Melodies of Greek, Albanian, Wallachian, Turkish, Persian, Chinese, and Moorish Melodies* (1804); *Cheshire Melodies* (1803); *The Musical Bouquet* (1799). Other publications for which no definite dates can be assigned are: *The Musical Miscellany; Terpsichore's Banquet; The Minstrel's Serenade; Maltese Melodies; The Musical Portfolio; Musical Remains of Handel, Bach, Abel, etc.; A Collection of Melodies for Beginners on the Harp.* He died in London.

JONES, E(mily) E(lizabeth) Constance (c.1857–). An English educator and writer on logic and ethics. She was educated at Girton College, Cambridge, taking a first class in the Moral Sciences Tripos in 1880; was resident lecturer on moral sciences (1884–1903) at Girton, vice mistress (1896–1903), and after 1903 mistress. She translated, with Miss Hamilton, Lotze's *Mikrokosmus* (1888); edited Sidgwick's *Methods of Ethics* (1901) and his *Ethics of Green, Spencer, and Martineau* (1902); and wrote *Elements of Logic* (1890); *A Primer of Logic* (1905); *A Primer of Ethics* (1909); *A New Law of Thought and its Logical Bearing* (1911); *Girton College* (1913).

JONES, Ernest Charles (1819–68). An English orator, poet, and politician. He was born in Berlin and studied at Luneburg and Göttingen. He was called to the bar in 1844 and two years afterward became deeply interested in the Chartist programme. He edited the *Laborer* and the *Northern Star*, defended O'Connor, and soon after broke with him, as his own plans became more radical and revolutionary. Jones urged a provisional government and was elected as one of its members by the Chartists. His speeches in May, 1848, counseled forcible attack on the established order, and he was imprisoned for two years. He adhered to Chartism after all others had forsaken it. Jones was a persuasive and brilliant orator. His prose had little worth, but his verse was marked by a true lyric gift. His varied literary activity included the writing of sensational novels and stories, published in the fifties and now forgotten; *The Battle Day and Other Poems* (1855), highly praised by Landor; *Evenings with the People* (1856), a series of political addresses.

JONES, Francis Coates (1851–). An American figure painter. He was born in Baltimore and studied at the Ecole des Beaux-Arts, Paris, under Boulanger and Lefebvre. A resident of New York after 1882, in 1894 he was elected to the National Academy of Design. He is fond of painting children or young girls in charming surroundings and shows cleverness in the handling of detail. His drawing is accurate, his color delicate, but his works are too detailed in finish and lack inspiration. Among his paintings are: "A Perplexing Move" (1909); "A Cup of Tea" (1910); "Nymphs Bathing" and "The Letter" (1911); "The Sisters" and "Wooded Hillside" (1912); "The Trout Pool" (1913). He was awarded the Clarke prize by the Academy in 1885, and the Shaw purchase by the Society of American Artists in 1904.

JONES, Frederick Scheetz (1862–). An American physicist and university dean. He was born at Palmyra, Mo., and was educated at Yale University (A.B., 1884; A.M., 1891), Berlin (1887–88), and the Polytechnic School at Zurich, Switzerland (1888–89). He was professor of physics from 1889 to 1909, and dean of the College of Engineering from 1902 to 1909,

at the University of Minnesota, and thereafter he served as dean of Yale College. His investigations in physics deal with primary cells and Röntgen rays.

JONES, George Heber (1867–1919). An American Methodist Episcopal missionary, born at Mohawk, N. Y. In 1887 he went as a missionary to Korea, where he was in educational work at Seoul (1888–93), was presiding elder of the Chemulpo District (1895–1903), and served as superintendent of the Korea Mission of his denomination (1897–99). He returned to the United States in 1903 to be field secretary of the Methodist Board of Missions, but four years later again went to the East as president of the Biblical Institute of Korea. He lectured on missions at Boston University in 1910, was executive secretary of the Korean Quarter Centennial Movement of the Methodist Episcopal church in 1910–12, and in 1913 became editorial secretary of the Methodist Board of Foreign Missions. An authority on the history, language, literature, and religion of the Koreans, he wrote *Korea: The Land, People, and Customs* (1907) and *An English-Korean Dictionary of Scientific and Technical Terms* (1910).

JONES, Harry Clary (1865–1916). An American chemist, born at New London, Md. He graduated from Johns Hopkins University (A.B., 1889; Ph.D., 1892); studied for two years at Leipzig, Amsterdam, and Stockholm; and then, returning to Johns Hopkins as an instructor in physical chemistry, later became associate (1898), associate professor (1900), and professor (1904). He became associate editor of the *Journal de Chimie Physique*, of the *Zeitschrift für physikalische Chemie*, and of the *Journal* of Franklin Institute, whose Langstreth medal he was awarded in 1913. Besides translating Biltz's *Practical Method of Determining Molecular Weights* (1899), he wrote: *Freezing Point, Boiling Point, and Conductivity Methods* (1897); *Theory of Electrolytic Dissociation* (1900); *Elements of Physical Chemistry* (1902; in Russian, 1911; in Italian, 1912); *Elements of Inorganic Chemistry* (1903); *Electrical Nature of Matter and Radioactivity* (1906); *Hydrates in Aqueous Solutions* (1907); *The Absorption Spectra of Solutions* (1909); *Introduction to Physical Chemistry* (1910); *Electrical Conductivity of Salts and Organic Acids* (1912); *A New Era in Chemistry* (1913); and many contributions to European and American journals.

JONES, Henry (1721–70). An Irish poet and dramatist, born at Beaulieu, near Drogheda, County Louth. He was a bricklayer by trade, but he pushed his way into literary circles through his flattery of influential men, while his ability to write complimentary verses stood him in good stead with the landladies who accepted them in lieu of board money. Lord Chesterfield became his patron when Lord Lieutenant of Ireland and afterward in London helped him to publish his *Poems on Several Occasions* (1749) and to get his tragedy, *The Earl of Essex*, put on at Covent Garden (1753). Other plays and poems of his have fallen into oblivion. An inordinate devotion to drink brought him under the wheels of a coach in St. Martin's Lane and terminated an unedifying career.

JONES, Henry (1831–99). An English writer on whist, born in London. He will be more generally recognized by his pen name, Cavendish. Bred to the game on which he became an authority by his father, Dr. Henry D. Jones, he codified its laws and wrote a work in many ways invaluable to card players, *Principles of Whist, Stated and Explained by "Cavendish"* (1862). Somewhat the same service he rendered in books on piquet and écarté. Of other games, outdoor and indoor, he also wrote, and notably of billiards, tennis, and croquet. In 1852 he began the practice of medicine in London and continued active in this profession for some 15 years.

JONES, Sir Henry (1852–1922). A British philosopher, born at Llangernyw, North Wales. He was educated at the University of Glasgow, was made professor of philosophy and political economy at the University College of North Wales and professor of logic and metaphysics at St. Andrews, whence in 1894 he went to Glasgow as professor of moral philosophy. He was given the LL.D. by St. Andrews (1895) and the D.Litt. by the University of Wales (1905) and in 1912 was knighted. He wrote: *Browning as a Religious and Philosophical Teacher* (1891; 6th ed., 1912); *The Philosophy of Lotze* (1895), a valuable piece of criticism; *The Immortality of the Soul in the Poems of Tennyson and Browning* (1905); *Idealism as a Practical Creed* (1909); *The Working Faith of the Social Reformer* (1910); *Social Powers* (1913).

JONES, Henry Arthur (1851–). An English playwright, born at Grandborough, Buckinghamshire, and educated at Winslow School. When only 13 years old, he left school and was thrown upon his own resources. He first became known in London as the author of *Clerical Error*, performed by Wilson Barrett at the Court Theatre (1879). This play was followed in 1882 by *The Silver King* at the Princess's Theatre, which ran for over a year. In 1884 Jones began a series of social dramas, mostly comedies. They met with extraordinary success, as played in English-speaking countries in both hemispheres, and some of them were translated and produced in continental cities. Among them are: *Saints and Sinners* (1884); *The Middleman* (1889); *Judah* (1890); *The Dancing Girl* (1891); *The Tempter* (1893), a tragedy; *Michael and his Lost Angel* (1896); *The Rogue's Comedy* (1896); *The Liars* (1897); *The Manœuvres of Jane* (1898); *Carnac Sahib* (1899); *Mrs. Dane's Defence* (1900); *The Princess's Nose* (1902); *Whitewashing Julia* (1903); *Joseph Entangled* (1904); *The Heroic Stubbs* (1906); *The Hypocrites* (1906); *We Can't be as Bad as All That* (1910); *Mary Goes First* (1913), in which Marie Tempest had notable success in London and New York; and *The Lie* (1914), in which Margaret Illington appeared. Jones visited the United States in 1914. He wrote also *The Renascence of the English Drama* (1896); *The Foundations of a National Drama* (1913); *The Theatre of Ideas*, three plays (1915).

JONES, Henry Bence (1814–73). An English physician and chemist, born at Thornington Hall, Suffolk. He was educated at Harrow and at Trinity College, Cambridge (B.A., 1836), and later studied chemistry at University College, London, and in Giessen under Liebig. Trinity College gave him the degrees of M.A. (1842) and M.D. (1849). From 1845 to 1862 he was connected with St. George's Hospital in London. Jones was an authority on diseases of the stomach and kidneys. He wrote: *Gravel,*

Calculus, and Gout (1842); *Animal Electricity* (1852); *Lectures on the Application of Chemistry and Mechanics to Pathology and Therapeutics* (1867); *Croonian Lectures on Matter and Force* (1868); *Life and Letters of Faraday* (1870); as well as many scientific memoirs in chemical, medical, and physical journals.

JONES, Hugh Bolton (1848–). An American painter, born at Baltimore, Md. He studied in his native city and then went abroad, where he remained for several years, sketching in Spain and France. He was elected an academician in 1883. Typical examples of his work, which is correct in line and delicate in color, but overdetailed in finish and lacking in inspiration, are "Spring" and "Autumn," in the Metropolitan Museum, New York.

JONES, Inigo (1573–1652). An English architect, born in London. Of his early history little is known till the time when the Earl of Pembroke, attracted by his great aptitude for drawing, sent him abroad for four years to study the masterpieces of architecture in France, Germany, and Italy. He spent most of his time in Venice, paying particular attention to the works of Palladio, whose style he introduced into England, whence we sometimes hear Jones designated as the "English Palladio." After a visit to Denmark he returned to England before 1605, when he was employed by James I in arranging the scenery and properties for the masques of Ben Jonson, which were at that time the chief amusement of the court. Jonson afterward satirized his fellow laborer in *Bartholomew Fair*. In 1613 and 1614 Jones revisited Italy, still further to improve his style, and on his return to England was appointed surveyor-general of the royal buildings (1615). Jones was at this time accounted the first architect of England and according to some the first of the age. His great reputation is, however, due less to the intrinsic merit of his works, which was often mediocre, than to his introduction of what was for England a new and monumental style of design. In 1618 he planned the palace of Whitehall (950 × 1280 feet), of which only the famous banqueting hall, considered to be his masterpiece, was carried out. Other works of his are Chiswick Villa, in close imitation of Palladio's Villa Capra, the church of St. Paul in Covent Garden, Ashburnham House, and Surgeons' Hall. Most of his important works, such as the renovations of the façade of Old St. Paul's, Shaftesbury House, Physicians' College, etc., have been destroyed. His *Designs*, consisting of plans for public and private buildings, was published by W. Kent at London, 1727. Consult: R. T. Blomfield, "Inigo Jones," in the *Portfolio* (London, 1889); W. J. Loftie, *Inigo Jones and Wren* (New York, 1893); Peter Cunningham, *Life of Inigo Jones* (London, 1898); Ernest Rhys, "The Masques of Inigo Jones," in *The Nineteenth Century and After*, vol. liv (ib., 1903); A. T. Bolton, *Jacobean Architecture and the Work of Inigo Jones in the Earlier Style* (ib., 1911).

JONES, Jacob (1768–1850). An American naval officer, born in Kent County, near Smyrna, Del. He studied medicine at the University of Pennsylvania, but soon after graduation gave up his practice to accept the position of clerk of the Supreme Court of Delaware. In 1799 he entered the United States navy as a midshipman and during the war against the Barbary corsairs was captured with the *Philadelphia* in 1803. He was liberated after a year and a half of captivity and in 1810 was promoted to the rank of commander. On Oct. 18, 1812, his vessel, the 18-gun sloop of war *Wasp*, captured the British 18-gun *Frolic;* but scarcely had he put a crew aboard his prize when the *Poictiers*, a British 74, appeared and captured them both. On his return to the United States Jones received a vote of thanks and a gold medal from Congress, which also voted $25,000 prize money to be distributed among the officers and crew of the *Wasp*. Jones was promoted to the rank of captain and was placed in command of the captured frigate *Macedonian*. After the return of peace he commanded squadrons in the Pacific and in the Mediterranean, where he vanquished the Algerian pirates. For several years he was a commissioner of the naval board, and governor of the naval asylum at Philadelphia.

JONES, James Kimbrough (1839–1908). An American lawyer and politician, born at Love, Marshall Co., Miss. Educated by private tutors, at 20 he entered an Arkansas mercantile firm, and during the Civil War, despite physical weakness, he served with credit in the Confederate army. Afterward he engaged in agriculture and, having just been admitted to the Arkansas bar, was elected State Senator in 1873. He was reëlected in 1875 and 1877 and during his last term was President of the Senate. A leader of the Democrats, Jones participated in the Brooks-Baxter war, which resulted in ousting the Republican party from control. He was elected to Congress in 1880, was twice reëlected, and from 1885 to 1903 was United States Senator. In the Senate Jones was an important figure, being chairman of the Democratic caucus and a member of the Finance Committee. He fought for the passage of the Wilson Tariff Bill, but opposed the Cleveland administration on the silver question. In 1896 he was chairman of the Democratic Convention at Chicago, and after Bryan's nomination he was manager of the campaign. Again in 1900 he was chairman of the Democratic Convention and also headed the National Committee. Defeated in his candidacy for a fourth term in the Senate, he retired to the practice of law in Washington.

JONES, Jenkin Lloyd (1843–). An American Unitarian clergyman and author, born at Llandyssil, Cardiganshire, Wales, but brought to Wisconsin when a year old. He served in the Civil War; graduated from Meadville (Pa.) Theological Seminary in 1870; for nine years had a charge at Janesville, Wis.; and in 1882 organized All Souls' Church, Chicago, of which he was thereafter pastor. He held various high offices in his church and was instrumental in organizing the Congress of Religion. *Unity*, the journal which became the organ of the congress, he edited after 1879. In 1909 he was given the degree of LL.D. by the University of Wisconsin. The founder and first president of the Chicago Browning Society, he lectured on literature at Chicago University and published: *The Faith that Makes Faithful* (1885), with W. C. Gannett (q.v.); *Practical Piety* (1890); *Word of the Spirit* (1897); *Jess: Bits of Wayside Gospel* (1897; and 2d series, 1901, as *A Search for an Infidel*); *Nuggets from a Welsh Mine* (1902); *Reinforcement of Faith* (1905); *Conscience Calls* (1906); *On the Firing Line in the Battle for Sobriety* (1910).

JONES, John (1729–91). An American surgeon, born at Jamaica, N. Y., of Welsh descent.

He studied medicine at Paris, Leyden, London, and Edinburgh; practiced in New York; was professor of surgery in King's College (now Columbia University) for nine years; and, with Dr. S. Bard, founded the New York Hospital (1771). When New York was occupied by the British, he went to Philadelphia, where he was elected one of the physicians of the Pennsylvania Hospital, and in 1787, on the institution of the College of Physicians of Philadelphia, he was elected vice president. He was Washington's family physician in Philadelphia and the intimate friend and physician of Franklin, whom he attended in his last illness. He published *Plain Remarks upon Wounds and Fractures* (1775), republished with a memoir, by Dr. Mease (1795). Jones was a skillful operator and especially well known for his success in lithotomy.

JONES, JOHN PAUL (1747–92). A famous naval officer in the American Revolution, born in Kirkcudbrightshire, Scotland, July 6, 1747. His name was originally John Paul, "Jones" being subsequently added for reasons unknown. In his twelfth year he was apprenticed to a merchant of Whitehaven, who was actively engaged in the American trade, and shortly thereafter sailed for Virginia, where his brother was settled as a planter. For a time he lived at Fredericksburg with his brother, devoting his leisure to the study of nautical affairs. In 1766, his indentures being canceled, he made a voyage to Jamaica as chief mate on a slaver. He soon abandoned this business, however, and in 1768 took passage in a brigantine for Scotland. The master and mate dying in the course of the voyage, Paul assumed command and carried the vessel safely into port. For this service the owners appointed him captain and supercargo and sent him on a voyage to the West Indies. He continued this trade and accumulated a fortune by commercial speculation. In 1773, his brother having died childless and intestate, he returned to Virginia to settle the affairs of the estate which had fallen to him, and for a time gave his attention to planting. It was then that he assumed the name of Jones, by which he was subsequently known. Upon the outbreak of the Revolution he offered his services on behalf of the Colonies and was early invited to aid the Naval Committee of Congress with information and advice. He also served on a commission for the purchase of vessels for the new navy, and on Dec. 22, 1775, was commissioned senior first lieutenant of the flagship *Alfred*. After a short cruise, during which a successful attack was made on New Providence and a squadron was captured, he was transferred to the *Providence* with the rank of captain. He then made a cruise in the West Indies and in 47 days captured 16 prizes and destroyed a number of small vessels together with the fishery at Isle Madame. He then resumed command of the *Alfred*, and in November, 1776, sailed from Newport to Nova Scotia, where he captured a number of British coal transports, liberated 100 Americans confined at hard labor in the mines, destroyed the Cape Breton fishery, and returned to Boston with several prizes. In June, 1777, Jones was transferred to the command of the *Ranger*, one of the newly built vessels of the navy, and the one upon which the stars and stripes are said to have been hoisted for the first time. On November 1 Jones sailed from Portsmouth, N. H., with instructions to hover about the coast of Great Britain and destroy the English shipping. Before entering the Channel he stopped in France to deliver to the American commissioners the official dispatches announcing the surrender of Burgoyne and to confer with them in regard to his mission in European waters. He then sailed to the north coast of England, seized the port of Whitehaven, spiked its guns, and burned some of the shipping. It was then that he conceived the project of capturing the Earl of Selkirk on his fine estate near Kirkcudbright and of holding him as a hostage. The project miscarried on account of the absence of the Earl, whose plate, however, was appropriated by the crew of the *Ranger* and was sold, but was subsequently purchased by Jones and restored to the rightful owner. In the summer of 1778 Jones captured near the English coast the *Drake*, a 20-gun warship of superior build, and carried it into Brest with 160 prisoners. His exploits won him great renown in America, and he was placed in command of the ship *Duras*, furnished by the French government, the name of which he changed to the *Bon Homme Richard*, and in August, 1779, he sailed with a squadron of five vessels, three American and two French, for the coast of Scotland, creating even greater alarm among the inhabitants than before. Off Flamborough he fell in with a fleet of 41 British merchantmen returning from the Baltic and convoyed by two powerful men-of-war, the *Serapis*, carrying 40 guns, and the *Countess of Scarborough*, with 20 guns. On the evening of Sept. 23, 1779, Jones engaged the *Serapis* in battle, and after three hours' desperate fighting, during the course of which the *Serapis* and the *Bon Homme Richard* were lashed together, the *Serapis* surrendered. The *Bon Homme Richard*, however, was so badly damaged that it sank two days later, the crew in the meantime being transferred to the *Serapis*.

For this victory Jones was, upon his arrival in Paris, presented by Louis XVI with a gold-mounted sword and was decorated with the cross of the Order of Military Merit. Upon his return to America in February, 1781, Congress voted him a gold medal, passed a resolution commending his "zeal, prudence, and intrepidity," assigned him to the command of a new ship of the line then building, and proposed to create for him the rank of rear admiral. The British, however, regarded Jones as a pirate and refused to recognize the validity of his captures. At the close of the war he went to Paris as American agent for prize money. In 1788 he entered the Russian service against the Turks, with the rank of rear admiral, but on account of the jealousies and intrigues of the Russian officers he resigned. In 1790 he retired to Paris, where he remained in retirement for the rest of his life. In 1792 he was appointed United States Consul at Algiers, but died before his commission arrived. A long search, instituted by Gen. Horace Porter, Ambassador to France, resulted in the discovery of his body in the old St. Louis Cemetery, in Paris, on April 14, 1905. The following July a United States squadron conveyed the body to Annapolis, Md., where it was buried, with the usual naval ceremonies.

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(Boston, 1901); A. C. Buell, *John Paul Jones* (2 vols., New York, 1906); J. S. Barnes (ed.), *Logs of the Serapis, Alliance, Ariel, under the Command of John Paul Jones, 1779–1780*, printed for the Naval History Society (ib., 1911); R. M. Crawford, *The Sailor whom England Feared* (London, 1913); Nathaniel Fanning, *Fanning's Narrative, the Memoirs of Nathaniel Fanning, an Officer of the American Navy, 1778–1783* (ib., 1913).

JONES, John Percival (1829–1912). An American legislator and politician, born in Herefordshire, England. When a year old, he was brought to the United States by his parents, who settled in northern Ohio. He received his education in the public schools of Cleveland. Shortly after the discovery of gold in California he crossed the plains to the Pacific coast, where he became successful as a mine owner and operator. He was sheriff of Tuolumne County and from 1863 to 1867 served as a member of the California State Senate, removing in the latter year to Nevada. There he became superintendent and part owner of the famous Crown Point silver mine, the subsequent development of which brought him a large fortune. In State politics, he gained great influence with the miners, by whom he was known as the Nevada Commoner. Elected by the Nevada Legislature (1873) to succeed James Nye in the United States Senate, he was reëlected as a Republican in 1879, 1885, and 1891, and as a Silverite in 1897. In the Senate he was long a member of the Committee on Post Roads, where he was an indefatigable worker in behalf of the extension of the system in the Pacific States, and of the Committee on Mines and Mining, to which his practical knowledge proved of the greatest value. His identification with the silver movement dates from August, 1875, when he became chairman of the monetary commission to examine and report upon the question of bimetallism. After that date he stood consistently as one of the foremost champions of bimetallism in the country, favored the free coinage of silver without regard to the rest of the world, and on that issue left the Republican party and supported Bryan in 1896. During the campaign of 1900 he returned to the Republican party, though without giving up his free-silver theories. He retired in 1903.

JONES, John Winter (1805–81). An English librarian, of Welsh descent, born in London. After education at St. Paul's School he studied law, but had to abandon the profession owing to an illness which affected his voice. When 18 years old, he had published a translation of the polyglot quotations in Blackstone's *Commentaries*, and he now devoted himself to the acquisition of foreign languages and the study of literature. In 1835 he became connected with the civil service and, as secretary to the charity commissioners, during two years traveled over the greater part of England. In 1837 the commissioners recommended him as an assistant in the British Museum Library, with which institution he was thenceforth identified. He was associated with Panizzi and Richard Garnett in the remodeling of that great institution, and the catalogue commenced in 1839, for which he, with others, framed scientific rules, and of which he was the general reviser, is a monument to his indefatigable industry, erudition, and judgment. On Panizzi's strong recommendation, when the latter resigned in 1866, Jones was appointed principal librarian and held that position till 1878, when ill health necessitated his retirement. Numerous interesting catalogues and other works were published under his direction; he translated and edited several valuable works of early travels, notably *Divers Voyages Touching the Discovery of America*, issued by the Hakluyt Society (1850), and was a prolific contributor to the *New Biographical Dictionary* of the Society for the Diffusion of Useful Knowledge.

JONES, Leonard Augustus (1832–1909). An American jurist and writer on legal topics. He graduated from Harvard College in 1855 and from Harvard Law School in 1858 and then practiced law until 1874. Thereafter he was associate editor (1874–1904) and editor in chief (1904–07) of the *American Law Review*. He became judge of the land court in 1898 and thereafter until his death was chief judge of that court. His writings include: *An Index to Legal Periodical Literature* (2 vols., 1888–89); *Legal Forms* (6th ed., rev., 1909); and treatises on the law of *Real Property* (2 vols., 1896); *Collateral Securities and Pledges* (3d ed., 1912); *Corporate Bonds and Mortgages* (3d ed., 1907); *Landlord and Tenant* (1906); *Mortgages of Real Property* (6th ed., 1904); *Mortgages on Personal Property* (5th ed., 1908).

JONES, Lewis Ralph (1864–). An American botanist, born at Brandon, Wis. He was educated at Ripon College (1883–86) and at the University of Michigan (Ph.B., 1889; Ph.D., 1904). From 1889 to 1910 he taught natural science at the University of Vermont and was botanist of the Vermont Experiment Station, and thereafter he was professor of plant pathology at the University of Wisconsin. He was special agent of the United States Bureau of Plant Industry in 1904, served as president of the Botanical Society of America (1912) and of the Phytopathological Society of America (1909), became one of the editors of the *American Journal of Botany*, contributed to *Webster's New International Dictionary*, and published several contributions on the diseases of plants.

JONES, Owen (1809–74). An English architect and designer, born in London, the son of Owen Jones, the Welsh antiquary. He studied six years in the office of the architect Vulliamy and at the Royal Academy. He traveled in the East and Europe and in 1834 went to Granada, which he revisited in 1837 for material for his *Plans, Elevations, Sections, and Details of the Alhambra* (1842–45, with 101 plates in color). He was one of the superintendents of works at the exhibition of 1851 and a year later had charge of the decorations of the Egyptian, Greek, Roman, and Alhambra courts at the Crystal Palace, Sydenham. The casts decorating the palace were also collected by him and Sir Digby Wyatt. As an architect, he built St. James's Hall, London. He was particularly successful with interior decoration, in which he was influenced by his love of Arabic ornamentation and color. He was vice president of the Royal Institute of British Architects and was the winner of various medals for designs. His works include: *Designs for Mosaic Tessellated Pavements* (1842); *The Illuminated Books of the Middle Ages* (1844), with Humphreys; *The Polychromatic Ornament of Italy* (1846); *An Attempt to Define the Principles which should Regulate the Employment of Color in the Decorative Arts* (1852); his famous *Grammar of Ornament*

(1856, 100 plates); *One Thousand and One Initial Letters* (1864); *Seven Hundred and Two Monograms* (1864); *Examples of Chinese Ornament* (1867).

JONES, Peter (1802–56). A Canadian Indian missionary and educator. He was born at Burlington Heights, Upper Canada, a member of the tribe of Ojibway Indians. Through the aid of influential friends he obtained an excellent education. In 1833 he was ordained a Wesleyan Methodist minister and from that time until his death was a zealous and influential missionary. He traveled much and preached in the United States and Great Britain. When in the latter country he did much to inform and rightly guide opinion in political and religious circles as to the position and treatment of the various Indian tribes in North America. He prepared several educational books for the use of the Ojibways, translated the Gospels of Matthew and John into their language, and published *My Life and Journals* (1860) and *History of the Ojibway Indians, with Special Reference to their Conversion to Christianity* (1861).

JONES, Samuel (1734–1819). An American jurist. He studied law with William Smith, the New York historian; was a Tory throughout the Revolution, but not an active one; and became a leader of the Federalist party and a member of the State Convention of 1788 which adopted the Constitution. He became recorder of the city of New York in 1789 and in the same year revised the State statutes with Richard Varick. In 1796 he was made State comptroller, the functions of which office he had legally prescribed at the request of John Jay. He was a brilliant jurist and wrote many papers for the New York Historical Society.

JONES, Samuel Porter (1847–1906), commonly known as Sam Jones and often styled the Mountain Evangelist. An American evangelist of the Methodist Episcopal Church South, born in Chambers Co., Ala. He was admitted to the bar in 1869 and for a time practiced successfully. His professional life was ruined by his passion for drink, but after his father's death, in 1872, he was converted, in the same year was ordained a clergyman of the Methodist Episcopal Church South, and at once began preaching. His success from the first was remarkable, and he became widely known as a speaker on evangelistic, revival, and Chautauqua platforms. Many of his sermons, discourses peculiar to themselves in their unconventionality, have been published. These include: *Famous Stories of Sam P. Jones* (1908); *Popular Lectures of Sam P. Jones* (1909); *Sam Jones's Revival Sermons,* compiled by his daughter, Annie Jones Pyron (1912); *Lightning Flashes and Thunderbolts,* compiled by J. S. Shingler (1912).

JONES, Thomas (1731–92). An American lawyer and Tory, born at Fort Neck, Long Island. He graduated from Yale in 1750, studied law, was admitted to the bar in 1755, became city attorney and recorder, and in 1773 succeeded his father, David Jones (1699–1775), as judge of the Supreme Court, an office which he held under the crown. He was twice captured by the Revolutionary forces and twice paroled; in 1779 he was captured in spite of his parole and exchanged (1780) for Gen. Gold Selleck Silliman. A year afterward he removed to England and was attainted in 1782 by the New York Legislature. Jones wrote a *History of New York during the Revolutionary War,* published by the Historical Society in 1879. The work has the value of a sole contemporary document and is Loyalist in sympathies.

JONES, Thomas ap Catesby (1787–1858). An American naval officer, born in Virginia. He entered the navy in 1805 and three years later was sent to the Gulf of Mexico, where he was engaged until the outbreak of the War of 1812 in suppressing piracy, smuggling, and the slave trade. He saw no active service against the British until near the end of the war, when he attempted with his squadron of five gunboats manned by 182 men to bar the passage across Lake Borgne to the fleet under Vice Admiral Cochrane, which was transporting General Packenham's army to New Orleans. He anchored his squadron in such a position that the deep-draft vessels of the British could not approach it and so forced the latter to attack in their tenders. After an obstinate resistance, in which he inflicted severe loss upon his assailants, but during which he was himself badly wounded, his vessels were captured. In 1820 Jones was promoted to the rank of commander and in 1829 to that of captain. At this time conditions in the Hawaiian Islands were attracting attention in the United States and in England. The missionaries, most of whom were Americans, had secured practical control of the government; but opposed to them was an aggressive party, composed of sailors and merchants, which was headed by the British Consul, Richard Charlton, who wished to secure the cession of the islands to Great Britain. Commander Jones in the sloop of war *Peacock* was sent out in 1826 to secure payment of debts claimed by American citizens and to endeavor to restore peace between the warring factions. He remained almost three months, collected the debts, denied publicly Charlton's assertion that the islands were a British dependency, and presided over a meeting at which the missionaries met the charges of their adversaries. In 1842, while commanding the Pacific squadron, he heard that war had been declared against Mexico, and, believing from the actions of the British warship *Dublin* that that government intended to annex California, he landed a force at Monterey and took possession in the name of the United States. For this indiscretion he was temporarily removed from his command.

JONES, Thomas Rupert (1819–1911). An English geologist, born in London. He was sent to school at Taunton and Ilminster and afterward studied medicine, but in 1850 became assistant secretary to the London Geological Society. He was professor of geology at the Royal Military and Staff Colleges, Sandhurst, from 1862 till superannuated in 1880. His works include: *Monograph of the Cretaceous Entomostraca* (1849); *The Tertiary Entomostraca in England* (1856); *Monograph of the Fossil Estheriæ* (1862); *Monograph of the Arctic and North Atlantic Foraminifera* (1865); *Foraminifera of the Crag* (1866); *Monograph of the Carboniferous Cypridinidæ* (1874); *Palæozoic Phyllopoda* (1888). He edited numerous books on natural science and contributed extensively to scientific periodicals.

JONES, Walter (1865–). An American physiological chemist, born at Baltimore, Md. He graduated from the Baltimore City College in 1884 and from Johns Hopkins Uni-

versity in 1888 (Ph.D., 1891). He served as professor of chemistry at Wittenberg College, Springfield, Ohio, in 1891–92, and as professor of analytical chemistry at Purdue University in 1892–95. He then returned to Johns Hopkins, where he was an assistant in physiological chemistry (1895–98), associate (1898–1902), associate professor (1902–08), and professor after 1908. The results of his many investigations in his field were published in various technical journals and in *Nucleic Acids* (1914).

JONES, Wesley Livsey (1863–). An American legislator. Born near Bethany, Ill., he graduated from Southern Illinois College in 1886 and was admitted to the bar in the same year. He moved to the Territory of Washington in 1889 and there began the practice of law in 1890. He participated in the Blaine campaign of 1884 and the Harrison campaign of 1888 in Illinois and in all subsequent campaigns in the State of Washington. He was a Republican member of the Fifty-sixth to the Sixtieth Congress (1899–1909), was elected United States Senator for Washington for the term of 1909–15, and in 1914 was reëlected.

JONES, Sir William (1746–94). A famous English Orientalist, Indian jurist, and littérateur. He was born in London, Sept. 28, 1746, and was sent to Harrow in 1753. In 1764 he was entered at University College, Oxford, where he was enabled to gratify his desire for a knowledge of the Oriental languages. In 1765 he left Oxford, to become tutor to Earl Spencer's eldest son, with whom he remained five years. In 1770 he published, at the request of the King of Denmark, a *Life of Nadir Shah*, translated into French from the Persian; in the following year, a *Persian Grammar* (1772; several times republished); and in 1774 his *Poeseos Asiaticæ Commentariorum Libri Sex*, republished by Eichhorn at Leipzig in 1776. In 1780 he completed a translation of the seven Arabic poems known as the *Moallakāt*, which obtain their collective name from being suspended in the temple at Mecca; wrote an essay *On the Legal Mode of Suppressing Riots*, and another, entitled *Essay on the Law of Bailments* (1781), and two or three odes. In March, 1783, Jones was knighted and obtained a judgeship in the Supreme Court of Judicature in Bengal, and landed at Calcutta in September. He at once set about the acquisition and promulgation of the knowledge of Oriental languages, literature, and customs. He established the Royal Asiatic Society, of which he was the first president. To the volumes of the *Asiatic Researches* Sir William contributed largely. Besides these, he wrote and published a story in verse, called *The Enchanted Fruit, or the Hindu Wife*, and a translation of an ancient Indian drama, called *Sakuntala, or the Fatal Ring* (1789), which aroused widespread interest in the literary circles of Europe. A translation by him of the *Ordinances of Manu* (q.v.) appeared in 1794. He was busily employed on a digest of the Hindu and Mohammedan laws at the time of his death (April 27, 1794). Jones was one of the greatest linguists and Oriental scholars that England has produced, and his enthusiasm and literary ability did much to arouse general interest in the subject. The East India Company erected a monument to his memory in St. Paul's Cathedral and a statue in Bengal. A complete edition of his works in six volumes was published by Lady Jones in 1799, and another appeared in 13 volumes (London, 1804–07), with a life of the author by Lord Teignmouth (republished, London, 1835). His translation of Jayadéva's *Gītagōvinda* was republished in 1894 (Calcutta). Consult the article by H. M. Stephens in the *Dictionary of National Biography*, vol. xxx (London, 1892).

JONES, William (1871–1909). An American scholar, anthropologist, and writer, of Welsh, English, and Indian descent, born in Indian Territory and reared, on the Sauk and Fox Reservation, by his grandmother, the daughter of Wa-shi-ho-wa, a Fox chief. He attended Hampton Institute and Phillips Andover Academy, graduated at Harvard in 1900, received the Ph.D. degree at Columbia, and collected Sauk, Fox, and Ojibwa ethnological specimens for the American Museum of Natural History, New York. An Algonquian linguist, he prepared field notes and Indian texts. While in the Philippines, sending material to the Field Museum, Chicago, he was fatally wounded by traitorous natives. Among his writings are: *The Algonkin Manitou; Kickapoo Texts; Fox Texts; Some Principles of Algonquian Word-Formation* (1904); *Mortuary Observances and the Adoption Rites of the Algonquin Foxes of Iowa.*

JONES, William, of Nayland (1726–1800). An English divine. He was born at Lowick, Northamptonshire; educated at the Charterhouse and University College, Oxford; ordained priest (1751); became successively curate of Finedon, vicar of Bethersden, rector of Pluckley, Paston, and perpetual curate of Nayland (1777). He adopted, while at Oxford, the philosophy of Hutchinson, as opposed to that of Sir Isaac Newton, and subsequently advocated it with great erudition and ingenuity. He was a man of vast learning, an able theologian, and proficient in music, and one of the most prominent in the High Church party of his day. He wrote with vigor against the principles disseminated during the French Revolution and illustrated by it. He wrote treatises on music and composed anthems, and founded the *British Critic* (1793). A complete collection of his works was published in 12 volumes in 1801, with a short life by W. Stevens (new ed. in 6 vols., 1810). His life forms part v of the *Biography of English Divines* (London, 1849). Consult also article by J. H. Overton in *Dictionary of National Biography*, vol. xxx (ib., 1892).

JONESBORO, jōnz'bŭr-ō. A city and the county seat of Craighead Co., Ark., 67 miles by rail northwest of Memphis, Tenn., on the St. Louis and San Francisco, the St. Louis Southwestern, and the Jonesboro, Lake City, and Eastern railroads (Map: Arkansas, E 2). It is a manufacturing centre of some importance, having flouring and lumber mills, peanut-hulling factory, cotton-oil mill, basket and handle factories, brickworks, cotton gins, machine shops. Jonesboro is also the distributing centre for a wide agricultural region. The city contains a State agricultural school, Elks Home, Federal building, and the St. Bernards Hospital. Settled in 1870 and incorporated in 1882, Jonesboro is governed under a charter of 1892 which provides for a mayor, elected biennially, and a unicameral council. The water works, electric-light plant, and sewer system are owned by the city. Pop., 1900, 4508; 1910, 7123.

JONESBORO. A city and the county seat of Clayton Co., Ga., 20 miles south of Atlanta, on the Central of Georgia Railroad (Map: Georgia, B 2). It has a tire factory. Pop., 1900, 877; 1910, 970. Here in August, 1864, was fought a stubborn battle between the Federal General Howard, at the head of a portion of General Sherman's army then besieging Atlanta, and the Confederate General Hardee, commanding about half of the army which, under General Hood, was endeavoring to hold that city. Howard had been sent to destroy the railroad at this point, and Hardee at 2 P.M. on the 31st made an attempt to drive him across Flint River, but was repulsed with considerable loss and forced to retreat. This victory placed the Federals in control of the Macon road and compelled General Hood hurriedly to evacuate Atlanta. The loss of the Federals in killed, wounded, and missing was about 300; that of the Confederates, while never actually ascertained, was probably about 2000. Consult Sherman, *Memoirs* (2 vols., New York, 1875), and Cox, *Atlanta*, in the "Campaigns of the Civil War Series" (ib., 1882).

JONGE, yŏng'e, JOHANNES CORNELIS DE (1793–1853). A Dutch historian, born at Zierikzee and educated at Leyden. There he became acquainted with Van Wijn, whose assistant he was until 1831, when he succeeded his master as keeper of the Dutch archives. Jonge had shown his patriotism by volunteering for the Hundred Days, and in his later years he held various representative offices. His historical works form the actual basis of Dutch history; they include: *Verhandeling over den oorsprong der hoeksche en kabeljaauwsche twisten* (1817); *Het derde stand in de staatsvergaderingen* (1824); the great work, *Geschiedenis van het Nederlandsche zeewezen* (1833–48; 2d ed., 1858); and a biography of Van Wijn (1832).

JONGKIND, yŏng'kĭnt, JOHANN BARTHOLD (1819–91). A Dutch landscape painter and etcher. He was born at Latrop, near Rotterdam, went to Paris while quite young, and studied chiefly with Isabey. There remain but scant details of his life at Paris, despite the fact that he numbered Baudelaire, Théophile Gautier, and Zola among his friends. Corot, Daubigny, and Monet were also of the number—fervent admirers of his work. None the less his life was passed in poverty, wandering from place to place, forever at work, but finding little sale for his beautiful productions. His privations and the bitterness they brought ended in mental collapse. From 1860 to his death, at La Côte Saint-André in 1891, Jongkind, like his great compatriot, Van Gogh, was insane.

Jongkind belongs to the Dutch school in the character of his outlook on nature and to the French in technique—it has been well said that he is the artistic descendant of Van Goyen, Ruysdael, and Van de Velde. He carried the naturalism of the men of 1830 to a point unattained by any of them and is the link between their art and that of the Impressionists. Jongkind's ceaseless industry made him a master of any medium he cared to work in—oils, water colors, pencil, etching, or lithography. He excelled especially in the handling of water color, and in etching he is one of the greatest masters of the nineteenth century. With a sure draftsmanship and with unsurpassed freedom and economy of means, he jotted down his impressions of nature directly on the copper. Both in painting and etching he succeeded especially with the canals and skies of his native land, but his French subjects are scarcely less attractive. His painting is well represented at Amsterdam in the Rijks-Museum and the Municipal Gallery, and in the Moreau-Nelaton collection of the Louvre; also in several French provincial museums and at Brussels and Amsterdam. Consult Frantz, "Johann Barthold Jongkind," in the *International Studio*, vol. xxxvi (New York, 1908–09).

JONGLEUR, zhôn'glẽr' (OF., from ML. *joculator*, jester, juggler, from Lat. *joculari*, to jest, juggle, from *joculus*, dim. of *jocus*, jest, joke). A title given in France during the Middle Ages to members of a class of public entertainers or minstrels, who wandered from place to place singing, as a rule, the compositions of others, though some confusion is occasionally found between the functions of the jongleur and the troubadour (q.v.). The jongleur, however, was of a lower and purely mercenary class. See also FRENCH LITERATURE.

JONGLEUR DE NOTRE DAME, de nôtr' dăm, LE (Fr., The Juggler of Our Lady). An opera by Massenet (q.v.), first produced in Monte Carlo, Feb. 18, 1902; in the United States, Nov. 27, 1908 (New York).

JÖNKÖPING, yĕn'chē-pĭng. Capital of the län of the same name, Sweden, at the south extremity of Lake Wetter, 85 miles east of Göttenberg. It is regularly and well built, and is situated among lakes and pine-clad hills, but is somewhat low and unhealthy. Its suburbs on surrounding hills are better placed (Map: Sweden, E 8). It is one of the most important industrial towns of Sweden and is famous for its manufactures of matches, founded in 1844 by John Eduard Lundström. Other important products are paper and wood pulp, arms, castings, carpets, tobacco, and machinery. The maritime trade is considerable. It is the seat of a court of appeal. Jönköping is an ancient town dating from legendary times; it received its town charter in 1284. Pop., 1901, 23,143; 1911, 26,969.

JONOPUS, an epiphyte. See Plate of EPIPHYTES.

JONQUIÈRES, zhôn'kyâr'. A town in Chicoutimi Co., Quebec, Canada, on the Quebec and Lake St. John Railway, 10 miles east of Chicoutimi (Map: Quebec, G 2). Among its industrial establishments are pulp and paper mills, a sash and door factory, planing mill, furniture factory, and foundry. Pop., 1911, 2354.

JON'QUIL (Fr. *jonquille*, from Lat. *juncus*, reed). A name given to certain species of *Narcissus* (q.v.) with rushlike leaves. The common jonquil (*Narcissus jonquilla*), a native of the south of Europe, is one of the most common bulbous-rooted plants in flower borders. It has from two to six yellow flowers at the summit of its scape (leafless stem). The sweet-scented jonquil (*Narcissus odorus*), also a native of the south of Europe, is another species very generally cultivated. Like other species of *Narcissus*, these are readily grown in forcing houses. The flowers are used in the manufacture of perfumes. All varieties are ordinarily propagated by bulbels. New varieties are obtained from seeds.

JON'SON, BEN (BENJAMIN) (?1573–1637). An English dramatist, born probably at Westminster in 1573. His grandfather belonged to one of the Johnstone families of Annandale.

His father, who was a "minister," died a month before the dramatist's birth; and his mother soon married a "master bricklayer" living near Charing Cross. Ben was sent to Westminster School at the expense of William Camden, then second master there, and a famous scholar, to whom he was surely indebted for the beginnings of his solid learning. It is commonly stated, on the authority of Fuller, that from Westminster he proceeded to St. John's College, Cambridge. For the assertion there is, however, no real evidence. After he had won a name in letters, Jonson received from each university the degree of M.A., but—in his own words—"by their favour, not his studie." He was taken from school and put to the craft of his stepfather. Disliking this occupation, he went to the Low Countries, where he joined the English troops against Spain. While there, he killed one of the enemy in view of both armies. He returned to England about 1592 and "betook himself to his wonted studies." Near this time he also married a "wife who was a shrew yet honest." Precisely when he began writing for the stage is not known; but the date is probably not earlier than 1595. Two years later he was both actor and playwright in Henslowe's company. In 1598 he wrote a tragedy for this company and was mentioned by Meres as one of "the best for tragedy." These plays are lost. His first extant play is the famous *Every Man in his Humour*, performed by the lord chamberlain's servants, at the Globe Theatre, in September, 1598. Shakespeare himself played a part in this first noteworthy English comedy of character. While the play was on the stage, Jonson quarreled with an actor in Henslowe's company named Gabriel Spenser and killed him in a duel (September

A CULTIVATED JONQUIL.

22). He was imprisoned for a short time; but, by pleading benefit of clergy, he escaped with branding on the left thumb and loss of goods and chattels. The next year Jonson produced *Every Man Out of his Humour* and perhaps had already written *The Case is Altered*, an adaptation of Plautus. During the next 15 years he brought out *Cynthia's Revels* (1600), *The Poetaster* (1601), *Sejanus*, a tragedy (1603), *Catiline*, a tragedy (1611); and his greatest comedies, *Volpone* (1605), *Epicœne, or the Silent Woman*, best of all (1609), *The Alchemist* (1610), and *Bartholomew Fair* (1614). In 1616 came a poorer comedy, *The Devil is an Ass*. The regular stage Jonson now forsook for 10 years, and his later comedies have little interest. At his death he left fragments of a beautiful pastoral, *The Sad Shepherd, or a Tale of Robin Hood*.

With the accession of James he had begun for the court a series of festive performances which he classed as entertainments, barriers, and masques. They had respectively, as the centre of interest, a complimentary speech, a mock tournament, and a masqued dance. They were presented with elaborate machinery furnished by Inigo Jones (q.v.). But the general plan and the verse, often exquisite, were Jonson's. Besides masques, Jonson also composed many poems. Scattered through his comedies, written mostly in prose, are well-known songs, as "Still to be neat, still to be drest." But his larger poetic fame rests upon his charming epigrams (short poems embodying one idea), and the collections entitled *The Forest* and *Underwoods*. Unsurpassed of their kind are the lines "On Lucy, Countess of Bedford," and the "Epitaph on the Countess of Pembroke." And in a series of essays called *Discoveries* he displayed his solid character and ripe wisdom.

During these years Jonson lived a varied life. His combativeness led to "many quarrels" with Marston, one of his collaborators, whom he "beat," and satirized, in conjunction with Dekker in the *Poetaster*. When, in 1604, Chapman and Marston were sent to prison for certain passages in their *Eastward Ho*, offensive to the court, Jonson, who had a slight hand in the play, voluntarily joined them (1605). The next year he was also imprisoned with Chapman. But for the most part he enjoyed the favor of the King, whom he pleased by his masques and in other ways. In 1616 he was granted a royal pension of 100 marks, afterward raised to £200, and might have been knighted, it is said, had he wished. In 1613 he was abroad with the son of Sir Walter Raleigh, to whose *History of the World* he contributed the account of the Punic wars. In the summer of 1618 he traveled on foot to Scotland, returning the next year. He visited the poet Drummond at Hawthornden, about 11 miles from Edinburgh, in conversations with whom he spoke very freely of his contemporaries and of his own early life. His friends among the aristocracy were many, especially among the Sidneys. From the Earl of Pembroke he received every year £20 to buy books. Convivial by nature, he ruled as monarch at the hostelries where gathered poets and dramatists, first at the Mermaid and then at the Devil Tavern. Of Shakespeare, who no doubt was one of his early associates, he said late in life: "I loved the man and do honour his memory, on this side idolatry, as much as any." He died Aug. 6, 1637, and was buried in Westminster Abbey, where his tombstone bears the inscription, "O rare Ben Jonson." Jonson's work is the best representation of classic ideals in the English drama, adapting to contemporary life the spirit of ancient comedy. His aim was

to depict for ridicule and satire the "humours" of society, i.e., affectations in conduct, dress, and speech. His comedies he aptly described as "comical satires."

The first volume of the first folio edition of Jonson's *Works*, as revised by himself, was published in 1616. *Every Man in his Humour*, as published in 1601, was Italian in setting. In the folio of 1616 it first appeared as now generally known, with its scene shifted to London and the names of the characters in English. The second volume of the first folio appeared in installments between 1630 and 1641. The only critical edition in the nineteenth century was that of Gifford (9 vols., London, 1816; revised by Cunningham, 1875). It is not a careful piece of work. A convenient edition of the plays is *Complete Plays* (2 vols., New York and London, 1910), with introduction by F. E. Schelling. Selected plays, edited by B. Nicholson, with an introduction by C. H. Herford, were published in the *Mermaid Series* (3 vols., London and New York, 1894 and 1903).

Bibliography. The main source for Jonson's life is *Conversations with Drummond*, edited by Laing, Shakespeare Society (London, 1842). Consult also: John Dryden, *Essay on Dramatic Poesy* (ib., 1668); W. Gifford, "Memoirs of Ben Jonson," in his *Works*, vol. i (ib., 1872); Soergel, *Die englischen Maskenspiele* (Halle, 1882); J. A. Symonds, *Life of Johnson*, in "English Worthies Series" (London, 1886); A. C. Swinburne, *Study of Johnson* (ib., 1889); Fleay, *English Drama* (ib., 1891); Koeppel, *Quellen-Studien zu den Dramen Ben Jonsons* (Leipzig, 1895); F. E. Schelling, *Ben Jonson and the Classical School* (New York, 1898); Ward, *History of English Dramatic Literature* (London, 1899); A. H. Thorndike, "Ben Jonson," in *Cambridge History of English Literature*, vol. vi (Cambridge, 1907–10); Paul Birck, *Literarische Anspielungen in den Werken Ben Jonson's* (Strassburg, 1908), containing a bibliography; C. R. Baskerville, "English Elements in Jonson's Early Comedy," in University of Texas, *Bulletin*, "Humanistic Series," No. 178 (Austin, Tex., 1911); Mina Kerr, *Influence of Ben Jonson on English Comedy, 1598–1642* (Philadelphia, 1912), containing a bibliography.

JONSON, Cornelius. See Janssen.

JÓNSSON, yōns'sōn, Finnur (1704–89). An Icelandic bishop and historian. He was born at Hitardal, was educated at the University of Copenhagen, and was appointed Bishop of Skálholt in 1754. The public instruction in the island was greatly improved under his direction. Of his numerous works in Latin and Icelandic the most valuable is *Historia Ecclesiastica Islandiæ* (4 vols., Copenhagen, 1772–78). This is really the entire history of Iceland from earliest times to Jónsson's day, a learned work and important as a source of Icelandic history and literature.

JÓNSSON, yōns'sōn, Finnur (1858–). A noted Icelandic philologist and historian of literature, born at Akureyri. He was educated at Reykjavik and at the University of Copenhagen, where he became docent in northern philology in 1887 and professor in 1898. Learned and energetic, he published many critical editions of Old Norse texts, the most important being *Den norsk-islandske Skjaldedigtning* (1908; new ed., 1914). But his greatest work is *Den oldnorske og oldislandske Literaturs Historie* (3 vols., 1894–1902; abbreviated ed. in Icelandic, 1904–05, in Danish, 1907), the most detailed of all works on this subject, and a standard. His foremost linguistic works are *Det norsk-islandske Skjaldesprog* (1901) and *Islandsk Sproglære* (1905).

JOP'LIN. A city and one of the county seats of Jasper Co., Mo., 155 miles south of Kansas City, on the Kansas City Southern, the Missouri Pacific, the St. Louis and San Francisco, the Missouri, Kansas, and Texas, and three other railroads (Map: Missouri, B 4). It is of considerable commercial importance as the distributing point for a large agricultural district, but is known principally for its extensive mining interests, being the trade centre of the vast zinc and lead fields of southwestern Missouri. The industrial establishments include smelting, paint, and white-lead works, large foundries and machine shops, a wagon factory, a cooperage, ironworks, a candy factory, and flouring mills. Among the more notable structures are the courthouse, the opera house, several hotels, the Young Men's Christian Association building, a Federal government building ($155,000), the Frisco Lines station, and a Carnegie library. Joplin adopted the commission form of government in 1914. One of the light plants is owned by the municipality. The city has an assessed valuation of $10,042,000, while its debt is less than 4 per cent of this amount. The receipts for the year 1912 were $555,000, while its expenditures amounted to $530,000. Settled about 1870, Joplin was first incorporated in 1873. Since 1890 it has grown rapidly. Pop., 1900, 26,023; 1910, 32,073; 1914, (U. S. est.), 32,848; 1920, 29,855.

JOP'PA (Heb. *Yāphō*, beauty). The biblical name of the seaport of Jerusalem, the modern Jaffa (Map: Turkey in Asia, C 4). It was a very ancient Phœnician town and was fabled to be the place where Andromeda (q.v.) was chained to the rock. It is mentioned in Egyptian and Assyrian inscriptions. In the Old Testament it is referred to as part of the lot of Dan (Josh. xix. 46), as the place where timber from Lebanon was landed for transportation to Jerusalem (2 Chron. ii. 16; Ezra iii. 7), and the port at which Jonah took passage for Tarshish (Jonah i. 3). It was the home of Dorcas (Acts ix. 36–42), and at the house of Simon the tanner Peter received the vision which he interpreted to mean that Gentiles as well as Jews were to be admitted to the Christian Church (Acts x. 1–23). Joppa was a point of importance and suffered much in the Maccabæan and Roman wars. It was made a bishop's see under Constantine and attained great prosperity in the time of the Crusades, when it became one of the landing places of the warriors of Christendom. It was stormed by the French in 1799, and a shameful massacre of Turkish prisoners was then perpetrated. See Jaffa.

JORDAENS, yôr'däns, Jacob (1593–1678). A Flemish historical, genre, and portrait painter, one of the chief masters of the school. He was born at Antwerp, May 19, 1593, the son of a cloth merchant. He was a pupil of Adam van Noort, the master of Rubens, and remained with that master when his other pupils left him, finally marrying his daughter. In 1615 he was admitted to the Guild of St. Luke as a painter in water colors, though most of his work was in oils. He never studied in Italy as did the other principal Flemish painters of his day, but this had the

advantage of making him more essentially Flemish. He was influenced by Rubens and associated with him in work, but there is no evidence to show that he was his pupil. Rubens gave him a commission for a series of cartoons for tapestry which he had received from the King of Spain. Jordaens also painted "Vertumnus and Pomona" for this monarch, as well as a picture for Charles I of England (1640) and a passion suite for Charles Gustavus of Sweden (1665). In 1652 he decorated the palace of the widow of Frederick Henry of Orange, Stadtholder of Holland, near Scheveningen. These mural paintings are his best works. The principal one represents the "Triumph of the Stadtholder," who is seated in a triumphal car drawn by four white horses. It is imposing in effect and masterly in treatment. Jordaens had a large number of pupils, who assisted him in his work, and on the death of Rubens he was considered the chief painter of his time. He acquired wealth and erected a patrician house at Antwerp, filled with works of art. Notwithstanding his numerous commissions for the Catholic clergy, he was an ardent Calvinist and suffered some persecution for his faith. He died in Antwerp, Oct. 18, 1678.

The characteristics of the Flemish school, its exaggerated treatment of form and crude humor, are more evident in Jordaens than in any other painter. Like Rubens, he painted in full light red healthy faces and figures inclined to corpulency. His color was even warmer than that of his great contemporary, and his best pictures possess a peculiar and effective golden glow. His excessive realism, however, often descends into coarseness. He was a most prolific painter, whose works abound in all the principal European galleries.

Among his chief religious and mythological paintings are "Christ Driving the Money Lenders from the Temple" and the "Four Evangelists," in the Louvre; the "Entombment of Christ," the "Last Supper," "Commerce and Industry Protecting the Arts," "Pegasus," the "Divine Law Protecting Human Law," in the Museum of Antwerp; the "Martyrdom of St. Apollonia," "St. Charles Borromeus Praying for the Pest-Stricken at Milan," and "St. James," in the church of the Augustinians, Antwerp. Others are in the Museum of Brussels, The Hague, Brunswick, Cassel (which possesses, among other canvases, a remarkable "Triumph of Bacchus"), and Madrid. In the Gallery of Dresden there are a "Presentation in the Temple" and "Diogenes Seeking an Honest Man"; at Vienna, "Jupiter and Mercury," with "Philemon and Baucis," one of his best mythological pictures. The Metropolitan Museum in New York possesses "The Philosophers," a "Holy Family," and a fine sketch.

His genre pieces fall mainly into two classes: the first, entitled "The King Drinks" or "Epiphany," are scenes showing the Flemish celebration of the festival. Of this group the best examples are at Cassel, Valenciennes, in the Louvre, Brussels, and in the Academy Museum, St. Petersburg. Others illustrate the Flemish proverb "As the old sing, so the young peep," or, as we should say, "Like parent, like child." Of this subject there are versions in Antwerp, the Louvre, Dresden, and Würzburg. He painted also a few portraits, some of great power, such as "Van Surpale and his Wife" (Duke of Devonshire, London); "Jan Wierts, his Wife," at Cologne; the admirable "Unknown Man," formerly thought to be Jordaens, in the Uffizi; a family group, at Cassel; the "Lady with the Locket," Vienna Academy; the supposed portrait of De Ruyter, in the Louvre; and the fine portrait of an old man, at Budapest.

Bibliography. The chief authority on Jordaens is Max Rooses, an English translation of whose extensive monograph was published at London in 1908. Briefer monographs are by Génard (Ghent, 1852), by Paul Buschmann (Brussels, 1905), by Fierens-Gevaert, in *Les grands artistes* (Paris, n. d.), and by Aric van Veen, "Jacob Jordaens," in *Elseviers Geïllustreered Maandschr*, vol. xv (Amsterdam, 1905). An album of reproductions of his works was published at Antwerp in 1905.

JOR'DAN (Heb. *Yardēn;* probably connected with Syr. *yardā*, lake, Ar. *wird*, watering place). The principal river of Palestine, called Esh-Sheriah or Esh-Sheriah el-Kebir by the Arabs (Map: Palestine, D 3). Starting from the mountains in the north of Palestine, it flows southerly, passes through the small lake Huleh (the biblical waters of Merom, q.v.) and the Lake of Tiberias or of Gennesaret (Sea of Galilee), and enters the north end of the Dead Sea. The main sources of the Jordan are three in number: the largest, Nahr Leddan, issues from the mound called Tell el-Kadi (hill of the judge) near ancient Dan; the second, the Nahr Banais, springs from crevices between and from under rocks that choke the mouth of a cave near Banias (the ancient Paneas, Cæsarea Philippi, q.v.); and the third, smallest and most remote, the Nahr Hasbani, rises near Mount Hermon. Uniting their waters above Lake Huleh, these streams give rise to the Jordan. Above Lake Huleh the river is 30 to 100 feet in width, just below the lake about 60 feet, and in the valley between the Lake of Tiberias and the Dead Sea from 90 to 250 feet, and is 540 feet wide at its mouth. In the flood season it reaches a breadth of even 2 miles. At ordinary times it is fordable in a great many places—in some places even when the river is in flood. Its usual depth between the Lake of Tiberias and the Dead Sea is 2 to 3 feet; just below Lake Huleh it is about 15 feet deep; the depth of course increases in the flood season. The river is not navigable. In the flood season dangerous rapids are found. In its course the river makes a steep descent. Lake Huleh is about 7 feet above the level of the Mediterranean, while the Lake of Tiberias is about 680 feet, and the Dead Sea about 1300 feet below that level; so that between Huleh and the Lake of Tiberias the river falls about 69 feet to the mile, between the Lake of Tiberias and the Dead Sea about 9 feet to the mile. The valley is a portion of the great rift valley, or depression which extends nearly across Africa. It has four main affluents: the Sheriat el-Menadireh (Hieromax, Yarmuk) and Zerka (Jabbok) on the east; the Jalud and Faria on the west. A little below Huleh the river is crossed by a bridge, the Jisr Benat Yakob, over which the road from Damascus to Galilee passes, and a few miles below the Lake of Tiberias is another bridge, the Jisr Mujamia. Below the Lake of Tiberias the valley of the Jordan presents a most remarkable formation. Within a larger valley called the Ghor is a smaller valley called the Zor, and through this the Jordan flows. The precipitous ridges which

inclose the valley rise in some places to the height of 3000 or 4000 feet. The width of the Ghor is from somewhat over 1 mile to 16 miles, of the Zor from ½ mile to 2 miles. The river runs through the Zor in such a tortuous course that its total length is more than 200 miles, although the distance in a straight line is but 65 miles. Near the Dead Sea vegetation does not exist; but the valley above is covered with grass in the rainy season, and tamarisks, acacias, oleanders, etc., abound. Cereals are raised in various parts of the territory traversed by the river, especially barley. The Jordan was first thoroughly explored by Molyneux and Lynch—by the former in 1847 in the dry season, by the latter in 1848 when the river was in flood. The climate in the Jordan valley is tropical, and it has been well described as "a tropical oasis sunk in the temperate zone." The name Jordan was regarded by the Hebrews as suggesting the "swiftly flowing" stream (from *yarad*, to descend) and hence is always used in Hebrew with the article. Consult: Molyneux, in the *Journal of the Royal Geographical Society*, vol. xviii (London, 1848); W. F. Lynch, *Official Report of the United States Expedition to Explore the Dead Sea and the River Jordan* (Baltimore, 1852); Libby and Hoskins, *The Jordan Valley and Petra* (2 vols., New York, 1905); G. A. Smith, *Historical Geography of the Holy Land* (16th ed., London, 1910); and the travels in Palestine of Robinson, Porter, Tristram, Huntington, and others.

JORDAN, zhôr'dăn', Camille (1771–1821). A French politician, born at Lyons. He became interested in public affairs at a very early age and developed into an active opponent of the French Revolution. He published, in 1792, a satire on the church of the new constitution, cleverly entitled *Histoire de la conversion d'une dame parisienne*. Proscribed by the Directory for his participation in the insurrection of Lyons, he fled to Switzerland and London. Returning to Lyons in 1796, he was chosen in 1797 to the Council of Five Hundred, where he advocated the principles of religious liberty, of which he was one of the chief supporters until his death, gaining the nickname of Jordan les Cloches (church-bell Jordan). After the revolution of the 18th Fructidor he went to Germany. In 1800 he was recalled, and opposed the measures of Bonaparte, exposing the frauds in the election of 1802 in a pamphlet, *Vrai sens du vote national sur le consulat à vie*. He lived in retirement, devoted to literature, until the accession of Louis XVIII. He was elected in 1816 to the Chamber of Deputies and sided with the opposition. His writings were published in Paris in 1818. Consult C. A. Sainte-Beuve, "Jordan et Mme. de Staël," in *Revue des Deux Mondes* (Paris, 1868).

JORDAN, jôr'dan, Conrad N. (1830–1903). An American banker, born in New York City. He learned the printing trade (1843), became a compositor, and in 1852 was appointed to the staff of a New York bank. From 1864 to 1880 he was cashier of another banking establishment there, and in 1880–84 was treasurer of the New York, Ontario, and Western Railway Company. In 1885 he was appointed Treasurer of the United States, from which post he resigned in 1887, upon the resignation of Daniel Manning from the secretaryship of the Treasury. During his administration he introduced a new system of public reports by means of which the precise condition of the Treasury was made readily ascertainable. He was again active in banking, as vice president of a New York banking house in 1887 and subsequently its president. From 1893 until his death he was Assistant Treasurer of the United States in New York City, in which capacity he rendered efficient service during the financial difficulties of 1893–95.

JORDAN, David Starr (1851–). An American ichthyologist, educator, and writer, born at Gainesville, N. Y. He entered Cornell University at its opening session in 1868, was appointed an instructor in botany there in 1871, and a year later took the degree of M.S. In 1875 he received an M.D. from Indiana Medical College and in 1878 a Ph.D. from Butler University, where he was professor of biology from 1875 to 1879. He had already become an assistant to the United States Fish Commission and had begun under the direction of Agassiz the studies which eventually made him one of the foremost of ichthyologists. After six years as professor of zoölogy at Indiana University, he became president of that institution, serving from 1885 to 1891. His summers were spent in investigations and researches for the Fish Commission, with which his connection continued up to 1891 and from 1894 to 1909. In 1879–81 he was a special agent for the United States census and in that capacity made a report of great value on the marine industries of the Pacific coast. In 1891, on the founding of Leland Stanford Junior University, he became its president. Under his able supervision the university was successfully organized and was developed along original lines. (See Leland Stanford Junior University.) He remained president until his retirement in 1913, when he was chosen to the honorary post of chancellor. Dr. Jordan served as special United States Commissioner to investigate the fur-seal fisheries in Alaska (1897) and later to investigate salmon fisheries and in 1908–10 was international commissioner of fisheries. In 1910 he became chief director of the World Peace Foundation. He received the degree of LL.D. from several universities and in 1909 was president of the American Association for the Advancement of Science. In addition to papers in the proceedings of scientific societies, and in the reports of the United States Fish Commission and the Census Bureau, he published *A Manual of Vertebrate Animals of the Northern United States* (1876); *Science Sketches* (1887); *The Care and Culture of Men* (1896; new ed., 1910); *Fishes of North and Middle America* (4 vols., 1896–1900), with B. W. Evermann; *To Barbara* (1897), verse; *Matka and Kotik* (1897; new ed., as *The Story of Matka*, 1910); *Footnotes to Evolution* (1898); *Imperial Democracy* (1899); *Food and Game Fishes of North America* (1902), with B. W. Evermann; *Guide to the Study of Fishes* (New York, 1905); *The Human Harvest* (1907); *Fishes* (1907); *Life's Enthusiasms* (1907); *College and the Man* (1907); *The Religion of a Sensible American* (1909); *The Stability of Truth* (1909); *The Fate of Iciodoram* (1909); *War and Waste* (1913); *War's Aftermath* (1914), with H. E. Jordan.

JORDAN, Dorothy, or Dorothea (1762–1816). An Irish actress. She was born near Waterford, Ireland, and was the daughter of Grace Phillips, an actress, whose husband was a reputed Captain Bland. Dorothy made her dé-

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but in Crow Street Theatre, Dublin, in 1777, as Phœbe in *As You Like It*, and, after various vicissitudes as an English provincial actress and the adoption of the name of Mrs. Dora Jordan, she appeared in 1785 at Drury Lane, London, in the character of Peggy in *The Country Girl*. She speedily won great popularity, exhibiting decided talent in comedy and musical farce. Lady Teazle, Rosalind, and Viola were her chief successes, and her acting was extravagantly praised—among others by Lamb, Leigh Hunt, Hazlitt, Byron, and Campbell. As Mrs. Ford, she was for some years the mistress of Mr., afterward Sir, Richard Ford, by whom she had four children. In 1790 her beauty captivated the Duke of Clarence, afterward William IV, and her intimacy with him lasted until 1811, when it was terminated by the Duke, an ample provision being made for her and the 10 children she had borne him. The eldest of these children, George Augustus Frederick Fitzclarence, was created Earl of Munster in 1830, and the brothers and sisters were also ennobled. In 1814 Mrs. Jordan retired to France and is said to have died of a broken heart at Saint-Cloud, July 3, 1816; but there is a suspicion that she lived for seven years afterward in England under an assumed name. A statue of her, by Chantry, was erected by William IV after his accession. Consult Boaden, *The Life of Mrs. Jordan* (London, 2 vols., 1831).

JORDAN, yôr'dän, Henri (1833–86). A German archæologist, born at Berlin and educated at Bonn and at Berlin, where he became instructor. From 1867 to 1886 he was professor at Königsberg. He made many journeys to Italy, his especial study being Roman religion and topography. Among his works are the excellent editions of Cato Censor and Sallust, *Catonis præter Librum de Re Rustica quæ Extant*, with elaborate *Prolegomena* (1860), and *Sallusti Catilina, Jugurtha, Historiarum Reliquiæ* (1866; 2d ed., 1876); *Topographie der Stadt Rom im Altertum* (1871–85); *Forma Urbis Romæ* (1874); *Kritische Beiträge zur Geschichte der lateinischen Sprache* (1879); *Der Tempel der Vesta und das Haus der Vestalinnen* (1886); and the third edition of Preller, *Römische Mythologie* (1881–83).

JORDAN, jôr'dan, John Woolf (1841–1921). An American antiquary, born in Philadelphia and educated at Nazareth Hall. He became assistant librarian of the Pennsylvania Historical Society in 1885 and in 1888 editor of the *Pennsylvania Magazine of History and Biography*. Lafayette College gave him the degree of LL.D. in 1902. His writings include: *Occupation of New York by the British* (1889); *Moravian Immigration to Pennsylvania 1734–67* (1896); *Franklin as a Genealogist* (1899); *A Century and a Half of Pittsburgh and her People* (1909), with J. N. Boucher; *A History of Delaware County, Pa., and its People* (1914).

JORDAN, Louis Henry (1855–). A British theologian and authority on comparative religion. He was born in Halifax, studied at Dalhousie University, Edinburgh, Princeton, Oxford, Marburg, Leipzig, and Berlin. He was minister of churches in Halifax (1882–85), Montreal (1885–90), and Toronto (1894–1900), and lectured on Church polity at Montreal Theological College in 1887–89 and on comparative religion at the University of Chicago (1902). After 1900 he resided largely in England, spending much time in travel and study. He wrote: *Comparative Religion: Its Genesis and Growth* (1905); *Comparative Religion: A Survey of Recent Religion* (1906, 1909, 1912); *Comparative Religion: Its Method and Scope* (1902); *Modernism in Italy* (1909); *Comparative Religion: Its Meaning and Value* (1913).

JORDAN, zhôr'dän', Marie Ennemond Camille (1838–). A French mathematician, born at Lyons. He entered the Paris School of Mines in 1857 and received the degree of doctor of sciences in 1860, his theses being: (1) *Sur le nombre des valeurs des fonctions;* (2) *Sur les périodes des fonctions inverses des intégrales des différentielles algébriques* (1860). The next year he was made engineer of mines, and in 1885 he was promoted to the rank of chief engineer. After 1872 he devoted himself to the teaching of mathematics. In 1876 he was made professor of analysis at the Polytechnic School, and in 1883 he succeeded Liouville in the chair of mathematics at the Collège de France. In 1881 he was elected a member of the Academy of Sciences, in the place of Michel Chasles. One of the most noted of French mathematicians, Jordan gained a wide reputation through his discoveries in geometry and analysis. He applied himself especially to the theory of substitutions and made important applications of this theory to algebraic and linear differential equations. In France he came to be recognized as one of the greatest teachers of the *n*-dimensional geometry. The results of his investigations appeared in the form of memoirs to the number of more than 100, published chiefly in the *Journal für Mathematik, Annali di Matematica, Liouville's Journal, Mathematische Annalen, Comptes Rendus,* and the *Journal de l'Ecole Polytechnique.* Besides these contributions he published: *Théorie des substitutions et des équations algébriques* (1870), which received the Poncelet prize; *Cours d'analyse de l'Ecole Polytechnique* (3 vols., 1882–87; 3d ed., 1909).

JORDAN, yôr'dän, Rudolf (1810–87). A German genre painter. He was born in Berlin, studied there under Wach and afterward, at Düsseldorf, he studied under Schadow and Karl Sohn. Frequent journeys to the coasts of Holland, Belgium, and France furnished him with the subjects for the clever delineations from the life of fishermen and sailors, to which he devoted his brush almost exclusively. Of his many works, which became widely known through reproductions, the most familiar are "An Offer of Marriage in Heligoland," "Return of the Pilots" (1836), "Boat-Hawsing in Normandy" (1843), "The Pilot's Death" (1856), "Old Men's Home on the Coast of Holland" (1864), and "The Widow's Comfort" (1866), all in the National Gallery, Berlin; "Shipwreck on the Coast of Normandy" (1848), Dresden Gallery; "Soup for the Sick" and "The First Child" (1862), Düsseldorf Gallery; "First Visit after the Wedding" (1861) and "Soup-Day at a French Convent" (1868), Leipzig Museum. He did good work in water colors and was also favorably known as an illustrator and etcher. He was professor at the Düsseldorf Academy and received the great gold medal at the Berlin Exhibition in 1886.

JORDAN, jôr'dan, Thomas (1819–95). An American soldier and journalist, born in the Luray valley in Virginia. He graduated at West Point in 1840 in the same class with Sherman and Thomas, served in the Seminole and Mexican wars, and in 1861 resigned to enter

the Confederate army. He commanded the forces at the first battle of Bull Run until the arrival of Beauregard, whose chief of staff he became. After Shiloh he was promoted to the rank of brigadier general (April 14, 1862) and after service with Bragg returned to Beauregard's staff and was active in the defense of Charleston. In 1869 he joined the Cuban revolutionists, was made their chief commander, and won the battle of Guaimaro, but resigned soon afterward. He edited the Memphis *Appeal* (1866–69), and wrote, with J. B. Pryor, *The Campaigns of Lieutenant-General Forrest* (1868). Upon his return to New York he became editor of the *Financial and Mining Record*. He wrote a valuable criticism of the Confederate war policy for *Harper's Magazine* (1865).

JORDAN, yôr'dân, WILHELM (1819–1904). A German poet. He was born at Insterburg, East Prussia, and studied at Königsberg (1838–42) and in Berlin (1842–43). He became an exponent of liberalism and of the Young Hegelian philosophy and published two books of poems, *Irdische Phantasien* (1842) and *Schaum* (1846). Banished from Saxony by reason of his radical tendencies in politics and religion, he went to Bremen and in 1848 was elected a member of the National Assembly at Frankfort. He was subsequently secretary of the naval board in the short-lived Imperial ministry (1848) and held other offices. His best-known works are his two epics—*Demiurgos* (3 vols., 1852–54), deeply metaphysical and rather an exposition of the Young Hegelian philosophic system than a true epic, and *Nibelunge* (1867–74), in which he unsuccessfully sought to revive both the matter and manner of ancient Germanic poetry. But, as a wandering rhapsodist, Jordan recited this epic with great success in Europe and America (1871). His best work is contained in the three light dramas in verse, *Die Liebesleugner* (1855), *Tausch enttäuscht* (1856), and *Durchs Ohr* (1870). He wrote some other volumes—criticism, poetry, and prose fiction. Consult Schiffner, *Wilhelm Jordan* (Frankfort, 1889); Roepe, *Die moderne Nibelungendichtung* (1869); Von Stern, *Wilhelm Jordan* (1910).

JORDAN, WILLIAM GEORGE (1864–). An American author, editor, and lecturer. He was born in New York and was educated there in the City College. At 20 he became editor of *Book Chat*. He was subsequently editor of *Current Literature;* managing editor of the *Ladies' Home Journal* (1897); editor of the *Saturday Evening Post* (1898–99); for six years editor and vice president of the Continental Publishing Co.; and for one year editor of the *Search Light*. His educational views, formulated as "Mental Training by Analysis, Law, and Analogy," he spread through lectures. It was at his suggestion (made in 1907) that the State executives organized as the House of Governors. Jordan published: *Mental Training, a Remedy for Education* (1896); *The Kingship of Self Control* (1899); *The Majesty of Calmness* (1900); *The Power of Truth* (1902); *The House of Governors* (1907); *The Crown of Individuality* (1909); *The Power of Purpose* (1910); *Little Problems of Married Life* (1910).

JORDANES, jôr-dā'nēz. A historian of the sixth century, formerly erroneously called Jornandes. He was probably an Alan and a native of Lower Mœsia. In his early years he was secretary to one of the rulers of the Alans; later he became a monk and possibly a bishop. The work by which he has become famous is his *De Rebus Geticis*, usually called *Getica*, written about the year 552, while he was living in or near Ravenna. This is very little more than a condensation of the Gothic History of Cassiodorus (q.v.). But, as the latter has been lost, the *Getica* of Jordanes is of prime importance for the early history of the Goths. Moreover, his work has preserved many German legends and is also of some importance for philologists. The second work which he wrote, a summary of Roman history, named *De Summa Temporum vel Origine Actibusque Gentis Romanæ*, usually called *Romana*, is of little value. Of the numerous editions of both works the best is by Mommsen, in the *Monumenta Germaniæ Historica, Auctores Antiquissimi*, vol. v (Berlin, 1882). Consult: Thomas Hodgkin, *Italy and her Invaders*, vol. i (Oxford, 1892); Potthast, *Bibliotheca Historica Medii Ævi* (2d ed., Berlin, 1896); Wattenbach, *Deutschlands Geschichtsquellen im Mittelalter*, vol. i (7th ed., Stuttgart, 1904).

JORDAN (jôr'dan) **RIVER.** A river of the United States which heads at the northern end of Utah Lake and flows northward in a winding course of about 40 miles to Great Salt Lake. It drains an area of north-central Utah in the extreme eastern part of the Great Basin. The main stream and its tributaries are extensively used for irrigation.

JORDA'NUS, NEMORARIUS, possibly identical with JORDANUS DE SAXONIA (?–1236). A mathematician of the thirteenth century, born at Borgentreich, Diocese of Paderborn. He studied at Paris, where he gained a great reputation, and it is possible that he is the Jordanus who in 1220 was elected to succeed St. Dominic. With the exception of Leonardo of Pisa, Jordanus is the only learned man of the Latin West in the Middle Ages who deserved the name of mathematician, and his immediate influence was much greater than that of his Italian contemporary. His mathematical writings served as a basis for teaching in the various universities of the Middle Ages and Renaissance. The most important of his published writings are: *Arithmetica Demonstrata* (1496); *De Ponderibus* (1533); *Jordani Opusculum de Ponderositate* (1565); *De Numeris Datis* (published by Treutlein in the *Abhandlungen zur Geschichte der Mathematik*, 1879); *Jordani Nemorarii Geometria vel de Triangulis Libri IV* (Thorn, 1887); *Tractatus de Sphæra.*

JOREE. See CHEWINK.

JÖRG, yĕrk, JOHANN CHRISTIAN GOTTFRIED (1779–1856). A German physician, born at Predel, and educated at Leipzig, where in 1810 he was made professor of midwifery. As director of the charity hospital at Leipzig, he gained much practice in his special field. His notable contributions were the invention of mechanical aids and the introduction of a new system of Cæsarean section, gastroelytrotomy. In general he sought milder methods, both in obstetrics and orthopedy. Jörg wrote: *Handbuch der Krankheiten des Weibes* (3d ed., 1831); *Handbuch der Geburtshilfe* (3d ed., 1833); *Handbuch zum Erkennen und Heilen der Kinderkrankheiten* (2d ed., 1836); *Lehrbuch der Hebammenkunst* (5th ed., 1855).

JÖRG, JOSEPH EDMUND (1819–1901). A Bavarian Ultramontane politician. He was born at Immenstadt; studied law, history, and the-

ology at Munich; entered the Bureau of Archives in 1847; became in 1852 editor of the *Historischpolitische Blätter*, and in 1865 a member of the Second Bavarian Chamber. He published: *Deutschland in der Revolutionsperiode 1522–26* (1850); *Geschichte des Protestantismus in seiner neuesten Entwickelung* (1857); *Geschichte der socialpolitischen Parteien in Deutschland* (1867).

JÖRGENSEN, jēr′gen-sen, Adolf Ditlev (1840–97). A Danish historian and archivist, born at Graasten, Sönderjylland. Of an old Danish family he felt deeply the loss to Denmark of his native province (1864). Having studied history, in 1869 he became assistant in the royal archives, and in 1889 keeper of the public records. In the latter office he rearranged with much ability all the archives of the kingdom. He published works on the earliest Danish history and Danish popular songs (1868–71), *Om Danebroges Oprindelse* (1876), *Det gamle danske Kongevaaben* (1879), *Den nordiske Kirkes Grundloggelse og förste Udvikling* (2 vols., 1874–78), *Udsigt over de danske Rigsarkivers Historie* (1884), *Kongeloven og dens Forhistorie* (1886); many biographies, notably *Peter Schumacher Griffenfeld* (2 vols., 1893–94); also *40 Fortællinger af Fædrelandets Historie* (1882; 5th ed., 1908), *Fortællinger af Nordens Historie* (2 vols., 1892–93; 2d ed., 1901), *Bidrag til Oplysning af Middelalderens Love og Samfundsforhold* (4 vols., 1872–76), and *Danmarks Riges Historie, 1814–52* (1896–97). Posthumously appeared (in three languages) the weighty treatise *Det dansk-tyske Spörgsmaal* (1900), his collected works (4 vols., 1898–1900), and his autobiography, *En Redegjörelse for min Udvikling og mit Forfatterskab* (1901).

JÖRGENSEN, Jörgen (1779–1845). A Danish adventurer, the son of a Copenhagen watchmaker. In 1809 he audaciously seized upon the government of Iceland, looted the treasury, and with an "army of eight men" ruled the island for six weeks, until driven out by the captain of an English sloop of war. He went to England, was tried and found guilty on a charge of robbery, and was sent to Botany Bay, where he died. For his adventure he became known as the Hundadagarkonungur, i.e., the Dog-Days King. Consult J. F. Hogan, *The Convict King* (London, 1891; Dan. trans. by U. von Ripperda, Copenhagen, 1892).

JÖRGENSEN, jēr′gen-sen, Sophus Mads (1837–1914). A Danish chemist and author, born at Slagelse and educated at the University of Copenhagen. In 1867 he was made director of the chemical laboratory of the Polytechnic College in Copenhagen, in 1871 lecturer in chemistry in the university there, and from 1887 to 1908 was professor. As teacher and scientist, he did much important work, his advice being much sought by scientific associations and practical enterprises. He wrote 1900 pages of the celebrated Gmelin-Kraut *Handbuch der Chemie; Overjodider af Alkaloiderne* (1869); and widely used textbooks, such as *Lærebog i kvantitativ uorganisk Analyse* (1869), *Lærebog i organisk Kemi* (1880), and *Kemiens Grundbegreber* (1902), besides numerous articles in scientific periodicals. In 1906 he was awarded the Lavoisier gold medal and the Berthelot bronze medal by the Académie des Sciences, Paris.

JORIS, yō′rīs, or **JORISZOON,** yō′rīs-zōn, David (c.1501–56). An Anabaptist leader, whose real name was Hans Jorisz, born either at Ghent or Bruges. He was apprenticed to a glass painter and soon displayed great aptitude in the work. To perfect himself in the art, he visited Belgium, France, and England. Returning to Holland, he settled at Delft, practicing his trade (1524); but in 1528 he began to display unusual religious zeal against Roman Catholicism, and, while a procession on Ascension Day was passing in Delft, he stopped the priests, accused them of deceiving the people by false teachings, and reproached them for worshiping images and pictures. He was arrested and banished for three years. Abandoning the common principles of the Reformation, he became an adherent of Anabaptist views. At first he did not identify himself with the sect on account of their disorderly conduct and their doctrine of using the sword to establish their authority; but in 1534 he fully joined them by rebaptism. He was consecrated as Bishop of Delft by Dammas, Ubbo, and others. His influence was very great and his followers numerous. The Anabaptist leaders, jealous of his success, openly disavowed him. But at the convocation of Anabaptists in 1536 Joris fearlessly declared himself a divinely appointed leader and soon afterward issued a pamphlet calling all parties to a peaceful union. The leaders were still more provoked, and most of the Anabaptists forsook him. Those who adhered to him took the name of Jorists or Davidists. He professed to have visions and revelations and interpreted the persecutions to which his followers were subjected as proofs of the divine favor. At Delft, Haarlem, Amsterdam, Rotterdam, Leyden, and other cities, many suffered death for their adherence to him. His own mother died on the scaffold, a martyr to the doctrines which her son was propagating (February, 1538). He kept up his wandering life till 1544, when, the voluntary gifts of his followers rendering him independent, he altered his life completely. In Basel in August of that year appeared a man by the name of John of Bruges. He was wealthy, a communicant in the Reformed church, and had come there with his family. He was highly esteemed for his wealth and his virtues and died peacefully, Aug. 25, 1556. This was David Joris. For three years his secret was kept. Then his son-in-law, Nicholas Blesdyk—a reformed preacher, but an avaricious and unprincipled man, who had been his disciple—revealed the identity of John of Bruges with David Joris. The clergy and university declared his opinions heretical, and his body was dug up and burned. The sect, which Joris had secretly communicated with while living in Basel, survived his death half a century and circulated his writings. Joris was a thorough mystic and believed that he had divine visions. He rejected the doctrine of the Trinity and held strange views concerning Christ. He believed that he was to establish internally and externally the eternal kingdom of Christ, which before was the kingdom of Christ only internally. He denied the doctrine of future judgment and the existence of angels. He held that the body only was defiled by sin. Of his 250 books and 1000 letters, the most important is the *Book of Miracles*, under the title of *Wonderboeck*, two editions of which were printed (1542, 1551), both anonymous. In it he adopts the idea of Joachim of Floris (q.v.), of three dispensations. Consult, for a complete

account of his life and works, Nippold's articles in *Zeitschrift für die historische Theologie* (Leipzig, 1863, 1864, 1868); for a bibliography of his writings, Van der Linde, *David Joris: Bibliographie* (The Hague, 1867). See DAVIDISTS.

JORIS, yō'rēs, PIO (1843–). An Italian genre and landscape painter, born in Rome, where he studied at St. Luke's Academy from 1856 to 1864, and later under Fortuny, to whose influence he owes much. He traveled extensively in Germany, France, England, and Spain, and depicts life and nature with felicity of conception and coloristic splendor. Notable specimens of his art are: "Sunday Morning before the Porta del Popolo in Rome" (1869); "Baptism in Ischia" (1878); "Flight of Pope Eugene IV" (1883), in the National Gallery, Rome; and "Church Festival in St. Peter's" (1901). He also achieved distinction as a painter of water colors, being made president of the Società d'Acquarellisti in Rome and honorary member of the Société Belge des Aquarellistes.

JORISTS, jō'rists. See DAVIDISTS.

JORISZOON, DAVID. See JORIS, DAVID.

JOR'KINS. In Dickens's *David Copperfield*, the soft-hearted partner of Mr. Spenlow. The latter, in his intercourse with clients, paints Jorkins as a rigid taskmaster and so throws the responsibility for the firm's acts on him.

JÖRN, yērn, KARL (1876–). A Russian tenor, born at Riga. When he was about 18 years of age, Otto Lohse (q.v.), at that time the conductor of the Riga Opera, discovered his voice and induced him to study with Schutte-Harmsen, a baritone at the opera. After one year of study he went to Berlin to Ress. In 1895 he made his début at Freiburg, which resulted in an engagement at Zurich. Here Ludwig Barnay (q.v.) was greatly impressed by him and in 1899 secured him a contract with the Hamburg Opera, where he laid the foundation of his fame. In 1902–03 he was connected with the Berlin Royal Opera, but with generous leave for extended guest tours, which took him all over Europe and to South America. In 1908 he joined the Metropolitan Opera, where in his first season he established himself as a prime favorite. His repertory includes 100 operas in German, Italian, French, English, Russian, Spanish, and Portuguese.

JORNANDES. See JORDANES.

JOR'TIN, JOHN (1698–1770). A Church of England prelate. He was born in London, Oct. 23, 1698. His father was a French Protestant of Brittany who had come to England on the revocation of the Edict of Nantes. The son was educated at Charterhouse and at Jesus College, Cambridge, taking his first degree in 1719; soon became a fellow of the college; and graduated as M.A. in 1722. While at Cambridge, he published a small volume of Latin poems, entitled *Lusus Poetici*, regarded as worthy of a high place among modern Latin verses. He was presented with a living in Cambridgeshire (1727), but removed to London (1730), where he became an admired preacher. He was rector of Eastwell in Kent (1737) and St. Dunstan's-in-the-East (1751); became in 1762 the domestic chaplain of the Bishop of London, rector of Kensington, London, and prebend in the cathedral of St. Paul's. In 1764 he was made Archdeacon of London. He died Sept. 5, 1770. His most important works were: *Remarks on Ecclesiastical History* (1751–54; new ed. by Trollope, 1846); *Life of Erasmus* (1758–60; new ed. 1808); *Tracts, Philological, Critical, and Miscellaneous* (1790). He wrote also criticisms on Spenser, Milton, Tillotson, Cardinal Pole, Seneca, and others. His *Various Works* appeared in 1805–10, and his *Memoirs*, by Disney, in 1792. Consult his *Life*, by Trollope (London, 1846).

JORULLO, hō-rōō'lyō. A volcanic mountain in the State of Michoacan, Mexico, situated 70 miles southwest of Morelia, the capital of the state. It is of comparatively recent origin, having risen from the surrounding plain as a result of the earthquake of Sept. 29, 1759. Besides Jorullo, there sprang up five other volcanic cones and a large number of small cones, which were still active at the time of the visit of Humboldt in 1803. The surrounding region is covered with lava fields and scattered volcanic rocks, showing evidence of the extent of the eruption, and near the cone are a number of hot springs. The height of Jorullo above the sea is 4265 feet; it is now inactive.

JOSAPHAT. See BARLAAM AND JOSAPHAT.

JOSÉ, hō-sā', POEMA DE (Sp., Poem of Joseph). A Spanish poem belonging to the class of documents called *aljamiados*, i.e., works written in the Spanish language, but with Arabic characters. Through a hieratical impulse, or merely as a result of a rooted attachment to the alphabetical signs of their ancestral speech, certain of the Moors, when composing in Spanish, adapted the Arabic signs to the purpose and avoided the use of the Roman characters. The *José* is the most interesting work of the kind. It seems to have been written in the sixteenth century and possibly on Aragonese territory if we may judge by some dialect forms found in it. It tells the story of the selling of Joseph by his brethren and of his life in Egypt, intermingling with the narrative elements of Mohammedan tradition. In form it is modeled upon the old Spanish poems which were written in what Gonzalo de Berceo called the *Cuaderna Vía*, i.e., it is in quatrains of 12-syllabled or 14-syllabled lines, with a single rhyme in the quatrain. From the phonetic point of view this work, like others of its kind, has a certain value, since the adaptation of the Arabic alphabet to Spanish sounds affords a possible clew to the real nature of those sounds at the time in question. Consult: Morf's ed. of the *José* (Leipzig, 1883); *Biblioteca de autores españoles*, vol. lvii (Madrid, 1864); F. G. Robles, *Leyendas de José, Hijo de Jacob y de Alejandro Magno* (Saragossa, 1888); Ford, "The Old Spanish Sibilants," in *Harvard University Studies and Notes in Philology and Literature* (Boston, 1900); M. Schmitz, "Ueber das altspanische Poema de José," in *Romanische Forschungen*, vol. xi (Erlangen, 1901); Grünbaum, *Gesammelte Aufsätze zur Sprach- und Sagenkunde* (Berlin, 1901); Menéndez Pidal, *Poema de Yúçuf* (Madrid, 1902); Saroïhandy, "Remarques sur le poème de Yûçuf," in *Bulletin hispanique*, vol. vi (Paris, 1904).

JOSEF'FY, yō-zĕf'ĭ, RAFAEL (1852–1915). An Hungarian-American pianist, composer, and teacher, born at Miskolcz, Hungary. He was educated mainly under Moscheles at the Leipzig Conservatory, but studied subsequently under Tausig at Berlin. About 1880 he established himself in New York and afterward came to be recognized as one of the leading teachers and concert virtuosos in his adopted country. Be-

fore coming to America he had won for himself a high reputation as an interpreter of Chopin and, after some very successful concert tours throughout Germany and Austria, had made a place for himself in the musical life of Vienna, in which city he had taken up his residence. He published upward of a score of piano compositions, which are marked by delicacy and charm of musical phrasing. From 1885 to 1906 Joseffy was a member of the faculty of the National Conservatory of Music, New York. His playing has been characterized as possessing great delicacy, charm of touch, facility of execution, and exquisite finish. He is the author of an excellent *School of Advanced Piano Playing* (1892; also in German).

JO'SEPH (Heb. *Yōsēph*, he increases; perhaps an abbreviation of *Yōsēph 'El*, God increases). The son of Jacob and Rachel (Gen. xxx. 22–24), eponym of the tribe of Joseph. The story of Joseph is given with much detail in the last 14 chapters of the Book of Genesis. He is represented as the favored son of his father; for this reason and because of his own boyish arrogance in consequence of it, he gains the ill will of his brethren. Taking advantage of a favorable opportunity, they decide to kill him, but ultimately think better of their purpose and sell him into slavery instead. He is taken to Egypt and becomes the slave of Potiphar, an officer of Pharaoh. Resisting the advances of Potiphar's wife, he gains her enmity and is put in prison on a false accusation by her. His skill in interpreting dreams secures his release and brings him into favor with Pharaoh. He saves Egypt in a time of famine and becomes the highest official in the land. He marries the daughter of the high priest of Heliopolis. Through his wise administration he not only maintains the people of Egypt alive, but also secures for the crown possession of the soil and 20 per cent of all income from the land, and for the priesthood exemption from taxation. The famine extends to Palestine, and Joseph's brethren come to Egypt for provisions. A reconciliation follows, and Jacob and all his family remove to Egypt and take up their residence in the land of Goshen.

Many modern scholars think that the story of Joseph, like those of Abraham, Isaac, and Jacob, is a combination of two sources, the Yahwistic and Elohistic narratives. (See PENTATEUCH.) The combination represents, in their judgment, the welding together of a much larger number of elements than in any of the other narratives in Genesis. In the minds of both writers Joseph is supposed to be the representative of the Northern Kingdom of Israel, and the importance assigned to him is taken to indicate a northern origin of these stories. It is held, however, that this is particularly evident in those portions of the composite narrative which belong to E (a northern writer), and that, while J (a Judæan writer) also must admit the superiority to be accorded to Joseph over other tribes represented as his brethren, he saves his national pride by according to his own tribe as favorable a position as possible by the side of Joseph, by maintaining that it was Judah who proposed to save Joseph from the jealousy of his brothers, whereas according to the northern writer it was Reuben who intervened. But other scholars consider this conjectural division of the story into Yahwistic and Elohistic elements as unproved and improbable. In view of the uncertainty as to the use of the divine names in the original text, indicated by manuscripts and versions, they attach little importance to the sporadic use in two chapters of the name Yahwe. They find no difficulty in assuming more than one cause for the jealousy of the brethren or in supposing that two brothers were thought to be more friendly than the rest. Since both of these brothers speak of the Ishmaelites, and the Greek version suggests that the "Midianites" is a corruption of the "Ishmaelites," they find no contradiction in this respect. The keeper of the harem was often a married man in ancient Egypt, and with his office that of chief executioner is naturally connected; the term *saris* seems to designate not only an "eunuch," but also such an official as elsewhere was frequently an actual eunuch.

Various elements are distinguished in the story of Joseph: (1) northern traditions, reflecting the rivalry between various tribes which (or some of which) formed parts of the later Hebrew confederation; (2) recollections of the sojourn of certain Hebrew clans in the land of Goshen (q.v.), subsequently enlarged into the tradition which brought all the 12 clans into Egypt; (3) an Egyptian folk tale of a faithful servant wrongfully accused by his master; (4) a story of a Hebrew who rose to a high official position in Egypt; and (5) certain peculiarities of Egyptian life, such as the heavy taxation and the exemption of the priests, for which an explanation was sought. Approaching the story of Joseph from this point of view, its component parts become tolerably clear. Joseph is the favorite son of Jacob, the eldest son of the patriarch's favorite wife, Rachel. He belongs to Shechem (the chief sanctuary in the Northern Kingdom) in the same sense in which Jacob belongs to Bethel, Isaac to Beersheba, and Abraham to Hebron. He rouses the jealousy of his brothers because of a garment with sleeves (befitting one of superior rank) given to him by Jacob; and because of his dreams, which betokened future greatness and superiority over his brothers. The result is that the brothers decide to kill him, but are persuaded by Reuben and by Judah to spare his life. He is cast into a cistern and is sold by his brothers to Ishmaelites and in this way is carried down to Egypt. In this incident two factors are distinguished: (*a*) the story of Joseph's superiority, and (*b*) the story of his humiliation by his brothers. The former reflects the natural pride of the northern writer, the latter embraces a recollection of a combination of a number of tribes against one which had become too powerful. In actual Hebrew history there is no tribe of Joseph, but instead we have two clans, Ephraim and Manasseh (qq.v.), who are the main props of the Northern Kingdom and who are represented in tradition as the sons of Joseph. It would seem, therefore, that a Joseph tribe, after being large enough to produce two offshoots, aroused such opposition and fear because of growing power as to lead to a combination which succeeded in driving this dangerous tribe from its territory. Such an event is just what we encounter among Arabic clans. The story of Joseph in Egypt contains, again, two elements: (*a*) tradition of the sojourn of some of the Hebrew tribes in Goshen (q.v.), combined with (*b*) two stories that have nothing to do with the Hebrews. That some of the tribes

afterward forming part of the confederation of the Bene Israel came at one time to the land of Goshen adjoining Egypt proper on the northeast and counted as belonging to Egyptian territory, in connection either with the Hyksos invasion or in connection with that steady process leading Semitic nomads to make more or less permanent settlements on the frontier districts of Egypt, is hardly open to doubt, as, on the other hand, it is equally certain that not all of the tribes came into this region. The pragmatic method of history writing which prevails in Genesis (as in the whole Pentateuch) represents the Bene Israel as forming a unit from time immemorial, and hence the popular tradition is so modified as to bring all the Hebrew tribes into Egypt and to bring them out again in a body under the leadership of Moses. Joseph may have been the name of the tribe (and possibly also of its numen) which first pushed its way into the western part of Goshen (q.v.). Of the two Egyptian stories told of Joseph, one is a folk tale, probably of Egyptian origin; the other embodies a reminiscence based upon an actual occurrence. The folk tale is that of a faithful servant intrusted by his master with the care of his household, and who resists the temptations offered by the faithless wife of the master. The servant is wrongfully accused and thrown into prison. The sequel of the story in its original form no doubt told of the proof that was forthcoming, establishing the innocence of the servant, his reward for his fidelity and honesty, and the punishment of the bad wife. This story, the Egyptian parallel to which exists in the so-called *Tale of Two Brothers* (consult Petrie, *Egyptian Tales*, London, 1895–99; Ranke, in Gressmann, *Altorientalische Texte und Bilder*, pp. 223 ff., Tübingen, 1909), is attached to Joseph as a favorite character of northern Hebrew legend. It is a species of Midrash very much of the order of the stories found in the Jewish Midrashim to illustrate Abraham's piety or Moses' faith. Instead, however, of presenting the story with its original sequel, it is attached to another tale about a foreigner who rose to a position of great eminence at the Egyptian court, and who manifested his wisdom and devotion to the interest of his royal master in various ways. The period to which this incident belongs can no longer be determined. From the Tell el-Amarna tablets we learn that in the fifteenth century B.C. it was not uncommon for Semites to hold high positions in Egyptian domains; and it has therefore been supposed that at the period of Egyptian supremacy over Palestine, when the relations between Egyptians and Semites were naturally quite close, a Hebrew vizier lived, the memory of whose remarkable career was thus preserved. It should be borne in mind, however, that there is as yet no positive evidence of such a person. This story, too, is then supposed to have been attached to Joseph as a familiar subject of legend and an appropriate personage of whom it could be told, and, having been combined with the folklore tale, to have become another incident in the life of one and the same person.

The visit of Joseph's brothers, with its dramatic incidents, and the emigration of Jacob and his sons and their families into Egypt, may be due to the pragmatic historical scheme of the Old Testament writers; while the meeting between Jacob and Joseph, and Jacob's interview with Pharaoh, from this point of view, are another specimen of early Jewish Midrash. There remains the scene at the death of Jacob (xlviii. 15–20) when Joseph brings his two sons to his father, who in blessing them gives Ephraim, although the younger, the preference over Manasseh. This touch is due to the pride of the Ephraimitic writer, who in this way justifies the greater prominence which, as a matter of fact, the tribe of Ephraim obtained. Joseph dies in Egypt, which may be taken perhaps as another indication that the tribe actually never left Egypt, or the land of Goshen, which was counted as a part of the territory of Egypt. The name of Joseph, however, survives largely through the northern clans, Ephraim and Manasseh, and in the local legendary tales gradually assumes almost the same position as Israel until, with the prophets, "house of Joseph" becomes synonymous with the "house of Israel," and the terms "house of Joseph" and "house of Jacob" embrace the Hebrews as a body. For the results of critical investigation regarding Joseph, consult the commentaries on Genesis of Dillmann, Holzinger, Gunkel (3d ed., 1910), Driver, and Skinner, and the Hebrew histories of Stade, Guthe, Piepenbring, Kent, Kittel, and Wellhausen (7th ed., Berlin, 1914).

JOSEPH. Husband of Mary, and the reputed father of Jesus (Luke iii. 23, iv. 22; John i. 45, vi. 42). He was probably a carpenter (Matt. xiii. 55), although Matthew's designation of Jesus as "the son of the carpenter" may mean no more than that he was a "carpenter," as he is termed in Mark vi. 3. Joseph is not alluded to in the New Testament outside of the Gospels of Matthew, Luke, and John. The earliest Gospel (Mark) is silent about him. The chief sources of information (apart from the Apocryphal Gospels) are the two narratives of the infancy of Jesus, prefixed respectively to the first and third Gospel. In addition to the well-known material there preserved, Luke alone records that "Joseph and his mother" brought the child Jesus to Jerusalem to present him to the Lord, in accordance with the Law of Moses (ii. 22, 23); and that, when Jesus was a boy of 12, his parents following their annual custom, went with him to the Passover feast in Jerusalem (ii. 41). From this point on, Joseph passes out of the clear light of history. That he died before the public ministry of Jesus began is only an inference, though a strongly justified one, from Mark iii. 20 with 31, vi. 3; John xix. 26, 27.

JOSEPH. 1. An oratorio by Handel (q.v.), first produced in London, March 2, 1744. 2. An opera by Méhul (q.v.), first produced in Paris, Feb. 17, 1807.

JOSEPH THE CARPENTER, HISTORY OF. See APOCRYPHA, *New Testament*.

JOSEPH (*Ger. pron.* yō'zĕf) **I** (1678–1711). Holy Roman Emperor from 1705 to 1711. He was the eldest son of Emperor Leopold I and was born at Vienna, July 26, 1678. He was crowned King of Hungary in 1687 and King of the Romans in 1690. He succeeded his father as Emperor and ruler of the Hapsburg dominions on May 5, 1705. His accession infused new energy into the prosecution of the war against France, which on the part of the Imperialists had been carried on with some dilatoriness. (See SUCCESSION WARS, *War of the Spanish Succession*.) His ambition was directed towards the extension of the Austrian power in Italy and Bavaria; of the latter the victories

of Marlborough and Eugene made him the master, but his plan to bring the Electorate of Bavaria under the Austrian crown failed on account of the opposition of the other German sovereigns. He was engaged in a long war with his Hungarian subjects, led by Rákóczy, which was terminated immediately after the death of the Emperor. Joseph was powerful enough to impose his will upon the Pope, whom he forced in 1709 to acknowledge his brother Charles as King of Spain. The influence of the Prince of Salm, who had the charge of his education, and his subsequent connection with Prince Eugene, led Joseph to embrace opinions much more liberal than those which had generally prevailed in his family, and he granted privileges to the Protestants of Hungary and Bohemia which had been refused by his predecessors. He also concluded a treaty in 1706 with Charles XII of Sweden, by which he granted religious liberty to the Protestants of Silesia and restored to them over 200 churches which had been taken from them by the Jesuits. He was fond of courtly ceremonial, but in his personal relation was mild and affable. He sought to improve the condition of the peasantry in his dominions by relieving them from some of their feudal burdens. Consult Herchenhahn, *Geschichte der Regierung Kaiser Josephs I.* (2 vols., Leipzig, 1786–89), and Robinson and Beard, *Development of Modern Europe*, vol. i (Boston, 1907).

JOSEPH II (1741–90). Holy Roman Emperor from 1765 to 1790. He was the son of the Emperor Francis I, of the house of Lorraine, and Maria Theresa, sovereign of the Austrian dominions and Queen of Hungary, and was born at Vienna, March 13, 1741, at a time when his mother's fortunes were in their lowest state of depression. He early gave proof of excellent abilities. He was elected King of the Romans in 1764, and Maria Theresa associated him with herself in the government of the Austrian states; but for some time his actual share in it amounted to little more than the chief command of the army. In 1765 he succeeded his father as Holy Roman Emperor. On the death of Maria Theresa, in 1780, he inherited all her dignities and power. Joseph II was a zealous reformer, having imbibed, like Frederick the Great, the principles of philosophy which prevailed in that age; but he worked unwisely, depending too much upon the exercise of authority and having too much faith in the intelligence of the average man in his day. Deeply concerned for the welfare of his subjects, the Emperor set to work to abolish privilege and oppression throughout his dominions. He was the typical "benevolent despot" of the age, and he sought to impose his reforms by force of his autocratic will, without considering the expediency of many of his radical measures and in total disregard of the sentiments of those whom supposedly his reforms were to benefit. As it was, he succeeded for the greater part in antagonizing his subjects in Hungary, in Bohemia, and in the Netherlands, and was compelled repeatedly to revoke many of his important measures of reform. Not the least of his blunders was his attempt to merge the heterogeneous nationalities of his realms into a centralized state. Nevertheless he contributed immensely to the permanent improvement of the administration and the system of taxation and did much to develop commerce and industry. His liberal views in matters ecclesiastical aroused the bitter hostility of the clergy. As soon as he found himself in full possession of the government of Austria, he proceeded to declare himself independent of the Pope and to prohibit the publication of any new papal bulls in his dominions without his *placet regium*. The further publication of the bulls *Unigenitus* and *In Cœna Domini* was also prohibited. Besides this he suppressed no fewer than 700 convents, reduced the number of the regular clergy from 63,000 to 27,000, prohibited papal dispensations as to marriage, and on Oct. 13, 1781, published the celebrated Edict of Toleration, by which he allowed the free exercise of their religion to the Protestants and the adherents of the Greek faith in his dominions. Pope Pius VI thought to change this policy by a personal interview with the Emperor, and for that purpose made a visit to Vienna in 1782; but, although he was quite unsuccessful in his object, he carried away with him the conviction that the people were utterly unprepared for the reforms which their sovereign sought to accomplish. Many of the reforms instituted by this enlightened monarch were later undone. In 1788–89 Joseph II, in alliance with Russia, engaged in a war with Turkey, in which he was unsuccessful; the vexation caused by this and by the revolt in the Netherlands (1789–90), occasioned by the abolition of the ancient constitution of Brabant, hastened his death, which took place Feb. 20, 1790. Joseph II had the ideals and the will, but he lacked the temperament, of a constructive reformer. He believed that despotic authority was all-sufficient to make any desirable change and so failed to see that democracy was necessary in order to give stability and permanence to reforms. Consult: Gross-Hoffinger, *Lebens- und Regierungsgeschichte Josephs II.* (4 vols., Stuttgart, 1835–37); T. Juste, *Histoire du règne de l'empereur Joseph II et de la révolution belge de 1790* (2 vols., Brussels, 1845–46); Arneth, *Joseph II. und Leopold von Toscana: ihr Briefwechsel, 1781–90* (Vienna, 1870); Brunner, *Joseph II.* (Freiburg, 1885); Schlitter, *Pius VI. und Joseph II.* (Vienna, 1894); Robinson and Beard, *Development of Modern Europe*, vol. i (Boston, 1907).

JOSEPH, Aaron ben. See Aaron ben Joseph.

JOSEPH, Father. A popular name for François Leclerc du Tremblay (1577–1638), the private secretary and confidant of Cardinal Richelieu. He was born in Paris of a distinguished family and was originally a soldier, but left the army in 1599 and became a Capuchin friar. After some time Father Joseph, as he was called, attracted the attention of Richelieu and in 1611 became his secretary. He was intrusted by Richelieu with the management of his secret diplomacy and was frequently sent on important missions abroad. So great was his influence with the Cardinal and so well recognized his power that he was known by the sobriquet of His Gray Eminence, in contradistinction to the title of Cardinal Richelieu. (See Eminence Grise; Eminence Rouge.) Religious zeal actuated his entire official life, and the conversion and dissemination of the principles of the Church were the objects most dear to him. In pursuance of these objects he lent his aid to the forcible conversion of French Protestants and also sent missionaries to India and Canada, while he earnestly advocated a

crusade against the Turks. A priest of ascetic habits, but of fiery enthusiasm, he was also a statesman of broad views and comprehensive knowledge, and one of the shrewdest and most able diplomats of his time. His death took place at Ruel, Dec. 18, 1638. A series of memoirs of his time of which he is the author is deposited in the Bibliothèque Nationale in Paris, but the volumes have never been published, though supposed to contain important matter for the history of Louis XIII's reign. He was also the author of *Le Turciad*, a Latin poem, and of several political and religious tracts. Consult: Richard, *Vie du père Joseph* (Paris, 1702); Fagniez, *Le père Joseph et Richelieu, 1597–1638* (ib., 1894); R. F. O'Connor, *His Grey Eminence, the True Friar Joseph of Bulwer Lytton's "Richeliew": An Historical Study* (Philadelphia, 1912).

JOSEPH, Prayer of. An apocryphal work belonging to the Old Testament Pseudepigrapha, now known only from old lists of apocryphal books and some quotations in Origen, who seems to have esteemed it highly. The work was of Jewish origin. Why it was called the Prayer of Joseph is uncertain, since in Origen's quotations Jacob, not Joseph, is the speaker. It was apparently of pseudoprophetic or apocalyptic character, dealing largely with matters concerning angels and their respective ranks and the secrets of the future. Since Jacob speaks of himself as the first born of all living creatures, some have supposed that the book originated in the desire to counteract the claims of Christians in reference to Jesus, by representing the patriarchs as of equal honor and rank. Consult Emil Schürer, *History of the Jewish People in the Time of Jesus Christ*, vol. ii (New York, 1896).

JOSEPH AN'DREWS. A novel by Henry Fielding (1742). Begun as a satire on Richardson's *Pamela*, whose brother the hero is, it turned out an excellent story.

JOSEPH BAR'SABBAS. The unsuccessful candidate for the place among the Twelve made vacant by the death of Judas Iscariot. He is mentioned in the New Testament only in Acts i. 23. His Roman name, Justus, is clear; but his Jewish name, Barsabbas, perhaps son of Sheba or son of the Sabbath, is of doubtful etymology. Beyond the fact that he must have been a disciple of Jesus from the Baptism to the Ascension, in order to be eligible to a place among the Twelve (Acts i. 21–22), we know nothing. A later but untrustworthy tradition makes him one of the Seventy or Seventy-two (Luke x. 1).

JOSEPH FRIEDRICH WILHELM, yō'zĕf frē'drĭk vĭl'hĕlm, Prince of Saxe-Hildburghausen (1702–87). An Austrian general. He entered the service in 1719, became a colonel in 1732, and fought bravely in Italy and on the Rhine (1734–35). In 1736 he put down an insurrection of the Croats, and he served against the Turks as master general of the ordnance until 1739. During the War of the Austrian Succession (1740–48) he had charge of the defensive forces in the interior of the Empire. In 1757 he was put in command to act with the French under Soubise, was defeated at Rossbach, and retired from the service.

JOSEPHI, jō-zĕf'ī, Isaac A. (1859–). An American miniature painter. He was born in New York and studied at the Art Students' League, and under Bonnât in Paris. An ex-president of the American Society of Miniature Painters and a member of the Royal Society of Miniature Painters, London, he exhibited frequently in America and abroad and received honorable mention in Paris in 1900 and a medal at Charleston in 1902.

JOSEPHINE, zhō'zā'fēn' (Fr. *Joséphine*), Marie Rose Tascher de la Pagerie (1763–1814). First wife of Napoleon Bonaparte and first Empress of France. Josephine was born of a Creole family on the island of Martinique, June 23, 1763. Poorly educated, though carefully trained in the social formalities of the period, she was taken to France (Dec. 13, 1779) at the age of 16 to be married under the auspices of her aunt, Madame de Renaudin, to Alexandre, Vicomte de Beauharnais, also of a Martinique family. Of this union, which soon proved unhappy, were born two children—on Sept. 3, 1780, a son who became later, by the favor of Napoleon, Prince Eugene, Viceroy of Italy, and on April 10, 1783, a daughter, Hortense, who later was married to Napoleon's brother Louis and became Queen of Holland and mother of Napoleon III. Beauharnais played a considerable rôle in the political and military circles of the early period of the French Revolution. Assisted by the popularity of the salôn of Josephine, he became commander of the Army of the Rhine in 1793. Both fell under suspicion, however, in 1794 during the Terror, and Josephine barely escaped through the efforts of Madame Tallien, while her husband was executed. Left a widow, apparently with considerable means, Josephine became conspicuous in the society of the salôns, which included also such well-known figures as Madame Récamier and Madame Tallien, and enjoyed the special protection of Barras—for personal reasons, it has been alleged. Somewhat reluctantly she was induced to marry (March 9, 1796) the rising young commander Bonaparte, who was placed through the influence of Barras in command of the Italian campaign of 1796. Josephine accompanied him during part of his victorious campaign. During the Egyptian campaign, however, she remained in Paris and conducted herself in such a way that Napoleon on his return is said to have threatened a separation. During the four years of the Consulate Josephine reigned as queen of society and was able to add to the social prestige of Napoleon's position, though his numerous infidelities were a source of chagrin and apprehension. Josephine was crowned Empress beside Napoleon in Notre Dame on December 2 and remarried to him with a religious ceremony. (See Plate of David.) Her son was soon after made Viceroy of Italy and married the daughter of the King of Bavaria, while her daughter, Hortense, who had been married to Louis Bonaparte in 1802, became Queen of Holland in 1806. The childless union of Napoleon and Josephine was becoming increasingly unsatisfactory to Napoleon as his ideas of founding a dynasty developed, and in 1809, after his successful Austrian campaign, he definitely decided upon a divorce, to which Josephine was induced to give her mournful compliance. On the following day the Senate sanctioned the divorce and bestowed upon Josephine Imperial honors and a large annuity. She retired to Malmaison, where she led a lonely and unhappy life. Napoleon paid her frequent friendly visits and after his marriage with the Archduchess Marie-Louise

brought his son, the small King of Rome, to see her. She died at Malmaison, May 29, 1814.

Her character resembled that of other women of her time who had had the same education and environment. Frivolous and extravagant and of mediocre intelligence, she was also kind and affectionate, and her charm of manner, which combined the dignity of the old régime with the ease of the new, fitted her to reign in the society of the Empire.

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JOSEPH OF AR'IMATHÆ'A. The disciple of Jesus who provided for His burial. Arimathæa was probably the village of Ramah, or Ramathaim-zophim, of the hill country of Ephraim, the birthplace of Samuel (1 Sam. i. 1 with 19), a few miles north of Jerusalem, near Lydda (cf. 1 Macc. xi. 34). Joseph is mentioned in the New Testament only in connection with the entombment of Jesus (Mark xv. 43–46; Matt. xxvii. 57–60; Luke xxiii. 50–53; John xix. 38–42). The four Evangelists record in general agreement that Joseph came to Pilate and asked for the body of Jesus, and that the body, after a hasty preparation for burial, was placed in a new tomb. Mark calls Joseph a "councilor of honorable estate," which doubtless implies that he was a wealthy man of the better class and a member of the Council, or Sanhedrin; suggests his courage in making the daring request of the Procurator; and states that he was "looking for the kingdom of God," i.e., that he was one of the "pious" like Simeon (Luke ii. 25), who hoped for a coming of the Messiah which would be a religious blessing to the people of God. Matthew does not call him a councilor, but designates him as a "rich man" and a "disciple" of Jesus. Luke also calls him a "councilor" and a "good and righteous man" and states specifically that he had not assented to the action of the Sanhedrin in its condemnation of Jesus. John qualifies Matthew's remark about discipleship by observing that he was a disciple in secret only, for fear of the Jews, and then adds significantly that it was Nicodemus who brought the myrrh and aloes, and that he assisted Joseph in the preparations for the entombment. These differences in the accounts have been thought to indicate that John combines two originally different traditions—one that Jesus was buried by Joseph, a man of noble rank, wealthy, and the owner of a tomb near Jerusalem; the other that it was Nicodemus, a well-known Pharisee, friendly, however, to Jesus, a member of the Sanhedrin, who buried him. The differences, however, do not definitely prove the hypothesis. According to tradition, which is of no historical worth, Joseph went as missionary to Gaul and Britain and built the first Christian oratory in the latter country on the site of Glastonbury.

JOSE'PHUS, Flavius (37–?). A celebrated Jewish historian. He was born at Jerusalem in the year 37 A.D., of both royal and sacerdotal lineage, being descended, on the mother's side, from the line of Hasmonæan princes, while his father, Matthias, officiated as a priest in the first of the 24 courses. He received a good education and became familiar with both Hebrew and Greek literature. Having attended the lectures of the paramount religious schools of his time—"sects," as he terms them—he withdrew into the desert, to a man whom he calls Banos, probably an Essene. Three years later he returned to Jerusalem and henceforth belonged to the Pharisees. At the age of 26 he was chosen delegate to Nero. At the outbreak of the great war between the Jews and Romans, Josephus was appointed Governor of Galilee. Here he displayed valor and prudence; but the advance of the Roman general Vespasian (67) made resistance hopeless. The city of Jotapata, into which Josephus had thrown himself, was taken after a desperate resistance of 47 days. Along with some others he concealed himself in a cavern; but his hiding place was discovered, and, being brought before Vespasian, he would have been sent to Nero, had he not—according to his own account, for Josephus is his own and his sole biographer—prophesied that his captor would yet become Emperor of Rome. Nevertheless, he was kept in a sort of easy imprisonment for about three years. It was then that he adopted the Latinized name by which he is known. Josephus was present in the Roman army at the siege of Jerusalem by Titus and after the fall of the city (70) was instrumental in saving the lives of some of his relatives. After this he appears to have resided in Rome and to have devoted himself to literary studies. The exact period of his death is not ascertained. All we know is that he survived Herod Agrippa II, who died in 100. His works are: *History of the Jewish War*, in seven books, written both in Hebrew and Greek (the Hebrew version no longer extant); *Jewish Antiquities*, in 20 books, containing the history of his countrymen from the earliest times down to the end of the reign of Nero; an *Apology* of the Jews against Apion, valuable chiefly for its extracts from old historical writers; and an *Autobiography*, which may be considered supplementary to the *Antiquities*. The other works attributed to him are not believed to be genuine. Josephus in the main was honest and veracious; he had a sincere liking for his countrymen and much pride in the old national history; but the hopelessness

of attempting to withstand the enormous power of the Romans, and an aversion to martyrdom, caused him to side with the enemy—perhaps in the faint hope of being thus of some use to the national cause. The influence of Greek philosophy and learning is visible in all his writings and, as far as biblical history is concerned, infused into it a tone of rationalism. He speaks of Moses as a human rather than a divinely inspired lawgiver; he rationalizes the miracles of the Old Testament, such as the crossing of the Red Sea and the healing of the waters of Marah. His style is easy and elegant, and Josephus has often been called the Greek Livy. A description of Christ (*Ant.*, xviii, 63 f.) has caused much discussion, but is not regarded as genuine. The editio princeps of the Greek text appeared at Basel (Froben) in 1544. Since then the most important edition (with notes) is that of B. Niese (7 vols., Berlin, 1885–95; the text alone, 6 vols., 1885–95). Consult: Bärwald, *Topographisch-historisches Lexicon zu den Schriften des Josephus* (Leipzig, 1879); Destinon, *Die Quellen des Flavius Josephus* (Kiel, 1882); Olitzki, *Flavius Josephus und die Halacha* (Leipzig, 1886); Krenkel, *Josephus und Lukas* (ib., 1894); Schmidt, *De Flavii Josephi Elocutione* (ib., 1894); Emil Schürer, *History of the Jewish People in the Time of Christ* (5 vols., New York, 1896); Drüner, *Untersuchungen über Josephus* (Marburg, 1897). The best-known version in English is by W. Whiston (London, 1737), revised by A. R. Shilleto, in *Bohn's Library* (5 vols., 1888–89); especially valuable is the translation of the *Jewish War* and the *Autobiography* by R. Traill (ib., 1862).

JOSH BILLINGS. The nom de plume of the American humorist Henry W. Shaw (q.v.).

JOSH'UA (Heb. *Yēhōshu'a*, Yahwe is deliverance). The leader of Israel in the conquest of the land of Canaan. According to the Pentateuch, he was the son of Nun, of the tribe of Ephraim (Num. xi. 28; xiii. 8), led the fight against the Amalekites in the desert (Ex. xvii. 8–13), was sent by Moses among the spies that went into Canaan (Num. xiii. 8), and was appointed by Moses to be his successor (Deut. xxxi. 23). In the Book of Joshua he is represented as leading Israel in the crossing of the Jordan and the conquest of Palestine and as assigning the territories to the various tribes (Josh. i–xxiv). He is said to have died at the age of 110 (Josh. xxiv. 29).

This account of Joshua, according to the critics, is written from the point of view which regards the conquest of Canaan as the fulfillment of a promise made by Yahwe in the days of Moses. Many scholars have questioned the historical character of Joshua and regarded him as a mythical hero venerated in the cult at Timnath-serah (Josh. xxiv. 30). The name, when compared with the names used in Israel in the period of the Judges, is such as to awaken suspicions. Others consider it probable that an Ephraimitish leader took an active part in the first struggles for the possession of the land to the west of the Jordan and in the organization of the confederacy of the tribes that formed Israel. A slight transformation of the name is not impossible. Legend and dimmed tradition may have dealt generously with the historical element in the Joshua story. The long process involved in the conquest is pictured as though it took place in the days of Joshua and through the efforts of the popular hero. It is likely that many deeds ascribed to him belong to later periods. The supposed distribution of the lands among the tribes merely reflects the geographical position of the clans at a certain period after the conquest, probably subsequent to the reign of David.

JOSHUA. An oratorio by Handel (q.v.), first produced in London, March 9, 1748; in the United States, April 16, 1876 (Boston).

JOSHUA, Book of. The first of the four historical books in the Hebrew Bible, forming with Judges, Samuel, and Kings the division known in the Jewish canon as the Former Prophets. The Book of Joshua is mainly occupied with the narrative of the conquest of Canaan and with the settlement of the Hebrew clans in the newly gained territory.

Its contents may be summarized as follows: (*a*) Chaps. i–xii, crossing of the Jordan; capture of Jericho; advance to Ai; the ruse of the Gibeonites to save themselves from destruction; the subjugation of the south; campaign against the King of Hazor and allies; conquest of the north; list of victories. (*b*) Chaps. xiii–xxiv, distribution of the land to the trans-Jordanic tribes—to Caleb, Judah, Ephraim, and Manasseh; survey and allotment to the remaining tribes; Joshua's inheritance; designation of cities of refuge; Levitical cities; dismissal of trans-Jordanic tribes; final exhortations of Joshua; assembly and covenant at Shechem; death and burial of Joshua.

The authorship of the book is ascribed to Joshua in the Babylonian Talmud (*Baba bathra*, 14 a). Already Calvin questioned the accuracy of this ascription, and in modern times it has very generally been abandoned by scholars. It has been pointed out that the conception of the conquest of Canaan in certain parts of the book is in the strongest contrast with the more credible representation in the first chapter of the Book of Judges and in other parts of the Book of Joshua itself. While, according to the latter, the Israelitish tribes failed to dispossess the natives in large sections of the territory ideally assigned to them, so that many of the most important cities remained in the hands of the Canaanites for a long time, the former leaves the impression that the whole population was destroyed by the invaders, who had only to decide between themselves by lot what portion each tribe was to have. The quotation from the Book of Jashar (q.v.) in Josh. x. 12 has also been adduced against the traditional view, inasmuch as Joshua would not be likely to back up his account of his own victory by the testimony of a song already found in a book, and because this book is also said in 2 Sam. i. 18 to contain David's elegy over Saul and Jonathan. The passage (xxiv. 26) in which Joshua is claimed as the author seems very clearly to refer only to his farewell address, and the words "Joshua wrote in the book of the law of God" appear to indicate that this address was once found in a law book. The high eulogy passed on Joshua (iv. 4, vi. 27) and the account of his death and burial likewise seem to preclude a Joshuanic authorship. According to the generally prevailing view among Protestant scholars, the same sources that are supposed to have been used in the composition of the Pentateuch were also drawn upon in the Book of Joshua—the Yahwist and the Elohist particularly in the first half of the book and

the so-called Priests' Code in the second. Some independent scholars who reject the current analysis of the Pentateuch still maintain that different sources were used, or that there has been a gradual expansion of the original text. (See PENTATEUCH.) It is generally admitted that the memory of some incidents in the early period of the invasion has been preserved in the book, such as the capture of Jericho, Ai, and Bethel, the battle of Gibeah, and others, though, in the judgment of many scholars, the genuine tradition has often been overlaid with legendary embellishments. The second part of the book is extremely valuable because of the information it gives concerning the boundaries of the different tribes and the chief cities and towns in each, even though occasionally cities are included which only ideally, and not actually, belonged to one or another of these tribes. In connection with the modern analytic theory the term Hexateuch (q.v.) has sometimes been used to designate the Pentateuch and the Book of Joshua.

Consult chapters on the conquest in the Hebrew histories of Kittel, Stade, Wellhausen, Guthe, Renan, and Piepenbring; the commentaries to the Book of Joshua by Keil, Dillmann, Oettli, Steuernagel, and Bennett; also Budde, *Richter und Josua* (Giessen, 1888); Albers, *Die Quellenberichte in Josua I.–XXI.* (Bonn, 1891); Addis, *Documents of the Hexateuch* (London, 1898); Carpenter and Battersby, *The Hexateuch* (ib., 1900); and the introductions to the Old Testament by Driver, Kuenen, Kautzsch, König, and Cornill.

JOSI'AH (Heb. *Yō'shiyyāhū*, Yahwe supports) (c.637–608 B.C.). King of Judah. He was the son of Amon and Jedidah and is said to have succeeded his father at the age of eight years (2 Kings xxii. 1). It is hard to believe that this figure can be correct. Of the early years of his reign we hear nothing. The compiler of Kings is chiefly interested in an important event that happened in the eighteenth year of the King's reign. According to chaps. xxii–xxiii, the priest Hilkiah found in the temple a book of the Law which he sent to the King through Shaphan, the scribe. The King, upon learning of the contents of the book, is in deep distress at the religious practices of the country, which are in flagrant contradiction to the ordinances in the Law book. He orders an assembly of the elders, and in solemn convocation it is agreed to abide in the future by the laws prescribed in the new book. The narrative then goes on to give an account of the radical religious reforms instituted by Josiah in destroying all Baal cults, in removing the priests from the high places, and establishing the worship of Yahwe in its pure form, freed from all foreign elements. There is no longer any question among scholars that the Law book "found" by Hilkiah was the legal portion of the present book of Deuteronomy (q.v.). This religious code was probably compiled either by Hilkiah or during the reign of Josiah's predecessor. Josiah's religious reform marks the end of an important epoch in the religious history of Israel. As a result of the efforts of Elijah, Elisha, and of such prophets as Amos and Hosea, two principles became established: (1) the worship of Yahwe to the exclusion of the Canaanitish Baalim; (2) the centralization of Yahwe worship in the sanctuary at Jerusalem. The times seemed ripe for taking a decisive step in the new direction, and Josiah favored the movement. A reaction set in after Josiah's death, but the zealous Yahwe worshipers had gained their point, and a new direction was given to religious development among the Hebrews. The reign of Josiah seems to have been a peaceful one until the close, when Necho II, King of Egypt, thought the time opportune, since Assyria's fall was imminent, to attempt to regain control of Syria and Palestine. Josiah encountered the Egyptian forces and met his death on the plain of Megiddo (2 Kings xxiii. 29–30). His death was regarded as a national calamity and must have been particularly startling to the pious, who felt that so zealous a follower of Yahwe was certain of divine favor and help. The religious reaction after Josiah's death against the Deuteronomic reforms may have been a direct consequence of the consternation that his tragic fate aroused, which naturally raised a doubt as to the correctness of the step taken by him. Consult Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

JOSIAH ALLEN'S WIFE. The nom de plume of Marietta Holley (q.v.) and the title of one of her humorous sketches.

JOSIAS, yō-zē'ăs, FRIEDRICH, PRINCE OF SAXE-COBURG (1737–1815). An Austrian general, son of Duke Franz Josias of Coburg. Entering the Austrian army in 1756, he served in the Seven Years' War as a colonel and against the Turks (1788–91), commanding a battalion and winning the battle of Martinestye. He was made field marshal lieutenant for his services in this campaign and in 1793 was put at the head of the army in the Netherlands. Here he was remarkably successful for a short time and brought Belgium once again into Austria's power. The French victory at Fleurus forced him to retire (1794). He left the army soon afterward and lived in quiet at Coburg. Consult Witzleben, *Prinz Friedrich Josias von Coburg-Saalfeld* (Berlin, 1859).

JÓSIKA, yō'shī-kō, MIKLÓS, BARON (1794–1865). An Hungarian novelist, born of a noble and distinguished family, April 28, 1794, at Torda in Transylvania. In his youth he served for some time in the Austrian army and then for many years devoted himself to agriculture and study. He was a member of the Transylvanian Diet in 1834 and again in 1847. His first works appeared in 1834 under the title of *Irány* (*Tendency*) and *Vázolatok* (*Sketches*) and were exceedingly popular. From that period till the revolution in 1848 he wrote about 60 novels, all of which were published at Budapest, and most of which have been translated into German. The most important are: *Abafi* (1836); *Az utolsó Bátory* (*The Last Batory*, 1838); *Zrinyi a költö* (*The Poet Zrinyi*, 1840); *A Csehek Magyarországban* (*The Bohemians in Hungary*, dealing with the Hussites, 1840); and *Jósika István* (*Stephen Jósika*, one of the author's ancestors, 1847). Involved in the Hungarian revolution, he had to leave his native country, and afterward he resided at Brussels, where he continued his literary work. In 1864 he removed to Dresden, where he died in 1865. Among his productions written in exile are: *Egy Magyar család a forradalom alatt* (*A Hungarian Family during the Revolution*); *Die Familie Mailly*, like the foregoing first in German; *Eszter* (*Esther*); *A Szegedi boszorkányok* (*The Witches of Szegedin*). Jósika

was a thoroughly natural novelist and drew his materials almost wholly from the history of his own land. He has been called the Walter Scott of Hungary, being the real founder of the historical novel of that country. His heroines are especially remarkable. Consult his Memoirs, *Emlékirat* (Budapest, 1865), which he was writing at the time of his death.

JOSIP'PON, Book of. A Hebrew chronicle, written in Italy in the tenth century and giving a history of the world from the Creation until the overthrow of the second temple by Titus. It claims to be a translation of Josephus, but the author employs the works of other writers, some of them very late. Lucian, Strabo, and St. Jerome were among his sources, and the book contains much extravagant legend. The author calls himself Joseph ben Gorion. The Jewish historian Graetz (*History of the Jews*, vol. iii, p. 180) holds that the work was originally written in Arabic, but this view has not been accepted. The book was first published in 1476 at Mantua and during the following centuries enjoyed great popularity, several editions appearing besides translations into Latin and German.

JOSQUIN, zhŏs'kăn', Deprès. See Deprès, Josquin.

JOSS (a pidgin-Eng. corruption of Portug. *deos*, from Lat. *deus*, god). A pidgin-English term which is sometimes found in modern books of travel, in newspapers, etc., as well as colloquially in connection with Chinese matters. It is used for God and is also applied to Chinese idols (joss), temples, and churches (joss houses), the gilt paper on which charms and amulets are printed or in which they are neatly wrapped up (joss paper), and also the fragrant incense sticks (joss sticks) burned before the idols. The so-called "stick" is a paste made of the dust of various scented woods held together with clay, which in its combustion serves as a rude measure of time at night. The paste is rolled around the upper part of a stick of bamboo and in that form is commonly known. *Joss pidgin* means "religious ceremony," and clergymen and priests are spoken of as "joss-pidgin men." Joss paper to represent money is especially used at funerals or at the front doors of shops and houses. When incinerated, the Chinese idea is that this paper changes into real money in the spirit world.

JOSSELYN, jŏs'lĭn, John (seventeenth century). The author of one of the earliest accounts of the English settlements in New England. He was the son of Sir Thomas Josselyn, a knight of Essex, England, where he was born probably early in the seventeenth century. His brother Henry had sailed for New England as the agent for John Mason, the patentee of New Hampshire, in 1634, and had continued in the service of Mason's successor, Sir Ferdinando Gorges. It was at his brother's solicitation that John Josselyn visited New England in 1638, sailing from England late in April of that year and arriving in Boston on July 2. Thence, after calling upon John Winthrop and John Cotton, to whom he had letters, he proceeded to Black Point, Scarboro (Me.), where his brother Henry was stationed. He returned to England in October, 1639. It was not until 1663 that he returned to New England. He remained in America until December, 1671, traveling extensively through the other settlements in New England and noting facts as to their government, history, social life, and products. Upon his return to England he published his observations in two books. The first was entitled *New England's Rarities Discovered in Birds, Beasts, Fishes, Serpents, and Plants of that Country* (1672; reprinted in Boston, 1865). His second and more valuable book from the historical point of view is *An Account of Two Voyages to New England* (London, 1674; reprinted, Boston, 1869; also in *Collections of the Massachusetts Historical Society* for 1834).

JOST, yōst, Isaak Markus (1793–1860). A German-Hebrew historian, born in Bernburg. He studied philology at Göttingen and Berlin and was principal of a school in the latter city in 1826–35 and subsequently of the Jewish Realschule at Frankfort. His principal works are: *Geschichte der Israeliten* (9 vols., 1820–29; to which was added a tenth volume in 1849, entitled *Neuere Geschichte der Israeliten von 1815–45*); *Allgemeine Geschichte des israelitischen Volkes* (2 vols., 1831–32); a translation (into German) of the *Mishna*, with text and commentary (6 vols., 1832–34); and *Geschichte des Judentums und seiner Sekten* (3 vols., 1857–59). He also edited a journal entitled *Israelitische Annalen* (1839–41). Consult Zerndorf, *Isaak Markus Jost und seine Freunde* (Cincinnati, 1886).

JOTA, hō'tȧ. A Spanish dance in ¾ time, especially popular in Aragon. It is danced by couples and somewhat resembles a waltz, though there are many extempore variations of step. Its rapid, striking music is furnished by mandolins, castanets, and a song, whose couplets are often extemporized and are of a satirical or romantic character. The jota is sometimes danced as a solemn rite at funerals.

JOTUNHEIM, yō'tụn-hām (Icel., giants' home). In Norse mythology, a region of cold and darkness, extending around the rim of the earth, the abode of the frost giants.

JOTUNN, yō'tụn (Icel., giant, devourer). In Norse mythology, a race of giants and magicians, generally hostile to human beings, dwelling in caves in Jotunheim, and carrying on constant warfare with the powers of light. Originally giants of the storm, they are pictured as having power over the forces of nature. They are the enemies of Thor, who prevents their attempt to storm heaven.

JOUBERT, zhōō'bâr', Barthélemy Catherine (1769–99). A French Revolutionary general, born at Pont-de-Vaux, Ain. Though educated for the career of an advocate, Joubert showed early his preference for a military career, and enlisted as a volunteer in 1791, served in the Army of the Rhine, and, four years later, was made a general of brigade for brilliant service. In the Italian campaign of 1796–97 he acted as second in command to Bonaparte, being made general of division. He distinguished himself at the siege of Mantua and in the battle of Rivoli, in January, 1797; took Trent in the following year and led a French army of invasion into Tirol, effecting a junction with Napoleon. He subsequently commanded in Holland and on the Rhine and in 1798 was made head of the Army of Italy. He overran Piedmont and forced King Charles Emmanuel to abdicate. In June, 1799, he was made commandant of Paris, but soon after was sent to replace Moreau in Italy, where he gained slight advantages over the combined Russian and Austrian forces, but

was defeated by Suvaroff at Novi, where he fell mortally wounded, August 15, at too early an age to have won the military reputation to which his talents entitled him. A monument raised to his memory was demolished by order of Louis XVIII, but another was erected later in his birthplace. His biography has been written by Chevrier (2d ed., Paris, 1884).

JOUBERT, Joseph (1754–1824). A noteworthy French philosopher, born at Montignac (Périgord). He studied at the College of Toulouse, at that time conducted by the Jesuits, and was subsequently assistant master in the institution, but had to resign because of failing health. In 1778 he went to Paris, where he became the friend of Chateaubriand and Fontanes. In 1790–92 he was justice of the peace at Montignac and in 1809, at the instance of Fontanes, the grand master, was appointed by Napoleon a councilor of the newly organized University of Paris. Of frail health, he lived at Paris and at Villeneuve in Burgundy, where he was greatly inspired by Madame de Beaumont. He was constantly reading and taking notes, writing letters, and receiving the inevitable throng of friends who came to hear his extraordinary conversation, much, Matthew Arnold observes, as Englishmen flocked to hear that of Coleridge. In 1838 Chateaubriand edited a privately printed volume of fragments, which was reviewed by Sainte-Beuve in the *Revue des Deux Mondes,* and which established Joubert's fame. The best edition is that by P. de Raynal, entitled *Pensées; précédées de sa correspondance, d'une notice sur sa vie, son caractère et ses travaux* (Paris, 1864). Selections from his writings have appeared in Charles Dudley Warner, *Library of the World's Best Literature* (New York, 1896–97), and in a volume of translations by Katharine Lyttleton (ib., 1899). Consult: Condamin, *Essai sur les pensées et la correspondance de Joubert* (Paris, 1877); E. M. Caro, *Mélanges et portraits* (ib., 1888); and the fine appreciation in Matthew Arnold, *Essays in Criticism* (London, 1907).

JOUBERT, Petrus Jacobus (1831–1900). A Boer general and politician. He was born in the Oudsthoorn District of Cape Colony, of Dutch-Huguenot parents, his French ancestor, Joubert, having emigrated to South Africa in 1687 to escape religious persecution in France. After an elementary education and a youth spent in trading expeditions throughout South Africa, Piet Joubert, as he was called, settled in the Wakkerstroom District of the South African Republic and became a prosperous farmer and cattleman. In the early sixties he was elected a member of the Volksraad, and in 1870, having already had some experience in legal work, he was made Attorney-General of the Republic and became prominent politically. From that time on he was more or less the political rival of Kruger (q.v.). In 1874 Joubert acted as President during the visit of President Burgers to Europe, and his political opportunism earned him the name of Slim (or crafty) Piet. In 1880, on the outbreak of war with England, Joubert became commandant general of the forces and won the battles of Laing's Nek, Ingogo, and Majuba Hill (q.v.), the last of which closed the war in favor of the Boers in 1881. In 1883–84 he was acting President during Kruger's absence in Europe, and in the latter year he opposed the plan of annexing Bechuanaland to the Transvaal. Later he favored a liberal policy towards the Uitlanders in the country. He was defeated by only 800 votes in the contest against Kruger for the presidency in 1893, but he became Vice President and general commander of the army and frustrated the attempted raid by the forces of Dr. Jameson near Krugersdorp in January, 1896. When the relations between the Transvaal and England had become strained, in 1899, Joubert wrote an appeal to Queen Victoria in which he stated the case of the Boers. Joubert was the ablest of the Boer military men, and to his efforts in great measure was due the fact that the Transvaal was prepared with arms and munitions of war when the Republic declared war against Great Britain in October, 1899. As commandant general of the Boer forces, he began the campaign in Natal and laid siege to the town of Ladysmith, showing remarkable generalship as long as he remained in the field. But early in 1900 his health broke down, and he was forced to retire to Pretoria, where he died (March 27, 1900). Joubert commanded the profound respect of his enemies for his ability and honor, but his liberal views on many points did not commend him to the mass of the Transvaal Boers, who preferred Kruger's conservatism. See Transvaal; South African War.

JOUETT, jou'ĕt, James Edward (1828–1902). An American naval officer, son of the artist Matthew Harris Jouett. He was born at Lexington, Ky., was appointed a midshipman in the navy at the age of 13, and served on the *Independence,* and against slavers on the *Decatur.* During the Mexican War he was stationed in southeastern Texas. In 1861, soon after the outbreak of the Civil War, he entered Galveston Bay with a small detachment of marines and destroyed the *Royal Yacht* after a fierce fight. He was equally prominent in the operations in Mobile Bay under Farragut in 1864, and his promotion of 30 numbers, for his services in the capture of the *Selma,* was recommended by Farragut. Jouett became captain in 1866 and commodore in 1883, and in 1885 he commanded the North Atlantic squadron and opened the Isthmus of Panama. He became a rear admiral in 1886 and soon afterward was made president of the board of inspection and survey. He retired in 1890, and in 1893 Congress voted him full pay for life.

JOUETT, Matthew Harris (1783–1827). An American painter, born in Mercer Co., Ky. He was the pupil for a short time of Gilbert Stuart in Boston, painted all through the country from Kentucky to the Gulf, and was recognized as the best painter "west of the Mountains." Although weak in drawing, his paintings please by reason of their rich, harmonious color. His portrait of John Grimes is in the Metropolitan Museum, New York, and his full-length of Lafayette is in the capitol at Frankfort, Ky.

JOUFFROY, zhōō'frwä', François (1806–82). A French sculptor, born in Dijon. He was a pupil of the younger Ramey and at the Ecole des Beaux-Arts, and won the Prix de Rome in 1832. He became a member of the Institute in 1857, Officer of the Legion of Honor in 1861, and professor at the Beaux-Arts in 1863. He was par excellence the official sculptor of his period, and commissions were heaped upon him. Among his works are the marble statue of St. Bernard, at the Panthéon in Paris; the monument to St. Bernard, at Dijon; Napoleon, at Auxonne; Pierre de France, the Duc

de Longueville, the Duc d'Alençon, Marie Leczinska, at Versailles; "Young Girl Telling her Secret to Venus," at the Louvre, which almost justifies the high regard in which Jouffroy was held by his contemporaries. His works are characterized by grace and delicacy.

JOUFFROY, Théodore Simon (1796–1842). A French philosopher. He was born at Pontets, Doubs, and studied philosophy at Dijon and under Cousin at the Ecole Normale, Paris, where at 21 years of age he began to teach. After many changes he became in 1838 librarian to the University of Paris, which position he filled till his death on Feb. 4, 1842. He published translations of the works of Reid and translated also some of the works of Dugald Stewart, with notes and introductions, besides writing *Cours de droit naturel* (Paris, 1834–35) and *Mélanges philosophiques* (ib., 1833; selected translations by George Ripley, Boston, 1838). Some of his works appeared posthumously. He opposed the sensualism of Condillac and all tendencies to identify psychology with physiology; in general, his position was similar to that of Cousin (q.v.). Consult Tissot, "Théodore Jouffroy, sa vie et ses écrits," in *Mémoires de l'académie de Dijon*, vol. iii (Dijon, 1875–76).

JOUFFROY D'ABBANS, dȧ'bäN', Claude François Dorothée, Marquis de (1751–1832). An inventor and engineer. He was born in France in 1751 and spent the early portion of his life in the army. Witnessing the operation of a fire engine, he believed that steam could be used for vessels on water. He made his first attempt with a boat equipped with a Watt engine and "duck-foot" paddles mounted on a chain on the river Doubs in 1776, but the experiment was a failure. In 1780 he built a novel form of engine for a boat 150 feet long, and in 1783 he made another experiment on the Saône, with more success. Owing to various technicalities, the Academy refused to indorse the experiments, and the government declined to grant a promised monopoly. Impoverished and discouraged, Jouffroy went to England and was active in political plots, siding with the Bourbons. Returning to France, he became acquainted with Fulton, who admitted the merit of the experiments. He received permission in 1816 to form a company, and put his first steamer, called *Charles Philippe*, on the Seine; but the attempt was unsuccessful. He withdrew to the Hôtel des Invalides and died there of cholera. His claim was acknowledged by Arago and in 1840 by the French Academy. Jouffroy published *Les bateaux à vapeur* and wrote for the Academy *Mémoires sur les pompes à feu.*

JOUGS, jōōgz (OF. *joug*, yoke, from Lat. *jugum*, yoke; connected with Gk. *ζυγόν, zygon*, Skt. *yuga*, Goth. *juk*, OHG. *joh*, Ger. *Joch*, AS. *geoc*, Eng. *yoke*, from Lat. *jungere*, Gk. *ζευγνύναι, zeugnynai*, Skt. *yuj*, to join), Juggs, or Joggs. A form of pillory used in Scotland as well as in the Low Countries. It consisted of an iron ring, or collar, fastened by a chain of two or three links to a pillar or wall in some public place, such as a market cross, a prison door, a church door, a churchyard gate, a tree beneath whose branches courts and the like were held. The ring or collar opened by a hinge or joint, so as to inclose the culprit's neck, when it was secured by a loop, or staple, and a padlock. Jougs were employed as a punishment for ecclesiastical as well as for minor civil offenses in the fifteenth to the eighteenth centuries. Although they have not been in use for the last 100 years, they may still be found hanging at a few country churches. Branks (see Brank) were occasionally hung on the same pillar with the jougs. See Pillory; Stocks.

JOULE, joul (named in honor of James P. Joule). The joule is the practical unit of energy or work. It is 10^7 ergs. See C. G. S. System of Units; Mechanical Units; Mechanics, *Work and Energy.*

JOULE, James Prescott (1818–89). An English physicist. He was born at Salford, near Manchester, England. His father was the proprietor of a large brewery, and he took advantage of the opportunities offered by the equipment of such a plant to perform many of his best-known investigations. He was an invalid all his life, owing to a spinal trouble. His early education was secured at home, the chemist Dalton being the young man's instructor, and at the age of 19 he published in the *Annals of Electricity* a description of an electromagnetic engine which he had himself invented. In the course of researches on electricity he was able to show that in electric conduction the amount of heat absorbed was equivalent to the heat produced during the original combination of the elements in the cell which produced the current. Joule was the first Englishman to ascertain the mechanical equivalent of heat (see Heat), and in an address delivered in 1847 at Manchester he stated the doctrine of the conservation of energy. The paper was hardly noticed by press or scientists, and a similar paper presented to the British Association would also have been passed over had its merits not been seen by William Thomson, afterward Lord Kelvin. Joule worked for 40 years to determine the mechanical equivalent of heat, using both electric currents and the mechanical friction of water, and obtained a number of values for this quantity. Many researches on electricity and thermodynamics are to be credited to him, and his name is given to the unit of work, while Joule's law for determining the amount of energy in an electric circuit has become fundamental in electrical science. Dr. Joule received the Copley and other medals and numerous honors from the leading universities and scientific societies throughout the world. His *Scientific Papers*, in two volumes, were published in 1885 and 1887, and numerous valuable communications from him are to be found in the various English journals and in the proceedings of societies. Consult Osborne Reynolds, *Memoir of James Prescott Joule* (Manchester, 1892).

JOURDAIN, zhōōr'dăN', Monsieur. The leading character in Molière's *Bourgeois gentilhomme.*

JOURDAN, zhōōr'dăN', Jean Baptiste, Count (1762–1833). A French marshal. He was born April 29, 1762, at Limoges, where his father was a surgeon. He entered the army in 1778 and served under Count d'Estaing in the War of American independence. On returning to France in 1784 Jourdan married and opened a milliner's shop at Limoges. On the breaking out of the Revolution he abandoned trade and became the captain of the company of National Guards raised in Limoges. Under Dumouriez he rose to be chief of battalion, and in 1793 was made successively general of brigade and general of division. Finally in the autumn of that year he obtained the command of the Army of the North and gained an important victory at

Wattignies against the Austrians (Oct. 15–16, 1793). In 1794, as head of the Army of the Sambre and Meuse, he defeated the Austrians again at Fleurus and overran Belgium, forcing the enemy back across the Rhine. In 1795 he was less successful in his campaigns; for, having crossed the Rhine at Düsseldorf, he was defeated by the Austrians at Höchst (Oct. 11, 1795). In 1796 he pushed his way far into Germany, but was driven back by the Archduke Charles at Wetzlar (June 15), Amberg (August 24), and Würzburg (September 3). This discomfiture, for which the plan of campaign as worked out in Paris was responsible more than he, led him to resign his command and to devote himself to politics. In 1799 the Directory intrusted him with the command of the Army of the Danube; but he was defeated by the Archduke Charles at Ostrach and at Stockach in March of the same year and was superseded. Although he opposed the coup d'état of the Eighteenth Brumaire, the First Consul employed him in 1800 in the reorganization and administration of Piedmont; and on the establishment of the Empire in 1804, he was made a marshal. In 1803 he had been given the command in Italy, but in 1805 he was replaced by Masséna. He was sent with King Joseph to Naples (1806), and in 1808 he went with him to Spain as chief of staff. Louis XVIII appointed him commander of the seventh military division and made him a peer of France; but his Republican principles led him to enter heartily into the revolutionary movement of 1830, and for a short time after the July revolution he acted as Minister of Foreign Affairs. His last years were spent as governor of the Hôtel des Invalides, and there he died (Nov. 23, 1833). As member and president of the Council of Five Hundred (1797–99), Jourdan was instrumental in planning and establishing the system of military conscription throughout France. Unlike many of Napoleon's marshals, Jourdan lived and died poor. He was the author of *Opérations de l'armée du Danube* (Paris, 1799) and *Mémoires pour servir à l'histoire de la campagne de 1796* (ib., 1819). His *Mémoires militaires, guerre d'Espagne* was published in 1899.

JOURNAL. See BEARING.

JOURNAL DE SAINT-PÉTERSBOURG, zhōōr'nàl' de săn'pā'tĕrz'bōōr' (Fr., Journal of St. Petersburg). A political daily paper, at St. Petersburg, founded in 1825. It is issued in French and is the organ of the Ministry of Foreign Affairs.

JOURNAL DES DÉBATS, dȧ dȧ'bȧ' (Fr., Journal of the Debates). A Paris daily paper, founded in 1789 to report the sessions of the National Assembly. Since 1800 it has been owned by members of the Bertin family. In politics it pursues a moderate Republican course.

JOURNALISM. See NEWSPAPER; PERIODICAL.

JOURNALISM, COLLEGE. Like the system of Greek-letter fraternities, college journalism, embracing those periodicals edited and published wholly or partly by undergraduates and devoted to student interests, is a form of student activity which is almost entirely restricted to American institutions. It is differentiated from the departmental and official publications of the university by the fact that its sphere embraces *all* the varied interests of the student body and not alone the educational, and that it provides the channel for the expression of student opinion, formerly voiced through the oration and the debating society. Students in the English universities have from time to time attempted to establish publications similar to college papers in the United States, the most notable of which, *The Snob*, was edited by Thackeray while at Cambridge in 1829. While other efforts in the direction of college journalism in England were made sporadically, in the initial stage many of the journals rarely lasted longer than the college life of their original projectors. At Oxford and Cambridge weekly magazines are issued dealing largely with events of current interest in the respective universities, but include also reports of more important lectures and general articles by undergraduates and dons. In addition to these general university magazines a number of the colleges issue their own journals, and there are, besides, university magazines of lighter character. It may be said that all universities and colleges in the British Isles now have their students' magazines, which appear, as a rule, once a month. Such magazines are published by a student editorial board and are self-supporting. No college daily has yet appeared. The secondary schools also issue school journals of a general character. In the United States the college paper originally took the form of a periodical devoted to the publication of essays, serious poems, and criticisms, and often supplemented the literary societies. With the broadening of the student life there came a change in the character of the periodicals until to-day the students of nearly every American college support from one to a dozen periodicals. In recent years the institution has worked downward to the preparatory schools as well, and many of these maintain successful school papers modeled on the college publications.

The first American college periodical was the *Gazette*, published at Dartmouth in the year 1800. Daniel Webster, of the class of 1801, was its editor. The *Yale Literary Cabinet* was published in 1806 by the senior class of that year, and this was followed by the *Harvard Lampoon* in 1812. The oldest college paper now in existence is the *Yale Literary Magazine*, which dates from 1836. In the 20 years preceding that date there were born and died at Yale, besides the *Literary Cabinet*, the *Athenæum*, *Crayon*, *Sitting-Room*, *Students' Companion*, *Gridiron*, and *Medley*. Next to the Yale "*Lit.*," the paper which has had the longest existence is the *Nassau Literary Magazine*, founded in Princeton in 1842. The number of publications which have enjoyed only a temporary existence during the 100 years of college journalism is unknown, but it must have been very large. According to the best information obtainable, Amherst now supports 3 college papers, Brown 3, Leland Stanford 4, California 3, Columbia 5, Cornell 6, Harvard 7, Michigan 5, Minnesota 4, Pennsylvania 5, Princeton 4, Yale 6, Kansas 4, Wisconsin 4, and Tulane, Williams, Wellesley, Dartmouth, Missouri, Chicago, 2 each.

College journalism is represented by periodicals devoted to (1) literary matter exclusively; (2) news and some literary matter; (3) news and comment; (4) the comic and burlesque; (5) historical record; (6) the interests of certain departments or professional schools; and (7) the interests of the alumni. The typical forms are the daily, weekly, monthly, and annual, though there are many intermediate forms,

like the semiweekly, biweekly, or quarterly. The most popular forms of the college paper to-day are the daily and weekly, the weekly performing the same service in the smaller college that the daily does in the university, that of a newspaper pure and simple. The first ventures in the field of daily journalism appear to have been made in the universities of the Middle West; thus, the *Daily Illini* was issued at the University of Illinois in 1871 and the *Daily Student* at the University of Indiana in 1874. Of the better-known college dailies, however, the precedence in point of time is taken by the *Daily Princetonian*, which was established in 1876 and was soon followed by the *Yale News* (1878), the Harvard *Echo*, now the *Crimson* (1879), the *Cornell Daily Sun* (1880), and the *Pennsylvanian* (1884). Tradition takes the *Columbia Spectator* back to 1877, but its existence in its present form has only been continuous since 1902, when it replaced the *Acta Columbiana*. A college daily is now published in about 20 universities in the country, including, in addition to the above, the following: *Daily Palo Alto* (Leland Stanford, 1892), *Daily Californian* (California, 1893), *Maroon* (Chicago, 1892), *Purdue Exponent*, the *Daily Iowan* (Iowa, 1901), *University of Michigan Daily* (1890), *Minnesota Daily* (1900), *University Missourian* (1908), *Daily Nebraskan* (1901), *Daily Orange* (Syracuse, 1903), *Brown Herald* (Brown, 1891), *University of Washington Daily*, *Wisconsin Cardinal* (1892). A number of triweeklies are maintained, e.g., the *Northwestern* (Northwestern University, 1871) and the *Tech* (Massachusetts Institute of Technology, 1883); while in a few other institutions semiweekly papers are issued, e.g., *Scarlet and Black* (Grinnell, 1894), *Students' Herald* (Kansas A. and M. College, 1895), *I. S. C. Student* (Iowa State Agricultural College, 1890), *Williams Record* (Williams, 1874), *Denison Collegian*, and the *Brown and White* (Lehigh, 1894). Many of the latter class are probably on the way to becoming dailies. The typical daily is a four to eight page paper, devoted entirely to news and items of current student interest, and forms an important factor in student affairs. So much is this the case that the *Yale News* is commonly said at New Haven to "run the college."

The weekly college paper has increased in proportion more rapidly than the dailies. There are now about 92 weeklies in circulation in the leading institutions of college rank. It is to be noticed that historically the weekly is prior to the daily. The following college weeklies may be mentioned: *Amherst Student* (1867), *Dartmouth Weekly* (1867), *Scholastic* (Notre Dame, 1867), *Wesleyan Argus* (1868), *Rutgers Targum* (1869), *Campus* (Rochester, 1874), *The Fayette* (Lafayette, 1875), *Colby Echo* (1876), *California Occident* (1881), *Delphic* (Drake University, 1884), *Silver and Gold* (University of Colorado, 1892), *Knox Student* (1894), *Tufts Weekly* (1895), the *Triangle* (New York University, 1895), *Hamilton Life* (1898), *Syracuse Weekly* (1900), *Barnard Bulletin* (1901), the *Texan* (University of Texas), and *Olive and Blue* (Tulane). Most of these are devoted almost wholly to news, although a number are entirely literary in character, whilst several others include both news and literary matter.

The monthly magazines now make up the majority of college journals, more than 280 being issued. They include the *Amherst Literary Monthly* (1886), the *Brunonian* (Brown University, 1829), the *California Magazine* (1895), the *Columbia Monthly* (1893), the *Cornell Era* (1868), which absorbed the *Cornell Magazine* in 1900, the *Dartmouth Magazine* (1892), the *Hamilton Literary Monthly* (1866), the *Harvard Monthly* (1885), the Lafayette *Touchstone* (1896), the Michigan *Inlander*, the *Minnesota Magazine* (1895), the *Red and Blue* (University of Pennsylvania, 1886), the *Nassau Literary Magazine* (1842), the Syracuse *Herald* (1872), the *University of Virginia Magazine* (1840), and the *Williams Literary Monthly* (1885). In addition to the Hamilton *Life*, the official publication of the fraternities, the non-fraternity men at Hamilton publish about six times a year the *Review*. The *Harvard Illustrated Magazine*, established as a monthly in 1899, still stands in a class by itself. Among the more important papers published at women's colleges are the *Barnard Bear*, *Mount Holyoke*, *Wellesley Magazine*, *Radcliffe Magazine*, *Wells College Chronicle*, *Smith College Monthly*, and *Vassar Miscellany*.

While the dailies, weeklies, and monthlies form the largest class, these must be supplemented by the biweeklies and bimonthlies, and a number that are published at irregular intervals. There are about 30 journals that appear fortnightly, including the *Yale Courant* (1865), the *Yale Record* (1871), the *Harvard Advocate* (1866), the *Earlhamite*, the *Wrinkle* (University of Michigan), the *Oracle* (Hamline, 1888), the *State* (Stevens Institute of Technology), *Chapparal* (1900) and *Sequoia* (1891), both of Leland Stanford Junior University. The 14 bimonthlies include the *Coe College Cosmos* (1890), the *Worcester Polytechnic Journal*, the *Beacon* (Boston University), and the *Sibyl* (Elmira, 1871). The *Trinity Tablet* (Trinity College, 1868) is issued every three weeks.

The humorous college papers are few in number and generally conducted on the lines of the New York *Life* rather than of *Puck* or *Judge*. In fact, *Life* may be said to be the outgrowth of the college humorous magazines, since it was actually established by former editors of the *Harvard Lampoon*, and its success was due to *Lampoon* men and former editors of the *Columbia Spectator* and *Acta Columbiana*. Besides the *Harvard Lampoon*, established in 1876, the most important humorous college papers are the *Cornell Widow*, the University of Michigan *Wrinkle*, the *Yale Record*, all biweekly; the *Princeton Tiger*, monthly, and the *Columbia Jester*, a biweekly. In 1900 the *Punch Bowl* was started at the University of Pennsylvania as a monthly humorous magazine. At the University of California the literary monthly publishes a humorous illustrated supplement called the *Axe*.

Alumni news is sent out in some form from many colleges, often by the faculty in the form of a weekly, monthly, or quarterly magazine. An alumni newspaper published by a joint board of alumni and undergraduates is a less common form, but in those cases in which it exists the results are highly satisfactory and present perhaps the most successful examples of college journalism. The *Yale Alumni Weekly*, the *Cornell Alumni News*, *Columbia Alumni News*, and the *Princeton Alumni Weekly* are among the best-conducted college papers of any kind. Harvard publishes the *Harvard Bulletin*, weekly, and the *Harvard Graduate Magazine*, established

as a quarterly in 1893. Some other colleges maintain alumni papers, but those already quoted are representative of the class.

Many of the professional schools publish magazines of a serious nature, devoted to particular interests. Examples are the *Harvard Law Review* (weekly), the *Pennsylvania Dental Journal* (monthly), the *American Law Register* (University of Pennsylvania, monthly), the *Phagocyte* (Tulane Medical School), the *Yale Medical Journal*, the *Sibley Journal* (Sibley College, Cornell), the *Columbia School of Mines Quarterly*, and the *Columbia Law Review*. Some of these professional journals take high rank in the outside world. In some cases, as in the *Sibley Journal*, they are managed entirely by undergraduates; in others there are associate or advisory faculty or alumni editors.

The college annual gives a survey of the year's collegiate history. It contains statistics and records of the fraternities, clubs, societies, athletic events, and other matters of interest to students, and includes daring attempts at humor aimed at the students and the faculty. The cost of preparing one of these yearbooks already mounts into the thousands of dollars. They are yearly growing in size, and more and more attention is paid to art work in their preparation. Some of the college annuals are the Amherst *Olio*, the Brown *Lieber*, the California *Blue and Gold*, the Chicago *Cap and Gown*, the *Columbian* (formerly the *Columbiad*), the *Cornellian*, the Dartmouth *Ægis*, the Harvard *Register*, the *Hullabaloo* of Johns Hopkins, the Lafayette *Mélange*, the Lehigh *Epitome*, the *Michiganensian*, the Minnesota *Gopher*, the Pennsylvania *Record*, the Princeton *Bric-à-Brac*, the Stanford *Quad*, the Syracuse *Onondaguan*, the Texas *Cactus*, the Trinity *Ivy*, the Tulane *Jambalayo*, the Vermont *Ariel*, the Virginia *Corks and Curls*, the Williams *Giulielmensian*, the Yale *Banner* and *Potpourri*.

The peculiar system of management by which the college paper is perpetuated from year to year also involves a periodical fluctuation in the literary value of the contributions. Each year as a portion of the board of editors are graduated or pass to a higher class, an equal number of new classmen are elected to take their places. By this means the publication is kept alive, and its general tone and policy are preserved, while its literary standard is raised or lowered as the new editors are more or less clever than their predecessors. The college paper is generally recognized and encouraged by the faculty of the institution, and in some cases substantial acknowledgment is made for work done by the editors. In the majority of institutions the college papers, in common with other student organizations, are provided with office room, heat, light, and service.

Competition for places on the editorial boards of college papers is often very keen. The method of selecting editors varies considerably, vacancies being filled on the basis of literary competition, class election, editorial or faculty appointment, excellence in class work, fraternity or society representation, and various other ways. When editors are elected by the student body, they are held responsible to it, while they are left free in the internal management of the paper. The Cornell *Sun* is chartered by the whole student body; other papers are official society organs, close corporations, or stock companies. The evil effects of college politics are often apparent in the selection of editors, leading sometimes to the establishment of rival papers and to an injurious form of competition. Cases of the abuse of editorial positions for personal ends or animosities are noticeably rare, although no checks except student sentiment exist to prevent it.

A diversity of opinion exists as to the influence of the college paper in developing literary talent among the undergraduates. It seems probable that the general training in the various features of journalism now acquired by editors of college papers is at least equivalent to the purely literary training given by the old literary periodicals. It is a fact that numbers of the most successful of our younger writers have served their apprenticeship on the editorial board of college publications, which are increasingly recognized as valuable training schools for journalistic work. A college editor has much to unlearn when he takes a place on the daily paper, but he has at the same time acquired much valuable experience in editorial and business management and in reportorial work. The college paper, as now conducted, affords an agreeable and profitable employment and gives to friends of an institution an actual insight into the life of the college that cannot be gained from any official catalogue or report. Like general newspapers, the college paper has its exchange list, and its editors and readers are thus kept in touch with the doings and sentiments of all other colleges. To the instructors the college press affords the surest indication of student sentiment, and is helpful in the solution of educational problems affecting the institution. There are now in the United States and Canada, according to the best newspaper directories, about 500 undergraduate publications, not including alumni and professional school magazines and the official publications of the Greek-letter societies. See FRATERNITIES, AMERICAN COLLEGE.

JOURNALISTEN, zhur'nâ-lĭs'ten, DIE (Ger., The Journalists). A comedy by Gustav Freytag (1853), which deals with the influence of the press on German political and social life.

JOUR'NEYMAN (from *journey*, day's work, from *journee*, Fr. *journée*, from ML. *diurnata*, day's work, day's journey, from Lat. *diurnus*, daily, from *dies*, day + *man*). A term originally applied to laborers working by the day, but in the late Middle Ages applied to the laborers in the guilds who had completed their apprenticeship, but who had not attained the position of master. In contrast with the modern workman, the journeyman in the most flourishing period of the guilds was not a wage earner for life, but could look forward to the independent position of master. As industry became more complex and required a greater outlay for the necessary tools and materials, the possibility of attaining mastership practically ended, and journeymen became a permanent class of skilled wage earners. See GUILD.

JOUSTS, jŭsts (OF. *joste*, *jouste*, It. *giostra*, from OF. *juster*, *joster*, *jouster*, It. *giostrare*, to joust, from ML. *juxtare*, to approach, tilt, from Lat. *juxta*, near). Contests on horseback, engaged in as trials of strength in the Middle Ages by knights and nobles. In the jousts the combatants engaged one another singly, each against his antagonist, and not in a troop, as in the tournament (q.v.). The lance was the weapon chiefly used.

JOUTEL, zhōō′tĕl′, HENRI (c.1650–?). A French explorer, born in Rouen, the son of a gardener in the employ of Henri Cavelier, an uncle of La Salle (q.v.). He joined La Salle's expedition, which left France in 1684 to found a colony at the mouth of the Mississippi. When La Salle started through the wilderness for Canada, where he hoped to secure aid, he left Joutel in command of the post, St. Louis, which he had established on what proved to be an estuary on the coast of Texas. Joutel's administration was disturbed by plots and intrigues, the colonists being thoroughly disheartened. After La Salle's return the discontent increased, and finally in 1687 La Salle made a second and more determined attempt to reach Canada. Accompanied by his brother Jean, his two nephews Moranget and Cavelier, Joutel, and about 15 others, he again started from the little colony; but scarcely two months later, while encamped on a branch of the Trinity River in Texas, La Salle, Moranget, and two others were assassinated by four or five malcontents. Joutel and those of his companions who were loyal to La Salle were forced to conceal their horror at this deed, fearing a like fate for themselves; and the whole party pushed on to the Cenis villages, which had been the farthest point reached by La Salle in his first attempt. Here they remained for some time, the murderers not caring to enter Canada, where justice awaited them, and being equally unwilling to allow the others, who might become witnesses against them, to proceed on their journey. At last, however, the assassins quarreled among themselves, and this afforded the others a chance to escape. After more than two months of travel through the wilderness, Joutel and his companions finally reached the Mississippi, which they ascended to the Illinois, where they spent the winter at Fort St. Louis. The next spring they pushed on to Canada and took ship to France. Joutel wrote a *Journal historique du dernier voyage que feu M. de la Salle fit dans le Golfe de Mexique,* trans. by H. R. Stiles (Albany, 1906), which is probably the most trustworthy account of the expedition.

JOUVENET, zhōō′v'-nā′, JEAN (1644–1717). A French painter, born at Rouen. He was the most celebrated of a family of painter sculptors and was the son and pupil of Laurent Jouvenet, called The Younger (1609–81). He afterward studied at the Royal Academy in Paris and worked with Charles Lebrun, whom he assisted with the decorations of Versailles from 1661 to 1680. He soon became well known and was successively member (1675), professor (1687), and perpetual rector of the Royal Academy of Painting and Sculpture (1707). The death of Lebrun placed him at the head of the French school. There are examples of his work in many French museums. Among his mural paintings are those on the ceiling of the Hall of Mars at Versailles, and the "Apotheosis of the Apostles," a fresco at the Invalides. His four paintings at the Louvre—"Jesus and the Pharisee," "The Merchants Driven from the Temple," "The Resurrection of Lazarus," "The Miraculous Draft of Fish"—were reproduced in tapestries by order of Louis XIV and later presented to the Czar Peter the Great on the occasion of his visit to France. His paintings are in the style of Louis XIV, with rather more of the Italian influence showing than in Lebrun.

JOUY, zhōō′ē′, VICTOR JOSEPH ETIENNE DE (1764–1846). A French author, born at Jouy, near Versailles. In early life he served in the army and afterward took an active part in the troubles of the Revolution. In 1815 he was made a member of the Academy and in 1830 librarian of the Louvre. After 1797 he devoted himself to literature. His works include the opera texts, *La vestale* (1807), music by Spontini, *Les abencérages* (1813), music by Cherubini, and *Guillaume Tell* (1829), music by Rossini; two tragedies, *Tippo Saïb* (1812) and *Sylla* (1822); and his most important writings, several series of sketches, which first appeared in the *Gazette de France.* These were collected under the following titles: *L'Hermite de la Chaussée d'Antin* (1812–14), *Le franc-parleur* (1814), *L'Hermite de la Guyane* (1816), *L'Hermite en province* (1818–27), and, with Antoine Jouy, *Les hermites en prison* (1823) and *Les hermites en liberté* (1824). He was also the editor of several journals. He published an edition of his own *Œuvres complètes* in the years 1823–28.